EVALUATION OF LATERAL SPREAD INDUCED DAMAGE TO ROADWAYS AND BRIDGES IN SALT LAKE COUNTY

by

Matthew David Moriarty

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SUPERVISORY COMMMITTEE APPROVAL

of a thesis submitted by

Matthew David Moriarty

This thesis has been read by each member of the following supervisory committee and by majority vote has been found to be satisfactory.

Chair: Steven F. Bartlett

Evert Lawton

Xiaoyue Cathy Liu

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FINAL READING APPROVAL

To the Graduate Council of the University of Utah:

I have read the thesis of Matthew David Moriarty in its final form and have found that (1) its format, citations, and bibliographic style are consistent and acceptable; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the supervisory committee and is ready for submission to The Graduate School.

Date

Steven F. Bartlett
Chair: Supervisory Committee

Approved for the Major Department

Michael Barber
Department Chair

Approved for the Graduate Council

Dean of the Graduate School

ABSTRACT

Many areas within Salt Lake County, Utah are susceptible to liquefaction-induced ground failure resulting from a moderate to large, nearby seismic event. This susceptibility in combination with the general terrain of the county are expected to produce liquefaction-induced lateral spread ground deformation in many locations during such an event. Although lateral spread deformation is generally not life threatening, it can be very damaging to transportation infrastructure, especially bridges at river crossings. This type of damage from prior earthquakes has been very costly both in terms of required repairs and the interruption it causes to traffic and the corresponding economic losses.

This thesis develops a relatively simple methodology to estimate potential damage caused by lateral spread ground deformation to roadways and bridges located in Salt Lake County, Utah. This is done using mapped estimates of lateral spread displacement (Bartlett, Olsen, & Solomon, 2005), (Olsen, Bartlett, & Solomon, 2007) (Hinckley, 2010) in conjunction with recently published lateral spread fragility curves (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011). Such curves can be used to predict the damage states (i.e., condition) based on the estimates of lateral spread for mapped hazard zones. The results of this study, when used in conjunction with traffic modeling methods will be useful to public officials and planners to prepare for the impacts of future seismic events along the Wasatch Fault in Salt Lake Valley, Utah.

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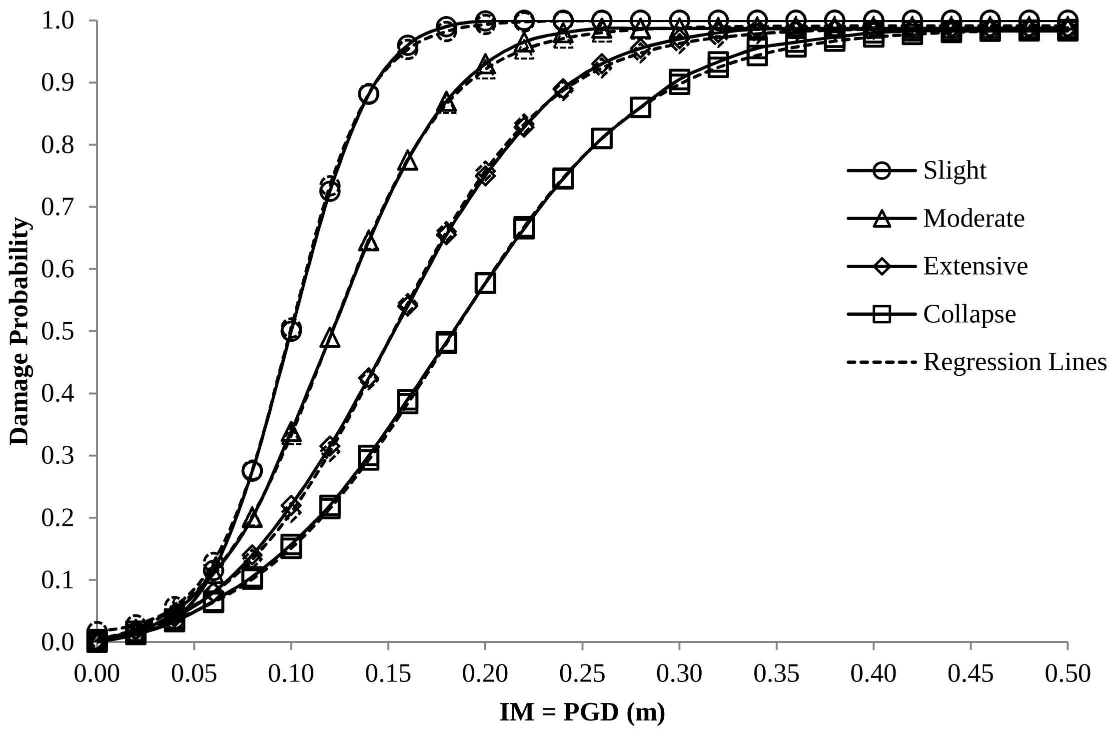
Damage Probability
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0.50
IM = PGD (m)
Slight
Moderate
Extensive
Collapse
Regression Lines

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INTRODUCTION

Liquefaction-induced ground failure is one of the primary earthquake hazards in areas with recently deposited, loose, saturated, granular sediments or man-made fill. This type of ground failure generally consists of blocks of partially intact, surficial soil moving horizontally down slope or in the direction of a free face, such as a river or canal atop a liquefied shear zone that has occurred at depth

Although lateral spread displacement may not be particularly life threatening, it can cause extensive damage to buildings, roadways, and utilities such as water, gas, and power which are vital to human life as evidenced by the February 22, 2011 Christchurch, New Zealand earthquake. During this event, extensive liquefaction of alluvial and river deposits occurred over approximately one third of the city area. The liquefaction was unprecedented both in scale and damage causing damage to approximately 60,000 residential buildings and many multistory buildings, key lifeline facilities and hundreds of kilometers to roads and buried pipes (Cubrinovski, et al., 2014).

Liquefaction-induced ground displacement is manifested at the surface by ground fissures, buckled and displaced ground, sand ejecta and ground settlement. Although all varieties of liquefaction-induced ground failure are important, this thesis primarily focuses on estimating the amount of lateral spread damage and its consequences to bridges and the adjacent roadway. The 1964 Alaska earthquake is a good example of this type of damage. From this very large event, it is estimated that lateral spread and ground settlement damage to 266 bridges and embankments resulted in $80 million (1964) of repair to the Alaska Railroad and Highway (McCulloch and Bonilla, 1970; Kachadoorian, 1968). As the ground displaced toward topographical depressions (e.g., stream and river channels) as a considerable part of the adjacent floodplain liquefied and moved toward the channels. Such displacement pushed bridge abutments and intermediate pile-supported bents riverward causing extensional damage near the banks and compressional damage in the centers of the channels. At some sites, extensional fissuring paralleling the channels was found as far as 200 to 300 m from the river banks (McCulloch and Bonilla, 1970). The majority of the lateral spread displacement took place in line with the longitudinal axis of the bridge in a direction perpendicular to the channel. Liquefaction and lateral spread of the channel and channel bank deposits produced a streamward movement of these deposits. In some cases, the channelward movement of the adjacent riverbanks decreased the post-earthquake channel widths by as much as 2 to 3 m. This horizontal movement was also accompanied by liquefaction-induced settlement in the abutment areas, and by a welling up of liquefied sediments within the center of the channels (McCulloch and Bonilla, 1970). For railroad bridges, compressive forces from the horizontal movement caused arching, buckling and jack-knifing of the bridge superstructure. Many highway bridges underwent partial or complete collapse. The most damaged were simply-supported structures with concrete decks that collapsed due to the large differential displacement between the supporting piers or bents.

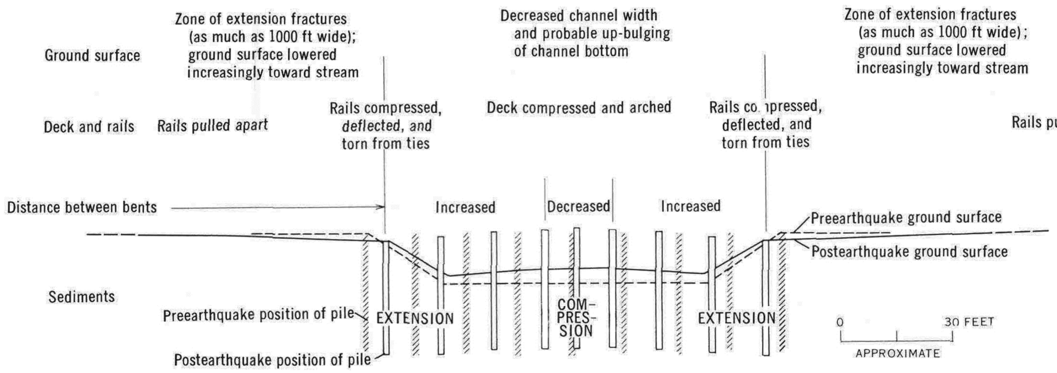


Figure 1: Generalized diagram of typical compressed open wood trestle railroad bridge showing relative pile foundation displacements (after McCulloch and Bonilla, 1970).

Unfortunately, Salt Lake County, Utah has a moderately high earthquake hazard and also has critical transportation infrastructure that is located on potentially liquefiable sediments. Liquefaction hazard maps for Salt County, Utah have been developed to quantitatively define the lateral spread displacement (Hinckley, 2010). These maps were developed for three different earthquake scenario events commonly used for design and planning purposes: (1) M7.0 deterministic scenario event, (2) probabilistic scenario event with ground motion having a 10 percent probability of exceedance in 50 years and, (3) probabilistic scenario event with ground motion having a 2 percent probability of exceedance in 50 years. The associated lateral spread displacement estimates for various geologic units and topography are used by this thesis to develop estimates of the potential bridge and roadway damage in Salt Lake County. This latter step is done using recently published fragility curves (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011) where the estimate bridge damage is a function of the amount of lateral spread displacement.

Because estimates of the lateral spread displacements have uncertainty due to variation in subsurface and surface conditions, statistical and sampling techniques are used herein to quantify this uncertainty. Therefore, using Monte Carlo techniques it is possible to propagate this uncertainty into the bridge damage assessment and traffic modeling. Quantification of the inherent uncertainty with these estimates is essential for future risk assessment evaluations.

Lastly, it is hoped that the results of this thesis will aid in the earthquake preparedness and emergency response planning for Salt Lake County and its associated municipalities. For example, the bridge and roadway damage estimates from this thesis might be used as a tool in planning the less vulnerable (i.e., more robust) traffic routes for emergency vehicles in post-earthquake response. The results might also be used as a tool in determining where current and future improvement efforts may be warranted to reduce the potential damage and impacts to lifeline transportation infrastructure.

LITERATURE REVIEW

Previous research and mapping efforts was used to provide estimates of the lateral spread displacement that may damage roadways and bridges in Salt Lake County, Utah (Bartlett, Olsen, & Solomon, 2005), (Olsen, Bartlett, & Solomon, 2007), (Hinckley, 2010). This research incorporates these lateral spread maps to develop methods that provide estimates of potential bridge and roadway damage. This is done by using fragility curves to estimate the potential damage state of a bridge or roadway as a function of lateral spread ground displacement.

Salt Lake County Liquefaction Hazard Mapping

Evaluations of Salt Lake County (Bartlett, Olsen, & Solomon, 2005), (Olsen, Bartlett, & Solomon, 2007), (Hinckley, 2010) quantify the liquefaction hazards in terms of liquefaction-induced lateral spread and ground settlement. This work evaluates three different seismic scenario events along the Wasatch fault: one deterministic event and two probabilistic events. The deterministic seismic event consists of a M7.0 earthquake and lateral spread estimates that have an 85 percent probability of non-exceedance. The two probabilistic seismic events consider the peak ground accelerations (PGA) associated with a 2 percent and 10 percent probability of exceedance in 50 years. The estimates of lateral spread are summarized in the form of maps shown in Figures 2- 4

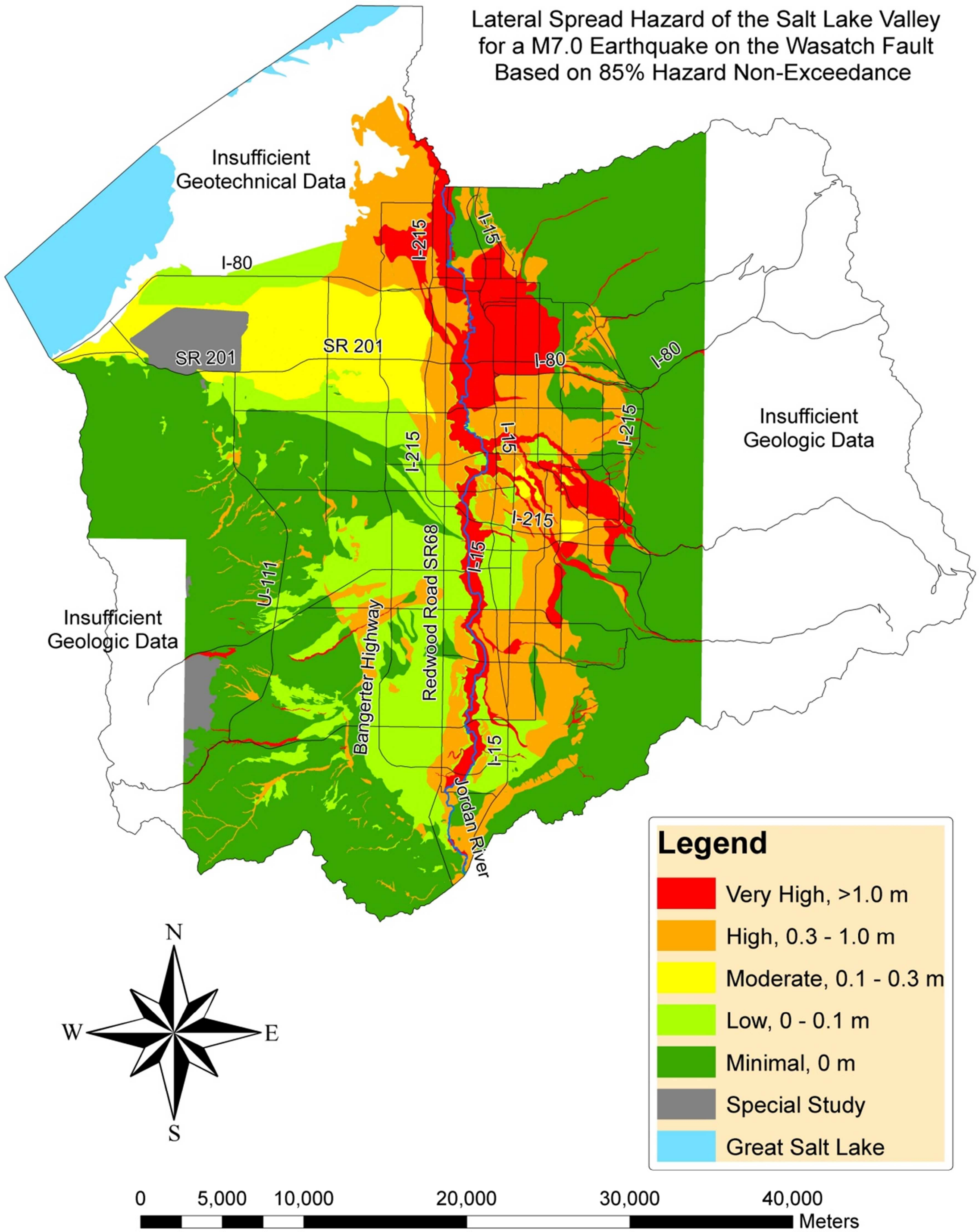


Figure 2: Lateral spread displacement hazard for the Salt Lake Valley, Utah based on a M7.0 scenario earthquake on the Salt Lake segment of the Wasatch fault and an 85 percent nonexceedance probability threshold (Hinckley, 2010).

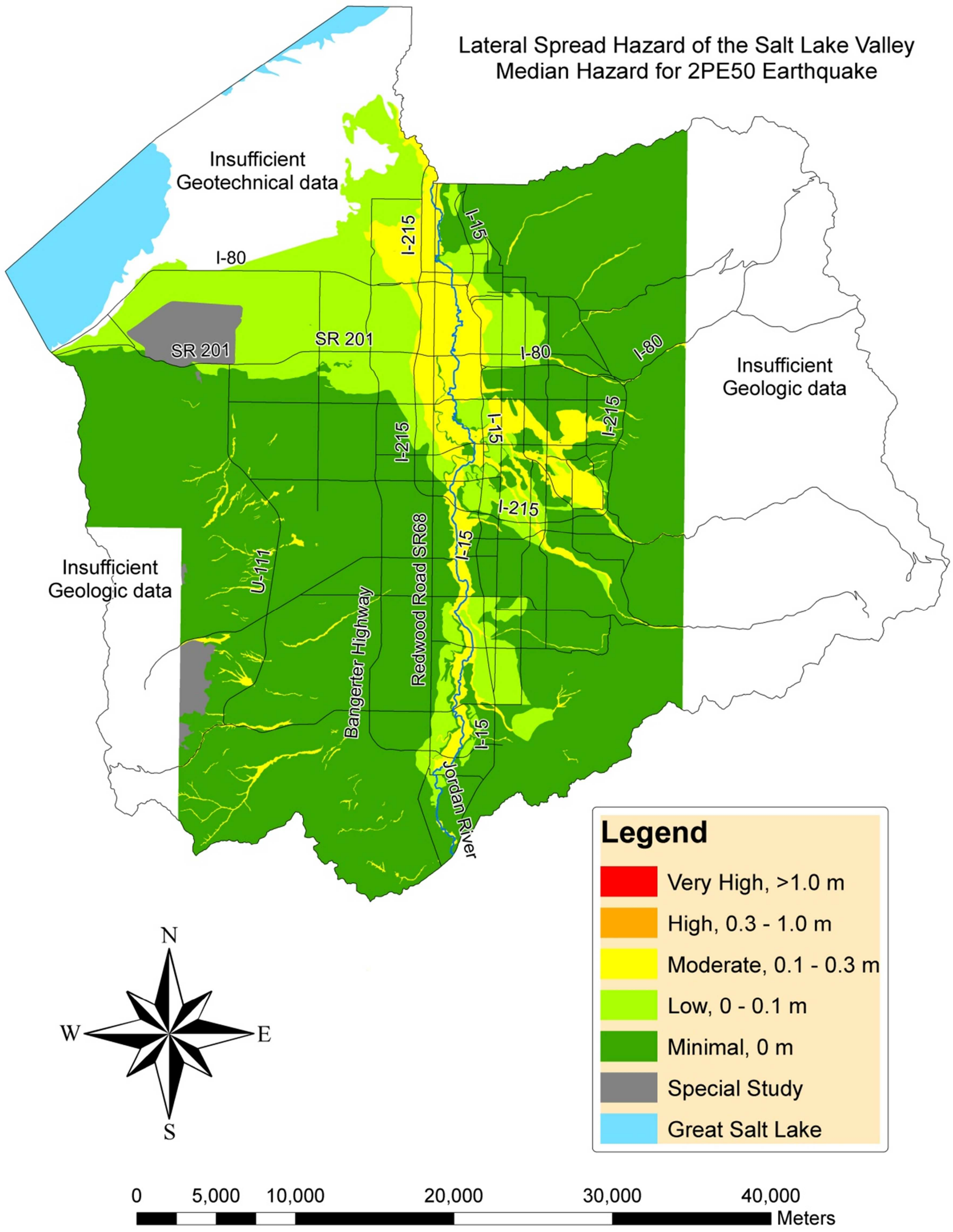


Figure 3: Lateral spread displacement hazard for the Salt Lake Valley, Utah based on the PGA associated with a 2 percent probability of exceedance in 50 years (Hinckley, 2010).

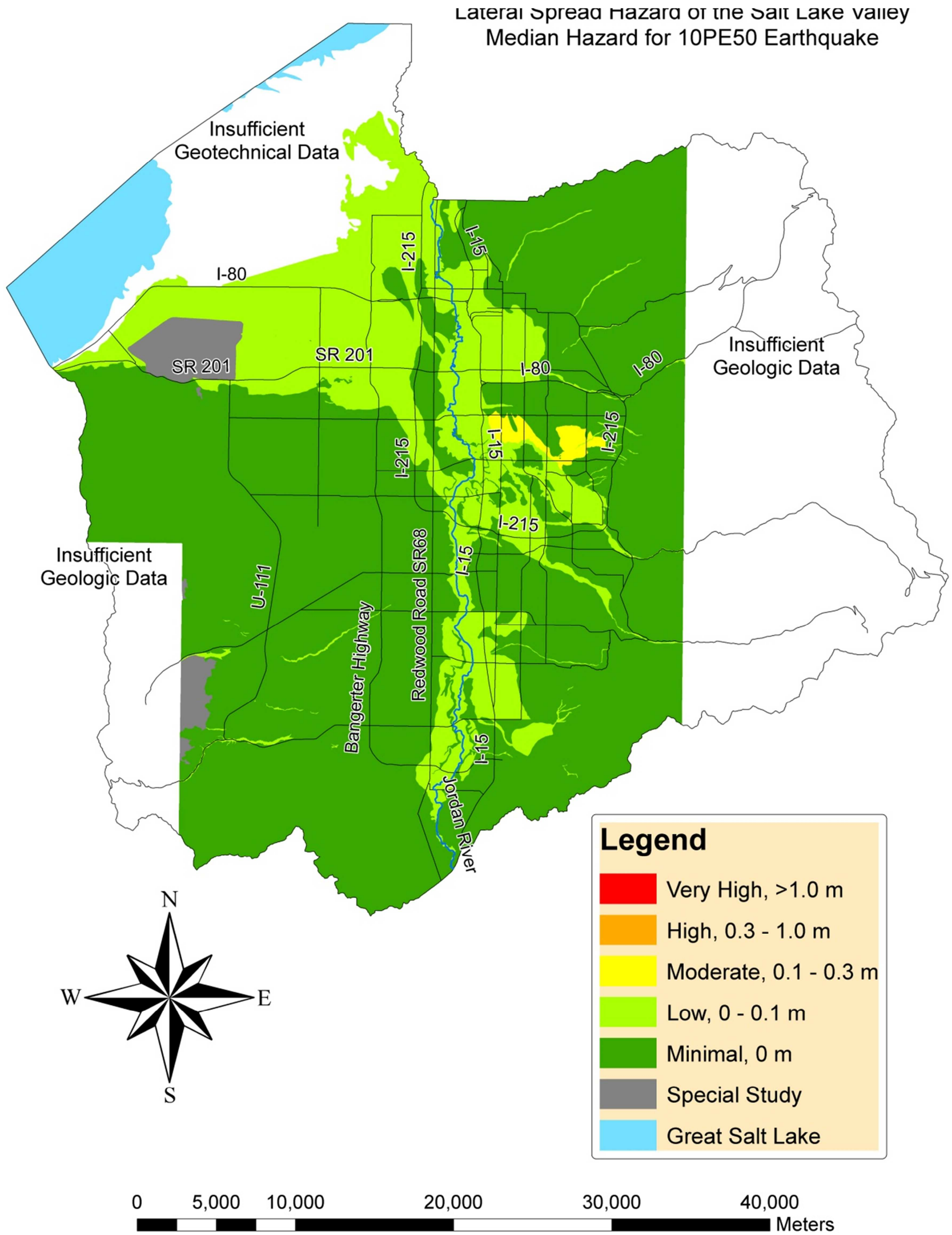


Figure 4: Lateral spread displacement hazard for the Salt Lake Valley, Utah based on the PGA associated with a 10 percent probability of exceedance in 50 years (Hinckley, 2010).

Map Development

In developing the lateral spread maps, Salt Lake County was divided by surficial geologic unit. Subsurface data, including SPT and CPT data was then collected from several sources, screened for quality purposes and classified or associated with its respective geologic unit. This association included changes in geologic unit(s) with depth; thus the classification included these depth changes.

This complied dataset was then used to perform a triggering analysis using methods proposed by the National Center for Earthquake Engineering Research (NCEER) summary report (Youd, et al., 2001). If liquefaction was triggered at any given borehole, a lateral spread analysis was subsequently performed. Lateral spread estimates were determined using regression equations (Bartlett & Youd, 1995) along with the implementation of regression coefficients suggested by (Youd, Hansen, & Bartlett, 2002).

Lateral spread values from each geologic unit were sorted into 1 of 5 classifications. These classifications included very high (> 1.0 m), high (0.3 - 1.0 m), moderate (0.1 – 0.3 m), low (0 – 0.1 m), and minimal (0 m). These classifications were then used to assign an overall classification to each geologic unit. Geologic units containing only a very small amount of data were assigned an overall classification based on the greatest magnitude of lateral spread estimated for any borehole in that unit.

Geologic units containing a greater amount of subsurface data and displacement estimates were assigned an overall classification based on a statistical approach. For the M7.0 scenario event, cumulative histograms were created using the estimated lateral spread displacement for each geologic unit. Each unit was subsequently assigned an overall displacement classification based on an 85% non-exceedance, meaning that only

15% of lateral spread estimates in such a geologic unit are expected to exceed the upper displacement bound for that classified unit (This was deemed a conservative displacement estimate that could be used by planners to determine if more rigorous liquefaction evaluations should be performed). For the probabilistic seismic events, the median value of displacement was used as the overall classification, meaning that approximately 50% of the lateral spread values in any given geologic unit are expected to exceed the upper displacement bound for that classified unit. With each geologic unit being assigned an associated lateral spread displacement hazard classification, the surficial geology map of Salt Lake County was then redrawn in terms of lateral spread hazard classification as is shown in Figures 2-4 for the various seismic events.

Figures 5-7 show the distribution of estimated lateral spread displacement values for each hazard area and for each scenario event. These plots illustrate that a wide range of estimated displacements exist for any given hazard area. They also show that all hazard areas have a significant number of locations where displacement is not expected. In addition, these charts illustrate the effects of the criteria used in determining the hazard area. If for example in Figure 5, a criteria of 50% nonexceedance were used for the M7.0 seismic event in place of the 85% nonexceedance, many of the geologic units assigned a "very high" hazard level would likely shift down to "moderate" or "low". Cumulative distribution plots for each hazard area are given in APPENDIX C.

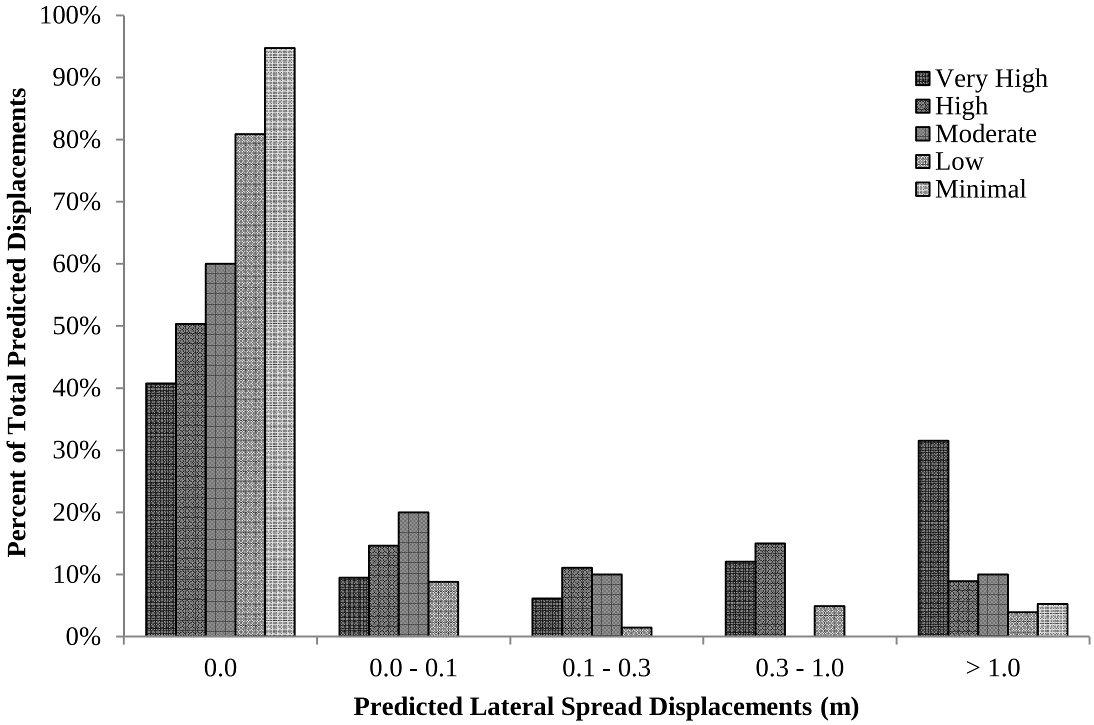


Figure 5: Estimated lateral spread distribution based on a M7.0 seismic event

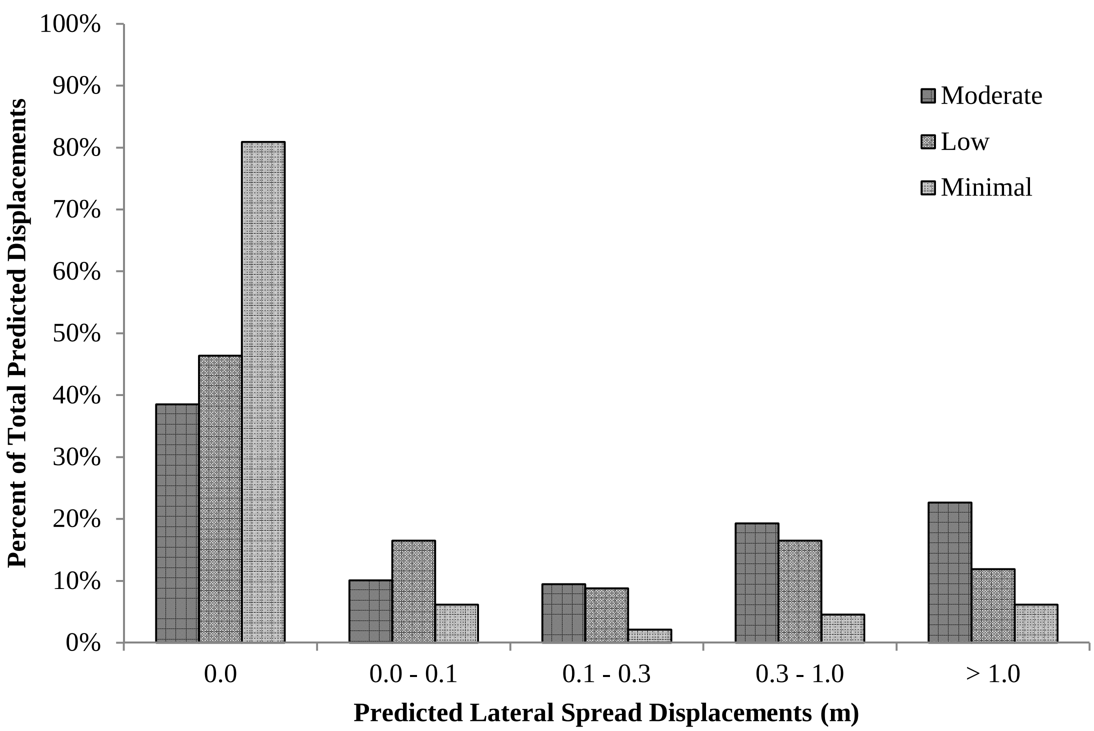


Figure 6: Estimated lateral spread distribution based on PGA associated with 2 percent probability of exceedance in 50 years

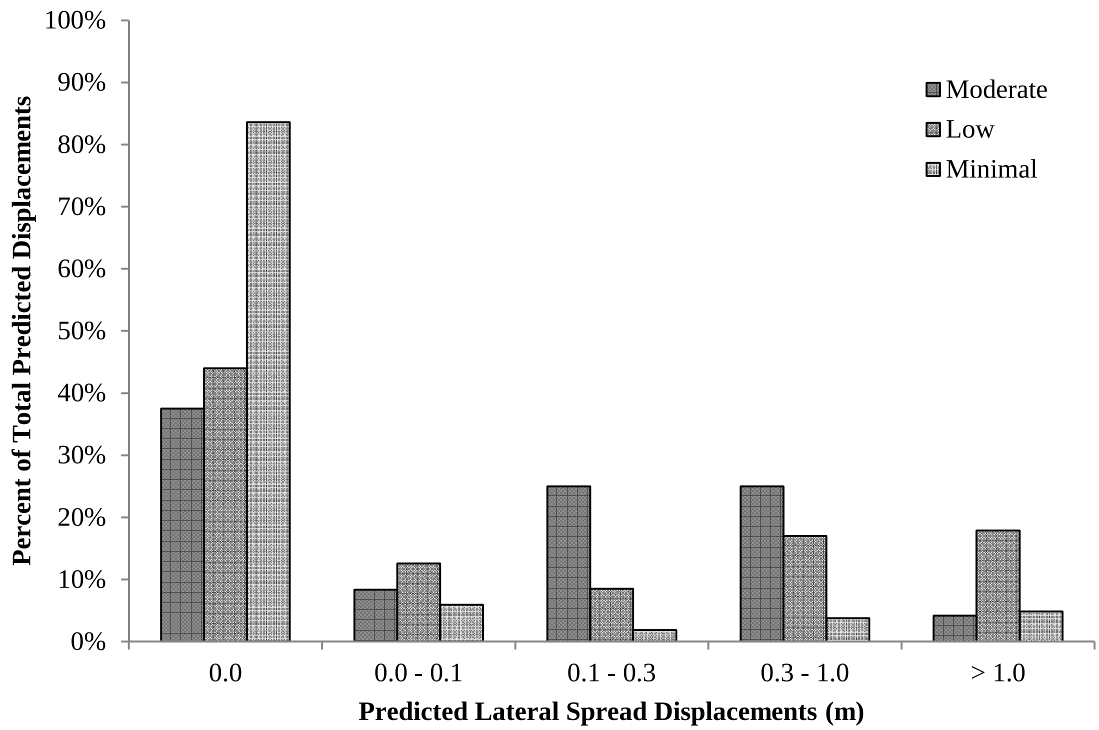


Figure 7: Estimated lateral spread distribution based on PGA associated with 2 percent probability of exceedance in 50 years

Liquefaction Fragility Curves

Fragility curves are used in loss estimation to estimate damage to structures, systems and components (SSCs). For earthquake engineering, such curves often express the percent damage occurring to SSCs as a function of some given earthquake input, usually expressed in some measure of strong ground motion intensity. Often, as is the case for many studies, the fragility curves provide estimates of damage as a function of peak ground acceleration, (PGA), or Modified Mercalli Intensity (MMI). However, for the purposes of this study, the fragility curves for estimating bridge and roadway damage will be expressed in terms of permanent ground displacement (PGD). This is required because this study focuses on potential lateral spread damages to bridges; hence the input to a fragility analysis is horizontal ground displacement. Very little research has been done in this area, but a handful of displacement-based fragility curves have been introduced by the Federal Emergency Management Agency (FEMA) and the Pacific Earthquake Engineering Research (PEER).

