Appendix G: Hazus Reports

Hazus: Flood Global Risk Report

Region Name: ShelbyCo

Flood Scenario: Shelby Co 100 yr 3 sq mi

Print Date: Thursday, December 15, 2022

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 Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). 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 flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Ohio

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

The geographical size of the region is approximately 22 square miles and contains 1,481 census blocks. The region contains over 19 thousand households and has a total population of 48,215 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 24,941 buildings in the region with a total building replacement value (excluding contents) of 14,105 million dollars. Approximately 70.86% of the buildings (and 39.86% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 24,941 buildings in the region which have an aggregate total replacement value of 14,105 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	5,621,795	39.9%
Commercial	2,833,238	20.1%
Industrial	1,978,347	14.0%
Agricultural	2,834,713	20.1%
Religion	285,451	2.0%
Government	172,407	1.2%
Education	379,464	2.7%
Total	**14,105,415**	**100%**

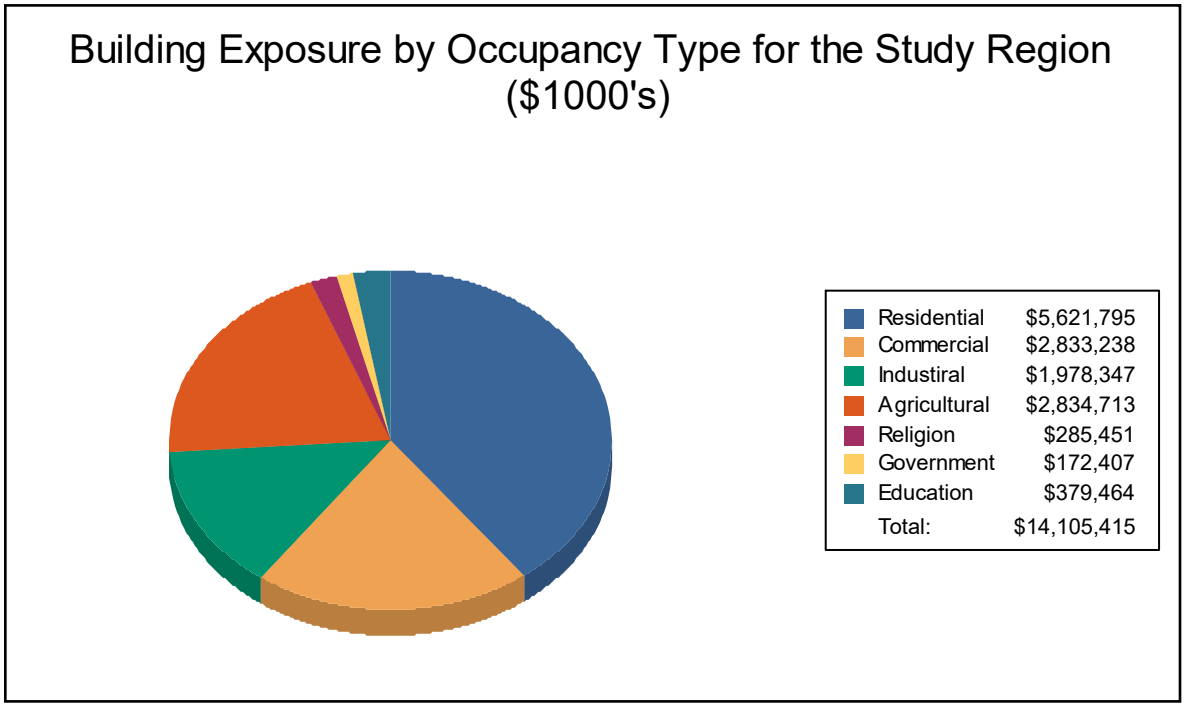
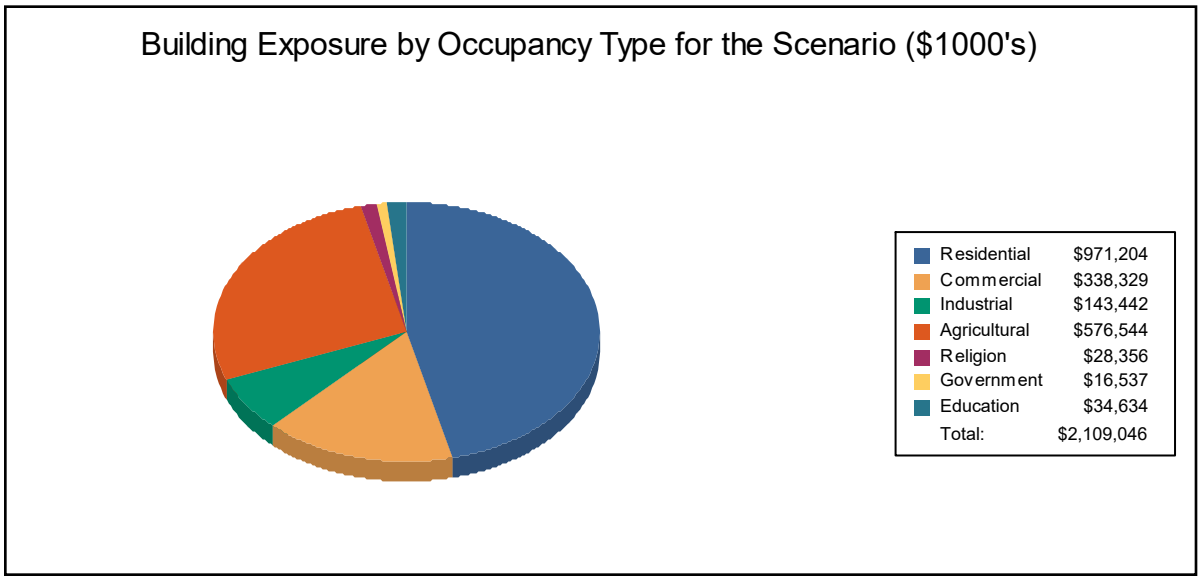


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	971,204	46.0%
Commercial	338,329	16.0%
Industrial	143,442	6.8%
Agricultural	576,544	27.3%
Religion	28,356	1.3%
Government	16,537	0.8%
Education	34,634	1.6%
Total	**2,109,046**	**100%**



Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 90 beds.
There are 23 schools, 13 fire stations, 8 police stations and 1 emergency operation center.

