Scenario: M 7.1 Tacoma Fault
Grays Harbor County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Educational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotels	0	0	0	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	0	0	0
Other-Residential	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Single Family	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Grays Harbor	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	143	3	1	0	0	147
Commercial	1602	48	8	0	0	1,658
Education	52	1	0	0	0	53
Government	55	1	0	0	0	56
Industrial	472	16	3	0	0	491
Religion	152	3	0	0	0	155
Other Residential	11284	448	62	0	0	11,794
Single Family	22,695	121	3	0	0	22,819

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$498,000	$4,480,000	$2,638,000	$127,000	0.1	$230,000	$123,000	$154,000	$165,000	$8,414,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large											
Medium	140	116	83	117	83	134	96	140	100	140	100
Small	24	23	94	23	94	24	100	24	100	24	100
Total	**164**	**139**	**—**	**140**	**—**	**158**	**—**	**164**	**—**	**164**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
269 (270*)	264	3	3	0	0

* values in parentheses include rounding error.

Scenario: M 7.1 Tacoma Fault
Grays Harbor County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
3	44	$3,348,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
27,930	0	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
27,930	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
1,000	0	1,000	40

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
0	0

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	99
Fire Station Facilities	39	99
Police Station Facilities	11	98
School	44	99

Scenario: M 7.1 Tacoma Fault
Jefferson County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Educational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotels	0	0	0	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	0	0	0
Other-Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single Family	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Jefferson	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	90	1	0	0	0	91
Commercial	839	11	1	0	0	851
Education	29	0	0	0	0	29
Government	31	0	0	0	0	31
Industrial	318	5	1	0	0	324
Religion	65	1	0	0	0	66
Other Residential	4525	144	17	0	0	4,686
Single Family	10,439	34	0	0	0	10,473

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$98,000	$1,094,000	$615,000	$21,000	0.05	$38,000	$16,000	$19,000	$25,000	$1,925,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large											
Medium											
Small	43	43	100	43	100	43	100	43	100	43	100
Total	**43**	**43**	**—**	**43**	**—**	**43**	**—**	**43**	**—**	**43**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
54	53	1	0	1	0

Scenario: M 7.1 Tacoma Fault
Jefferson County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
1	6	$478,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
12,634	0	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
12,634	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
0	0	0	0

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
0	0

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	100
Fire Station Facilities	21	98
Police Station Facilities	2	100
School	17	99

Scenario: M 7.1 Tacoma Fault
King County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	3	215	0	4	284	1	6	483	0	1	93	1	14	1075
Commercial	44	2,513	1,832	11	652	472	2	103	75	4	202	141	61	3470	2520
Educational	0	427	51	0	107	12	0	17	2	0	32	4	0	583	69
Hotels	28	5	9	7	1	2	1	0	0	2	0	1	38	6	12
Industrial	72	533	333	20	151	94	3	24	15	7	48	30	102	756	472
Other-Residential	884	180	330	190	40	72	21	5	8	40	8	15	1135	233	425
Single Family	420	79	158	42	8	16	2	1	1	4	1	2	468	89	177
Total King	**1,448**	**3,740**	**2,928**	**270**	**963**	**952**	**30**	**156**	**584**	**57**	**292**	**286**	**1805**	**5151**	**4750**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	1,218	364	227	84	27	1,920
Commercial	22,141	7,069	5,308	1,979	637	37,134
Education	850	242	165	64	21	1,342
Government	300	113	92	38	12	555
Industrial	5,413	1,910	1,675	699	247	9,944
Religion	1,489	427	278	103	32	2,329
Other Residential	50,213	17,464	11,010	5,515	1,698	85,900
Single Family	321,178	103,624	22,094	1,456	219	448,571

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$892,213,000	$3,794,145,000	$1,598,010,000	$55,713,000	2.94	$514,149,000	$265,250,000	$321,892,000	$308,639,000	$7,750,011,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	4,943	4,028	81	4,048	82	4,800	97	4,937	100	4,938	100
Medium	684	331	48	337	49	569	83	673	98	677	99
Small	100	58	58	59	59	93	93	100	100	100	100
Total	**5,727**	**4,417**	**—**	**4,444**	**—**	**5,462**	**—**	**5,710**	**—**	**5,715**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

	Average Number for Damage State				
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
1,033 (1,022*)	868	41	31	41	41

* values in parentheses include rounding error.

Scenario: M 7.1 Tacoma Fault
King County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
88	14,160	$1,253,791,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
745,853	143,979	19	129,141	17	99,891	13	227	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
745,853	71,392	10	46,205	6	20,591	3	4443	0.6	95	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
750,000	1,492,000	2,242,000	89,680

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
10,241	6,331

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	18	71
Fire Station Facilities	164	71
Police Station Facilities	52	75
School	721	70

Scenario: M 7.1 Tacoma Fault
Kitsap County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	5	0	0	9	0	0	12	0	0	2	0	0	28
Commercial	1	89	92	0	18	21	0	2	3	0	5	5	1	114	121
Educational	0	42	4	0	10	1	0	1	0	0	3	0	0	56	5
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	2	12	8	0	3	2	0	0	0	0	1	0	2	16	10
Other-Residential	107	21	38	19	4	7	1	0	0	2	0	1	129	25	46
Single Family	65	14	25	8	2	3	0	0	0	1	0	0	74	16	28
Total Kitsap	**175**	**178**	**172**	**27**	**37**	**43**	**1**	**3**	**15**	**3**	**9**	**8**	**206**	**227**	**238**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	203	56	33	13	4	309
Commercial	2,262	780	521	157	35	3,755
Education	97	30	19	6	2	154
Government	88	23	15	4	1	131
Industrial	679	234	185	69	20	1,187
Religion	173	57	35	12	3	280
Other Residential	8,856	4,004	2,800	1,439	431	17,530
Single Family	47,681	14,409	2,445	367	77	64,979

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$76,212,000	$339,447,000	$138,211,000	$2,202,000	2.38	$47,514,000	$16,614,000	$21,185,000	$20,214,000	$661,598,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	297	223	75	225	76	291	98	297	100	297	100
Medium	55	17	31	18	32	44	80	55	100	55	100
Small											
Total	**352**	**240**	**—**	**243**	**—**	**335**	**—**	**352**	**—**	**352**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
82 (83*)	74	3	2	2	2

* values in parentheses include rounding error.

Scenario: M 7.1 Tacoma Fault
Kitsap County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
10	537	$36,829,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
91,417	36,026	39	27,374	30	8,606	9	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
91,417	6,049	7	4,033	4	1,940	2	489	0.5	8	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
86,000	95,000	181,000	7,240

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
363	237

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	65
Fire Station Facilities	50	70
Police Station Facilities	8	77
School	110	77

Scenario: M 7.1 Tacoma Fault
Mason County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	6	0	0	8	0	0	14	0	0	3	0	0	31
Commercial	1	44	41	0	12	11	0	2	2	0	4	3	1	62	57
Educational	0	16	1	0	4	0	0	1	0	0	1	0	0	22	1
Hotels	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Industrial	1	4	3	0	1	1	0	0	0	0	0	0	1	5	4
Other-Residential	46	11	16	9	2	3	1	0	0	1	0	0	57	13	19
Single Family	17	1	6	2	0	1	0	0	0	0	0	0	19	1	7
Total Mason	**66**	**76**	**73**	**11**	**19**	**24**	**1**	**3**	**16**	**1**	**5**	**6**	**79**	**103**	**119**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	62	22	15	6	2	107
Commercial	542	205	191	85	30	1,053
Education	19	7	5	2	1	34
Government	24	6	5	3	1	39
Industrial	194	78	80	38	14	404
Religion	41	14	12	5	2	74
Other Residential	3,291	1,786	1,696	982	308	8,063
Single Family	11,295	5,059	1,693	68	3	18,118

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$29,643,000	$124,568,000	$47,992,000	$1,024,000	4.18	$21,161,000	$5,352,000	$6,699,000	$7,144,000	$243,584,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large											
Medium	68	57	83	57	84	67	98	68	100	68	100
Small											
Total	**68**	**57**	**—**	**57**	**—**	**67**	**—**	**68**	**—**	**68**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
92 (93*)	79	4	3	4	3

* values in parentheses include rounding error.

Scenario: M 7.1 Tacoma Fault
Mason County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
4	10	$697,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
20,412	311	2	10	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
20,412	3,480	17	2,326	11	1,075	5	233	1.1	4	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
40,000	44,000	84,000	3,360

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
47	29

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	2	84
Fire Station Facilities	31	65
Police Station Facilities	3	84
School	23	61

Scenario: M 7.1 Tacoma Fault
Pierce County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	6	0	1	8	0	1	13	0	0	3	0	2	30
Commercial	4	256	212	1	49	43	0	6	6	0	12	11	5	323	272
Educational	0	87	9	0	20	2	0	3	0	0	6	0	0	116	11
Hotels	3	1	1	1	0	0	0	0	0	0	0	0	4	1	1
Industrial	6	43	27	1	9	6	0	1	1	0	2	1	7	55	35
Other-Residential	149	29	54	24	5	9	1	0	1	3	0	1	177	34	65
Single Family	102	19	38	7	1	3	0	0	0	1	0	0	110	20	41
Total Pierce	**264**	**435**	**347**	**34**	**85**	**71**	**1**	**11**	**21**	**4**	**20**	**16**	**303**	**551**	**455**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	501	148	78	22	6	755
Commercial	7,275	2,712	1,653	416	79	12,135
Education	270	90	55	14	3	432
Government	141	45	30	8	1	225
Industrial	2,185	823	578	178	42	3,806
Religion	594	186	93	21	4	898
Other Residential	32,261	12,455	5,491	1,325	469	52,001
Single Family	143,080	38,420	4,636	213	25	186,374

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$180,231,000	$822,383,000	$361,779,000	$10,205,000	1.91	$106,466,000	$51,198,000	$61,420,000	$57,140,000	$1,650,822,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	2,873	2,346	82	2,357	82	2,828	98	2,870	100	2,870	100
Medium	397	303	76	305	77	389	98	397	100	397	100
Small											
Total	**3,270**	**2,649**	**—**	**2,662**	**—**	**3,217**	**—**	**3,267**	**—**	**3,267**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

	Average Number for Damage State				
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
404 (399*)	351	16	16	12	4

* values in parentheses include rounding error.

Scenario: M 7.1 Tacoma Fault
Pierce County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
32	2,735	$173,251,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
282,052	13,228	5	7,536	3	955	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
282,052	6,754	2	4,564	2	2,153	1	484	0.2	9	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
168,000	250,000	418,000	16,720

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
916	545

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	5	80
Fire Station Facilities	86	76
Police Station Facilities	26	75
School	299	78

Scenario: M 7.1 Tacoma Fault
Thurston County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Commercial	0	6	5	0	0	0	0	0	0	0	0	0	0	6	5
Educational	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Other-Residential	5	1	2	0	0	0	0	0	0	0	0	0	5	1	2
Single Family	3	0	1	0	0	0	0	0	0	0	0	0	3	0	1
Total Thurston	**8**	**9**	**8**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**8**	**9**	**9**

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

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	392	23	6	0	0	421
Commercial	3,771	303	64	2	0	4,140
Education	146	10	2	0	0	158
Government	255	23	5	0	0	283
Industrial	1,142	102	30	1	0	1,275
Religion	285	19	4	0	0	308
Other Residential	18,208	2,082	505	8	0	20,803
Single Family	55,976	1,705	20	1	0	57,702

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$5,210,000	$41,183,000	$21,030,000	$476,000	0.29	$2,471,000	$1,249,000	$1,697,000	$1,650,000	$74,966,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	375	360	96	360	96	374	100	375	100	375	100
Medium	119	116	98	116	98	119	100	119	100	119	100
Small											
Total	**494**	**476**	**—**	**476**	**—**	**493**	**—**	**494**	**—**	**494**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
186	180	4	2	0	0

Scenario: M 7.1 Tacoma Fault
Thurston County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
9	622	$42,561,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
89,162	0	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
89,162	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
6,000	4,000	10,000	400

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
5	3

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	5	96
Fire Station Facilities	46	97
Police Station Facilities	9	96
School	95	97

HAZUS-MH: Earthquake Event Report

Region Name: TacomaM71_redoOct09

Earthquake Scenario: TacomaRedoOct09

Print Date: March 10, 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.

