

HAZUS-MH: Earthquake Event Report

Region Name: Bountiful

Earthquake Scenario: Bountiful M 6.5

Print Date: February 19, 2010

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

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 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 is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake 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 earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 12 county(ies) from the following state(s):

Utah

Note:

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

The geographical size of the region is 27,432.56 square miles and contains 424 census tracts. There are over 669 thousand households in the region and has a total population of 2,154,071 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 545 thousand buildings in the region with a total building replacement value (excluding contents) of 114,814 (millions of dollars). Approximately 94.00 % of the buildings (and 0.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 25,077 and 5,324 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 545 thousand buildings in the region which have an aggregate total replacement value of 114,814 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 44% 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 (HPL) facilities. 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 39 hospitals in the region with a total bed capacity of 6,021 beds. There are 860 schools, 211 fire stations, 89 police stations and 3 emergency operation facilities. With respect to HPL facilities, there are 302 dams identified within the region. Of these, 126 of the dams are classified as 'high hazard'. The inventory also includes 630 hazardous material sites, 0 military installations and 0 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 30,401.00 (millions of dollars). This inventory includes over 3,287 kilometers of highways, 1,902 bridges, 94,005 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	1,902	2,616.60
	Segments	808	19,628.10
	Tunnels	2	1.80
	Subtotal		22,246.40
Railways	Bridges	31	3.80
	Facilities	10	26.60
	Segments	1,006	1,804.00
	Tunnels	0	0.00
	Subtotal		1,834.40
Light Rail	Bridges	0	0.00
	Facilities	24	63.90
	Segments	24	37.20
	Tunnels	0	0.00
	Subtotal		101.10
Bus	Facilities	8	8.50
	Subtotal		8.50
Ferry	Facilities	0	0.00
	Subtotal		0.00
Port	Facilities	0	0.00
	Subtotal		0.00
Airport	Facilities	12	127.80
	Runways	20	759.30
	Subtotal		887.10
		Total	25,077.50

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	1,133.00
	Facilities	1	32.60
	Pipelines	0	0.00
	Subtotal		1,165.70
Waste Water	Distribution Lines	NA	679.80
	Facilities	39	2,545.50
	Pipelines	0	0.00
	Subtotal		3,225.30
Natural Gas	Distribution Lines	NA	453.20
	Facilities	1	1.10
	Pipelines	399	983.60
	Subtotal		1,437.90
Oil Systems	Facilities	21	2.10
	Pipelines	257	348.90
	Subtotal		351.00
Electrical Power	Facilities	13	1,401.40
	Subtotal		1,401.40
Communication	Facilities	93	9.10
	Subtotal		9.10
		Total	7,590.30

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	Bountiful M 6.5
Type of Earthquake	User-defined
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	6.50
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Building Damage

HAZUS estimates that about 49,178 buildings will be at least moderately damaged. This is over 9.00 % of the total number of buildings in the region. There are an estimated 1,258 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 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	370	0.09	77	0.11	56	0.15	17	0.17	1	0.11
Commercial	15,559	3.67	1,889	2.61	1,357	3.58	444	4.44	66	5.27
Education	521	0.12	77	0.11	64	0.17	28	0.28	5	0.39
Government	863	0.20	161	0.22	204	0.54	82	0.82	9	0.71
Industrial	5,022	1.19	911	1.26	786	2.07	231	2.31	38	3.02
Other Residential	34,336	8.11	12,347	17.03	9,240	24.36	2,293	22.94	220	17.51
Religion	1,590	0.38	314	0.43	288	0.76	115	1.15	15	1.20
Single Family	365,275	86.24	56,726	78.24	25,932	68.37	6,785	67.89	903	71.80
Total	423,536		72,502		37,926		9,994		1,258	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	216,215	51.05	21597	29.79	1,378	3.63	474	4.74	113	8.98
Steel	3,923	0.93	558	0.77	584	1.54	202	2.02	41	3.24
Concrete	3,277	0.77	479	0.66	432	1.14	154	1.54	19	1.54
Precast	2,784	0.66	192	0.27	174	0.46	91	0.92	21	1.70
RM	95,842	22.63	6479	8.94	2,672	7.05	505	5.05	65	5.13
URM	92,078	21.74	41318	56.99	30,768	81.13	7,964	79.68	947	75.24
MH	9,419	2.22	1879	2.59	1,919	5.06	604	6.05	53	4.18
Total	423,536		72,502		37,926		9,994		1,258	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 6,021 hospital beds available for use. On the day of the earthquake, the model estimates that only 5,150 hospital beds (86.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 98.00% of the beds will be back in service. By 30 days, 100.00% 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	39	0	0	36
Schools	860	0	0	847
EOCs	3	0	0	3
PoliceStations	89	0	0	86
FireStations	211	0	0	210

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

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	808	0	0	808	808
	Bridges	1,902	40	0	1,864	1,888
	Tunnels	2	0	0	2	2
Railways	Segments	1,006	0	0	1,006	1,006
	Bridges	31	0	0	31	31
	Tunnels	0	0	0	0	0
	Facilities	10	0	0	10	10
Light Rail	Segments	24	0	0	24	24
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	24	0	0	24	24
Bus	Facilities	8	0	0	8	8
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	12	0	0	12	12
	Runways	20	0	0	20	20

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	0	0	1	1
Waste Water	39	3	0	32	39
Natural Gas	1	0	0	1	1
Oil Systems	21	6	0	14	21
Electrical Power	13	2	0	8	13
Communication	93	5	0	93	93

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

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	56,651	895	619
Waste Water	33,991	708	490
Natural Gas	2,167	9	19
Oil	1,197	13	29

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	669,075	97,803	74,394	26,930	0	0
Electric Power		0	0	0	0	0

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 53 ignitions that will burn about 1.30 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 4,204 people and burn about 221 (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 3.100 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 60.00% 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 123,840,000 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 6,118 households to be displaced due to the earthquake. Of these, 4,246 people (out of a total population of 2,154,071) will seek temporary shelter in public shelters.

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	17	3	0	1
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	20	4	0	1
	Industrial	26	5	1	1
	Other-Residential	475	79	8	15
	Single Family	1,242	212	23	44
	Total	1,780	304	33	62
2 PM	Commercial	962	183	22	43
	Commuting	2	2	3	1
	Educational	239	53	8	15
	Hotels	4	1	0	0
	Industrial	189	41	5	10
	Other-Residential	90	15	2	3
	Single Family	232	41	5	9
	Total	1,718	336	45	81
5 PM	Commercial	690	134	17	32
	Commuting	62	81	139	27
	Educational	31	7	1	2
	Hotels	6	1	0	0
	Industrial	118	25	3	6
	Other-Residential	188	32	3	6
	Single Family	498	87	10	18
	Total	1,593	367	174	91

Economic Loss

The total economic loss estimated for the earthquake is 4,535.33 (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 4,177.55 (millions of dollars); 30 % 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 47 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	44.03	120.88	11.32	32.08	208.31
	Capital-Related	0.00	19.08	111.32	7.00	7.68	145.08
	Rental	60.74	110.63	113.51	9.13	12.21	306.22
	Relocation	226.16	61.13	166.32	50.43	109.93	613.96
	Subtotal	286.89	234.87	512.02	77.88	161.90	1,273.57
Capital Stock Losses							
	Structural	243.25	76.55	157.93	60.87	86.54	625.14
	Non_Structural	577.27	271.77	333.00	184.44	206.02	1,572.50
	Content	198.41	70.94	182.23	130.31	90.58	672.47
	Inventory	0.00	0.00	8.67	24.35	0.84	33.87
	Subtotal	1,018.93	419.27	681.83	399.97	383.99	2,903.98
	Total	1,305.82	654.14	1,193.85	477.86	545.88	4,177.55

