APPENDIX F
SEISMIC PERFORMANCE EVALUATION

1. All bridges in seismically susceptible regions must be evaluated for performance under seismic loading. The need for evaluation is a function of a bridge's seismic performance category (SPC) that is a function of seismic hazard and structure importance (Table F-1). Seismic hazard is a function of the acceleration coefficient. The importance of a bridge is a function of several factors including the need to serve as a lifeline for emergency vehicles, utilities, or civil defense immediately following an earthquake or a bridge whose loss would create a major economic impact. This category also includes those bridges that cross routes that are defined as critical in a local emergency response plan and those that are located on identified evacuation routes.

Table F-1
Seismic Performance Category (SPC)

	Importance Cassification[2]	
Acceleration Coefficient[1]	**Essential**	**Standard**
$A \leq 0.09$	B	A
$0.09 < A \leq 0.19$	C	B
$0.19 < A \leq 0.29$	C	C
$0.29 < A$	D	C

[1] Acceleration Coefficient (A) values that are assigned to all locations covered by the American Association of State Highway and Transportation Officials Specifications.

[2] "Essential" bridges are those which may continue to function after an earthquake or which cross routes that may continue to operate immediately following an earthquake. All other bridges are classified as "Standard."

2. The Federal Highway Administration has established a logical, systematic procedure for identifying seismically susceptible bridges and prioritizing retrofit needs. The U.S. Army Corps of Engineers has adopted and implemented these guidelines. The evaluation procedures should be conducted in three phases:

a. Phase I is an initial evaluation process that should prioritize seismic retrofitting needs for the bridge inventory.

(1) All bridges shall be classified according to their SPC. Bridges in SPC A do not have to be considered for seismic retrofitting. Bridges in SPC B need only be screened, evaluated, and strengthened based on the vulnerability of their bearings, joint restrainers, and support widths. However, a comprehensive program of retrofitting shall be established for all bridges classified in SPC C and D. Screening, evaluation, and retrofitting will include all major components subject to failure during a strong earthquake (bearings, substructures, and foundations). The effects of soil failure, such as liquefaction, are also considered for bridges in categories C and D, and for certain bridges in category B.

(2) A preliminary screening shall be conducted for all bridges classified as SPC B, C, and D in accordance with Chapter 2 of reference 4*u* of this regulation.

b. Phase II is a detailed evaluation conducted in accordance with Chapter 3 of reference 4*u*. All bridges identified in Phase I may not require further evaluation. The decision to evaluate will be based on location of bridge, type of use, bridge details, types of failures likely, and consequences of failure.

c. Phase III is design of retrofit measures. All bridges identified needing retrofit in Phase II evaluation shall be designed in accordance with Chapters 4 through 9 of reference 4*u*. In general, however, bridges in SPC B will only require retrofitting at the bearings and expansion joints. Bridges in SPC C should also be considered for retrofit of columns, piers, and footings. Bridges in SPC D should be considered for retrofit of all components.

3. Reference 4*u* is intended for use on highway bridges of conventional steel and concrete girder and box girder construction with spans not exceeding 150 m (500 feet). Suspension bridges, cable-stayed bridges, arches, long-span trusses, and movable bridges are not covered. However, many of the concepts presented in reference 4*u* are applicable to these types of structures if appropriate judgment is used.

4. All retrofit schemes should be carefully evaluated to avoid forcing objectionable damage into critical bridge components or areas that are difficult to inspect after an earthquake.