Seismic Risk Rating of California Superior Court Buildings Volume 1 & 2

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JUDICIAL COUNCIL
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EXECUTIVE SUMMARY

This report describes updates and revisions to the database of seismic risk ratings for California court buildings; a Seismic Risk Rating tool to gauge the relative risk to life safety, which is indicative of the degree of damage from a seismic event; and a cost model to perform structural strengthening for those buildings in the database which represent the greatest seismic safety risk. The technical background for the development of the Seismic Risk Rating tool is described in Volume 2 of this report.

In 2003, the Office of Court Construction and Management of the Administrative Office of the Courts (AOC, now the Judicial Council of California) initiated a seismic assessment program to ascertain the seismic performance of court buildings statewide in preparation for transfer of ownership and management responsibility for trial court facilities from the counties to the state. The Summary Report of Preliminary Findings, dated January 2004, documented the preliminary findings of that seismic assessment program which was conducted in accordance with the Trial Court Facilities Act of 2002 (Sen. Bill 1732, [Escutia]). The act established the process for affecting the transfers and required that the state evaluate buildings containing court facilities for seismic safety. Buildings were required to meet the seismic criteria set forth in the act to be eligible to transfer, unless provisions were made for correction of their deficient items. The background and detailed provisions of the seismic assessment program are discussed in the following sections of this report.

The Trial Court Facilities Act specified that the seismic evaluations be performed according to procedures developed by the California Department of General Services (DGS). The technical evaluation method used by the DGS was based on a document developed by the Federal Emergency Management Agency (FEMA) and published as *ASCE 31, Standard for the Seismic Evaluation of Buildings*. These procedures resulted in structures being assigned a seismic risk level ranging from I to VII, with Risk Level I representing the best performance and Risk Level VII representing the worst performance. The act specified further that Risk Levels V to VII represented an "unacceptable seismic safety rating." (Gov. Code, § 70301(l).) Hence the distinction between buildings rated as Risk Level IV (or better) and Risk Level V (or worse) was paramount. Of the 300 building segments (termed structures) considered in the 2003 seismic assessment program, 72 were assigned ratings of Risk Level IV and 228 were assigned ratings of Risk Level V (including 81 assigned Risk Level V-Pending due to inadequate information).

Subsequent to the 2003 seismic assessment program, the AOC embarked on a major capital building program intended to replace and/or consolidate existing court facilities largely through the construction of new court buildings across the state. Although this Trial Court Capital-Outlay Program did not include seismic risk reduction as one of its objectives, 33 existing structures—26 of which were rated as Risk Level V—were removed from the inventory of court buildings as a consequence of it.

In late 2015, the Judicial Council Capital Program Office updated the court building database to reflect changes to the inventory that had occurred in the intervening years since 2003 primarily due to closure of court building due to funding reductions, and the capital building program. In the process of performing this update (which also significantly enhanced the functionality of the database by incorporating key building attributes), the total number of building structures in the database was reduced from 300 to 225. Currently there are 352 superior court buildings actively used in California, including courthouses, office and storage buildings. The 2003 seismic assessment program as well as this current update only considers court facilities which have not been exempted by criteria included in Senate Bill 1732. The majority of court buildings evaluated have a Risk Level V.

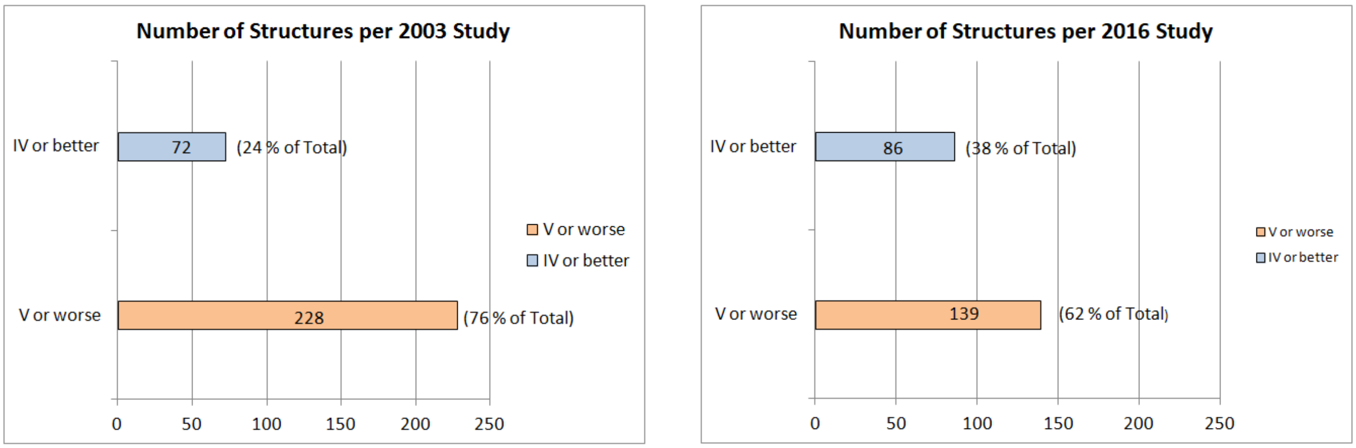


Figure 1

In addition, recognizing that the hazard posed by all Risk Level V buildings—principally risk of collapse or major risks to life—are not the same, the Judicial Council engaged Rutherford + Chekene (R+C) to rank the 139 Risk Level V structures that remained in the inventory based on the seismic risk that they represented. R+C developed a Seismic Risk Assessment Tool for the Judicial Council which employs the Federal Emergency Management Agency's HAZUS modeling algorithm. After setting aside 3 structures (which were identified as Risk Level V but with not enough information available to allow a complete assessment of the building structure, however they are expected to be replaced), the remaining 136 Risk Level V building structures were ranked according to their seismic risk. The ranking was based upon the relative probability of collapse in a seismic event as estimated by the HAZUS model which considers the structural capacity of the building, site specific seismic hazard, and structural characteristics that influence capacity or response to earthquakes. While this ranking parameter is primarily a measure of life safety, it is also indicative of the degree of damage and hence business interruption. The 136 building structures were then sorted into categories as shown in the table below. Besides assignment to one of the three risk categories—very high, high, or moderate—the table also includes 3 building structures in the inventory that were not rated since not enough information is available to allow a complete assessment and they are expected to be replaced, as well as the number of building structures that have been identified as representing acceptable risk by virtue of the fact that they have been retrofitted or already meet SB 1732 Seismic Safety Criteria.

Table 1: Rankings of Seismic Risk Rating (SRR)			**# of Bldg. Structures**
Very High Risk (VHR)	SRR >10	Building Structures of **Very High Risk** recommended as highest priority for mitigation of risk.	15
High Risk (HR)	2 <SRR < 10	Building Structures of **High Risk** recommended as high priority for mitigation of risk.	51
Moderate Risk (MR)	SRR <2	Building Structures of **Moderate Risk** recommended as lower priority for mitigation of risk compared to the others.	70
Not Rated/Potentially Replaced(NR/PR)	Building Structures that were not evaluated or the seismic evaluation was incomplete due to inadequate information to allow assessment of the building structures. These structures are expected to be replaced when the capital project ready to start construction is funded.		3
Acceptable Risk (AR)	Retrofitted building structures or building structures meeting SB 1732 Seismic Safety Criteria as determined by an evaluation report are categorized as **Acceptable Rating**.		86

The 15 building structures in the Very High Risk category represent the highest priority for mitigation of risk—presumably by vacating or structural strengthening—and the 51 building structures in the High Risk category represent a high priority for mitigation of risk. The 70 building structures in the Moderate Risk category represent the lowest priority for mitigation of risk. When considering the seismic risk ratings, the values should only be used for comparison of relative risk among a large number of buildings, rather than for determining the seismic risk of an individual building. Further, a low SRR value does not indicate conformance to life-safety objectives per SB 1732 or other rating systems.

Action plans for follow-up activities associated with development of detailed feasibility studies for mitigation of seismic risk for selected building structures in the VHR and HR categories are provided in the Recommended Action Plans and Follow-up Activities section of this report.

In order to gauge the financial impact of performing structural strengthening for those buildings in the inventory that represent the greatest seismic risk, a rough-order-of-magnitude retrofit cost was developed to improve 10 of the 15 Risk Level V building structures assigned to the Very High Risk category and 50 of the 51 Risk Level V building structures assigned to the High Risk category for which the Judicial Council would be entitled to fund the work. It is important to understand the ownership type of a particular court building when determining if the seismic risk could be mitigated by a retrofit financed by the Judicial Council. Certain court buildings – historic structures and those where the Court was a minor tenant in a County building did not transfer to the

Judicial Council. The transfer of some certain other court buildings from the counties to the state resulted in ownership conditions which would preclude the Judicial Council from funding structural strengthening or other building improvements. Restrictions due to ownership type are discussed further in the Objective of This Study and Database Update section of the report.

For these building structures, the cost for structural strengthening is listed as not applicable (N/A) in the database. In addition, there are a few instances where the court has a very small occupancy (e.g., 10%) in a county-owned building with deferred transfer of title. As such, it may be difficult for the Judicial Council to justify funding their strengthening though those costs are included herein. Regardless of the ownership conditions, however, the Judicial Council is still exposed to risk due to life-safety concerns, court fixture damage, and business interruption from earthquakes.

The cost model generally identifies total project costs associated with mitigation of all seismic-related structural and critical nonstructural deficiencies (e.g., plaster ceilings) of the subject buildings, including restoration of collateral architectural, mechanical, and electrical elements that are impacted in the process. The cost model also includes soft costs, such as fees and miscellaneous project expenses. Total Project costs, when summed up, range from $365M to $462M for the 10 Very High Risk building structures and from $1.36B to $1.73B for the 50 High Risk building structures. These figures should be taken as indicative of program-wide budget requirements; an individual building retrofit cost budget must be validated by feasibility studies discussed in Recommended Action Plans and Follow-Up Activities section.