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.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

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

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	19,628.06	\$41.21	0.21
	Bridges	2,616.57	\$98.04	3.75
	Tunnels	1.76	\$0.00	0.00
	Subtotal	22246.40	139.30	
Railways	Segments	1,803.99	\$0.99	0.06
	Bridges	3.79	\$0.00	0.12
	Tunnels	0.00	\$0.00	0.00
	Facilities	26.63	\$4.29	16.12
	Subtotal	1834.40	5.30	
Light Rail	Segments	37.15	\$0.14	0.38
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	63.91	\$11.11	17.38
	Subtotal	101.10	11.20	
Bus	Facilities	8.55	\$0.43	4.97
	Subtotal	8.50	0.40	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Airport	Facilities	127.81	\$8.12	6.35
	Runways	759.28	\$3.31	0.44
	Subtotal	887.10	11.40	
	Total	25077.50	167.60	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	32.60	\$0.84	2.58
	Distribution Lines	1,133.00	\$7.98	0.70
	Subtotal	1,165.66	\$8.82	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	2,545.50	\$73.98	2.91
	Distribution Lines	679.80	\$6.31	0.93
	Subtotal	3,225.26	\$80.29	
Natural Gas	Pipelines	983.60	\$0.19	0.02
	Facilities	1.10	\$0.08	7.53
	Distribution Lines	453.20	\$6.75	1.49
	Subtotal	1,437.91	\$7.02	
Oil Systems	Pipelines	348.90	\$0.16	0.05
	Facilities	2.10	\$0.14	6.67
	Subtotal	350.95	\$0.30	
Electrical Power	Facilities	1,401.40	\$93.43	6.67
	Subtotal	1,401.40	\$93.43	
Communication	Facilities	9.10	\$0.27	2.91
	Subtotal	9.11	\$0.27	
	Total	7,590.30	\$190.13	

Table 14. Indirect Economic Impact with outside aid
(Employment as # of people and Income in millions of \$)

	LOSS	Total	%
First Year			
	Employment Impact	58,449	8.26
	Income Impact	126	0.46
Second Year			
	Employment Impact	24,518	3.46
	Income Impact	12	0.05
Third Year			
	Employment Impact	591	0.08
	Income Impact	(77)	-0.28
Fourth Year			
	Employment Impact	28	0.00
	Income Impact	(102)	-0.37
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(103)	-0.38
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(103)	-0.38

Appendix A: County Listing for the Region

Box Elder,UT

Cache,UT

Davis,UT

Duchesne,UT

Morgan,UT

Rich,UT

Salt Lake,UT

Summit,UT

Tooele,UT

Utah,UT

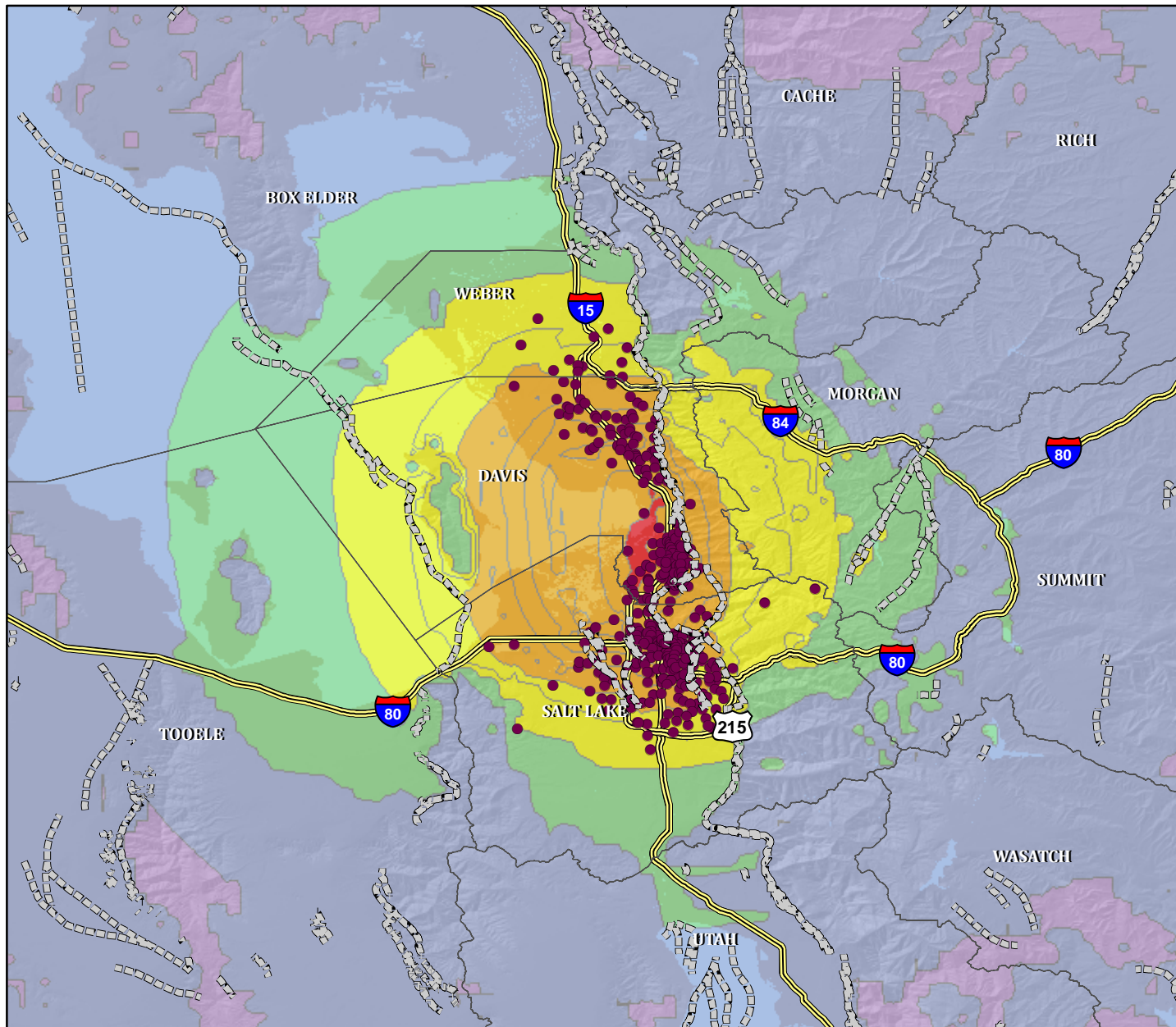
Wasatch,UT

Weber,UT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Utah	Box Elder	45,659	1,658	687	2,346
	Cache	100,585	3,382	1,703	5,085
	Davis	270,344	10,230	3,870	14,101
	Duchesne	15,233	496	248	744
	Morgan	7,910	305	139	444
	Rich	2,327	249	38	288
	Salt Lake	962,837	39,526	18,636	58,162
	Summit	35,804	2,598	708	3,307
	Tooele	50,184	1,782	564	2,347
	Utah	429,727	9,780	6,285	16,065
	Wasatch	18,879	0	89	89
	Weber	214,582	8,462	3,369	11,831
Total State		2,154,071	78,468	36,336	114,809
Total Region		2,154,071	78,468	36,336	114,809

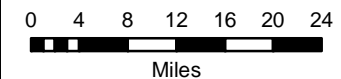
Direct Building Economic Loss - Earthquake Scenario: Bountiful Scenario, UT