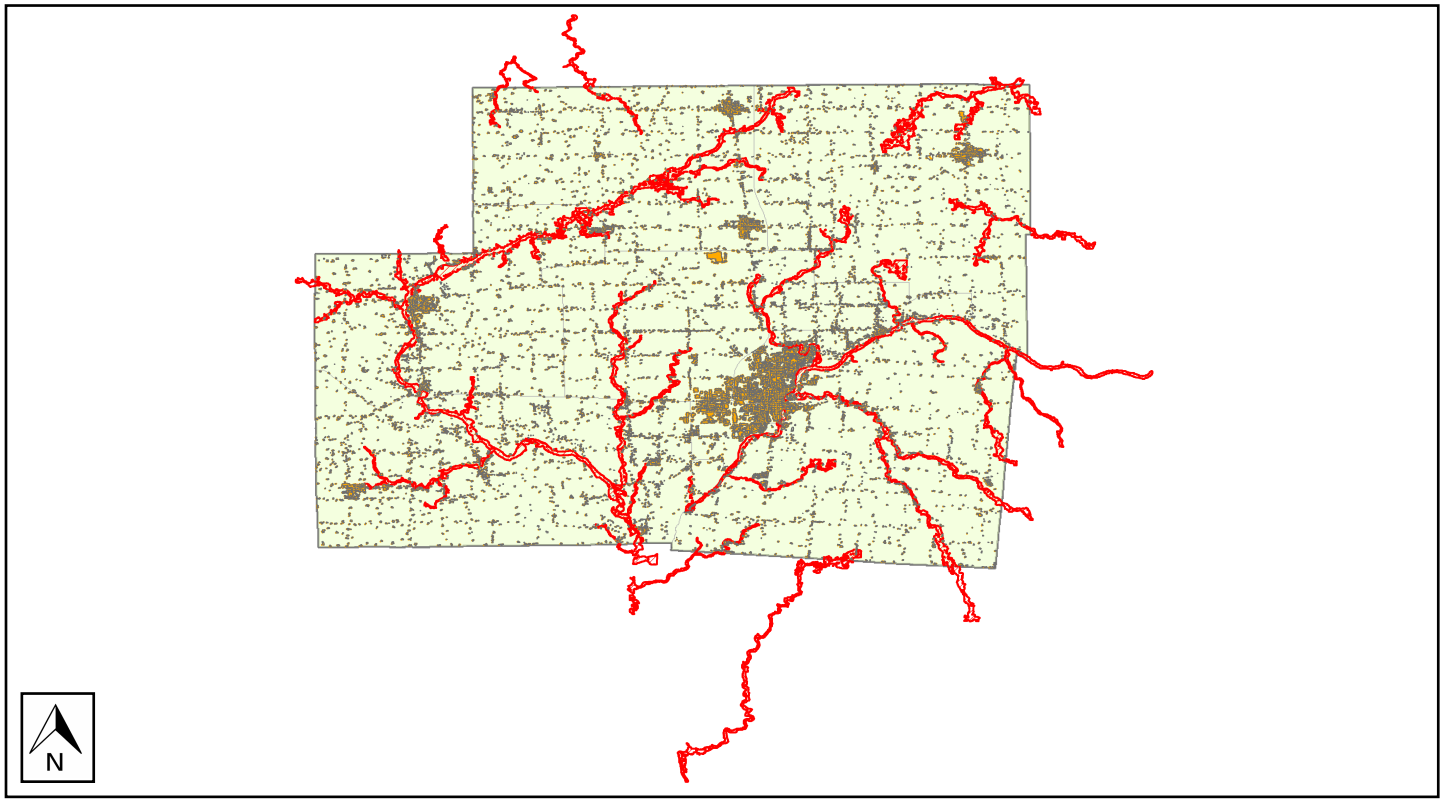
Flood Scenario Parameters

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

Study Region Name:	ShelbyCo
Scenario Name:	Shelby Co 100 yr 3 sq mi
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 60 buildings will be at least moderately damaged. This is over 77% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