FEMA Fragility Curves

Hazus®-MH 2.1 (Hazards US – Multi Hazard) is a computer program developed by FEMA that implements a standardized methodology and models for estimating potential losses from earthquakes, floods and hurricanes. Hazus uses Geographic Information Systems (GIS) technology to estimate physical, economic and social impacts of disasters. It graphically illustrates the limits of identified high-risk locations due to earthquake, hurricane and floods (http://www.fema.gov/hazus).

In the case of earthquakes, Hazus estimates damage to infrastructure through the use of built in fragility curves. These curves are presented in the Hazus®-MH 2.1 Technical Manual (FEMA, 2012). The fragility curves can be used to estimate damage states for most types of infrastructure including roadways and bridges which are of particular interest for the purposes of this thesis. There are a total of five damage states that may be predicted for roadways and bridges using the fragility curves. These damage states are defined as none (ds_1), slight/minor (ds_2), moderate (ds_3), extensive (ds_4), and complete (ds_5).

Each of the five damage states has characteristics associated with them. Slight damage is defined as a few inches of settlement or offset for roads and minor cracking and spalling of structural elements such as abutments, columns, shear keys, or deck for bridges. Moderate Damage is defined as several inches of settlement or offset for roads and moderate shear cracks in columns with moderate movement of the abutment and extensive cracking and spalling of other structural elements. Extensive damage is defined as a few feet of settlement or offset for roadways and as column degradation of column without collapse and significant movement at connections and approaches. Complete damage has the same definition as extensive damage for roadways and is defined as partial or total collapse of a bridge or any of its elements.

The fragility curves used by Hazus®-MH 2.1 to predict damage to roadways are shown in Figures 8 and 9. These fragility curves are a function exclusively of PGD. The fragility curves shown in Figure 8 are for major roads while those shown in Figure 9 are for minor roads. Major roads are described as roads with four or more lanes while minor roads are defined as any road consisting of two or less lanes. Using these curves, the probability of reaching a given damage state is obtained. The curves are lognormally-distributed functions with the median (M) and lognormal standard deviation (β) shown in

Table 1.

The fragility curves used by Hazus®-MH 2.1 to estimate bridge damage are a function of either PGA or peak ground displacement (PGD). The curves associated with PGD are fairly simplistic; they categorize bridge undergoing displacement to fall within ds_4 or ds_5.

In addition to damage state, a displacement capacity is calculated for ds_4 and ds_5 for each bridge type. While the initial capacities are the same for all bridge types, they are modified based on skew and number of spans. If the predicted ground displacement is greater than the capacity associated with ds_5 then the bridge is considered to be in ds_5, if it is greater than ds_4 the bridge is considered to be in d_4, otherwise the bridge is considered to be in ds_1. A schematic of these basic fragility curves is shown in Figure 10. It should be noted that this model predicts that a bridge will be at a certain damage state at calculated cutoff points which differs from traditional fragility curves that return a range of probabilities of the bridge falling within the given damage states.

Table 1: Median and lognormal standard deviation values for major and minor road fragility curves (FEMA, 2012)

Road Type	Damage State	Median (in)	β
Major Road	slight/minor	12	0.7
	moderate	24	0.7
	extensive/complete	60	0.7
Urban Road	slight/minor	6	0.7
	moderate	12	0.7
	extensive/complete	24	0.7

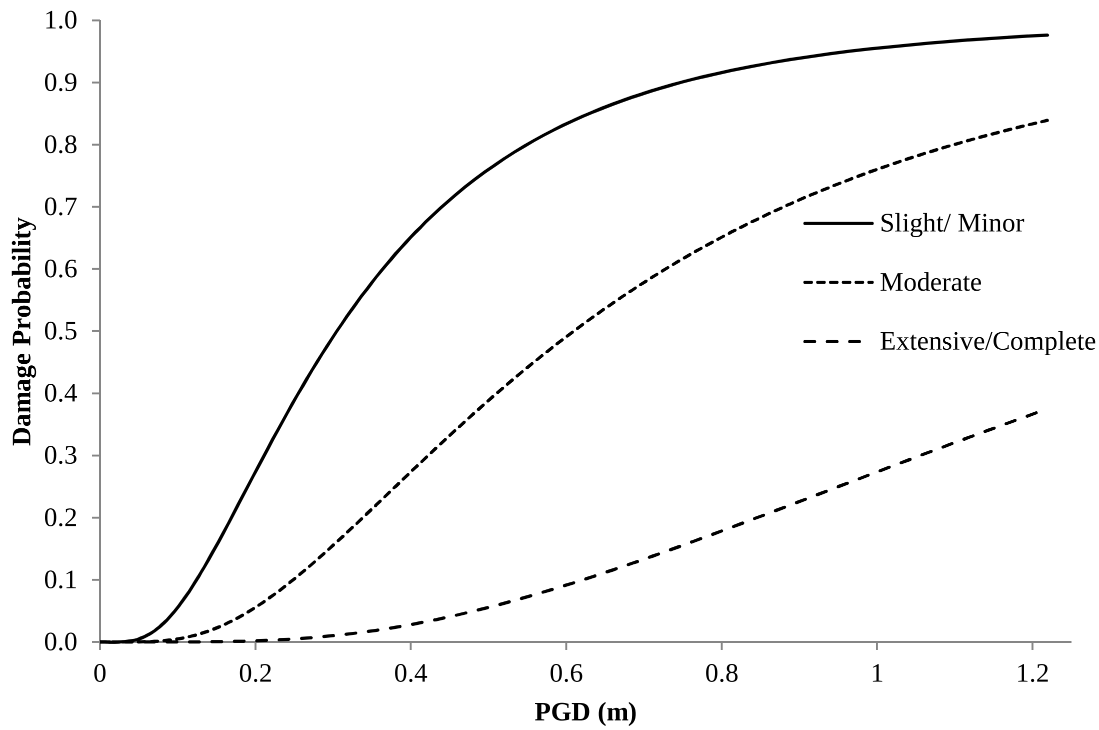


Figure 8: Fragility curves for major roads (FEMA, 2012)

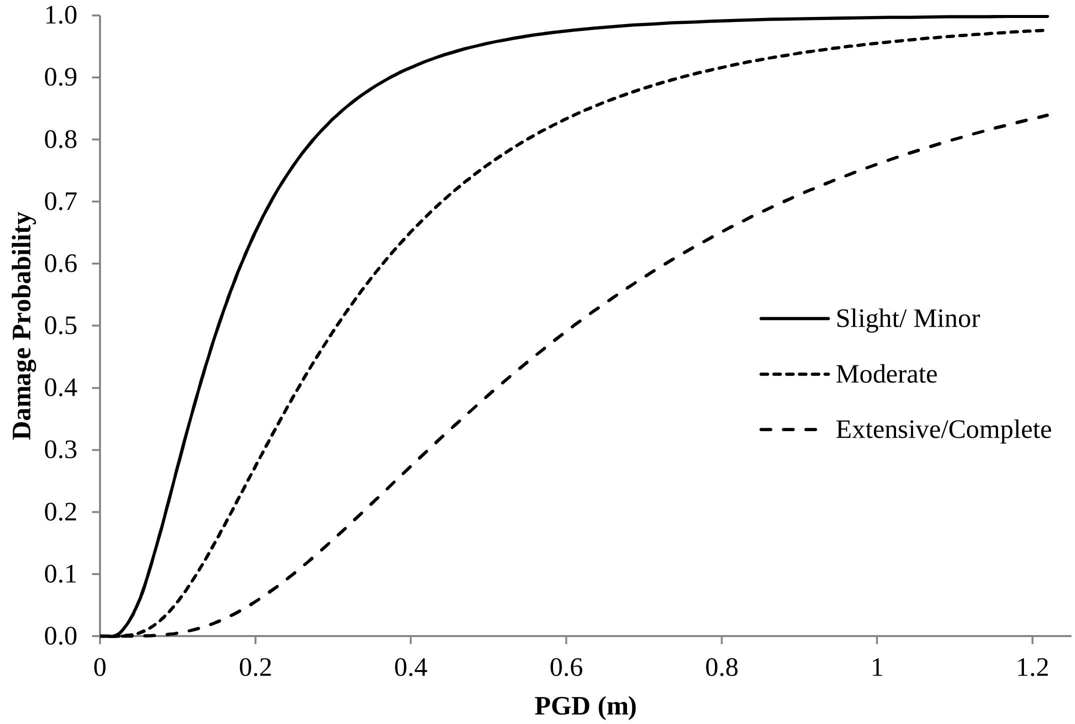


Figure 9: Fragility curves for minor roads (FEMA, 2012)

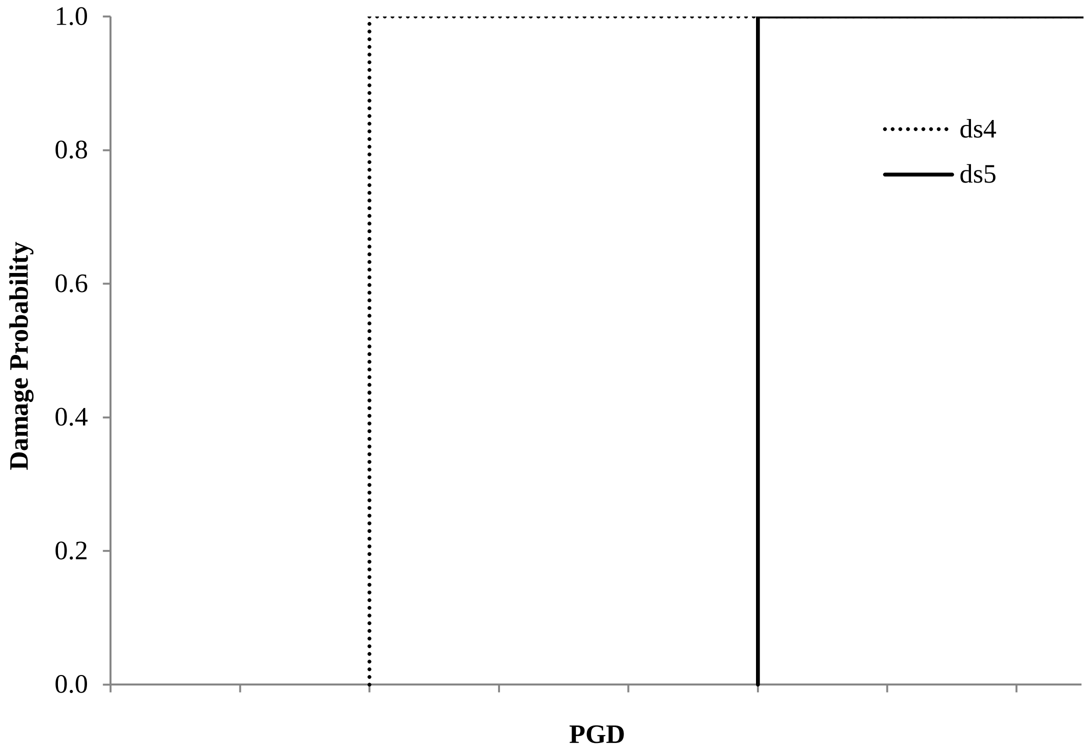


Figure 10: Schematic of FEMA fragility curve for bridges

PEER Fragility Curves

Fragility curves as a function of PGD were also developed by PEER (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011). These curves were developed for six different bridge and abutment combinations including monolithic (integral) abutments and five variations of seat abutments as is shown in Figure 11. All bridges were considered to have single column supports with structural properties consistent with older-vintage bridges that were not designed to current seismic code. The soils supporting the bridges were modeled as an embankment founded on a clay crust overlying a liquefiable sand layer which rested on dense sand as shown in Figure 12.

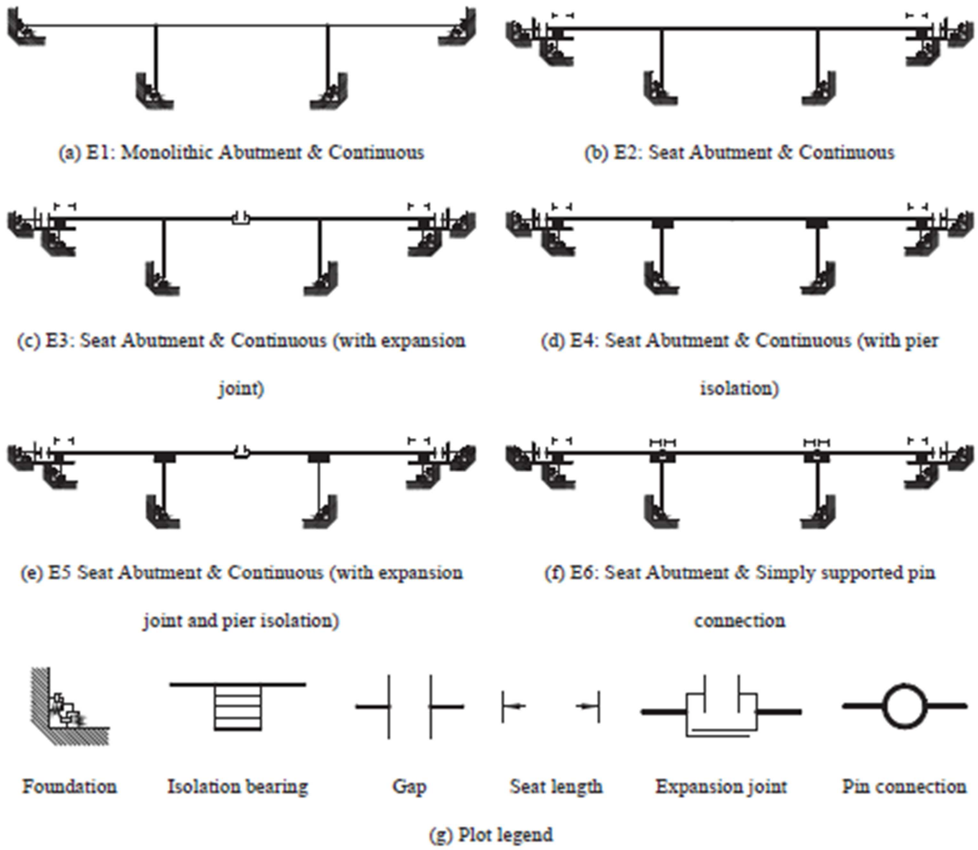


Figure 11: Sketches of PEER bridge models (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

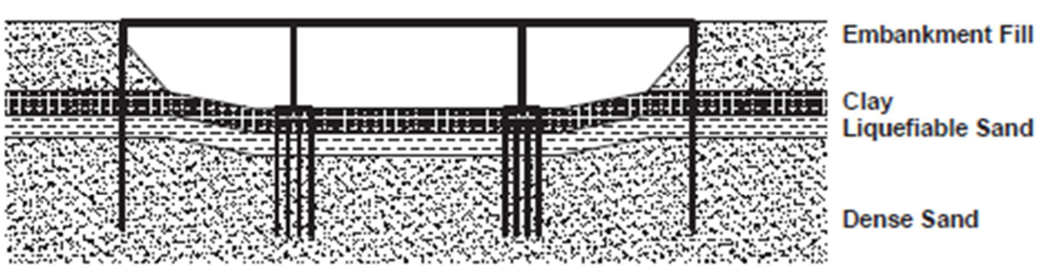
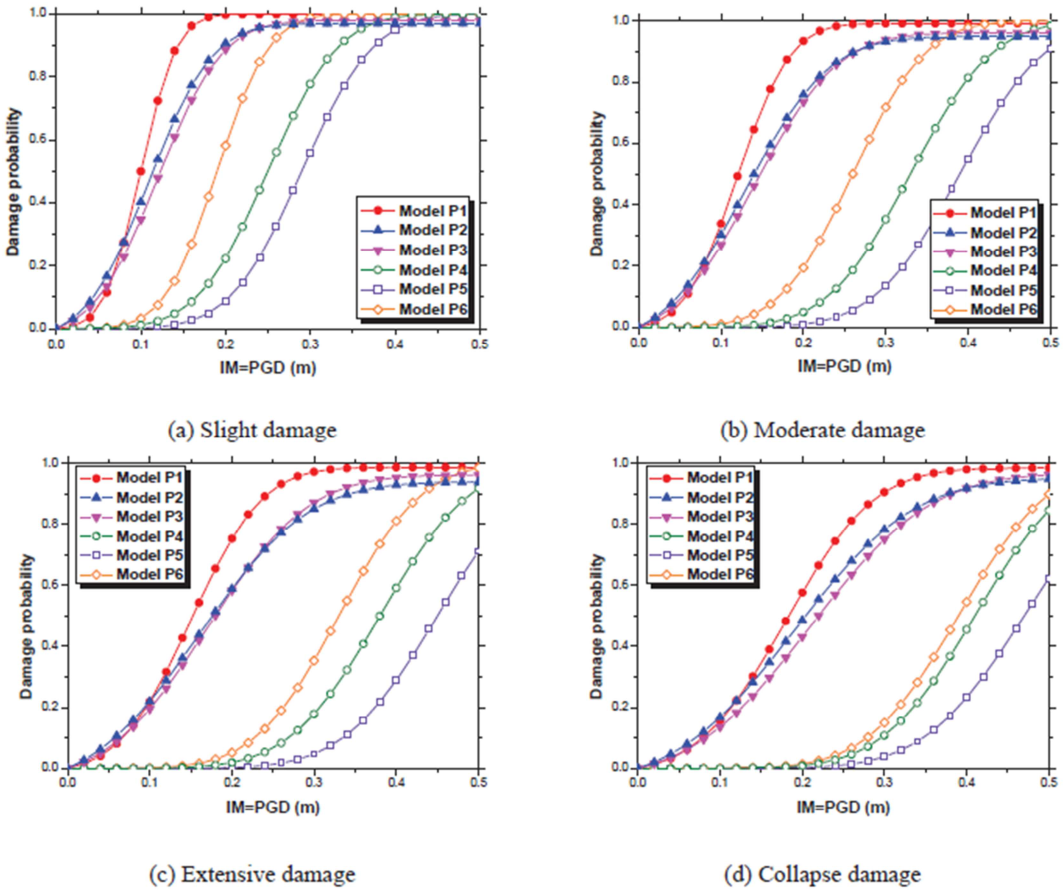


Figure 12: Soil profile used liquefaction fragility curve models (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

An equivalent static analysis was done on each bridge type using an incremental approach where bridge damage was determined for increasing ground displacements. In addition to the loads imposed on the bridges from lateral spreading, inertial forces were also added due to the plausible scenario that these two forces could occur concurrently. The inertial forces were added to structural connections and the pile caps. The size of the inertial force added to the structure was proportional to the amount of lateral spread being imposed. Throughout the analysis, thickness and strength parameters for each layer were allowed to vary along with p-y values for the pile foundation, axial tip capacity, and inertial loads. A Monte Carlo method, as will be explained in more detail later, was used in creating the fragility functions.

The results of the analysis are shown in Figure 13. As with the FEMA fragility curves, these fragility curves describe five damage states. These damage states include non, slight, moderate, extensive, and collapse which have the same definitions as the damage states of the FEMA fragility curves. Models P1-P6 correspond to models E1-E6 shown in Figure 11. It is shown that Model P1, which represents a bridge with integral abutments, performs the worst. Models P2 and P3, which are continuous bridges with seat abutments, perform better than Model P1 with nearly no difference between the each other. Models P4 and P5, representing continuous bridges with seat abutments and pier isolation perform the best. Finally, Model P6, representing a non-continuous bridge with seat abutments performs somewhere in between Models P1-P3 and Models P4-P5.



(a) Slight damage

(b) Moderate damage

(c) Extensive damage

(d) Collapse damage

Figure 13: Fragility curves for lateral spreading (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

METHODOLOGY

In order to estimate the liquefaction induced damage to bridges in Salt Lake County, several steps are required. The first step is to determine which lateral spread hazard area corresponds to each bridge location, which involves mapping or locating each bridge on the lateral spread maps shown in Figures 2-4. The second step is to compile, organize and evaluate the lateral spread estimates and their statistical variability for each hazard area. The third step is the selection and application of fragility curves for each bridge type. The fourth and final step is to apply the Monte Carlo Method to the estimates to obtain a distribution of probabilities of bridges falling within given damage states for each earthquake scenario.

Mapping

The purpose of mapping the bridges is to determine which lateral spread hazard area they fall within. Due to the large number of bridges within Salt Lake County, this is most efficiently done in a mapping program such as ArcGIS. The benefit of using a program such as ArcGIS is that it is capable of quickly determining areas in which a mapped point resides. Some preliminary work is required before mapping the bridges on the lateral spread hazard maps such as obtaining information on bridge location and digitizing the lateral spread maps. After this preliminary work is completed it is possible to determine the location of each bridge with respect to the corresponding lateral spread hazard area.

Bridge Data

Before the bridge locations could be mapped, data was required regarding bridge location and other features. The National Bridge Inventory (NBI) (Svirsky, 2014) was used as the primary source of information for bridge data in this study. Along with the name and location of each bridge, the NBI also provides other key data. This data includes year of construction and/or reconstruction, length, width, number of spans, number of lanes, bridge type, and material type among other things.

The NBI reports that over 575 bridges are found in Salt Lake County. These bridges were constructed from as early as 1934 through 2011. The bridge types and features reported for Salt Lake County include arch, box beam or girders, culvert, frame, girder and floorbeam, slab, string/multi-beam or girder, and tee beam. The bridges are constructed from various materials such as concrete, prestressed concrete, masonry, and steel. The bridges range from single span bridges that are only slightly longer than 20 ft. to multi-span bridges as long as 2360 ft.

While not all of the data provided by the NBI is critical to the purposes of this study, much of the data proved to be critical in later steps. Information regarding the age of the bridge, bridge type, material type, and number of lanes were all used in determining which fragility functions would be assigned to determine bridge damage for each specific bridge. The selection of fragility functions will be discussed in further detail later in this thesis.

Lateral Spread Map Digitization

At the time this thesis was written, the lateral spread hazard maps were published in hardcopy only; however, for the evaluations herein, the lateral spread maps needed to be placed in ArcGIS format. This was done by importing an image of the maps into ArcGIS. The images of the lateral spread hazard maps meant relatively little in an ArcGIS environment until they were referenced to a geographic coordinate system. The process by which these maps are referenced to a coordinate system is known as georeferencing.

In order to georeference an image file, mapped data referencing a geographic coordinate system, known for the purposes of georeferencing as a reference map, must already exist. The reference map and the map being georeferenced must share similar features such as roads, buildings, rivers, or shorelines. The lateral spread hazard maps show some of the major roads in Salt Lake County making that a sensible feature to use for the georeferencing process. All major roads in the state of Utah have been mapped using ArcGIS (State of Utah, 2014). These roads are mapped in a shape file and use the NAD 1983 UTM Zone 12N coordinate system. The mapped roads were used as the reference map in georeferencing the lateral spread hazard maps.

The shape file of Utah roads was added to an ArcGIS file along with the image of the lateral spread hazard maps. Intersections that are shown on both the Utah roads shape file and the lateral spread hazard maps were used as ground control points. Ground control points are points that exist in both maps that represent the same geographic location. For example, the intersection of I-215 and SR-201 is shown on both the lateral spread maps and the Utah roads shape file. This intersection was thus used as a ground control point. ArcGIS adjusted the image of the lateral spread hazard map to match the ground control points that were selected. While not every intersection shown on the lateral spread hazard maps was used as a ground control point, several throughout the map were used until all the roads shown on the lateral spread hazard maps were mapped directly on top of the Utah roads shape file.

After the lateral spread hazard maps were georeferenced, several polygons were made to represent the hazard areas. These polygons were made using the polygon construction tool in ArcGIS to trace each lateral spread hazard area. If multiple polygons were created to represent the same hazard level, they were merged into one polygon. This limited the amount of polygons to the number of hazard levels shown on the lateral spread hazard maps. The polygons were named after the hazard area they represent. This process of georeferencing and creating polygons representing lateral spread hazard areas was repeated for each seismic event.

Mapping Bridges

With the lateral spread hazard maps georeferenced and polygons representing hazard levels created, it was then possible to determine which polygon any mapped point falls within. This means that once the bridge data was mapped, the lateral spread hazard level of each bridge site could be quickly determined. This, along with other information provided by the NBI would be used in later steps to estimate the damage level of each bridge in Salt Lake County.

Before the bridges were mapped in ArcGIS, they were mapped in Google Earth. This was done to ensure that the latitude and longitude data reported by the NBI was correct. In order to map the bridges in Google Earth, the bridge data from the NBI was first exported to Excel. The Excel file was then exported to a Google Fusion Table which is available as part of Google Drive. A Google Fusion Table is a spreadsheet tool that enables a user to map data in Google Maps or Google Earth without inputting each data point. This tool also allows all the data associated with latitude and longitude pair, such as bridge attributes provided by the NBI, to remain with that point throughout the mapping process. Once the NBI data was exported into the fusion table, a map was made, and downloaded as a KML file, which is a file format recognized by Google Earth.

While the coordinate system used by the NBI and Google Earth may be slightly different, most bridges were mapped directly over the bridge shown in Google Earth's satellite imagery. The fact that the majority locations provided by the NBI matched the locations shown on Google Earth indicated the different coordinate systems used by the two sources were very small, which in turn meant that corrections to the bridge locations which were mapped incorrectly could be made using Google Earth. If the street address provided by the NBI didn't match where it was mapped, Google Earth was used to find the correct latitude and longitude. The corrected data was then added to the original Excel file which was then imported into ArcGIS. The bridge locations in Salt Lake County can be seen overlying the lateral spread hazard maps in Figures 14-16.

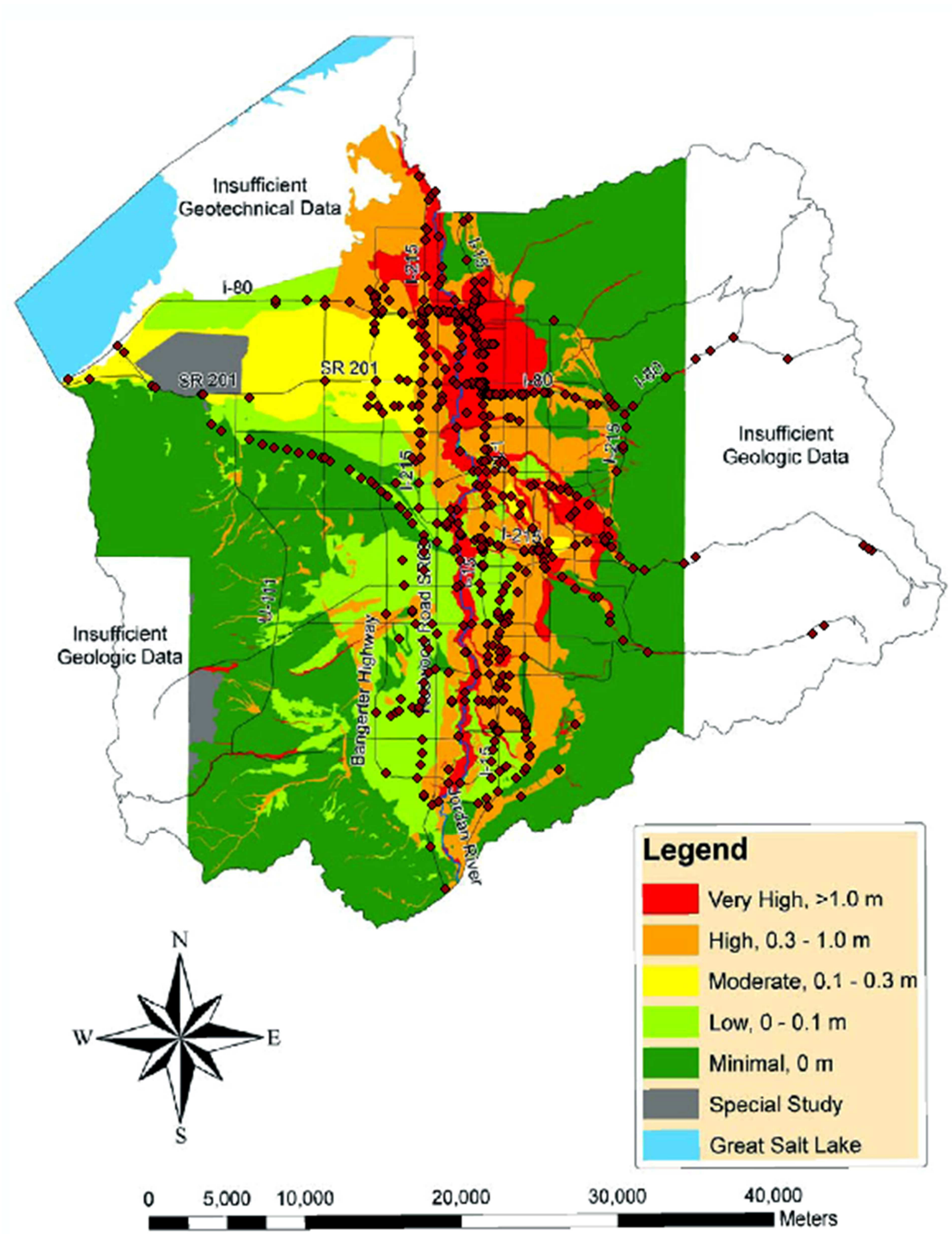


Figure 14: Salt Lake County bridges shown on the lateral spread hazard map for a M7.0 earthquake

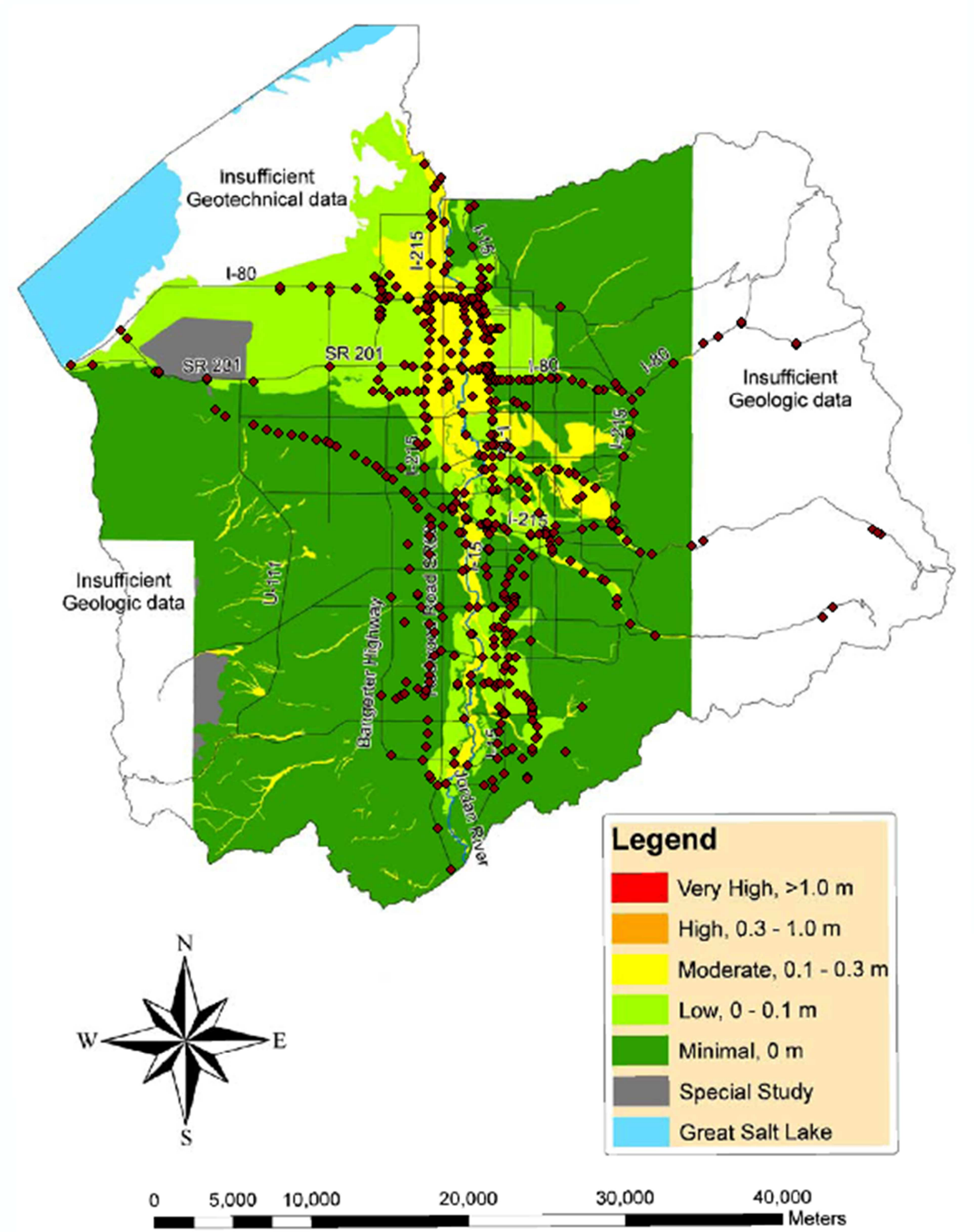


Figure 15: Salt Lake County bridges shown on the lateral spread hazard map based on PGA associated with a 2 percent probability of exceedance in 50 years.