Table of Contents

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

Washington

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

The geographical size of the region is 36,495.82 square miles and contains 1,084 census tracts. There are over 2,043 thousand households in the region and has a total population of 5,283,432 people (2005 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 1,877 thousand buildings in the region with a total building replacement value (excluding contents) of 402,081 (millions of dollars). Approximately 92.00 % 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 151,145 and 21,726 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 1,877 thousand buildings in the region which have an aggregate total replacement value of 402,081 (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 81% 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 75 hospitals in the region with a total bed capacity of 14,258 beds. There are 2,254 schools, 938 fire stations, 226 police stations and 55 emergency operation facilities. With respect to HPL facilities, there are 450 dams identified within the region. Of these, 146 of the dams are classified as 'high hazard'. The inventory also includes 839 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 172,871.00 (millions of dollars). This inventory includes over 9,562 kilometers of highways, 4,996 bridges, 286,170 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	4,996	90,051.60
	Segments	3,454	53,323.90
	Tunnels	29	67.00
		Subtotal	**143,442.50**
Railways	Bridges	77	20.00
	Facilities	68	181.10
	Segments	1,407	2,642.40
	Tunnels	0	0.00
		Subtotal	**2,843.50**
Light Rail	Bridges	0	0.00
	Facilities	38	101.20
	Segments	48	203.90
	Tunnels	0	0.00
		Subtotal	**305.00**
Bus	Facilities	45	54.00
		Subtotal	**54.00**
Ferry	Facilities	45	59.90
		Subtotal	**59.90**
Port	Facilities	486	970.50
		Subtotal	**970.50**
Airport	Facilities	62	660.40
	Runways	74	2,809.30
		Subtotal	**3,469.70**
		Total	**151,145.10**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	2,861.70
	Facilities	41	1,501.80
	Pipelines	0	0.00
		Subtotal	**4,363.50**
Waste Water	Distribution Lines	NA	1,717.00
	Facilities	146	10,696.00
	Pipelines	0	0.00
		Subtotal	**12,413.00**
Natural Gas	Distribution Lines	NA	1,144.70
	Facilities	56	67.10
	Pipelines	0	0.00
		Subtotal	**1,211.80**
Oil Systems	Facilities	15	1.70
	Pipelines	0	0.00
		Subtotal	**1.70**
Electrical Power	Facilities	78	9,438.00
		Subtotal	**9,438.00**
Communication	Facilities	196	21.60
		Subtotal	**21.60**
		Total	**27,449.60**

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	TacomaRedoOct09
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	7.10
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

HAZUS estimates that about 84,296 buildings will be at least moderately damaged. This is over 4.00 % of the total number of buildings in the region. There are an estimated 4,457 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 summaries the expected damage by general occupancy for the buildings in the region. Table 4 summaries 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	7,175	0.46	649	0.29	366	0.57	125	0.81	39	0.89
Commercial	76,038	4.84	11,557	5.18	7,816	12.13	2,641	17.14	781	17.52
Education	2,802	0.18	394	0.18	249	0.39	86	0.56	27	0.59
Government	1,933	0.12	219	0.10	149	0.23	53	0.34	15	0.34
Industrial	23,381	1.49	3,347	1.50	2,590	4.02	987	6.41	323	7.25
Other Residential	308,581	19.65	40,791	18.30	21,925	34.03	9,271	60.17	2,907	65.21
Religion	5,526	0.35	730	0.33	426	0.66	141	0.91	41	0.92
Single Family	1,145,144	72.91	165,234	74.12	30,908	47.97	2,105	13.66	324	7.28
Total	**1,570,580**		**222,921**		**64,429**		**15,410**		**4,457**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,294,946	82.45	185240	83.10	33,786	52.44	2,273	14.75	406	9.10
Steel	31,668	2.02	4127	1.85	3,372	5.23	1,118	7.25	282	6.33
Concrete	30,981	1.97	4471	2.01	2,857	4.43	969	6.29	291	6.52
Precast	21,804	1.39	3197	1.43	2,745	4.26	1,040	6.75	309	6.93
RM	58,983	3.76	5125	2.30	4,085	6.34	1,361	8.83	261	5.85
URM	9,621	0.61	2629	1.18	1,949	3.02	806	5.23	372	8.35
MH	122,577	7.80	18133	8.13	15,635	24.27	7,842	50.89	2,537	56.92
Total	**1,570,580**		**222,921**		**64,429**		**15,410**		**4,457**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 14,258 hospital beds available for use. On the day of the earthquake, the model estimates that only 12,216 hospital beds (86.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 97.00% of the beds will be back in service. By 30 days, 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	75	0	0	67
Schools	2,254	0	0	2,034
EOCs	55	0	0	51
PoliceStations	226	0	0	216
FireStations	938	0	0	871

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	3,454	0	0	3,454	3,454
	Bridges	4,996	91	12	4,913	4,947
	Tunnels	29	0	0	29	29
Railways	Segments	1,407	0	0	1,407	1,407
	Bridges	77	0	0	77	77
	Tunnels	0	0	0	0	0
	Facilities	68	1	0	67	68
Light Rail	Segments	48	0	0	48	48
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	38	1	0	37	38
Bus	Facilities	45	0	0	45	45
Ferry	Facilities	45	1	0	45	45
Port	Facilities	486	0	0	486	486
Airport	Facilities	62	1	0	61	62
	Runways	74	0	0	74	74

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	41	6	0	31	41
Waste Water	146	9	0	122	144
Natural Gas	56	3	0	51	56
Oil Systems	15	0	0	14	15
Electrical Power	78	4	0	70	78
Communication	196	13	0	190	196

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

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	143,085	2927	1550
Waste Water	85,851	2315	1226
Natural Gas	57,234	2475	1311
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	2,043,617	193,544	164,061	109,452	227	0
Electric Power		87,675	57,128	25,759	5,649	116

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 176 ignitions that will burn about 7.51 sq. mi 0.02 % of the region's total area.) The model also estimates that the fires will displace about 21,233 people and burn about 1,728 (millions of dollars) of building value.

Debris Generation

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

The model estimates that a total of 2.950 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 36.00% 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 117,960,000 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 11,576 households to be displaced due to the earthquake. Of these, 7,146 people (out of a total population of 5,283,432) 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	50	13	2	4
	Commuting	0	1	1	0
	Educational	0	0	0	0
	Hotels	33	8	1	2
	Industrial	81	22	4	7
	Other-Residential	1,197	243	24	45
	Single Family	609	59	3	6
	Total	**1,970**	**345**	**35**	**64**
2 PM	Commercial	2,922	733	113	223
	Commuting	4	5	8	2
	Educational	575	141	21	42
	Hotels	6	1	0	0
	Industrial	594	163	26	51
	Other-Residential	243	50	5	9
	Single Family	118	12	1	1
	Total	**4,461**	**1,106**	**175**	**328**
5 PM	Commercial	2,191	547	85	161
	Commuting	233	309	524	101
	Educational	65	15	2	5
	Hotels	10	2	0	1
	Industrial	372	102	16	32
	Other-Residential	443	91	9	17
	Single Family	229	23	1	2
	Total	**3,542**	**1,090**	**638**	**319**

Economic Loss

The total economic loss estimated for the earthquake is 13,148.21 (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 10,501.42 (millions of dollars); 18 % 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 54 % 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 Loses							
	Wage	0.00	28.95	349.13	18.06	18.56	414.69
	Capital-Related	0.00	12.25	313.36	10.79	4.78	341.18
	Rental	46.98	129.56	204.84	6.59	8.95	396.92
	Relocation	166.51	127.16	300.19	31.92	68.54	694.32
	Subtotal	**213.49**	**297.92**	**1,167.52**	**67.35**	**100.83**	**1,847.12**
Capital Stock Loses							
	Structural	348.23	236.55	435.85	97.78	71.90	1,190.31
	Non_Structural	2,116.61	1,265.95	1,244.81	341.19	220.76	5,189.32
	Content	888.03	325.36	647.46	224.64	118.19	2,203.68
	Inventory	0.00	0.00	21.60	47.55	1.85	71.00
	Subtotal	**3,352.87**	**1,827.85**	**2,349.72**	**711.16**	**412.70**	**8,654.31**
	Total	**3,566.36**	**2,125.77**	**3,517.24**	**778.51**	**513.54**	**10,501.42**

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	53,323.90	$148.06	0.28
	Bridges	90,051.61	$1467.33	1.63
	Tunnels	66.98	$0.35	0.52
	Subtotal	**143442.50**	**1,615.70**	
Railways	Segments	2,642.42	$3.92	0.15
	Bridges	19.99	$0.06	0.29
	Tunnels	0.00	$0.00	0.00
	Facilities	181.08	$25.12	13.87
	Subtotal	**2843.50**	**29.10**	
Light Rail	Segments	203.85	$1.36	0.67
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	101.19	$17.49	17.28
	Subtotal	**305.00**	**18.90**	
Bus	Facilities	53.96	$3.88	7.20
	Subtotal	**54.00**	**3.90**	
Ferry	Facilities	59.90	$5.06	8.45
	Subtotal	**59.90**	**5.10**	
Port	Facilities	970.54	$86.08	8.87
	Subtotal	**970.50**	**86.10**	
Airport	Facilities	660.36	$38.39	5.81
	Runways	2,809.34	$3.49	0.12
	Subtotal	**3469.70**	**41.90**	
	Total	**151145.10**	**1,800.60**	

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	1,501.80	$120.50	8.02
	Distribution Lines	2,861.70	$21.36	0.75
	Subtotal	**4,363.54**	**$141.86**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	10,696.00	$383.70	3.59
	Distribution Lines	1,717.00	$16.89	0.98
	Subtotal	**12,412.98**	**$400.59**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	67.10	$1.44	2.14
	Distribution Lines	1,144.70	$18.06	1.58
	Subtotal	**1,211.83**	**$19.49**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	1.70	$0.07	4.23
	Subtotal	**1.65**	**$0.07**	
Electrical Power	Facilities	9,438.00	$283.24	3.00
	Subtotal	**9,438.00**	**$283.24**	
Communication	Facilities	21.60	$0.93	4.33
	Subtotal	**21.56**	**$0.93**	
	Total	**27,449.55**	**$846.19**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%
First Year			
	Employment Impact	1,827,734	101.54
	Income Impact	5,488	6.15
Second Year			
	Employment Impact	697,537	38.75
	Income Impact	2,893	3.24
Third Year			
	Employment Impact	16,334	0.91
	Income Impact	578	0.65
Fourth Year			
	Employment Impact	921	0.05
	Income Impact	(251)	-0.28
Fifth Year			
	Employment Impact	49	0.00
	Income Impact	(297)	-0.33
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(300)	-0.34