The Summary Seismic Risk Rating Database follows, which includes identification and descriptions of all 225 of the nonexempt building structures as well as a rough-order-of-magnitude of total project costs required to structurally strengthen those buildings in the Very High and High Risk categories for which the Judicial Council would be entitled to fund this work. The costs have been multiplied by 90% to establish a lower bound and by 115% to establish an upper bound. Input parameters used for calculation of the Seismic Risk Rating (SRR), the description of these input parameters, and a glossary of key terminology are included in a separate volume.

It is envisioned that the Judicial Council will utilize the information contained in this study to inform future decisions, ranging from contingency planning to prioritization of funding for capital improvement projects for California superior court buildings. Follow-up activities as listed below are recommended:

- Prepare feasibility studies for 20 to 25 buildings with Very High or High seismic risk ratings (SRR), as outlined in Recommended Action Plans and Follow-Up Activities section;
- Expand this database and the geographic overlay to include all active court buildings.

Table 2: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	DSA Rating [2016]	Seismic Risk Rating	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
19-H1-A	Los Angeles	Glendale Superior and Municipal Courthouse	1956	7,400	2	S4/C1	V	44.2	$2,020,000	$2,550,000
01-A2-E	Alameda	County Administration Bldg.	1961	196,850	5	C2	V	37.4	$64,420,000	$81,500,000
19-W2-E	Los Angeles	Pomona Courthouse North	circa 1955	36,904	2	RM2	V	27.6	$12,750,000	$16,130,000
19-K1-A	Los Angeles	Stanley Mosk Courthouse, West Wing	1955	220,860	9	S4	V	23.4	$60,230,000	$76,200,000
19-K1-B	Los Angeles	Stanley Mosk Courthouse, East Wing	1955	515,340	7	S4	V	23.1	$140,550,000	$177,790,000
28-B1-E	Napa	Historical Courthouse	circa 1878	16,000	2	URM	V	22.9	N/A	N/A
32-A1	Plumas	Courthouse	1919	36,187	4	C2	V	22.7	$11,190,000	$14,150,000
27-C1	Monterey	Monterey Courthouse	1965	65,334	3	C1	V	14.1	$21,980,000	$27,800,000
48-A1-A	Solano	Hall of Justice, 1973 Addition	1973	74,740	3	C2	V	14.1	$23,100,000	$29,220,000
01-A1	Alameda	Rene C. Davidson	1934	284,120	13	S4	V	12.4	N/A	N/A
29-A1-E & C	Nevada	Courthouse & 1936 Addition	1850's	16,425	3	URM	V	11.2	$7,760,000	$9,820,000
42-A1	Santa Barbara	Santa Barbara County Courthouse	1926	134,729	4	S4	V	10.8	N/A	N/A
02-A1	Alpine	Alpine County Courthouse	1927	7,326	1	URM/C2A	V	10.8	N/A	N/A
53-A1-E	Trinity	Trinity County Courthouse	circa 1857	11,276	2	URM	V	10.7	N/A	N/A
13-A1	Imperial	Imperial County Courthouse	1923	66,000	2	C2	V	10.5	$21,000,000	$26,570,000
			Programmatic Retrofit Cost for **VERY HIGH Risk Rated Buildings**						**$365,000,000**	**$461,730,000**
23-A1-E	Mendocino	County Courthouse	circa 1928	12,000	3	C2 or S4	P(V)	9.96	$3,930,000	$4,970,000
19-R1-B	Los Angeles	Eastlake Juvenile Courthouse, North Portion	1951	10,064	1	RM2	V	9.8	$3,110,000	$3,940,000
49-A1-A	Sonoma	Hall of Justice	1962	180,188	2	C2	V	9.3	$34,400,000	$43,520,000
33-F1	Riverside	Hemet	1969	31,720	1	RM1	V	8.2	$11,530,000	$14,590,000
19-L1	Los Angeles	Criminal Courts Bldg.	1968	1,020,266	19	S1/S4	V	7.3	$204,050,000	$258,130,000
45-A7	Shasta	Main Courthouse Annex	1965	35,445	3	S4	V	7.2	$8,700,000	$11,010,000
19-AO1-E	Los Angeles	Whittier Courthouse	1953	12,242	1	RM1	V	6.4	$3,780,000	$4,790,000
53-A1-A	Trinity	Trinity County Courthouse, 1950's Addition	circa 1950	16,924	2	RM2	V	6.4	$4,920,000	$6,230,000
44-A1	Santa Cruz	Main Courthouse	1965	37,585	1	C1a	V	6.3	$12,980,000	$16,420,000
48-B1-E	Solano	Hall of Justice	circa 1955	24,000	2	C2A	P(V)	6.3	$7,640,000	$9,660,000
01-F1	Alameda	George E. McDonald Hall of Justice	circa 1970	25,850	2	S1	V	6.2	$7,990,000	$10,110,000
19-AO1-A	Los Angeles	1959 Addition	1959	17,151	1	RM1	V	6.2	$5,300,000	$6,710,000
23-A1-A	Mendocino	County Courthouse, Addition	1946	45,979	4	S4	V	6.0	$11,290,000	$14,280,000
19-AF1	Los Angeles	San Fernando Valley Juvenile Court	1976	38,902	1	RM2	P(V)	5.7	$12,380,000	$15,660,000
11-A1	Glenn	Historic Courthouse	circa 1894	30,031	2	URM	V	5.7	$13,100,000	$16,580,000
17-B1	Lake	South Civic Center	1971	8,385	1	RM1	V	5.6	$2,820,000	$3,570,000
19-J2	Los Angeles	Pasadena Municipal Courthouse	1952	36,572	2	C2	V	5.4	$6,650,000	$8,410,000
42-B1	Santa Barbara	Santa Barbara Municipal Court	circa 1953	44,470	2	S4/C2	V	5.2	$12,940,000	$16,360,000
07-F1	Contra Costa	Richmond-Bay District	1953	76,462	2	S1/S4	V	5.1	$20,160,000	$25,500,000
19-AQ1	Los Angeles	Beverly Hills Courthouse	1967	184,882	4	C2	V	5.1	$55,460,000	$70,160,000
19-O1	Los Angeles	Rio Hondo Court	1974	129,176	4	S1	V	5.1	$35,230,000	$44,570,000
19-G1-E	Los Angeles	Burbank Superior and Municipal Courthouse	1952	37,280	2	C2	V	5.0	$10,170,000	$12,860,000
19-R1-A	Los Angeles	Eastlake Juvenile Courthouse	1951	18,000	1	RM2	V	5.0	$4,420,000	$5,590,000
19-R1-C	Los Angeles	Eastlake Juvenile Courthouse, 1958 Addition	1958	18,100	1	S2A/RM1	V	5.0	$3,950,000	$5,000,000
50-A2	Stanislaus	Hall of Records	1938	45,600	4	C2	V	4.7	$12,850,000	$16,260,000
19-X1-E	Los Angeles	Citrus Municipal Court, Phase I	1957	31,368	1	RM1	V	4.7	$9,410,000	$11,900,000
19-H1-E	Los Angeles	Glendale Superior and Municipal Courthouse	1956	48,000	2	S4	V	4.5	$11,560,000	$14,630,000
30-C2-ARCADE	Orange	North Justice Center Annex	1972	1,000	2	PC1A	V	4.4	$280,000	$360,000
19-AR1-E	Los Angeles	West Los Angeles Courthouse	1958	20,000	2	C2/C2A	V	4.4	$5,450,000	$6,900,000
17-A3-E	Lake	Courthouse	1966	47,323	4	S1	V	4.3	$11,830,000	$14,970,000
36-L1-A	San Bernardino	Victorville Court	circa 1973	40,000	1	RM1	V	4.3	N/A	N/A
19-AE1	Los Angeles	Lancaster Courthouse Main Bldg.	1960	42,388	2	RM1	V	4.1	$9,250,000	$11,700,000
19-I1	Los Angeles	Alhambra Superior and Municipal Court	1971	110,174	4	S4	V	3.9	$28,040,000	$35,480,000
19-AD1	Los Angeles	New Hall Municipal Court	1969	32,124	1	RM1	V	3.7	$11,100,000	$14,040,000
19-AK1	Los Angeles	Norwalk Courthouse	1965	208,195	7	S2/S4	V	3.4	$60,570,000	$76,620,000
19-AV1-B	Los Angeles	Hall of Records, Records Bldg	1958	97,000	13	C2	V	3.3	$13,230,000	$16,730,000
30-B1	Orange	Lamoreaux Justice Center	1988	248,676	8	S1	V	3.3	$67,820,000	$85,790,000
19-AX2	Los Angeles	Van Nuys Branch Court	1985	284,102	10	S1	V	3.3	$87,810,000	$111,080,000
40-A1-A	San Luis Obispo	San Luis Obispo Government Center	1980	66,000	3	S2/S2A	V	3.1	$17,400,000	$22,010,000
19-AV1-A	Los Angeles	Hall of Records, Administration Bldg	1958	350,000	11	S4	V	3.0	$63,640,000	$80,500,000
44-A2	Santa Cruz	County Administration Bldg.	1965	206,400	5	C1	V	2.7	$63,800,000	$80,700,000
17-A3-B	Lake	South Wing Addition	1982	7,775	3	S2	V	2.7	$2,050,000	$2,590,000
07-A2	Contra Costa	Wakefield Taylor Courthouse	1931	100,657	4	S4	V	2.7	$30,200,000	$38,200,000
48-A1-E	Solano	Hall of Justice	1923	65,000	3	C2A	V	2.7	$21,270,000	$26,910,000
29-A1-D	Nevada	Courthouse, 1936 Addition	circa 1936	1,648	1	C2	P(V)	2.7	$480,000	$610,000
19-X1-A	Los Angeles	Citrus Municipal Court, Phase II	1967	33,250	1	RM1	V	2.6	$9,670,000	$12,240,000
19-AP1-B	Los Angeles	Santa Monica Courthouse, Central Wing	1950	33,855	2	C2/C2A	V	2.6	$5,850,000	$7,400,000
01-H1	Alameda	Fremont Hall of Justice	1976	124,100	3	RM2	V	2.4	$20,310,000	$25,690,000
38-B1	San Francisco	Hall of Justice	1958	711,889	8	C2	V	2.3	$200,620,000	$253,790,000
30-A1-C	Orange	Central Justice Center	1966	179,000	3	S1	P(V)	2.1	$47,190,000	$59,700,000
10-A1	Fresno	Fresno County Courthouse	1964	213,687	9	S1/S4	V	2.1	$56,340,000	$71,260,000
			Programmatic Retrofit Cost for **HIGH Risk Rated Buildings**						**$1,364,920,000**	**$1,726,680,000**

