

Simplified Seismic Assessment Form
For Detached, Single-Family, Wood-Frame Dwellings
 (Please print all information)

Grade

Street Address	Community/Area/City	ZIP Code	Date
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Owner	Inspector	Inspection Form # (optional)
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For each question, circle only one answer. Circle the one with higher penalty if more than one answer applies. Exception: question B-1

A. Foundation (If the dwelling has a crawl space, the inspector should view all the areas that are accessible.)

	<u>Penalty</u>		<u>Penalty</u>
*A-1 The exterior footing is:		*A-5 At the dwelling perimeter walls, where the foundation system supports a wood framed floor:	
a. continuous concrete or reinforced masonry	[0]	a. the foundation sill plate (mudsill) is bolted to the foundation with average anchor bolt spacing of 72 in. or less	[0]
b. other footing conditions	[4.2]	b. the foundation sill plate is fastened to the foundation with retrofit anchors equivalent to 72 in. or less anchor bolt spacing	[0]
A-2 The lowest floor of the dwelling is:		c. the anchor bolts have average spacing that is > 72 in. but <= 108 in.	[1.7]
a. slab-on-grade	[0]	d. the anchor bolts have > 108 in. average spacing	[4.6]
b. wood framed over crawl space or basement	[2.9]	e. the foundation sill plates have extensive decay, splitting, or inadequate edge distance at one-third or more of the anchor bolt locations such that significant slip of the sill plate could occur	[10.0]
c. combination of slab-on-grade and wood framed floor over crawl space or basement	[2.9]	f. the anchor bolts have significant corrosion at one third or more of the anchor bolt locations such that significant slip of the sill plate could occur	[10.0]
*A-3 At the dwelling crawlspace or basement interior, the lowest floor framing is supported on:		g. there are no foundation anchor bolts	[15.0]
a. continuous stem walls or a combination of continuous stem walls and beams on posts bearing on concrete footings/piers	[0]	h. there are no foundation sill plates to connect to the foundation	[15.0]
b. beams on posts bearing on piers/pad footings	[0.8]	i. not applicable	[0]
c. beams on posts supported directly on soil	[2.2]		
d. not applicable: slab-on-grade	[0]	Total	
A-4 For a foundation on a slope of 3 horizontal to 1 vertical or steeper, the top of the footing or foundation stem wall on which wall studs or posts are supported is:			
a. sloped parallel to the ground slope	[3.7]		
b. stepped	[1.8]		
c. at a constant elevation with no steps	[0.6]		
d. not applicable	[0]		

B. Superstructure Framing and Configuration (Every accessible area such as the attic and under-floor area that reveals structural elements must be inspected.)

	<u>Penalty</u>		<u>Penalty</u>
B-1 The dwelling has: (circle all that apply, a to e)		*B-4 For an attached garage with a second floor above, the narrow walls at the side of the garage door openings have:	
a. unsymmetrical wall strength (torsion problems)	yes [1.6]	a. wood structural panels on each narrow wall pier	[0]
b. reentrant corners (seen in plan view)	yes [0.3]	b. structural steel frames around or alongside the door	[0]
c. split-level floor construction	yes [2.0]	c. prefabricated narrow shear walls, installed in accordance with manufacturer's recommendations	[0]
d. out-of-plane offsets of more than 4 ft. in exterior walls	yes [0.4]	d. none of the conditions specified in conditions a, b, or c above (that are visible)	[3.0]
e. non-orthogonal seismic resisting systems	yes [0.6]	e. not applicable (single story) or built in accordance with 1997 UBC, 2000 IBC, 2000 IRC or later edition	[0]
f. none of the above, or built in accordance with 1994 UBC, 2000 IBC, 2000 IRC or later edition	yes [0]		
*B-2 For exterior walls at the lowest occupied story, the summed length of full story height wall sections (between openings, excluding < 2'-8" panels) on any face is less than:		*B-5 The exterior wall covering is primarily:	
a. 20% of the length of the wall, if a single story	yes [3.2]	a. siding known to be over plywood or OSB sheathing	[0]
b. 25% of the length of the wall, if two stories	yes [3.2]	b. siding not known to be over plywood or OSB sheathing	[2.5]
c. 40% of the length of the wall, if three stories or more	yes [3.2]	c. plywood (T1-11) or diagonal wood siding	[0]
d. none of the above	[0]	d. stucco	[1.0]
*B-3 If the roofing is heavy (i.e., clay or concrete tile) the dwelling is:		e. masonry veneer not more than 10 feet above the supporting foundation	[2.5]
a. single story	[1.6]	f. masonry veneer more than 10 feet above the supporting foundation	[3.5]
b. multi-story	[3.5]		
c. not applicable: roofing is light.	[0]		