Appendix A: County Listing for the Region

Chelan,WA

Clallam,WA

Clark,WA

Cowlitz,WA

Grays Harbor,WA

Island,WA

Jefferson,WA

King,WA

Kitsap,WA

Kittitas,WA

Klickitat,WA

Lewis,WA

Mason,WA

Pacific,WA

Pierce,WA

San Juan,WA

Skagit,WA

Skamania,WA

Snohomish,WA

Thurston,WA

Wahkiakum,WA

Whatcom,WA

Yakima,WA

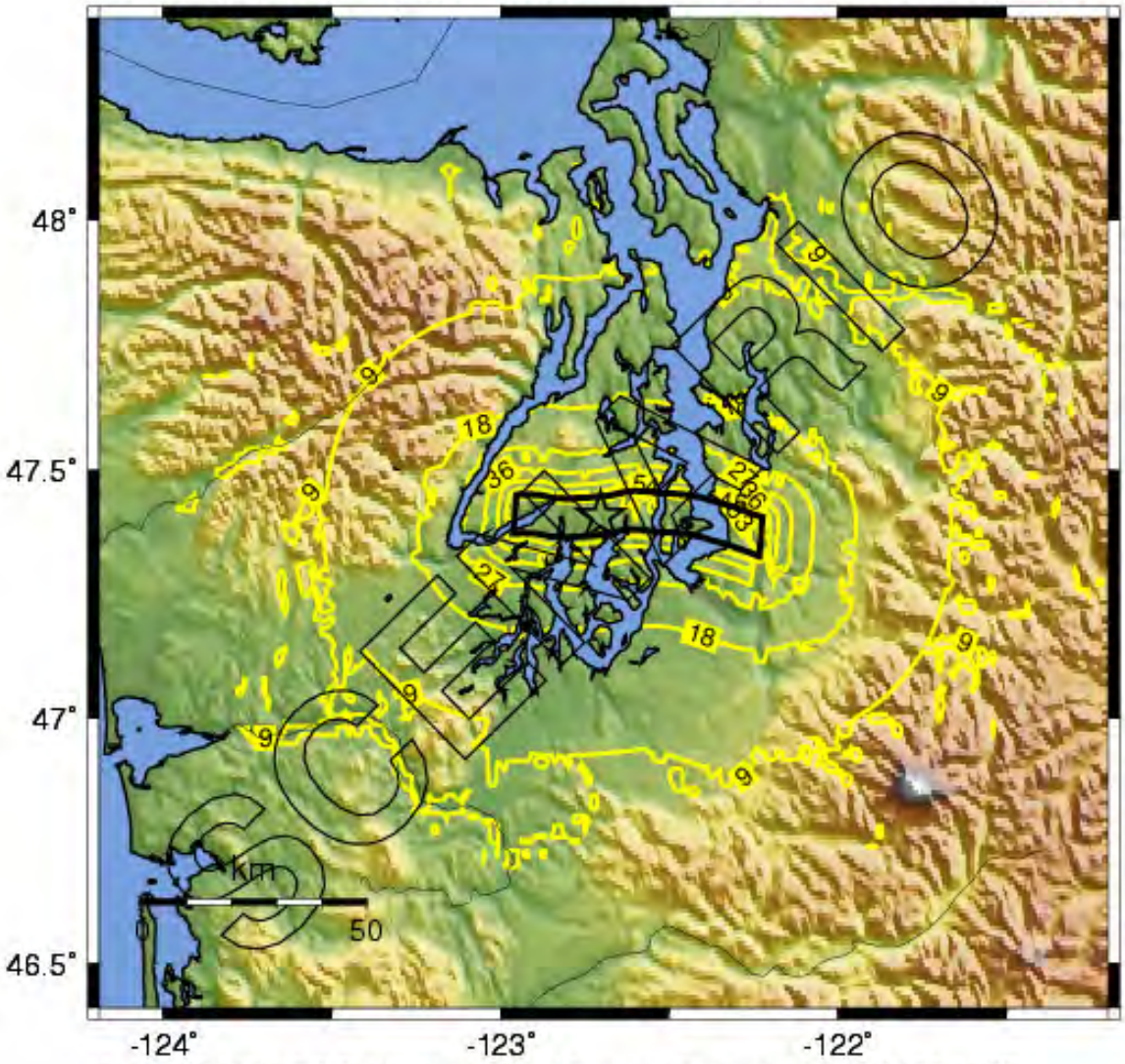
Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Washington					
	Chelan	68,646	3,915	1,524	5,439
	Clallam	68,232	3,789	1,128	4,917
	Clark	395,707	21,358	5,081	26,439
	Cowlitz	96,113	5,167	1,575	6,742
	Grays Harbor	69,881	3,866	1,228	5,095
	Island	78,149	5,289	842	6,132
	Jefferson	28,169	1,741	517	2,258
	King	1,828,516	123,492	35,829	159,322
	Kitsap	245,278	14,460	2,974	17,435
	Kittitas	37,701	2,087	539	2,627
	Klickitat	20,162	908	287	1,195
	Lewis	70,750	3,424	1,286	4,711
	Mason	53,236	3,094	593	3,687
	Pacific	20,855	1,443	384	1,828
	Pierce	757,734	42,208	10,185	52,394
	San Juan	15,413	1,454	350	1,805
	Skagit	111,356	6,119	1,896	8,015
	Skamania	10,300	551	118	670
	Snohomish	661,444	38,562	8,570	47,132
	Thurston	226,721	12,793	3,286	16,080
	Wahkiakum	3,900	204	62	267
	Whatcom	185,545	10,528	3,715	14,244
	Yakima	229,624	9,899	3,738	13,637
Total State		**5,283,432**	**316,351**	**85,707**	**402,071**
Total Region		**5,283,432**	**316,351**	**85,707**	**402,071**

-- Earthquake Planning Scenario --

Peak Accel. Map (in %g) for Tacoma7.1 Scenario

Scenario Date: Thu Jun 4, 2009 12:00:00 GMT M 7.1 N47.41 W122.70 Depth: 0.0km

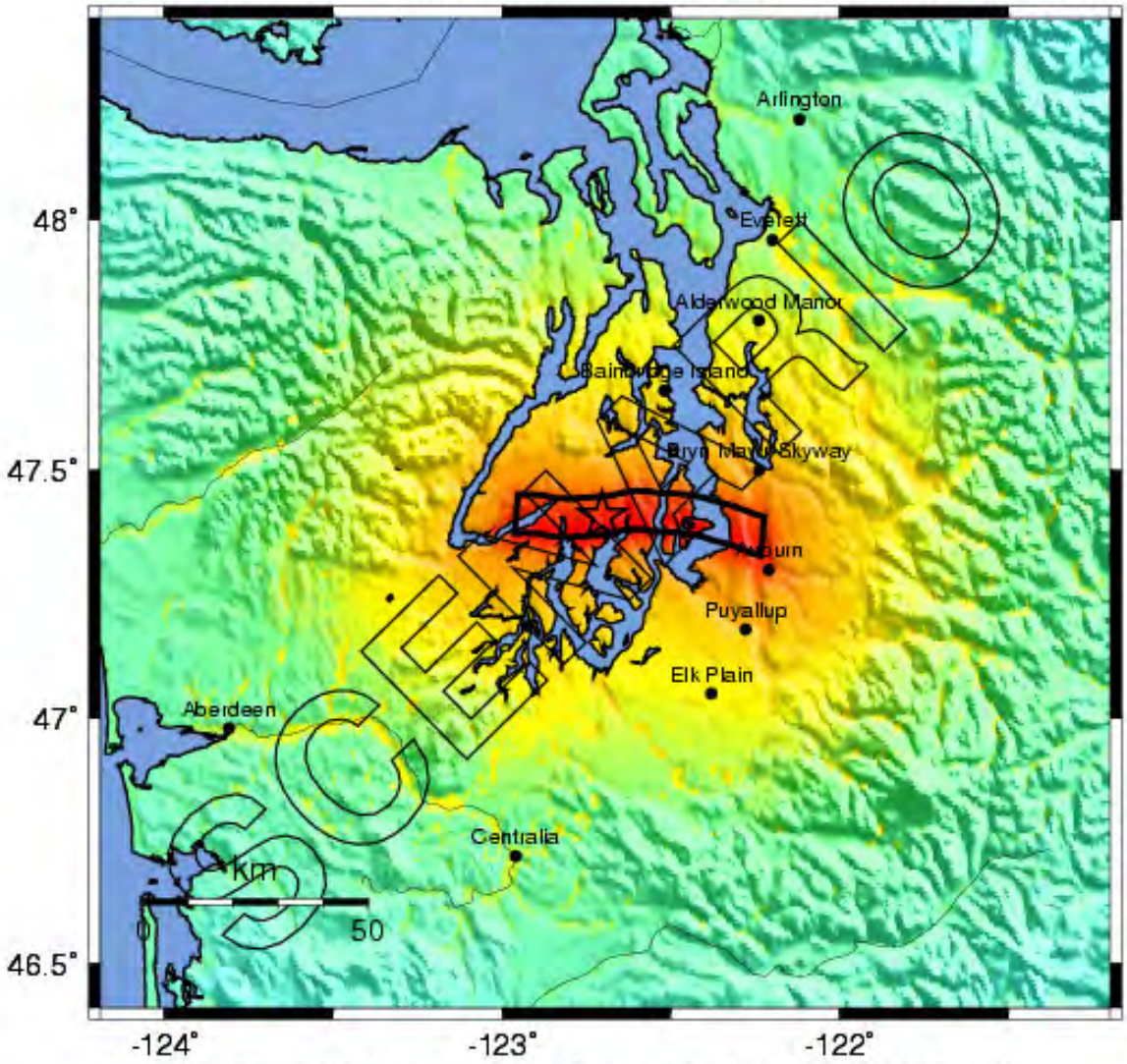


PLANNING SCENARIO ONLY -- Map Version 1 Processed Thu Jun 4, 2009 03:09:25 PM MDT

-- Earthquake Planning Scenario --

ShakeMap for Tacoma7.1 Scenario

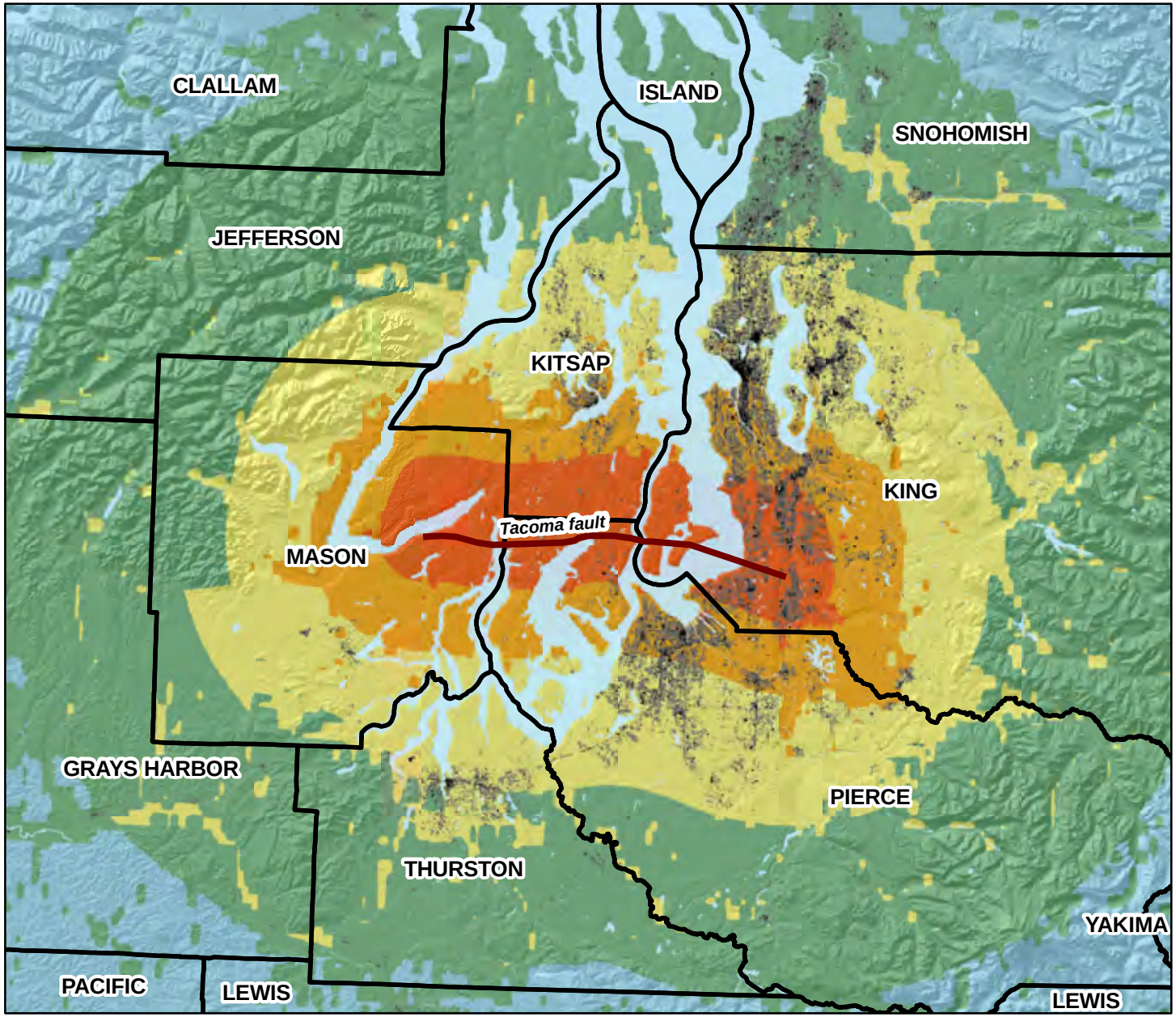
Scenario Date: Thu Jun 4, 2009 12:00:00 GMT M 7.1 N47.41 W122.70 Depth: 0.0km