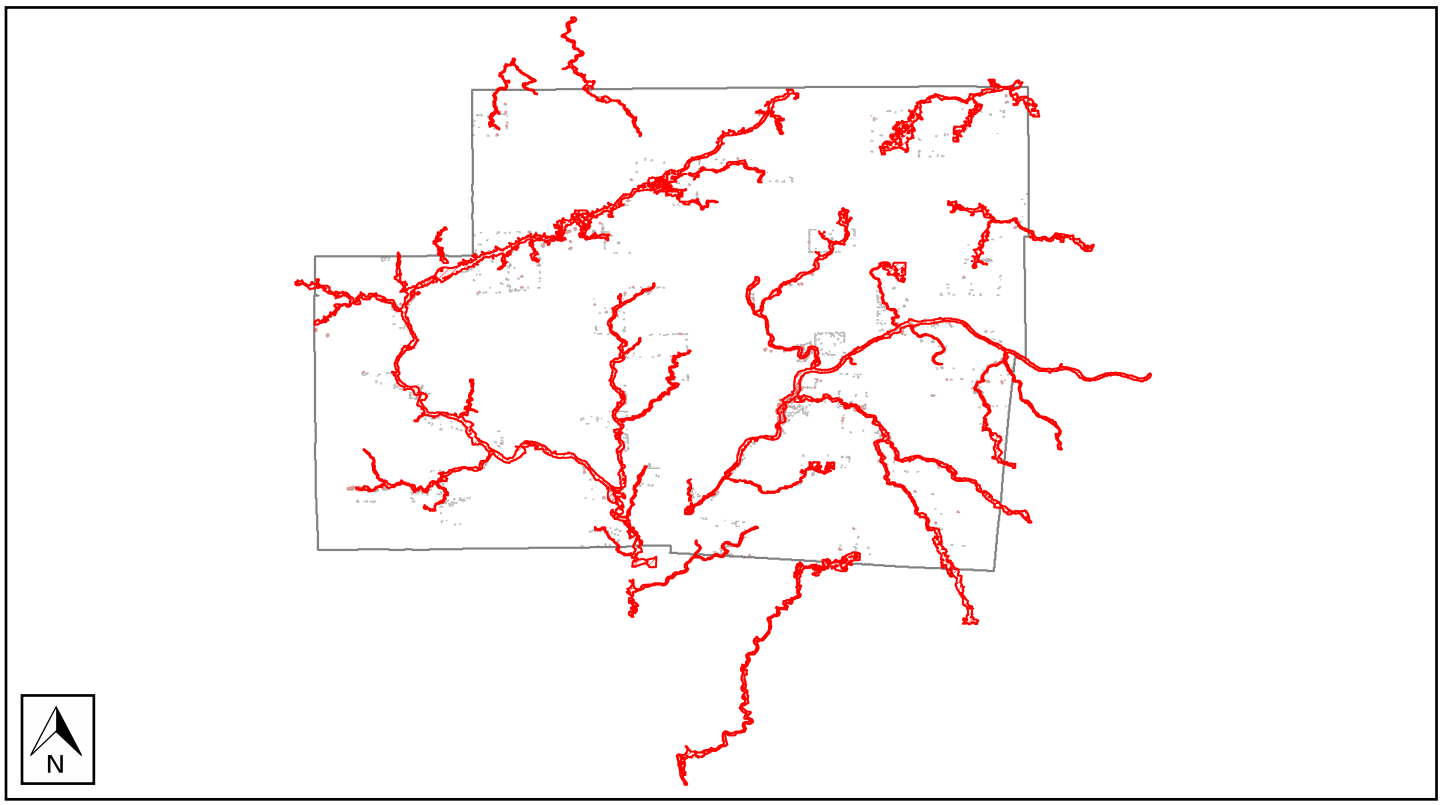


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	2	40	3	60	0	0	0	0	0	0	0	0
Commercial	3	38	5	63	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	1	100	0	0	0	0	0	0	0	0
Residential	26	34	38	49	10	13	3	4	0	0	0	0
Total	**31**		**47**		**10**		**3**		**0**		**0**	

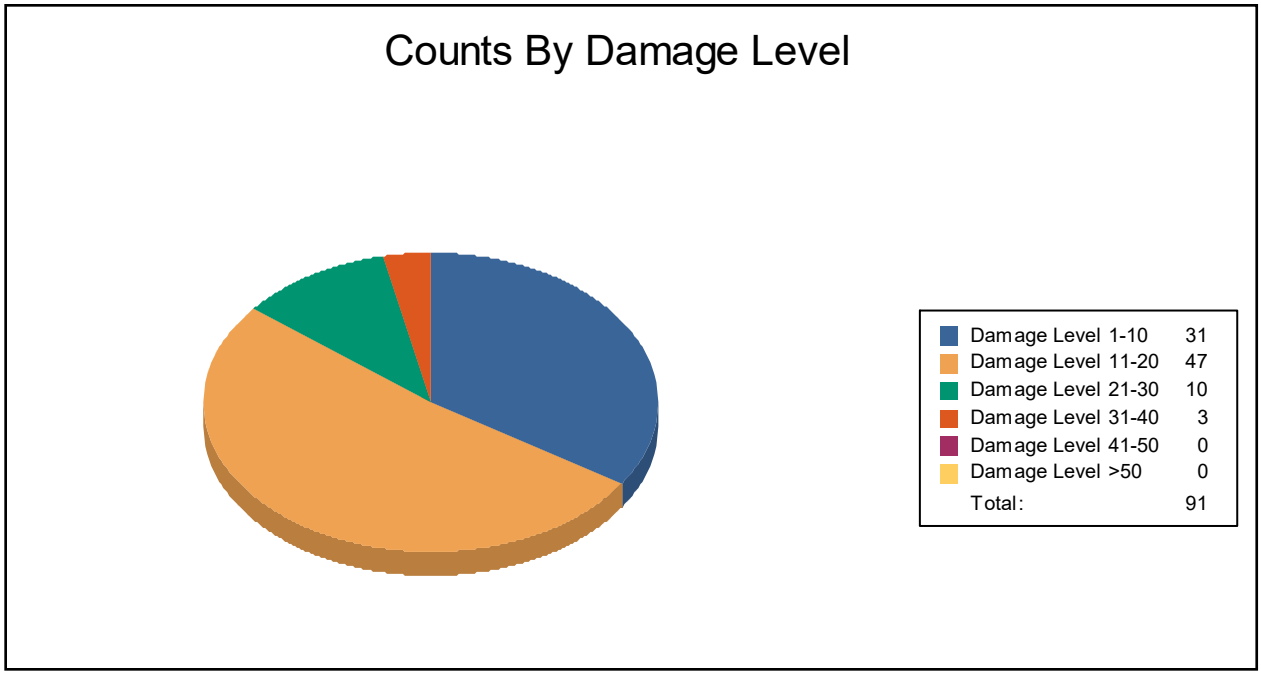


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	5	31	10	63	1	6	0	0	0	0	0	0
Steel	1	50	1	50	0	0	0	0	0	0	0	0
Wood	23	33	34	49	9	13	3	4	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 90 hospital beds available for use. On the day of the scenario flood event, the model estimates that 90 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	1	0	0	0
Fire Stations	13	0	0	0
Hospitals	1	0	0	0
Police Stations	8	0	0	0
Schools	23	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