Table 2: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	DSA Rating [2016]	Seismic Risk Rating	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
19-S1	Los Angeles	Hollywood Branch Courthouse	1984	57,772	2	RM2	V	1.9		
33-J1-B	Riverside	Corona	1974	9,470	1	S2	V	1.9		
17-A3-A	Lake	Pedestrian Bridge/Walkway	-	490	1	Varies	V	1.9		
15-A1-A	Kern	Bakersfield Superior Court, Central Wing	1956	97,210	7	S2/S4	V	1.9		
36-E1	San Bernardino	Joshua Tree Courthouse	1982	37,340	1	S3/RM2	P(V)	1.7		
07-C1	Contra Costa	Danville District Courthouse	1973	37,104	2	RM1	V	1.7		
09-A1	El Dorado	Main St. Courthouse	1911	17,951	3	S5	V	1.6		
30-D1-A	Orange	West Justice Center	1966	115,150	2	C2/RM2	V	1.5		
19-X1-B	Los Angeles	Citrus Municipal Court, Phase III	1973	43,380	1	RM1	V	1.5		
30-E1-A	Orange	Harbor Justice Center, Phase II	1985	44,060	2	S1	V	1.5		
33-J1-A	Riverside	Corona	1974	40,300	2	S1	V	1.5		
19-AM1-A	Los Angeles	Downey Courthouse	1986	103,553	4	S1	V	1.4		
37-F3	San Diego	Annex	circa 1964	21,895	1	C2A	V	1.4		
29-A1-B	Nevada	Courthouse, Stairwell to Jail	1930's	960	3	C2	P(V)	1.2		
19-J1	Los Angeles	Pasadena Superior Courthouse	1968	187,120	6	S4	V	1.2		
29-A1-A	Nevada	Courthouse, Old Jail	1850's	3,450	3	URM	V	1.0		
19-U1	Los Angeles	Central Arraignment Courthouse	1970	67,719	3	C2	V	1.0		
19-E1	Los Angeles	Inglewood Juvenile Court-Superior	1950	18,791	2	C2b	P(V)	0.9		
30-C1-E	Orange	North Justice Center	1968	64,225	2	PC1A	V	0.9		
25-A2	Modoc	Barclay Justice Center	1914	8,482	3	C2	V	0.9		
58-A1-E	Yuba	Yuba County Courthouse	1960	97,460	3	S4	P(V)	0.8		
56-B1	Ventura	East County Courthouse	1989	84,252	2	PC1	V	0.7		
19-W1	Los Angeles	Pomona Superior Court	1965	194,000	7	S4	V	0.6		
46-A1-E	Sierra	Courthouse/Sheriff Station-Jail	1950	18,181	2	C2A	V	0.6		
45-A1	Shasta	Main Courthouse	1954	44,528	3	S4	V	0.6		
19-C2	Los Angeles	South Bay Courthouse Annex-Municipal	1964	15,126	1	RM1	V	0.6		
27-D1	Monterey	King City Courthouse	1973	12,163	1	W1A/RM1	V	0.6		
29-A2	Nevada	Annex	1962	40,024	3	C1	V	0.6		
41-C1-B	San Mateo	Municipal Court Bldg., Detention Cen ter	1981	10,497	1	RM1	V	0.5		
30-C2-MAIN BLD	Orange	North Justice Center Annex	1972	34,600	2	S4/PC1	V	0.5		
30-A1-B	Orange	Central Justice Center	1966	59,000	2	S1	P(V)	0.4		
39-D2	San Joaquin	Lodi Branch- Dept. 2	1969	6,844	1	RM1	P(V)	0.4		
19-F1	Los Angeles	Inglewood Municipal Court	circa 1975	174,041	6	S1	P(V)	0.4		
30-A1-A	Orange	Central Justice Center	1966	300,000	11	S1	P(V)	0.4		
19-T1	Los Angeles	Metropolitan Courthouse	1968	250,000	8	S4	V	0.3		
41-C1-A	San Mateo	Municipal Court Bldg., Addition	1970	31,110	1	RM1	P(V)	0.3		
41-C1-E	San Mateo	Municipal Court Bldg., Northern Branch	1960	15,040	1	RM1	P(V)	0.3		
04-A1-E	Butte	Butte County Courthouse, Original	1970	18,810	1	S2A	P(V)	0.3		
37-H1	San Diego	South County Regional Center	1978	142,253	3	S1/C2	P(V)	0.3		
14-A1	Inyo	Independence Superior Court	1920	20,846	2	C2	V	0.3		
34-A1	Sacramento	Sacramento Superior Court	1962	288,896	6	C2	V	0.3		
19-AG1	Los Angeles	Compton Courthouse	1975	417,159	12	S1	P(V)	0.3		
19-C1	Los Angeles	South Bay Courthouse Superior and Municipal	1967	146,711	5	C2	V	0.3		
54-A1-A	Tulare	Visalia Superior Court	1955	185,111	4	S1	V	0.3		
45-B1	Shasta	Shasta County Superior Court/Sheriff's Station	1964	4,867	1	W1	V	0.2		
37-F2-A	San Diego	North County Regional Center - Vista Center Addition	circa 1972	97,000	1	S2	V	0.2		
15-B1	Kern	Bakersfield Justice Bldg.	1977	125,783	4	S4	V	0.2		
29-A1-F	Nevada	Courthouse, Addition	1900's	980	1	C2A	P(V)	0.2		
19-V1	Los Angeles	East Los Angeles Municipal Court	1986	105,627	5	S1	V	0.1		
30-D1-B	Orange	West Justice Center	1969	32,000	2	C2/RM2	P(V)	0.1		
33-A2	Riverside	1903/33 Courthouse	1903	138,551	3	C2b	P(V)	0.1		
20-D1	Madera	Sierra Courthouse	1974	5,884	1	W2/RM1	P(V)	0.1		
15-H1	Kern	Arvin/ Lamont Branch	1988	26,680	1	RM1	V	0.1		
30-C1-A- MAIN	Orange	North Justice Center Addition	1981	71,200	4	S4	V	0.1		
26-A1	Mono	Bridgeport County Courthouse	circa 1881	11,689	2	W2	P(V)	0.1		
41-A2	San Mateo	Traffic/ Small Claims Annex	circa 1960	9,714	1	C2A	P(V)	0.1		
40-A1-E	San Luis Obispo	San Luis Obispo Government Center	1963	46,000	3	C2/RM2	P(V)	0.1		
42-F3	Santa Barbara	Santa Maria Muni Clerk	1953	4,400	1	W1	V	0.1		
25-A1-B	Modoc	Barclay Justice Center, East Wing Addition	circa 1990	3,660	1	W1/RM1	V	0.1		
53-A1-B	Trinity	Trinity County Courthouse, West Addition	1977	14,589	1	RM1	V	0.1		
42-F1-C	Santa Barbara	Santa Maria Courts, North Wing	1953	16,000	2	W1A	V	0.04		
34-D1	Sacramento	Carol Miller Justice Center Court Facility	1990	98,628	3	S1	V	0.04		
54-A1-B	Tulare	Visalia Superior Court, Addition	1988	58,000	4	S1	V	0.03		
19-W2-A	Los Angeles	Pomona Courthouse North -1990 Addition	circa 1990	10363	2	RM1	V	0.03		
28-B1-B	Napa	Historical Courthouse, 1977 Addition	1977	14,109	3	RM2	P(V)	0.02		
42-F1-D	Santa Barbara	Santa Maria Courts, South Wing	1963	14,000	2	W1A	V	0.01		
09-E1	El Dorado	Johnson Bldg.	1979	37,453	2	W2	V	0.01		
28-B1-A	Napa	Historical Courthouse, 1916 Building	1916	6,000	2	C2	P(V)	0.01		
42-D1-B	Santa Barbara	Lompoc Municipal Court	-	10,787	2	W2	P(V)	0.01		
22-A1	Mariposa	Mariposa County Courthouse	circa 1854	5,920	2	W2	P(V)	0.0002		
47-A1-A	Siskiyou	Siskiyou County Courthouse, 1952 Building	1952	28,350	2	C2	P(V)	NR/PR		
47-A1-E	Siskiyou	Siskiyou County Courthouse, 1908 Building	1908	7,906	2	S5	P(V)	NR/PR		
55-A1	Tuolumne	Historic Courthouse	circa 1897	23,120	3	URMA	P(V)	NR/PR		