PLANNING SCENARIO ONLY -- Map Version 1 Processed Thu Jun 4, 2009 03:09:25 PM MDT

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Population Density and Ground Shaking Intensities - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Population Density

People

- 0 - 4
- 4 - 20
- 20 - 40
- 40 - 50
- > 50

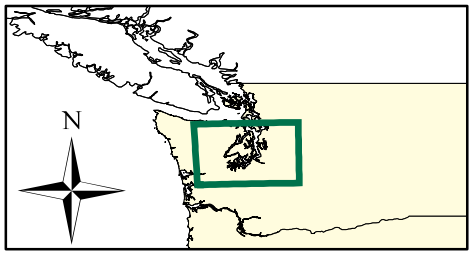
- Counties
- Fault source

MM Intensity

- IV Light
- V Moderate
- VI Strong
- VII Very Strong
- VIII Severe

0 2.5 5 10 15 20 25 30 Miles

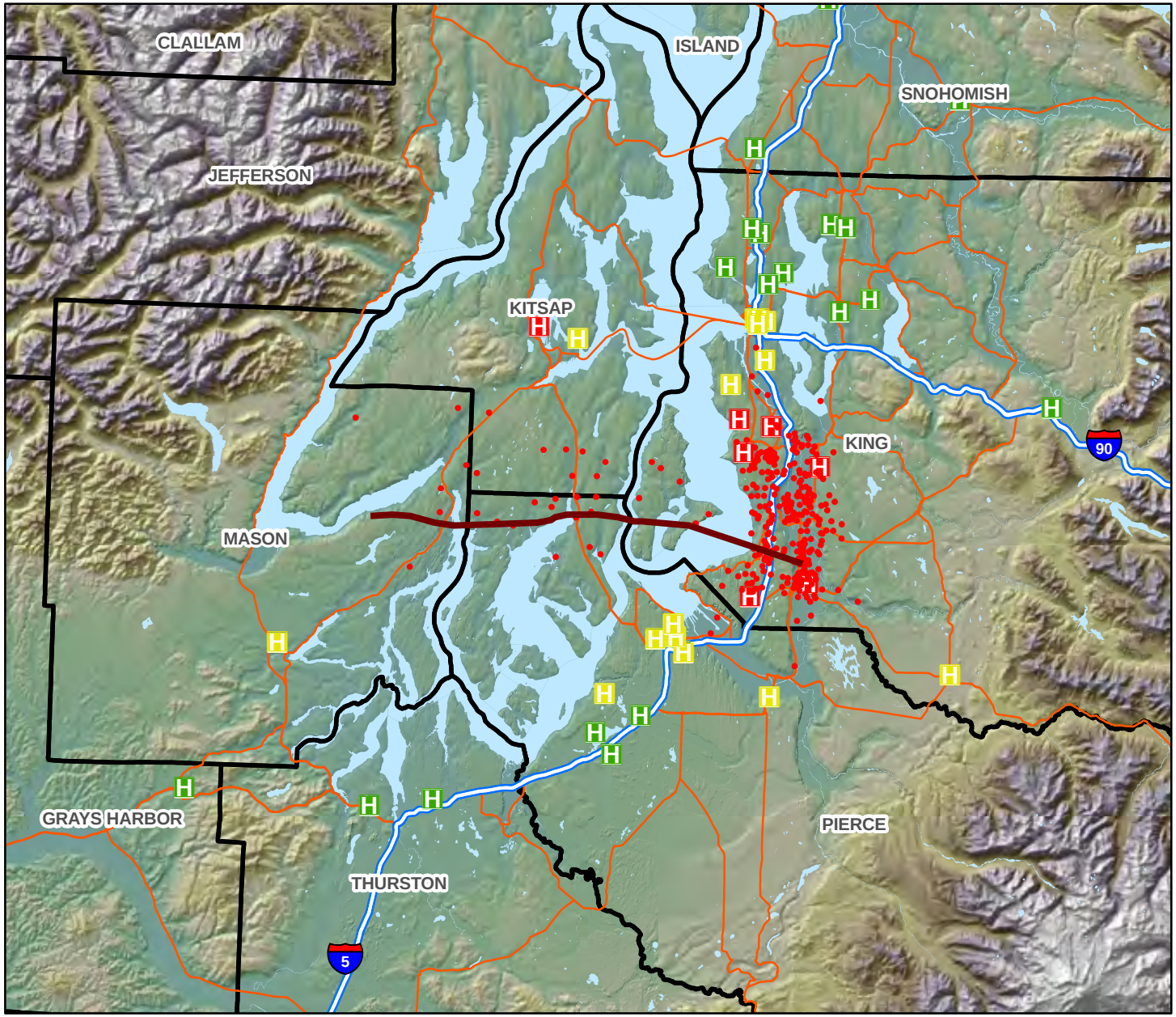
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, MMI Map USGS 2009
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 1

Injuries (2 pm) and Impaired Hospitals (Day 1) - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

1 Dot = 1 Fatalitiy
(Severity Level 4 delineated by census tract)

Roads
- Interstate
- Highway

Counties

Fault source

Impaired Hospitals at Day 1

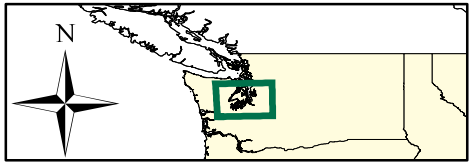
Damage is expressed as the probability that a given hospital will be functional at Day 1.

- < 50%
- 50 - 90%
- > 90%

County	Injuries Requiring Hospital Treatment (2 PM)	Fatalities (2 PM)
Grays Harbor	1	0
King	4,859	293
Kitsap	219	9
Lewis	1	0
Mason	103	6
Pierce	531	21
Snohomish	18	0
Thurston	10	0
Total	**5,742**	**329**

0 2 4 8 12 16 20 24
Miles

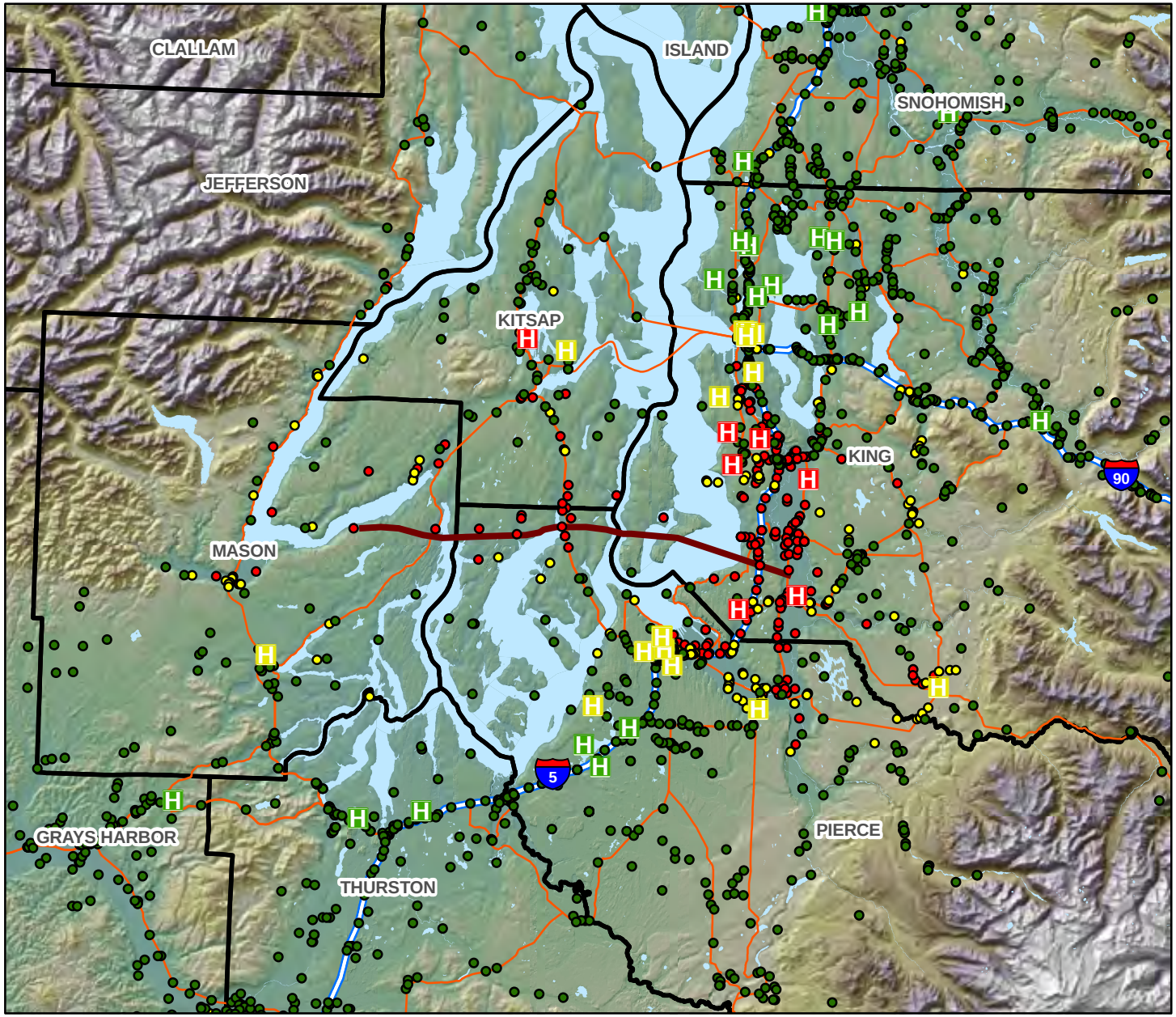
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 2

Impaired Hospitals (Day 1), Hospital Bed Availability, & Bridge Functionality - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Highway Bridge Impacts

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

Bridge Seg.
- high
- moderate
- low

Counties
Fault source

Roads
- Interstate
- Highway

Impaired Hospitals at Day 1

Damage is expressed as the probability that a given hospital will be functional at Day 1.