*Assessment item that may be improved by seismic retrofit; see page 6, Section H

B. Superstructure Framing and Configuration (Every accessible area such as the attic and under-floor area that reveals structural elements must be inspected.) (continued)

	<u>Penalty</u>		<u>Penalty</u>
B-6 There is evidence of interior remodeling that has removed interior walls:	yes [1.0] no/ not applicable [0]	c. original or retrofitted perimeter cripple walls with plywood or OSB sheathing where cripple walls are one story or less in height	[1.0]
B-7 The number of stories is:		d. original or retrofitted perimeter cripple walls with plywood or OSB sheathing where cripple walls are greater than one story in height	[4.0]
a. one (1)	[0]	e. wood or steel diagonal braces not detailed in accordance with 1997 UBC, 2000 IBC or later edition	[7.0]
b. two (2)	[1.8]	f. plywood or OSB sheathed perimeter skirt walls that do not extend to and anchor to the foundation	[7.0]
c. 3 or more	[3.6]	g. none of the above	[0]
*B-8 At the dwelling perimeter, the main lowest framed floor is supported on:			
a. beam and column (post-and-pier) system with no sheathed exterior walls	[14.0]		
b. perimeter cripple walls with no plywood or OSB sheathing	[14.0]		
		Total	<input type="text"/>

C. General Condition Assessment

	<u>Penalty</u>		<u>Penalty</u>
C-1 The overall condition of the dwelling is:		*C-4 At the foundation level, there is:	
a. good (essentially crack free, no moisture/water intrusion problems)	[0]	a. significant deterioration visible (corrosion, material breakdown)	[1.3]
b. fair (minor wood decay and cracks)	[1.0]	b. some deterioration visible	[0.6]
c. poor (many cracks on interior and exterior, floor out-of-level and wood decay)	[2.1]	c. no deterioration visible	[0]
*C-2 In the under floor area, there has been structural alteration (e.g. cutting or notching of framing for electrical, plumbing, mechanical equipment) that would affect the performance of the dwelling in an earthquake:	yes [1.5] no [0] not applicable [0]	C-5 Throughout the dwelling, the quality of construction appears to be:	
		a. good	[0]
		b. average	[0.8]
		c. poor	[1.7]
*C-3: There is evidence of: stucco detachment, bowing of stucco, corroded wire mesh, extensive cracking at finished grade above the bottom of the stucco:			
a. extensive	[2.0]		
b. minor	[1.0]		
c. none	[0]		
		Total	<input type="text"/>

D. Nonstructural Elements, Age, and Size

	<u>Penalty</u>		<u>Penalty</u>
*D-1 The chimney inspection revealed:		*D-4 The dwelling has exterior stairs, decks or porch roofs, without internal earthquake bracing, that are attached to the dwelling with:	
a. properly connected anchor straps tying the masonry/concrete chimney(s) at side of house to the floor, ceiling and roof framing	yes [1.0] no [2.0]	a. two or more connections tying the stair, deck or porch to the dwelling interior framing	[0]
b. chimney occurs at dwelling interior	[1.0]	b. nails or screws that would be loaded in withdrawal if the stair deck or porch moved away from the dwelling	[1.0]
c. dwelling has no masonry/concrete chimney	[0]	c. other connection configurations	[1.0]
*D-2 The gas water heater has effective anchor straps and water and gas connections:	yes [0] no [1.0]	D-5 The dwelling was built: (if remodel/added area >50% of total area, use addition date):	
The electric water heater has approved anchor straps:	yes [0] no [0.7]	a. before 1920	[3.0]
		b. 1921 to 1977	[2.0]
		c. 1978 to 1993	[1.0]
		d. 1994 or later	[0]
*D-3 An earthquake-activated gas shut-off valve is installed:	yes [0] no [1.0] not applicable [0]	D-6 The approximate total floor area (sq. ft.) of the dwelling and attached garage is:	
		a. < 1600.	[0]
		b. 1601 - 2500	[1.0]
		c. ≥ 2501	[2.0]
		Total	<input type="text"/>

