

Hazus: Earthquake Global Risk Report

Region Name: SouthCarolina

Earthquake Scenario: Aiken6.0

Print Date: July 22, 2025

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

Section	Page #
General Description of the Region	3
Building and Lifeline Inventory	4
Building Inventory	
Critical Facility Inventory	
Transportation and Utility Lifeline Inventory	
Earthquake Scenario Parameters	7
Direct Earthquake Damage	8
Buildings Damage	
Essential Facilities Damage	
Transportation and Utility Lifeline Damage	
Induced Earthquake Damage	14
Fire Following Earthquake	
Debris Generation	
Social Impact	15
Shelter Requirements	
Casualties	
Economic Loss	17
Building Related Losses	
Transportation and Utility Lifeline Losses	
Appendix A: County Listing for the Region	
Appendix B: Regional Population and Building Value Data	

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 46 county(ies) from the following state(s):

South Carolina

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 30,888.67 square miles and contains 1,317 census tracts. There are over 2,048 thousand households in the region which has a total population of 5,118,425 people. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 2,191 thousand buildings in the region with a total building replacement value (excluding contents) of 1,013,323 (millions of dollars). Approximately 90.00 % of the buildings (and 68.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 127,068 and 110,369 (millions of dollars), respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2,191 thousand buildings in the region which have an aggregate total replacement value of 1,013,323 (millions of dollars). Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 69% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 121 hospitals in the region with a total bed capacity of 15,229 beds. There are 1,695 schools, 1,134 fire stations, 327 police stations and 51 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 237,437.00 (millions of dollars). This inventory includes over 8,151.77 miles of highways, 9,392 bridges, 28,893.13 miles of pipes.

Table 1: Transportation System Lifeline Inventory

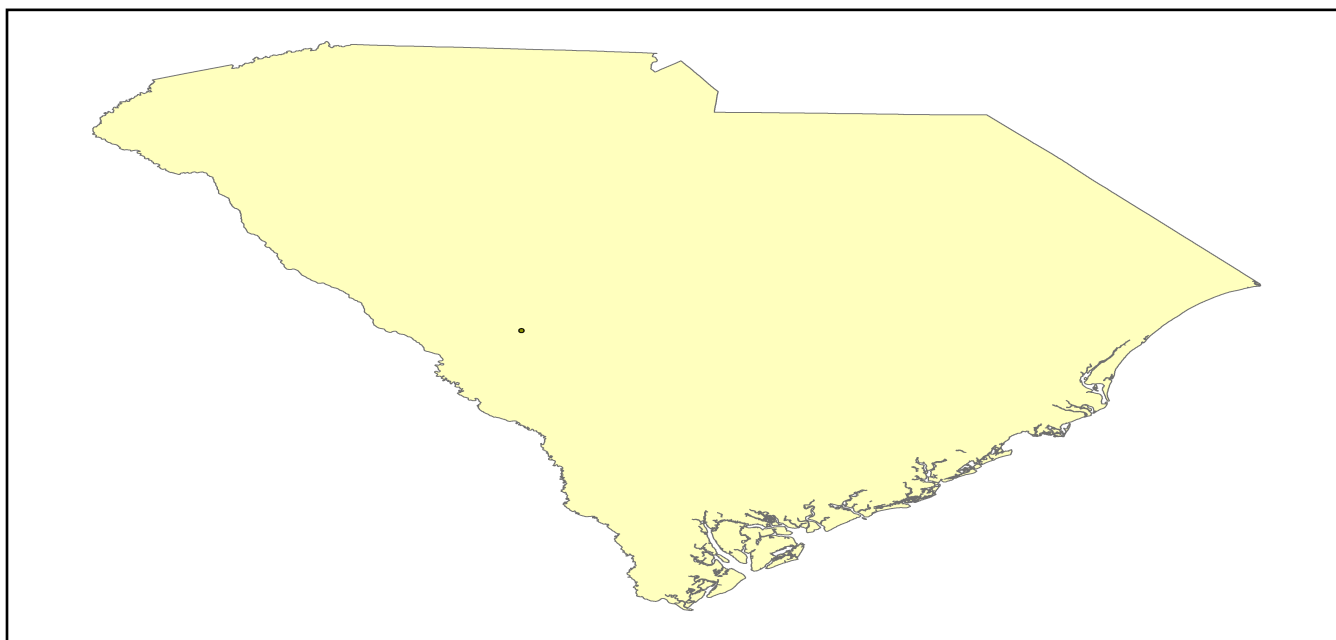
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	9,392	28005.3164
	Segments	3,093	61050.5655
	Tunnels	4	3.7133
	Subtotal		89059.5952
Railways	Bridges	1,089	4611.9150
	Facilities	40	106.5200
	Segments	1,472	31281.5257
	Tunnels	0	0.0000
	Subtotal		35999.9607
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
	Subtotal		0.0000
Bus	Facilities	34	56.8759
	Subtotal		56.8759
Ferry	Facilities	14	18.6340
	Subtotal		18.6340
Port	Facilities	164	465.2862
	Subtotal		465.2862
Airport	Facilities	73	895.7930
	Runways	88	571.9112
	Subtotal		1467.7042
Total			127,068.10