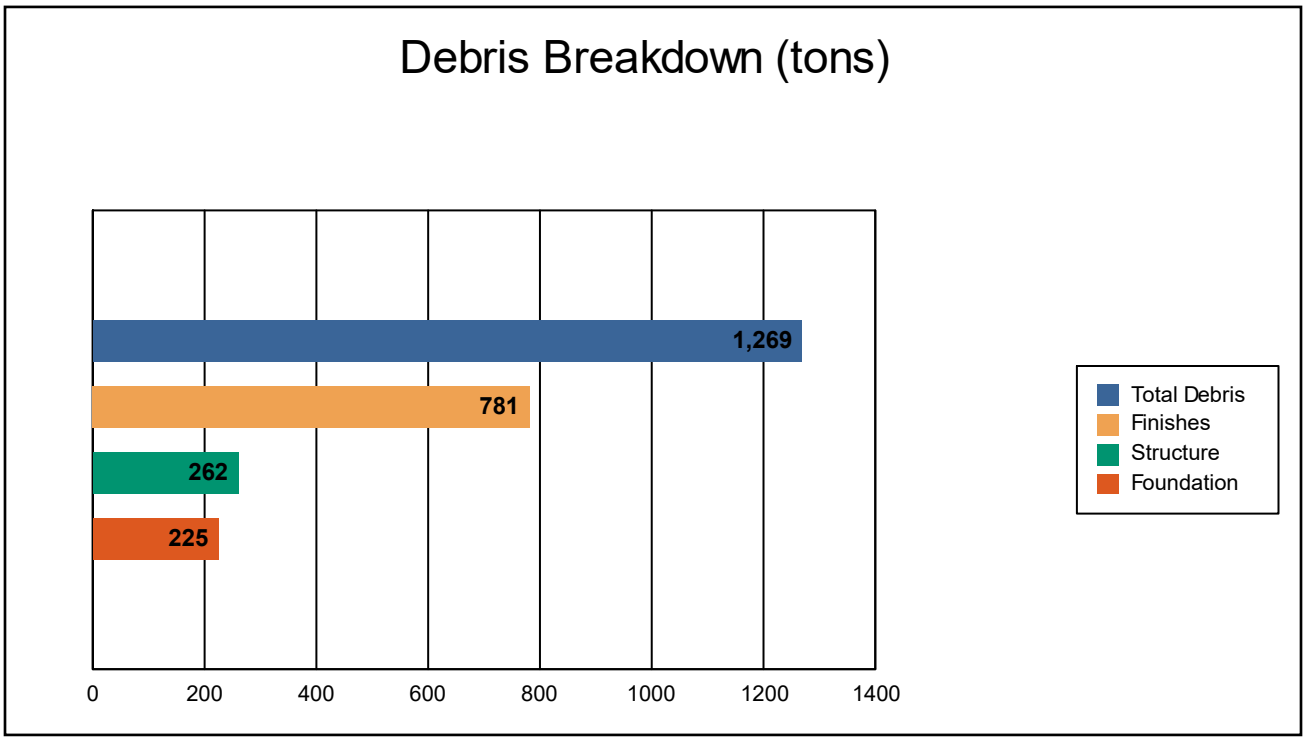
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

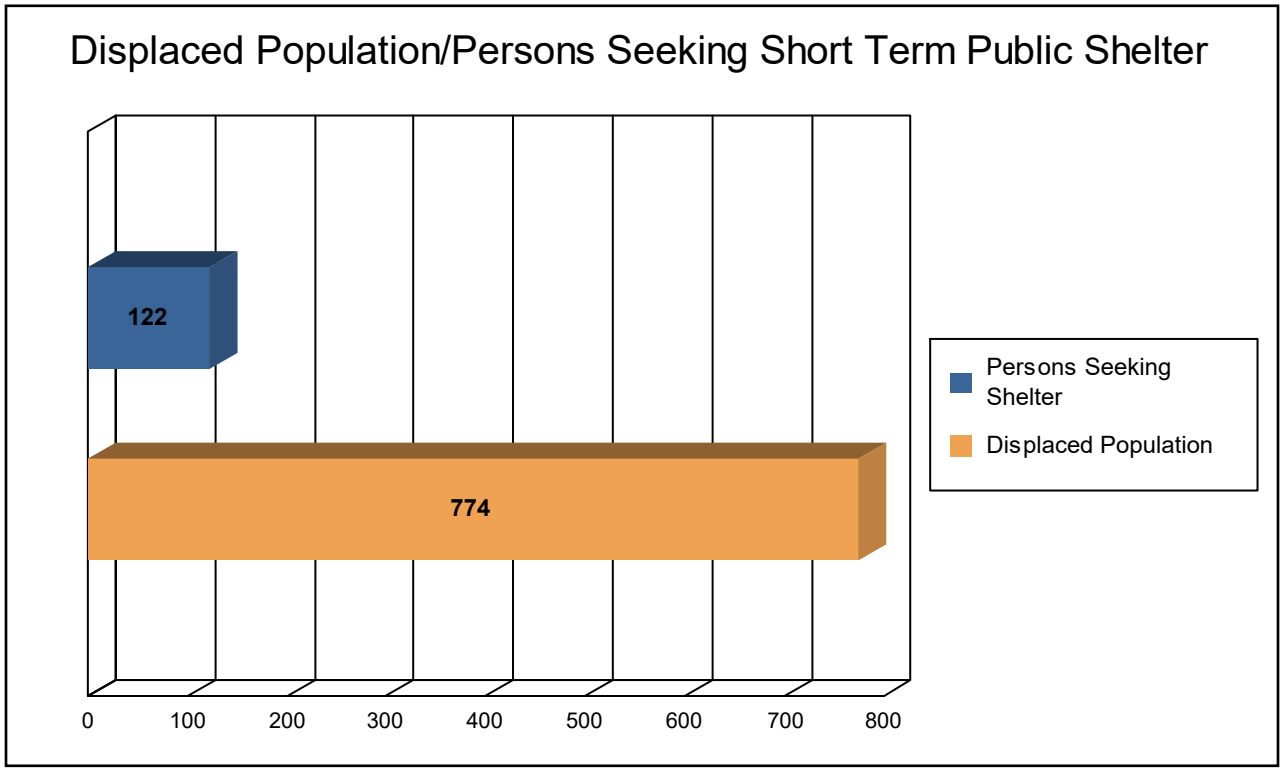


The model estimates that a total of 1,269 tons of debris will be generated. Of the total amount, Finishes comprises 62% of the total, Structure comprises 21% of the total, and Foundation comprises 18%. If the debris tonnage is converted into an estimated number of truckloads, it will require 51 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 258 households (or 774 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 122 people (out of a total population of 48,215) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 156.05 million dollars, which represents 7.40 % of the total replacement value of the scenario buildings.