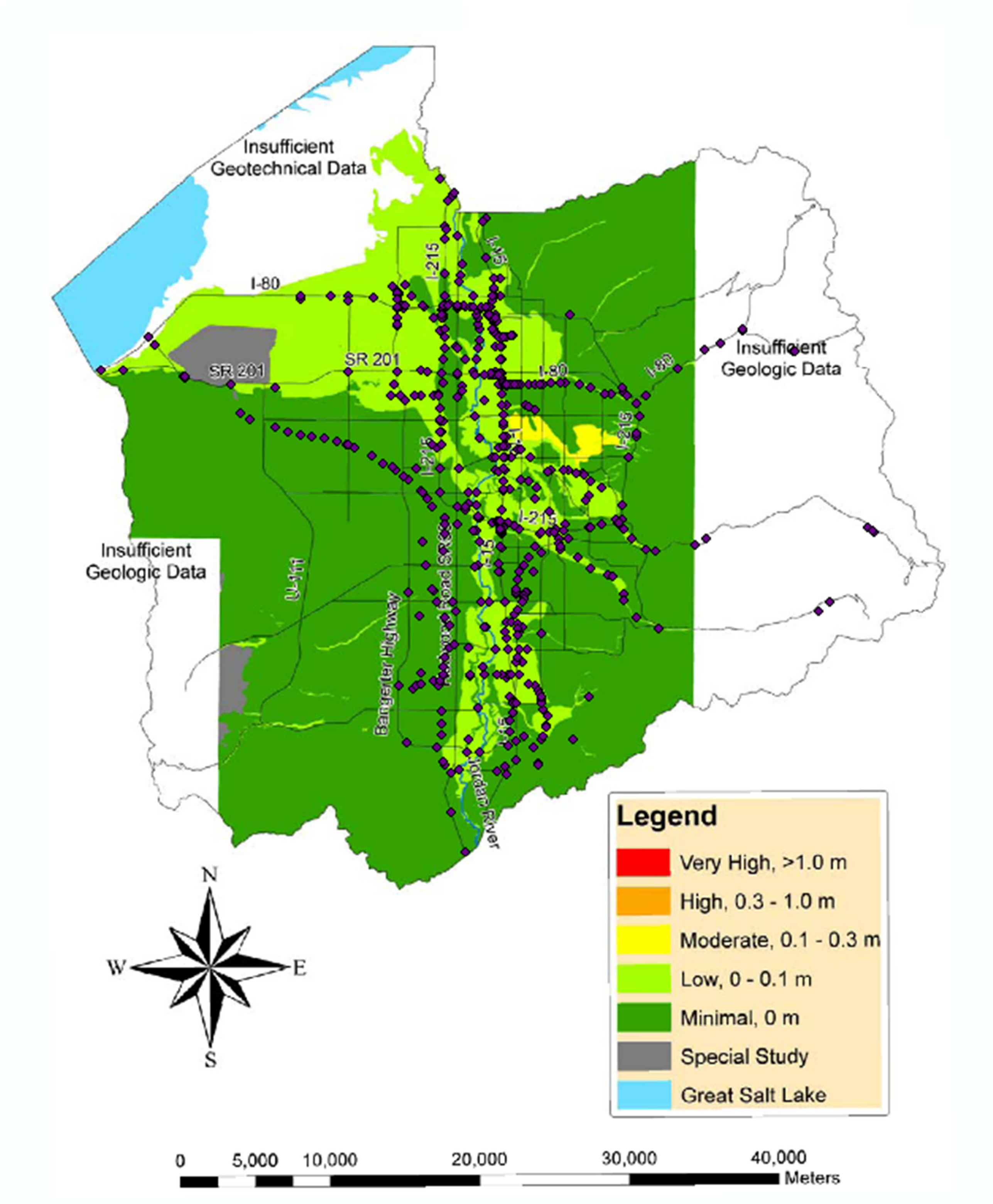


Figure 16: Salt Lake County Bridges shown on the lateral spread hazard map based on a PGA associated with a 10 percent probability of exceedance in 50 years

Fragility Curve Selection & Curve Fitting

Fragility curves were presented for several bridge and road types by both FEMA and PEER as described previously. It is therefore necessary to select the appropriate fragility curves to be used for the various bridge and road types located in Salt Lake County. The process used to select appropriate fragility curves and assumptions made while using the fragility curves are presented in this section. Also presented in this section are the curve fitting methods used to determine equations representing the fragility curves presented by PEER (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

Fragility Curve Selection

The fragility curves previously presented include FEMA curves for roads, FEMA curves for bridges, and PEER curves for bridges. These curves represent the majority of the body of work done on fragility curves as a function of ground displacement. In addition to PEER curves used by this study (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011), the paper by these authors presents other, more detailed curves for potential use. However these latter, more detailed curves were not considered for this study for two reasons. The first is that these more detailed curves required more detailed information regarding the bridge than is available from the NBI (e.g., pile type and diameter). The second reason is that rather than having outputs in terms of damage, the more detailed curves outputs are in terms of pile cap displacement, pile cap rotation, abutment displacement, and abutment rotation. This limits the use of these fragility curves to a site specific analysis. Because this study is looking at the performance of bridges on a macro level (Salt Lake County), these detailed curves are too specific and difficult to use for regional mapping. Therefore, the more simplistic PEER curves (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011) were used in this study.

The FEMA fragility curves for bridges are similar to the PEER fragility curves in that they require an input of ground displacement and provide an output of the estimated damage state for the given bridge. However, the FEMA curves are relatively simplistic. As is shown by the schematic shown in Figure 10, the FEMA curves predict that once the displacement corresponding to d_{s4} is exceeded, the bridge is in d_{s4} and once the displacement corresponding to d_{s5} is exceeded, the bridge is considered in d_{s5}. Any displacement falling below that corresponding to ds_4 could fall within any of the other three damage states.

The PEER fragility curves differ from the FEMA curves in how the damage states are reported for any given lateral spread value. The PEER curves return a range of probabilities that a bridge will fall within any of the five defined damage states. For example, for a given bridge type and displacement the PEER curves may predict a 50% chance that it will fall within d_{s1}, 20% chance of falling within d_{s2}, 15% chance of falling within d_{s3}, 10% chance of falling within d_{s4}, and a 5% chance of falling within d_{s5}. This type of output is much more realistic as there are too many unknowns at any given site to say that a bridge will fall within a given damage state at some arbitrary cutoff value of lateral spread.

While the PEER curves (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011) provide a more useful output, they still have some shortcomings. The primary shortcomings of the PEER curves are that they were derived only for multi-span bridges with single column supports and older vintage structural properties. While these shortcomings exist, it is unclear how significant they actually are due to the lack of research in this area. In the end, it was decided that the FEMA curves were too simplistic for this study and that the PEER curves would provide a better representation of reality in spite of their shortcomings. For these reasons, the PEER curves were selected for the analysis of all the major bridges in this study.

The PEER fragility curves include curves for six types of bridges categorized by abutment type, expansion joints, isolation, and bridge continuity. The NBI provides information on whether or not the bridge is continuous, but not on abutment type, expansion joints, or isolation which means that some methodology needed to be established to aid in selecting the proper fragility curve for each bridge using only the data reported by the NBI. This process was made slightly easier by eliminating the bridge models including isolation based on the assumption that very few, if any, Salt Lake County bridges were designed in this manner. The process was further eased by neglecting the expansion joint for simply supported bridges. While many bridges in Salt Lake County have expansion joints, the model with the expansion joint and seat abutments performed only slightly better than the model without the expansion joint. Thus, for continuous bridges with seat abutments, the fragility curves corresponding to the model without the expansion joint were used.

With the elimination of the three bridge types discussed, three bridge types remained. Two of the bridge types were seat abutment bridges with the only difference being in whether or not the bridge is continuous. This distinction is clearly made by the NBI making it a straightforward process of selecting the bridge type once the abutments are determined to be seat abutments. The greater challenge is in the determination of abutment type.

Integral or semi-integral abutments are currently the preferred abutment type for most DOTs including UDOT. However, there are restrictions to when integral abutments can be used. These restrictions vary state by state and are generally based on length and skew. While UDOT does not currently have publicly available guidance on the selection of abutment type, it was found through personal correspondence with their structures department that for the purposes of this study any bridge less than 300 ft. in length could be considered an integral abutment. This guidance falls within the general guidance provided by other states. While skew restrictions also exist for bridges with integral abutments, this data is not provided by the NBI making it difficult to use skew as an estimate of abutment type. Further, the skew restriction for most states is generally around 30 degrees and very few short span bridges in Salt Lake County appear to exceed this angle. It was therefore deemed acceptable to ignore this parameter in estimating bridge type.

While integral abutments have been constructed for over 70 years they did not gain wide spread acceptance until the mid to late 1980s (Mistry, 2005). The exact year when UDOT began to use integral abutments as the default abutment type is unclear, but it most likely around the same time period when they became widely accepted throughout the country. From site visits it appears that UDOT began using integral abutments, at least occasionally, in the late 1970s to early 1980s. It appears that by 1985 integral abutments were the preferred abutment type and thus, for the purposes of this study, 1985 is used as the year when UDOT used integral abutments as the default abutment type.

Consequently, in determining the fragility curves to be used for a given bridge, if the date of construction is prior to 1985 a seat abutment is assumed, if the date of construction is after 1985 an integral abutment is assumed unless the bridge length is greater than 300 ft.

Many bridges reported by the NBI are actually culverts used to cross canals and small streams. It is unlikely that these will behave like any of the bridges modeled by PEER since they are essentially ridged box frames. Rather than remove these from the analysis, the FEMA fragility curves for major and minor roads were applied. If the road has four lanes or more lanes the fragility curves for major roads were applied otherwise the fragility curves for minor roads were applied. All of the selection parameters were combined into one process as shown in Figure 17.

Curve Fitting and Regression Equations

The PEER fragility curves (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011) have no reported functional form or actual data points given in their report. Equations used to represent the fragility curves were essential to this study as it would be impractical to hand select several points of a plot for every bridge located within the study area. Two functional forms were considered for fitting these fragility curves. The first functional form considered was a polynomial fit curve and the second was a sigmoidal fit curve. The two functional forms were compared to determine which best fit the data. The functional form that best fit the data was used for the remainder of the study.

Before a line could be fit to the curves, the graphed points were plotted in Excel. As there were no published data points available, this process was done by reading points off the published plots and then plotting them. Since this process can be somewhat subjective a plotting process was used in an effort to reduce error in plotted data points. This process involved using a tool such as Excel's screen clipping tool to create an image consisting of only the inner part of the plots. This image was as tall as the y axis and as wide as the x axis. This newly created image was then used as the background to an Excel plot that was formatted to have its x and y axes match the axes of the original plot. The Excel data points were then formatted to have the same shape and size as those in the original plots. The points were then moved until they and the line connecting them matched the original plots.

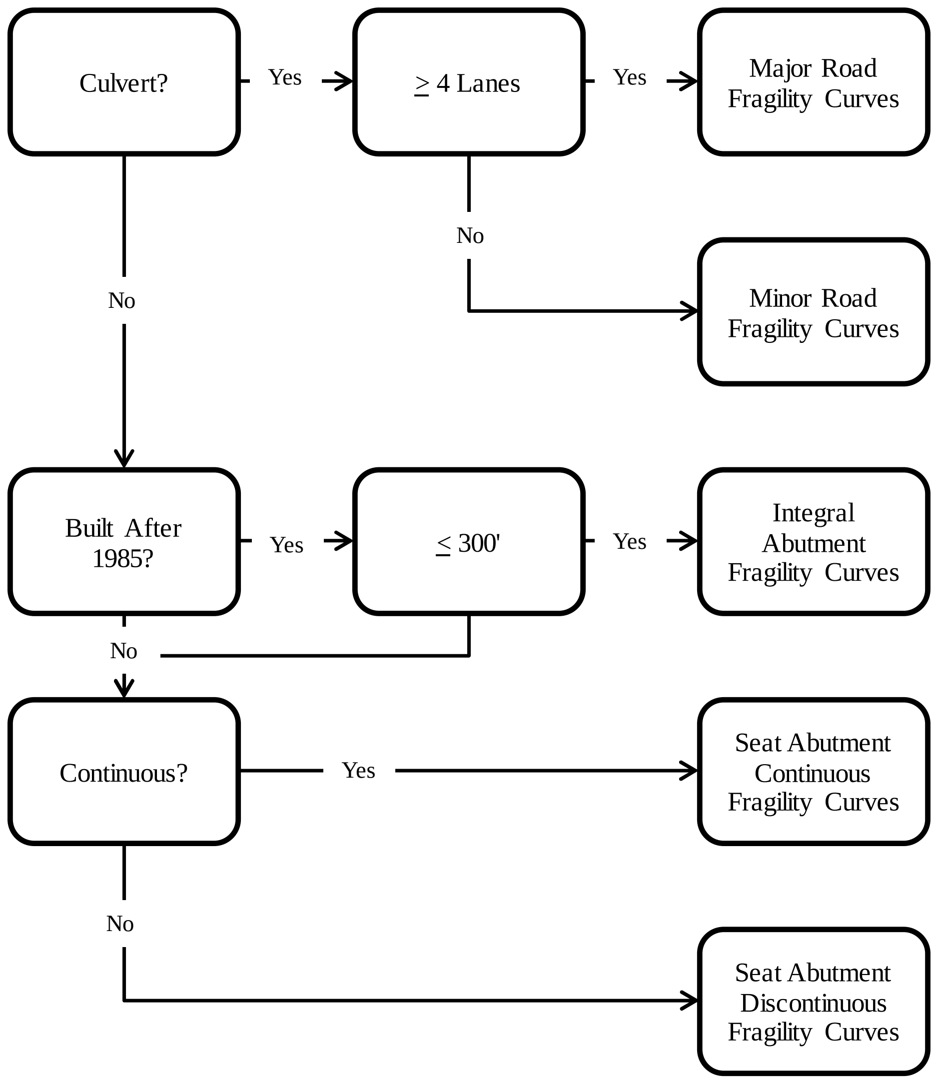


Figure 17: Fragility curve selection flow chart

With the data points known and plotted with reasonable accuracy, the regression process could begin. The first functional form used in the regression analysis was the polynomial form:

$$y = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a \qquad \text{Equation 1}$$

where: $a_n \dots a$ = coefficients.

This regression analysis was done using Excel's trend line tool. This tool automatically fits a trend (regression) line to the data in accordance to the functional form selected by the user. For this case, a trend line was added using the polynomial functional form. A sixth order polynomial was used to fit the data as this had the best fit in comparison to the other orders of polynomial regression forms available in Excel. The results of this regression analysis are shown in Figures 18-20.

The other functional form used in the regression analysis of the fragility curve data was the Boltzmann sigmoidal form:

$$y = A_1 * \frac{A_1 - A_2}{1 + \exp\left(\frac{x_0 - x}{dx}\right)} \qquad \text{Equation 2}$$

where: A_1 = bottom horizontal asymptote

A_2 = top horizontal asymptote

x_0 = point of inflection, and

dx = slope.

This form is not available as one of the regression models in Excel. The regression analysis was thus performed using a trial and error method. This was done by changing the variables in Equation 2 until the approximate best fit line was obtained. The best fit line was determined by computing the R-squared value for the regression line and maximizing this value. The R-squared value is a measure of how well the regression equation describes the change in the data and is computed as:

$$R^2 = \frac{\sum(y_i - \bar{y})^2}{\sum(y_i - f_i)^2}$$

Equation 3

where: y_i = data point

$\bar{y}$ = average of data points, and

f_i = regression point

An R-squared value of 1 indicates that the variation in the data is perfectly described by the regression equation while an R-squared value of 0 would indicate that none of the variation in the data is described by the regression equation. Therefore, the best fit line was obtained by changing the variables until the R-squared value was maximized.

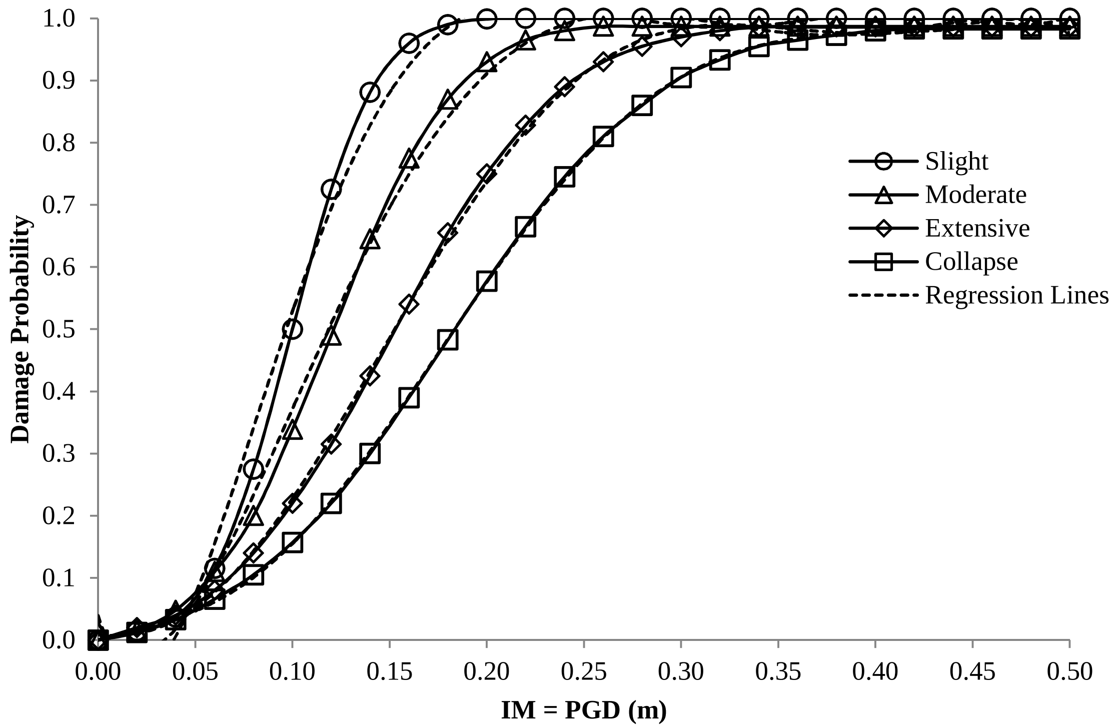


Figure 18: Polynomial fit fragility curves for bridges with integral abutments (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

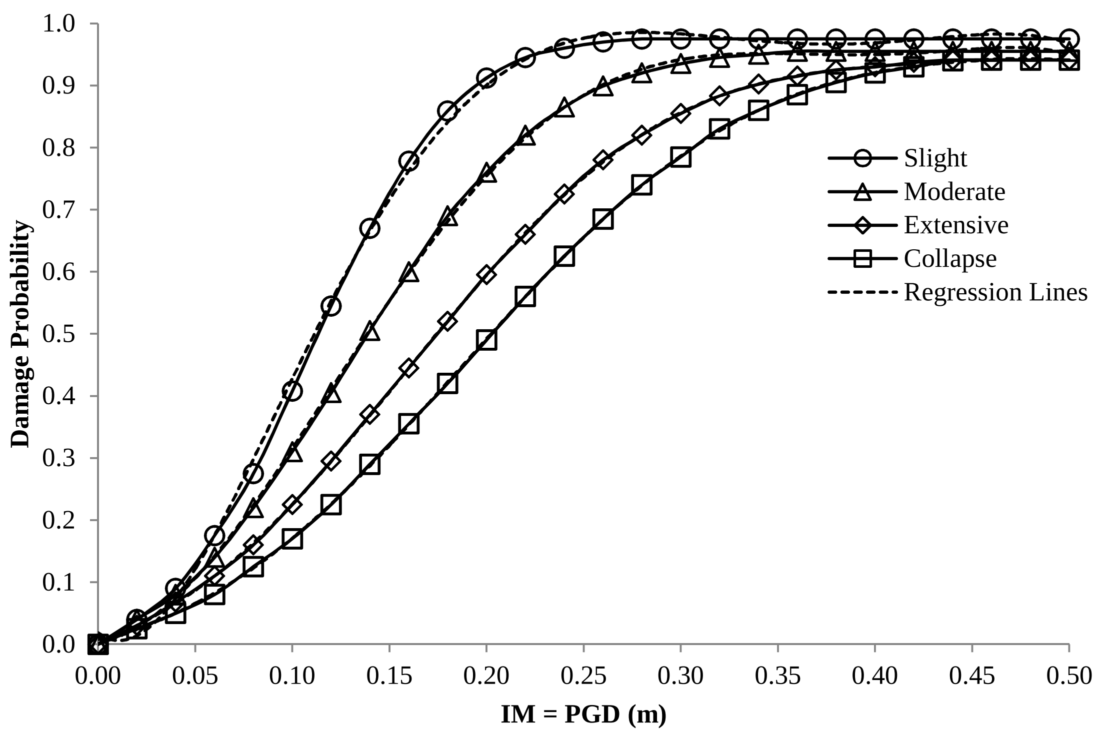


Figure 19: Polynomial fit fragility curves for continuous bridges with seat abutments (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

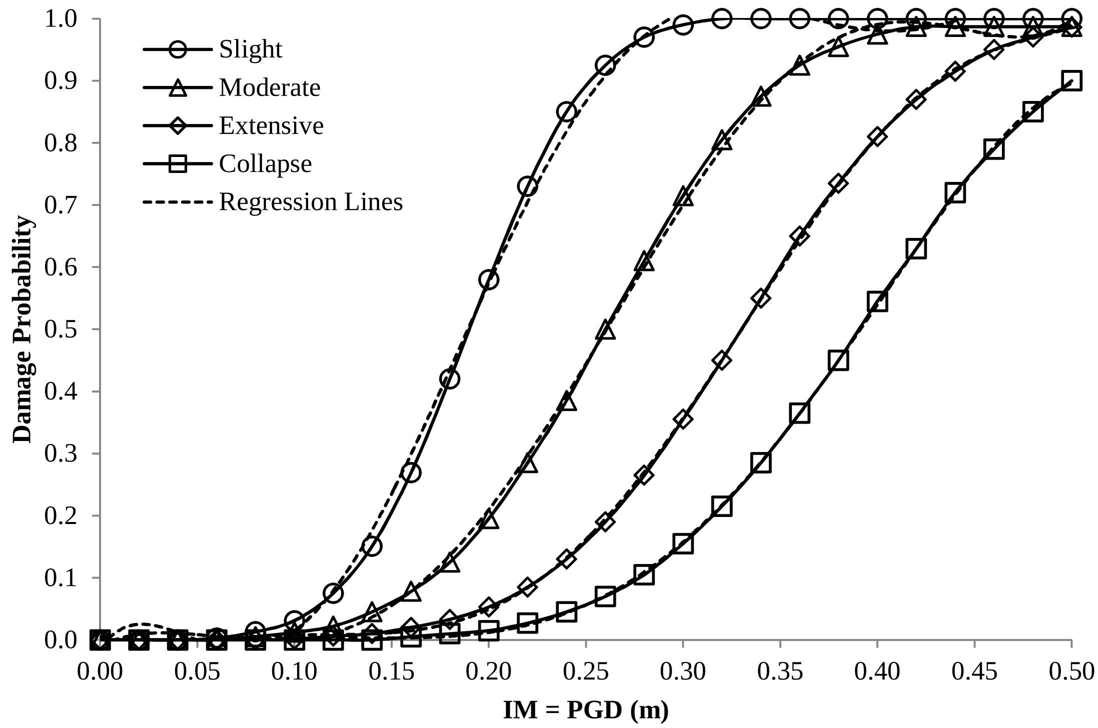


Figure 20: Polynomial fit fragility curves for discontinuous bridges with seat abutments (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

While the R-squared value is a useful tool in determining how well a regression line describes the data, there are times where the highest R-squared value is not the best fit for the data. This was true for several instances while attempting to fit the curves to the data. For example, some of the data provided by PEER resulted in instances where the curves would return negative probabilities of occurrence. This, for example, occurred when the moderate damage curve fell slightly above the slight damage curve, thus returning a negative probability of the bridge falling within the slight damage state. This occurred in other instances as well, and always occurred at the extremes of PGD values shown on the plots. These conditions were corrected when the regression lines were created by ensuring that the lesser damage states did not fall below the greater damage states. Plots displaying the fragility data with the subsequent regression lines are shown in Figures 21-23.

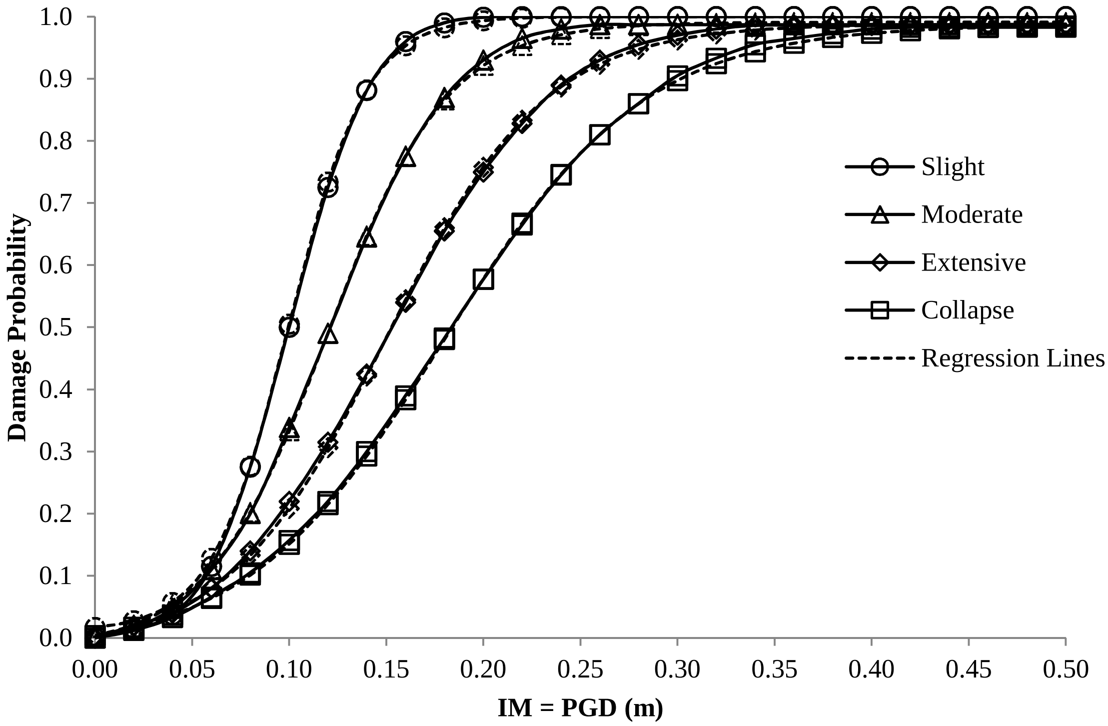


Figure 21: Sigmoidal fit fragility curves for bridges with integral abutments (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

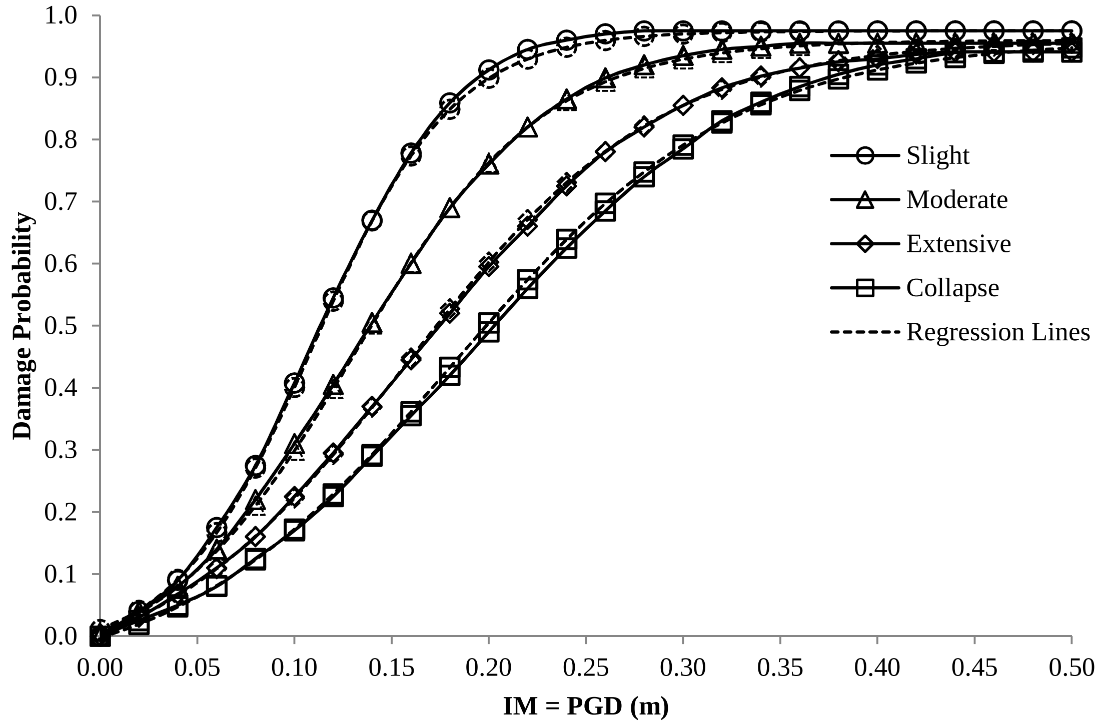


Figure 22: Sigmoidal fit fragility curves for continuous bridges with seat abutments (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

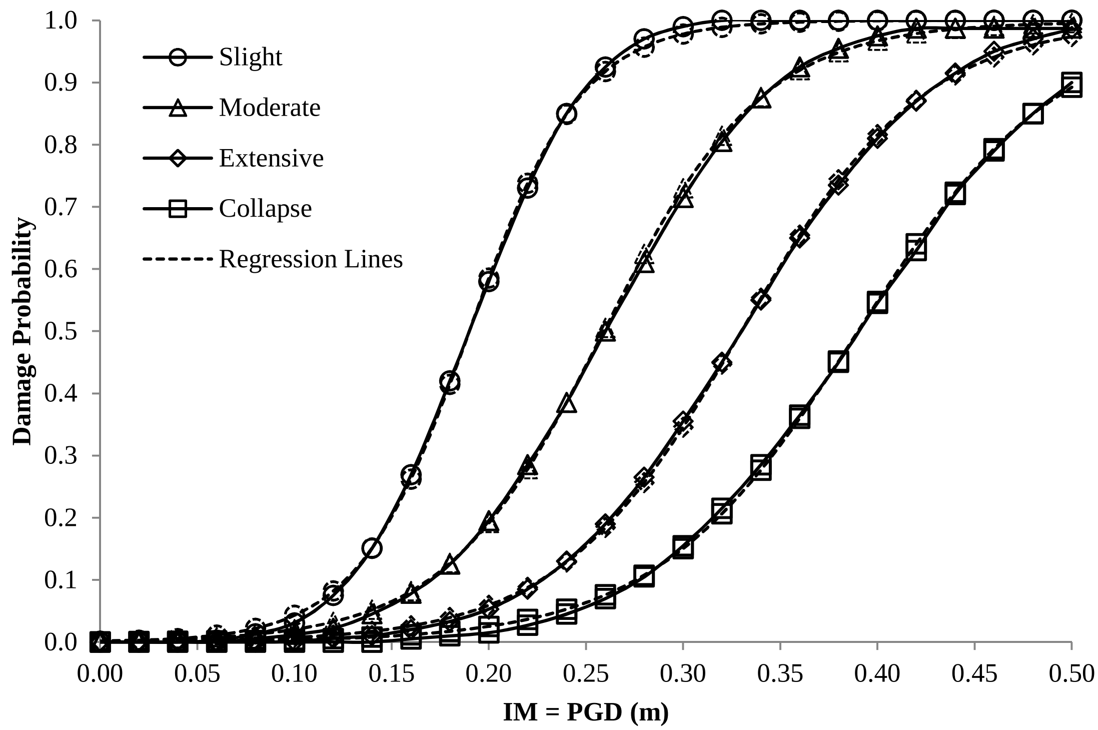


Figure 23: Sigmoidal fit fragility curves for discontinuous bridges with seat abutments (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011)

Another instance where a high R-squared value does not represent the best fit line occurred is when the line passes relatively well through the data points but does not follow the general trend of the data. This often occurs with high order polynomial equations like the sixth order polynomial equations used in the polynomial regression analysis. An example of this situation is shown in Figure 24 where the moderate damage fragility curve data is plotted and a sixth order polynomial regression fitted to the data points. This regression line has an R-squared value of 0.9973 but lacks a fit to the general trend in the data.

The sigmoidal fit to the data was selected as the fit to be used for the analysis of the Salt Lake County bridges. Table 2 shows a summary of R-squared values obtained using the polynomial and sigmoidal functional forms. The sigmoidal fit generally provided the better fit for the steeper curves while the polynomial fit of the data generally provided the better fit for the shallower curves. While there are several instances where the polynomial form provided a better fit of the data, this was confined to values of PGD up to 0.5 m. For values of PGD greater than 0.5 m the polynomial fit is no longer valid while the sigmoidal fit still reasonably represents the general trend of the data. This presents a problem when considering that many of the lateral spread values used in the creation of the liquefaction hazard maps are greater than 0.5 m. Due to this and the issues with the polynomial fits matching the general trend of the data, the sigmoidal fit was used in analysis. All the variables for the sigmoidal fit fragility curves are shown in Table 3.