- H < 50%
- H 50 - 90%
- H > 90%

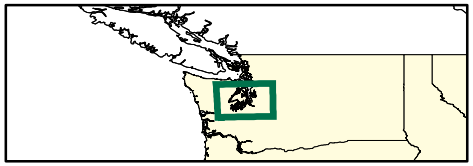
County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Grays Harbor	164	145	1
King	5,727	3,586	4,859
Kitsap	352	187	219
Lewis	415	399	1
Mason	68	57	103
Pierce	3,270	2,582	531
Snohomish	858	847	18
Thurston	494	478	10
Total	**11,348**	**8,281**	**5,742**

N

0 1.5 3 6 9 12 15 18

Miles

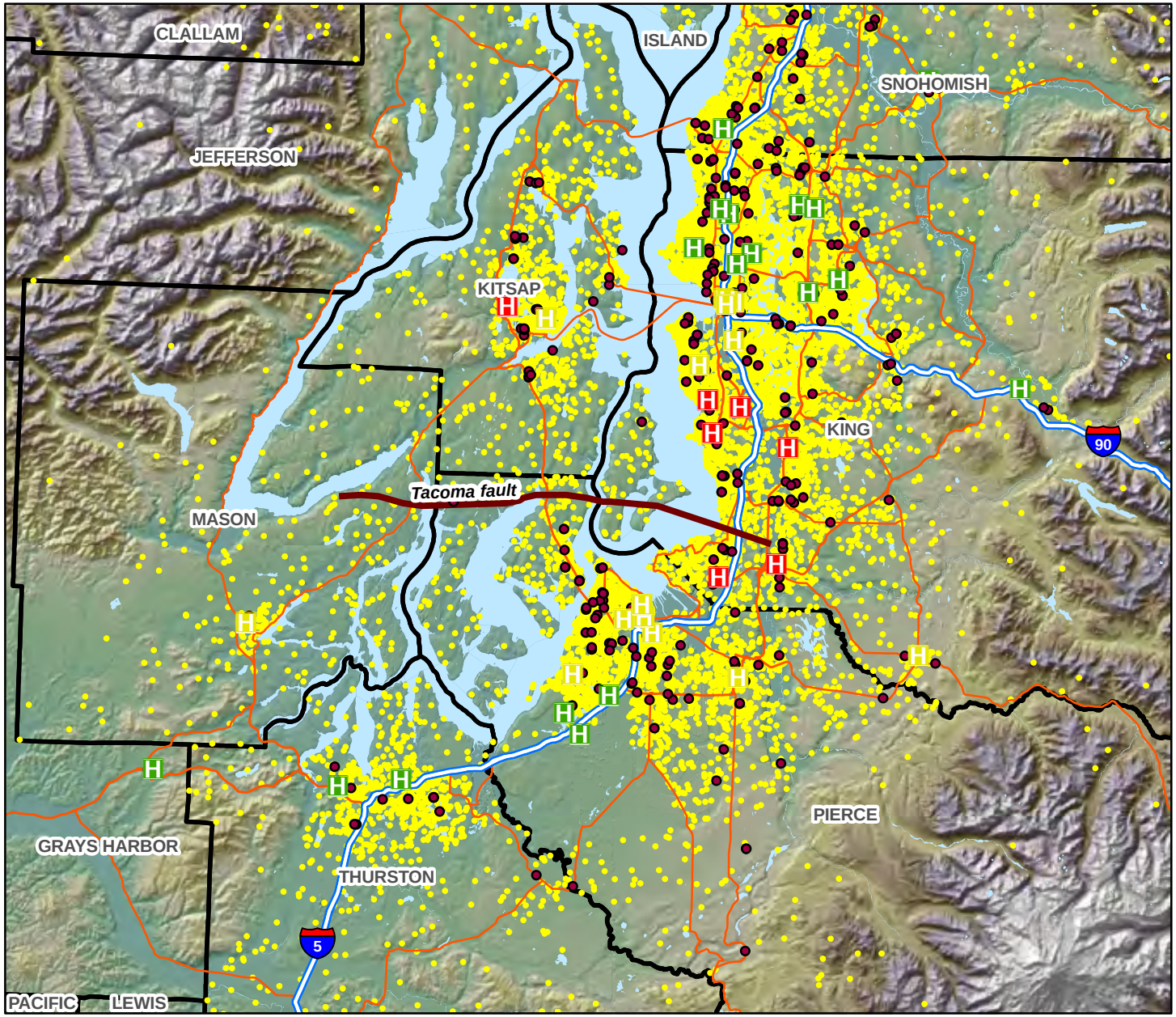
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 3

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



M 7.1 Tacoma Fault

1 Dot = 30 People over 65

Counties

Fault source

Nursing Home

Roads

Interstate

Highway

Impaired Hospitals at Day 1

Damage is expressed as the probability that a given hospital will be functional at Day 1.

H < 50%

H 50 - 90%

H > 90%

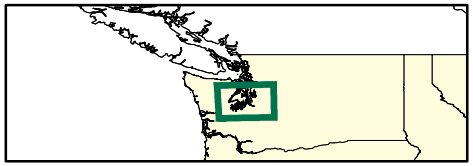
County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Grays Harbor	164	145	1
King	5,727	3,586	4,859
Kitsap	352	187	219
Lewis	415	399	1
Mason	68	57	103
Pierce	3,270	2,582	531
Snohomish	858	847	18
Thurston	494	478	10
Total	**11,348**	**8,281**	**5,742**

0 1.5 3 6 9 12 15 18

Miles

N

12-04-09 Fabia Terra, URS Corporation

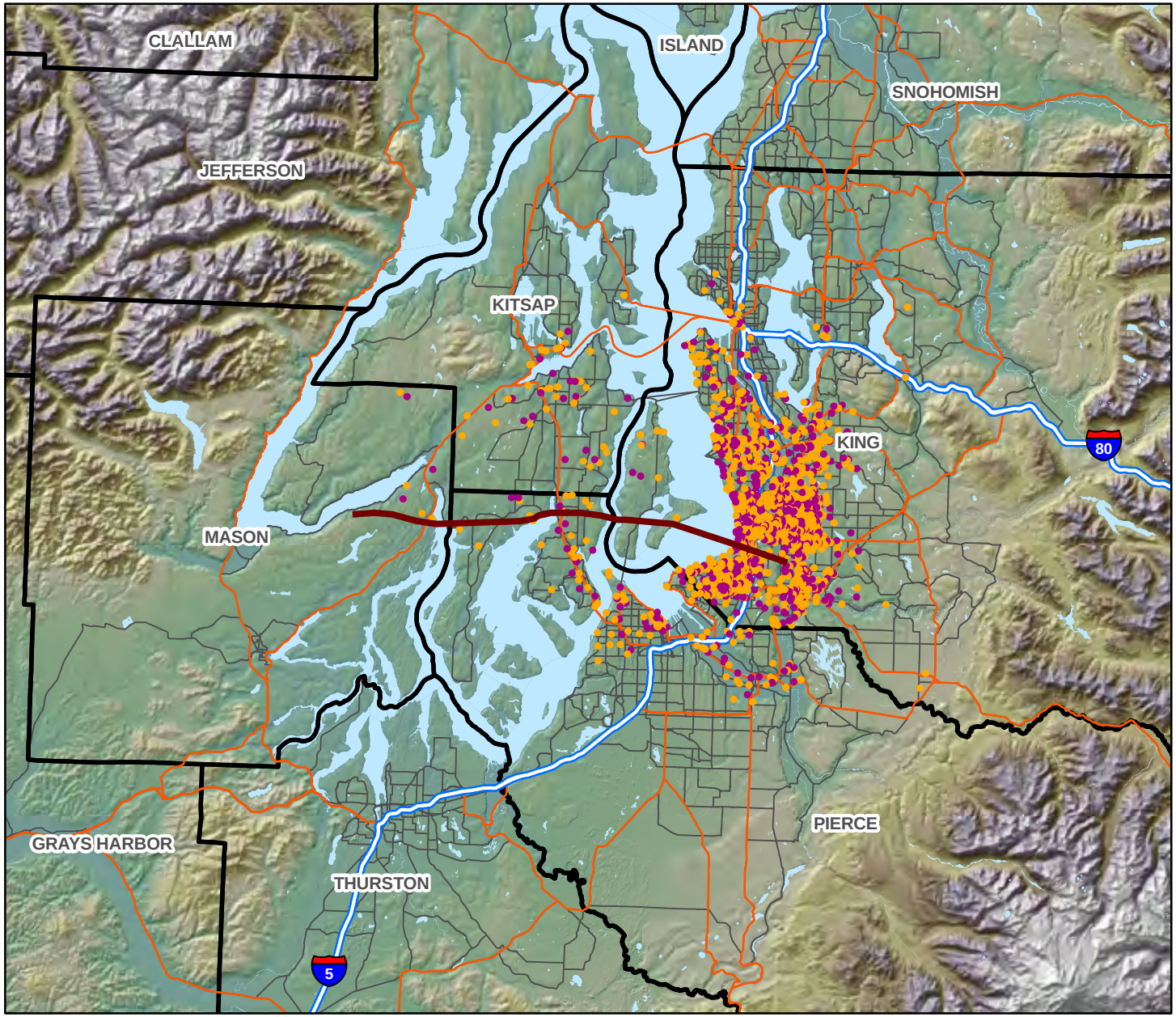


Sources: 2009 HAZUS runs by URS Corporation, Highways and Nursing homes HSIP Gold 2007

Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 4

Estimated Displaced Households & Short Term Public Shelter Needs - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

	Total #
Public Shelter Needs (Individuals)	7,147
Displaced Households	11,577

1 Dot = 10 Displaced Households*

1 Dot = 10 Public Shelter Needs (Individuals)*

* delineated by census tract

Counties

Fault source

Roads

Interstate

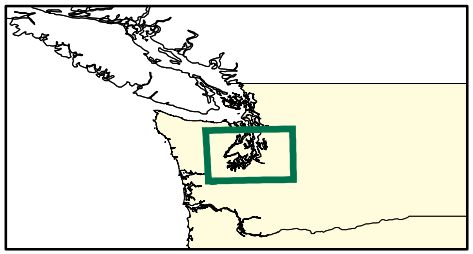
Highway

Major Road

N

0 3 6 9 12 15 18 Miles

12-04-09 Fabia Terra, URS Corporation

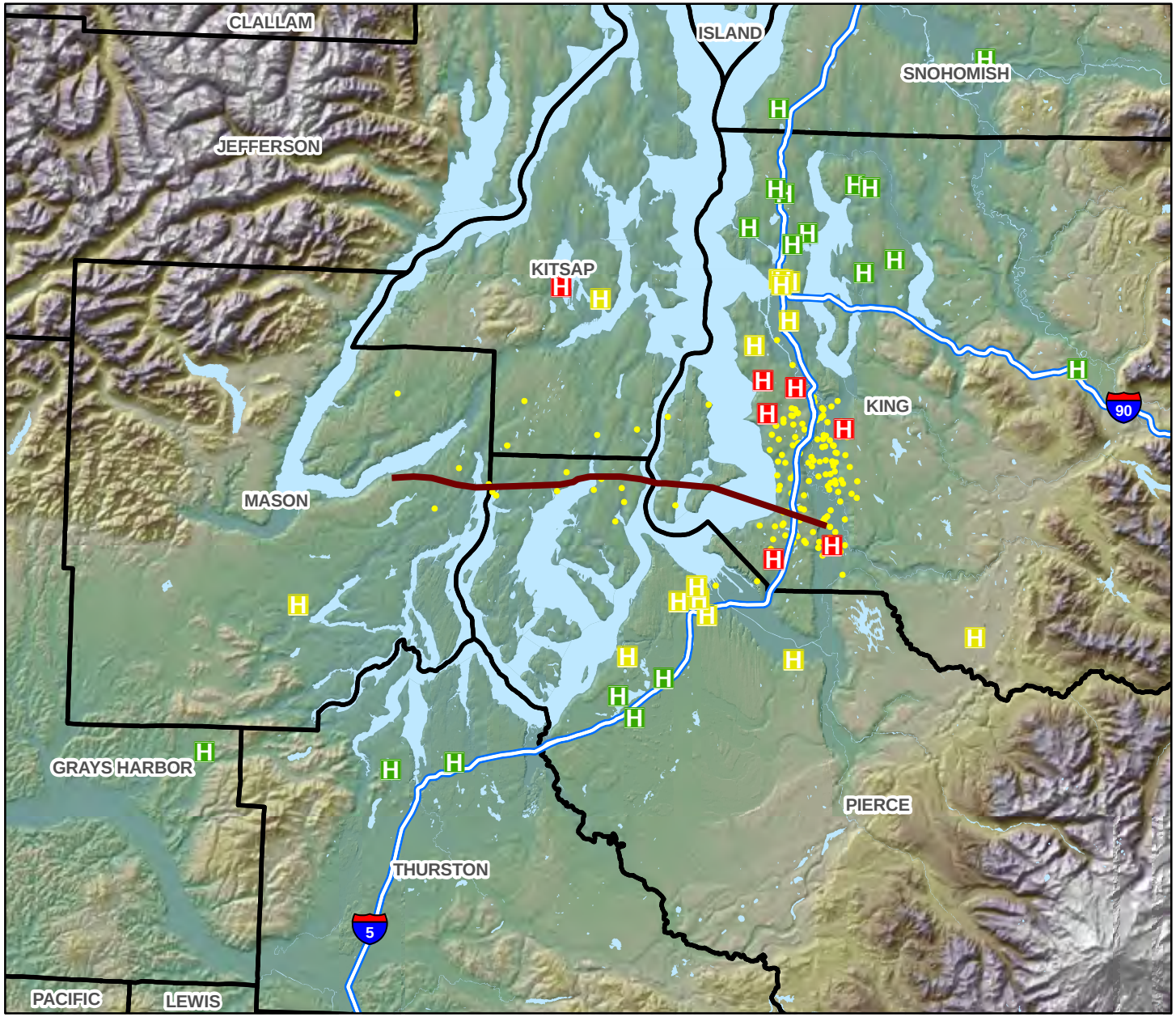


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007

Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 5

Potential Search and Rescue Needs, Collapsed Structures, and Impaired Hospitals - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Impaired Hospitals (Day1)

H < 50%
H 50 - 90%
H > 90%

Damage is expressed as the probability that a given hospital will be functional on Day 1.

