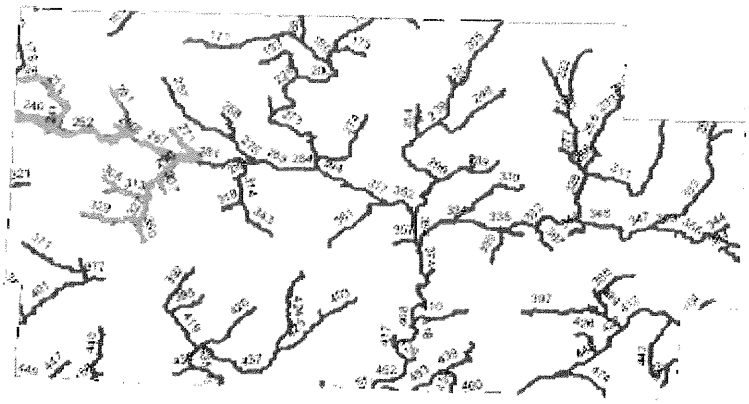
APPENDIX B

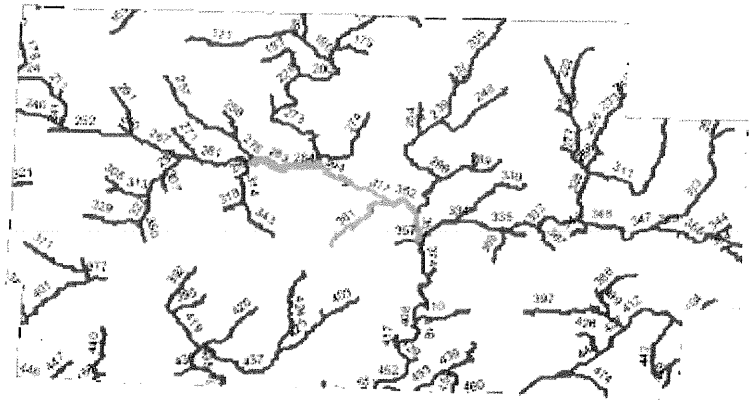
Flood Loss Estimation

Maps for HAZUS-MH Study Case Regions

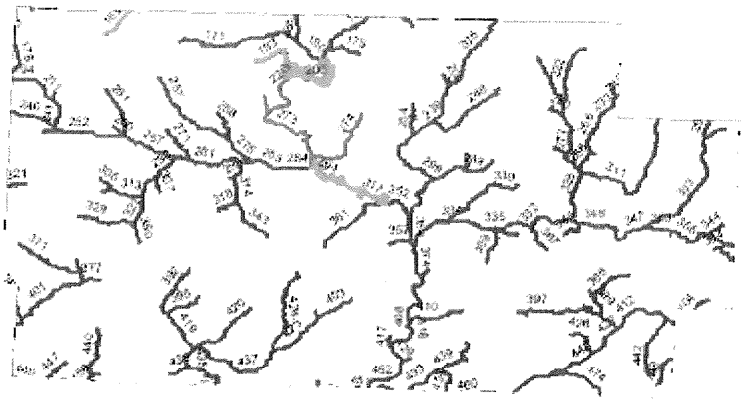
Study Case 4



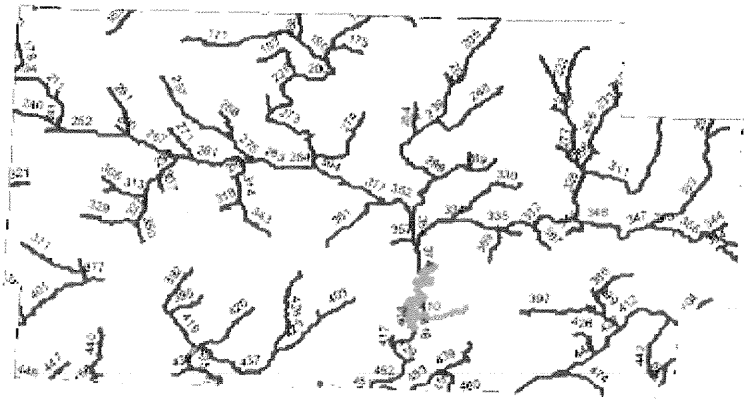
Study Case 6



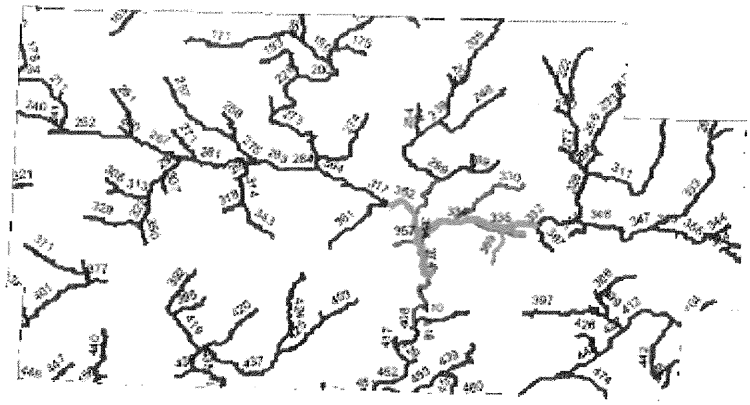
Study Case 11



Study Case 0319b



Study Case A



HAZUS-MH: Flood Event Report

Region Name: Coshocton-rev2

Flood Study Case: Case4

Print Date: Monday, May 10, 2004

Disclaimer:
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.

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General Description of the Region

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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 564 square miles and contains 2,320 census blocks. There are over 14 thousand households in the region and has a total population of 36,655 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,100 buildings in the region with a total building replacement value (excluding contents) of 1,952 million dollars (2002 dollars). Approximately 99.10% of the buildings (and 86.61% of the building value) are associated with residential housing.

General Building Stock

HAZUS estimates that there are 13,100 buildings in the region which have an aggregate total replacement value of 1,952 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case 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	1,690,192	86.6%
Commercial	164,052	8.4%
Industrial	59,642	3.1%
Agricultural	7,511	0.4%
Religion	22,905	1.2%
Government	3,865	0.2%
Education	3,341	0.2%
Total	1,951,508	100.00%

Table 2
Building Exposure by Occupancy Type for the Study Case

Occupancy	Exposure ($1000)	Percent of Total
Residential	50,480	96.8%
Commercial	760	1.5%
Industrial	255	0.5%
Agricultural	660	1.3%
Religion	0	0.0%
Government	0	0.0%
Education	0	0.0%
Total	52,155	100.00%

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 134 beds. There are 17 schools, 5 fire stations, 3 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:	Coshocton-rev2
Scenario Name:	Case4
Return Period Analyzed:	100
Analysis Options Analyzed:	0

General Building Stock Damage