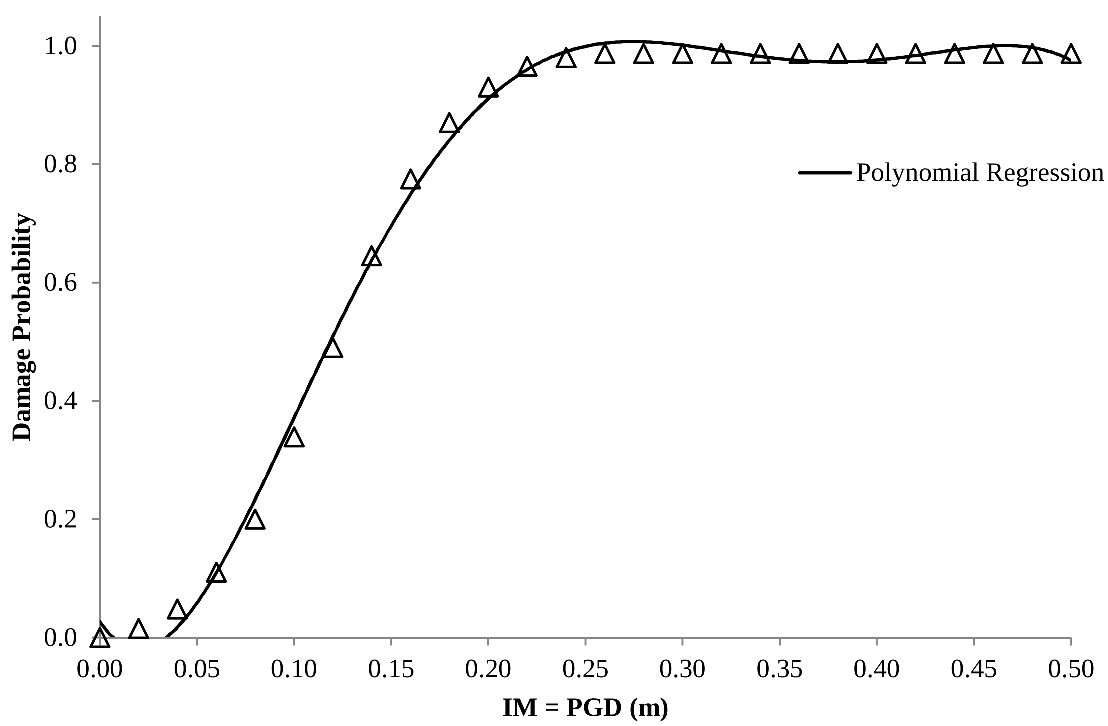


Figure 24: Polynomial fit for moderate damage to bridges with integral abutments

Table 2: Comparison of R- squared values for polynomial and sigmoidal regressions

Model	Damage State	R^2 Polynomial	R^2 Sigmoidal
Integral Abutment	Slight	0.9935	0.9996
	Moderate	0.9973	0.9998
	Extensive	0.9995	0.9998
	Collapse	0.9999	0.9998
Seat Abutment Continuous	Slight	0.9988	0.9996
	Moderate	0.9998	0.9998
	Extensive	1.0000	0.9997
	Collapse	0.9999	0.9678
Seat Abutment Discontinuous	Slight	0.9982	0.9998
	Moderate	0.9994	0.9997
	Extensive	0.9999	0.9997
	Collapse	0.9999	0.9996

Table 3: Variables for fragility curve regression equations

Model	Damage State	A_1	A_2	x_0	dx
Integral Abutment	Slight	0.010	1.000	0.100	0.020
	Moderate	-0.018	0.991	0.120	0.031
	Extensive	-0.022	0.988	0.150	0.041
	Collapse	-0.026	0.987	0.180	0.052
Seat Abutment Continuous	Slight	-0.035	0.975	0.110	0.036
	Moderate	-0.060	0.960	0.130	0.049
	Extensive	-0.080	0.960	0.158	0.065
	Collapse	-0.080	0.960	0.182	0.072
Seat Abutment Discontinuous	Slight	0.000	1.000	0.190	0.029
	Moderate	0.000	1.000	0.259	0.041
	Extensive	0.000	1.000	0.330	0.047
	Collapse	0.000	1.000	0.390	0.052

Uncertainty Analysis

As discussed previously, the lateral spread hazard maps were created through the use of soil data throughout Salt Lake County. Most of the data consisted of SPT and CPT data which was organized into geologic units. Each borehole or sounding was analyzed to predict lateral spread at that location (Hinckley, 2010). Each geologic unit was then assigned a hazard level depending upon the distribution of lateral spread estimates within that unit. This thesis uses the lateral spread data to create standardized lateral spread distributions for each hazard level within each lateral spread hazard map by combining the lateral spread estimates for each geologic unit assigned to that level. Probabilities of a bridge falling within given damage states were then estimated for each hazard level within each lateral spread hazard map using the Monte Carlo technique as presented in the following discussion.

Monte Carlo Technique

A Monte Carlo technique was employed using the lateral spread displacement distributions in each hazard area to preserve the uncertainty in this variable. Each individual displacement within a hazard zone represents the horizontal displacement predicted at its respective location using liquefaction and lateral spread evaluations done on an individual borehole. However, the displacement estimates within a hazard zone are considered to be spatially uncorrelated by this study (This is not strictly true, however the data density within a hazard zone is generally not spaced sufficiently close to determine the spatial correlation function and apply spatial statistics). Thus, this study assumes that the displacement predicted at each borehole is statistically independent of the other estimates and that each estimate within a hazard zone is equally-likely.

Within a lateral spread hazard zone, the potential lateral spread displacement is variable and uncertain. The variability mainly arises from the aleatory uncertainty arising from the natural variability of the deposited sediments in each zone. In addition to this, uncertainty exists in the individual estimates of lateral spread displacement due to epistemic uncertainty resulting from uncertainty in the methods used to calculate liquefaction and lateral spread displacement. The amount of epistemic uncertainty is not easily quantified, but is probably somewhat less than the aleatory uncertainty.

To address the potential aleatory uncertainty, a Monte Carlo method of analysis was selected. In its simplest form, this technique consists of randomly selecting an equally-likely independent variable or variables from a distribution and then determining the value of the dependent variable or variables, which when taken in total will represent the distribution of the potential outcomes. The key to this technique is the sampling of random, but equally-likely input variables from a distribution that reasonably represents their potential variation.

Most lateral spread hazard areas within the study area have numerous (i.e., more than 150) estimates of horizontal displacement. For these hazard areas, where the number of lateral spread estimates consist of 150 or greater estimates, the Monte Carlo method was initiated by random selecting a lateral spread estimate from the distribution associated with the given hazard area. The randomly selected lateral spread value was then used to predict probabilities of a bridge or roadway falling within the given damage states using the fragility curves described previously (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011) (FEMA, 2012). This process was repeated a smooth distribution of outcomes was created, which was typically found to occur after 1000 repetitions.

There are two points to make regarding this. First, the random selection was done from each hazard area, which entails in some cases more than one mapped geological unit. The pooling of estimates from similar geological units with the same hazard area definitions increases the sampling size for each hazard unit and somewhat improves the robustness of the estimation process. Second, it is assumed that the sample distribution obtained from the sampling of mapped estimates constitutes a reasonable representation of the population of mapped estimates for that hazard unit.

Three lateral spread hazard areas had lateral spread samples size consisting of fewer than 150 estimates. These three cases were: (1) moderate hazard area for the M7.0 deterministic event (2) minimal hazard area for the M7.0 deterministic event and (3) moderate hazard area for the 10 percent probability of exceedance in 50 years probabilistic event. For these cases, the normal or log normal distribution should be modified for small sample size effects. This was done by random sampling from the Student's t-distribution. The t-distribution is similar in shape to the standard normal distribution but is only defined in terms of degrees of freedom (defined as number of samples minus one). This distribution aids in accounting for variability that comes from small sample sizes and becomes more similar to the standard normal distribution as the degrees of freedom increase (Khisty & Mohammadi, 2001).

Prior to random sampling from the Student's t-distribution estimates of the mean and standard deviation of the sample were required. These values were estimated by plotting the cumulative distribution for the data set without zero values. Normal and lognormal cumulative distributions were then plotted over the cumulative distribution of the data as shown in Figures 25-27. The mean and standard deviation of both the normal and lognormal distributions were varied until the computed R^2 value was maximized. For both cases the log-normal distribution yielded the larger R^2 value and was thus assumed to more accurately represent the data.

Using the estimated means and standard deviations, random values of lateral spread were generated using a t-distribution to account for the small sample size (Bailey, 1994). Lateral spread values were generated until the percent difference between the mean of the randomly generated lateral spread estimates and the estimated sample mean from the lateral spread dataset without zero values was less than or equal to 5 percent. The percent of zero values from the lateral spread data set was then added to randomly generated distribution to create the distribution that would be used in analysis. The randomly generated distributions of lateral spread estimates were then applied to the fragility curves as described for larger distributions.

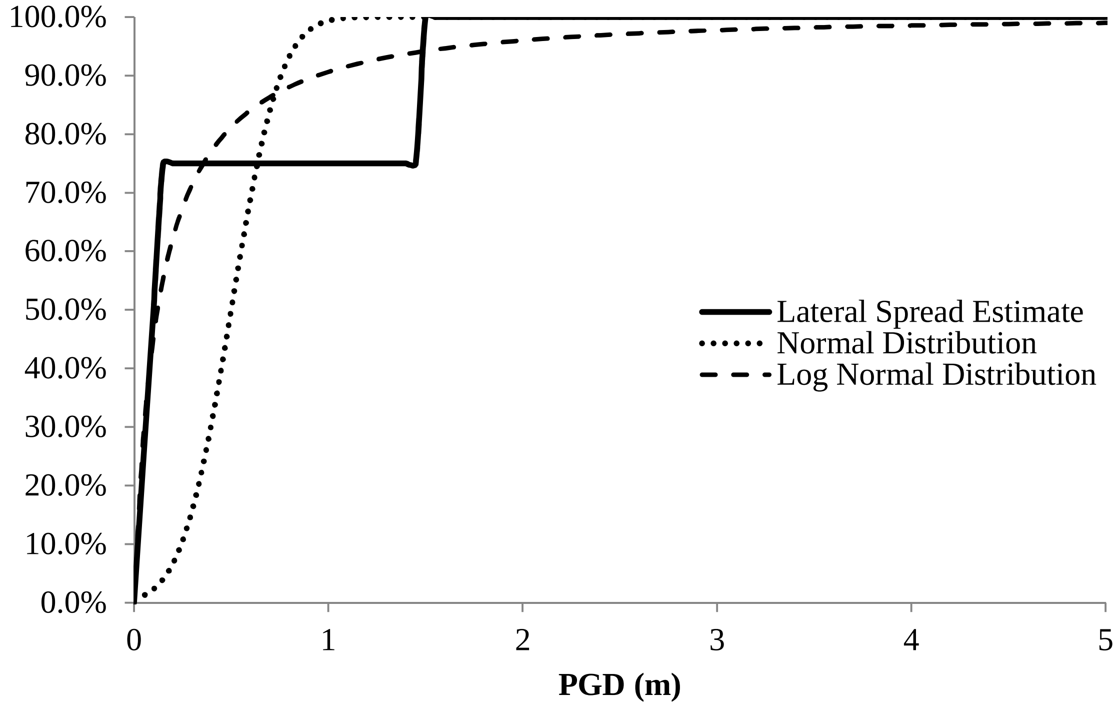


Figure 25: Lateral spread distribution for the moderate hazard area for a magnitude 7.0 earthquake overlain by normal and lognormal distributions

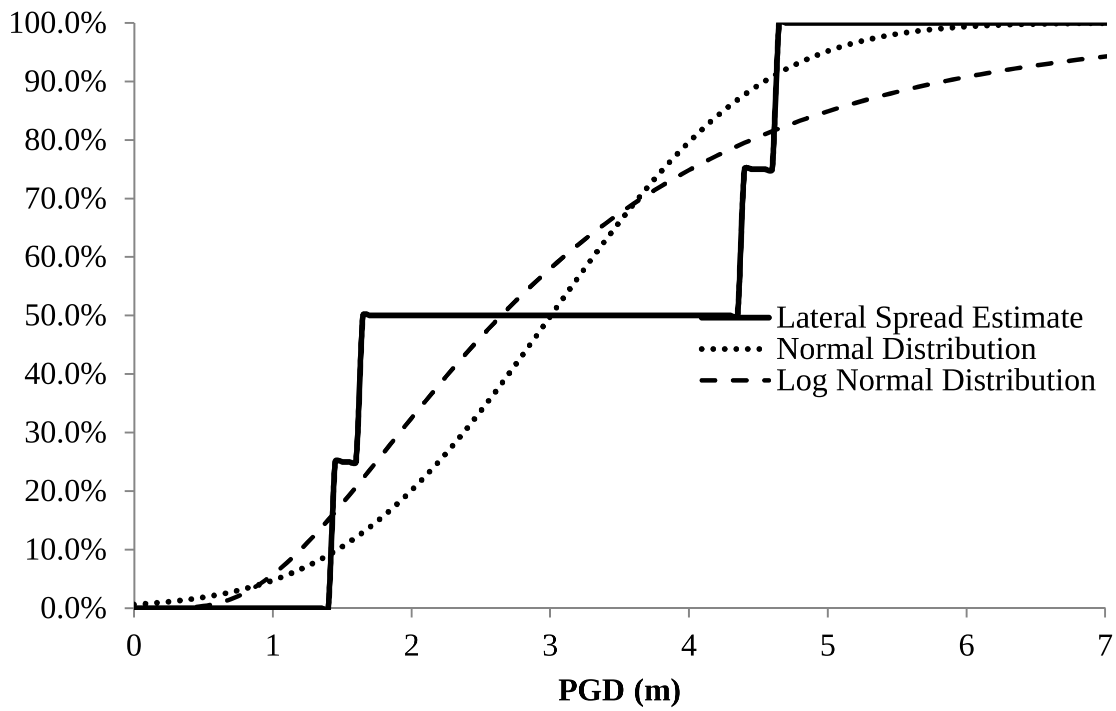


Figure 26: Lateral spread distribution for the minimal hazard area for a magnitude 7.0 earthquake overlain by normal and lognormal distributions

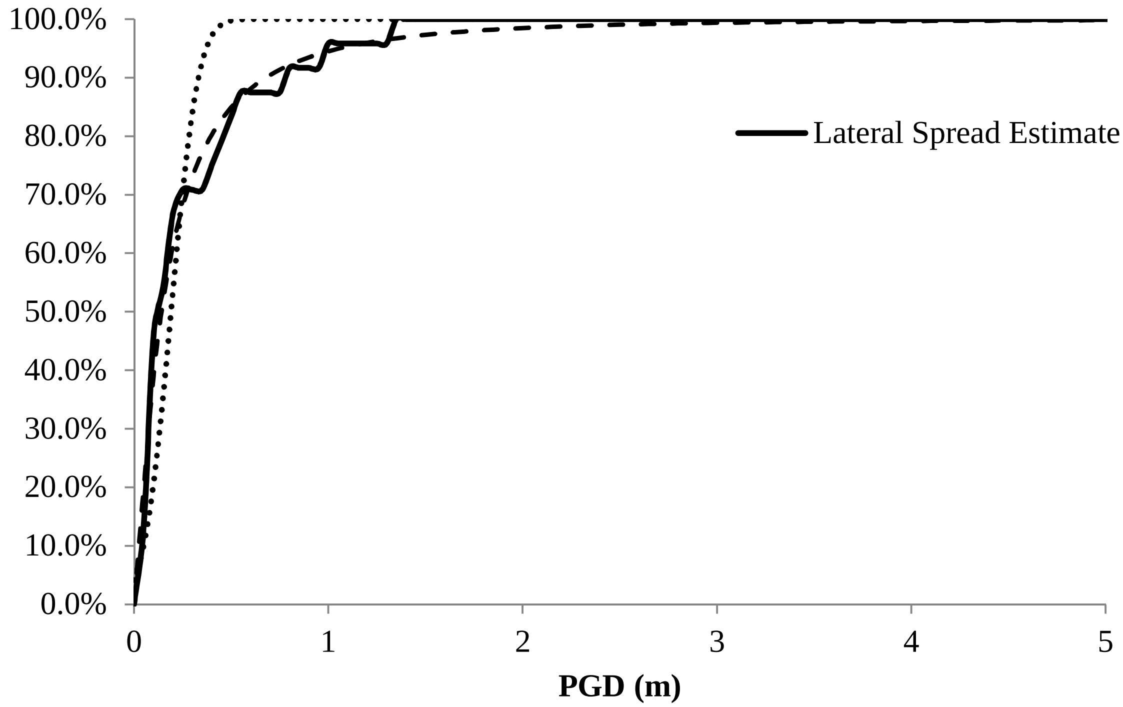


Figure 27: lateral spread distribution for moderate hazard area with 10 percent probability of exceedance in 50 years overlain by Normal and Lognormal Distributions

RESULTS

A summary of the results as a function of bridge or road type and lateral spread area are shown in Tables 4 through 6. These tables show the mean probability and standard deviation of a bridge or road falling within one of the five damage states. The mean probabilities for any given bridge type and lateral spread hazard area sum to one. This, as expected, is not the case for the mean plus or minus one standard deviation values.

It is of some interest that the mean probabilities of a bridge falling within the slight, moderate, or extensive damage states are generally very small. This is due to the relatively small range of PGD where these curves are significantly different. Generally speaking, for PGD below 0.1 m and above 0.35 to 0.45 m the slight, moderate, and extensive damage state fragility curves fell very close to each other. Most of the lateral spread values used in the analysis fell outside of this range which resulted in the small probability that these damage states would be predicted.

The results are also summarized as a function of existing Salt Lake County bridges which are shown in Appendix A. This summary may be more useful for the assessment of an existing bridge. The results are also summarized as a function of lateral spread estimates in Appendix B.

Table 4: Mean and standard deviation values representing the probability of falling within any given damage state due to a M7.0 seismic event

Structure Type	Lateral Spread Hazard Area	None μ	None σ	Slight μ	Slight σ	Moderate μ	Moderate σ	Extensive μ	Extensive σ	Collapse μ	Collapse σ
Bridge with Integral Abutments	Very High	0.459	0.478	0.021	0.042	0.015	0.043	0.012	0.034	0.491	0.473
	High	0.622	0.461	0.025	0.044	0.024	0.057	0.022	0.050	0.307	0.416
	Moderate	0.758	0.387	0.028	0.049	0.021	0.052	0.016	0.040	0.178	0.338
	Low	0.892	0.280	0.014	0.013	0.002	0.011	0.002	0.011	0.091	0.273
	Minimal	0.934	0.214	0.013	0.001	0.000	0.001	0.000	0.000	0.053	0.214
Continuous Bridge with Seat Abutments	Very High	0.483	0.464	0.020	0.032	0.014	0.034	0.012	0.022	0.471	0.458
	High	0.643	0.437	0.025	0.043	0.025	0.046	0.021	0.028	0.287	0.395
	Moderate	0.776	0.363	0.021	0.040	0.020	0.039	0.017	0.023	0.166	0.321
	Low	0.899	0.273	0.006	0.010	0.005	0.012	0.008	0.009	0.082	0.263
	Minimal	0.941	0.210	0.004	0.003	0.003	0.001	0.007	0.002	0.045	0.210
Discontinuous Bridge with Seat Abutments	Very High	0.508	0.490	0.023	0.084	0.021	0.071	0.015	0.049	0.432	0.482
	High	0.695	0.435	0.047	0.115	0.041	0.096	0.027	0.069	0.191	0.366
	Moderate	0.833	0.351	0.026	0.086	0.022	0.069	0.014	0.049	0.106	0.289
	Low	0.911	0.281	0.005	0.040	0.006	0.043	0.003	0.021	0.075	0.258
	Minimal	0.949	0.218	0.000	0.000	0.001	0.001	0.000	0.003	0.050	0.217
Major Roads	Very High	0.559	0.458	0.08	0.119	0.147	0.184	0.214	0.314	-	-
	High	0.772	0.353	0.084	0.13	0.084	0.147	0.06	0.169	-	-
	Moderate	0.873	0.283	0.047	0.104	0.041	0.11	0.039	0.159	-	-
	Low	0.925	0.246	0.019	0.072	0.029	0.101	0.027	0.121	-	-
	Minimal	0.951	0.216	0.003	0.02	0.011	0.06	0.036	0.164	-	-
Minor Roads	Very High	0.503	0.472	0.056	0.105	0.08	0.119	0.361	0.42	-	-
	High	0.689	0.414	0.083	0.134	0.084	0.13	0.144	0.282	-	-
	Moderate	0.815	0.34	0.058	0.112	0.047	0.104	0.08	0.224	-	-
	Low	0.913	0.273	0.012	0.051	0.019	0.072	0.056	0.199	-	-
	Minimal	0.95	0.218	0.001	0.007	0.003	0.02	0.047	0.206	-	-

Table 5: Mean and standard deviation values representing the probability of falling within any given damage state due to PGA associated with 2 percent probability of exceedance in 50 years

Structure Type	Lateral Spread Hazard Area	Probability of Falling within Damage State: None		Slight		Moderate		Extensive		Collapse	
		μ	σ	μ	σ	μ	σ	μ	σ	μ	σ
Bridge with Integral Abutments	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.473	0.475	0.025	0.050	0.020	0.051	0.015	0.039	0.467	0.466
	Low	0.592	0.466	0.025	0.048	0.019	0.052	0.014	0.039	0.350	0.444
	Minimal	0.887	0.287	0.015	0.014	0.003	0.021	0.003	0.022	0.091	0.269
Continuous Bridge with Seat Abutments	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.496	0.458	0.023	0.038	0.018	0.038	0.015	0.024	0.448	0.449
	Low	0.612	0.445	0.021	0.039	0.017	0.038	0.015	0.023	0.334	0.428
	Minimal	0.896	0.278	0.007	0.017	0.006	0.020	0.009	0.012	0.082	0.261
Discontinuous Bridge with Seat Abutments	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.536	0.484	0.027	0.090	0.020	0.072	0.020	0.060	0.393	0.470
	Low	0.656	0.459	0.023	0.077	0.023	0.067	0.020	0.061	0.278	0.427
	Minimal	0.911	0.276	0.007	0.054	0.005	0.032	0.003	0.018	0.073	0.256
Major Roads	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.595	0.443	0.093	0.126	0.151	0.188	0.161	0.264	-	-
	Low	0.71	0.406	0.08	0.126	0.109	0.173	0.101	0.223	-	-
	Minimal	0.923	0.252	0.014	0.057	0.026	0.094	0.036	0.148	-	-
Minor Roads	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.525	0.463	0.07	0.114	0.093	0.126	0.312	0.392	-	-
	Low	0.645	0.443	0.065	0.112	0.08	0.126	0.209	0.34	-	-
	Minimal	0.911	0.273	0.012	0.058	0.014	0.057	0.063	0.223	-	-

Table 6: Mean and standard deviation values representing the probability of falling within any given damage state due to PGA associated with 10 percent probability of exceedance in 50 years

Structure Type	Lateral Spread Hazard Area	Probability of Falling within Damage State									
		None		Slight		Moderate		Extensive		Collapse	
		μ	σ	μ	σ	μ	σ	μ	σ	μ	σ
Bridge with Integral Abutments	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.600	0.446	0.037	0.063	0.033	0.064	0.024	0.047	0.306	0.407
	Low	0.560	0.474	0.023	0.045	0.016	0.047	0.012	0.035	0.390	0.460
	Minimal	0.884	0.291	0.015	0.014	0.004	0.020	0.004	0.022	0.094	0.272
Continuous Bridge with Seat Abutments	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.627	0.418	0.031	0.048	0.028	0.046	0.022	0.027	0.291	0.386
	Low	0.580	0.456	0.019	0.035	0.015	0.034	0.013	0.021	0.373	0.445
	Minimal	0.892	0.282	0.007	0.017	0.007	0.021	0.010	0.013	0.084	0.261
Discontinuous Bridge with Seat Abutments	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.709	0.428	0.038	0.099	0.033	0.084	0.024	0.064	0.196	0.371
	Low	0.613	0.476	0.020	0.076	0.020	0.065	0.016	0.054	0.332	0.456
	Minimal	0.907	0.282	0.010	0.063	0.009	0.048	0.005	0.028	0.068	0.242
Major Roads	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.772	0.355	0.080	0.125	0.078	0.146	0.069	0.198	-	-
	Low	0.661	0.433	0.079	0.120	0.130	0.186	0.129	0.240	-	-
	Minimal	0.926	0.240	0.020	0.072	0.027	0.095	0.027	0.124	-	-
Minor Roads	Very High	-	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-	-
	Moderate	0.680	0.403	0.092	0.129	0.080	0.125	0.147	0.291	-	-
	Low	0.605	0.460	0.057	0.104	0.079	0.120	0.260	0.372	-	-
	Minimal	0.909	0.273	0.017	0.067	0.020	0.072	0.054	0.198	-	-

CONCLUSION

This study combines lateral spread hazard maps (Hinckley, 2010) with bridge data for Salt Lake County (Svirsky, 2014). Fragility curves (FEMA, 2012) & (Brandenberg, Zhang, Kashighandi, Huo, & Zhao, 2011) were then used to predict possible damage states for each bridge. This was done using values from a distribution of lateral spread values associated with the lateral spread hazard area in which a bridge was found. Results of this analysis are in the form of mean probabilities that a bridge or roadway would fall within the defined damage states. Standard deviations associated with the mean probabilities were also reported.

This data can be used to obtain general estimates of damage caused by lateral spread to bridges located in Salt Lake County. These estimates are useful when assessing the entire county or larger regions within the county. They are in no way intended to replace the need for site specific analysis, but could be used to determine whether a site specific analysis is necessary. It is also important to note that lateral spread may or may not be the controlling contributor to damage for any given bridge. Other seismic hazards such as strong ground motion, seismic compaction, and liquefaction induced settlement should also be evaluated.

Due to the high standard deviations, the results become very hard to interpret if any value other than the mean probability is used. Take, for example, the results for a bridge with integral abutments located in a moderate lateral spread area for a 2 percent probability of exceedance in 50 years seismic event. The mean plus one standard deviation of the bridge having no damage ranges from a probability of 0.00 to 0.96 while the mean plus one standard deviation of the bridge facing collapsing ranges from a probability of 0.00 to 0.93. This case is not unique to the bridge type, lateral spread hazard area, or seismic event.

The high standard deviations obtained in the analysis are most likely due to the bimodal nature of the lateral spread distributions used in creating the lateral spread hazard maps. The bimodal nature of the data is especially apparent in considering that most PGD over about 0.35 m will result in a high probability of collapse. The mean plus one standard deviation yields an extremely high probability of collapse that is most likely not representative of what would actually occur during an earthquake. It is thus recommended that this data be implemented with care not to be overly conservative in predicting potential consequences of lateral spreading on the infrastructure of Salt Lake County.

Due to the large variability in the results, a Monte Carlo Simulation would again be useful in applying the results. The results of this data may be useful to traffic modelers wishing to model traffic in Salt Lake County after a seismic event. This could be done by randomly assigning lateral spread values to the bridges located within a given hazard area based on the distributions shown in Appendix B. A damage state could then be assigned based on the desired level of non-exceedance after which the traffic model could then be run and the results recorded. Lateral spread estimates would again be randomly assigned to the bridges along with its associated damage state and the model would be run again. This process would be continued until a distribution of traffic scenarios is obtained. The modeler would then have a distribution of possible outcomes of traffic scenarios for post-earthquake Salt Lake County.

FUTURE WORK

Due to the relatively small body of work done in the area of fragility curves for bridges as a function of laterally spreading soil, it is recommended that more research be done in this area. Some areas in which there is a particular lack of data include single span bridges with no bents, longer bridges with more than two bents, and bridges with bents consisting of more than one column. If this research were done, the research and conclusions presented herein could be updated to reflect the increased body of knowledge.

The work presented in this paper is not considered a fully probabilistic approach. While it is semi-probabilistic there are efforts that could be made to make it a fully probabilistic approach. In this approach the ground motions at any location would be based on a given probability rather than on a given seismic event. This would be useful in that the estimates of lateral spreading would become more site specific as it would be based on the general seismicity of the sites surroundings rather than seismicity caused only by a given fault.

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APPENDIX A

This appendix contains tables of the mean probabilities of Salt Lake County bridges falling within the given damage states. The tables also include the NBI identification number along with bridge location, hazard area, and behavior type. This table may be useful to those wishing to perform a simplified analysis of Salt Lake County. Criteria such as 85 percent non-exceedance could be chosen and each bridge could be assigned a damage state based on that criteria.

Some caution is necessary in using these tables located in this appendix due to the very high standard deviations reported in Tables 4-6. The high standard deviations are especially noteworthy for the “None” and “Collapse” damage states. In many cases the mean plus or minus one standard deviation covers probabilities from 0 to 1 for these damage states. It is therefore recommended that the mean probabilites be used if these tables are implemented.

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035001E	40.71114	-111.96756	Moderate	Maj. Road	0.873	0.047	0.041	0.039	-
035002E	40.71128	-111.97208	Moderate	Maj. Road	0.873	0.047	0.041	0.039	-
035003D	40.50775	-111.95030	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035004E	40.50994	-111.89667	Low	Maj. Road	0.925	0.019	0.029	0.027	-
035005D	40.53686	-111.95207	Low	Integral	0.892	0.014	0.002	0.002	0.091
035006E	40.63043	-111.92329	Very High	Min. Road	0.503	0.056	0.080	0.361	-
035007D	40.63013	-111.92632	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035008E	40.71119	-111.95800	Moderate	Maj. Road	0.873	0.047	0.041	0.039	-
035009D	40.66009	-111.88215	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035010D	40.65606	-111.87565	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
035011D	40.67973	-111.89123	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035012D	40.66686	-111.90861	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035013E	40.64961	-111.87673	High	Min. Road	0.689	0.083	0.084	0.144	-
035014F	40.62854	-111.87259	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
035015E	40.53083	-111.83334	High	Min. Road	0.689	0.083	0.084	0.144	-
035016D	40.56039	-111.92914	High	Integral	0.622	0.025	0.024	0.022	0.307
035017F	40.66636	-111.90625	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035018D	40.62584	-111.85104	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035019C	40.72589	-111.92633	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035020D	40.66724	-111.86502	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035021D	40.59408	-111.95713	High	Integral	0.622	0.025	0.024	0.022	0.307
035022D	40.62403	-111.96548	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035023E	40.71104	-111.93893	High	Maj. Road	0.772	0.084	0.084	0.060	-
035024F	40.68711	-112.06305	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035025F	40.68502	-112.04392	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035026F	40.68356	-112.03433	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035027D	40.68613	-112.05359	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035028D	40.68210	-112.02661	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
035029F	40.67993	-112.01998	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035030D	40.67474	-112.00564	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035031F	40.70014	-112.11033	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035032D	40.69195	-112.08228	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035033F	40.69653	-112.10292	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035034D	40.61501	-111.88186	High	Integral	0.622	0.025	0.024	0.022	0.307
035035F	40.60584	-111.88885	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035036F	40.60586	-111.87748	High	Integral	0.622	0.025	0.024	0.022	0.307
035037D	40.60956	-111.88594	Low	Integral	0.892	0.014	0.002	0.002	0.091
035038D	40.59381	-111.88358	High	Integral	0.622	0.025	0.024	0.022	0.307
035039E	40.59310	-111.88453	High	Min. Road	0.689	0.083	0.084	0.144	-
035040E	40.59166	-111.88486	High	Min. Road	0.689	0.083	0.084	0.144	-

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035041D	40.51463	-111.94965	Low	Integral	0.892	0.014	0.002	0.002	0.091
035042E	40.57865	-111.96729	Minimal	Maj. Road	0.951	0.003	0.011	0.036	-
035043D	40.62076	-111.87744	High	Integral	0.622	0.025	0.024	0.022	0.307
035044F	40.50068	-111.89714	Low	Integral	0.892	0.014	0.002	0.002	0.091
035045E	40.55160	-111.88603	High	Maj. Road	0.772	0.084	0.084	0.060	-
035046E	40.53706	-111.87672	High	Min. Road	0.689	0.083	0.084	0.144	-
035047F	40.67072	-111.99705	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035048E	40.58775	-111.95440	Low	Maj. Road	0.925	0.019	0.029	0.027	-
035051F	40.58059	-111.89269	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
035052E	40.59223	-111.89123	Low	Min. Road	0.913	0.012	0.019	0.056	-
035053E	40.59315	-111.89213	Low	Min. Road	0.913	0.012	0.019	0.056	-
035054D	40.60952	-111.92129	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035055D	40.61765	-111.87136	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
035056F	40.51613	-111.89571	Low	Integral	0.892	0.014	0.002	0.002	0.091
035057F	40.54431	-111.88865	High	Integral	0.622	0.025	0.024	0.022	0.307
035058F	40.48958	-111.94733	High	Integral	0.622	0.025	0.024	0.022	0.307
035059E	40.49093	-111.94833	High	Min. Road	0.689	0.083	0.084	0.144	-
035060D	40.63181	-111.80667	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035061E	40.54041	-111.95691	Low	Min. Road	0.913	0.012	0.019	0.056	-
035062C	40.66503	-111.84012	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035063D	40.62628	-111.80034	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035064D	40.65622	-111.82392	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035065D	40.65205	-111.83418	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035066D	40.66383	-111.83882	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035067C	40.63546	-111.81158	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035068D	40.66028	-111.83286	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035069D	40.63775	-111.81300	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035070D	40.71181	-111.98397	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
035071D	40.60785	-111.83299	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035072D	40.60391	-111.81924	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035073D	40.60311	-111.81594	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035074V	40.57848	-111.79710	Very High	Min. Road	0.503	0.056	0.080	0.361	-
035075D	40.63350	-111.61464	-	Integral	0.000	-	-	-	-
035076E	40.53434	-111.87325	High	Min. Road	0.689	0.083	0.084	0.144	-
035077D	40.53251	-111.87209	High	Integral	0.622	0.025	0.024	0.022	0.307
035078E	40.52881	-111.87108	High	Min. Road	0.689	0.083	0.084	0.144	-
035080E	40.52323	-111.87022	Low	Min. Road	0.913	0.012	0.019	0.056	-
035081D	40.50453	-111.87117	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035082D	40.64503	-111.95790	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035083D	40.63858	-111.94881	Low	Integral	0.892	0.014	0.002	0.002	0.091