*Assessment item that may be improved by seismic retrofit; see page 6, Section H

E. Local Site Conditions

	<u>Penalty</u>		<u>Penalty</u>
E-1 The dwelling is located primarily on:		E-4 The evidence of differential settlement in or around the dwelling is:	
a. a flat lot or slope ($\leq 3:1$)	[0]	a. extensive	[2.5]
b. steep slope ($> 3:1$)	[3.0]	b. minor	[1.0]
E-2 The dwelling is located on a cut-and-fill pad, which was developed:		c. none visible	[0]
a. without a geotechnical investigation	[2.7]	E-5: The slope above or below the structure appears to be unstable:	
b. with a geotechnical investigation	[1.3]	yes	[3.2]
c. dwelling is <i>not</i> on cut-and-fill pad	[0]	no	[0]
*E-3 The exterior concrete footing has:		not applicable	[0]
a. no visible cracks or a few minor cracks	[0]	*E-6: General condition of site drainage:	
b. minor cracks in several areas	[1.0]	a. roof gutters and downspouts collecting and conducting water away from foundation	[0]
c. extensive cracking	[2.7]	b. water collecting at/near perimeter footing with no positive slope away from dwelling	[2.6]
d. not applicable	[0]	c. no roof gutters but drainage appears to be adequate or roof gutters with downspouts that empty into splash blocks	[1.3]
Total			

F. Regional Seismic Hazard Score

<p>F-1 Enter points for shaking hazard potential for location of dwelling (from Table 1). [_____]</p> <p>F-2 Are ground failure hazards to be looked up using Tables 2, 3, and 4? yes, go to F-3. no, proceed to F-6 and enter 4.0 points for ground failure hazards</p> <p>F-3 Is this dwelling located in a liquefaction zone (from Table 2) or landslide zone (from Table 3)? yes, go to F-4. no, go to F-5.</p> <p>F-4 Proceed to F-6 and enter ground failure hazard points in accordance with the following table:</p>	<table border="1" style="width:100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width:50%; text-align: center;">Ground Shaking Points</th> <th style="width:50%; text-align: center;">Ground Failure Points</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">2, 4</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">6, 8</td> <td style="text-align: center;">4</td> </tr> </tbody> </table> <p>F-5 Is the dwelling located in a fault rupture zone (from Table 4)? yes [2] no [0]</p> <p>F-6 Total ground failure points from F-2, F-4, or F-5 (no summation). [_____]</p> <p>Total Seismic Hazard Score (Sum of F-1 and F-6) _____</p>	Ground Shaking Points	Ground Failure Points	0	2	2, 4	3	6, 8	4
Ground Shaking Points	Ground Failure Points								
0	2								
2, 4	3								
6, 8	4								

Table 1. Assignment of Ground Shaking Hazard Score

1. Use the USGS Seismic Design Maps Web Application (<http://earthquake.usgs.gov/designmaps/usapp>)¹ to look up ground shaking parameter S_{DS} :
 - a. Press the 'Launch Application' button.
 - b. In the web application, select '2012 IBC' for the Building Code Reference Document.
 - c. Select 'Site Class D – "Stiff Soil" (Default)' for the Site Soil Classification.
 - d. Enter the site address or latitude and longitude.
 - e. Press the 'Compute Values' button.
 - f. Read parameter S_{DS} from the summary report. Enter here: _____ g
 - g. Multiply value from 1f by 100: _____ %g
2. Using the value from 1g, assign ground shaking points according to the following table (these points are assigned in Item F-1):

Value of S_{DS} (% g)	Ground Shaking Hazard Points
33 - 66.99	0
67 - 82.99	2
83 - 124.99	4
125 - 187.99	6
188 - 250	8

¹Note: If you are using the USGS application for the first time, or have recently cleared your web browser cookies, you may have to register for immediate use. Also, if you are using an anti-virus software program, you may have to enable some links to this site, e.g., if you receive a message that says "only secure content is displayed," you must click on "show all content."

* Assessment item that may be improved by seismic retrofit; see page 6, Section H