Table 2: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	DSA Rating [2016]	Seismic Risk Rating	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
01-A2-A	Alameda	Vertical Addition	1982	11,296	1	S1A	IV	AR		
01-B3	Alameda	Wiley W. Manuel Courthouse	1977	196,277	7	S1	IV	AR		
01-D1	Alameda	Hayward Hall of Justice	1974	184,785	5	S4b	IVb	AR		
03-C1	Amador	John C. Begovich Building	1985	19,010	1	W2	IV	AR		
07-A3	Contra Costa	Bray Courts	1986	48,883	3	S1	IV	AR		
07-A4	Contra Costa	Jail Annex	1977	12,843	1	S1/S1A	IV	AR		
07-D1	Contra Costa	Concord-Mt. Diablo District	1980	7,938	1	W1A	IVb	AR		
08-A1	Del Norte	Del Norte County Superior Court	circa 1950	29,008	1	W2	IVb	AR		
09-C1	El Dorado	Superior Court	1983	7,834	1	W2	IVb	AR		
10-B1	Fresno	North Annex Jail	circa 1985	25,667	2	C2c	IVb	AR		
10-C1	Fresno	Juvenile Delinquency Court	1978	121,076	2	W1A	IVb	AR		
11-B1	Glenn	Orland Superior Court	1965	9,845	1	RM1	IV	AR		
15-A1-B	Kern	Bakersfield Superior Court, West Wing	1956	73,850	2	C2	IV	AR		
15-A1-C	Kern	Bakersfield Superior Court, Jury Services	1955	52,590	2	C2	IV	AR		
15-C1	Kern	Bakersfield Juvenile Center	1987	82,680	4	S2/C2	IV	AR		
15-D1	Kern	Delano/North Kern Court	1983	14,377	1	RM1	IV	AR		
15-E1	Kern	Shafter/Wasco Courts Bldg.	1988	16,836	1	RM1/W2	IV	AR		
15-F1	Kern	Taft Courts Bldg.	1982	6,127	1	W1A	IVb	AR		
15-G1	Kern	East Kern Court-Lake Isabella Branch	1988	14,154	1	RM1/W2	IV	AR		
15-I1	Kern	Mojave-Main Court Facility	1974	12,112	1	RM1	IV	AR		
15-I2	Kern	Mojave-County Administration Bldg.	circa 1978	8,538	1	RM1	IV	AR		
15-J1	Kern	Ridgecrest-Main Facility	1976	9,340	1	RM1	IV	AR		
19-AC1	Los Angeles	San Fernando Courthouse	1976	187,874	4	C2	IV	AR		
19-AI1	Los Angeles	Los Padrinos Juvenile Courthouse	1955	34,167	1	C2	IV	AR		
19-AM1-B	Los Angeles	Mechanical Tower	1986	7,670	4	C2	IV	AR		
19-AO1-B	Los Angeles	1972 Addition	1969	58,502	3	C2	IV	AR		
19-AP1-A	Los Angeles	Santa Monica Courthouse, North Wing	1962	36,855	2	C2	IV	AR		
19-AP1-C	Los Angeles	Santa Monica Courthouse, South Wing	1962	51,855	2	C2	IV	AR		
19-AR1-A	Los Angeles	West Los Angeles Courthouse, Addition	1976	25,129	3	C2/C2A	IVb	AR		
19-AX1	Los Angeles	Van Nuys Courthouse	1963	178,048	7	S4	IV	AR		
19-N1	Los Angeles	Santa Anita Court	1953	19,440	1	W2	IV	AR		
19-Q1	Los Angeles	Children's Court	1990	263,623	6	S1	IV	AR		
23-B1	Mendocino	Justice Center	1989	12,586	1	W1A	IVb	AR		
24-A1	Merced	New Courts Bldg.	1949	17,716	1	C2	IV	AR		
25-A1-A	Modoc	Barclay Justice Center, East Wing	1967	4,080	1	RM1	IV	AR		
27-A1	Monterey	Salinas Courthouse- North Wing	1966	97,630	3	S1	IV	AR		
29-B1-E	Nevada	Superior Court in Truckee	1974	10,000	2	Varies	IV	AR		
30-C1-A- JURY A	Orange	North Justice Center Addition	1981	2,100	1	S4	IV	AR		
30-D1-C	Orange	West Justice Center	1978	18,820	2	PC1	IV	AR		
30-D1-D	Orange	West Justice Center	1978	5,210	3	C2A	IV	AR		
30-D1-E	Orange	West Justice Center	1978	18,820	2	PC1	IV	AR		
30-E1-E	Orange	Harbor Justice Center, Phase I	1973	62,530	2	PC1A	IV	AR		
31-A1	Placer	Historic Courthouse	circa 1894	24,918	3	URMA	IV	AR		
33-A3	Riverside	Hall of Justice	1989	167,386	7	S1	IV	AR		
33-E1	Riverside	Palm Springs Court	circa 1962	51,336	1	RM1/W1	IV	AR		
33-H1	Riverside	Temecula	1988	12,557	1	W2	IV	AR		
33-N1	Riverside	Juvenile Justice Center	1986	6,614	1	C2A	IV	AR		
36-A1	San Bernardino	Central Courthouse	1926	118,580	4	C2	IV	AR		
36-A2	San Bernardino	Central Courthouse - Annex	1958	79,667	6	C3	IV	AR		
36-B1	San Bernardino	Juvenile Court	1968	8,149	1	RM2	IVb	AR		
36-F1	San Bernardino	Rancho Cucamonga Courthouse	1984	261,155	4	Base Isolat	IVb	AR		
36-G1	San Bernardino	Chino Courthouse	1976	47,261	2	RM1	IV	AR		
36-J1	San Bernardino	Barstow Courthouse	1975	35,702	2	RM2	IV	AR		
36-K1	San Bernardino	Needles Courthouse	1972	12,574	1	RM1	IVb	AR		
37-C1	San Diego	Kearny Mesa Court	circa 1960	41,450	1	RM1	IV	AR		
37-E1	San Diego	Juvenile Court	1977	46,759	2	RM1	IVb	AR		
37-F2-B	San Diego	North County Regional Center - Vista Center Addition	circa 1972	12,500	1	C2	IV	AR		
37-F2-C	San Diego	North County Regional Center - Vista Center Addition	circa 1972	58,150	1	C2	IV	AR		
37-F2-D	San Diego	North County Regional Center - Vista Center Addition	1986	48,000	2	C2	IV	AR		
37-I1-A	San Diego	East County Regional Center	1980	230,000	10	S1	IV	AR		
37-I1-B	San Diego	East County Regional Center	1980	44,230	5	S2/S4	IV	AR		
37-I1-C	San Diego	East County Regional Center	1980	30,000	2	S2/S4	IV	AR		
37-J1	San Diego	Ramona Courthouse	1972	17,315	1	W1A	IV	AR		
39-B1	San Joaquin	Juvenile Justice Center	1982	12,740	1	RM1	IV	AR		
39-C1	San Joaquin	Manteca Branch Court	1970	6,425	1	RM1	IV	AR		
39-E1	San Joaquin	Tracy Branch Courthouse	circa 1968	6,714	1	RM1	IV	AR		
41-A1	San Mateo	Hall of Justice	1954	316,515	8	S1	IV	AR		
41-B1	San Mateo	Central Branch	1960	17,438	1	RM1/W2	IV	AR		
42-D1-A	Santa Barbara	Lompoc Municipal Court, South Wing	1956	14,800	1	W2	IV	AR		
43-A1	Santa Clara	Hall of Justice	1988	127,139	6	S1/S2	IV	AR		
43-A2	Santa Clara	San Jose Municipal Court	1960	69,810	4	C2	IV	AR		
43-B1	Santa Clara	Downtown Superior Courthouse	1962	126,005	5	C2b	IV	AR		
43-B2	Santa Clara	Old County Courthouse	circa 1866	33,557	3	S4b	IVb	AR		
43-D1	Santa Clara	Palo Alto Facility	1960	83,451	4	C2	IV	AR		

Table 2: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	DSA Rating [2016]	Seismic Risk Rating	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
43-F1	Santa Clara	Sunnyvale Facility	1966	19,994	1	W2	IV	AR		
43-G1	Santa Clara	Santa Clara Municipal Courts	1974	33,559	2	S2	IV	AR		
46-A1-A	Sierra	Courthouse/Sheriff Station-Jail, Stairwell	1993	1,000	2	RM1	IV	AR		
47-B1	Siskiyou	Dorris	circa 1974	2,585	1	W1	IV	AR		
48-A2	Solano	Law and Justice Center - Fairfield	1988	258,850	5	C2b	IVb	AR		
48-B1-A	Solano	Hall of Justice, 1974 Addition	1974	30,400	1	C2	IV	AR		
50-A1	Stanislaus	Modesto Main Courthouse	1958	60,404	2	C2	IV	AR		
50-B1	Stanislaus	Modesto Juvenile Court	1976	9,200	1	RM1/RM2	IV	AR		
50-D1	Stanislaus	Turlock Municipal Court	1975	4,735	1	W2	IV	AR		
54-A1-A1	Tulare	Visalia Superior Court, East Wing	1955	20,000	1	S1	IV	AR		
56-A1-A	Ventura	Hall of Justice, Second Wing	1975	150,057	3	S2	IV	AR		
56-A1-B	Ventura	Hall of Justice, Main Wing	1975	200,000	4	S2	IV	AR		

OBSERVATIONS

1. The 2003 seismic assessment program identified 300 (nonexempt) building structures in the court building database:
    - 72 were assigned ratings of Risk Level IV;
    - 228 were assigned ratings of Risk Level V (including 81 assigned Risk Level V–Pending due to inadequate information).

2. The 2015/2016 Reassessment identified 225 (nonexempt) building structures in the court building database:
    - 86 were assigned ratings of Risk Level IV;
    - 139 were assigned ratings of Risk Level V
    - The Judicial Council Trial Court Capital-Outlay Program constructed or is currently constructing 15 new or upgraded court facilities which contributed to the reduction in Risk Level V building structures when compared to the 2003 court building database.
    - Court buildings closed or abandoned, since 2004, due to permanent reductions funding for trial courts reduced the number of structures in the Seismic Assessment database.

3. The 2015/2016 Reassessment further sorted the 139 Risk Level V building structures into risk categories based upon their "probability of collapse":
    - 15 were assigned to the Very High Risk category;
    - 51 were assigned to the High Risk category;
    - 70 were assigned to the Moderate Risk category;
    - 3 were assigned to the Not Rated/Potentially Replaced category.

4. Rough-Order-of-Magnitude costs were developed to retrofit to Risk Level IV, the Risk Level V buildings that were sorted into the Very High Risk and High Risk categories for which the Judicial Council would be able to fund the work:
    - $365M to $462M is representative of the total program-wide budgetary cost to retrofit the 10 of the 15 building structures in the Very High Risk category;
    - $1.36B to $1.73B is representative of the total program-wide budgetary cost to retrofit the 50 of the 51 building structures in the High Risk category.