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

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

Requiring Hospital Treatment**	Immediate Life Threatening Injuries**
5,742	174

**Totals for counties in view extent.

Structure Type	Red (Complete)	Collapse Rates for Complete Damage	Total Collapse
Wood	406	3%	12
Steel	282	6%	17
Concrete	291	10%	29
Precast	309	13%	40
Reinforced Masonry	261	10%	26
Unreinforced Masonry	372	15%	56
Manufactured Housing	2,537	3%	76
Total	4,458		256

Counties — Fault source

0 1.5 3 6 9 12 15 18 Miles

N

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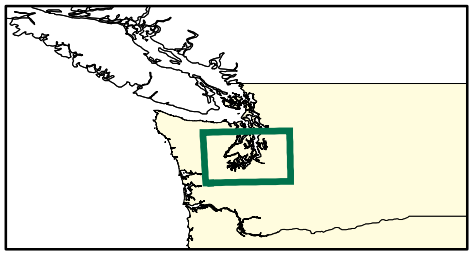
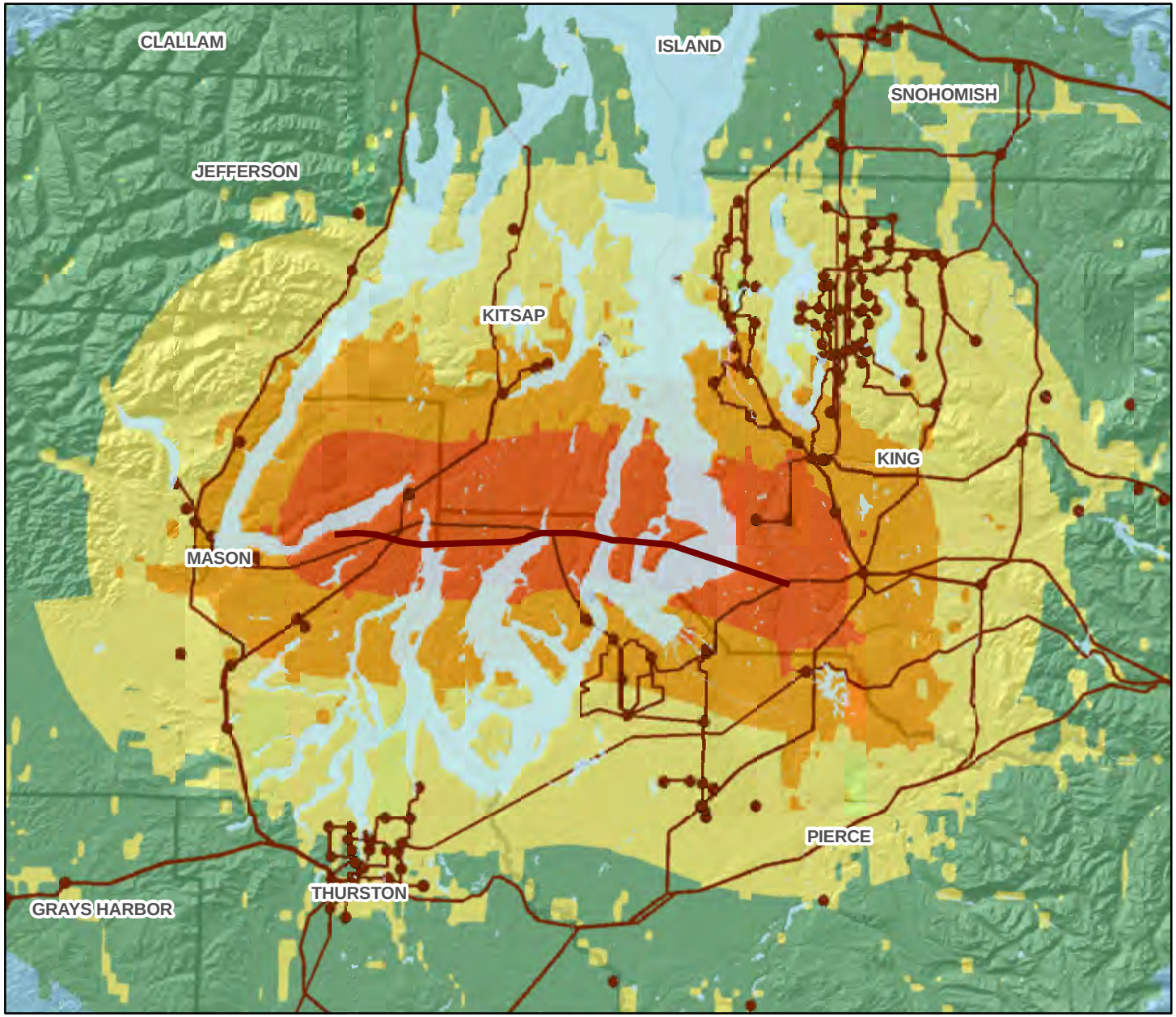


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 6

Power Lines and Facilities, Households Without Electricity, and Ground Shaking Intensities - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Power Lines

Power Facilities

MM Intensity

- IV Light
- V Moderate
- VI Strong
- VII Very Strong
- VIII Severe

Number of Households without Electricity

King	71,392
Kitsap	6,049
Mason	3,480
Pierce	6,754

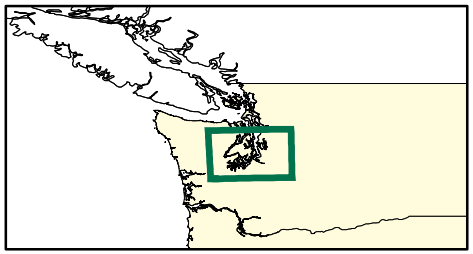
Counties

Fault source

N

0 2 4 8 12 16 20 24 Miles

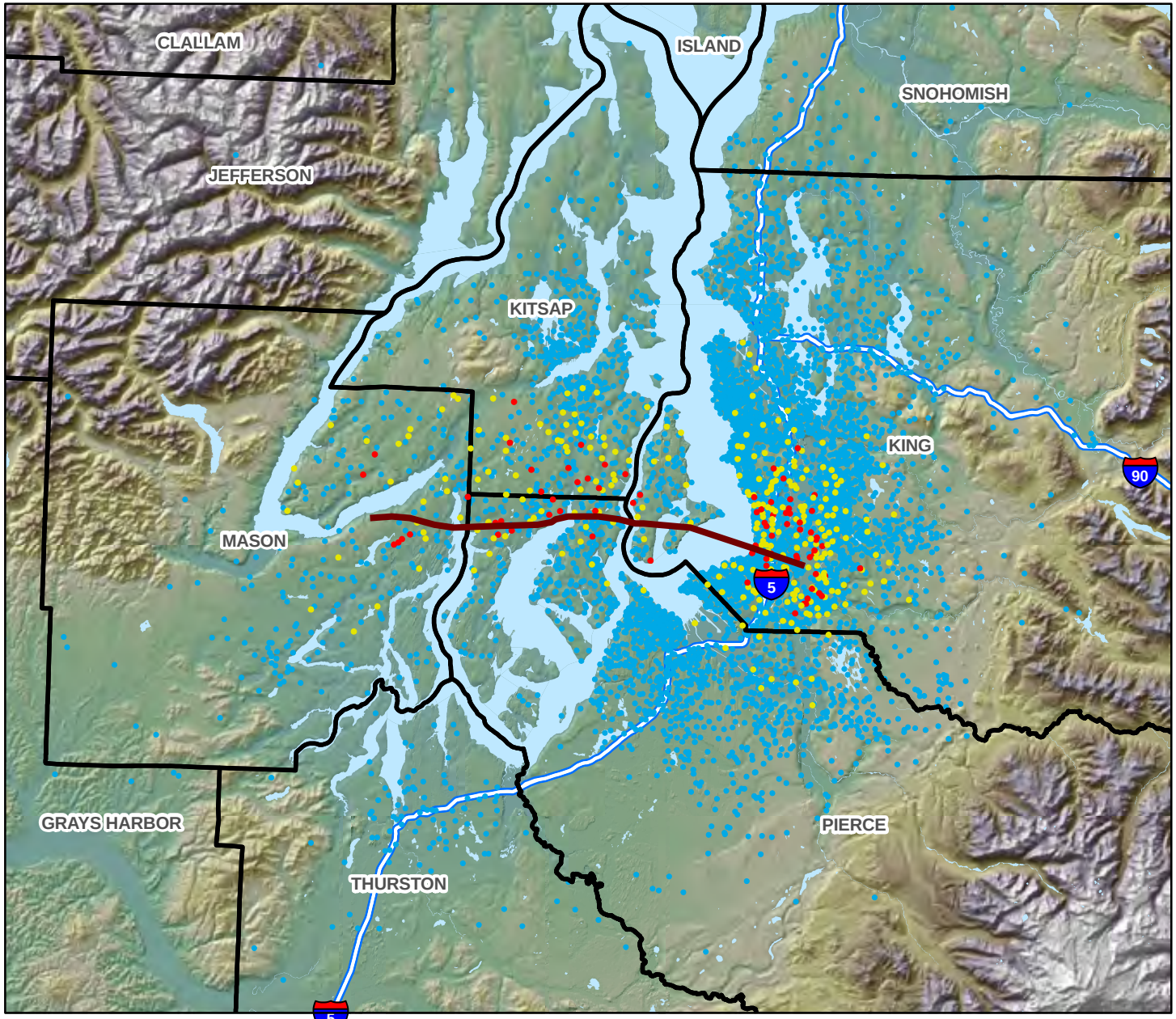
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Power lines and facilities HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 7

Estimated Building Inspection Needs - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

	Estimated # of Structures	Estimated # of Inspectors Needed
Red (Complete)	4,457	30
Yellow (Extensive)	15,410	205
Light Blue (Slight/ Moderate)	287,345	1,916
Total	307,212	2,151

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

1 Dot = 50 buildings (by census tract)

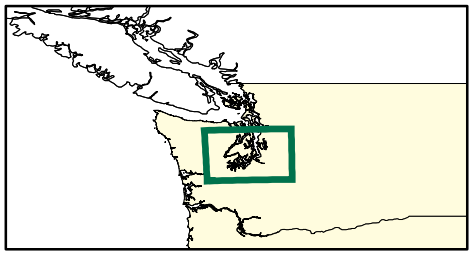
- Red Tag (Complete Damage)
- Yellow Tag (Extensive Damage)
- Blue Tag (Slight/Moderate Damage)