Building-Related Losses

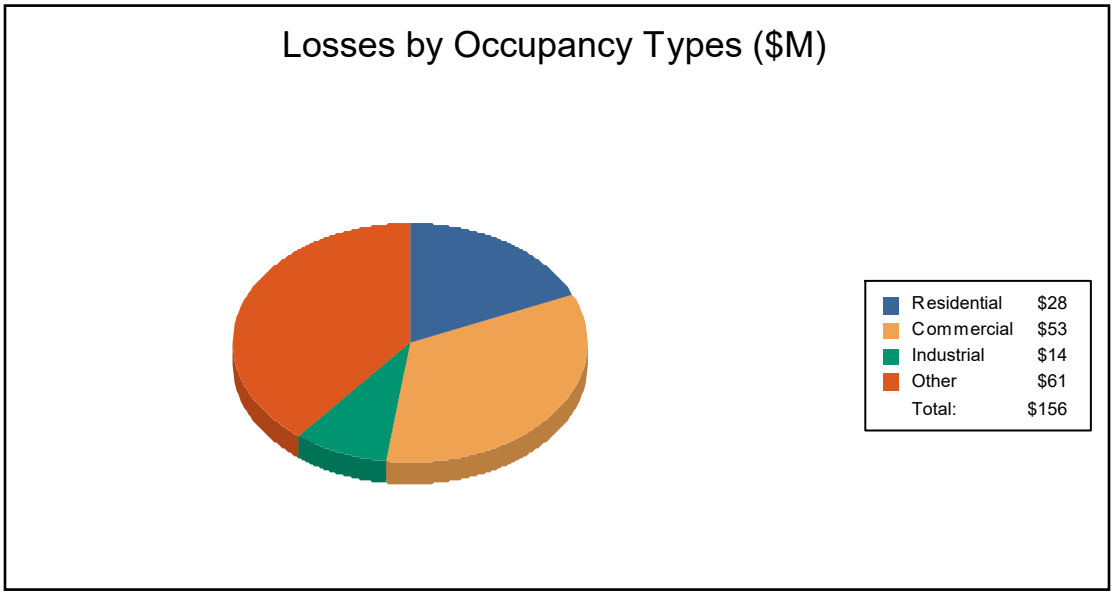
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability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

The total building-related losses were 85.92 million dollars. 45% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 18.25% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	14.76	4.99	3.43	4.33	27.51
	Content	6.53	13.93	7.92	17.29	45.67
	Inventory	0.00	1.93	1.04	9.78	12.74
	Subtotal	**21.29**	**20.85**	**12.38**	**31.40**	**85.92**
Business Interruption						
	Income	0.01	12.65	0.40	6.93	19.99
	Relocation	5.17	3.46	0.33	3.30	12.25
	Rental Income	1.99	2.61	0.06	0.17	4.82
	Wage	0.02	13.36	0.34	19.34	33.06
	Subtotal	**7.18**	**32.07**	**1.13**	**29.74**	**70.12**
ALL	**Total**	**28.47**	**52.92**	**13.51**	**61.14**	**156.05**



Appendix A: County Listing for the Region

Ohio

- Shelby

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Ohio				
Shelby	48,215	5,621,795	8,483,620	14,105,415
Total	**48,215**	**5,621,795**	**8,483,620**	**14,105,415**
Total Study Region	**48,215**	**5,621,795**	**8,483,620**	**14,105,415**

Hazus: Earthquake Global Risk Report

Region Name: ShelbyCo

Earthquake Scenario: Shelby Co 5 Mag, 5 km Depth

Print Date: December 15, 2022

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.

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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 1 county(ies) from the following state(s):

Ohio

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

The geographical size of the region is 411.02 square miles and contains 10 census tracts. There are over 18 thousand households in the region which has a total population of 48,230 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 24 thousand buildings in the region with a total building replacement value (excluding contents) of 14,107 (millions of dollars). Approximately 71.00 % of the buildings (and 40.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 932 and 1,473 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 24 thousand buildings in the region which have an aggregate total replacement value of 14,107 (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 56% 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 1 hospitals in the region with a total bed capacity of 90 beds. There are 23 schools, 13 fire stations, 8 police stations and 1 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 2,405.00 (millions of dollars). This inventory includes over 20.51 miles of highways, 284 bridges, 2,629.02 miles of pipes.

Table 1: Transportation System Lifeline Inventory

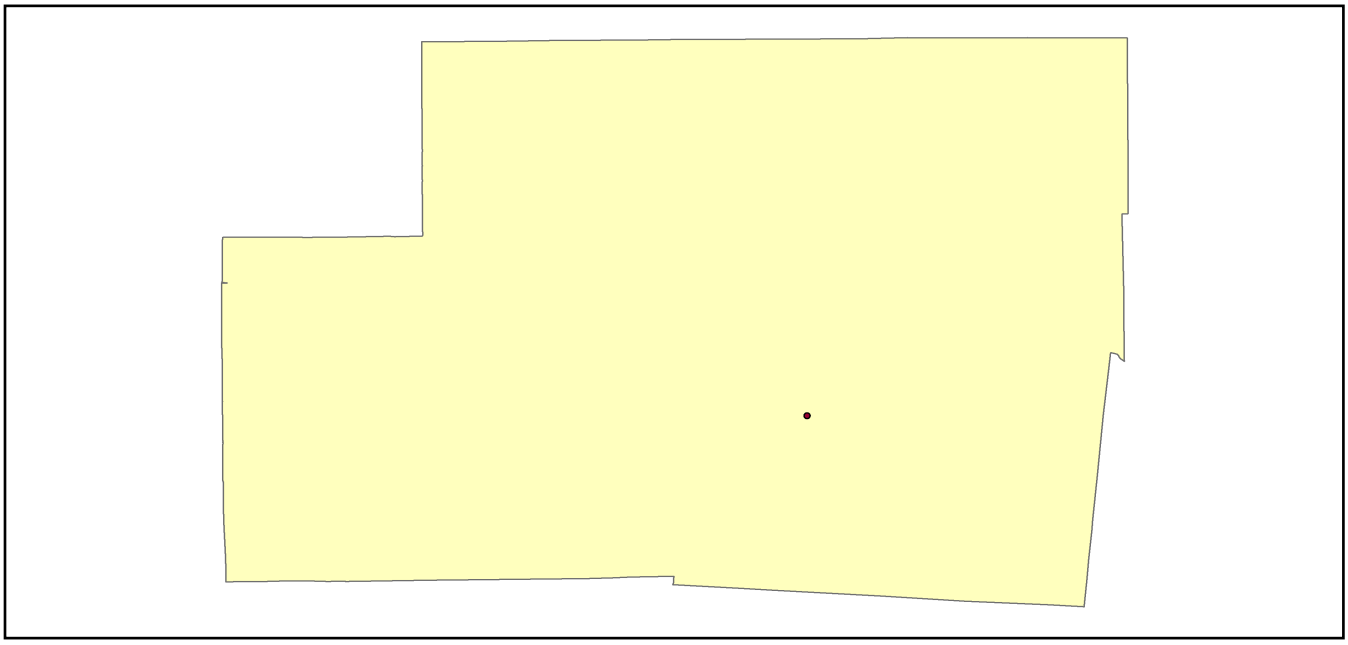
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	284	395.7963
	Segments	3	222.5180
	Tunnels	0	0.0000
		Subtotal	**618.3143**
Railways	Bridges	39	177.0600
	Facilities	3	7.9890
	Segments	18	112.2518
	Tunnels	0	0.0000
		Subtotal	**297.3008**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	2	10.6000
	Runways	2	6.3955
		Subtotal	**16.9955**
		Total	**932.60**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	42.3178
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**42.3178**
Waste Water	Distribution Lines	NA	25.3907
	Facilities	10	1371.9880
	Pipelines	0	0.0000
		Subtotal	**1397.3787**
Natural Gas	Distribution Lines	NA	16.9271
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**16.9271**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	1	16.2785
		Subtotal	**16.2785**
Communication	Facilities	2	0.2100
		Subtotal	**0.2100**
		Total	**1,473.10**