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3043.9751
	Facilities	1,798	6503.3306
	Pipelines	69,676	7864.0505
	Subtotal		17411.3562
Waste Water	Distribution Lines	NA	1826.3851
	Facilities	188	24060.5596
	Pipelines	70,839	8009.9171
	Subtotal		33896.8618
Natural Gas	Distribution Lines	NA	1217.5900
	Facilities	6	366.7110
	Pipelines	328	8023.0647
	Subtotal		9607.3657
Oil Systems	Facilities	35	62.5660
	Pipelines	22	231.6181
	Subtotal		294.1841
Electrical Power	Facilities	105	48981.1224
	Subtotal		48981.1224
Communication	Facilities	202	178.8830
	Subtotal		178.8830
		Total	110,369.80

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	Aiken6.0
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-81.59
Latitude of Epicenter	33.60
Earthquake Magnitude	6.00
Depth (km)	5.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 45,370 buildings will be at least moderately damaged. This is over 2.00 % of the buildings in the region. There are an estimated 3,043 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

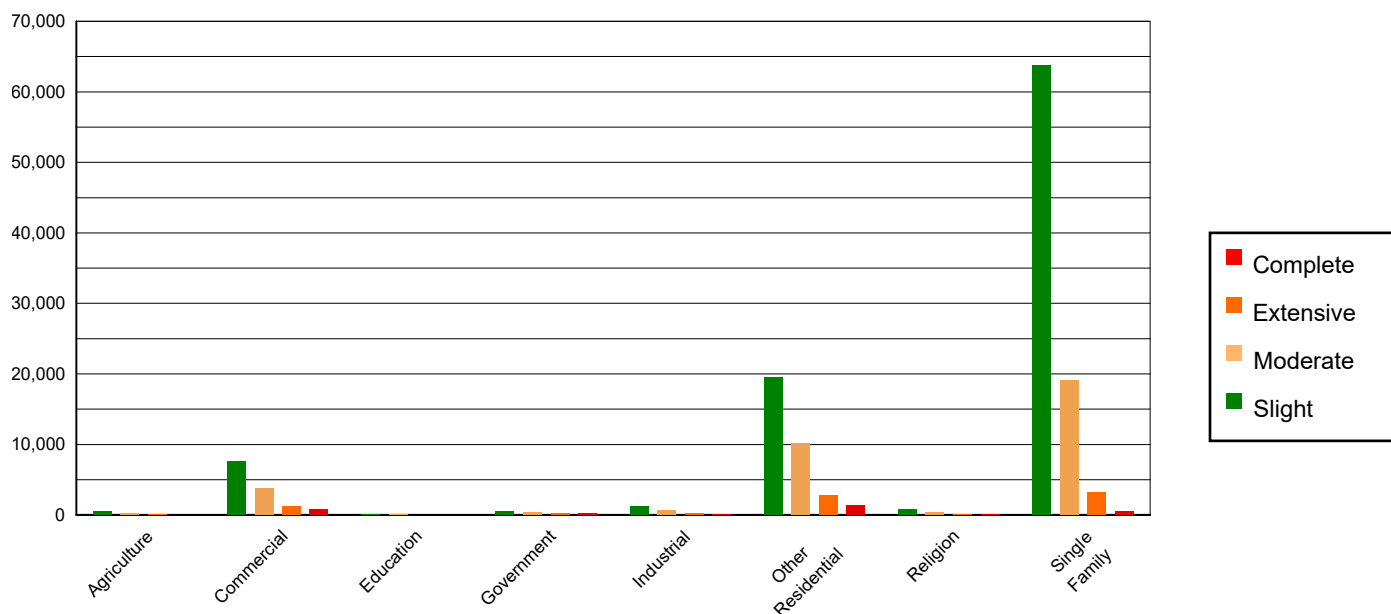


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	11772.80	0.57	567.15	0.60	207.90	0.60	38.84	0.50	12.30	0.40
Commercial	136978.29	6.67	7537.38	8.02	3757.84	10.86	1219.84	15.78	757.65	24.89
Education	2398.22	0.12	126.74	0.13	65.16	0.19	22.36	0.29	15.52	0.51
Government	7429.19	0.36	536.81	0.57	374.99	1.08	207.81	2.69	189.20	6.22
Industrial	23618.21	1.15	1189.10	1.27	605.79	1.75	192.18	2.49	128.72	4.23
Other Residential	369008.68	17.98	19450.13	20.71	10105.17	29.21	2809.30	36.34	1329.71	43.69
Religion	12734.57	0.62	813.26	0.87	373.60	1.08	104.34	1.35	52.24	1.72
Single Family	1488204.16	72.52	63705.31	67.83	19105.30	55.22	3136.83	40.57	558.39	18.35
Total	2,052,144		93,926		34,596		7,732		3,044	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1438820.51	70.11	57377.37	61.09	14840.42	42.90	2211.35	28.60	333.64	10.96
Steel	122710.26	5.98	4793.05	5.10	3122.49	9.03	1427.81	18.47	1098.88	36.10
Concrete	84146.52	4.10	798.68	0.85	363.19	1.05	91.25	1.18	63.44	2.08
Precast	7344.39	0.36	249.29	0.27	178.97	0.52	56.39	0.73	24.69	0.81
RM	3981.50	0.19	71.34	0.08	27.08	0.08	2.58	0.03	0.19	0.01
URM	216431.86	10.55	17839.85	18.99	8760.06	25.32	2153.87	27.86	837.89	27.53
MH	178709.08	8.71	12796.30	13.62	7303.52	21.11	1788.25	23.13	685.00	22.51
Total	2,052,144		93,926		34,596		7,732		3,044	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 15,229 hospital beds available for use. On the day of the earthquake, the model estimates that only 13,998 hospital beds (92.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 97.00% of the beds will be back in service. By 30 days, 99.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	121	1	0	120
Schools	1,695	25	9	1,662
EOCs	51	1	1	50
PoliceStations	327	4	2	320
FireStations	1,134	12	4	1,115