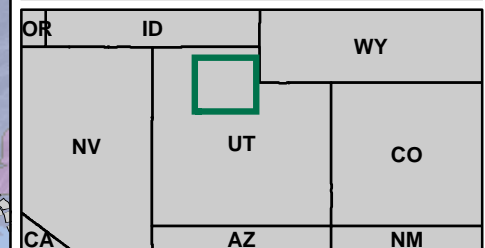
M 6.5 Bountiful Scenario

County	Cost Structural Damage	Cost Non-Structural Damage	Total Loss
Utah	\$564	\$2,945	\$6,246
Wasatch	\$3	\$23	\$50
Box Elder	\$120	\$330	\$727
Tooele	\$209	\$661	\$1,414
Salt Lake	\$336,451	\$840,396	\$2,418,472
Weber	\$24,278	\$73,160	\$172,765
Summit	\$39	\$568	\$1,037
Cache	\$25	\$148	\$294
Morgan	\$102	\$303	\$661
Davis	\$263,348	\$653,966	\$1,575,884
Total	\$625,139	\$1,572,500	\$4,177,550

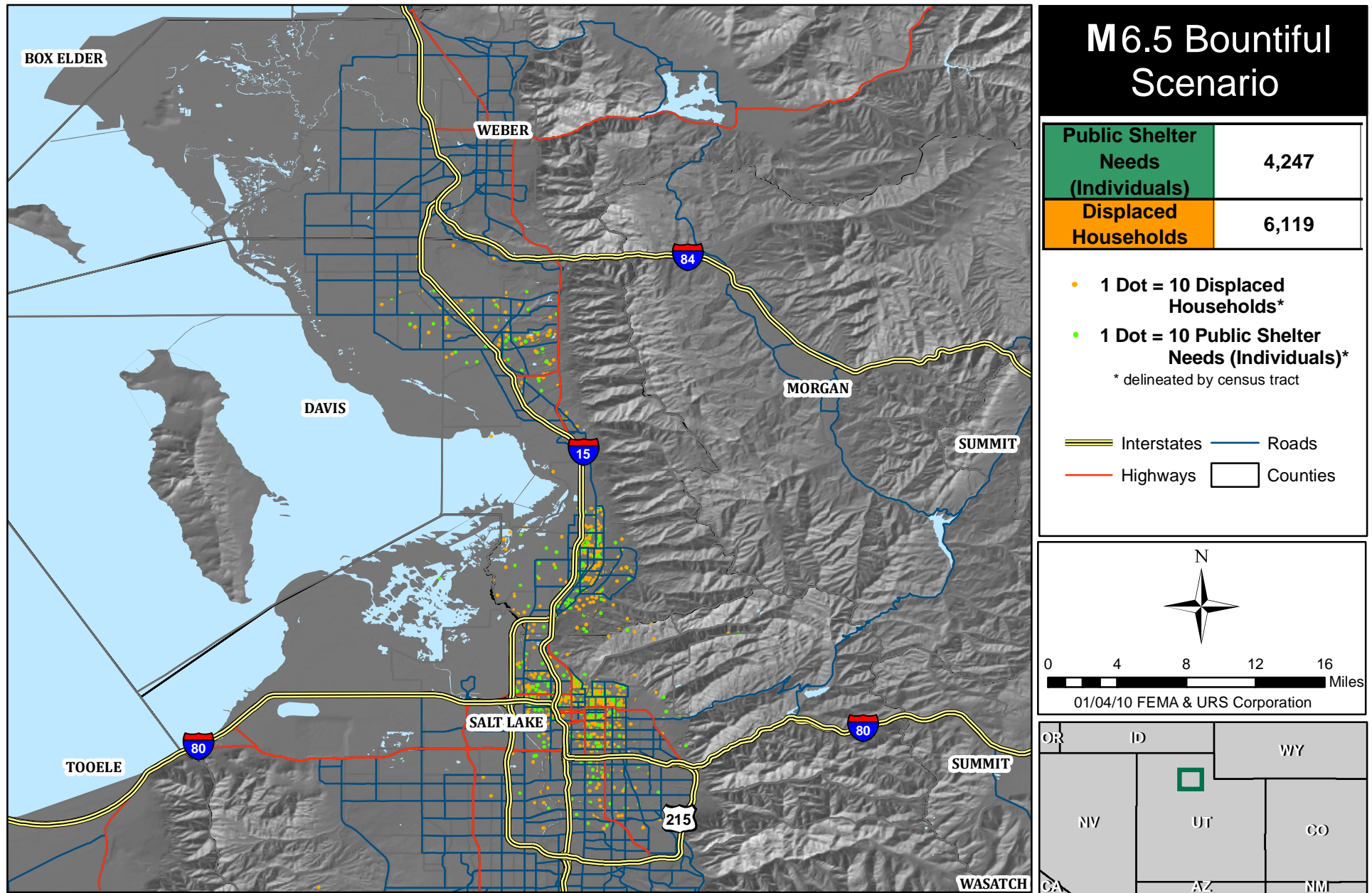
* All values are thousands of dollars



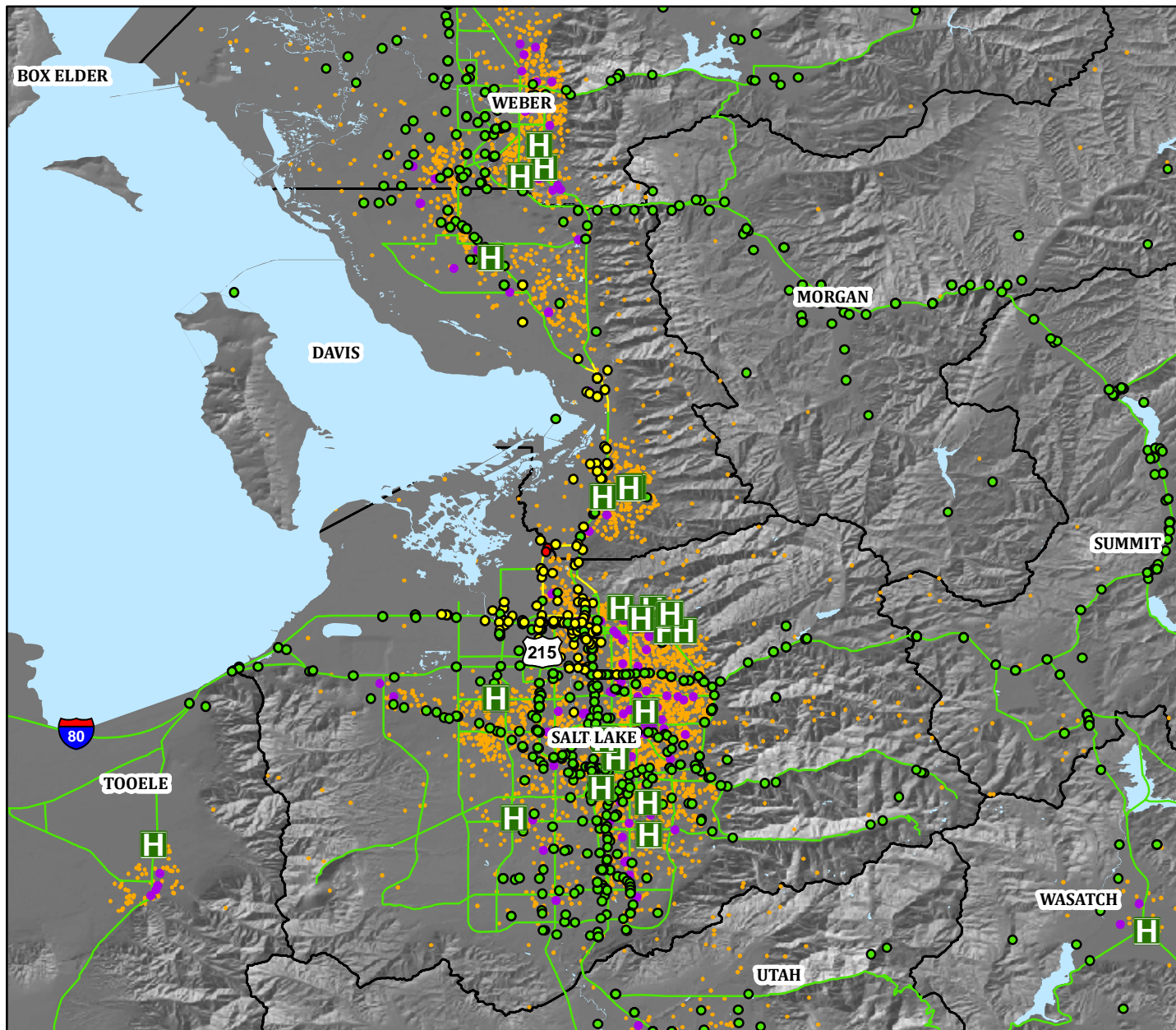
12/21/09 FEMA & URS Corporation



Estimated Displaced Households & Short Term Public Shelter Needs - Earthquake Scenario: Bountiful Scenario, UT



Distribution of Elderly, Impaired Hospitals (Day 1), & Hospital Bed Availability - Earthquake Scenario: Bountiful Scenario, UT