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None µ	Slight µ	Moderate µ	Extensive µ	Collapse µ
035084C	40.63806	-111.94831	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035085F	40.63404	-111.94831	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035086D	40.65426	-111.96741	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035087D	40.66045	-111.97699	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035088D	40.66744	-111.98806	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035089D	40.66673	-111.98669	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
035090F	40.68631	-111.92125	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
035091F	40.73353	-111.92332	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
035092F	40.73314	-111.93294	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
035093C	40.74049	-111.92273	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035094P	40.74533	-111.92093	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035095D	40.75149	-111.92119	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035096P	40.75411	-111.92288	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035097F	40.75844	-111.92330	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
035098D	40.76065	-111.92366	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035099D	40.76281	-111.92424	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035100F	40.76500	-111.92618	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035101C	40.75047	-111.95292	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035102F	40.75843	-111.95803	High	Integral	0.622	0.025	0.024	0.022	0.307
035103E	40.77268	-111.98697	High	Maj. Road	0.772	0.084	0.084	0.060	-
035104E	40.77264	-111.98580	High	Maj. Road	0.772	0.084	0.084	0.060	-
035105V	40.59549	-111.95783	High	Min. Road	0.689	0.083	0.084	0.144	-
035106F	40.79104	-111.93556	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035107F	40.78429	-111.93631	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
035108D	40.78019	-111.93804	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035109D	40.71875	-111.95036	High	Integral	0.622	0.025	0.024	0.022	0.307
035110D	40.66483	-111.84461	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035111D	40.50473	-111.92923	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035112D	40.54829	-111.94851	Low	Integral	0.892	0.014	0.002	0.002	0.091
035113D	40.63153	-111.86075	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035114E	40.50692	-111.88511	High	Min. Road	0.689	0.083	0.084	0.144	-
035115F	40.68108	-111.89969	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035116D	40.63472	-111.85358	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
035117D	40.70834	-111.91695	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035118F	40.67982	-111.95499	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
035119F	40.71701	-111.93535	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035120F	40.71427	-111.93502	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
035121V	40.55451	-111.94819	Low	Min. Road	0.913	0.012	0.019	0.056	-
035122F	40.76911	-112.06289	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035123F	40.70564	-111.88539	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035124D	40.50067	-111.87800	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
035125C	40.64726	-111.92936	Low	Integral	0.892	0.014	0.002	0.002	0.091
035126F	40.70498	-111.88269	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035127F	40.68664	-111.90008	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
035128C	40.64538	-111.92271	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035129F	40.61966	-111.85671	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035130F	40.61455	-111.84305	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035131D	40.64938	-111.83713	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035132C	40.84195	-111.95355	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035133D	40.68000	-111.90544	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035134D	40.62582	-111.85785	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035135E	40.66667	-111.85118	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
035136C	40.63025	-111.60883	-	Continuous Seat	0.000	-	-	-	-
035137F	40.63106	-111.61064	-	Integral	0.000	-	-	-	-
035138E	40.68210	-111.95826	Low	Maj. Road	0.925	0.019	0.029	0.027	-
035139V	40.57797	-111.94823	Low	Min. Road	0.913	0.012	0.019	0.056	-
035140E	40.70625	-111.89961	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
035141D	40.68889	-112.07240	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
035142E	40.71604	-112.08228	Moderate	Min. Road	0.815	0.058	0.047	0.080	-
035144D	40.66756	-111.97071	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
035145F	40.74159	-111.90853	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035147F	40.52131	-111.89403	Low	Integral	0.892	0.014	0.002	0.002	0.091
035150D	40.77128	-111.97556	High	Integral	0.622	0.025	0.024	0.022	0.307
035151E	40.62294	-111.85756	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
035152C	40.74075	-111.93975	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035154D	40.70319	-111.87691	High	Integral	0.622	0.025	0.024	0.022	0.307
035155F	40.52924	-111.89466	High	Integral	0.622	0.025	0.024	0.022	0.307
035156D	40.53076	-111.89602	High	Integral	0.622	0.025	0.024	0.022	0.307
035157E	40.55160	-111.89194	High	Maj. Road	0.772	0.084	0.084	0.060	-
035158D	40.56972	-111.88919	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035159V	40.57229	-111.88638	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
035160D	40.62089	-111.85680	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035161F	40.59294	-111.80721	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035162F	40.58875	-111.80696	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035163E	40.58774	-111.94169	Low	Maj. Road	0.925	0.019	0.029	0.027	-
035164D	40.53853	-111.88172	High	Integral	0.622	0.025	0.024	0.022	0.307
035165D	40.51335	-111.86758	High	Integral	0.622	0.025	0.024	0.022	0.307
035166D	40.71765	-111.98892	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
035167D	40.71114	-111.99172	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
035168D	40.66830	-111.98960	Minimal	Integral	0.934	0.013	0.000	0.000	0.053

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035169E	40.54007	-111.95134	Low	Min. Road	0.913	0.012	0.019	0.056	-
035170V	40.49023	-111.87389	High	Min. Road	0.689	0.083	0.084	0.144	-
035171V	40.48971	-111.87391	High	Min. Road	0.689	0.083	0.084	0.144	-
035172V	40.50541	-111.84614	High	Maj. Road	0.772	0.084	0.084	0.060	-
035173D	40.52767	-111.89353	High	Integral	0.622	0.025	0.024	0.022	0.307
035174D	40.50646	-111.87013	Low	Integral	0.892	0.014	0.002	0.002	0.091
035175D	40.64321	-111.93143	Low	Integral	0.892	0.014	0.002	0.002	0.091
035176E	40.58934	-111.88515	High	Min. Road	0.689	0.083	0.084	0.144	-
035177D	40.53529	-111.97282	Low	Integral	0.892	0.014	0.002	0.002	0.091
035178V	40.53690	-111.96971	Low	Min. Road	0.913	0.012	0.019	0.056	-
035179D	40.60901	-111.92380	Low	Integral	0.892	0.014	0.002	0.002	0.091
035180E	40.54212	-111.89859	High	Min. Road	0.689	0.083	0.084	0.144	-
035181F	40.57213	-111.91576	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035182V	40.57206	-111.91669	Very High	Min. Road	0.503	0.056	0.080	0.361	-
035183D	40.62829	-111.94831	Low	Integral	0.892	0.014	0.002	0.002	0.091
035184D	40.57586	-111.89929	High	Integral	0.622	0.025	0.024	0.022	0.307
035185D	40.57583	-111.89570	High	Integral	0.622	0.025	0.024	0.022	0.307
035186D	40.59502	-111.89233	Low	Integral	0.892	0.014	0.002	0.002	0.091
035189E	40.51886	-111.86667	High	Min. Road	0.689	0.083	0.084	0.144	-
035191C	40.77338	-111.98548	High	Integral	0.622	0.025	0.024	0.022	0.307
035192F	40.77433	-111.98628	High	Integral	0.622	0.025	0.024	0.022	0.307
035193C	40.77716	-111.99094	High	Integral	0.622	0.025	0.024	0.022	0.307
035194C	40.77342	-111.98678	High	Integral	0.622	0.025	0.024	0.022	0.307
035195C	40.77790	-111.98028	High	Integral	0.622	0.025	0.024	0.022	0.307
035196E	40.54470	-111.96615	Low	Min. Road	0.913	0.012	0.019	0.056	-
035197D	40.54306	-111.92739	Low	Integral	0.892	0.014	0.002	0.002	0.091
035198E	40.54853	-111.91733	Very High	Min. Road	0.503	0.056	0.080	0.361	-
035199E	40.55967	-111.94428	Low	Min. Road	0.913	0.012	0.019	0.056	-
035200E	40.57321	-111.94470	Low	Min. Road	0.913	0.012	0.019	0.056	-
035204E	40.66728	-111.85430	Very High	Min. Road	0.503	0.056	0.080	0.361	-
035207E	40.52696	-111.87086	High	Maj. Road	0.772	0.084	0.084	0.060	-
035208E	40.53834	-111.96678	Low	Min. Road	0.913	0.012	0.019	0.056	-
035209D	40.77149	-111.92606	Very High	Integral	0.459	0.021	0.015	0.012	0.491
035210D	40.61833	-111.94915	Low	Integral	0.892	0.014	0.002	0.002	0.091
035211F	40.55885	-111.88871	High	Integral	0.622	0.025	0.024	0.022	0.307
035212F	40.55883	-111.88301	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
035214C	40.77150	-111.90538	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035217D	40.51236	-111.86803	High	Integral	0.622	0.025	0.024	0.022	0.307
035218F	40.64921	-111.96191	Low	Integral	0.892	0.014	0.002	0.002	0.091
0C 369	40.76542	-111.93267	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
0C 377	40.76572	-111.93466	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 401	40.74740	-111.89983	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0C 420	40.71819	-111.88819	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0C 460	40.75193	-111.94855	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 518	40.68701	-111.79756	Minimal	Continuous Seat	0.941	0.004	0.003	0.007	0.045
0C 562	40.74375	-111.73113	-	Continuous Seat	0.000	-	-	-	-
0C 574	40.73935	-111.74284	-	Continuous Seat	0.000	-	-	-	-
0C 575	40.72858	-111.76502	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 584	40.63508	-111.89847	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 620	40.63187	-111.89000	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
0C 621	40.63317	-111.89282	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
0C 629	40.68215	-111.95149	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 635	40.77100	-112.06305	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
0C 649	40.63803	-111.92057	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 659	40.70393	-111.95301	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
0C 662	40.71223	-111.95363	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 669	40.77103	-112.02506	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 688	40.75848	-111.95046	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 689	40.75994	-111.95083	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 692	40.76548	-111.95054	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 693	40.77146	-111.94931	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 704	40.76274	-111.95100	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 709	40.72673	-111.96786	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
0C 725	40.62978	-111.87200	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0C 726	40.63010	-111.86593	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 752	40.74047	-111.94924	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
0C 757	40.63755	-111.80869	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 759	40.63514	-111.81104	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 806	40.78234	-111.90522	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 812	40.68671	-111.90289	High	Integral	0.622	0.025	0.024	0.022	0.307
0C 813	40.71264	-111.90410	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0C 814	40.66067	-111.90178	High	Integral	0.622	0.025	0.024	0.022	0.307
0C 815	40.50237	-111.97674	Low	Integral	0.892	0.014	0.002	0.002	0.091
0C 816	40.78222	-111.91083	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 817	40.49757	-111.92937	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 819	40.50436	-111.89110	Low	Integral	0.892	0.014	0.002	0.002	0.091
0C 926	40.58806	-111.64444	-	Integral	0.000	-	-	-	-
0C 953	40.67456	-111.80292	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
0C 968	40.69986	-111.79517	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
0C 980	40.54425	-111.91658	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
0D 258	40.62606	-111.74191	-	Continuous Seat	0.000	-	-	-	-
0D 410	40.53073	-111.87122	High	Integral	0.622	0.025	0.024	0.022	0.307
0D 480	40.74028	-111.93901	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0D 564	40.80823	-111.93900	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0D 805	40.65304	-111.92339	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0D 807	40.57223	-111.77848	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0D 809	40.69943	-111.92465	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0D 811	40.67958	-111.88828	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0D 844	40.43742	-111.93097	High	Integral	0.622	0.025	0.024	0.022	0.307
0D 845	40.46105	-111.94208	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
0E 907	40.61853	-111.78131	Very High	Min. Road	0.503	0.056	0.080	0.361	-
0E1032	40.48886	-111.89994	Low	Min. Road	0.913	0.012	0.019	0.056	-
0E1064	40.60150	-111.89079	Low	Maj. Road	0.925	0.019	0.029	0.027	-
0E1070	40.55416	-111.89077	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E1200	40.70625	-111.90361	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1201	40.68073	-111.90217	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1218	40.67433	-111.88092	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1227	40.66624	-111.86750	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1272	40.72578	-112.20361	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
0E1283	40.66763	-111.93723	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E1286	40.67495	-111.91139	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1324	40.82856	-111.94691	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1445	40.56606	-111.89953	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1683	40.48514	-111.94200	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E1709	40.76073	-111.85043	Minimal	Maj. Road	0.951	0.003	0.011	0.036	-
0E1767	40.49243	-111.89133	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E1833	40.71122	-111.95362	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E1858	40.64206	-111.86592	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E1908	40.72607	-111.96239	Moderate	Maj. Road	0.873	0.047	0.041	0.039	-
0E1909	40.65301	-111.92951	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E2113	40.65309	-111.96620	Low	Maj. Road	0.925	0.019	0.029	0.027	-
0E2150	40.63447	-111.93878	Low	Maj. Road	0.925	0.019	0.029	0.027	-
0E2225	40.66080	-111.88830	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E2372	40.70816	-111.98009	Moderate	Maj. Road	0.873	0.047	0.041	0.039	-
0E2374	40.66294	-111.98155	Minimal	Maj. Road	0.951	0.003	0.011	0.036	-
0E2379	40.60947	-111.96327	Low	Integral	0.892	0.014	0.002	0.002	0.091
0E2381	40.58738	-111.91895	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E2405	40.58810	-111.88676	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E2421	40.68134	-112.02474	Minimal	Maj. Road	0.951	0.003	0.011	0.036	-
0E2439	40.50026	-111.95328	Low	Maj. Road	0.925	0.019	0.029	0.027	-

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
0E2475	40.48616	-111.90641	Minimal	Min. Road	0.950	0.001	0.003	0.047	-
0E2486	40.58210	-111.93870	Low	Maj. Road	0.925	0.019	0.029	0.027	-
0E2507	40.52673	-111.89333	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E2528	40.52227	-111.94940	Low	Maj. Road	0.925	0.019	0.029	0.027	-
0E2543	40.58305	-111.89084	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E2544	40.57440	-111.89084	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E2545	40.57145	-111.89079	High	Maj. Road	0.772	0.084	0.084	0.060	-
0E2546	40.56752	-111.89079	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
0E2568	40.56230	-111.93988	Minimal	Maj. Road	0.951	0.003	0.011	0.036	-
0E2613	40.54414	-111.94883	Low	Min. Road	0.913	0.012	0.019	0.056	-
0E2614	40.54432	-111.89738	High	Min. Road	0.689	0.083	0.084	0.144	-
0F 6	40.76489	-111.92950	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0F 7	40.76459	-111.92625	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0F 33	40.76406	-111.93892	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0F 34	40.76472	-111.93892	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0F 35	40.76618	-111.93914	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0F 48	40.71966	-111.85366	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
0F 49	40.71878	-111.84213	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0F 52	40.71697	-111.80911	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
0F 115	40.67478	-111.90792	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0F 131	40.63572	-111.91014	Low	Discontinuous Seat	0.911	0.005	0.006	0.003	0.075
0F 244	40.58773	-111.91272	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
0F 344	40.76855	-112.02505	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0F 410	40.74685	-111.94888	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0F 419	40.76465	-111.96571	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0F 431	40.81310	-111.94926	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0F 458	40.64589	-111.80838	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
0F 470	40.80566	-111.94909	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0F 475	40.62981	-111.86236	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0F 476	40.62300	-111.75066	-	Continuous Seat	0.000	-	-	-	-
0F 477	40.73311	-111.94961	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 500	40.78471	-111.94912	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0F 504	40.63045	-111.85472	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
0F 505	40.63450	-111.82473	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 506	40.63301	-111.83410	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 522	40.72582	-111.98633	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
0F 523	40.72575	-112.02489	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
0F 543	40.58253	-111.65283	-	Integral	0.000	-	-	-	-
0F 547	40.74524	-112.18303	-	Integral	0.000	-	-	-	-
0F 562	40.61982	-111.78957	Very High	Integral	0.459	0.021	0.015	0.012	0.491

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
0F 571	40.62374	-111.92083	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0F 576	40.59344	-111.97700	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 595	40.74098	-112.17784	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
0F 596	40.53692	-111.98413	Low	Integral	0.892	0.014	0.002	0.002	0.091
0F 607	40.49685	-111.91981	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0F 608	40.48636	-111.93602	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 663	40.55900	-111.89783	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 683	40.55889	-111.90799	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0F 687	40.76066	-111.90931	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
0F 693	40.52356	-111.92186	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0F 727	40.56912	-111.87211	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0F 783	40.54433	-111.90286	High	Integral	0.622	0.025	0.024	0.022	0.307
0F 791	40.79444	-111.91704	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
0F 838	40.67449	-111.89560	High	Integral	0.622	0.025	0.024	0.022	0.307
0V 737	40.72170	-112.15582	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
0V2101	40.54417	-111.92726	Low	Maj. Road	0.925	0.019	0.029	0.027	-
0V2102	40.54409	-111.90688	Very High	Maj. Road	0.559	0.080	0.147	0.214	-
1C 520	40.69617	-111.95214	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
1C 528	40.66743	-111.95242	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
1C 587	40.65304	-111.95243	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
1C 617	40.72528	-111.95100	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1C 628	40.76417	-111.98651	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1C 663	40.68935	-111.95165	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1C 664	40.69643	-111.95017	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
1C 668	40.75842	-111.98665	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
1C 698	40.75825	-111.94989	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1C 699	40.76018	-111.95005	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1C 700	40.76325	-111.95005	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1C 701	40.76488	-111.94774	High	Integral	0.622	0.025	0.024	0.022	0.307
1C 737	40.75311	-111.98674	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
1C 738	40.75466	-111.98672	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
1C 827	40.61994	-111.90361	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
1C 829N	40.62914	-111.90326	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
1C 832N	40.63483	-111.90500	Low	Integral	0.892	0.014	0.002	0.002	0.091
1C 833	40.63372	-111.90234	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1C 836N	40.64275	-111.90272	High	Integral	0.622	0.025	0.024	0.022	0.307
1C 849	40.72113	-111.90371	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1C 850	40.71972	-111.90375	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1C 860N	40.72236	-111.90417	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1C 861	40.72236	-111.90333	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
1C 868N	40.74972	-111.90917	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
1C 870	40.75568	-111.90985	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1C 875N	40.76061	-111.91400	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1C 880N	40.76900	-111.91145	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1C 931	40.68926	-111.79744	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
1D 672	40.81847	-111.91633	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1E1322	40.81125	-111.94781	Very High	Min. Road	0.503	0.056	0.080	0.361	-
1E2569	40.83230	-111.94283	-	Integral	0.000	-	-	-	-
1F 207	40.48393	-111.89876	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
1F 609N	40.58801	-111.90018	High	Integral	0.622	0.025	0.024	0.022	0.307
1F 610N	40.62071	-111.90395	Low	Integral	0.892	0.014	0.002	0.002	0.091
1F 611N	40.63083	-111.90393	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 613N	40.63223	-111.90400	High	Integral	0.622	0.025	0.024	0.022	0.307
1F 615N	40.63622	-111.90464	Low	Integral	0.892	0.014	0.002	0.002	0.091
1F 616N	40.65480	-111.90156	High	Integral	0.622	0.025	0.024	0.022	0.307
1F 617N	40.67453	-111.90139	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 618N	40.69396	-111.90235	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1F 619N	40.69994	-111.90204	High	Integral	0.622	0.025	0.024	0.022	0.307
1F 622	40.72103	-111.90346	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 628	40.71847	-111.90431	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1F 629	40.71750	-111.90403	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
1F 630N	40.72542	-111.90410	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 631	40.72542	-111.90347	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 633N	40.73361	-111.90444	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 634	40.73361	-111.90417	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 636N	40.74556	-111.90472	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 637N	40.74750	-111.90653	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 646N	40.56967	-111.89979	High	Integral	0.622	0.025	0.024	0.022	0.307
1F 647N	40.60561	-111.90467	Low	Integral	0.892	0.014	0.002	0.002	0.091
1F 648N	40.61079	-111.90574	Low	Integral	0.892	0.014	0.002	0.002	0.091
1F 649N	40.66735	-111.90117	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 655N	40.74153	-111.90403	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 656	40.74153	-111.90326	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 658N	40.75194	-111.91056	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 659	40.76361	-111.91369	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 660N	40.76500	-111.91306	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 661N	40.77150	-111.91033	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 662N	40.77597	-111.91011	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 664	40.63248	-111.90193	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1F 694	40.52667	-111.89083	Very High	Integral	0.459	0.021	0.015	0.012	0.491

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
1F 747	40.83161	-111.94389	Very High	Integral	0.459	0.021	0.015	0.012	0.491
1F 774	40.81640	-111.91959	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
1F 784	40.54433	-111.89478	High	Integral	0.622	0.025	0.024	0.022	0.307
2C 371	40.72137	-112.15374	Minimal	Discontinuous Seat	0.949	0.000	0.001	0.000	0.050
2C 400	40.74729	-111.90278	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
2C 402	40.74748	-111.89540	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
2C 421	40.71299	-111.81772	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
2C 438	40.72514	-112.22059	-	Continuous Seat	0.000	-	-	-	-
2C 554	40.63617	-111.90701	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
2C 573R	40.75152	-111.71390	-	Continuous Seat	0.000	-	-	-	-
2C 585	40.64454	-111.93892	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
2C 624	40.76434	-111.96548	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
2C 631	40.76373	-111.98218	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
2C 633	40.76956	-111.98654	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
2C 637	40.76528	-111.98278	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
2C 702	40.76517	-111.94961	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
2C 710	40.77090	-112.03920	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
2C 732	40.77017	-112.00556	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
2C 761	40.63486	-111.81114	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 838	40.72392	-111.91350	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 839	40.72383	-111.91158	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 844	40.72408	-111.90866	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 845	40.72445	-111.90841	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 854	40.71813	-111.89687	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 871	40.75632	-111.90986	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 876	40.76061	-111.91522	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 884	40.76379	-111.91681	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2C 887	40.76412	-111.91677	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 919	40.71764	-112.11789	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
2C 936	40.72389	-111.93892	High	Integral	0.622	0.025	0.024	0.022	0.307
2C 956	40.71814	-111.88249	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 957	40.71819	-111.87681	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 958	40.71861	-111.87125	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 959	40.71925	-111.86536	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 960	40.71825	-111.87397	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 962	40.71806	-111.87397	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2C 963	40.71954	-111.85727	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
2C 964	40.71939	-111.85722	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
2F 50	40.71644	-111.83392	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
2F 133	40.63856	-111.92192	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
2F 254R	40.73917	-111.67292	-	Continuous Seat	0.000	-	-	-	-
2F 283	40.64447	-111.93253	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
2F 620E	40.72423	-111.92493	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 621E	40.72408	-111.91730	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 624	40.71792	-111.89972	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 625	40.71771	-111.89972	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 626E	40.71819	-111.89111	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 627	40.71799	-111.89111	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 640	40.75625	-111.90722	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
2F 643	40.76447	-111.91970	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 645	40.76421	-111.91970	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 651E	40.71806	-111.89389	Very High	Integral	0.459	0.021	0.015	0.012	0.491
2F 793	40.71290	-111.82240	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3C 423	40.71187	-111.80443	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
3C 520	40.69676	-111.95263	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
3C 528	40.66739	-111.95278	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
3C 587	40.65306	-111.95274	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
3C 617	40.72530	-111.95144	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 625	40.76485	-111.98699	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 663	40.68989	-111.95203	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 668	40.75833	-111.98702	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
3C 694	40.75849	-111.95106	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3C 695	40.75971	-111.95173	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3C 696	40.76600	-111.94738	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 697	40.76676	-111.94573	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 703	40.76594	-111.95097	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 737	40.75310	-111.98703	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
3C 738	40.75468	-111.98703	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
3C 739	40.76608	-111.94653	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3C 828	40.62080	-111.90490	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
3C 829S	40.62936	-111.90367	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
3C 830	40.62924	-111.90389	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
3C 832S	40.63488	-111.90523	Low	Integral	0.892	0.014	0.002	0.002	0.091
3C 834	40.63500	-111.90548	Low	Integral	0.892	0.014	0.002	0.002	0.091
3C 835	40.63626	-111.90527	Low	Integral	0.892	0.014	0.002	0.002	0.091
3C 836S	40.64296	-111.90314	High	Integral	0.622	0.025	0.024	0.022	0.307
3C 842	40.72542	-111.90667	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
3C 857	40.83396	-111.94170	-	Continuous Seat	0.000	-	-	-	-
3C 859	40.71861	-111.90472	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
3C 860S	40.72236	-111.90472	Very High	Integral	0.459	0.021	0.015	0.012	0.491

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
3C 862	40.72250	-111.90535	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3C 868S	40.74972	-111.90972	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
3C 875S	40.76061	-111.91455	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
3C 878	40.76408	-111.91433	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3C 880S	40.76925	-111.91200	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
3C 886	40.76533	-111.91441	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
3C 931	40.68926	-111.79744	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
3F 53	40.70736	-111.79688	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
3F 207	40.48417	-111.89889	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
3F 609S	40.58795	-111.90056	High	Integral	0.622	0.025	0.024	0.022	0.307
3F 610S	40.62083	-111.90420	Low	Integral	0.892	0.014	0.002	0.002	0.091
3F 611S	40.63072	-111.90423	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 612	40.63052	-111.90446	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 613S	40.63218	-111.90500	High	Integral	0.622	0.025	0.024	0.022	0.307
3F 614	40.63194	-111.90500	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 615S	40.63626	-111.90498	Low	Integral	0.892	0.014	0.002	0.002	0.091
3F 616S	40.65500	-111.90184	High	Integral	0.622	0.025	0.024	0.022	0.307
3F 617S	40.67451	-111.90165	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 618S	40.69508	-111.90238	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3F 619S	40.69990	-111.90234	High	Integral	0.622	0.025	0.024	0.022	0.307
3F 630S	40.72542	-111.90472	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 632	40.72542	-111.90507	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 633S	40.73361	-111.90486	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 635	40.73361	-111.90514	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 637S	40.74708	-111.90667	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 646S	40.56966	-111.90013	High	Integral	0.622	0.025	0.024	0.022	0.307
3F 647S	40.60588	-111.90522	Low	Integral	0.892	0.014	0.002	0.002	0.091
3F 648S	40.61094	-111.90618	Low	Integral	0.892	0.014	0.002	0.002	0.091
3F 649S	40.66744	-111.90159	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 653	40.72237	-111.90511	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 654	40.72278	-111.90556	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 655S	40.74153	-111.90444	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 657	40.74153	-111.90472	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 658S	40.75194	-111.91097	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 660S	40.76500	-111.91389	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 661S	40.77153	-111.91105	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 662S	40.77619	-111.91078	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 665	40.71861	-111.90590	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 666	40.72542	-111.90521	Very High	Integral	0.459	0.021	0.015	0.012	0.491
3F 694	40.52667	-111.89139	Very High	Integral	0.459	0.021	0.015	0.012	0.491

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
3F 774	40.81647	-111.91991	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
3F 784	40.54432	-111.89500	High	Integral	0.622	0.025	0.024	0.022	0.307
4C 371	40.72149	-112.15380	Minimal	Discontinuous Seat	0.949	0.000	0.001	0.000	0.050
4C 400	40.74740	-111.90279	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
4C 402	40.74750	-111.89681	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
4C 424	40.71202	-111.78991	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432
4C 438	40.72553	-112.22008	-	Continuous Seat	0.000	-	-	-	-
4C 573R	40.75184	-111.71352	-	Continuous Seat	0.000	-	-	-	-
4C 585	40.64488	-111.93882	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
4C 710	40.77116	-112.03914	Low	Continuous Seat	0.899	0.006	0.005	0.008	0.082
4C 727	40.62988	-111.86143	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 736	40.63279	-111.83350	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
4C 760	40.63561	-111.81108	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 837	40.72483	-111.91254	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 841	40.72409	-111.90668	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 846	40.71874	-111.90271	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 847	40.71852	-111.90272	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 848	40.71857	-111.90076	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 851	40.71889	-111.90222	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 852	40.71872	-111.90112	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 853	40.71861	-111.89972	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 855	40.71832	-111.89664	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 856	40.71850	-111.89683	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 873	40.75750	-111.91111	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 874	40.75806	-111.91111	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4C 883	40.76466	-111.91968	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 885	40.76458	-111.91681	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 917	40.76561	-111.98048	Moderate	Continuous Seat	0.776	0.021	0.020	0.017	0.166
4C 919	40.71780	-112.11779	Moderate	Integral	0.758	0.028	0.021	0.016	0.178
4C 936	40.72413	-111.93894	High	Integral	0.622	0.025	0.024	0.022	0.307
4C 937	40.72472	-111.93889	High	Integral	0.622	0.025	0.024	0.022	0.307
4C 956	40.71833	-111.88250	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 957	40.71833	-111.87681	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 958	40.71881	-111.87126	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 959	40.71956	-111.86525	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 960	40.71842	-111.87397	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 961	40.71861	-111.87397	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4C 963	40.71972	-111.85750	Minimal	Integral	0.934	0.013	0.000	0.000	0.053
4F 36	40.76497	-111.96595	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
4F 50	40.71666	-111.83385	Very High	Discontinuous Seat	0.508	0.023	0.021	0.015	0.432

Table 7: Probabilities of Bridge Damage States – M7.0 Deterministic Event

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
4F 133	40.63887	-111.92191	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4F 254R	40.73942	-111.67239	-	Continuous Seat	0.000	-	-	-	-
4F 283	40.64489	-111.93186	Moderate	Discontinuous Seat	0.833	0.026	0.022	0.014	0.106
4F 415	40.76542	-111.96622	High	Continuous Seat	0.643	0.025	0.025	0.021	0.287
4F 620W	40.72439	-111.92492	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4F 621W	40.72427	-111.91716	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4F 623	40.71833	-111.89972	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4F 626W	40.71836	-111.89095	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4F 641	40.75819	-111.90903	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4F 642	40.76064	-111.91347	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
4F 651W	40.71833	-111.89389	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4F 652	40.71847	-111.89389	Very High	Integral	0.459	0.021	0.015	0.012	0.491
4F 793	40.71319	-111.82222	Very High	Integral	0.459	0.021	0.015	0.012	0.491
0C 422	40.71404	-111.80664	High	Discontinuous Seat	0.695	0.047	0.041	0.027	0.191
035146C	40.72555	-111.90900	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471
035188C	40.65526	-111.89760	Very High	Continuous Seat	0.483	0.020	0.014	0.012	0.471

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035001E	40.71114	-111.96756	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035002E	40.71128	-111.97208	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035003D	40.50775	-111.95030	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035004E	40.50994	-111.89667	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035005D	40.53686	-111.95207	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035006E	40.63043	-111.92329	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035007D	40.63013	-111.92632	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035008E	40.71119	-111.95800	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035009D	40.66009	-111.88215	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035010D	40.65606	-111.87565	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
035011D	40.67973	-111.89123	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035012D	40.66686	-111.90861	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035013E	40.64961	-111.87673	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035014F	40.62854	-111.87259	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035015E	40.53083	-111.83334	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035016D	40.56039	-111.92914	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035017F	40.66636	-111.90625	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035018D	40.62584	-111.85104	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035019C	40.72589	-111.92633	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035020D	40.66724	-111.86502	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035021D	40.59408	-111.95713	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035022D	40.62403	-111.96548	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035023E	40.71104	-111.93893	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
035024F	40.68711	-112.06305	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035025F	40.68502	-112.04392	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035026F	40.68356	-112.03433	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035027D	40.68613	-112.05359	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035028D	40.6821	-112.02661	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035029F	40.67993	-112.01998	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035030D	40.67474	-112.00564	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035031F	40.70014	-112.11033	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035032D	40.69195	-112.08228	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035033F	40.69653	-112.10292	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035034D	40.61501	-111.88186	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035035F	40.60584	-111.88885	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035036F	40.60586	-111.87748	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035037D	40.60956	-111.88594	Minimal	Integral	0.887	0.015	0.003	0.003	0.091

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035038D	40.59381	-111.88358	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035039E	40.5931	-111.88453	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035040E	40.59166	-111.88486	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035041D	40.51463	-111.94965	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035042E	40.57865	-111.96729	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035043D	40.62076	-111.87744	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035044F	40.50068	-111.89714	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035045E	40.5516	-111.88603	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035046E	40.53706	-111.87672	Low	Min. Road	0.645	0.065	0.080	0.209	-
035047F	40.67072	-111.99705	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035048E	40.58775	-111.95440	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035051F	40.58059	-111.89269	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035052E	40.59223	-111.89123	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035053E	40.59315	-111.89213	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035054D	40.60952	-111.92129	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035055D	40.61765	-111.87136	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035056F	40.51613	-111.89571	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035057F	40.54431	-111.88865	Low	Integral	0.592	0.025	0.019	0.014	0.350
035058F	40.48958	-111.94733	Low	Integral	0.592	0.025	0.019	0.014	0.350
035059E	40.49093	-111.94833	Low	Min. Road	0.645	0.065	0.080	0.209	-
035060D	40.63181	-111.80667	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035061E	40.54041	-111.95691	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035062C	40.66503	-111.84012	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035063D	40.62628	-111.80034	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035064D	40.65622	-111.82392	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035065D	40.65205	-111.83418	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035066D	40.66383	-111.83882	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035067C	40.63546	-111.81158	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035068D	40.66028	-111.83286	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035069D	40.63775	-111.81300	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035070D	40.71181	-111.98397	Low	Integral	0.592	0.025	0.019	0.014	0.350
035071D	40.60785	-111.83299	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035072D	40.60391	-111.81924	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035073D	40.60311	-111.81594	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035074V	40.57848	-111.79710	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035075D	40.6335	-111.61464	-	Integral	-	-	-	-	-
035076E	40.53434	-111.87325	Low	Min. Road	0.645	0.065	0.080	0.209	-

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035077D	40.53251	-111.87209	Low	Integral	0.592	0.025	0.019	0.014	0.350
035078E	40.52881	-111.87108	Low	Min. Road	0.645	0.065	0.080	0.209	-
035080E	40.52323	-111.87022	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035081D	40.50453	-111.87117	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035082D	40.64503	-111.95790	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035083D	40.63858	-111.94881	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035084C	40.63806	-111.94831	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035085F	40.63404	-111.94831	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035086D	40.65426	-111.96741	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035087D	40.66045	-111.97699	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035088D	40.66744	-111.98806	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035089D	40.66673	-111.98669	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035090F	40.68631	-111.92125	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
035091F	40.73353	-111.92332	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
035092F	40.73314	-111.93294	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
035093C	40.74049	-111.92273	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035094P	40.74533	-111.92093	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035095D	40.75149	-111.92119	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035096P	40.75411	-111.92288	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035097F	40.75844	-111.92330	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
035098D	40.76065	-111.92366	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035099D	40.76281	-111.92424	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035100F	40.765	-111.92618	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035101C	40.75047	-111.95292	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035102F	40.75843	-111.95803	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035103E	40.77268	-111.98697	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035104E	40.77264	-111.98580	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035105V	40.59549	-111.95783	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035106F	40.79104	-111.93556	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035107F	40.78429	-111.93631	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
035108D	40.78019	-111.93804	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035109D	40.71875	-111.95036	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035110D	40.66483	-111.84461	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035111D	40.50473	-111.92923	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035112D	40.54829	-111.94851	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035113D	40.63153	-111.86075	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035114E	40.50692	-111.88511	Low	Min. Road	0.645	0.065	0.080	0.209	-