HAZUS estimates that about 10 buildings will be at least moderately damaged. This is over 100% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	10	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**10**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	9	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the study case flood event, the model estimates that 0 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
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	3	1	0	1
Schools	17	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 ask 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 29,518 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 43% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,181 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 20 households will be displaced due to the flood. Of these, 9 people (out of a total population of 36,655) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 2.09 million dollars, which represents 0.33 % of the total replacement value of the region's 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 0.06 million dollars. 14% of the estimated losses were related to the business interruption of the region. The residential occupancies made up over 74% 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

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	27.69	1.34	0.48	0.87	30.37
	Content	14.19	2.39	0.78	2.24	19.60
	Inventory	0.00	0.15	0.15	0.00	0.30
	Subtotal	**41.88**	**3.88**	**1.41**	**3.10**	**50.27**
Business Interruption						
	Income	0.00	0.38	0.04	1.40	1.81
	Relocation	0.69	0.24	0.01	0.32	1.25
	Rental Income	0.21	0.18	0.00	0.03	0.43
	Wage	0.00	1.10	0.04	3.30	4.43
	Subtotal	**0.90**	**1.89**	**0.09**	**5.05**	**7.92**
ALL	**Total**	**42.77**	**5.77**	**1.50**	**8.15**	**58.19**

HAZUS-MH: Flood Event Report

Region Name: Coshocton-rev2

Flood Study Case: Case6

Print Date: Monday, May 10, 2004

Disclaimer:
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.

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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 564 square miles and contains 2,320 census blocks. There are over 14 thousand households in the region and has a total population of 36,655 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,100 buildings in the region with a total building replacement value (excluding contents) of 1,952 million dollars (2002 dollars). Approximately 99.10% of the buildings (and 86.61% of the building value) are associated with residential housing.