M 6.5 Bountiful Scenario

Highway Damage

Damage is expressed as the probability that a given bridge or highway segment will realize at least moderate damage.

Major Roadway Bridge Impact

- Low
- Moderate
- High

Highway Segment Impact

- Low
- Moderate
- High

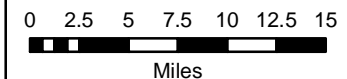
Impaired Hospitals (Day 1)

Damage is expressed as the probability that a given hospital will realize at least moderate damage.

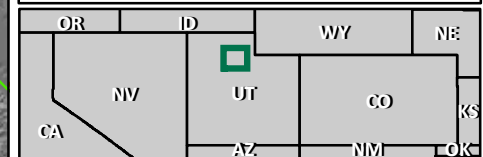
- H Low
- H Moderate
- H High

- 1 Dot = 30 People over 65
- Nursing Home

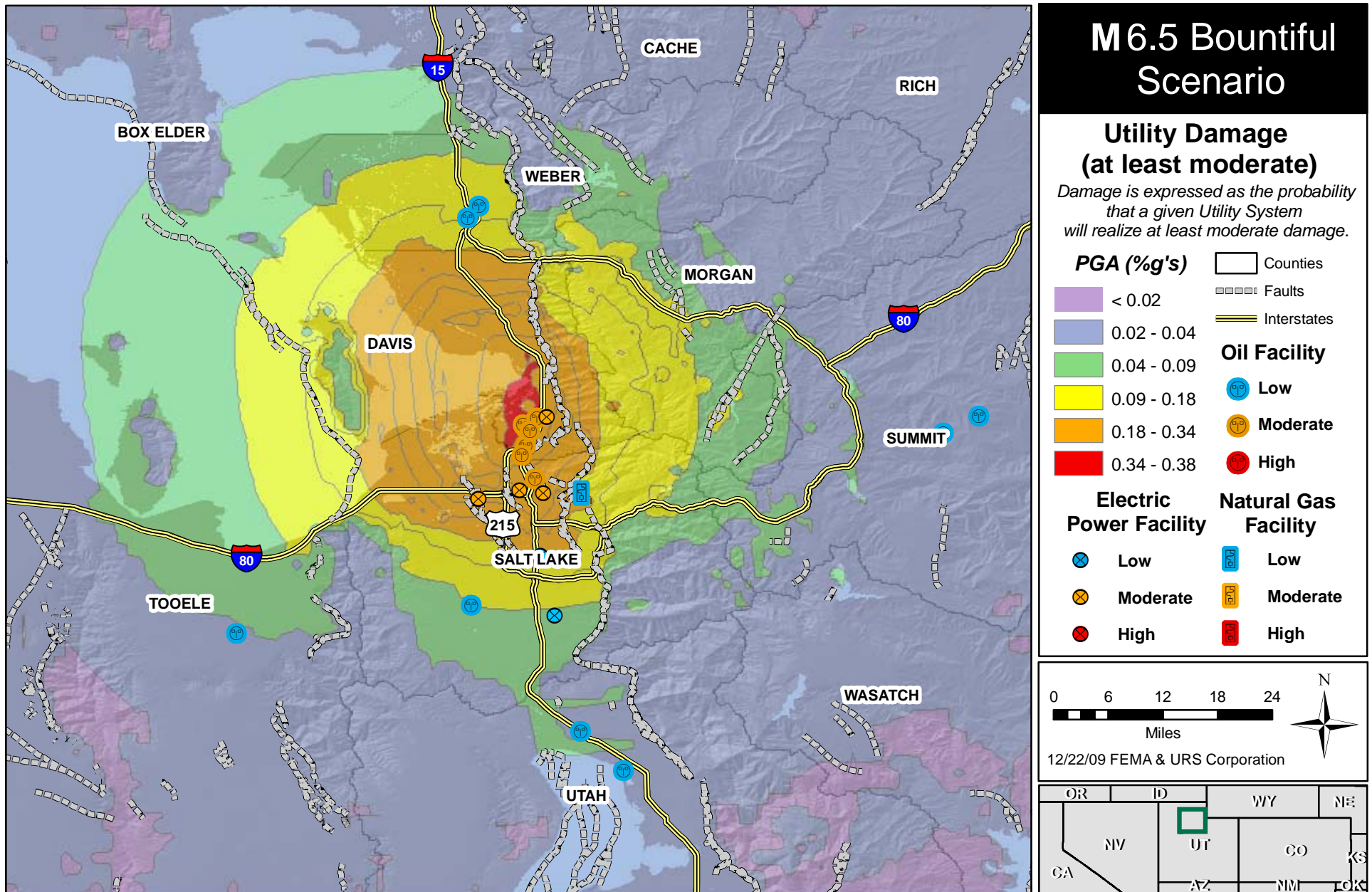
County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Box Elder	107	107	0
Cache	158	158	0
Davis	468	237	201
Salt Lake	3,440	2,870	176
Utah	1,013	1,012	0
Wasatch	20	20	0
Weber	655	586	3
Total	5,861	4,990	380