5. The program-wide costs noted above would be reduced by $107M to $136M if/when the following 9 court projects which have already completed preliminary design, and in many instances final design, are advanced into construction. This would allow removal of another 7 HR category nonexempt building structures (in addition to 2 from MR category, all (3) from NR/PR category and 2 from AR category) from the court building database:
    - Willows Historic Courthouse Renovation (11-A1), which removes 1 structure;
    - New Yreka Courthouse (47-H1), which removes 2 structures;
    - New Sonora Courthouse (55-D1), which removes 1 structure;

- New Santa Rosa Criminal Courthouse (49-H1), which removes 1 structure;
- New Lakeport Courthouse (17-F1), which removes 3 structures;
- New Santa Barbara Criminal Courthouse (42-M1), which removes 1 structure;
- New Modesto Courthouse (50-H1), which removes 2 structures;
- New Mid-County Civil Courthouse (33-F2), which removes 1 structure; and
- New Redding Courthouse, which removes 2 structures.

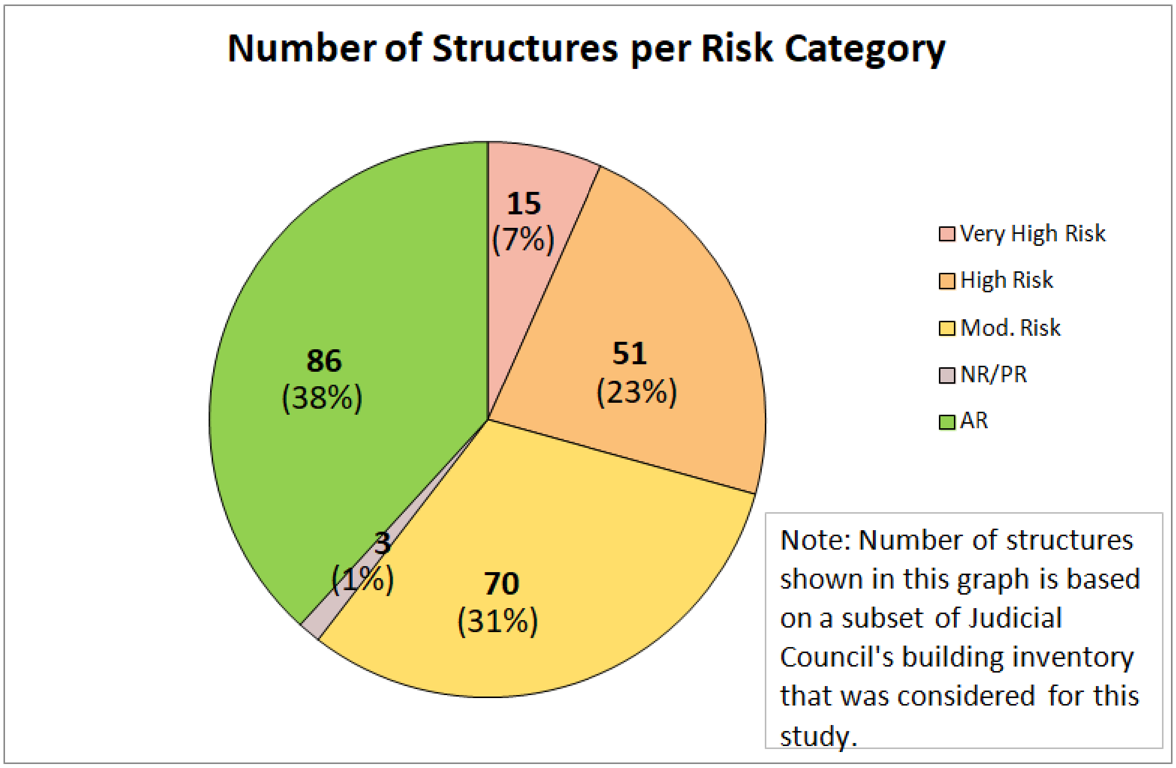


Figure 2

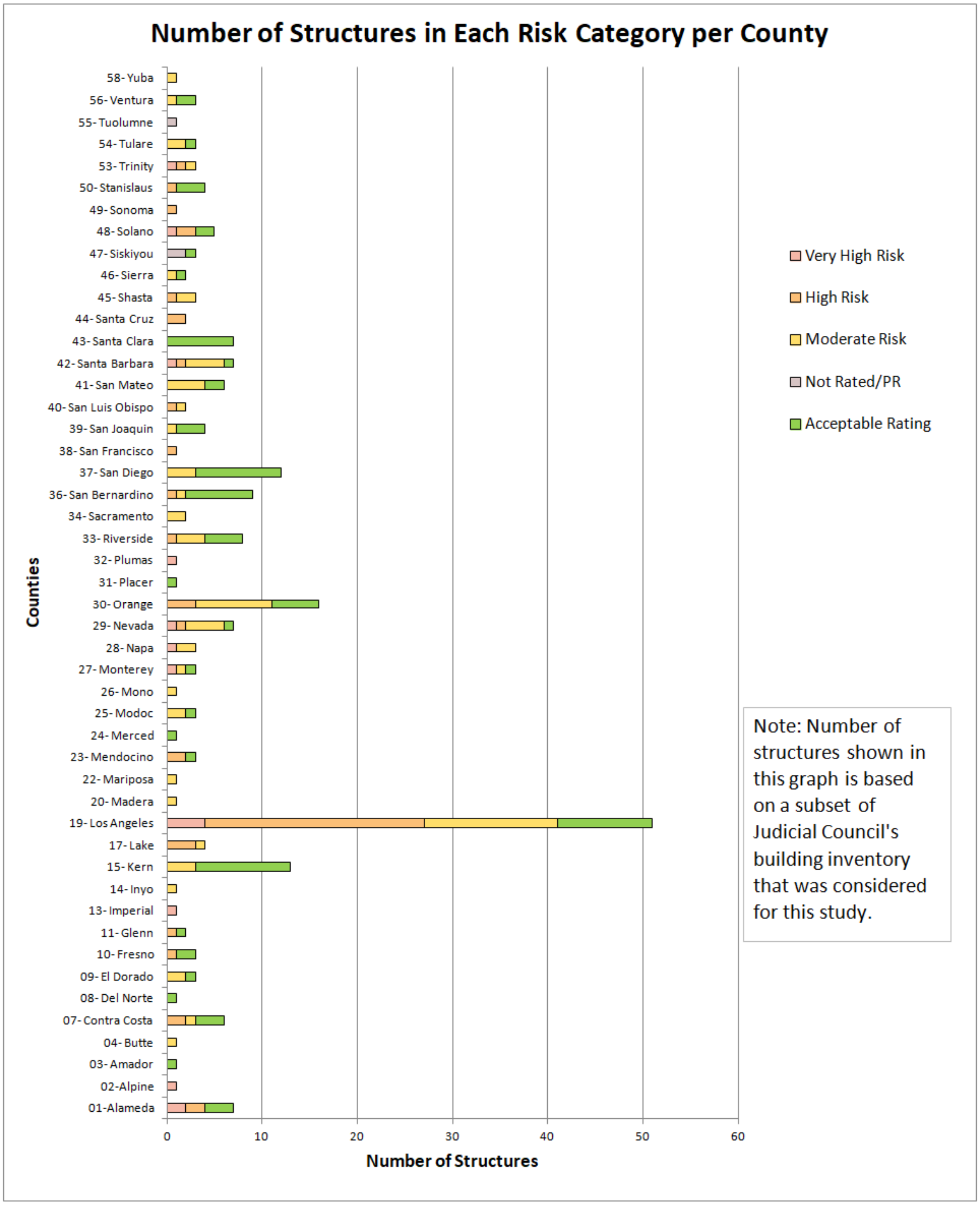

Number of Structures in Each Risk Category per County
58- Yuba
56- Ventura
55- Tuolumne
54- Tulare
53- Trinity
50- Stanislaus
49- Sonoma
48- Solano
47- Siskiyou
46- Sierra
45- Shasta
44- Santa Cruz
43- Santa Clara
42- Santa Barbara
41- San Mateo
40- San Luis Obispo
39- San Joaquin
38- San Francisco
37- San Diego
36- San Bernardino
34- Sacramento
33- Riverside
32- Plumas
31- Placer
30- Orange
29- Nevada
28- Napa
27- Monterey
26- Mono
25- Modoc
24- Merced
23- Mendocino
22- Mariposa
20- Madera
19- Los Angeles
17- Lake
15- Kern
14- Inyo
13- Imperial
11- Glenn
10- Fresno
09- El Dorado
08- Del Norte
07- Contra Costa
04- Butte
03- Amador
02-Alpine
01-Alameda
Counties
0
10
20
30
40
50
60
Number of Structures
Very High Risk
High Risk
Moderate Risk
Not Rated/PR
Acceptable Rating
Note: Number of structures shown in this graph is based on a subset of Judicial Council's building inventory that was considered for this study.