Transportation Lifeline Damage

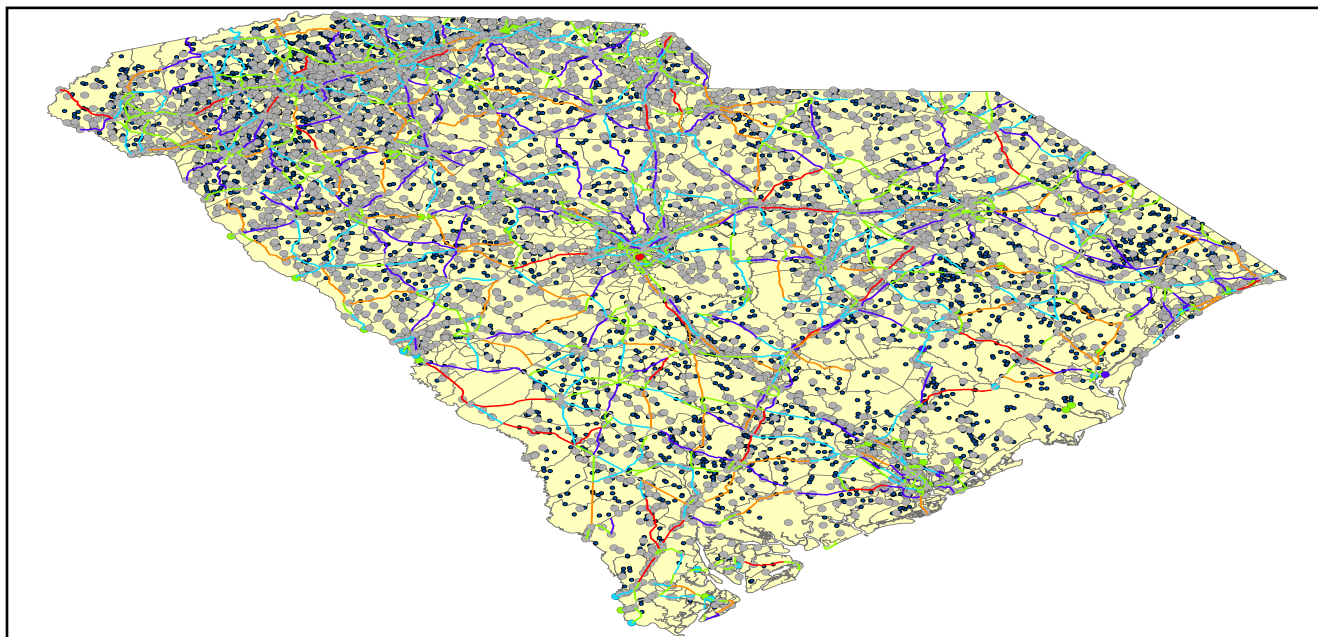


Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	3,093	0	0	3,093	3,093
	Bridges	9,392	64	16	9,329	9,358
	Tunnels	4	0	0	4	4
Railways	Segments	1,472	0	0	1,472	1,472
	Bridges	1,089	0	0	1,089	1,089
	Tunnels	0	0	0	0	0
	Facilities	40	0	0	40	40
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	34	2	0	33	34
Ferry	Facilities	14	0	0	14	14
Port	Facilities	164	0	0	164	164
Airport	Facilities	73	1	0	72	73
	Runways	88	0	0	88	88

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	1,798	19	0	1,742	1,794
Waste Water	188	1	0	182	188
Natural Gas	6	1	0	5	6