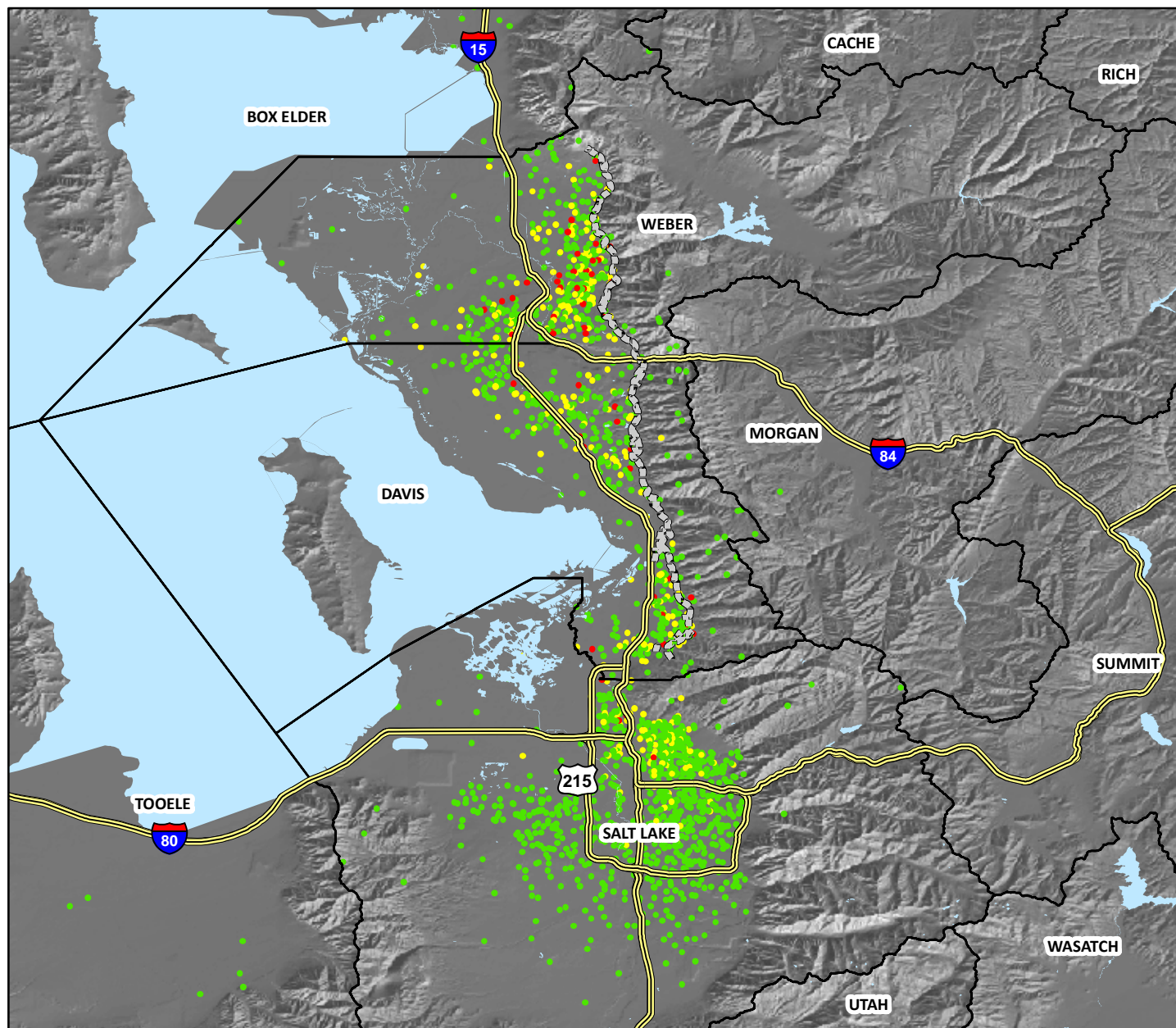
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Electrical, Natural Gas, and Oil Facility Damage - Earthquake Scenario: Bountiful Scenario, UT



Estimated Building Inspection Needs - Earthquake Scenario: Bountiful Scenario, UT



M 6.5 Bountiful Scenario

	Estimated # of Structures	Estimated # of Inspectors Needed
Red (Complete)	1,258	8
Yellow (Extensive)	9,994	133
Light Green (Slight/Moderate)	110,428	736
Total	121,680	878

*Estimated number of inspectors needed to complete inspections in 30 days.

- Red Tag (Complete Damage)
- Yellow Tag (Extensive Damage)
- Green Tag (Slight/Moderate Damage)

*1 Dot = 100 (by census tract)

Counties
 Faults
 Interstates

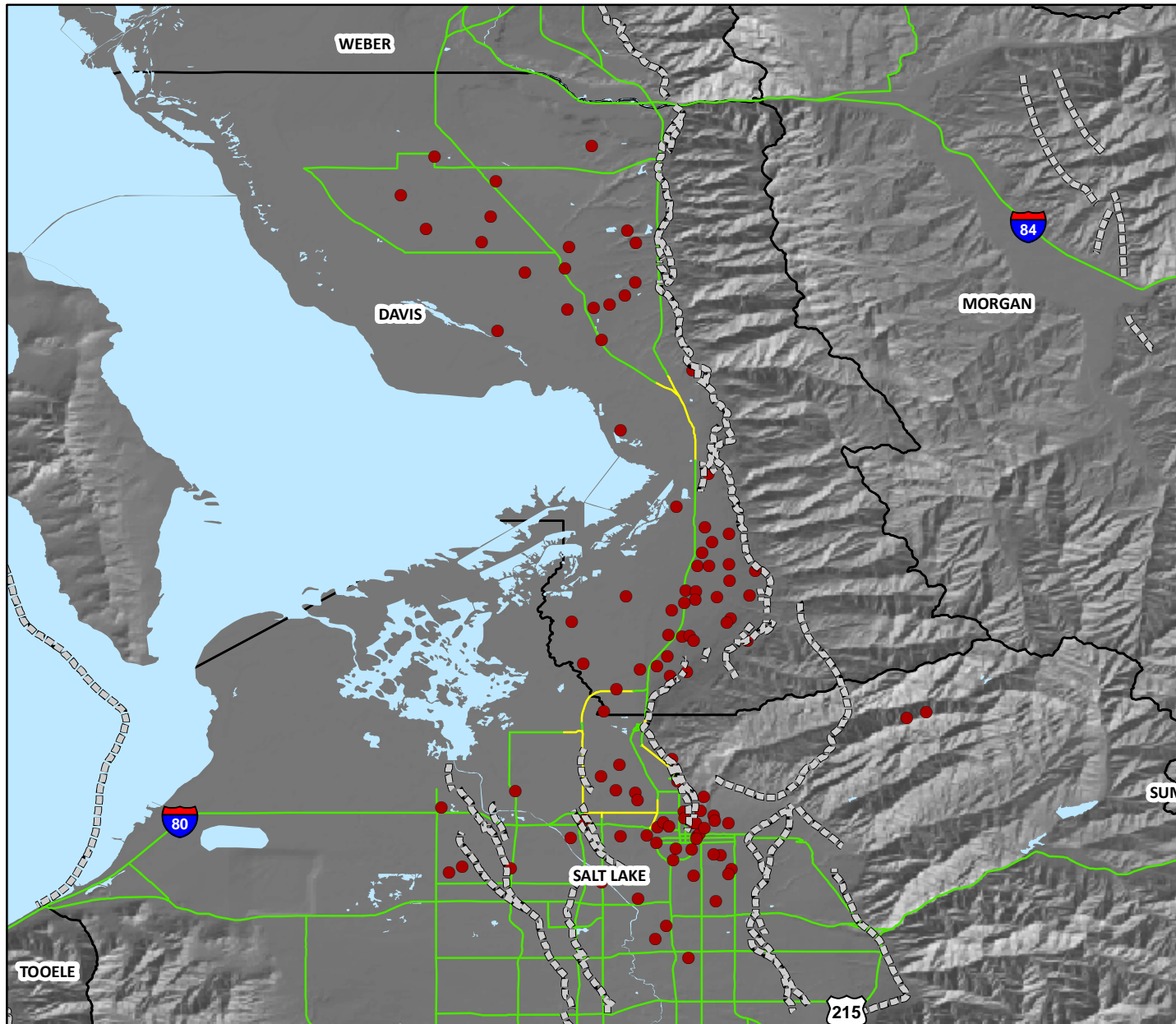
0 3 6 9 12 15 18
Miles



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OR	ID	WY
NV	UT	CO
CA	AZ	NM

Estimated Concrete, Steel Debris and Highway Damage - Earthquake Scenario: Bountiful Scenario, UT



M 6.5 Bountiful Scenario

Highway Damage

Damage is expressed as the probability that a given bridge or highway segment will realize at least moderate damage.