Figure 3

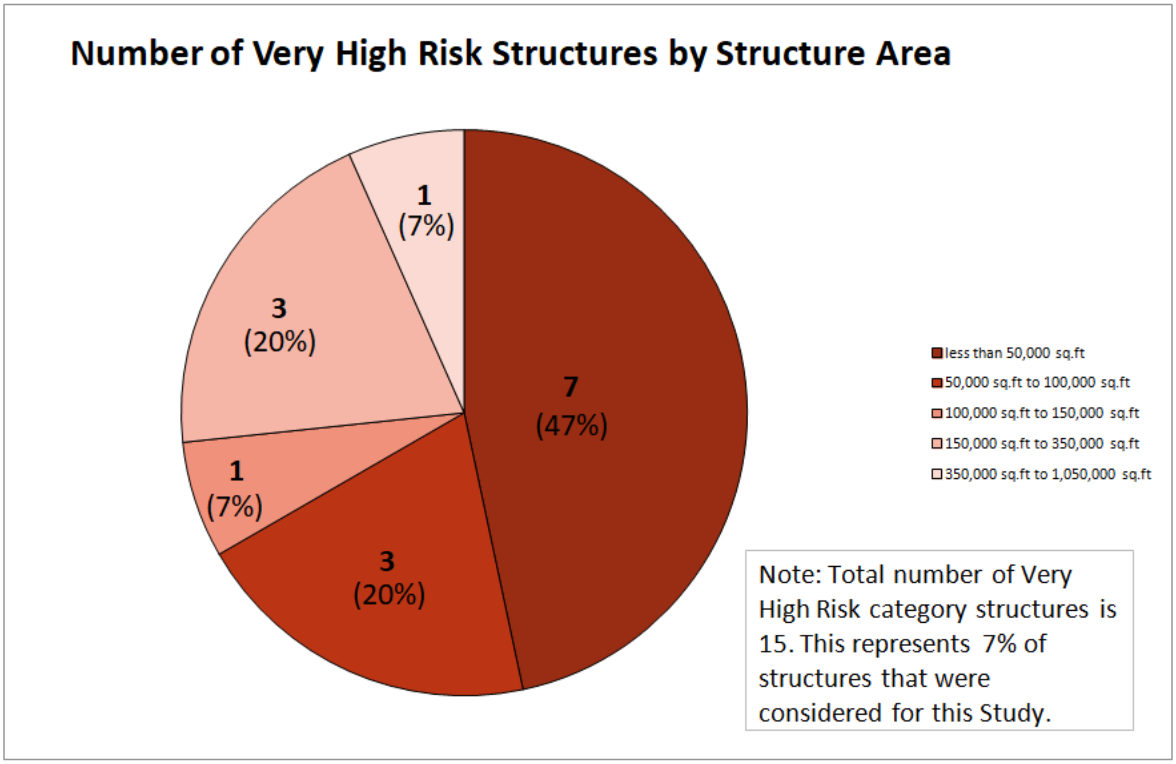


Figure 4

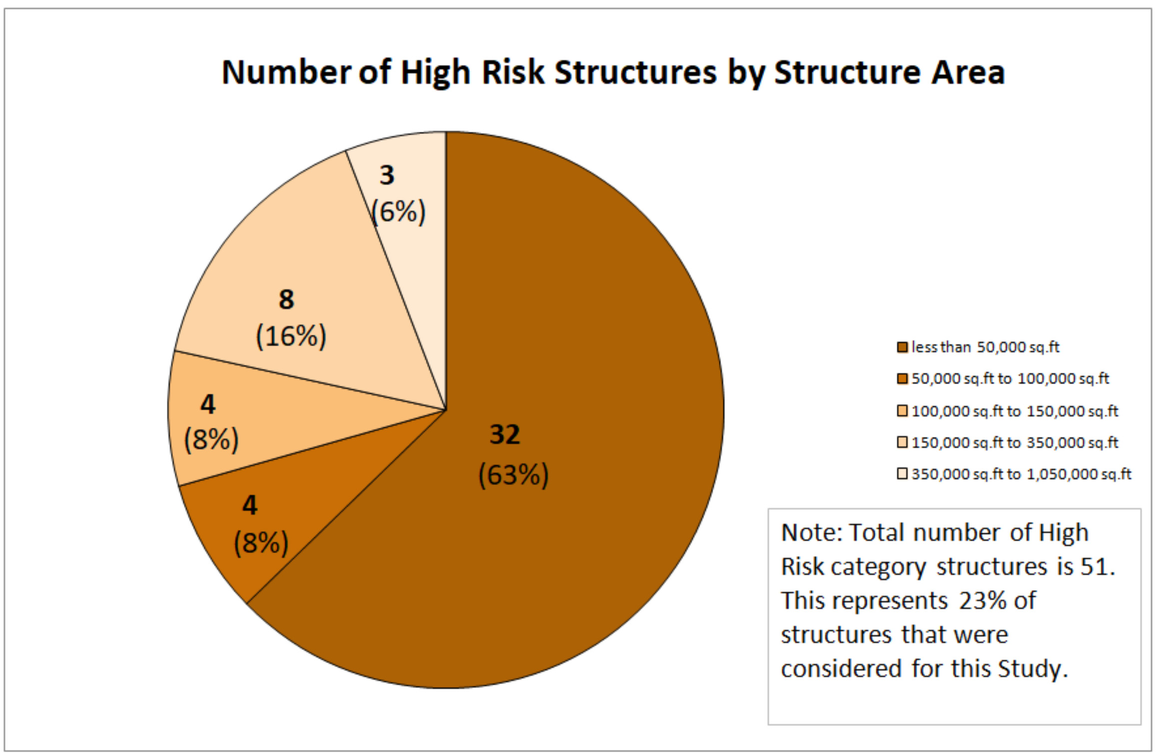
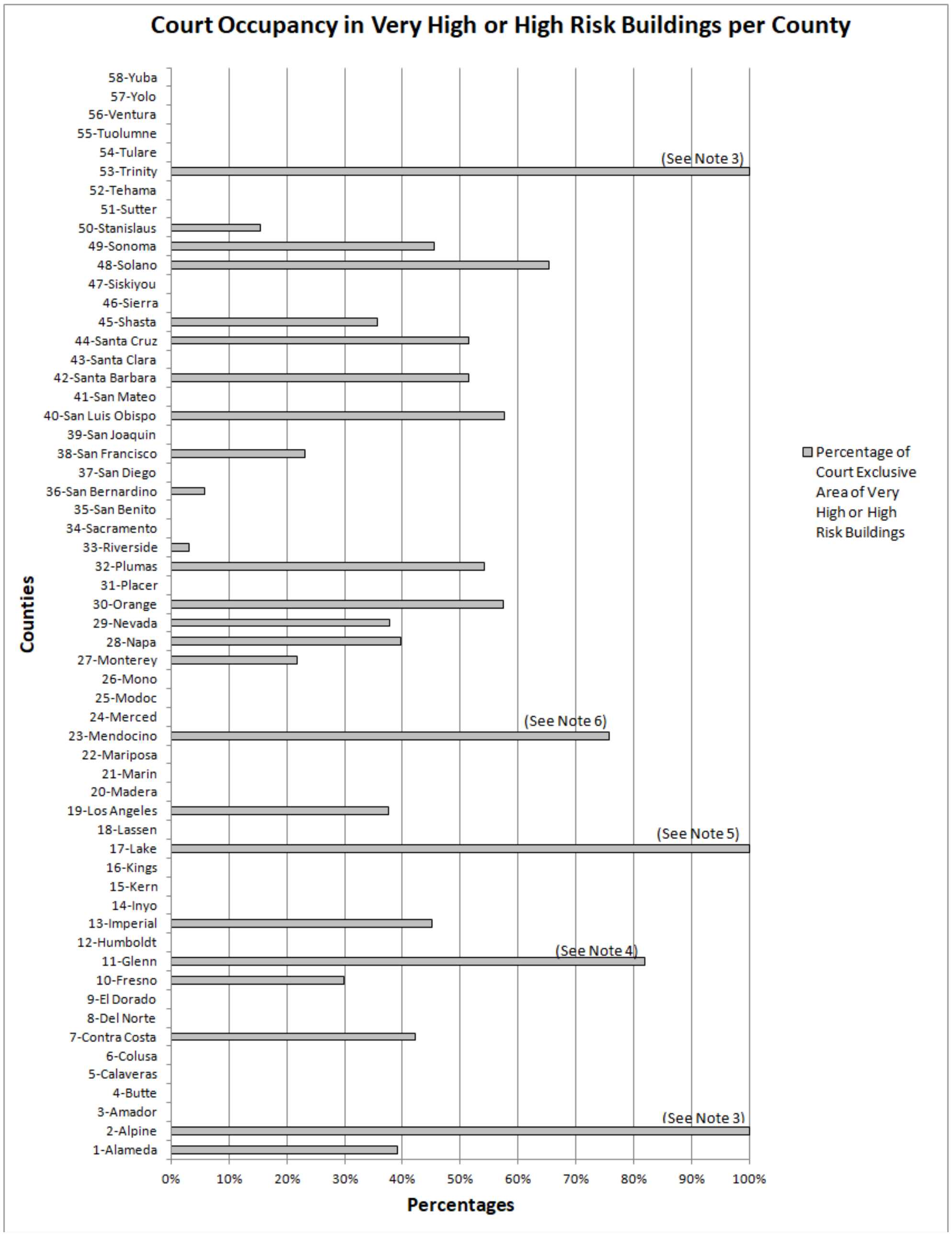


Figure 5



Notes:

1) Total court occupied area in High or Very High Risk buildings by County - %
2) Percentages shown in this graph are based on all Active Courthouses in Judicial Council's building inventory.
3) Alpine and Trinity county structures are historic buildings not owned by Judicial Council.
4) Glenn county structures are to be replaced by new court buildings or retrofitted- if funding is available.
5) Pending new Courthouse does not replace High Risk structure at Clearlake.
6) Would be reduced by new Ukiah Courthouse.

Figure 6

BACKGROUND

In 2003, the Office of Court Construction and Management of the Administrative Office of the Courts (AOC, now the Judicial Council of California) initiated a seismic assessment program to ascertain the seismic performance of court buildings statewide in preparation for transfer of ownership and management responsibility for trial court facilities from the counties to the state. The Summary Report of Preliminary Findings, dated January 2004, documented the preliminary findings of that seismic assessment program which was conducted in accordance with the Trial Court Facilities Act of 2002 (Sen. Bill 1732, [Escutia]). The act established the process for affecting the transfers and required that the state evaluate buildings containing court facilities for seismic safety. Buildings were required to meet the seismic criteria set forth in the act to be eligible to transfer, unless provisions were made for correction of their deficient items.

As a precursor, the Task Force on Court Facilities conducted a statewide inventory of court buildings (1999–2001) under Assembly Bill 233: the Lockyer-Isenberg Trial Court Act of 1997. Of the 452 buildings identified in the inventory, 227 were exempted from evaluation under the seismic assessment program by meeting one or more of the following criteria:

- The building was built in accordance with the 1988 Uniform Building Code (or later code) or upgraded since 1988;
- The court-occupied space is less than 10,000 square feet (sf) and less than 20% of the total building area; or
- The building is a leased, abandoned, modular, or storage facility.

The AOC selected eight prominent California consulting structural engineering firms to evaluate the remaining 225 nonexempt buildings in the seismic assessment program. The AOC also selected Rutherford + Chekene as Supervising Structural Engineer to develop and coordinate the program. During an initial review of the inventory, the engineers noted that many buildings previously identified by occupancy and use as standalone buildings actually consisted of multiple structures, separated by expansion or seismic joints. Because each of these segments required independent seismic evaluation, the database of structures to be evaluated increased to 300 separate entries that made up the 225 buildings.