Oil Systems	35	0	0	35	35
Electrical Power	105	5	0	103	105
Communication	202	3	0	199	202

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	16,176	305	76
Waste Water	10,851	416	104
Natural Gas	1,663	47	12
Oil	203	3	1

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	2,048,912	0	0	0	0	0
Electric Power		35,592	28,090	16,972	3,243	43

Induced Earthquake Damage

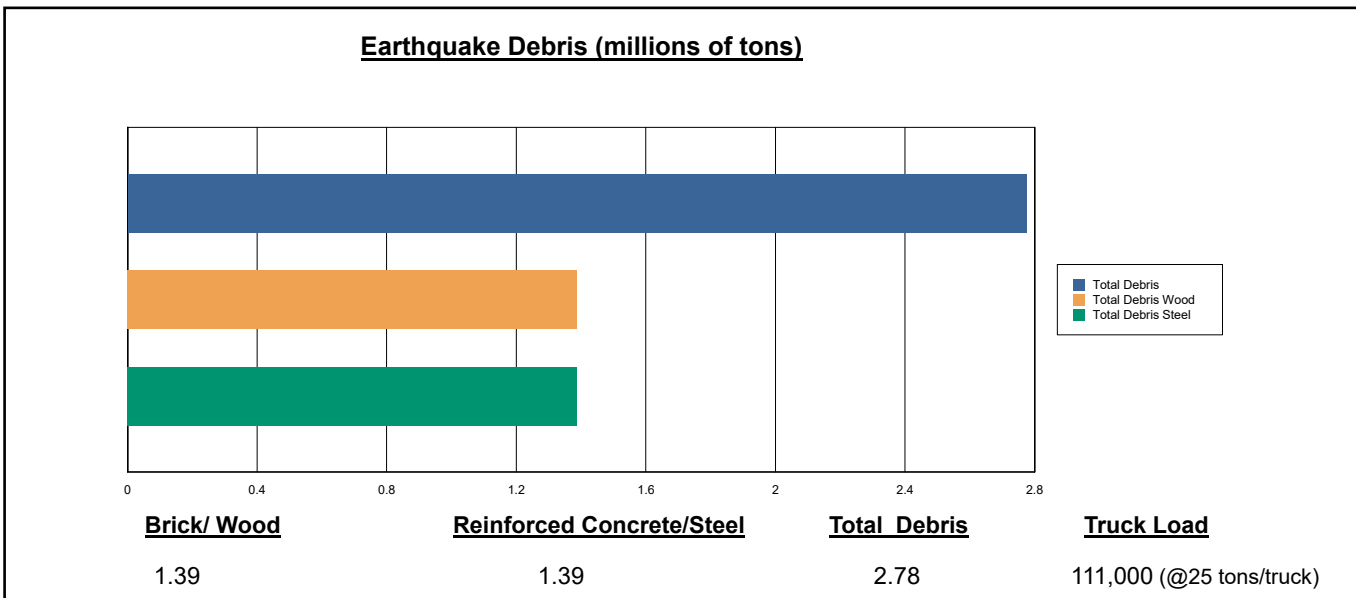
Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,775,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 50.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 111,000 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