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	Shelby Co 5 Mag, 5 km Depth
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-84.16
Latitude of Epicenter	40.28
Earthquake Magnitude	5.00
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 5,132 buildings will be at least moderately damaged. This is over 21.00 % of the buildings in the region. There are an estimated 345 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

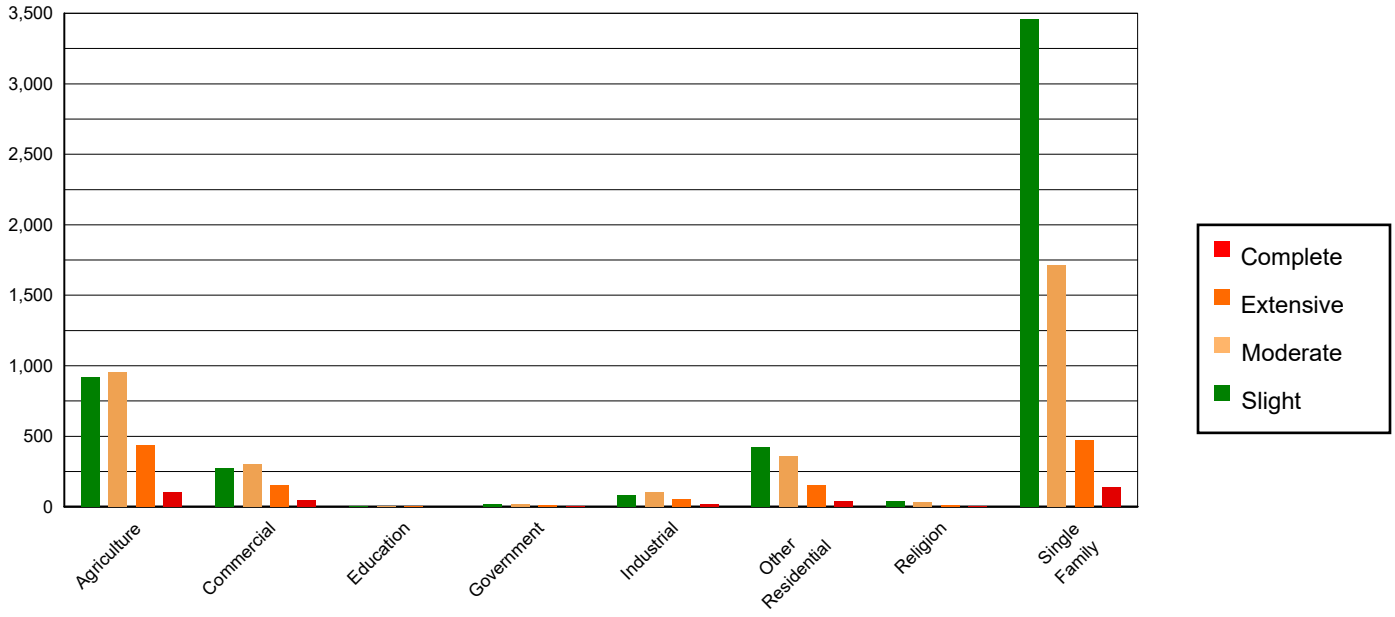


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2555.42	17.52	917.11	17.56	954.42	27.34	439.97	33.96	101.08	29.24
Commercial	718.65	4.93	274.39	5.25	304.71	8.73	150.84	11.64	45.41	13.14
Education	15.94	0.11	5.55	0.11	6.04	0.17	2.65	0.20	0.83	0.24
Government	52.45	0.36	17.08	0.33	20.15	0.58	8.59	0.66	2.74	0.79
Industrial	209.66	1.44	84.53	1.62	103.60	2.97	56.94	4.39	16.27	4.71
Other Residential	1139.06	7.81	425.16	8.14	359.38	10.30	149.07	11.51	36.33	10.51
Religion	116.19	0.80	36.13	0.69	30.84	0.88	14.56	1.12	4.29	1.24
Single Family	9779.30	67.04	3462.35	66.30	1711.52	49.03	473.10	36.51	138.73	40.13
Total	**14,587**		**5,222**		**3,491**		**1,296**		**346**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	9462.91	64.87	3133.36	60.00	1177.30	33.73	149.33	11.53	11.73	3.39
Steel	999.20	6.85	341.85	6.55	493.51	14.14	280.14	21.62	73.63	21.30
Concrete	474.59	3.25	155.69	2.98	164.24	4.71	72.51	5.60	14.76	4.27
Precast	496.21	3.40	136.38	2.61	198.07	5.67	120.38	9.29	19.86	5.74
RM	106.24	0.73	22.45	0.43	33.54	0.96	20.31	1.57	2.48	0.72
URM	2842.73	19.49	1294.63	24.79	1218.01	34.89	550.43	42.48	200.53	58.01
MH	204.78	1.40	137.93	2.64	205.97	5.90	102.63	7.92	22.68	6.56
Total	**14,587**		**5,222**		**3,491**		**1,296**		**346**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 90 hospital beds available for use. On the day of the earthquake, the model estimates that only 20 hospital beds (23.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 45.00% of the beds will be back in service. By 30 days, 74.00% 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	1	1	0	0
Schools	23	8	0	10
EOCs	1	1	0	0
PoliceStations	8	2	0	5
FireStations	13	3	0	8