General Building Stock

HAZUS estimates that there are 13,100 buildings in the region which have an aggregate total replacement value of 1,952 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case 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	1,690,192	86.6%
Commercial	164,052	8.4%
Industrial	59,642	3.1%
Agricultural	7,511	0.4%
Religion	22,905	1.2%
Government	3,865	0.2%
Education	3,341	0.2%
Total	1,951,508	100.00%

Table 2
Building Exposure by Occupancy Type for the Study Case

Occupancy	Exposure ($1000)	Percent of Total
Residential	116,693	80.1%
Commercial	26,856	18.4%
Industrial	539	0.4%
Agricultural	743	0.5%
Religion	570	0.4%
Government	0	0.0%
Education	288	0.2%
Total	145,689	100.00%

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 134 beds. There are 17 schools, 5 fire stations, 3 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:	Coshocton-rev2
Scenario Name:	Case6
Return Period Analyzed:	100
Analysis Options Analyzed:	0

General Building Stock Damage

HAZUS estimates that about 116 buildings will be at least moderately damaged. This is over 89% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	92	79.31	12	10.34	8	6.90	4	3.45	0	0.00	0	0.00
Total	**96**		**12**		**8**		**4**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	18	81.82	2	9.09	2	9.09	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	78	79.59	10	10.20	6	6.12	4	4.08	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the study case flood event, the model estimates that 0 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
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	3	0	0	0
Schools	17	1	0	1

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 ask 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 66,995 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 43% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 2,680 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 167 households will be displaced due to the flood. Of these, 275 people (out of a total population of 36,655) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 6.33 million dollars, which represents 1.01 % of the total replacement value of the region's 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 0.18 million dollars. 19% of the estimated losses were related to the business interruption of the region. The residential occupancies made up over 67% 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

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	74.87	8.81	0.08	0.18	83.93
	Content	39.80	17.93	0.09	0.59	58.40
	Inventory	0.00	0.62	0.02	0.00	0.64
	Subtotal	**114.67**	**27.36**	**0.19**	**0.76**	**142.97**
Business Interruption						
	Income	0.00	10.99	0.00	0.39	11.38
	Relocation	2.54	3.18	0.00	0.00	5.72
	Rental Income	0.84	2.38	0.00	0.00	3.21
	Wage	0.00	11.60	0.01	0.91	12.52
	Subtotal	**3.38**	**28.15**	**0.01**	**1.29**	**32.83**
ALL	**Total**	**118.05**	**55.50**	**0.20**	**2.06**	**175.80**

HAZUS-MH: Flood Event Report

Region Name: Coshocton-rev2

Flood Study Case: case11

Print Date: Monday, May 10, 2004

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There are an estimated 13,100 buildings in the region with a total building replacement value (excluding contents) of 1,952 million dollars (2002 dollars). Approximately 99.10% of the buildings (and 86.61% of the building value) are associated with residential housing.

General Building Stock

HAZUS estimates that there are 13,100 buildings in the region which have an aggregate total replacement value of 1,952 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case respectively. Appendix B provides a general distribution of the building value by State and County.

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Commercial	164,052	8.4%
Industrial	59,642	3.1%
Agricultural	7,511	0.4%
Religion	22,905	1.2%
Government	3,865	0.2%
Education	3,341	0.2%
Total	1,951,508	100.00%

Table 2
Building Exposure by Occupancy Type for the Study Case

Occupancy	Exposure ($1000)	Percent of Total
Residential	42,647	97.2%
Commercial	315	0.7%
Industrial	124	0.3%
Agricultural	650	1.5%
Religion	0	0.0%
Government	0	0.0%
Education	130	0.3%
Total	43,866	100.00%

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 134 beds. There are 17 schools, 5 fire stations, 3 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:	Coshocton-rev2
Scenario Name:	case11
Return Period Analyzed:	100
Analysis Options Analyzed:	0

General Building Stock Damage

HAZUS estimates that about 3 buildings will be at least moderately damaged. This is over 100% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**3**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the study case flood event, the model estimates that 0 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
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	3	0	0	0
Schools	17	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 ask 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 4,349 tons of debris will be generated. Of the total amount, Finishes comprises 24% of the total, Structure comprises 41% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 174 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 10 households will be displaced due to the flood. Of these, 4 people (out of a total population of 36,655) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 0.28 million dollars, which represents 0.04 % of the total replacement value of the region's 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 0.01 million dollars. 2% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 100% 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

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	4.96	0.00	0.00	0.00	4.96
	Content	2.61	0.00	0.00	0.00	2.61
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**7.57**	**0.00**	**0.00**	**0.00**	**7.57**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.11	0.00	0.00	0.00	0.11
	Rental Income	0.03	0.00	0.00	0.00	0.03
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.14**	**0.00**	**0.00**	**0.00**	**0.14**
ALL	**Total**	**7.71**	**0.00**	**0.00**	**0.00**	**7.71**

HAZUS-MH: Flood Event Report

Region Name: Coshocton-rev2

Flood Study Case: 0319b

Print Date: Tuesday, May 18, 2004

Disclaimer:
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.

