

HAZUS-MH: Flood Event Report

Region Name: Sedgwick County, Kansas

Flood Scenario: Level 1 Flood

Print Date: Tuesday, April 14, 2009

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):

- Kansas

Note:

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

The geographical size of the region is 999 square miles and contains 11,107 census blocks. There are over 176 thousand households in the region and has a total population of 452,869 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 185,363 buildings in the region with a total building replacement value (excluding contents) of 31,548 million dollars (2006 dollars). Approximately 92.74% of the buildings (and 70.66% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 185,363 buildings in the region which have an aggregate total replacement value of 31,548 million (2006 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 | 22,292,603 | 70.7% |
| Commercial | 5,886,388 | 18.7% |
| Industrial | 2,209,049 | 7.0% |
| Agricultural | 81,213 | 0.3% |
| Religion | 584,172 | 1.9% |
| Government | 129,534 | 0.4% |
| Education | 365,407 | 1.2% |
| Total | 31,548,366 | 100.00% |

Table 2
Building Exposure by Occupancy Type for the Scenario

| Occupancy | Exposure (\$1000) | Percent of Total |
|------------------|--------------------------|-------------------------|
| Residential | 9,798,824 | 69.2% |
| Commercial | 2,864,118 | 20.2% |
| Industrial | 972,898 | 6.9% |
| Agricultural | 38,056 | 0.3% |
| Religion | 275,503 | 1.9% |
| Government | 70,012 | 0.5% |
| Education | 150,209 | 1.1% |
| Total | 14,169,620 | 100.00% |

Essential Facility Inventory

For essential facilities, there are 10 hospitals in the region with a total bed capacity of 2,059 beds. There are 183 schools, 7 fire stations, 26 police stations and 2 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: | Sedgwick County, Kansas |
| Scenario Name: | Level 1 Flood |
| Return Period Analyzed: | 100 |
| Analysis Options Analyzed: | 0 |

Building Damage

General Building Stock Damage

HAZUS estimates that about 30,399 buildings will be at least moderately damaged. This is over 13% of the total number of buildings in the study case. There are an estimated 6,835 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 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

| Occupancy | 1-10 | | 11-20 | | 21-30 | | 31-40 | | 41-50 | | Substantially | |
|--------------|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|-------|---------------|-------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 0 | 0.00 | 6 | 75.00 | 2 | 25.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Commercial | 25 | 2.29 | 794 | 72.78 | 154 | 14.12 | 96 | 8.80 | 22 | 2.02 | 0 | 0.00 |
| Education | 16 | 76.19 | 5 | 23.81 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Government | 0 | 0.00 | 45 | 91.84 | 4 | 8.16 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Industrial | 1 | 0.56 | 43 | 23.89 | 57 | 31.67 | 15 | 8.33 | 54 | 30.00 | 10 | 5.56 |
| Religion | 1 | 0.84 | 118 | 99.16 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Residential | 13 | 0.04 | 891 | 3.07 | 3,450 | 11.90 | 8,002 | 27.61 | 9,806 | 33.83 | 6,825 | 23.55 |
| Total | 56 | | 1,902 | | 3,667 | | 8,113 | | 9,882 | | 6,835 | |

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 | 6 | 4.72 | 90 | 70.87 | 29 | 22.83 | 0 | 0.00 | 2 | 1.57 | 0 | 0.00 |
| ManufHousing | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2,537 | 100.00 |
| Masonry | 31 | 1.34 | 281 | 12.10 | 160 | 6.89 | 718 | 30.92 | 809 | 34.84 | 323 | 13.91 |
| Steel | 6 | 1.92 | 241 | 77.24 | 54 | 17.31 | 4 | 1.28 | 7 | 2.24 | 0 | 0.00 |
| Wood | 13 | 0.05 | 1,049 | 4.24 | 3,361 | 13.59 | 7,330 | 29.63 | 9,020 | 36.46 | 3,965 | 16.03 |

Essential Facility Damage

Before the flood analyzed in this study case, the region had 8,236 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

| Classification | Total | # Facilities | | |
|-----------------|-------|-------------------|----------------------|-------------|
| | | At Least Moderate | At Least Substantial | Loss of Use |
| Fire Stations | 7 | 1 | 0 | 0 |
| Hospitals | 10 | 3 | 0 | 3 |
| Police Stations | 26 | 8 | 0 | 0 |
| Schools | 183 | 70 | 0 | 2 |

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.

Analysis has not been performed for this Scenario.

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 46,547 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 127,726 people (out of a total population of 452,869) will seek temporary shelter in public shelters.

Appendix A: County Listing for the Region

Kansas

- Sedgwick

Appendix B: Regional Population and Building Value Data

| | Building Value (thousands of dollars) | | | |
|---------------------------|--|--------------------|------------------------|-------------------|
| | Population | Residential | Non-Residential | Total |
| Kansas | | | | |
| Sedgwick | 452,869 | 22,292,603 | 9,255,763 | 31,548,366 |
| Total | 452,869 | 22,292,603 | 9,255,763 | 31,548,366 |
| Total Study Region | 452,869 | 22,292,603 | 9,255,763 | 31,548,366 |