Highway Segment Impact

— Low

— Moderate

— High

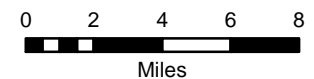
1 Dot = 10 thousand tons of Concrete and Steel Debris (by census tract)

--- Faults

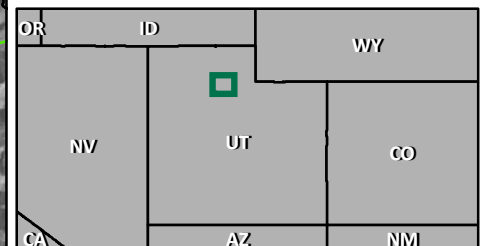
□ Counties

County	Brick and Wood (tons)	Concrete and Steel (tons)	Estimated Truck Loads*
Box Elder	0	0	0
Cache	0	0	0
Davis	423	575	40
Morgan	0	0	0
Salt Lake	1,363	631	80
Tooele	1	0	0
Utah	2	0	0
Weber	78	23	4
Total	1,867	1,229	124

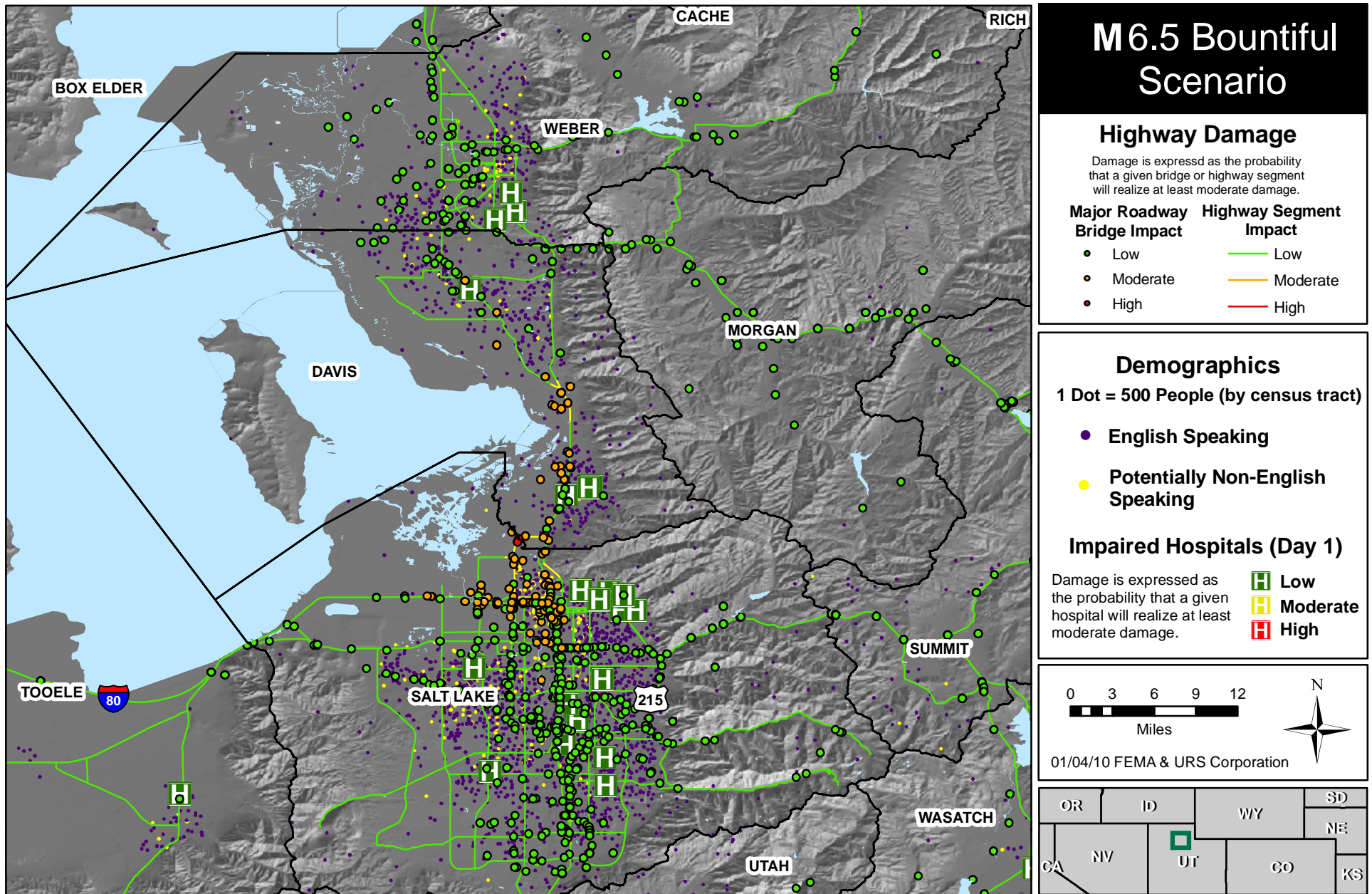
* Truck loads estimated at 25 tons per truck