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035115F	40.68108	-111.89969	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035116D	40.63472	-111.85358	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035117D	40.70834	-111.91695	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035118F	40.67982	-111.95499	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035119F	40.71701	-111.93535	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035120F	40.71427	-111.93502	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035121V	40.55451	-111.94819	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035122F	40.76911	-112.06289	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035123F	40.70564	-111.88539	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035124D	40.50067	-111.87800	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035125C	40.64726	-111.92936	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035126F	40.70498	-111.88269	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035127F	40.68664	-111.90008	Low	Discontinuous Seat	0.656	0.023	0.023	0.020	0.278
035128C	40.64538	-111.92271	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035129F	40.61966	-111.85671	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035130F	40.61455	-111.84305	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035131D	40.64938	-111.83713	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035132C	40.84195	-111.95355	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035133D	40.68	-111.90544	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035134D	40.62582	-111.85785	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035135E	40.66667	-111.85118	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
035136C	40.63025	-111.60883	-	Continuous Seat	-	-	-	-	-
035137F	40.63106	-111.61064	-	Continuous Seat	-	-	-	-	-
035138E	40.6821	-111.95826	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035139V	40.57797	-111.94823	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035140E	40.70625	-111.89961	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035141D	40.68889	-112.07240	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035142E	40.71604	-112.08228	Low	Min. Road	0.645	0.065	0.080	0.209	-
035144D	40.66756	-111.97071	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035145F	40.74159	-111.90853	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035147F	40.52131	-111.89403	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035150D	40.77128	-111.97556	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035151E	40.62294	-111.85756	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
035152C	40.74075	-111.93975	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035154D	40.70319	-111.87691	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035155F	40.52924	-111.89466	Low	Integral	0.592	0.025	0.019	0.014	0.350
035156D	40.53076	-111.89602	Low	Integral	0.592	0.025	0.019	0.014	0.350

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035157E	40.5516	-111.89194	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035158D	40.56972	-111.88919	Low	Integral	0.592	0.025	0.019	0.014	0.350
035159V	40.57229	-111.88638	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035160D	40.62089	-111.85680	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035161F	40.59294	-111.80721	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035162F	40.58875	-111.80696	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035163E	40.58774	-111.94169	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035164D	40.53853	-111.88172	Low	Integral	0.592	0.025	0.019	0.014	0.350
035165D	40.51335	-111.86758	Low	Integral	0.592	0.025	0.019	0.014	0.350
035166D	40.71765	-111.98892	Low	Integral	0.592	0.025	0.019	0.014	0.350
035167D	40.71114	-111.99172	Low	Integral	0.592	0.025	0.019	0.014	0.350
035168D	40.6683	-111.98960	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035169E	40.54007	-111.95134	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035170V	40.49023	-111.87389	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035171V	40.48971	-111.87391	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035172V	40.50541	-111.84614	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
035173D	40.52767	-111.89353	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035174D	40.50646	-111.87013	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035175D	40.64321	-111.93143	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035176E	40.58934	-111.88515	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035177D	40.53529	-111.97282	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035178V	40.5369	-111.96971	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035179D	40.60901	-111.92380	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035180E	40.54212	-111.89859	Low	Min. Road	0.645	0.065	0.080	0.209	-
035181F	40.57213	-111.91576	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
035182V	40.57206	-111.91669	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035183D	40.62829	-111.94831	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035184D	40.57586	-111.89929	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035185D	40.57583	-111.89570	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035186D	40.59502	-111.89233	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035189E	40.51886	-111.86667	Low	Min. Road	0.645	0.065	0.080	0.209	-
035191C	40.77338	-111.98548	Low	Integral	0.592	0.025	0.019	0.014	0.350
035192F	40.77433	-111.98628	Low	Integral	0.592	0.025	0.019	0.014	0.350
035193C	40.77716	-111.99094	Low	Integral	0.592	0.025	0.019	0.014	0.350
035194C	40.77342	-111.98678	Low	Integral	0.592	0.025	0.019	0.014	0.350
035195C	40.7779	-111.98028	Low	Integral	0.592	0.025	0.019	0.014	0.350
035196E	40.5447	-111.96615	Minimal	Min. Road	0.911	0.012	0.014	0.063	-

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035197D	40.54306	-111.92739	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
035198E	40.54853	-111.91733	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035199E	40.55967	-111.94428	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035200E	40.57321	-111.94470	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035204E	40.66728	-111.85430	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
035207E	40.52696	-111.87086	Low	Maj. Road	0.710	0.080	0.109	0.101	-
035208E	40.53834	-111.96678	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
035209D	40.77149	-111.92606	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035210D	40.61833	-111.94915	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
035211F	40.55885	-111.88871	Low	Integral	0.592	0.025	0.019	0.014	0.350
035212F	40.55883	-111.88301	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035214C	40.7715	-111.90538	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
035217D	40.51236	-111.86803	Low	Integral	0.592	0.025	0.019	0.014	0.350
035218F	40.64921	-111.96191	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0C 369	40.76542	-111.93267	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 377	40.76572	-111.93466	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 401	40.7474	-111.89983	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0C 420	40.71819	-111.88819	Low	Discontinuous Seat	0.656	0.023	0.023	0.020	0.278
0C 460	40.75193	-111.94855	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0C 518	40.68701	-111.79756	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
0C 562	40.74375	-111.73113	-	Continuous Seat	-	-	-	-	-
0C 574	40.73935	-111.74284	-	Continuous Seat	-	-	-	-	-
0C 575	40.72858	-111.76502	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 584	40.63508	-111.89847	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
0C 620	40.63187	-111.89000	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
0C 621	40.63317	-111.89282	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
0C 629	40.68215	-111.95149	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 635	40.771	-112.06305	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 649	40.63803	-111.92057	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 659	40.70393	-111.95301	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 662	40.71223	-111.95363	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 669	40.77103	-112.02506	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 688	40.75848	-111.95046	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0C 689	40.75994	-111.95083	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0C 692	40.76548	-111.95054	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 693	40.77146	-111.94931	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 704	40.76274	-111.95100	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
0C 709	40.72673	-111.96786	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 725	40.62978	-111.87200	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 726	40.6301	-111.86593	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 752	40.74047	-111.94924	Low	Integral	0.592	0.025	0.019	0.014	0.350
0C 757	40.63755	-111.80869	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 759	40.63514	-111.81104	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0C 806	40.78234	-111.90522	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0C 812	40.68671	-111.90289	Low	Integral	0.592	0.025	0.019	0.014	0.350
0C 813	40.71264	-111.90410	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0C 814	40.66067	-111.90178	Low	Integral	0.592	0.025	0.019	0.014	0.350
0C 815	40.50237	-111.97674	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0C 816	40.78222	-111.91083	Low	Integral	0.592	0.025	0.019	0.014	0.350
0C 817	40.49757	-111.92937	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0C 819	40.50436	-111.89110	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0C 926	40.58806	-111.64444	-	Integral	-	-	-	-	-
0C 953	40.67456	-111.80292	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0C 968	40.69986	-111.79517	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0C 980	40.54425	-111.91658	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0D 258	40.62606	-111.74191	-	Continuous Seat	-	-	-	-	-
0D 410	40.53073	-111.87122	Low	Integral	0.592	0.025	0.019	0.014	0.350
0D 480	40.74028	-111.93901	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0D 564	40.80823	-111.93900	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0D 805	40.65304	-111.92339	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0D 807	40.57223	-111.77848	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0D 809	40.69943	-111.92465	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0D 811	40.67958	-111.88828	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0D 844	40.43742	-111.93097	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
0D 845	40.46105	-111.94208	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
0E 907	40.61853	-111.78131	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
0E1032	40.48886	-111.89994	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
0E1064	40.6015	-111.89079	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E1070	40.55416	-111.89077	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E1200	40.70625	-111.90361	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1201	40.68073	-111.90217	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1218	40.67433	-111.88092	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1227	40.66624	-111.86750	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1272	40.72578	-112.20361	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
0E1283	40.66763	-111.93723	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E1286	40.67495	-111.91139	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1324	40.82856	-111.94691	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1445	40.56606	-111.89953	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1683	40.48514	-111.94200	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E1709	40.76073	-111.85043	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E1767	40.49243	-111.89133	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E1833	40.71122	-111.95362	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1858	40.64206	-111.86592	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E1908	40.72607	-111.96239	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E1909	40.65301	-111.92951	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E2113	40.65309	-111.96620	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2150	40.63447	-111.93878	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2225	40.6608	-111.88830	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E2372	40.70816	-111.98009	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E2374	40.66294	-111.98155	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2379	40.60947	-111.96327	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0E2381	40.58738	-111.91895	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E2405	40.5881	-111.88676	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2421	40.68134	-112.02474	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2439	40.50026	-111.95328	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2475	40.48616	-111.90641	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
0E2486	40.5821	-111.93870	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2507	40.52673	-111.89333	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
0E2528	40.52227	-111.94940	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2543	40.58305	-111.89084	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E2544	40.5744	-111.89084	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E2545	40.57145	-111.89079	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2546	40.56752	-111.89079	Low	Maj. Road	0.710	0.080	0.109	0.101	-
0E2568	40.5623	-111.93988	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0E2613	40.54414	-111.94883	Minimal	Min. Road	0.911	0.012	0.014	0.063	-
0E2614	40.54432	-111.89738	Low	Min. Road	0.645	0.065	0.080	0.209	-
0F 6	40.76489	-111.92950	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 7	40.76459	-111.92625	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 33	40.76406	-111.93892	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0F 34	40.76472	-111.93892	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0F 35	40.76618	-111.93914	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
0F 48	40.71966	-111.85366	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
0F 49	40.71878	-111.84213	-	Discontinuous Seat	-	-	-	-	-
0F 52	40.71697	-111.80911	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
0F 115	40.67478	-111.90792	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0F 131	40.63572	-111.91014	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
0F 244	40.58773	-111.91272	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
0F 344	40.76855	-112.02505	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0F 410	40.74685	-111.94888	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 419	40.76465	-111.96571	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 431	40.8131	-111.94926	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 458	40.64589	-111.80838	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0F 470	40.80566	-111.94909	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 475	40.62981	-111.86236	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 476	40.623	-111.75066	-	Continuous Seat	-	-	-	-	-
0F 477	40.73311	-111.94961	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 500	40.78471	-111.94912	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 504	40.63045	-111.85472	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
0F 505	40.6345	-111.82473	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0F 506	40.63301	-111.83410	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0F 522	40.72582	-111.98633	Low	Integral	0.592	0.025	0.019	0.014	0.350
0F 523	40.72575	-112.02489	Low	Integral	0.592	0.025	0.019	0.014	0.350
0F 543	40.58253	-111.65283	-	Integral	-	-	-	-	-
0F 547	40.74524	-112.18303	-	Integral	-	-	-	-	-
0F 562	40.61982	-111.78957	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 571	40.62374	-111.92083	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 576	40.59344	-111.97700	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0F 595	40.74098	-112.17784	Low	Integral	0.592	0.025	0.019	0.014	0.350
0F 596	40.53692	-111.98413	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0F 607	40.49685	-111.91981	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 608	40.48636	-111.93602	Low	Integral	0.592	0.025	0.019	0.014	0.350
0F 663	40.559	-111.89783	Low	Integral	0.592	0.025	0.019	0.014	0.350
0F 683	40.55889	-111.90799	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 687	40.76066	-111.90931	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
0F 693	40.52356	-111.92186	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 727	40.56912	-111.87211	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0F 783	40.54433	-111.90286	Low	Integral	0.592	0.025	0.019	0.014	0.350
0F 791	40.79444	-111.91704	Minimal	Integral	0.887	0.015	0.003	0.003	0.091

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
0F 838	40.67449	-111.89560	Low	Integral	0.592	0.025	0.019	0.014	0.350
0V 737	40.7217	-112.15582	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
0V2101	40.54417	-111.92726	Minimal	Maj. Road	0.923	0.014	0.026	0.036	-
0V2102	40.54409	-111.90688	Moderate	Maj. Road	0.595	0.093	0.151	0.161	-
1C 520	40.69617	-111.95214	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1C 528	40.66743	-111.95242	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
1C 587	40.65304	-111.95243	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
1C 617	40.72528	-111.95100	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 628	40.76417	-111.98651	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1C 663	40.68935	-111.95165	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1C 664	40.69643	-111.95017	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1C 668	40.75842	-111.98665	Low	Integral	0.592	0.025	0.019	0.014	0.350
1C 698	40.75825	-111.94989	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1C 699	40.76018	-111.95005	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1C 700	40.76325	-111.95005	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 701	40.76488	-111.94774	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1C 737	40.75311	-111.98674	Low	Integral	0.592	0.025	0.019	0.014	0.350
1C 738	40.75466	-111.98672	Low	Integral	0.592	0.025	0.019	0.014	0.350
1C 827	40.61994	-111.90361	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
1C 829N	40.62914	-111.90326	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
1C 832N	40.63483	-111.90500	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
1C 833	40.63372	-111.90234	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1C 836N	40.64275	-111.90272	Low	Integral	0.592	0.025	0.019	0.014	0.350
1C 849	40.72113	-111.90371	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 850	40.71972	-111.90375	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 860N	40.72236	-111.90417	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1C 861	40.72236	-111.90333	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 868N	40.74972	-111.90917	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
1C 870	40.75568	-111.90985	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 875N	40.76061	-111.91400	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1C 880N	40.769	-111.91145	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1C 931	40.68926	-111.79744	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
1D 672	40.81847	-111.91633	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
1E1322	40.81125	-111.94781	Moderate	Min. Road	0.525	0.070	0.093	0.312	-
1E2569	40.8323	-111.94283	-	Integral	-	-	-	-	-
1F 207	40.48393	-111.89876	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
1F 609N	40.58801	-111.90018	Low	Integral	0.592	0.025	0.019	0.014	0.350

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
1F 610N	40.62071	-111.90395	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
1F 611N	40.63083	-111.90393	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 613N	40.63223	-111.90400	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 615N	40.63622	-111.90464	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
1F 616N	40.6548	-111.90156	Low	Integral	0.592	0.025	0.019	0.014	0.350
1F 617N	40.67453	-111.90139	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 618N	40.69396	-111.90235	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1F 619N	40.69994	-111.90204	Low	Integral	0.592	0.025	0.019	0.014	0.350
1F 622	40.72103	-111.90346	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 628	40.71847	-111.90431	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1F 629	40.7175	-111.90403	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
1F 630N	40.72542	-111.90410	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 631	40.72542	-111.90347	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 633N	40.73361	-111.90444	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 634	40.73361	-111.90417	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 636N	40.74556	-111.90472	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 637N	40.7475	-111.90653	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 646N	40.56967	-111.89979	Low	Integral	0.592	0.025	0.019	0.014	0.350
1F 647N	40.60561	-111.90467	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
1F 648N	40.61079	-111.90574	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
1F 649N	40.66735	-111.90117	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 655N	40.74153	-111.90403	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 656	40.74153	-111.90326	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 658N	40.75194	-111.91056	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 659	40.76361	-111.91369	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 660N	40.765	-111.91306	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 661N	40.7715	-111.91033	Low	Integral	0.592	0.025	0.019	0.014	0.350
1F 662N	40.77597	-111.91011	Low	Integral	0.592	0.025	0.019	0.014	0.350
1F 664	40.63248	-111.90193	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
1F 694	40.52667	-111.89083	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
1F 747	40.83161	-111.94389	-	Integral	-	-	-	-	-
1F 774	40.8164	-111.91959	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
1F 784	40.54433	-111.89478	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 371	40.72137	-112.15374	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
2C 400	40.74729	-111.90278	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
2C 402	40.74748	-111.89540	Low	Discontinuous Seat	0.656	0.023	0.023	0.020	0.278
2C 421	40.71299	-111.81772	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
2C 438	40.72514	-112.22059		Continuous Seat	-	-	-	-	-
2C 554	40.63617	-111.90701	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
2C 573R	40.75152	-111.71390		Continuous Seat	-	-	-	-	-
2C 585	40.64454	-111.93892	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
2C 624	40.76434	-111.96548	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 631	40.76373	-111.98218	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 633	40.76956	-111.98654	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
2C 637	40.76528	-111.98278	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
2C 702	40.76517	-111.94961	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 710	40.7709	-112.03920	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
2C 732	40.77017	-112.00556	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
2C 761	40.63486	-111.81114	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2C 838	40.72392	-111.91350	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 839	40.72383	-111.91158	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 844	40.72408	-111.90866	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 845	40.72445	-111.90841	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 854	40.71813	-111.89687	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 871	40.75632	-111.90986	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 876	40.76061	-111.91522	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 884	40.76379	-111.91681	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2C 887	40.76412	-111.91677	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2C 919	40.71764	-112.11789	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 936	40.72389	-111.93892	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2C 956	40.71814	-111.88249	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 957	40.71819	-111.87681	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 958	40.71861	-111.87125	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 959	40.71925	-111.86536	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 960	40.71825	-111.87397	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 962	40.71806	-111.87397	Low	Integral	0.592	0.025	0.019	0.014	0.350
2C 963	40.71954	-111.85727	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
2C 964	40.71939	-111.85722	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
2F 50	40.71644	-111.83392	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
2F 133	40.63856	-111.92192	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
2F 254R	40.73917	-111.67292		Continuous Seat	-	-	-	-	-
2F 283	40.64447	-111.93253	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
2F 620E	40.72423	-111.92493	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2F 621E	40.72408	-111.91730	Moderate	Integral	0.473	0.025	0.020	0.015	0.467

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
2F 624	40.71792	-111.89972	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2F 625	40.71771	-111.89972	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2F 626E	40.71819	-111.89111	Low	Integral	0.592	0.025	0.019	0.014	0.350
2F 627	40.71799	-111.89111	Low	Integral	0.592	0.025	0.019	0.014	0.350
2F 640	40.75625	-111.90722	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
2F 643	40.76447	-111.91970	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2F 645	40.76421	-111.91970	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
2F 651E	40.71806	-111.89389	Low	Integral	0.592	0.025	0.019	0.014	0.350
2F 793	40.7129	-111.82240	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3C 423	40.71187	-111.80443	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
3C 520	40.69676	-111.95263	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
3C 528	40.66739	-111.95278	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
3C 587	40.65306	-111.95274	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
3C 617	40.7253	-111.95144	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 625	40.76485	-111.98699	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
3C 663	40.68989	-111.95203	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
3C 668	40.75833	-111.98702	Low	Integral	0.592	0.025	0.019	0.014	0.350
3C 694	40.75849	-111.95106	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3C 695	40.75971	-111.95173	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3C 696	40.766	-111.94738	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 697	40.76676	-111.94573	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 703	40.76594	-111.95097	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 737	40.7531	-111.98703	Low	Integral	0.592	0.025	0.019	0.014	0.350
3C 738	40.75468	-111.98703	Low	Integral	0.592	0.025	0.019	0.014	0.350
3C 739	40.76608	-111.94653	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 828	40.6208	-111.90490	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
3C 829S	40.62936	-111.90367	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
3C 830	40.62924	-111.90389	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
3C 832S	40.63488	-111.90523	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3C 834	40.635	-111.90548	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3C 835	40.63626	-111.90527	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3C 836S	40.64296	-111.90314	Low	Integral	0.592	0.025	0.019	0.014	0.350
3C 842	40.72542	-111.90667	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 857	40.83396	-111.94170		Continuous Seat	-	-	-	-	-
3C 859	40.71861	-111.90472	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 860S	40.72236	-111.90472	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3C 862	40.7225	-111.90535	Moderate	Integral	0.473	0.025	0.020	0.015	0.467

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
3C 868S	40.74972	-111.90972	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 875S	40.76061	-111.91455	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 878	40.76408	-111.91433	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3C 880S	40.76925	-111.91200	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
3C 886	40.76533	-111.91441	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
3C 931	40.68926	-111.79744	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3F 53	40.70736	-111.79688	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
3F 207	40.48417	-111.89889	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
3F 609S	40.58795	-111.90056	Low	Integral	0.592	0.025	0.019	0.014	0.350
3F 610S	40.62083	-111.90420	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3F 611S	40.63072	-111.90423	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 612	40.63052	-111.90446	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 613S	40.63218	-111.90500	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 614	40.63194	-111.90500	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 615S	40.63626	-111.90498	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3F 616S	40.655	-111.90184	Low	Integral	0.592	0.025	0.019	0.014	0.350
3F 617S	40.67451	-111.90165	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 618S	40.69508	-111.90238	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
3F 619S	40.6999	-111.90234	Low	Integral	0.592	0.025	0.019	0.014	0.350
3F 630S	40.72542	-111.90472	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 632	40.72542	-111.90507	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 633S	40.73361	-111.90486	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 635	40.73361	-111.90514	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 637S	40.74708	-111.90667	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 646S	40.56966	-111.90013	Low	Integral	0.592	0.025	0.019	0.014	0.350
3F 647S	40.60588	-111.90522	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3F 648S	40.61094	-111.90618	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
3F 649S	40.66744	-111.90159	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 653	40.72237	-111.90511	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 654	40.72278	-111.90556	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 655S	40.74153	-111.90444	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 657	40.74153	-111.90472	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 658S	40.75194	-111.91097	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 660S	40.765	-111.91389	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 661S	40.77153	-111.91105	Low	Integral	0.592	0.025	0.019	0.014	0.350
3F 662S	40.77619	-111.91078	Low	Integral	0.592	0.025	0.019	0.014	0.350
3F 665	40.71861	-111.90590	Moderate	Integral	0.473	0.025	0.020	0.015	0.467

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
3F 666	40.72542	-111.90521	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 694	40.52667	-111.89139	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
3F 774	40.81647	-111.91991	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
3F 784	40.54432	-111.89500	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 371	40.72149	-112.15380	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
4C 400	40.7474	-111.90279	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
4C 402	40.7475	-111.89681	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
4C 424	40.71202	-111.78991	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
4C 438	40.72553	-112.22008		Continuous Seat	-	-	-	-	-
4C 573R	40.75184	-111.71352		Continuous Seat	-	-	-	-	-
4C 585	40.64488	-111.93882	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
4C 710	40.77116	-112.03914	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
4C 727	40.62988	-111.86143	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 736	40.63279	-111.83350	Minimal	Continuous Seat	0.896	0.007	0.006	0.009	0.082
4C 760	40.63561	-111.81108	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4C 837	40.72483	-111.91254	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4C 841	40.72409	-111.90668	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 846	40.71874	-111.90271	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 847	40.71852	-111.90272	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 848	40.71857	-111.90076	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 851	40.71889	-111.90222	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 852	40.71872	-111.90112	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 853	40.71861	-111.89972	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 855	40.71832	-111.89664	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 856	40.7185	-111.89683	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 873	40.7575	-111.91111	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 874	40.75806	-111.91111	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4C 883	40.76466	-111.91968	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4C 885	40.76458	-111.91681	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4C 917	40.76561	-111.98048	Low	Continuous Seat	0.612	0.021	0.017	0.015	0.334
4C 919	40.7178	-112.11779	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 936	40.72413	-111.93894	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4C 937	40.72472	-111.93889	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4C 956	40.71833	-111.88250	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 957	40.71833	-111.87681	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 958	40.71881	-111.87126	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 959	40.71956	-111.86525	Low	Integral	0.592	0.025	0.019	0.014	0.350

Table 8: Probabilities of Bridge Damage States - 2% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
4C 960	40.71842	-111.87397	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 961	40.71861	-111.87397	Low	Integral	0.592	0.025	0.019	0.014	0.350
4C 963	40.71972	-111.85750	Minimal	Integral	0.887	0.015	0.003	0.003	0.091
4F 36	40.76497	-111.96595	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
4F 50	40.71666	-111.83385	Moderate	Discontinuous Seat	0.536	0.027	0.020	0.020	0.393
4F 133	40.63887	-111.92191	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4F 254R	40.73942	-111.67239		Continuous Seat	-	-	-	-	-
4F 283	40.64489	-111.93186	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
4F 415	40.76542	-111.96622	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4F 620W	40.72439	-111.92492	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4F 621W	40.72427	-111.91716	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4F 623	40.71833	-111.89972	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
4F 626W	40.71836	-111.89095	Low	Integral	0.592	0.025	0.019	0.014	0.350
4F 641	40.75819	-111.90903	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4F 642	40.76064	-111.91347	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
4F 651W	40.71833	-111.89389	Low	Integral	0.592	0.025	0.019	0.014	0.350
4F 652	40.71847	-111.89389	Low	Integral	0.592	0.025	0.019	0.014	0.350
4F 793	40.71319	-111.82222	Moderate	Integral	0.473	0.025	0.020	0.015	0.467
0C 422	40.71404	-111.80664	Minimal	Discontinuous Seat	0.911	0.007	0.005	0.003	0.073
035146C	40.72555	-111.90900	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448
035188C	40.65526	-111.89760	Moderate	Continuous Seat	0.496	0.023	0.018	0.015	0.448

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035001E	40.71114	-111.96756	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035002E	40.71128	-111.97208	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035003D	40.50775	-111.95030	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035004E	40.50994	-111.89667	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035005D	40.53686	-111.95207	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035006E	40.63043	-111.92329	Low	Min. Road	0.605	0.057	0.079	0.260	-
035007D	40.63013	-111.92632	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035008E	40.71119	-111.95800	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035009D	40.66009	-111.88215	Low	Integral	0.560	0.023	0.016	0.012	0.390
035010D	40.65606	-111.87565	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
035011D	40.67973	-111.89123	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035012D	40.66686	-111.90861	Low	Integral	0.560	0.023	0.016	0.012	0.390
035013E	40.64961	-111.87673	Low	Min. Road	0.605	0.057	0.079	0.260	-
035014F	40.62854	-111.87259	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035015E	40.53083	-111.83334	Low	Min. Road	0.605	0.057	0.079	0.260	-
035016D	40.56039	-111.92914	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035017F	40.66636	-111.90625	Low	Integral	0.560	0.023	0.016	0.012	0.390
035018D	40.62584	-111.85104	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035019C	40.72589	-111.92633	Low	Integral	0.560	0.023	0.016	0.012	0.390
035020D	40.66724	-111.86502	Low	Integral	0.560	0.023	0.016	0.012	0.390
035021D	40.59408	-111.95713	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035022D	40.62403	-111.96548	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035023E	40.71104	-111.93893	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035024F	40.68711	-112.06305	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035025F	40.68502	-112.04392	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035026F	40.68356	-112.03433	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035027D	40.68613	-112.05359	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035028D	40.68210	-112.02661	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035029F	40.67993	-112.01998	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035030D	40.67474	-112.00564	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035031F	40.70014	-112.11033	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035032D	40.69195	-112.08228	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035033F	40.69653	-112.10292	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035034D	40.61501	-111.88186	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035035F	40.60584	-111.88885	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035036F	40.60586	-111.87748	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035037D	40.60956	-111.88594	Minimal	Integral	0.884	0.015	0.004	0.004	0.094

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035038D	40.59381	-111.88358	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035039E	40.59310	-111.88453	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035040E	40.59166	-111.88486	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035041D	40.51463	-111.94965	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035042E	40.57865	-111.96729	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035043D	40.62076	-111.87744	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035044F	40.50068	-111.89714	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035045E	40.55160	-111.88603	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035046E	40.53706	-111.87672	Low	Min. Road	0.605	0.057	0.079	0.260	-
035047F	40.67072	-111.99705	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035048E	40.58775	-111.95440	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035051F	40.58059	-111.89269	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035052E	40.59223	-111.89123	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035053E	40.59315	-111.89213	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035054D	40.60952	-111.92129	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035055D	40.61765	-111.87136	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035056F	40.51613	-111.89571	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035057F	40.54431	-111.88865	Low	Integral	0.560	0.023	0.016	0.012	0.390
035058F	40.48958	-111.94733	Low	Integral	0.560	0.023	0.016	0.012	0.390
035059E	40.49093	-111.94833	Low	Min. Road	0.605	0.057	0.079	0.260	-
035060D	40.63181	-111.80667	Low	Integral	0.560	0.023	0.016	0.012	0.390
035061E	40.54041	-111.95691	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035062C	40.66503	-111.84012	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035063D	40.62628	-111.80034	Low	Integral	0.560	0.023	0.016	0.012	0.390
035064D	40.65622	-111.82392	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035065D	40.65205	-111.83418	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035066D	40.66383	-111.83882	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035067C	40.63546	-111.81158	Low	Integral	0.560	0.023	0.016	0.012	0.390
035068D	40.66028	-111.83286	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035069D	40.63775	-111.81300	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035070D	40.71181	-111.98397	Low	Integral	0.560	0.023	0.016	0.012	0.390
035071D	40.60785	-111.83299	Low	Integral	0.560	0.023	0.016	0.012	0.390
035072D	40.60391	-111.81924	Low	Integral	0.560	0.023	0.016	0.012	0.390
035073D	40.60311	-111.81594	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035074V	40.57848	-111.79710	Low	Min. Road	0.605	0.057	0.079	0.260	-
035075D	40.63350	-111.61464	-	Integral	-	-	-	-	-
035076E	40.53434	-111.87325	Low	Min. Road	0.605	0.057	0.079	0.260	-

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035077D	40.53251	-111.87209	Low	Integral	0.560	0.023	0.016	0.012	0.390
035078E	40.52881	-111.87108	Low	Min. Road	0.605	0.057	0.079	0.260	-
035080E	40.52323	-111.87022	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035081D	40.50453	-111.87117	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035082D	40.64503	-111.95790	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035083D	40.63858	-111.94881	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035084C	40.63806	-111.94831	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035085F	40.63404	-111.94831	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035086D	40.65426	-111.96741	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035087D	40.66045	-111.97699	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035088D	40.66744	-111.98806	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035089D	40.66673	-111.98669	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035090F	40.68631	-111.92125	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
035091F	40.73353	-111.92332	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
035092F	40.73314	-111.93294	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
035093C	40.74049	-111.92273	Low	Integral	0.560	0.023	0.016	0.012	0.390
035094P	40.74533	-111.92093	Low	Integral	0.560	0.023	0.016	0.012	0.390
035095D	40.75149	-111.92119	Low	Integral	0.560	0.023	0.016	0.012	0.390
035096P	40.75411	-111.92288	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035097F	40.75844	-111.92330	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
035098D	40.76065	-111.92366	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035099D	40.76281	-111.92424	Low	Integral	0.560	0.023	0.016	0.012	0.390
035100F	40.76500	-111.92618	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035101C	40.75047	-111.95292	Low	Integral	0.560	0.023	0.016	0.012	0.390
035102F	40.75843	-111.95803	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035103E	40.77268	-111.98697	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035104E	40.77264	-111.98580	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035105V	40.59549	-111.95783	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035106F	40.79104	-111.93556	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035107F	40.78429	-111.93631	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
035108D	40.78019	-111.93804	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035109D	40.71875	-111.95036	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035110D	40.66483	-111.84461	Low	Integral	0.560	0.023	0.016	0.012	0.390
035111D	40.50473	-111.92923	Low	Integral	0.560	0.023	0.016	0.012	0.390
035112D	40.54829	-111.94851	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035113D	40.63153	-111.86075	Low	Integral	0.560	0.023	0.016	0.012	0.390
035114E	40.50692	-111.88511	Low	Min. Road	0.605	0.057	0.079	0.260	-

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
035115F	40.68108	-111.89969	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035116D	40.63472	-111.85358	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035117D	40.70834	-111.91695	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035118F	40.67982	-111.95499	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035119F	40.71701	-111.93535	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035120F	40.71427	-111.93502	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035121V	40.55451	-111.94819	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035122F	40.76911	-112.06289	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035123F	40.70564	-111.88539	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035124D	40.50067	-111.87800	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035125C	40.64726	-111.92936	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035126F	40.70498	-111.88269	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035127F	40.68664	-111.90008	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
035128C	40.64538	-111.92271	Low	Integral	0.560	0.023	0.016	0.012	0.390
035129F	40.61966	-111.85671	Low	Integral	0.560	0.023	0.016	0.012	0.390
035130F	40.61455	-111.84305	Low	Integral	0.560	0.023	0.016	0.012	0.390
035131D	40.64938	-111.83713	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035132C	40.84195	-111.95355	Low	Integral	0.560	0.023	0.016	0.012	0.390
035133D	40.68000	-111.90544	Low	Integral	0.560	0.023	0.016	0.012	0.390
035134D	40.62582	-111.85785	Low	Integral	0.560	0.023	0.016	0.012	0.390
035135E	40.66667	-111.85118	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035136C	40.63025	-111.60883	-	Continuous Seat	-	-	-	-	-
035137F	40.63106	-111.61064	-	Continuous Seat	-	-	-	-	-
035138E	40.68210	-111.95826	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035139V	40.57797	-111.94823	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035140E	40.70625	-111.89961	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035141D	40.68889	-112.07240	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035142E	40.71604	-112.08228	Low	Min. Road	0.605	0.057	0.079	0.260	-
035144D	40.66756	-111.97071	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035145F	40.74159	-111.90853	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035147F	40.52131	-111.89403	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035150D	40.77128	-111.97556	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035151E	40.62294	-111.85756	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035152C	40.74075	-111.93975	Low	Integral	0.560	0.023	0.016	0.012	0.390
035154D	40.70319	-111.87691	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035155F	40.52924	-111.89466	Low	Integral	0.560	0.023	0.016	0.012	0.390
035156D	40.53076	-111.89602	Low	Integral	0.560	0.023	0.016	0.012	0.390