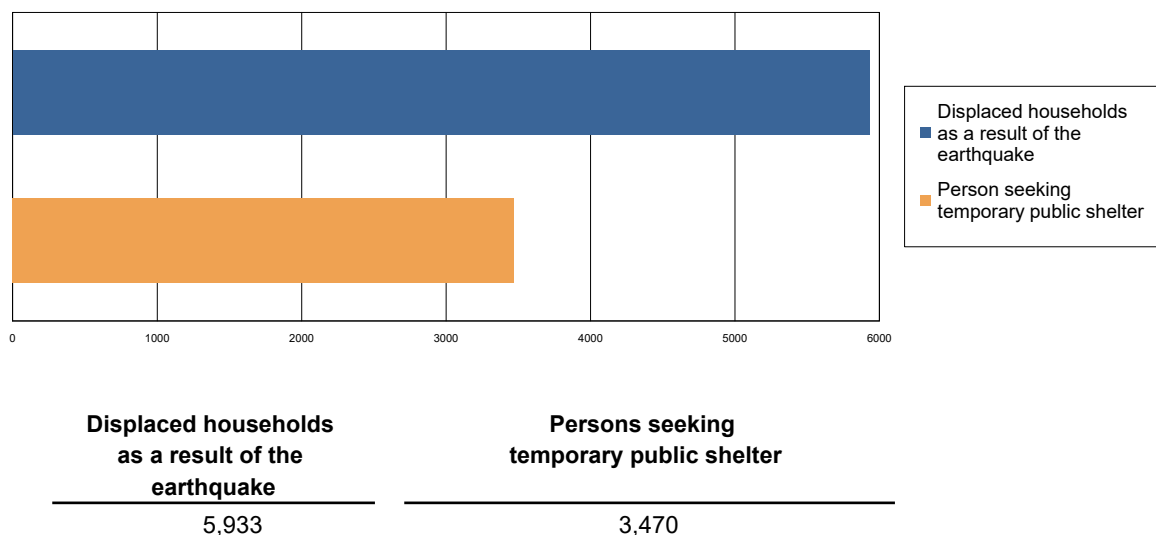


Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 5,933 households to be displaced due to the earthquake. Of these, 3,470 people (out of a total population of 5,118,425) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	29.40	7.72	1.13	2.22
	Commuting	0.16	0.19	0.34	0.06
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.62	0.15	0.02	0.04
	Industrial	39.03	11.17	1.70	3.34
	Other-Residential	481.88	109.26	13.00	25.14
	Single Family	397.41	60.60	5.91	11.35
	Total	949	189	22	42
2 PM	Commercial	1867.10	486.53	71.26	138.89
	Commuting	1.40	1.69	3.07	0.58
	Educational	1082.33	292.70	44.94	86.80
	Hotels	0.12	0.03	0.00	0.01
	Industrial	289.01	82.87	12.71	24.68
	Other-Residential	160.70	36.48	4.52	8.32
	Single Family	134.38	21.36	2.23	4.05
	Total	3,535	922	139	263
5 PM	Commercial	1199.28	311.01	45.69	87.99
	Commuting	26.16	31.42	57.25	10.87
	Educational	290.15	78.69	12.14	23.29
	Hotels	0.19	0.04	0.01	0.01
	Industrial	180.63	51.79	7.94	15.42
	Other-Residential	183.49	41.75	5.17	9.51
	Single Family	156.31	24.73	2.58	4.68
	Total	2,036	539	131	152