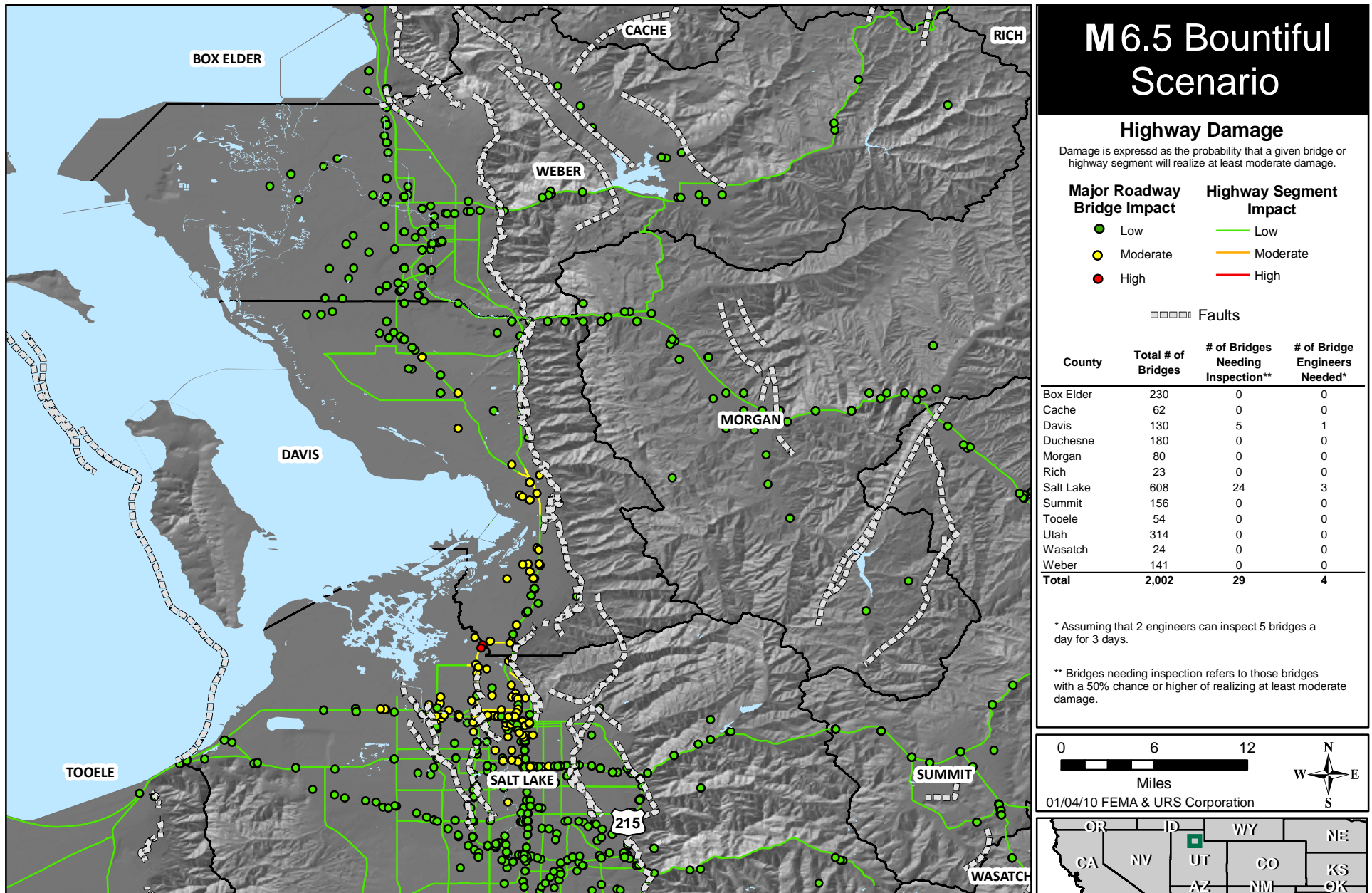
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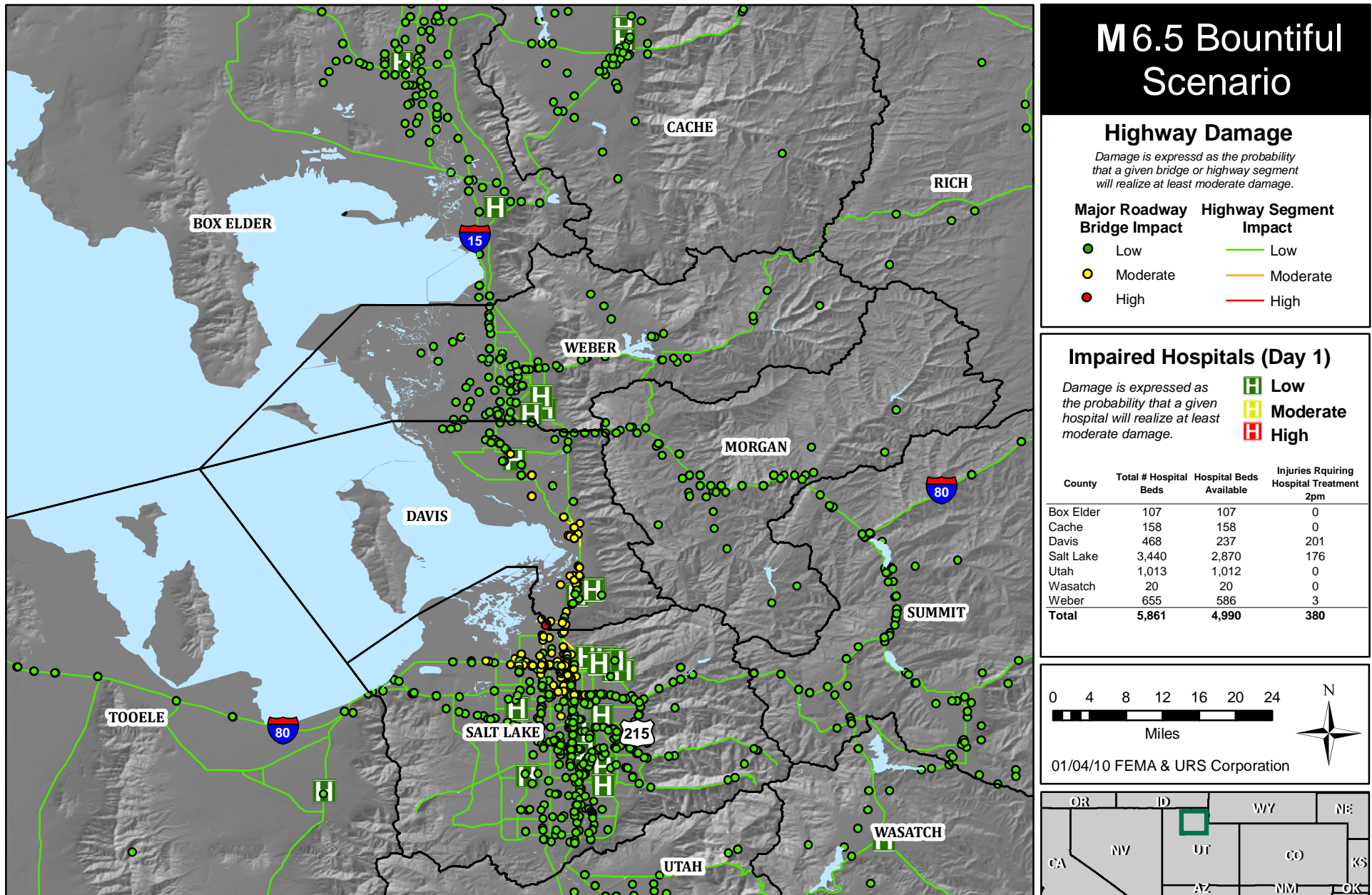
Demographic Distribution and Highway Functionality - Earthquake Scenario: Bountiful Scenario, UT



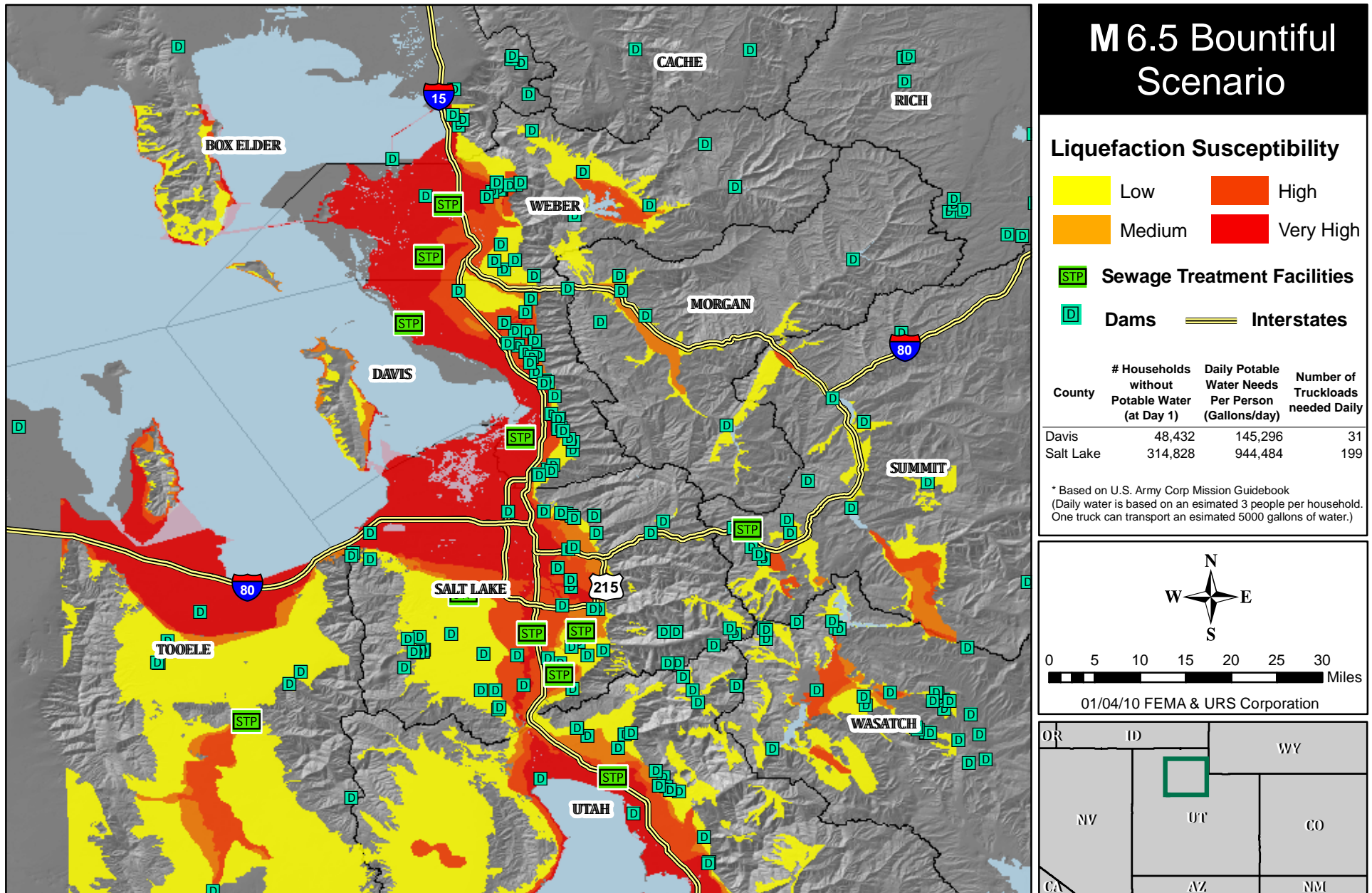
Estimated Highway Infrastructure Damage - Earthquake Scenario: Bountiful Scenario, UT