The Trial Court Facilities Act of 2002 specified that the seismic evaluations be performed according to procedures developed by the California Department of General Services (DGS). The technical evaluation method used by the DGS was based on a document developed by the Federal Emergency Management Agency (FEMA) and published as *ASCE 31, Standard for the Seismic Evaluation of Buildings*. These procedures resulted in structures being assigned a seismic risk level which was based upon a set of seismic performance descriptions originally conceived by the California Division of the State Architect (DSA) in 1994. The risk levels range from I to VII, with Risk Level I representing the best performance and Risk Level VII representing the worst performance (see

Table 3). The act specified further that Risk Levels V to VII represented an "unacceptable seismic safety rating." (Gov. Code, § 70301(l).) A structure rated Risk Level V (or worse) required provision for correction of the deficient item(s) before it could be transferred to the state.

Table 3: DSA Risk Level Descriptions

Risk Level	Aspect	Anticipated Results
I	Building:	Potentially no structural damage: repairable, if any. Negligible non-structural damage: repairable.
	Risk to Life:	Negligible.
	Systems:	All systems will probably remain operational.
	Occupancy:	Immediate, with only negligible disruption during clean-up.
II	Building:	Negligible structural damage: repairable. Minor non-structural damage: repairable.
	Risk to Life:	Negligible.
	Systems:	Minor disruptions for hours to days.
	Occupancy:	Minor disruptions for hours to days.
III	Building:	Minor structural damage: repairable. Moderate non-structural damage: extensive repair.
	Risk to Life:	Minor.
	Systems:	Disruption of systems for days to months.
	Occupancy:	Return within weeks, with minor disruptions.
IV	Building:	Moderate structural damage: substantial repair. Substantial non-structural damage: extensive repair.
	Risk to Life:	Moderate.
	Systems:	Disruption of systems for months to years.
	Occupancy:	Partially to totally vacated during repairs.
V	Building:	Substantial structural damage: partial collapse likely, repair may not be cost effective. Extensive non-structural damage: repair may not be cost effective.
	Risk to Life:	Substantial.
	Systems:	Total disruption of systems: repair may not be cost effective.
	Occupancy:	Totally vacated during repairs.
VI	Building:	Extensive structural damage, partial to total collapse likely: repair may not be cost effective. Extensive nonstructural damage: repair may not be cost effective.
	Risk to Life:	Extensive, but not imminent: extrication protracted and difficult.
	Systems:	Total disruption of systems: repair may not be cost effective.
	Occupancy:	Totally vacated during repairs (if repairable).

Table 3: DSA Risk Level Descriptions		
Risk Level	**Aspect**	**Anticipated Results**
VII	Building:	Unstable under existing vertical loads or earthquake.
	Risk to Life:	Imminent threat to occupants and/or adjacent property.
	Systems:	Total disruption of systems: most likely not repairable.
	Occupancy:	Should be vacated until structural upgrading is accomplished.

During the evaluation process it was determined that for some of the structures, due to a lack of available information or the need for analysis beyond that prescribed in the program, less reliable risk level assignments had been made than for the balance of the inventory. This group of structures included 60 for which adequate structural drawings were not available, 14 for which adequate information was not available to perform a complete seismic evaluation concerning the possibility of liquefaction at the site, anchorage of plaster ceilings over large assembly spaces, or anchorage of external precast concrete panels, and 7 for which the consulting structural engineers indicated that further analysis (e.g., a more detailed evaluation) might change their rating. Although all 81 of these structures were evaluated and assigned risk levels in accordance with procedures consistent with the methods of DGS, the AOC decided to classify these structures as “pending” until the issues described above were resolved. Hence, of the 300 building structures in the 2003 seismic assessment program, 72 were assigned ratings of Risk Level IV, and 228 were assigned ratings of Risk Level V (including 81 assigned Risk Level V–Pending).

In 2006, the AOC embarked on a major capital building program—the Judicial Council Trial Court Capital-Outlay Program—intended to replace and/or consolidate existing court facilities largely through the construction of new court buildings across the state. The prioritization methodology employed (in August 2006 and updated in October 2008) did not consider seismic risk. Rather, program objectives for the prioritization of proposed new trial court building projects were to:

- Improve security;
- Reduce overcrowding;
- Correct physical hazards; and
- Improve access to court services.

The report to the Judicial Council regarding project prioritization contained the following explanation regarding seismic (safety) conditions of an existing building to be replaced by a new court building:

> If legislation is adopted that allows the state to accept transfer of responsibility for or title to court facilities with an uncorrected seismic condition, then the seismic condition of buildings affected by projects will be factored into the evaluation as follows—projects that replace or

renovate a building with an uncorrected seismic condition will receive the maximum points (i.e., 5 of 5 possible points) for the Physical Condition criterion.

Court building projects ranked by the above methodology in the two highest groups—Immediate Need and Critical Need—were subsequently funded with the enactment of SB 1407 (Perata) that established a lease revenue bond program for new court buildings, the Immediate and Critical Need Account.

Later in 2006, SB 10 (Dunn) was adopted. This bill revised the Trial Court Facilities Act to allow 107 Risk Level V buildings to transfer to the state as long as liability for all earthquake-related damage, replacement, injury, and loss remained with the counties to the same extent they would have been liable if the responsibility for court facilities had not transferred to the state. This liability attaches to the county (though the state would maintain liability for business interruption) until on or after the earliest of the following:

- The seismic rating is improved;
- The building no longer contains court facilities;
- Thirty-five years pass from the date of transfer of the facilities; or
- The county has complied with the conditions for relief from liability.

The enactment of this legislation did not alter the prioritization of Trial Court Capital-Outlay Projects. Hence it is fair to say that the Judicial Council court building program has not intentionally reduced the risk of damage, injury, or business interruption resulting from seismic events.

Even though seismic risk reduction was not an intended goal of the court building program, 33 structures—26 of which were rated as Risk Level V—were removed from the inventory of court buildings as a consequence of it. In addition to these, 6 structures could also be removed from the inventory upon completion of bidding/construction of already-designed replacement facilities, and 8 more such structures could be removed from the inventory upon completion of final design/bidding/construction of replacement facilities that have undergone preliminary design.

OBJECTIVE OF THIS STUDY AND DATABASE UPDATE

In late 2015, the Judicial Council Capital Program Office updated the court building database to reflect changes to the inventory that had occurred in the intervening years since 2003 (such as due to closure of court building due to funding reductions, and the capital building program) and also to enhance its functionality by incorporating information related to key building attributes, such as:

- Court exclusive area;
- Ownership of title—Judicial Council or county;
- Judicial Council acquisition type—title or responsibility;
- Number of courtrooms and types of cases; and
- County SB 10 status—indemnity of Judicial Council for damage or injury from earthquakes.

In the process of performing this update, the total number of building structures in the database was reduced from 300 to 225.

In addition, recognizing that the hazard posed by all Risk Level V buildings was not the same, the Judicial Council engaged Rutherford + Chekene (R+C) to rank the 139 Risk Level V building structures that remained in the inventory based on the seismic risk that they represented. Borrowing from similar work that they had recently performed for the federal General Services Administration, R+C developed a Seismic Risk Assessment Tool for the Judicial Council which employs the Federal Emergency Management Agency's HAZUS modeling algorithm.

After setting aside 3 building structures (which were identified as Risk Level V in the database even though there was not enough information available to allow a complete assessment of the building structure, however they are expected to be replaced) the remaining 136 Risk Level V building structures were ranked according to their seismic risk. The ranking was based upon the relative probability of collapse in a seismic event as estimated by the HAZUS model which considers the structural capacity of the building, site specific seismic hazard, and structural characteristics that influence capacity or response to earthquakes. While this ranking parameter is primarily a measure of life safety, it is also indicative of the degree of damage and hence business interruption. The 136 building structures were then sorted into categories as shown in the table below. Besides assignment to one of the three risk categories—very high, high, or moderate—the table also includes 3 building structures in the inventory that were not rated since not enough information is available to allow a complete assessment and they are expected to be replaced, as well as the number of building structures that have been identified as representing acceptable risk by virtue of the fact that they have been retrofitted or already meet SB 1732 Seismic Safety Criteria.

Table 4: Rankings of Seismic Risk Rating (SRR)			# of Bldg. Structures
Very High Risk (VHR)	SRR > 10	Building Structures of **Very High Risk** recommended as highest priority for mitigation of risk.	15
High Risk (HR)	2 < SRR < 10	Building Structures of **High Risk** recommended as high priority for mitigation of risk.	51
Moderate Risk (MR)	SRR < 2	Building Structures of **Moderate Risk** recommended as lower priority for mitigation of risk compared to the others.	70
Not Rated/Potentially Replaced(NR/PR)	Building Structures that were not evaluated or the seismic evaluation was incomplete due to inadequate information to allow assessment of the building structures. These structures are expected to be replaced when the capital project ready to start construction is funded.		3
Acceptable Risk (AR)	Retrofitted building structures or building structures meeting SB 1732 Seismic Safety Criteria as determined by an evaluation report are categorized as **Acceptable Rating**.		86

Graphical representation of information contained in the updated court building database, including SRR values and other building attributes, have been imported into a Google Earth Overlay to afford a convenient means of accessing, sorting, and displaying much of the available building data. It is envisioned that the Judicial Council will utilize all of this information to better understand the buildings in their inventory, from structural/seismic and many other perspectives, to inform future decisions ranging from contingency planning to prioritization of funding for capital improvement projects to mitigate seismic risk for California superior court buildings.