N

- Counties
- Fault source

0 1.5 3 6 9 12 15 18 Miles

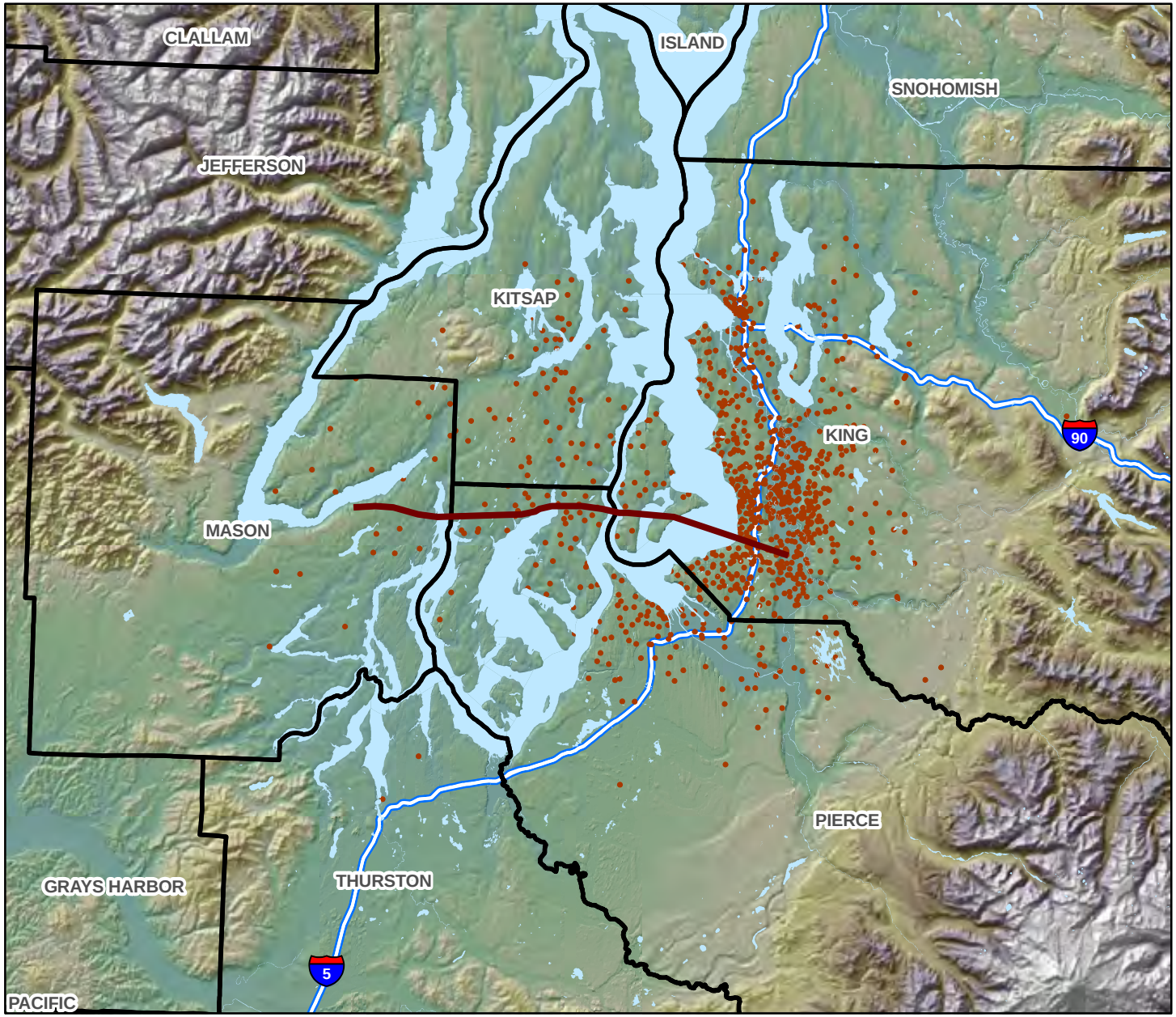
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 8

Direct Building Economic Loss - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

1 Dot = $10,000,000 worth of vulnerable building stock (by census tract)

County	Cost Strucutral Damage	Cost Non-Structural Damage	Total Loss (Including Contents)
Grays Harbor	$0 M	$4 M	$8 M
King	$892 M	$3,794 M	$6,284 M
Kitsap	$76 M	$339 M	$554 M
Lewis	$0 M	$4 M	$6 M
Mason	$30 M	$125 M	$202 M
Pierce	$180 M	$822 M	$1,364 M
Snohomish	$5 M	$54 M	$89 M
Thurston	$5 M	$41 M	$67 M
Total	**$1,190 M**	**$5,184 M**	**$8,575 M**

* All values are millions of dollars

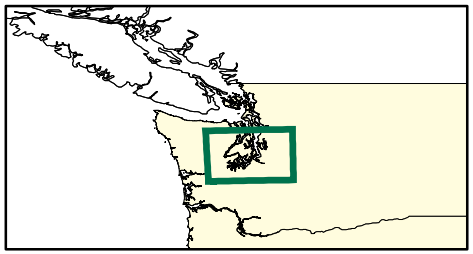
Counties

Fault source

N

0 4 8 12 16 20 24 Miles

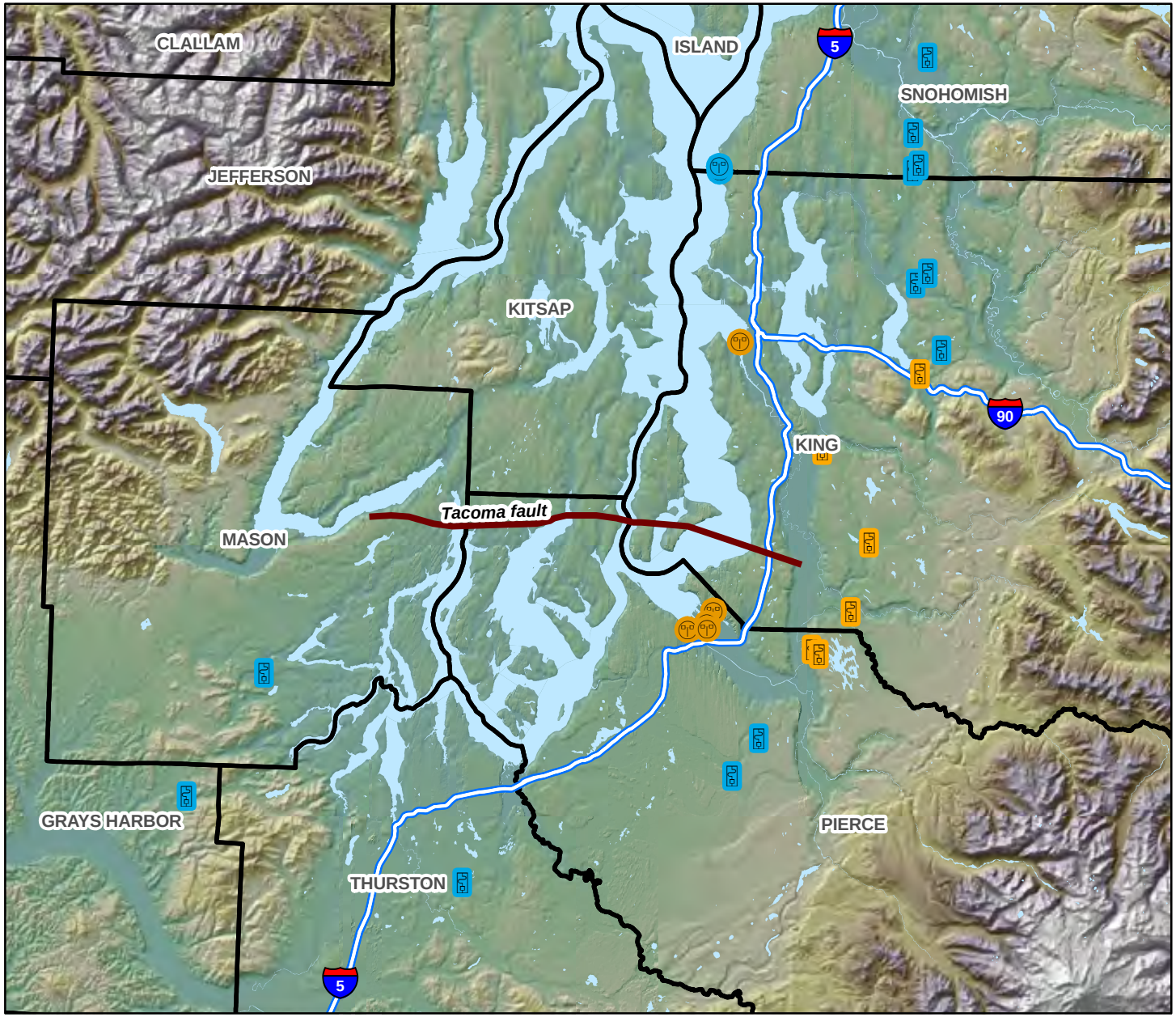
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 9

Natural Gas, and Oil Facility Damage - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Utility Damage (at least moderate)

Damage is expressed as the percentage chance that a given Utility System will realize at least moderate damage.

Oil Facility

- < 20%
- 20% - 60%
- > 60%

Natural Gas Facility

- < 20%
- 20% - 60%
- > 60%

Counties

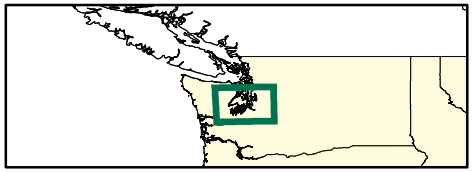
Fault source

N

0 3 6 9 12 15 18

Miles

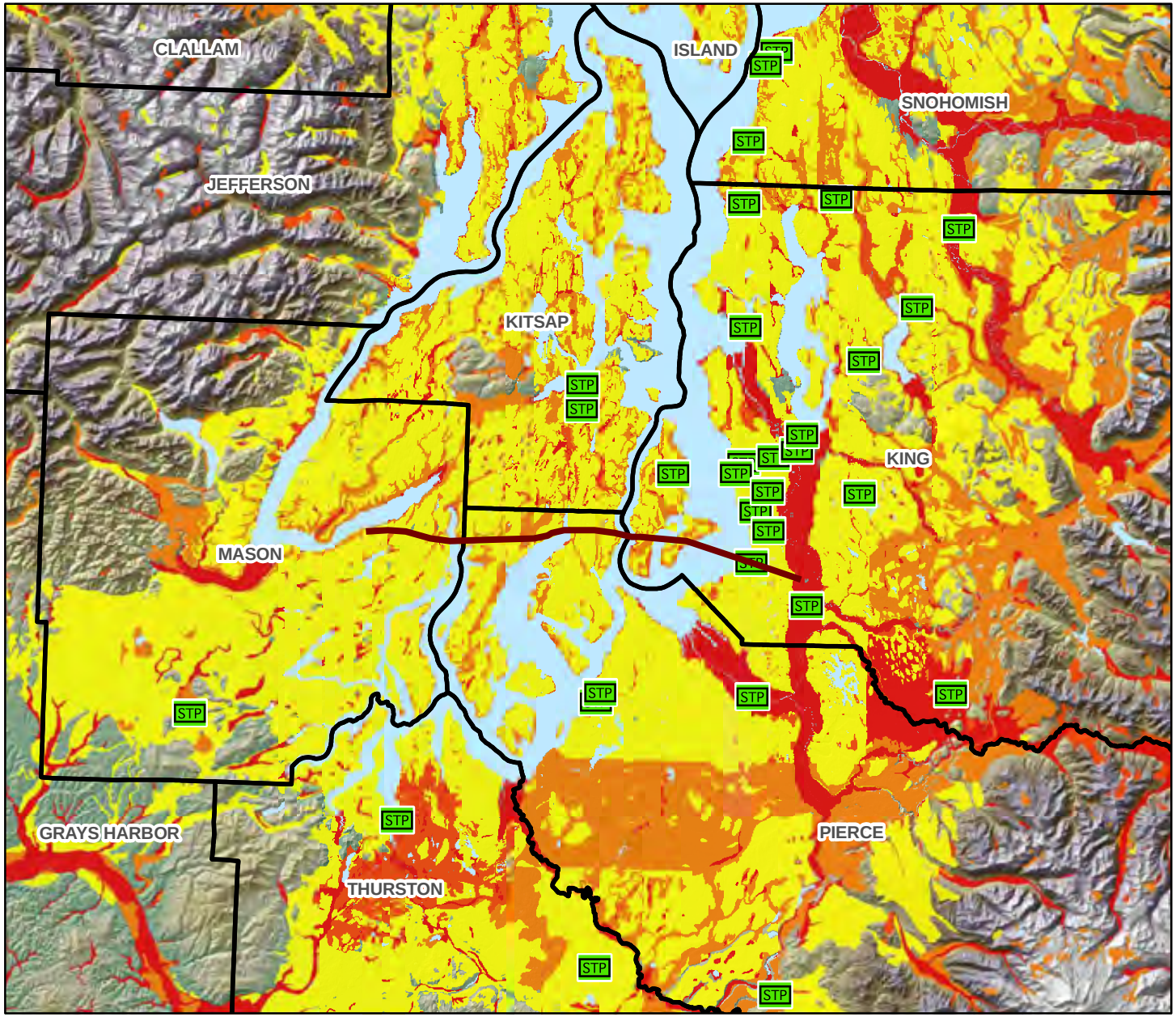
12-04-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007, MMI Map USGS 2009
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 10

Sewage Treatment Facility Distribution, Households Without Potable Water, and Liquefaction Susceptibility - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Liquefaction Susceptibility

- Low
- Moderate
- Low-Moderate
- High
- Sewage Treatment Facilities (STP)
- Counties
- Fault source

County	# Households without Potable Water (at Day 1)	Daily Potable Water Needs Per Person (Gallons/day)*	Number of Truckloads needed Daily
King	143,979	431,937	91
Kitsap	36,026	108,078	23
Mason	311	933	1
Pierce	13,228	39,684	8

* Based on U.S. Army Corp Mission Guidebook
(Daily water is based on an esimated 3 people per household. One truck can transport an esimated 5000 gallons of water.)
Note: Counties not listed had no potable water losses.