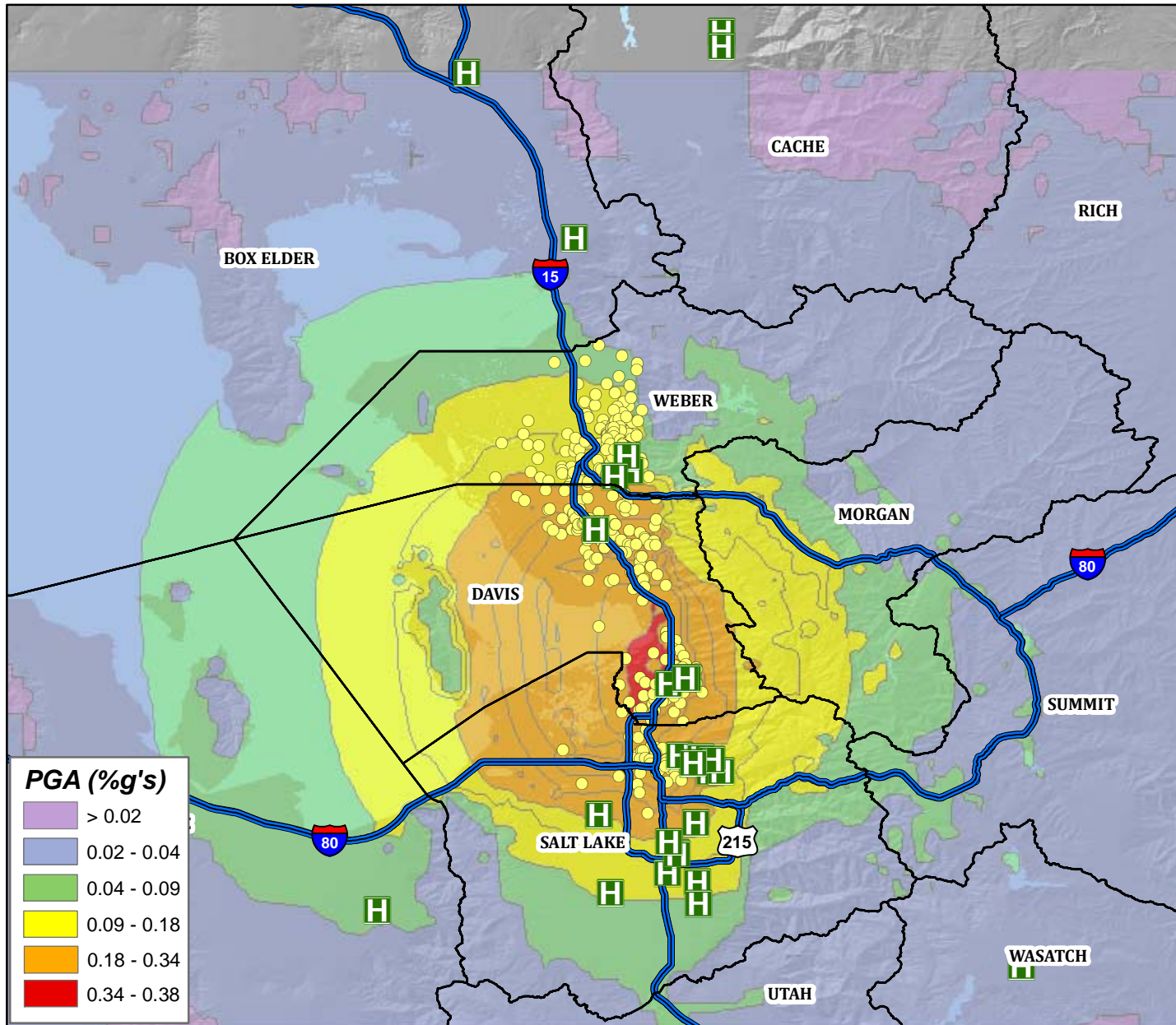
Impaired Hospitals (Day 1), Hospital Bed Availability, & Highway Functionality - Earthquake Scenario: Bountiful Scenario, UT



Water Line, Sewage Treatment Facility Distribution and Liquefaction Susceptibility - Earthquake Scenario: Bountiful Scenario, UT



Potential Search and Rescue Needs - Earthquake Scenario: Bountiful Scenario, UT



M6.5 Bountiful Scenario

Impaired Hospitals (Day 1)

Damage is expressed as the probability that a given hospital will realize at least moderate damage.

Low
Moderate
High

1 Dot = 1 Life Threatening Injury (Severity Level 3* - 2pm)

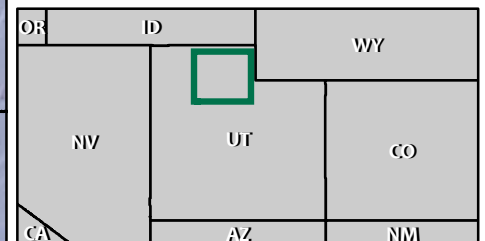
County	Requiring Hospital Treatment (2pm)	Immediate Life Threatening Injuries (2pm)
Davis	198	27
Salt Lake	176	18
Weber	3	0
Total	377	45

Structure Type	Red (Complete)	Collapse Rates for Complete Damage	Total Collapse
Wood	113	3%	3
Steel	41	6%	2
Concrete	19	10%	2
Precast	21	13%	3
Reinforced Masonry	65	10%	7
Unreinforced Masonry	947	15%	142
Manufactured Housing	53	3%	2
Total	1,259		161

*Severity Level 3 is defined as injuries that require hospitalization and can become life threatening if not promptly treated.

0 3 6 9 12 15 18 Miles

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Correctional and Daycare Facilities, Impaired Hospitals (Day 1), and Highway Functionality - Earthquake Scenario: Bountiful Scenario, UT