Economic Loss

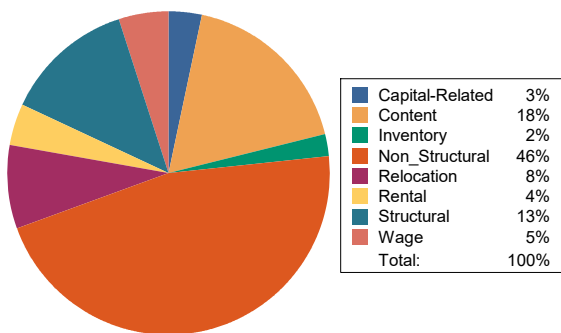
The total economic loss estimated for the earthquake is 12,068.30 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 11,041.37 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 40 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type (\$ millions)



Earthquake Losses by Occupancy Type (\$ millions)

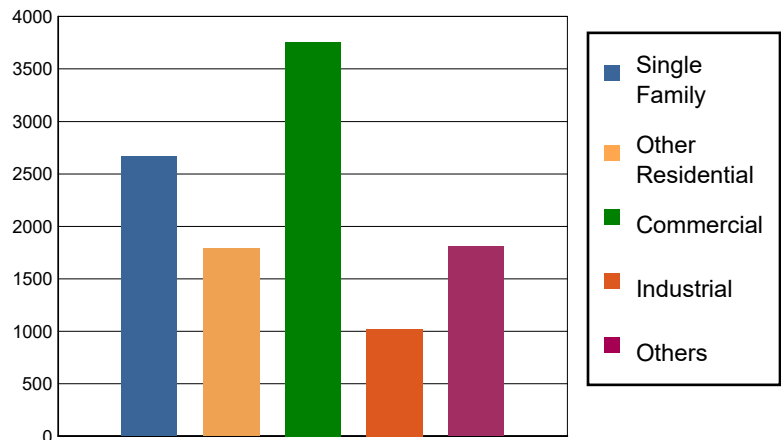


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	69.2225	365.1212	17.1057	93.6096	545.0590
	Capital-Related	0.0000	29.4527	317.3383	10.5372	15.7965	373.1247
	Rental	60.3820	134.5413	195.7572	9.9999	47.8655	448.5459
	Relocation	215.7053	103.0025	297.6008	40.3419	258.0111	914.6616
	Subtotal	276.0873	336.2190	1175.8175	77.9847	415.2827	2281.3912
Capital Stock Losses							
	Structural	386.3341	225.9989	482.0223	132.1984	235.7043	1,462.2580
	Non_Structural	1524.8654	1015.8824	1302.7142	451.9623	791.5960	5,087.0203
	Content	476.1010	212.4889	623.3694	297.4206	355.3922	1,964.7721
	Inventory	0.0000	0.0000	173.1128	60.5695	12.2501	245.9324
	Subtotal	2387.3005	1454.3702	2581.2187	942.1508	1394.9426	8759.9828
Total		2663.39	1790.59	3757.04	1020.14	1810.23	11041.37

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	61050.5655	0.0000	0.00
	Bridges	28005.3164	87.7480	0.31
	Tunnels	3.7133	0.0000	0.00
	Subtotal	89059.5952	87.7480	
Railways	Segments	31281.5257	0.0000	0.00
	Bridges	4611.9150	2.3128	0.05
	Tunnels	0.0000	0.0000	0.00
	Facilities	106.5200	1.2100	1.14
	Subtotal	35999.9607	3.5228	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Bus	Facilities	56.8759	2.3254	4.09
	Subtotal	56.8759	2.3254	
Ferry	Facilities	18.6340	0.0699	0.38
	Subtotal	18.6340	0.0699	
Port	Facilities	465.2862	1.8121	0.39
	Subtotal	465.2862	1.8121	
Airport	Facilities	895.7930	15.8903	1.77
	Runways	571.9112	0.0000	0.00
	Subtotal	1467.7042	15.8903	
	Total	127,068.06	111.37	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	7864.0505	0.7161	0.01
	Facilities	6503.3306	97.8174	1.50
	Distribution Lines	3043.9751	17.2459	0.57
	Subtotal	17411.3562	115.7794	
Waste Water	Pipelines	8009.9171	1.2470	0.02
	Facilities	24060.5596	159.0781	0.66
	Distribution Lines	1826.3851	8.6631	0.47
	Subtotal	33896.8618	168.9882	
Natural Gas	Pipelines	8023.0647	0.0000	0.00
	Facilities	366.7110	5.6058	1.53
	Distribution Lines	1217.5900	2.9679	0.24
	Subtotal	9607.3657	8.5737	
Oil Systems	Pipelines	231.6181	0.0174	0.01
	Facilities	62.5660	1.7366	2.78
	Subtotal	294.1841	1.7540	
Electrical Power	Facilities	48981.1224	615.8050	1.26
	Subtotal	48981.1224	615.8050	
Communication	Facilities	178.8830	4.6488	2.60
	Subtotal	178.8830	4.6488	
	Total	110,369.77	915.55	