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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 564 square miles and contains 2,320 census blocks. There are over 14 thousand households in the region and has a total population of 36,655 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,100 buildings in the region with a total building replacement value (excluding contents) of 1,952 million dollars (2002 dollars). Approximately 99.10% of the buildings (and 86.61% of the building value) are associated with residential housing.

General Building Stock

HAZUS estimates that there are 13,100 buildings in the region which have an aggregate total replacement value of 1,952 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case 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	1,690,192	86.6%
Commercial	164,052	8.4%
Industrial	59,642	3.1%
Agricultural	7,511	0.4%
Religion	22,905	1.2%
Government	3,865	0.2%
Education	3,341	0.2%
Total	1,951,508	100.00%

Table 2
Building Exposure by Occupancy Type for the Study Case

Occupancy	Exposure ($1000)	Percent of Total
Residential	42,099	86.2%
Commercial	5,222	10.7%
Industrial	830	1.7%
Agricultural	62	0.1%
Religion	331	0.7%
Government	280	0.6%
Education	0	0.0%
Total	48,824	100.00%

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 134 beds. There are 17 schools, 5 fire stations, 3 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:	Coshocton-rev2
Scenario Name:	0319b
Return Period Analyzed:	100
Analysis Options Analyzed:	0

General Building Stock Damage

HAZUS estimates that about 3 buildings will be at least moderately damaged. This is over 100% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**3**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the study case flood event, the model estimates that 0 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
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	3	0	0	0
Schools	17	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 ask you to replace the existing results.

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 7,453 tons of debris will be generated. Of the total amount, Finishes comprises 25% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 298 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 36 households will be displaced due to the flood. Of these, 66 people (out of a total population of 36,655) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 0.51 million dollars, which represents 0.04 % of the total replacement value of the region's 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 0.01 million dollars. 7% of the estimated losses were related to the business interruption of the region. The residential occupancies made up over 93% 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

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	8.44	0.02	0.00	0.01	8.46
	Content	4.57	0.06	0.00	0.03	4.66
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**13.01**	**0.07**	**0.00**	**0.03**	**13.12**
Business Interruption						
	Income	0.00	0.03	0.00	0.01	0.04
	Relocation	0.01	0.00	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.05	0.00	0.85	0.90
	Subtotal	**0.01**	**0.08**	**0.00**	**0.86**	**0.95**
ALL	**Total**	**13.02**	**0.15**	**0.00**	**0.89**	**14.06**

HAZUS-MH: Flood Event Report

Region Name: Coshocton-rev2

Flood Study Case: CaseA

Print Date: Monday, May 10, 2004

Disclaimer:
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.

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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 564 square miles and contains 2,320 census blocks. There are over 14 thousand households in the region and has a total population of 36,655 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,100 buildings in the region with a total building replacement value (excluding contents) of 1,952 million dollars (2002 dollars). Approximately 99.10% of the buildings (and 86.61% of the building value) are associated with residential housing.

General Building Stock

HAZUS estimates that there are 13,100 buildings in the region which have an aggregate total replacement value of 1,952 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case respectively. Appendix B provides a general distribution of the building value by State and County.

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Residential	1,690,192	86.6%
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Agricultural	7,511	0.4%
Religion	22,905	1.2%
Government	3,865	0.2%
Education	3,341	0.2%
Total	1,951,508	100.00%

Table 2
Building Exposure by Occupancy Type for the Study Case

Occupancy	Exposure ($1000)	Percent of Total
Residential	122,872	67.7%
Commercial	41,348	22.8%
Industrial	11,119	6.1%
Agricultural	248	0.1%
Religion	3,844	2.1%
Government	280	0.2%
Education	1,819	1.0%
Total	181,530	100.00%

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 134 beds. There are 17 schools, 5 fire stations, 3 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:	Coshocton-rev2
Scenario Name:	CaseA
Return Period Analyzed:	100
Analysis Options Analyzed:	0

General Building Stock Damage

HAZUS estimates that about 3 buildings will be at least moderately damaged. This is over 100% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**3**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the study case flood event, the model estimates that 0 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
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	3	0	0	0
Schools	17	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 ask you to replace the existing results.