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035157E	40.55160	-111.89194	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035158D	40.56972	-111.88919	Low	Integral	0.560	0.023	0.016	0.012	0.390
035159V	40.57229	-111.88638	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035160D	40.62089	-111.85680	Low	Integral	0.560	0.023	0.016	0.012	0.390
035161F	40.59294	-111.80721	Low	Integral	0.560	0.023	0.016	0.012	0.390
035162F	40.58875	-111.80696	Low	Integral	0.560	0.023	0.016	0.012	0.390
035163E	40.58774	-111.94169	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035164D	40.53853	-111.88172	Low	Integral	0.560	0.023	0.016	0.012	0.390
035165D	40.51335	-111.86758	Low	Integral	0.560	0.023	0.016	0.012	0.390
035166D	40.71765	-111.98892	Low	Integral	0.560	0.023	0.016	0.012	0.390
035167D	40.71114	-111.99172	Low	Integral	0.560	0.023	0.016	0.012	0.390
035168D	40.66830	-111.98960	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035169E	40.54007	-111.95134	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035170V	40.49023	-111.87389	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035171V	40.48971	-111.87391	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035172V	40.50541	-111.84614	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
035173D	40.52767	-111.89353	Low	Integral	0.560	0.023	0.016	0.012	0.390
035174D	40.50646	-111.87013	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035175D	40.64321	-111.93143	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035176E	40.58934	-111.88515	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035177D	40.53529	-111.97282	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035178V	40.53690	-111.96971	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035179D	40.60901	-111.92380	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035180E	40.54212	-111.89859	Low	Min. Road	0.605	0.057	0.079	0.260	-
035181F	40.57213	-111.91576	Low	Integral	0.560	0.023	0.016	0.012	0.390
035182V	40.57206	-111.91669	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035183D	40.62829	-111.94831	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035184D	40.57586	-111.89929	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035185D	40.57583	-111.89570	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035186D	40.59502	-111.89233	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035189E	40.51886	-111.86667	Low	Min. Road	0.605	0.057	0.079	0.260	-
035191C	40.77338	-111.98548	Low	Integral	0.560	0.023	0.016	0.012	0.390
035192F	40.77433	-111.98628	Low	Integral	0.560	0.023	0.016	0.012	0.390
035193C	40.77716	-111.99094	Low	Integral	0.560	0.023	0.016	0.012	0.390
035194C	40.77342	-111.98678	Low	Integral	0.560	0.023	0.016	0.012	0.390
035195C	40.77790	-111.98028	Low	Integral	0.560	0.023	0.016	0.012	0.390
035196E	40.54470	-111.96615	Minimal	Min. Road	0.909	0.017	0.020	0.054	-

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
035197D	40.54306	-111.92739	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
035198E	40.54853	-111.91733	Low	Min. Road	0.605	0.057	0.079	0.260	-
035199E	40.55967	-111.94428	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035200E	40.57321	-111.94470	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035204E	40.66728	-111.85430	Low	Min. Road	0.605	0.057	0.079	0.260	-
035207E	40.52696	-111.87086	Low	Maj. Road	0.661	0.079	0.130	0.129	-
035208E	40.53834	-111.96678	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
035209D	40.77149	-111.92606	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035210D	40.61833	-111.94915	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
035211F	40.55885	-111.88871	Low	Integral	0.560	0.023	0.016	0.012	0.390
035212F	40.55883	-111.88301	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035214C	40.77150	-111.90538	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035217D	40.51236	-111.86803	Low	Integral	0.560	0.023	0.016	0.012	0.390
035218F	40.64921	-111.96191	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0C 369	40.76542	-111.93267	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 377	40.76572	-111.93466	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 401	40.74740	-111.89983	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0C 420	40.71819	-111.88819	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
0C 460	40.75193	-111.94855	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 518	40.68701	-111.79756	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 562	40.74375	-111.73113	-	Continuous Seat	-	-	-	-	-
0C 574	40.73935	-111.74284	-	Continuous Seat	-	-	-	-	-
0C 575	40.72858	-111.76502	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 584	40.63508	-111.89847	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 620	40.63187	-111.89000	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 621	40.63317	-111.89282	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 629	40.68215	-111.95149	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 635	40.77100	-112.06305	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 649	40.63803	-111.92057	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 659	40.70393	-111.95301	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 662	40.71223	-111.95363	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 669	40.77103	-112.02506	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 688	40.75848	-111.95046	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 689	40.75994	-111.95083	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 692	40.76548	-111.95054	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 693	40.77146	-111.94931	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 704	40.76274	-111.95100	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
0C 709	40.72673	-111.96786	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 725	40.62978	-111.87200	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 726	40.63010	-111.86593	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 752	40.74047	-111.94924	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 757	40.63755	-111.80869	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0C 759	40.63514	-111.81104	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 806	40.78234	-111.90522	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 812	40.68671	-111.90289	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 813	40.71264	-111.90410	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0C 814	40.66067	-111.90178	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 815	40.50237	-111.97674	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0C 816	40.78222	-111.91083	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 817	40.49757	-111.92937	Low	Integral	0.560	0.023	0.016	0.012	0.390
0C 819	40.50436	-111.89110	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0C 926	40.58806	-111.64444	-	Integral	-	-	-	-	-
0C 953	40.67456	-111.80292	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0C 968	40.69986	-111.79517	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0C 980	40.54425	-111.91658	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0D 258	40.62606	-111.74191	-	Continuous Seat	-	-	-	-	-
0D 410	40.53073	-111.87122	Low	Integral	0.560	0.023	0.016	0.012	0.390
0D 480	40.74028	-111.93901	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0D 564	40.80823	-111.93900	Low	Integral	0.560	0.023	0.016	0.012	0.390
0D 805	40.65304	-111.92339	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0D 807	40.57223	-111.77848	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0D 809	40.69943	-111.92465	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0D 811	40.67958	-111.88828	Low	Integral	0.560	0.023	0.016	0.012	0.390
0D 844	40.43742	-111.93097	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0D 845	40.46105	-111.94208	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0E 907	40.61853	-111.78131	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
0E1032	40.48886	-111.89994	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
0E1064	40.60150	-111.89079	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E1070	40.55416	-111.89077	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1200	40.70625	-111.90361	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1201	40.68073	-111.90217	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1218	40.67433	-111.88092	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1227	40.66624	-111.86750	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1272	40.72578	-112.20361	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
0E1283	40.66763	-111.93723	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1286	40.67495	-111.91139	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E1324	40.82856	-111.94691	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1445	40.56606	-111.89953	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1683	40.48514	-111.94200	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E1709	40.76073	-111.85043	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E1767	40.49243	-111.89133	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E1833	40.71122	-111.95362	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E1858	40.64206	-111.86592	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1908	40.72607	-111.96239	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E1909	40.65301	-111.92951	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2113	40.65309	-111.96620	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2150	40.63447	-111.93878	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2225	40.66080	-111.88830	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E2372	40.70816	-111.98009	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E2374	40.66294	-111.98155	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2379	40.60947	-111.96327	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0E2381	40.58738	-111.91895	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E2405	40.58810	-111.88676	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2421	40.68134	-112.02474	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2439	40.50026	-111.95328	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2475	40.48616	-111.90641	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
0E2486	40.58210	-111.93870	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2507	40.52673	-111.89333	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E2528	40.52227	-111.94940	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2543	40.58305	-111.89084	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2544	40.57440	-111.89084	Low	Maj. Road	0.661	0.079	0.130	0.129	-
0E2545	40.57145	-111.89079	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2546	40.56752	-111.89079	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2568	40.56230	-111.93988	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0E2613	40.54414	-111.94883	Minimal	Min. Road	0.909	0.017	0.020	0.054	-
0E2614	40.54432	-111.89738	Low	Min. Road	0.605	0.057	0.079	0.260	-
0F 6	40.76489	-111.92950	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 7	40.76459	-111.92625	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 33	40.76406	-111.93892	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0F 34	40.76472	-111.93892	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0F 35	40.76618	-111.93914	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					µ	µ	µ	µ	µ
0F 48	40.71966	-111.85366	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
0F 49	40.71878	-111.84213	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0F 52	40.71697	-111.80911	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
0F 115	40.67478	-111.90792	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0F 131	40.63572	-111.91014	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
0F 244	40.58773	-111.91272	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
0F 344	40.76855	-112.02505	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 410	40.74685	-111.94888	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 419	40.76465	-111.96571	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0F 431	40.81310	-111.94926	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 458	40.64589	-111.80838	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0F 470	40.80566	-111.94909	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 475	40.62981	-111.86236	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 476	40.62300	-111.75066	-	Continuous Seat	-	-	-	-	-
0F 477	40.73311	-111.94961	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0F 500	40.78471	-111.94912	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
0F 504	40.63045	-111.85472	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 505	40.63450	-111.82473	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0F 506	40.63301	-111.83410	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0F 522	40.72582	-111.98633	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 523	40.72575	-112.02489	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 543	40.58253	-111.65283	-	Integral	-	-	-	-	-
0F 547	40.74524	-112.18303	-	Integral	-	-	-	-	-
0F 562	40.61982	-111.78957	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 571	40.62374	-111.92083	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 576	40.59344	-111.97700	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0F 595	40.74098	-112.17784	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 596	40.53692	-111.98413	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0F 607	40.49685	-111.91981	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 608	40.48636	-111.93602	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 663	40.55900	-111.89783	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 683	40.55889	-111.90799	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 687	40.76066	-111.90931	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
0F 693	40.52356	-111.92186	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 727	40.56912	-111.87211	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 783	40.54433	-111.90286	Low	Integral	0.560	0.023	0.016	0.012	0.390
0F 791	40.79444	-111.91704	Minimal	Integral	0.884	0.015	0.004	0.004	0.094

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None μ	Slight μ	Moderate μ	Extensive μ	Collapse μ
0F 838	40.67449	-111.89560	Low	Integral	0.560	0.023	0.016	0.012	0.390
0V 737	40.72170	-112.15582	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0V2101	40.54417	-111.92726	Minimal	Maj. Road	0.926	0.020	0.027	0.027	-
0V2102	40.54409	-111.90688	Low	Maj. Road	0.661	0.079	0.130	0.129	-
1C 520	40.69617	-111.95214	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 528	40.66743	-111.95242	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1C 587	40.65304	-111.95243	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1C 617	40.72528	-111.95100	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1C 628	40.76417	-111.98651	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 663	40.68935	-111.95165	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 664	40.69643	-111.95017	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 668	40.75842	-111.98665	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 698	40.75825	-111.94989	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 699	40.76018	-111.95005	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 700	40.76325	-111.95005	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1C 701	40.76488	-111.94774	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1C 737	40.75311	-111.98674	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 738	40.75466	-111.98672	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 827	40.61994	-111.90361	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1C 829N	40.62914	-111.90326	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1C 832N	40.63483	-111.90500	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1C 833	40.63372	-111.90234	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 836N	40.64275	-111.90272	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 849	40.72113	-111.90371	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 850	40.71972	-111.90375	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 860N	40.72236	-111.90417	Low	Integral	0.560	0.023	0.016	0.012	0.390
1C 861	40.72236	-111.90333	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 868N	40.74972	-111.90917	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
1C 870	40.75568	-111.90985	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 875N	40.76061	-111.91400	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 880N	40.76900	-111.91145	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1C 931	40.68926	-111.79744	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1D 672	40.81847	-111.91633	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1E1322	40.81125	-111.94781	Low	Min. Road	0.605	0.057	0.079	0.260	-
1E2569	40.83230	-111.94283	-	Integral	-	-	-	-	-
1F 207	40.48393	-111.89876	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
1F 609N	40.58801	-111.90018	Low	Integral	0.560	0.023	0.016	0.012	0.390

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
1F 610N	40.62071	-111.90395	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1F 611N	40.63083	-111.90393	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 613N	40.63223	-111.90400	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1F 615N	40.63622	-111.90464	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1F 616N	40.65480	-111.90156	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 617N	40.67453	-111.90139	-	Integral	-	-	-	-	-
1F 618N	40.69396	-111.90235	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1F 619N	40.69994	-111.90204	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 622	40.72103	-111.90346	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 628	40.71847	-111.90431	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1F 629	40.71750	-111.90403	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1F 630N	40.72542	-111.90410	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 631	40.72542	-111.90347	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 633N	40.73361	-111.90444	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 634	40.73361	-111.90417	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 636N	40.74556	-111.90472	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 637N	40.74750	-111.90653	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 646N	40.56967	-111.89979	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 647N	40.60561	-111.90467	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1F 648N	40.61079	-111.90574	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
1F 649N	40.66735	-111.90117	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 655N	40.74153	-111.90403	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 656	40.74153	-111.90326	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 658N	40.75194	-111.91056	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 659	40.76361	-111.91369	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 660N	40.76500	-111.91306	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 661N	40.77150	-111.91033	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 662N	40.77597	-111.91011	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 664	40.63248	-111.90193	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
1F 694	40.52667	-111.89083	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 747	40.83161	-111.94389	Low	Integral	0.560	0.023	0.016	0.012	0.390
1F 774	40.81640	-111.91959	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
1F 784	40.54433	-111.89478	Low	Integral	0.560	0.023	0.016	0.012	0.390
2C 371	40.72137	-112.15374	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
2C 400	40.74729	-111.90278	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
2C 402	40.74748	-111.89540	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
2C 421	40.71299	-111.81772	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
2C 438	40.72514	-112.22059	-	Continuous Seat	-	-	-	-	-
2C 554	40.63617	-111.90701	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
2C 573R	40.75152	-111.71390	-	Continuous Seat	-	-	-	-	-
2C 585	40.64454	-111.93892	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
2C 624	40.76434	-111.96548	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
2C 631	40.76373	-111.98218	Low	Integral	0.560	0.023	0.016	0.012	0.390
2C 633	40.76956	-111.98654	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 637	40.76528	-111.98278	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 702	40.76517	-111.94961	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
2C 710	40.77090	-112.03920	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 732	40.77017	-112.00556	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 761	40.63486	-111.81114	Low	Integral	0.560	0.023	0.016	0.012	0.390
2C 838	40.72392	-111.91350	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 839	40.72383	-111.91158	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 844	40.72408	-111.90866	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 845	40.72445	-111.90841	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 854	40.71813	-111.89687	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 871	40.75632	-111.90986	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 876	40.76061	-111.91522	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 884	40.76379	-111.91681	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2C 887	40.76412	-111.91677	Low	Integral	0.560	0.023	0.016	0.012	0.390
2C 919	40.71764	-112.11789	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 936	40.72389	-111.93892	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 956	40.71814	-111.88249	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 957	40.71819	-111.87681	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 958	40.71861	-111.87125	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 959	40.71925	-111.86536	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 960	40.71825	-111.87397	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 962	40.71806	-111.87397	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 963	40.71954	-111.85727	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2C 964	40.71939	-111.85722	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2F 50	40.71644	-111.83392	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
2F 133	40.63856	-111.92192	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
2F 254R	40.73917	-111.67292	-	Continuous Seat	-	-	-	-	-
2F 283	40.64447	-111.93253	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
2F 620E	40.72423	-111.92493	Low	Integral	0.560	0.023	0.016	0.012	0.390
2F 621E	40.72408	-111.91730	Low	Integral	0.560	0.023	0.016	0.012	0.390

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
2F 624	40.71792	-111.89972	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2F 625	40.71771	-111.89972	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2F 626E	40.71819	-111.89111	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2F 627	40.71799	-111.89111	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2F 640	40.75625	-111.90722	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
2F 643	40.76447	-111.91970	Low	Integral	0.560	0.023	0.016	0.012	0.390
2F 645	40.76421	-111.91970	Low	Integral	0.560	0.023	0.016	0.012	0.390
2F 651E	40.71806	-111.89389	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
2F 793	40.71290	-111.82240	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3C 423	40.71187	-111.80443	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
3C 520	40.69676	-111.95263	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 528	40.66739	-111.95278	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 587	40.65306	-111.95274	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 617	40.72530	-111.95144	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 625	40.76485	-111.98699	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 663	40.68989	-111.95203	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 668	40.75833	-111.98702	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 694	40.75849	-111.95106	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 695	40.75971	-111.95173	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 696	40.76600	-111.94738	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 697	40.76676	-111.94573	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 703	40.76594	-111.95097	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 737	40.75310	-111.98703	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 738	40.75468	-111.98703	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 739	40.76608	-111.94653	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 828	40.62080	-111.90490	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 829S	40.62936	-111.90367	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 830	40.62924	-111.90389	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3C 832S	40.63488	-111.90523	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3C 834	40.63500	-111.90548	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3C 835	40.63626	-111.90527	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3C 836S	40.64296	-111.90314	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 842	40.72542	-111.90667	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 857	40.83396	-111.94170	-	Continuous Seat	-	-	-	-	-
3C 859	40.71861	-111.90472	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 860S	40.72236	-111.90472	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 862	40.72250	-111.90535	Low	Integral	0.560	0.023	0.016	0.012	0.390

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
3C 868S	40.74972	-111.90972	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 875S	40.76061	-111.91455	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 878	40.76408	-111.91433	Low	Integral	0.560	0.023	0.016	0.012	0.390
3C 880S	40.76925	-111.91200	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 886	40.76533	-111.91441	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3C 931	40.68926	-111.79744	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3F 53	40.70736	-111.79688	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
3F 207	40.48417	-111.89889	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
3F 609S	40.58795	-111.90056	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 610S	40.62083	-111.90420	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3F 611S	40.63072	-111.90423	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 612	40.63052	-111.90446	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 613S	40.63218	-111.90500	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3F 614	40.63194	-111.90500	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 615S	40.63626	-111.90498	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3F 616S	40.65500	-111.90184	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 617S	40.67451	-111.90165	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 618S	40.69508	-111.90238	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
3F 619S	40.69990	-111.90234	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 630S	40.72542	-111.90472	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 632	40.72542	-111.90507	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 633S	40.73361	-111.90486	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 635	40.73361	-111.90514	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 637S	40.74708	-111.90667	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 646S	40.56966	-111.90013	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 647S	40.60588	-111.90522	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3F 648S	40.61094	-111.90618	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
3F 649S	40.66744	-111.90159	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 653	40.72237	-111.90511	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 654	40.72278	-111.90556	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 655S	40.74153	-111.90444	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 657	40.74153	-111.90472	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 658S	40.75194	-111.91097	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 660S	40.76500	-111.91389	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 661S	40.77153	-111.91105	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 662S	40.77619	-111.91078	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 665	40.71861	-111.90590	Low	Integral	0.560	0.023	0.016	0.012	0.390

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
3F 666	40.72542	-111.90521	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 694	40.52667	-111.89139	Low	Integral	0.560	0.023	0.016	0.012	0.390
3F 774	40.81647	-111.91991	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
3F 784	40.54432	-111.89500	Low	Integral	0.560	0.023	0.016	0.012	0.390
4C 371	40.72149	-112.15380	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
4C 400	40.74740	-111.90279	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
4C 402	40.74750	-111.89681	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
4C 424	40.71202	-111.78991	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
4C 438	40.72553	-112.22008	-	Continuous Seat	-	-	-	-	-
4C 573R	40.75184	-111.71352	-	Continuous Seat	-	-	-	-	-
4C 585	40.64488	-111.93882	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4C 710	40.77116	-112.03914	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 727	40.62988	-111.86143	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 736	40.63279	-111.83350	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4C 760	40.63561	-111.81108	Low	Integral	0.560	0.023	0.016	0.012	0.390
4C 837	40.72483	-111.91254	Low	Integral	0.560	0.023	0.016	0.012	0.390
4C 841	40.72409	-111.90668	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 846	40.71874	-111.90271	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 847	40.71852	-111.90272	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 848	40.71857	-111.90076	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4C 851	40.71889	-111.90222	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4C 852	40.71872	-111.90112	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4C 853	40.71861	-111.89972	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4C 855	40.71832	-111.89664	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 856	40.71850	-111.89683	Low	Integral	0.560	0.023	0.016	0.012	0.390
4C 873	40.75750	-111.91111	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 874	40.75806	-111.91111	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 883	40.76466	-111.91968	Low	Integral	0.560	0.023	0.016	0.012	0.390
4C 885	40.76458	-111.91681	Low	Integral	0.560	0.023	0.016	0.012	0.390
4C 917	40.76561	-111.98048	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4C 919	40.71780	-112.11779	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 936	40.72413	-111.93894	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 937	40.72472	-111.93889	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 956	40.71833	-111.88250	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 957	40.71833	-111.87681	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 958	40.71881	-111.87126	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 959	40.71956	-111.86525	Minimal	Integral	0.884	0.015	0.004	0.004	0.094

Table 9: Probabilities of Bridge Damage States - 10% Probability of Exceedance in 50 Years

NBI	Latitude	Longitude	Hazard Level	Bridge Behavior Type	None	Slight	Moderate	Extensive	Collapse
					μ	μ	μ	μ	μ
4C 960	40.71842	-111.87397	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 961	40.71861	-111.87397	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4C 963	40.71972	-111.85750	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4F 36	40.76497	-111.96595	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
4F 50	40.71666	-111.83385	Low	Discontinuous Seat	0.613	0.020	0.020	0.016	0.332
4F 133	40.63887	-111.92191	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4F 254R	40.73942	-111.67239	-	Continuous Seat	-	-	-	-	-
4F 283	40.64489	-111.93186	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
4F 415	40.76542	-111.96622	Minimal	Continuous Seat	0.892	0.007	0.007	0.010	0.084
4F 620W	40.72439	-111.92492	Low	Integral	0.560	0.023	0.016	0.012	0.390
4F 621W	40.72427	-111.91716	Low	Integral	0.560	0.023	0.016	0.012	0.390
4F 623	40.71833	-111.89972	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4F 626W	40.71836	-111.89095	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4F 641	40.75819	-111.90903	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4F 642	40.76064	-111.91347	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
4F 651W	40.71833	-111.89389	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
4F 652	40.71847	-111.89389	Low	Integral	0.560	0.023	0.016	0.012	0.390
4F 793	40.71319	-111.82222	Minimal	Integral	0.884	0.015	0.004	0.004	0.094
0C 422	40.71404	-111.80664	Minimal	Discontinuous Seat	0.907	0.010	0.009	0.005	0.068
035146C	40.72555	-111.90900	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373
035188C	40.65526	-111.89760	Low	Continuous Seat	0.580	0.019	0.015	0.013	0.373

APPENDIX B

This appendix contains tables which contain the lateral spread distribution for each hazard area within each seismic event. Along with the distributions estimates of damage state are reported based on 50 percent, 85 percent, and 99 percent non-exceedance. Damage states are reported as numeric values and follow the same description given in the text (1 = None, 2 = Slight, 3 = Moderate, 4 = Extensive, 5 = Collapse). These tables are best implemented through a Monte Carlo analysis. Where this type of analysis is used, the modeler would randomly select a displacement based on the distributions given in the tables and assign it to a bridge. This would be repeated for every bridge located within the given hazard area. Once all the bridges within a hazard area are assigned displacements, a damage state could then be assigned to each bridge based on the desired non-exceedance value and the bridge type. This method of analysis is more complex than the method described in Appendix A, but is likely to provide more realistic results. It is worth noting that the majority of displacements in any given hazard area have a value of 0 m.

Table 10: Magnitude 7.0 - Very High Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	389	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	13	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	7	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	17	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	1	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	6	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	15	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	5	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	6	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	13	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	4	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	3	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.13	12	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	11	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.16	5	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.17	2	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.19	2	5	5	5	4	5	5	2	3	5	1	2	3	2	3	4
0.20	1	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.21	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	14	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.26	5	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.27	7	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.29	6	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.31	3	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.33	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.34	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.38	4	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.41	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.43	7	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.44	7	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.47	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.49	7	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.52	7	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.55	6	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4

Table 10: Magnitude 7.0 - Very High Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.56	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.59	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.61	7	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.64	5	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.66	0	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.67	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.69	4	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.70	3	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.73	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.74	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.76	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.77	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.78	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.80	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.87	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.91	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.92	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.97	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.98	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.00	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.01	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.03	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.07	11	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.08	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.10	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.11	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.12	10	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.13	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.14	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.15	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.17	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.18	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.19	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.21	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.22	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.23	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4

Table 10: Magnitude 7.0 - Very High Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
1.24	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.25	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.26	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.28	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.29	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.30	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.33	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.34	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.35	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.37	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.42	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.43	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.44	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.48	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.49	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.51	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.52	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.54	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.55	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.58	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.60	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.70	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.71	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.73	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.78	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.89	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.92	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.94	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.95	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.96	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.97	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.00	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.01	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.03	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.04	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.05	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.12	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.14	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 10: Magnitude 7.0 - Very High Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
2.23	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.24	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.30	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.33	7	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.46	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.48	7	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.59	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.69	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.74	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.90	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.91	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.93	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.96	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.99	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.06	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.11	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.23	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.24	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.32	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.35	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.39	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.50	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.55	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.73	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.82	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.88	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.94	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.05	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.10	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.21	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.33	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.35	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.62	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.93	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.15	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.24	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.61	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.29	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 10: Magnitude 7.0 - Very High Hazard Area

Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		Damage State for a Given Structure and a Probability of Non-Exceedance														
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
7.60	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.94	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
10.13	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
19.39	7	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 11: Magnitude 7.0 – High Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	488	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	17	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	37	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	23	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	23	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	21	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	8	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	4	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	8	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	4	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	3	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	6	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.13	7	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	10	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.15	5	3	5	5	3	5	5	1	2	4	1	2	3	1	3	4
0.16	12	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.17	6	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.18	7	4	5	5	4	5	5	1	2	5	1	2	3	2	3	4
0.19	11	5	5	5	4	5	5	2	3	5	1	2	3	2	3	4
0.20	9	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.21	12	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.22	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.23	8	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	13	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.26	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.27	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	5	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.29	12	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.32	15	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.33	10	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.34	2	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.35	11	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	14	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.38	0	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.39	6	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.44	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4

Table 11: Magnitude 7.0 – High Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.49	8	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.57	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.61	7	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.63	7	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.65	3	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.66	5	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.68	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.69	3	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.75	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.79	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.83	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.87	9	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.95	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.99	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.01	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.02	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.11	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.12	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.16	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.25	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.27	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.32	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.49	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.60	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.68	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.80	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.81	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.86	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.90	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.92	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.00	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.01	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.04	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.53	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.63	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 11: Magnitude 7.0 – High Hazard Area

Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
3.16	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.37	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.82	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.94	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Damage State for a Given Structure and a Probability of Non-Exceedance

Table 12: Magnitude 7.0 – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	701	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	37	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	41	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	19	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	17	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	21	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	17	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	15	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	20	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	11	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	14	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	15	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	8	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.13	13	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	4	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.15	3	3	5	5	3	5	5	1	2	4	1	2	3	1	3	4
0.16	4	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.17	9	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.18	7	4	5	5	4	5	5	1	2	5	1	2	3	2	3	4
0.19	6	5	5	5	4	5	5	2	3	5	1	2	3	2	3	4
0.20	8	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.21	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.22	3	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.23	2	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	3	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	6	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.26	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.27	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	6	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.29	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.30	4	5	5	5	5	5	5	3	5	5	1	3	4	2	4	4
0.31	2	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.32	2	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.33	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.34	2	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.35	1	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.36	4	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	4	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4

Table 12: Magnitude 7.0 – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.38	4	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.39	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.40	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.41	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.42	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.47	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.48	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.49	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.51	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.52	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.54	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.55	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.56	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.58	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.59	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.61	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.64	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.66	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.68	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.69	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.70	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.71	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.74	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.76	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.77	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.80	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.82	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.83	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.84	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.86	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.87	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.88	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.89	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4

Table 12: Magnitude 7.0 – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.91	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.93	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.94	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.98	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.99	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.02	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.03	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.05	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.09	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.23	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.24	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.25	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.34	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.37	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.42	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.45	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.46	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.47	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.62	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.69	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.73	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.86	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.89	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.95	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.10	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.18	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.46	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.55	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.69	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.80	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.00	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.01	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.06	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.38	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.47	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.50	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.62	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.74	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 12: Magnitude 7.0 – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
4.32	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.91	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.20	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
6.12	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.03	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.46	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.64	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.91	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
8.22	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
9.75	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
14.20	7	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 13: Magnitude 7.0 - Low Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	817	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	21	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	49	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	3	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	8	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	4	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	4	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.10	6	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.27	7	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.29	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.34	2	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.55	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.57	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.58	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.59	8	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.68	5	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.70	3	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.85	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.97	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.03	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.36	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.42	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.54	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.73	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.76	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.70	7	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.22	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 14: Magnitude 7.0 - Minimal Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	950	1	1	2	1	1	2	1	1	2	1	1	1	1	1	1
0.49	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.87	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.98	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.08	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.21	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.23	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.28	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.29	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.36	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.40	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.41	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.45	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.81	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.91	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.92	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.93	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.95	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.07	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.26	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.33	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.37	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.41	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.54	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.62	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.65	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.73	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.78	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.87	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.88	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.92	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.93	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.98	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.05	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.10	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.28	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.52	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.66	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 14: Magnitude 7.0 - Minimal Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
4.03	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.13	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.58	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.59	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.76	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.90	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.43	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
8.14	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
8.16	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
9.35	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
12.08	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 15: 2 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	365	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	6	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	14	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	28	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	17	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	9	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	12	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	20	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	4	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	3	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	3	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	10	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	9	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.13	11	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	5	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.15	18	3	5	5	3	5	5	1	2	4	1	2	3	1	3	4
0.17	3	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.21	11	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.22	2	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.23	10	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	5	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	7	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.27	2	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	1	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.30	0	5	5	5	5	5	5	3	5	5	1	3	4	2	4	4
0.31	8	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.32	7	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.35	5	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	1	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.38	8	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.39	11	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.41	6	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.42	0	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.43	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.44	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.48	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.49	9	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4

Table 15: 2 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.51	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.52	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.55	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.56	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.57	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.58	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.59	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.63	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.67	3	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.70	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.71	3	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.75	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.76	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.77	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.78	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.79	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.81	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.82	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.83	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.84	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.86	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.87	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.90	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.91	8	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.92	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.94	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	8	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.97	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.98	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.00	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.01	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.02	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.04	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.05	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.07	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.13	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4

Table 15: 2 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
1.14	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.16	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.17	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.18	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.19	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.20	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.21	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.22	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.23	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.25	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.28	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.30	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.33	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.35	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.39	14	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.41	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.46	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.49	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.58	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.59	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.69	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.70	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.72	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.76	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.78	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.79	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.80	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.82	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.87	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.88	9	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.89	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.90	8	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.91	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.04	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.09	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.13	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.14	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.19	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 15: 2 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
2.26	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.27	8	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.33	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.35	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.37	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.40	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.47	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.49	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.54	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.66	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.88	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.90	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.10	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.75	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.34	7	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.40	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.44	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.58	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.77	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.44	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 16: 2 Percent Probability of Exceedance in 50 Years – Low Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	429	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	34	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	47	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	26	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	26	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	6	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	5	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	19	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	3	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	6	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	8	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	3	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	1	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.13	19	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	8	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.15	9	3	5	5	3	5	5	1	2	4	1	2	3	1	3	4
0.17	2	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.19	23	5	5	5	4	5	5	2	3	5	1	2	3	2	3	4
0.22	1	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.23	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	3	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.26	2	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.27	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.29	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.30	4	5	5	5	5	5	5	3	5	5	1	3	4	2	4	4
0.32	4	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.34	6	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.35	2	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	11	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.39	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.40	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.42	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.43	9	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.44	9	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	6	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.48	6	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4

Table 16: 2 Percent Probability of Exceedance in 50 Years – Low Hazard Area

Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		Damage State for a Given Structure and a Probability of Non-Exceedance														
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.51	6	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.55	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.60	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.62	4	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.63	4	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.65	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.69	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.70	7	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.71	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.72	5	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.78	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.79	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.82	9	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.84	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.86	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.87	9	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.89	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.92	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	13	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.00	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.03	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.07	8	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.09	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.11	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.17	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.19	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.28	8	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.34	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.49	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.51	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.54	8	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.56	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.67	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.78	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.92	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.93	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 16: 2 Percent Probability of Exceedance in 50 Years – Low Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
2.39	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.60	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.89	8	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.90	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.04	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.09	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.36	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.51	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.63	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.07	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.91	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.45	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
13.74	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 17: 2 Percent Probability of Exceedance in 50 Years – Minimal Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	846	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	18	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	16	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	10	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	2	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	4	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	0	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	4	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.09	5	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	1	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	1	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.18	4	4	5	5	4	5	5	1	2	5	1	2	3	2	3	4
0.20	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.22	3	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	7	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.26	0	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.31	1	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.33	0	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.34	1	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.43	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	0	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.54	0	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.58	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.68	0	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.75	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.80	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.82	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.84	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.92	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.14	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.15	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.23	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.30	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.34	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4

Table 17: 2 Percent Probability of Exceedance in 50 Years – Minimal Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
1.38	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.44	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.52	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.60	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.66	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.69	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.70	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.78	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.13	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.21	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.44	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.63	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.69	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.71	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.58	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.76	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.28	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.46	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 18: 10 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance: Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	`	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	299	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	30	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	25	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	29	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	19	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	13	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	18	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	16	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	14	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	15	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	13	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	13	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	11	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.13	15	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	7	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.15	7	3	5	5	3	5	5	1	2	4	1	2	3	1	3	4
0.16	7	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.17	6	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.18	5	4	5	5	4	5	5	1	2	5	1	2	3	2	3	4
0.19	7	5	5	5	4	5	5	2	3	5	1	2	3	2	3	4
0.20	6	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.21	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.22	1	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.23	2	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	6	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.26	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.27	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	1	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.29	4	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.30	4	5	5	5	5	5	5	3	5	5	1	3	4	2	4	4
0.32	6	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.33	5	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.34	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.35	2	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.36	6	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.38	2	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4

Table 18: 10 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	`	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.39	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.40	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.41	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.42	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.43	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.44	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.48	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.49	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.52	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.54	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.56	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.57	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.58	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.60	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.61	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.62	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.64	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.65	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.67	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.69	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.71	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.72	1	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.74	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.75	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.77	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.80	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.81	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.82	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.83	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.86	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.90	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.94	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4

Table 18: 10 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	`	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.99	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.01	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.05	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.06	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.08	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.10	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.11	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.12	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.13	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.14	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.15	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.16	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.18	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.29	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.31	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.32	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.34	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.35	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.39	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.41	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.42	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.50	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.54	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.56	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.60	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.61	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.69	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.71	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.72	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.73	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.80	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.97	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.08	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.27	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.29	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.30	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.31	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.44	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 18: 10 Percent Probability of Exceedance in 50 Years – Moderate Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	`	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
2.64	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.66	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.78	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.86	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.92	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.07	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.31	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.45	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.61	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.70	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.76	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.79	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.18	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.21	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.45	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.50	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.26	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
5.30	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
6.01	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
10.24	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
10.29	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
10.71	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
12.19	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
14.20	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 19: 10 Percent Probability of Exceedance in 50 Years – Low Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	455	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	18	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	17	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	21	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	17	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	9	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	10	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	14	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.08	6	1	3	5	1	4	5	1	1	3	1	1	2	1	2	3
0.09	1	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	4	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.11	5	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	3	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.13	15	3	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.14	8	3	5	5	3	5	5	1	2	4	1	1	3	1	2	4
0.15	7	3	5	5	3	5	5	1	2	4	1	2	3	1	3	4
0.17	5	4	5	5	3	5	5	1	2	5	1	2	3	2	3	4
0.18	0	4	5	5	4	5	5	1	2	5	1	2	3	2	3	4
0.19	5	5	5	5	4	5	5	2	3	5	1	2	3	2	3	4
0.21	3	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.22	2	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.23	2	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	6	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	4	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.26	2	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.27	3	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.28	1	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.30	6	5	5	5	5	5	5	3	5	5	1	3	4	2	4	4
0.31	2	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.32	3	5	5	5	5	5	5	3	5	5	2	3	4	3	4	4
0.33	1	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.34	0	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.35	3	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.37	6	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.38	4	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.39	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.40	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.42	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4

Table 19: 10 Percent Probability of Exceedance in 50 Years – Low Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.43	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.44	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.48	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.49	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.50	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.51	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.52	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.53	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.54	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.55	3	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.56	0	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.57	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.59	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.62	0	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.63	4	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.64	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.67	4	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.68	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.69	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.70	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.71	4	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.74	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.75	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.76	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.77	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.79	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.80	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.81	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.83	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.85	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.86	8	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.87	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.88	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.89	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.90	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.91	8	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4

Table 19: 10 Percent Probability of Exceedance in 50 Years – Low Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.93	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.95	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.97	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.99	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.00	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.01	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.03	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.04	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.06	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.09	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.10	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.11	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.12	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.14	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.15	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.16	9	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.17	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.18	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.19	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.20	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.22	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.24	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.27	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.28	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.29	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.32	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.33	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.38	7	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.40	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.45	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.48	5	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.49	0	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.52	6	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.53	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.54	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.57	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.66	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 19: 10 Percent Probability of Exceedance in 50 Years – Low Hazard Area

Displacement (m)	Occurrences (#)	Damage State for a Given Structure and a Probability of Non-Exceedance														
		Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
1.68	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.69	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.70	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.75	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.76	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.78	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.79	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.81	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.84	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.86	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.87	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.89	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
1.92	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.03	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.11	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.12	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.18	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.25	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.26	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.31	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.33	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.36	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.39	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.45	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.48	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.53	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.58	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.64	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.86	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.88	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.02	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.08	8	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.35	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.50	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.61	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.73	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.05	4	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.29	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Table 19: 10 Percent Probability of Exceedance in 50 Years – Low Hazard Area

Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
4.38	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.40	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.57	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.74	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.88	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.41	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
7.42	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
13.69	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

Damage State for a Given Structure and a Probability of Non-Exceedance

Table 20: 10 Percent Probability of Exceedance in 50 Years – Minimal Hazard Area

		Damage State for a Given Structure and a Probability of Non-Exceedance														
Displacement (m)	Occurrences (#)	Integral Abutment			Continuous Seat Abutment			Discontinuous Seat Abutment			Major Road			Minor Road		
		0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99	0.5	0.85	0.99
0.00	842	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
0.01	14	1	1	4	1	1	4	1	1	1	1	1	1	1	1	1
0.02	12	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1
0.03	11	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.04	4	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.05	8	1	1	5	1	1	5	1	1	1	1	1	1	1	1	2
0.06	4	1	1	5	1	2	5	1	1	2	1	1	2	1	1	3
0.07	1	1	3	5	1	3	5	1	1	2	1	1	2	1	1	3
0.09	6	1	4	5	1	4	5	1	1	3	1	1	2	1	2	3
0.10	1	2	5	5	1	5	5	1	1	3	1	1	2	1	2	3
0.12	1	2	5	5	2	5	5	1	1	4	1	1	3	1	2	4
0.18	4	4	5	5	4	5	5	1	2	5	1	2	3	2	3	4
0.20	1	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.24	4	5	5	5	5	5	5	2	3	5	1	2	3	2	3	4
0.25	9	5	5	5	5	5	5	2	4	5	1	2	3	2	3	4
0.26	5	5	5	5	5	5	5	3	4	5	1	2	3	2	3	4
0.33	6	5	5	5	5	5	5	4	5	5	2	3	4	3	4	4
0.43	4	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.45	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.46	2	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.49	0	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.52	5	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.57	1	5	5	5	5	5	5	5	5	5	2	3	4	3	4	4
0.67	2	5	5	5	5	5	5	5	5	5	3	3	4	4	4	4
0.75	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.82	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.83	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.91	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
0.96	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.12	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.14	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.22	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.28	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.33	4	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.38	2	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.42	1	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.51	3	5	5	5	5	5	5	5	5	5	3	4	4	4	4	4
1.65	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

1.68	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.11	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.21	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.60	2	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.65	0	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
2.70	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
3.51	1	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4
4.46	3	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4

APPENDIX C

This appendix contains plots of cumulative distribution for each hazard area in each seismic event.