Table 2. Assignment of Site as Being Within a Liquefaction Zone

1. If site is in California, locate site on the California Emergency Management Agency (Cal EMA) MyPlan web site (myplan.calema.ca.gov).
 - a. Enter address in 'Find Location' window.
 - b. Select 'liquefaction' in menu bar to right of map.
 - c. Zoom as needed to see map details.
 - d. If site is located within green zone on map, answer to Question F-3 is 'yes'.
 - e. If site located in non-liquefaction and non-seismic landslide zone on map (generally pale yellow), answer to Question F-3 is 'no'.
 - f. Site not mapped if background is stippled. Go to Step (2).
2. If site is not on Cal EMA web site, determine site liquefaction potential/susceptibility using available web resources. See www.ATCouncil.org/pdfs/FEMAP-50LiquefactionInfo.pdf for a list of such resources. Map types shown in these web resources are:
 - a. Liquefaction susceptibility maps. Answer to F-3 is 'yes' if site is in a zone of moderate-to-high liquefaction susceptibility. Answer is 'no' if in a low susceptibility or non-susceptible zone.
 - b. Liquefaction potential maps. Answer to F-3 is 'yes' if site is in a liquefaction potential zone. Answer is 'no' if in a low or null potential zone.
 - c. Liquefaction potential index (LPI) maps. Answer to F-3 is 'yes' if site is has mapped LPI ≥ 5 and no if mapped LPI < 5 .
3. If the location of the site has not been mapped, Question F-3 can be answered as 'yes' if other local information suggests liquefaction potential and 'no' if such information suggests no such hazards.
4. If no maps are available and no information on site conditions is available, answer question F-2 as 'no'.

Table 3. Assignment of Site as Being Within a Seismic Landslide Zone

1. If site is in California, attempt to locate site on the Cal EMA MyPlanweb site (myplan.calema.ca.gov).
 - a. Enter address in 'Find Location' window.
 - b. Select 'landslide' in menu bar to right of map.
 - c. Zoom as needed to see map details.
 - d. If site is located within brown zone on map, answer to Question F-3 is 'yes'.
 - e. If site located in non-seismic landslide zone on map (generally pale yellow), answer to Question F-3 is 'no'.
 - f. Site not mapped if background is stippled. Go to Step (2).
2. If site is not on Cal EMA web site, determine site landslide potential/susceptibility using available web resources. See www.ATCouncil.org/pdf/FEMAP-50LandslideInfo.pdf for a list of such resources. Map types shown in these web resources are:
 - a. Seismic landslide susceptibility maps. Answer to F-3 is 'yes' if site is in a zone of moderate to high seismic landslide susceptibility. Answer is 'no' if in a low susceptibility or non-susceptible zone.
 - b. Seismic landslide potential maps. Answer to F-3 is 'yes' if site is in a seismic landslide potential zone. Answer is 'no' if in a low or null potential zone.
3. If the location of the site has not been mapped, Question F-3 can be answered as 'yes' if other local information suggests high landslide potential and 'no' if such information suggests no such hazards (e.g., flat site).
4. If no maps are available and no information on site conditions is available, answer question F-2 as 'No'.

Table 4. Assignment of Site as Being Within a Surface Fault Rupture Zone

1. If site is in California, locate site on the Cal EMA MyPlanweb site (myplan.calema.ca.gov).
 - a. Enter address in 'Find Location' window.
 - b. Select 'Fault Lines' in menu bar to right of map.
 - c. Zoom as needed to see map details.
 - d. If site is located within gray zone on map, answer to Question F-5 is 'yes'.
 - e. If site located in non-gray zone, answer to Question F-5 is 'no'.
 - f. Site not mapped if background is stippled. Go to Step (2).
2. If site is not on Cal EMA web site, locate site using USGS Quaternary faults web site (<http://geohazards.usgs.gov/qfaults/map.php>).
 - a. Select applicable state or region.
 - b. Zoom in on site and determine whether site is near a Quaternary fault that has been active within 15,000 years (marked as red or yellow on map).
 - c. Faults are only marked for map scales marked at the 1 km (or larger) level. At this level of zoom, Question F-5 can be answered as 'yes' if the mapped fault trace is within approximately 0.25 km of the site and 'no' otherwise.

Table 5. Seismic Performance Grade Based on Structural Score and Regional Seismic Hazard Score

Seismic Hazard Score		0 - 1	2 - 3	4 - 5	6 - 7	8 - 10	11 - 12
Structural Score	1.0 - 45.9	B-	C+	C	D	D-	D-
	46.0 - 64.9	B+	B	C+	D+	D	D-
	65.0 - 74.9	A-	B+	B	C	C-	D+
	75.0 - 84.9	A-	A-	B+	B-	C	C
	85.0 - 100	A	A	A-	B+	B	B-