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 7,453 tons of debris will be generated. Of the total amount, Finishes comprises 25% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 298 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 36 households will be displaced due to the flood. Of these, 66 people (out of a total population of 36,655) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 0.51 million dollars, which represents 0.04 % of the total replacement value of the region's 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 0.01 million dollars. 7% of the estimated losses were related to the business interruption of the region. The residential occupancies made up over 93% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

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(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	8.44	0.02	0.00	0.01	8.46
	Content	4.57	0.06	0.00	0.03	4.66
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**13.01**	**0.07**	**0.00**	**0.03**	**13.12**
Business Interruption						
	Income	0.00	0.03	0.00	0.01	0.04
	Relocation	0.01	0.00	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.05	0.00	0.85	0.90
	Subtotal	**0.01**	**0.08**	**0.00**	**0.86**	**0.95**
ALL	**Total**	**13.02**	**0.15**	**0.00**	**0.89**	**14.06**

HAZUS-MH: Flood Event Report

Region Name: Coshocton-rev2

Flood Study Case: CaseA

Print Date: Monday, May 10, 2004

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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 564 square miles and contains 2,320 census blocks. There are over 14 thousand households in the region and has a total population of 36,655 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 13,100 buildings in the region with a total building replacement value (excluding contents) of 1,952 million dollars (2002 dollars). Approximately 99.10% of the buildings (and 86.61% of the building value) are associated with residential housing.

General Building Stock

HAZUS estimates that there are 13,100 buildings in the region which have an aggregate total replacement value of 1,952 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case respectively. Appendix B provides a general distribution of the building value by State and County.

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Agricultural	7,511	0.4%
Religion	22,905	1.2%
Government	3,865	0.2%
Education	3,341	0.2%
Total	1,951,508	100.00%

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Building Exposure by Occupancy Type for the Study Case

Occupancy	Exposure ($1000)	Percent of Total
Residential	122,872	67.7%
Commercial	41,348	22.8%
Industrial	11,119	6.1%
Agricultural	248	0.1%
Religion	3,844	2.1%
Government	280	0.2%
Education	1,819	1.0%
Total	181,530	100.00%

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 134 beds. There are 17 schools, 5 fire stations, 3 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:	Coshocton-rev2
Scenario Name:	CaseA
Return Period Analyzed:	100
Analysis Options Analyzed:	0

General Building Stock Damage

HAZUS estimates that about 60 buildings will be at least moderately damaged. This is over 68% of the total number of buildings in the region. There are an estimated 22 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of 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.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	12	14.29	42	50.00	4	4.76	0	0.00	6	7.14	20	23.81
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	2	50.00	0	0.00	0	0.00	2	50.00
Total	**12**		**42**		**6**		**0**		**6**		**22**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	6	75.00	0	0.00	0	0.00	0	0.00	2	25.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	6	23.08	12	46.15	0	0.00	0	0.00	2	7.69	6	23.08
Steel	6	23.08	12	46.15	0	0.00	0	0.00	2	7.69	6	23.08
Wood	6	20.00	12	40.00	2	6.67	0	0.00	2	6.67	8	26.67

Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the study case flood event, the model estimates that 0 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
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	3	0	0	0
Schools	17	1	0	1

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 ask 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 15,680 tons of debris will be generated. Of the total amount, Finishes comprises 49% of the total, Structure comprises 22% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 627 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 132 households will be displaced due to the flood. Of these, 280 people (out of a total population of 36,655) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 10.75 million dollars, which represents 1.71 % of the total replacement value of the region's 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 0.30 million dollars. 49% of the estimated losses were related to the business interruption of the region. The residential occupancies made up over 10% 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

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	15.55	23.60	3.83	1.13	44.12
	Content	9.72	76.64	9.57	7.06	103.00
	Inventory	0.00	2.82	2.47	0.00	5.29
	Subtotal	**25.27**	**103.07**	**15.87**	**8.19**	**152.40**
Business Interruption						
	Income	0.97	45.68	0.22	1.27	48.14
	Relocation	0.56	12.78	0.06	1.18	14.58
	Rental Income	2.02	9.47	0.02	0.43	11.93
	Wage	2.27	46.22	0.31	22.67	71.47
	Subtotal	**5.82**	**114.15**	**0.61**	**25.55**	**146.13**
ALL	**Total**	**31.09**	**217.22**	**16.48**	**33.74**	**298.53**