N

0 3 6 9 12 15 18 Miles

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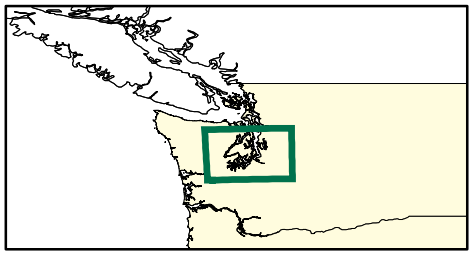
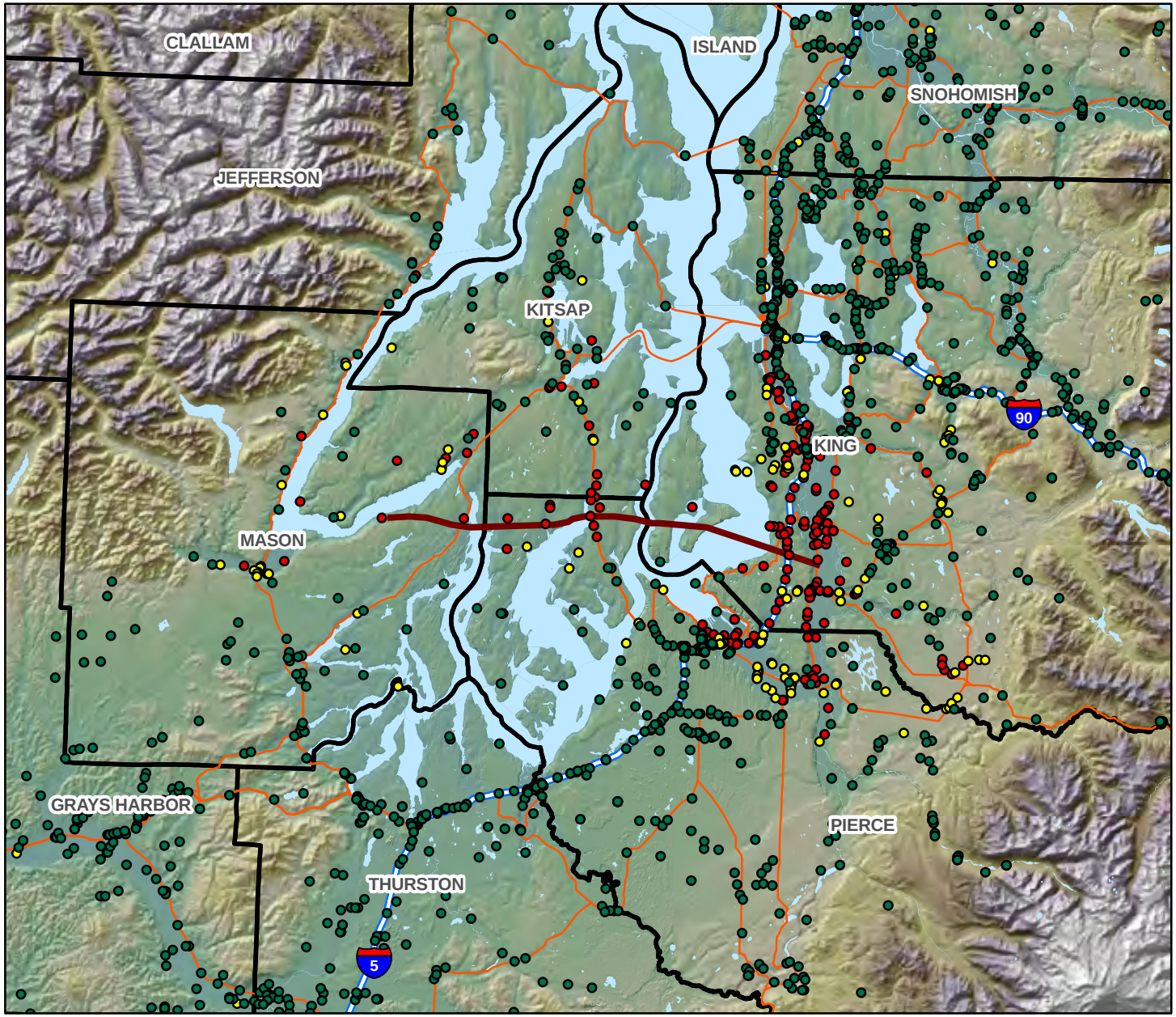


Sources: 2009 HAZUS runs by URS Corporation, Sewage Treatment Facilities HSIP Gold 2007, Liquefaction The Wash State Geological Survey
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 11

Estimated Highway Bridge Damage and Number of Bridges Needing Inspection - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

Highway Bridge Impacts

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

Counties

Fault source

Roads

Interstate

Highway

Major Roadway Bridge Impacts

low

moderate

high

County	# of Bridges Needing Inspection	# of Bridge Engineers Needed*
Grays Harbor	269	36
Island	6	1
King	1,033	138
Kitsap	83	11
Mason	92	12
Pierce	402	54
Snohomish	466	62
Thurston	186	25
Total	**2,537**	**338**

* Based on assuming 2 engineers can inspect 5 bridges a day for 3 days

0 4 8 12 16 20 24

Miles

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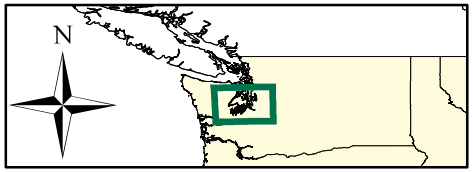
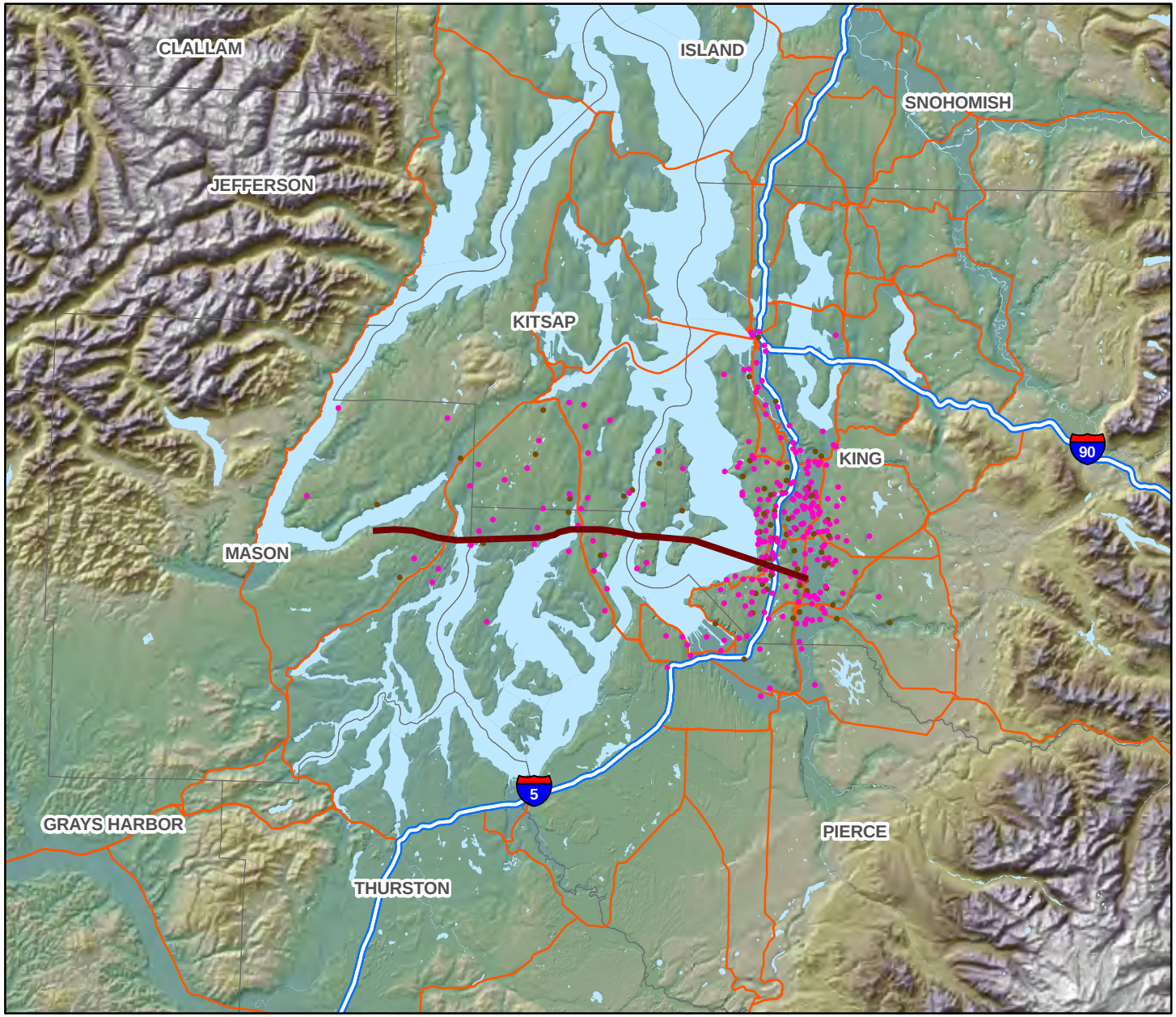


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007

Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 12

Estimated Brick, Concrete, Steel, and Wood Debris - Earthquake Scenario: Washington



M 7.1 Tacoma Fault

1 Dot = 10 thousand tons of Concrete and Steel Debris*
1 Dot = 10 thousand tons of Brick and Wood Debris*
*by census tract

Counties

Fault source

Roads

Interstate

Highway

County	Brick and Wood (tons)	Concrete and Steel (tons)	Estimated Truck Loads*
King	750,000	1,492,000	89,680
Kitsap	86,000	95,000	7,240
Mason	40,000	44,000	3,360
Pierce	168,000	250,000	16,720
Snohomish	7,000	4,000	440
Thurston	6,000	4,000	400
Total	**1,057,000**	**1,889,000**	**117,840**

* Truck loads estimated at 25 tons per truck

0 4 8 12 16 20 24 Miles

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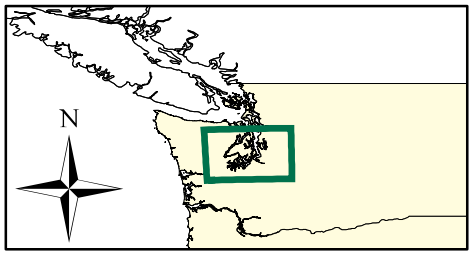

Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 13