Transportation Lifeline Damage

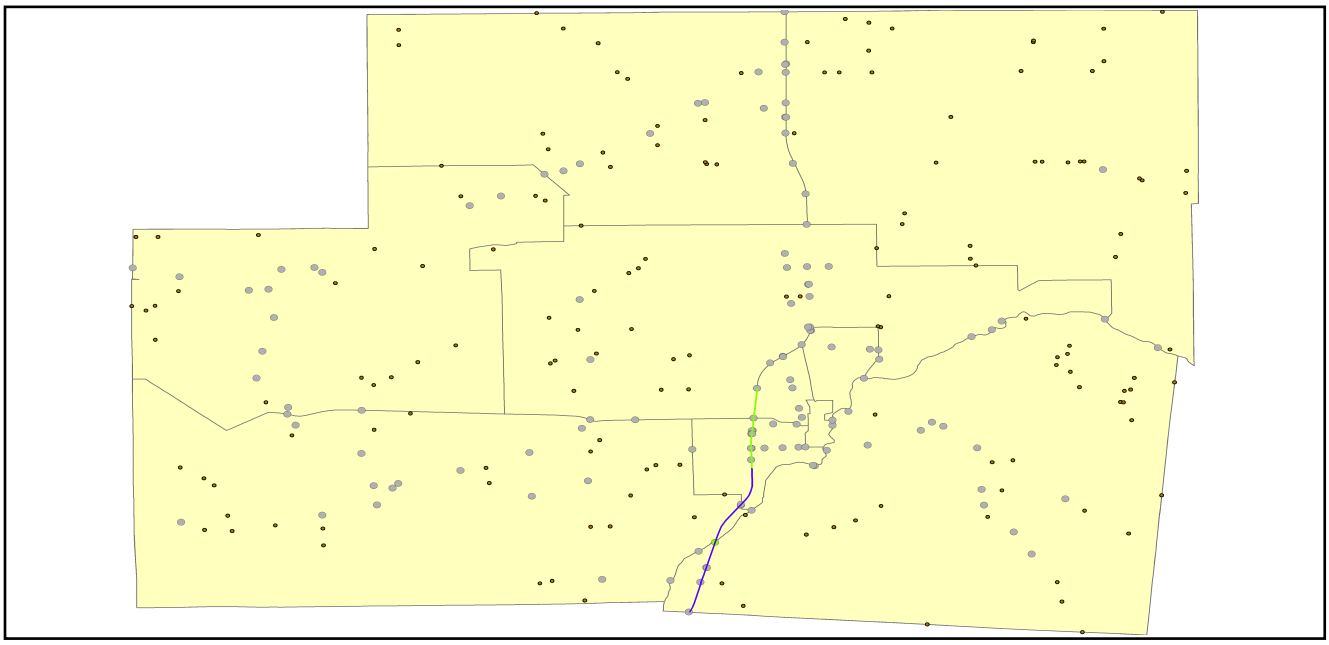


Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	3	0	0	3	3
	Bridges	284	4	0	281	284
	Tunnels	0	0	0	0	0
Railways	Segments	18	0	0	18	18
	Bridges	39	0	0	39	39
	Tunnels	0	0	0	0	0
	Facilities	3	2	0	3	3
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	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	2	2	0	2	2
	Runways	2	0	0	2	2

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	0	0	0	0	0
Waste Water	10	7	0	3	10
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	1	0	0	0
Communication	2	1	0	2	2

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

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	1,315	181	45
Waste Water	789	91	23
Natural Gas	526	31	8
Oil	0	0	0

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	18,803	56	0	0	0	0
Electric Power		10,041	8,125	4,841	730	12

Induced Earthquake Damage

Fire Following Earthquake

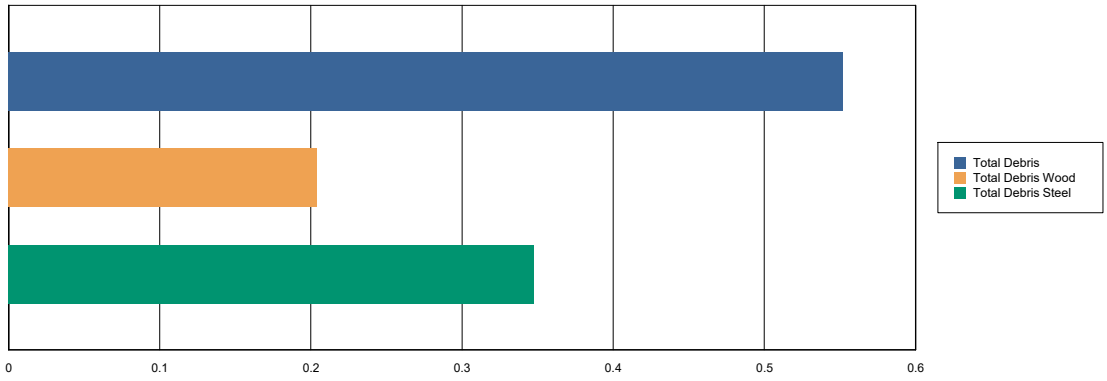
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 552,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 37.00% 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 22,080 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



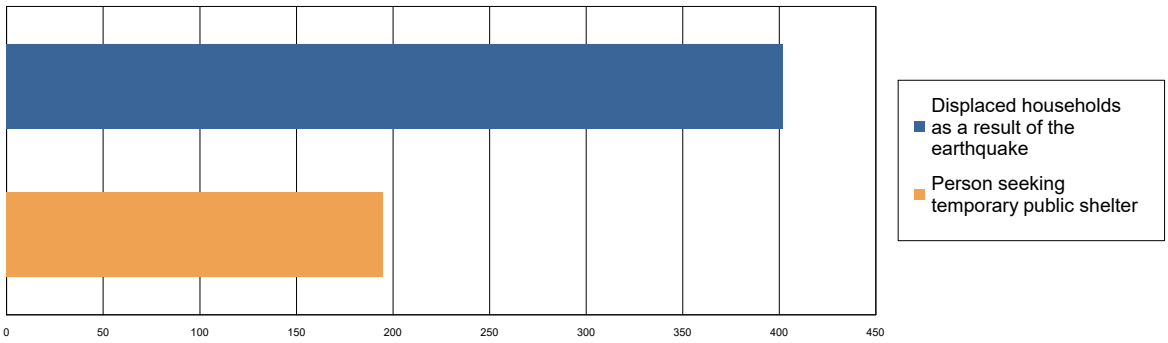
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.20	0.35	0.55	22,080 (@25 tons/truck)