G. Determination of Seismic Performance Grade

<p>1. Structural Score</p> <p>a. Foundation (Section A) []</p> <p>b. Superstructure Framing and Configuration (Section B) []</p> <p>c. General Condition Assessment []</p> <p>d. Nonstructural Elements, Age, and Size (Section D) []</p> <p>e. Local Site Conditions (Section E) []</p> <p style="padding-left: 40px;">Total Penalty Points (a to e): <input style="width: 60px;" type="text"/></p> <p style="padding-left: 40px;">Structural Score = (100 – Total Penalty points from line above): <input style="width: 60px;" type="text"/></p> <p>2. Seismic Hazard Score (from Section F): <input style="width: 60px;" type="text"/></p> <p>3. Seismic Performance Grade (from Table 5) Note: insert this grade, including + or -, if applicable in box on page 1 <input style="width: 60px;" type="text"/></p>	<p>4. Anticipated Seismic Performance¹</p> <p>Following anticipated seismic events:²</p> <p>Grade A, A-: Excellent Performer (Potential minor structural and finish damage, earthquake damage ratio³ of 0%-10%, continued occupancy is likely)</p> <p>Grade B, B+, B-: Good Performer (Potential moderate structural and finish damage, continued occupancy likely following minor structural repairs, earthquake damage ratio³ of 0%-50%, seismic retrofit measures are encouraged)</p> <p>Grade C, C+, C-: Fair Performer (Potential moderate to major structural and finish damage, structural repairs may be required prior to continued occupancy, earthquake damage ratio³ of 10%-60%, seismic retrofit measures are strongly encouraged)</p> <p>Grade D, D+, D-: Poor Performer (Potential severe structure and finish damage requiring significant repairs prior to re-occupancy, earthquake damage ratio³ of 20% – 100%, significant seismic retrofit measures are strongly encouraged)</p> <p>Notes:</p> <p>1. Dwellings are generally anticipated but not certain to have the described performance. The occupancy levels described in this table are generally consistent with the damage levels presented.</p> <p>2. The anticipated seismic events are similar to those used to develop the earthquake ground-motion contours illustrated in the <i>International Residential Code</i> Seismic Design Category maps in Figures 2-1 to 2-4.</p> <p>3. Reported earthquake damage ratios are expressed as a percentage of the replacement cost of the dwelling. The damage ratio ranges were obtained from a stochastic computer model of dwellings adjusted to suit the stated structural scores and subjected to a wide range of simulated ground motions. The damage ratios were chosen to have a 1/500 likelihood of being exceeded in any given year for the stated range of seismic hazard score. The stochastic analysis is discussed in detail in Appendix D.</p>
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H. Improving the Seismic Performance Grade

The Structural Score and Seismic Performance Grade may be altered as a result of seismic retrofit or by a more in-depth seismic evaluation of the dwelling and the site by a qualified licensed design professional. Guidance on these issues is provided in Chapter 8.

If seismic retrofit is being considered, the Structural Score could be increased (and the Seismic Performance Grade potentially increased) by retrofitting conditions that would allow the elimination or reduction in penalties, if any, for the following items:

Item	Retrofit Description	Points (circle applicable number)	Priority Retrofit
A-1	Provide continuous reinforced concrete foundation	4.2	
A-3	Provide foundation pads under interior posts	1.4	Yes
A-5	Add anchor bolts or retrofit anchors	1.7 4.6 10.0 15.0	Yes
B-2	Add bracing walls at dwelling exterior	3.2	
B-3	Install lighter roofing	1.6 3.5	
B-4	Install plywood/OSB or steel frame at garage front	3.0	Yes
B-5	Change exterior wall finish	1.0 2.5 3.5	
B-8	Improve bracing at perimeter walls below lowest floor	4.0 7.0 14.0	Yes
C-2	Repair cut structural framing	1.5	
C-3	Repair deteriorated stucco	1.0 2.0	
C-4	Repair deteriorated foundation	0.6 1.3	
D-1	Strap exterior chimney to roof and floors	1.0	
D-2	Provide bracing and flexible water and gas connections for water heater	1.0	Yes
D-3	Provide earthquake-activated gas shut-off valves	1.0	Yes
D-4	Anchor exterior stairs, deck and porch roof	1.0	Yes
E-3	Repair footing cracks	1.0 2.7	
E-6	Improve rain water routing away from foundations	1.3 2.6	Yes

Priority Retrofits: For this dwelling, the Structural Score can be increased by as many as _____ "Priority Retrofit" points (insert sum of points for circled items in rows with "Yes" in Priority Retrofit column). This will increase Structural Score to _____ (Section G, Item 1f Structural Score plus "Priority" retrofit points). This will result in an improved Structural Grade of _____ (from Table 5, using improved Structural Score).

All Retrofits: For this dwelling, the Structural Score can be increased by as many as _____ retrofit points (insert sum of ALL points for circled items). This will increase the Structural Score to _____ (Section G, Item 1f structural score plus ALL points circled above). This will result in an improved Structural Grade of _____ (from Table 5, using improved Structural Score).

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