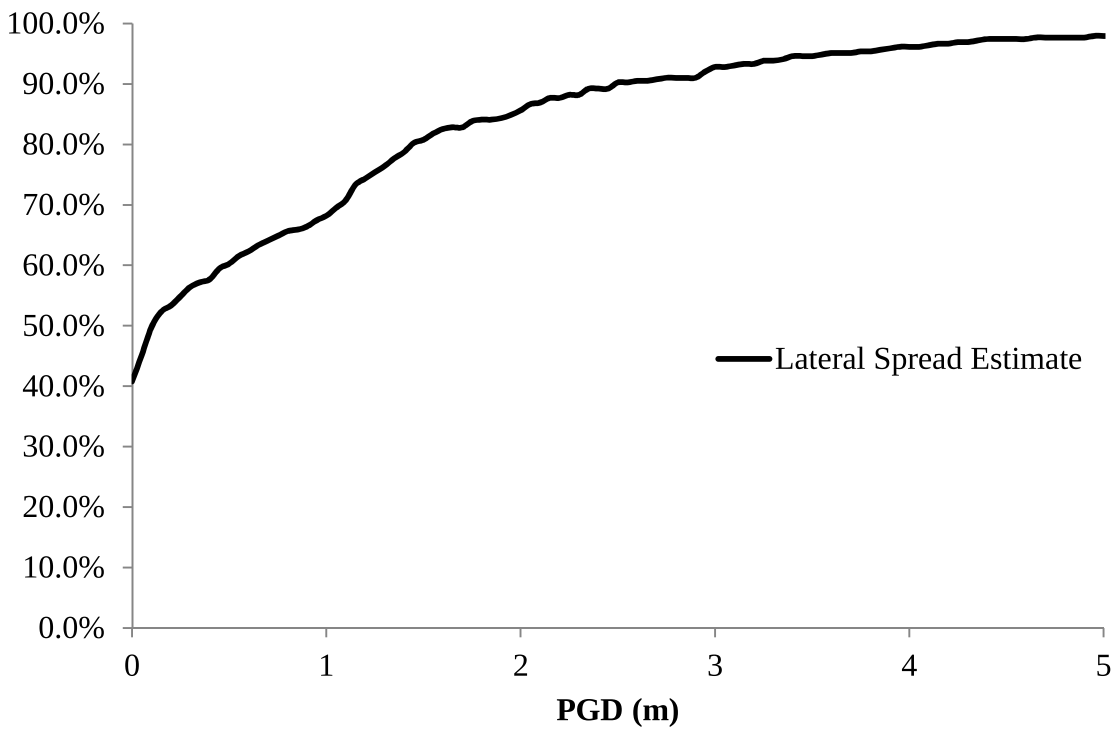

Figure 28: Cumulative distribution – Very High Hazard Area - M7.0 seismic event

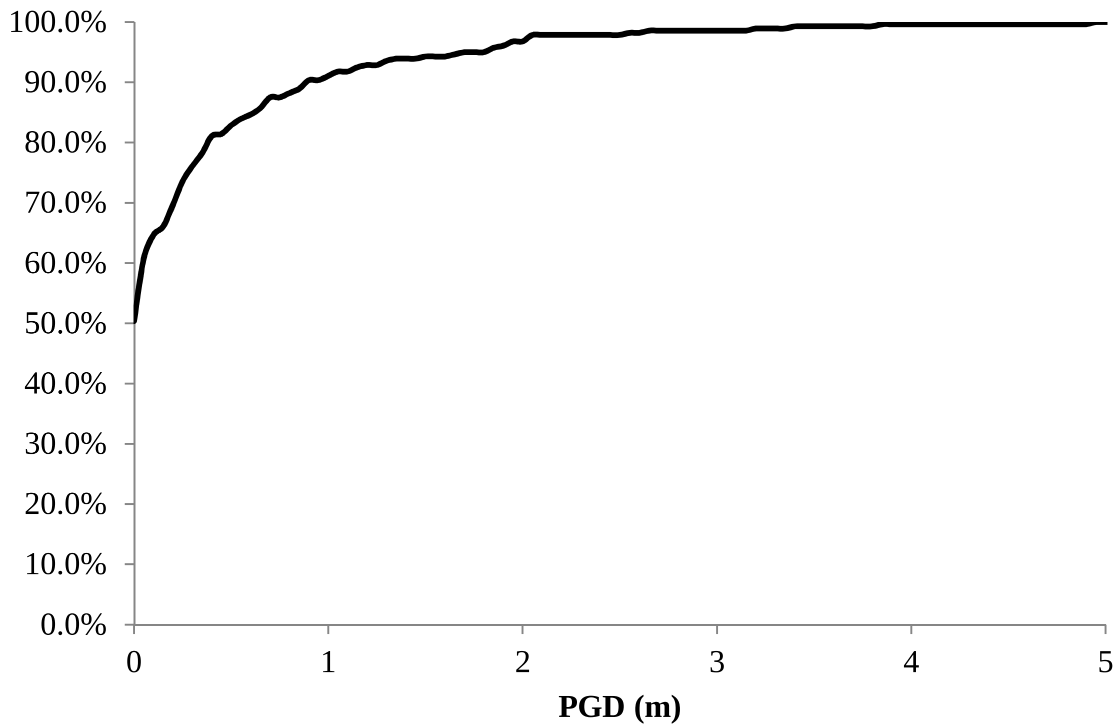

Figure 29: Cumulative distribution - High Hazard Area - M7.0 seismic event

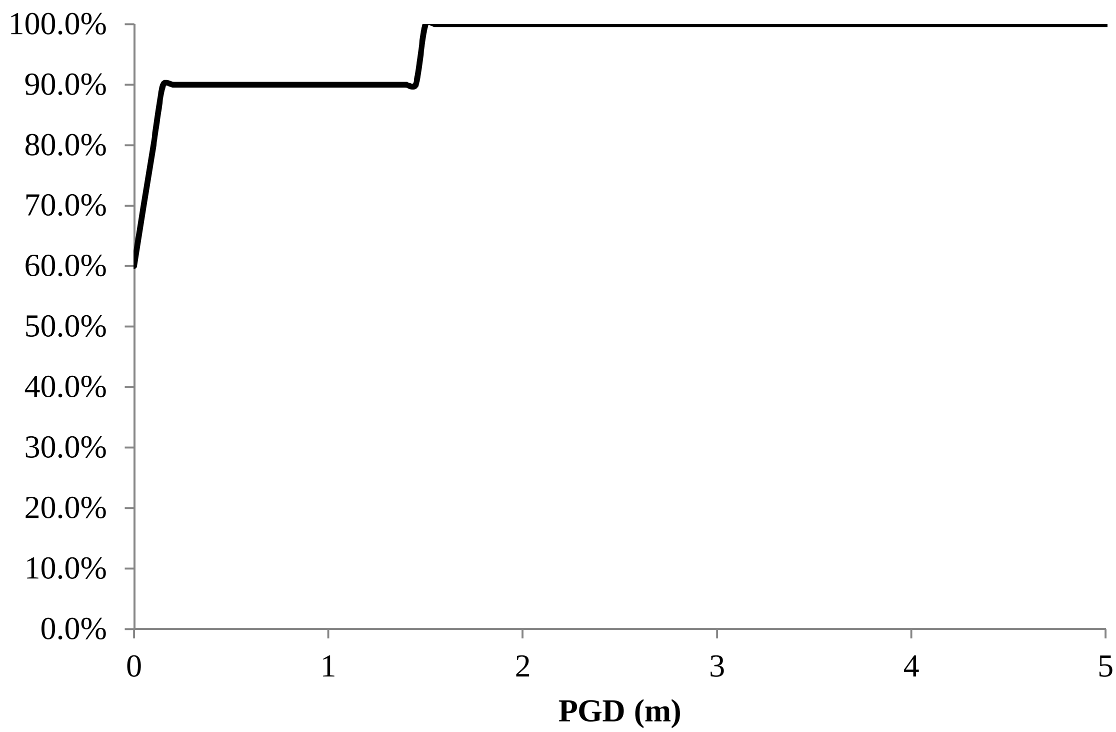

Figure 30: Cumulative distribution - Moderate Hazard Area - M7.0 seismic event

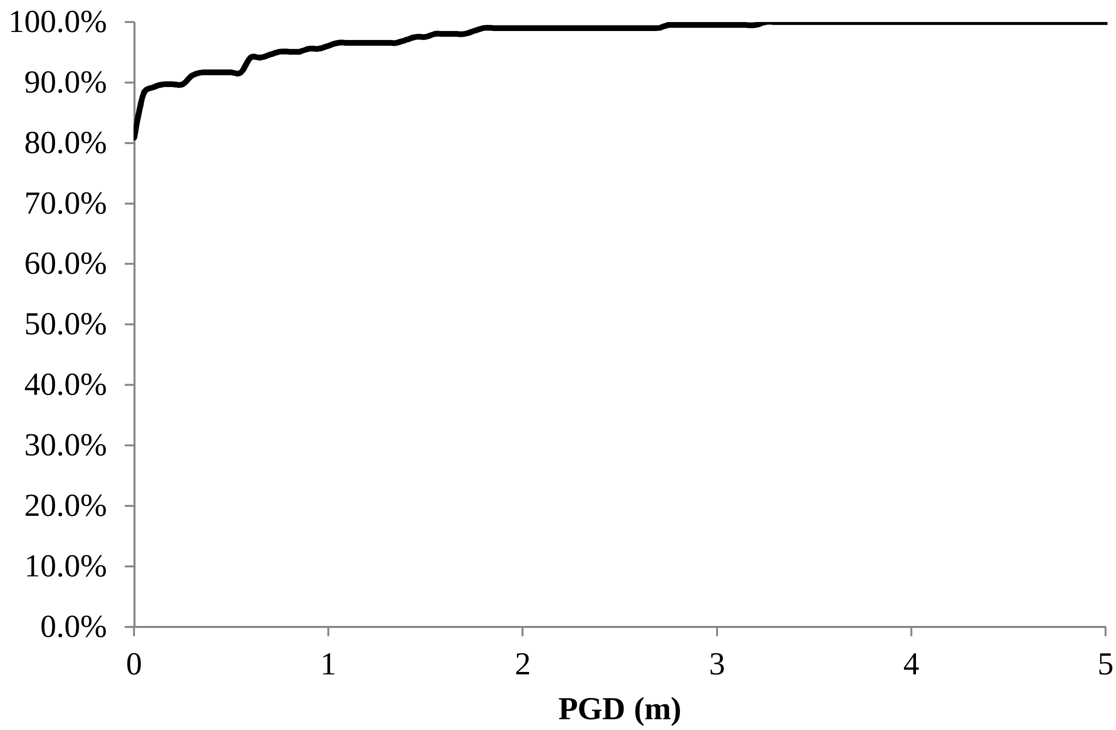

Figure 31: Cumulative distribution - Low Hazard Area - M7.0 seismic event

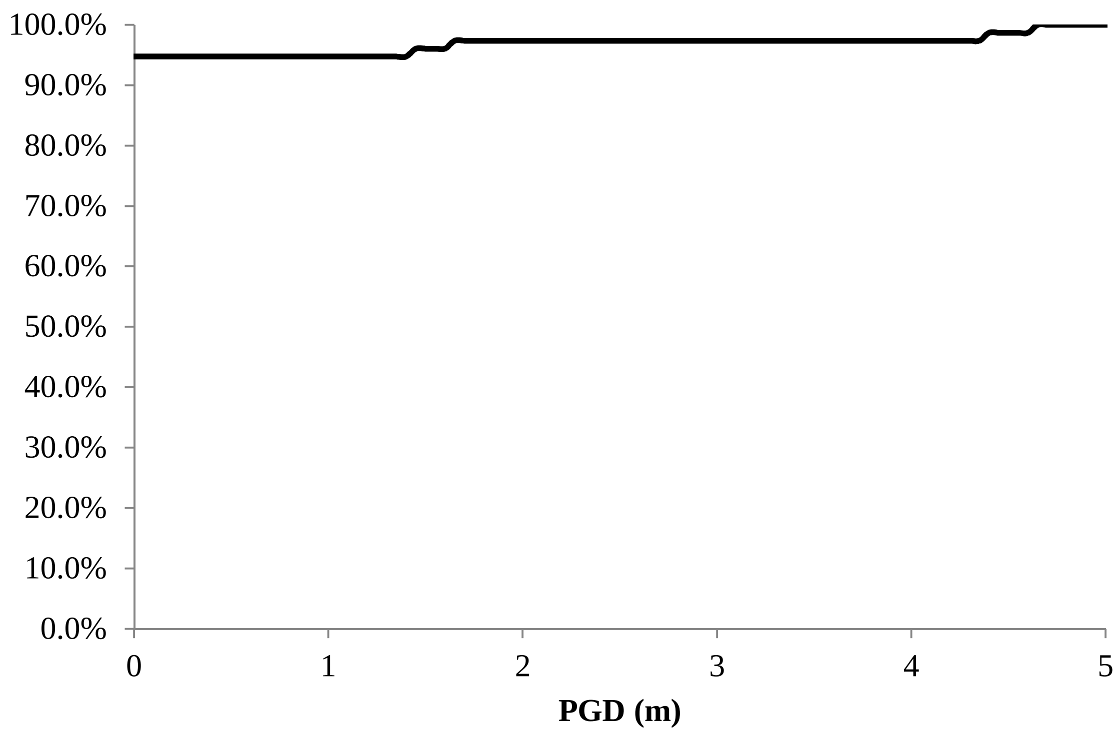

Figure 32: Cumulative distribution - Minimal Hazard Area - M7.0 seismic event

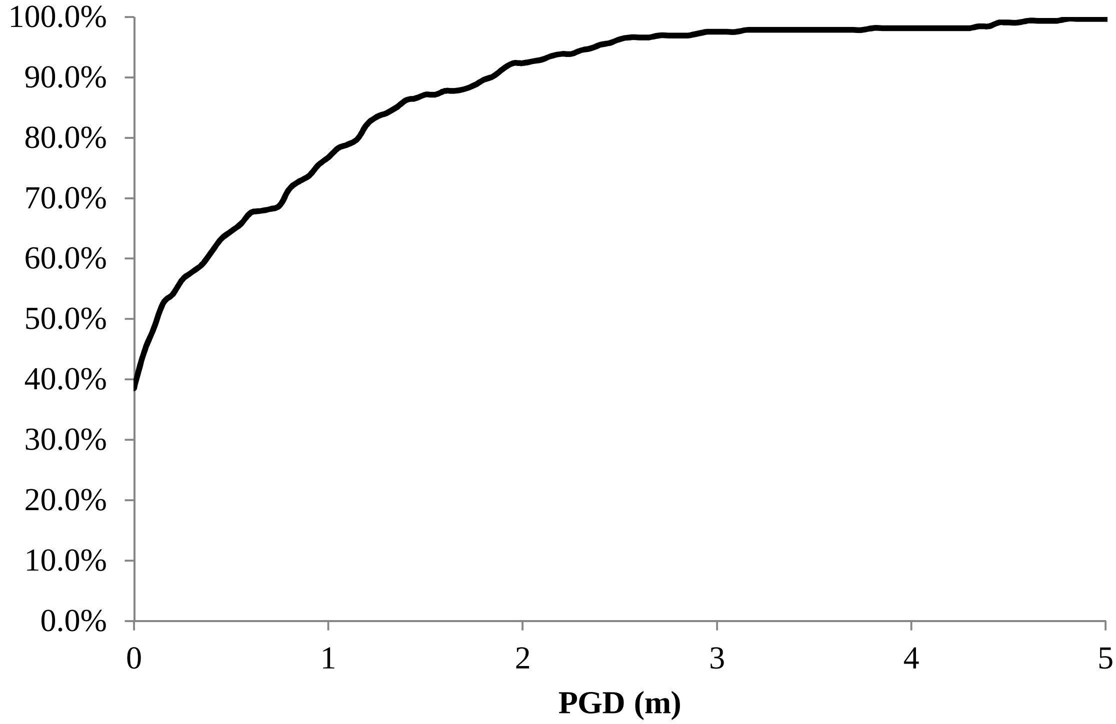

Figure 33: Cumulative distribution - Moderate Hazard Area – 2% probability of exceedance in 50 years seismic event

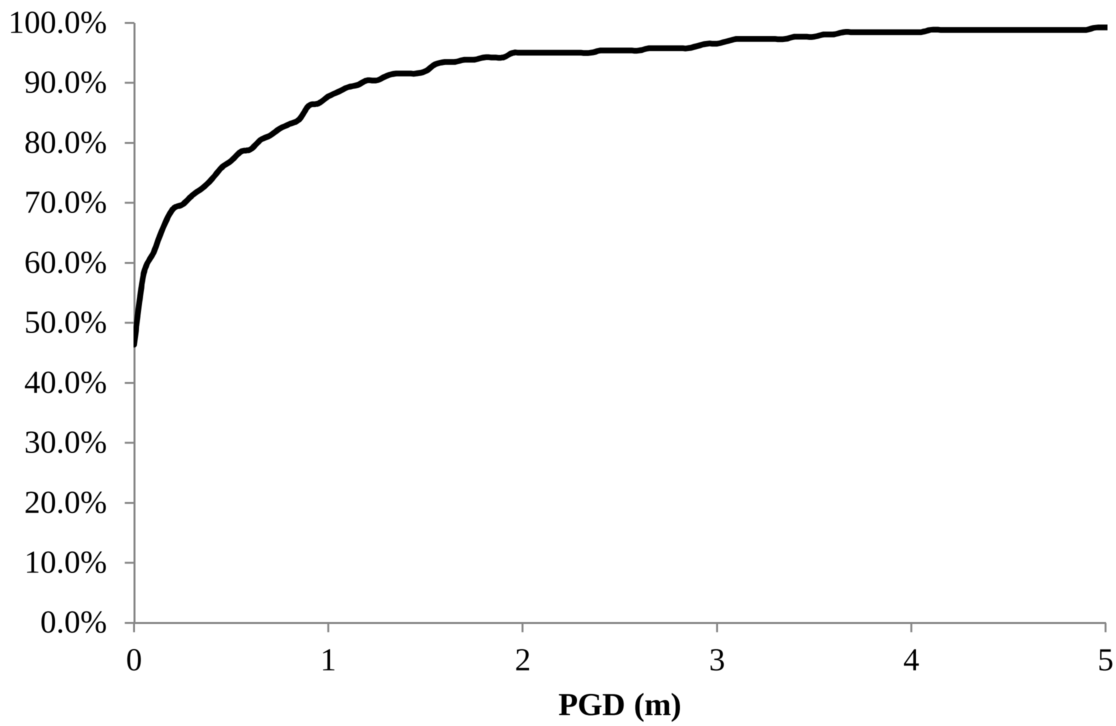

Figure 34: Cumulative distribution - Low Hazard Area – 2% probability of exceedance in 50 years seismic event

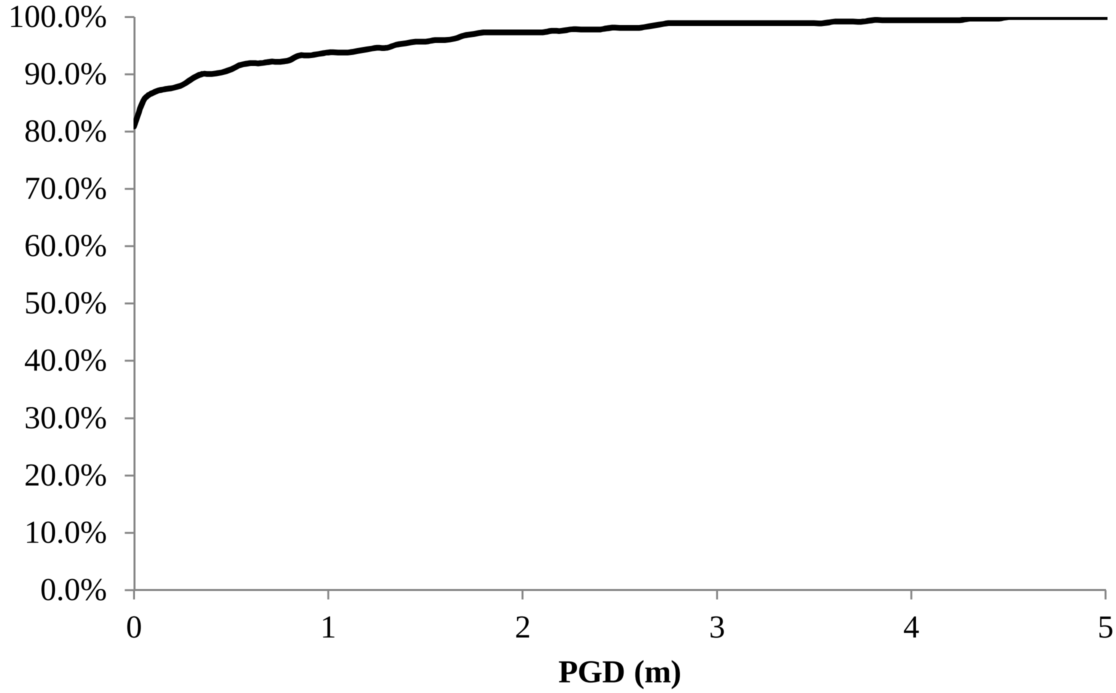

Figure 35: Cumulative distribution - Minimal Hazard Area – 2% probability of exceedance in 50 years seismic event

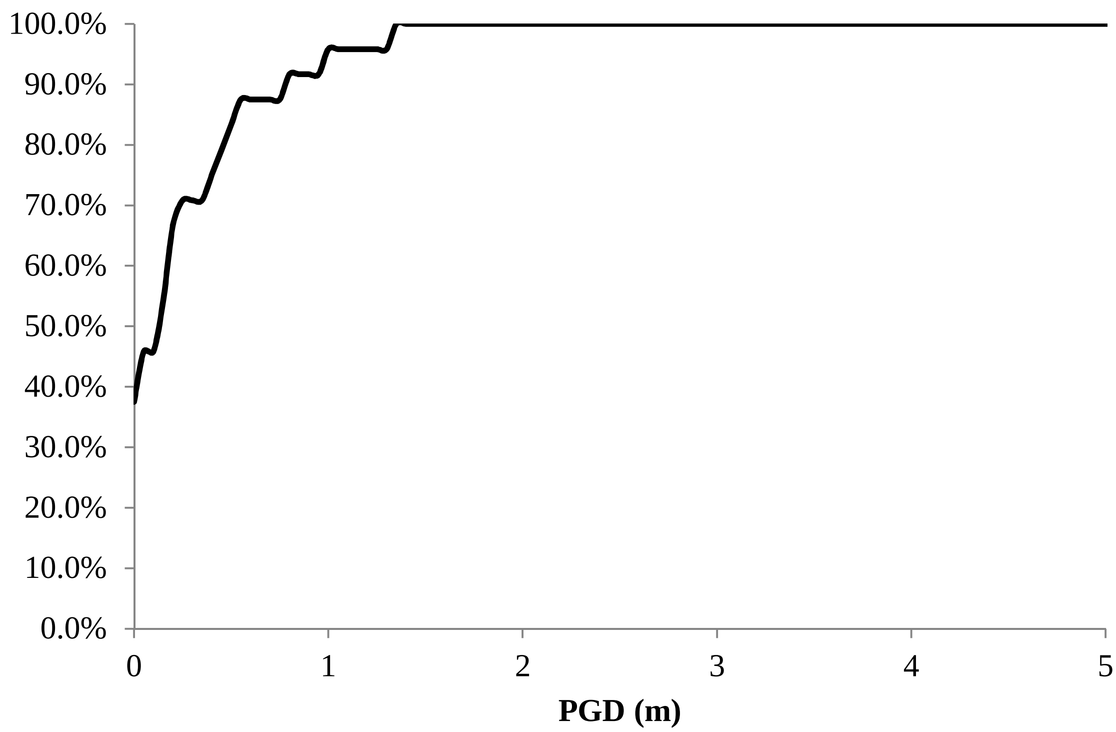

Figure 36: Cumulative distribution - Moderate Hazard Area – 10% probability of exceedance in 50 years seismic event

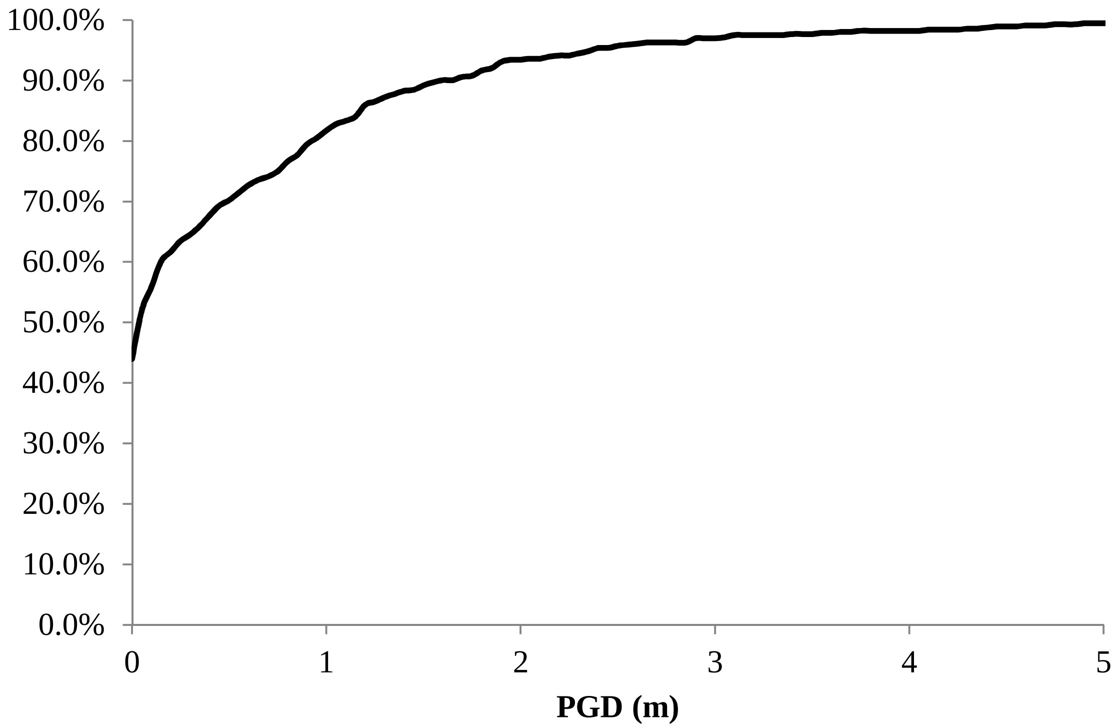

Figure 37: Cumulative distribution - Low Hazard Area – 10% probability of exceedance in 50 years seismic event

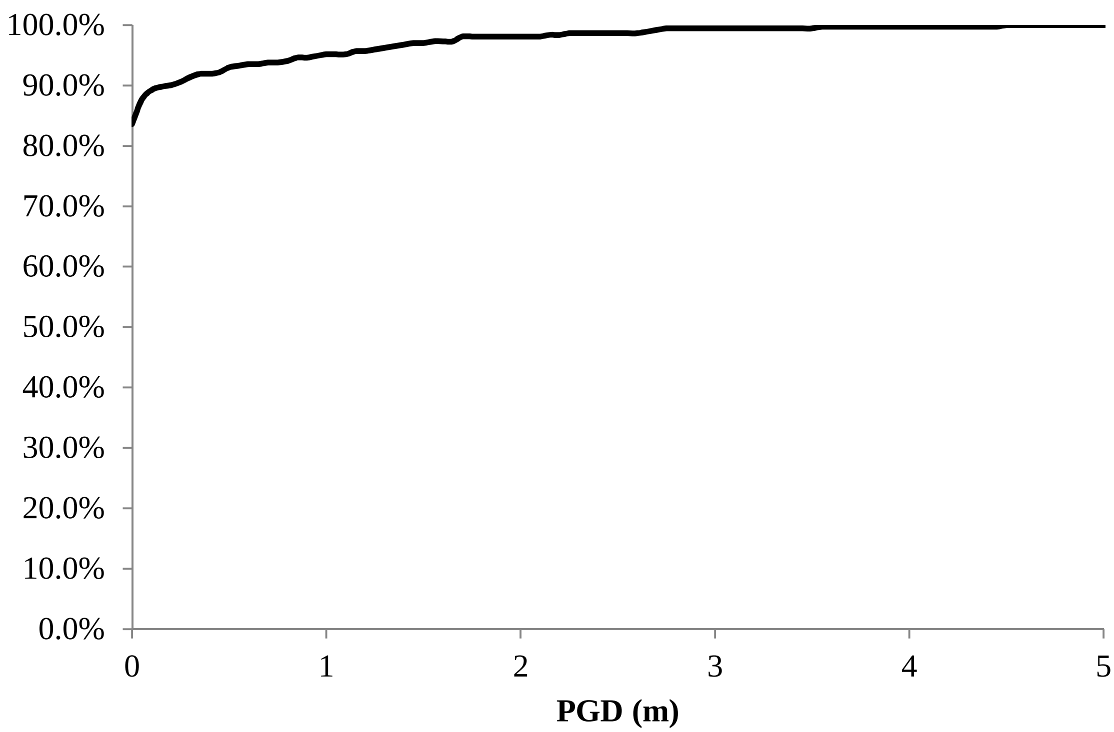

Figure 38: Cumulative distribution - Minimal Hazard Area – 10% probability of exceedance in 50 years seismic event