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 402 households to be displaced due to the earthquake. Of these, 195 people (out of a total population of 48,230) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
402	195

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	4.86	1.13	0.15	0.29
	Commuting	0.01	0.01	0.01	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.19	0.05	0.01	0.01
	Industrial	9.23	2.24	0.30	0.58
	Other-Residential	23.14	4.92	0.56	1.08
	Single Family	91.34	20.49	2.76	5.41
	Total	**129**	**29**	**4**	**7**
2 PM	Commercial	299.39	69.73	9.32	18.08
	Commuting	0.05	0.06	0.11	0.02
	Educational	42.70	10.53	1.53	2.96
	Hotels	0.04	0.01	0.00	0.00
	Industrial	67.96	16.54	2.20	4.24
	Other-Residential	6.64	1.45	0.18	0.33
	Single Family	26.12	6.05	0.85	1.60
	Total	**443**	**104**	**14**	**27**
5 PM	Commercial	204.26	47.78	6.45	12.36
	Commuting	1.02	1.28	2.25	0.43
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.06	0.01	0.00	0.00
	Industrial	42.47	10.34	1.38	2.65
	Other-Residential	8.95	1.96	0.24	0.44
	Single Family	36.66	8.49	1.19	2.24
	Total	**293**	**70**	**12**	**18**

Economic Loss

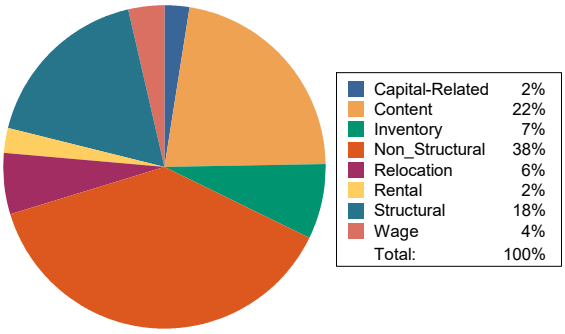
The total economic loss estimated for the earthquake is 2,222.08 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 1,886.95 (millions of dollars); 15 % 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 21 % 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)

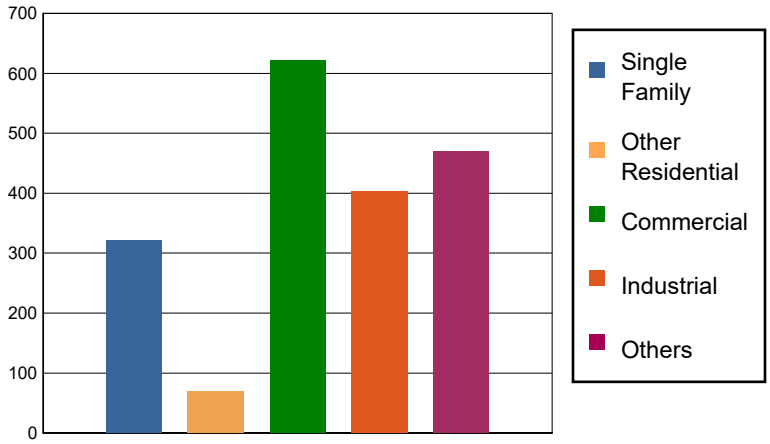


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	3.8476	50.4517	7.9052	5.0439	67.2484
	Capital-Related	0.0000	1.6361	36.2562	5.0405	3.1079	46.0407
	Rental	6.7201	4.8813	26.4940	3.1919	2.3599	43.6472
	Relocation	24.1011	3.3056	46.8053	15.0593	29.7041	118.9754
	Subtotal	**30.8212**	**13.6706**	**160.0072**	**31.1969**	**40.2158**	**275.9117**
Capital Stock Losses							
	Structural	44.2706	6.1040	100.4754	52.7443	128.7399	332.3342
	Non_Structural	174.8941	37.7383	204.5522	169.6680	130.9953	717.8479
	Content	71.6274	12.1239	119.0022	126.4860	93.7372	422.9767
	Inventory	0.0000	0.0000	37.4007	23.5596	76.9153	137.8756
	Subtotal	**290.7921**	**55.9662**	**461.4305**	**372.4579**	**430.3877**	**1611.0344**
	Total	**321.61**	**69.64**	**621.44**	**403.65**	**470.60**	**1886.95**

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	222.5180	0.0000	0.00
	Bridges	395.7963	7.2151	1.82
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**618.3143**	**7.2151**	
Railways	Segments	112.2518	0.0000	0.00
	Bridges	177.0600	0.9687	0.55
	Tunnels	0.0000	0.0000	0.00
	Facilities	7.9890	2.5726	32.20
	Subtotal	**297.3008**	**3.5413**	
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	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	10.6000	4.5223	42.66
	Runways	6.3955	0.0000	0.00
	Subtotal	**16.9955**	**4.5223**	
	Total	**932.61**	**15.28**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	42.3178	0.8138	1.92
	Subtotal	**42.3178**	**0.8138**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	1371.9880	307.2375	22.39
	Distribution Lines	25.3907	0.4088	1.61
	Subtotal	**1397.3787**	**307.6463**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	16.9271	0.1400	0.83
	Subtotal	**16.9271**	**0.1400**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	16.2785	11.1817	68.69
	Subtotal	**16.2785**	**11.1817**	
Communication	Facilities	0.2100	0.0713	33.95
	Subtotal	**0.2100**	**0.0713**	
	Total	**1,473.11**	**319.85**	

Appendix A: County Listing for the Region

Shelby,OH

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Ohio					
	Shelby	48,230	5,622	8,484	14,107
Total Region		**48,230**	**5,622**	**8,484**	**14,107**