Appendix A: County Listing for the Region

Abbeville,SC

Aiken,SC

Allendale,SC

Anderson,SC

Bamberg,SC

Barnwell,SC

Beaufort,SC

Berkeley,SC

Calhoun,SC

Charleston,SC

Cherokee,SC

Chester,SC

Chesterfield,SC

Clarendon,SC

Colleton,SC

Darlington,SC

Dillon,SC

Dorchester,SC

Edgefield,SC

Fairfield,SC

Florence,SC

Georgetown,SC

Greenville,SC

Greenwood,SC

Hampton,SC

Horry,SC

Jasper,SC

Kershaw,SC

Lancaster,SC

Laurens,SC

Lee,SC

Lexington,SC

McCormick,SC

Marion,SC

Marlboro,SC

Newberry,SC

Oconee,SC

Orangeburg,SC

Pickens,SC

Richland,SC

Saluda,SC

Spartanburg,SC

Sumter,SC

Union,SC

Williamsburg,SC

York,SC

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
South Carolina	Abbeville	24,295	2,412	1,822	4,235
	Aiken	168,808	25,500	12,602	38,102
	Allendale	8,039	1,392	875	2,268
	Anderson	203,718	23,312	12,358	35,670
	Bamberg	13,311	1,773	942	2,715
	Barnwell	20,589	2,315	1,606	3,922
	Beaufort	187,117	33,287	7,849	41,137
	Berkeley	229,861	27,758	8,987	36,745
	Calhoun	14,119	1,773	1,176	2,950
	Charleston	408,235	59,437	26,557	85,994
	Cherokee	56,216	8,461	4,414	12,875
	Chester	32,294	2,898	2,464	5,362
	Chesterfield	43,273	7,742	4,205	11,948
	Clarendon	31,144	3,920	1,682	5,602
	Colleton	38,604	4,878	2,971	7,850
	Darlington	62,905	6,651	3,818	10,469
	Dillon	28,292	9,473	2,156	11,629
	Dorchester	161,540	19,551	7,158	26,710
	Edgefield	25,657	3,025	899	3,924
	Fairfield	20,948	2,546	1,393	3,940
	Florence	137,059	15,168	10,933	26,102
	Georgetown	63,404	10,008	4,082	14,091
	Greenville	525,534	70,204	36,305	106,510
	Greenwood	69,351	8,277	6,663	14,940
	Hampton	18,561	2,528	1,513	4,042
	Horry	351,029	45,159	19,390	64,549
	Jasper	28,791	2,689	1,808	4,497
	Kershaw	65,403	7,884	4,971	12,855
	Lancaster	96,016	12,575	4,323	16,899
	Laurens	67,539	7,779	5,340	13,120
	Lee	16,531	1,601	904	2,506
	Lexington	293,991	40,163	16,316	56,480
	McCormick	9,526	939	293	1,233
	Marion	29,183	3,678	2,349	6,028
	Marlboro	26,667	2,578	1,225	3,804
	Newberry	37,719	5,472	4,123	9,596
	Oconee	78,607	12,123	5,215	17,338
	Orangeburg	84,223	9,274	8,011	17,286
	Pickens	131,404	17,257	7,391	24,648

	Richland	416,147	58,114	23,569	81,683
	Saluda	18,862	2,980	487	3,467
	Spartanburg	327,997	35,433	26,945	62,379
	Sumter	105,556	14,774	7,336	22,111
	Union	27,244	3,862	2,876	6,739
	Williamsburg	31,026	3,880	2,425	6,305
	York	282,090	44,578	15,467	60,046
Total Region		5,118,425	687,081	326,194	1,013,301