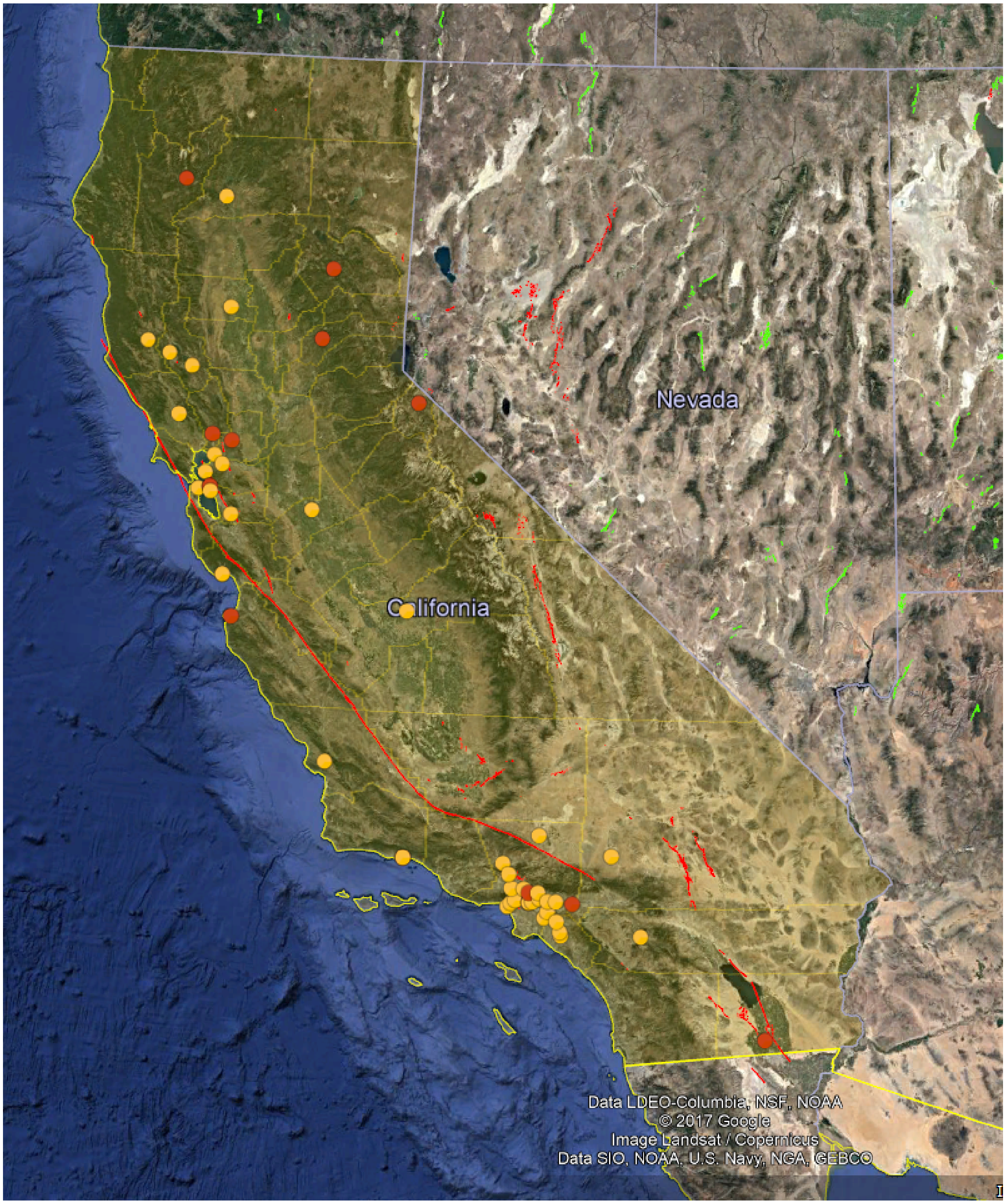


Figure 7: Graphical representation of VHR and HR buildings in Google Earth Overlay

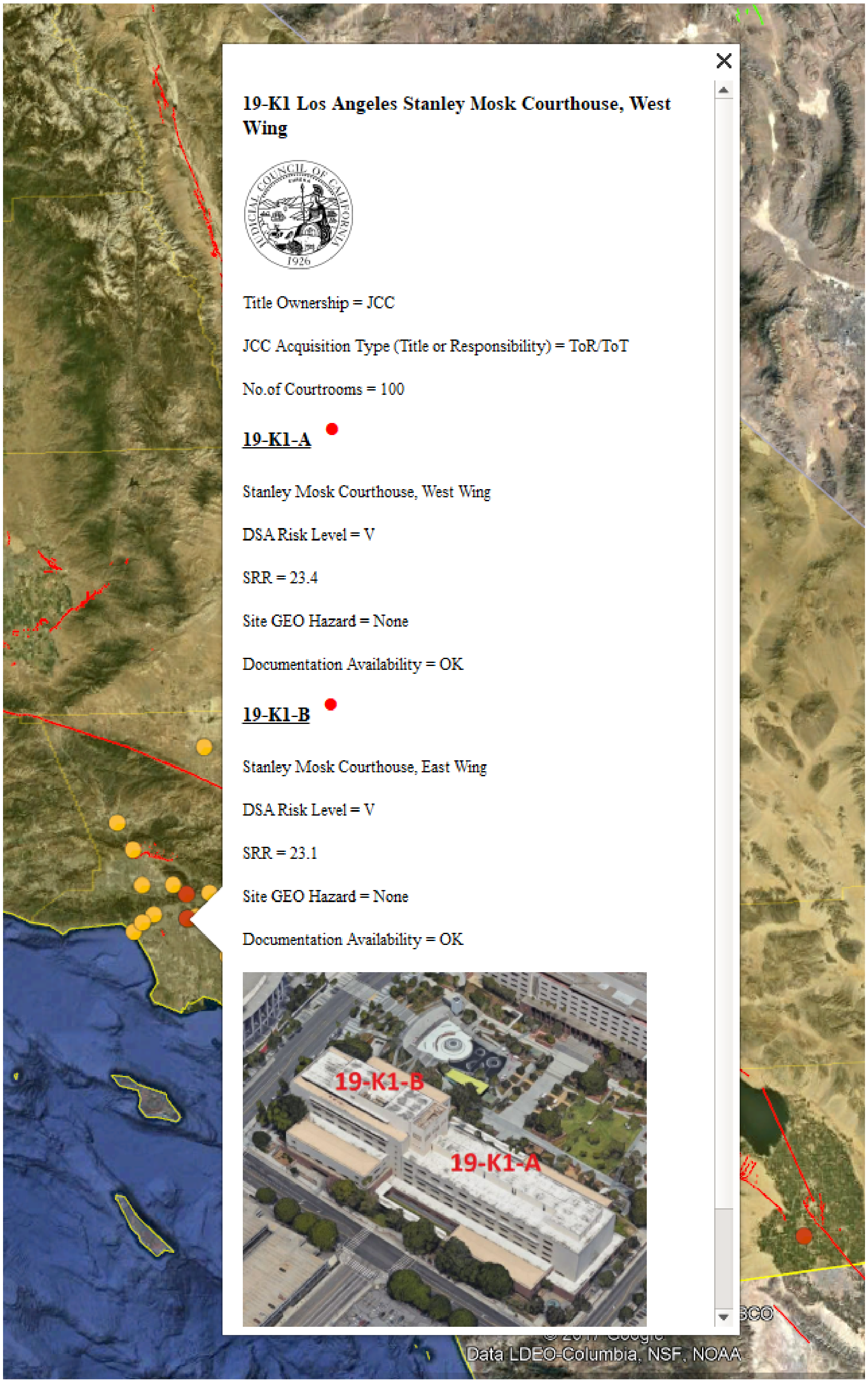


Figure 8: Sample data for each building in the database accessible from Google Earth Overlay

SEISMIC RISK RATING METHODOLOGY

The seismic rating system utilizes the HAZUS AEBM methodology as a tool to define the relative seismic risk among structures in the Judicial Council's inventory of court buildings. HAZUS is a nationally applicable, standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. HAZUS (seismic) was launched in 1997 by the Federal Emergency Management Agency (FEMA). HAZUS AEBM (Advanced Engineering Building Module) was released in 2003 as an adaptation of the HAZUS earthquake methodology for use in single buildings.

In the mid- to late-2000's, the California Office of Statewide Health Planning and Development (OSHPD), the agency responsible for seismic safety of hospitals in California, adapted HAZUS AEBM as a "screening tool" to evaluate life-safety risk to occupants of California Acute Care Hospitals for the purpose of setting priorities for mitigation. In 2010, HAZUS AEBM methodology was adapted by the U.S. Department of Veterans Affairs for the seismic risk assessment of (VA) Hospital Buildings.

The HAZUS AEBM methodology has been adapted to this project as follows:

- The methodology follows the modifications as outlined by OSHPD in the California Administrative Code section 2013, appendix H to chapter 6;
- Adjustments have been made to capture multistory, wood-frame buildings with severe, weak story deficiencies; and
- For nonexempt buildings that are designed after 1975, the methodology follows the modifications as outlined in "*Seismic Risk Assessment of VA Hospital Buildings—Risk Assessment Methods Phase 1 Report*" prepared by the National Institute of Building Sciences, dated April 13, 2010.

The Seismic Risk Rating (SRR) is established for each structure based on the probability of collapse (POC) values determined from the HAZUS AEBM methodology mentioned above. The POC values are calculated based on the following key parameters:

- Structural capacity of each structure: The structural capacity is derived from the seismic design coefficient (base shear–C_S) determined for each building based on the lateral force resisting system (Model Building Type), size, location, and the age of the building;
- Seismic Hazard: BSE-2E seismic hazard level at each site is determined based on ASCE 41-13, "*Seismic Evaluation and Retrofit of Existing Buildings.*" BSE-2E is taken as a seismic hazard with 5% probability of exceedance in 50 years at a site; and
- Significant structural characteristics that influence building capacity and building response include degradation, maximum drift, and modal shape factor.

When determining SRR values, building data was extracted from existing seismic evaluation reports. Structural drawings were typically not reviewed since the intent of this current study was to develop ratings based upon existing available information, and not to engage in reevaluation of the buildings.

Building data is recorded in the Judicial Council's court building database and includes the following building-specific information, much of which was used when establishing SRR values:

- Building location (address, longitude, and latitude coordinates);
- Site characteristics (including soil type and level of seismicity);
- Seismic Hazard Parameters (BSE-2E);
- Building characteristics (including number of stories, area, age, and code year);
- Structural characteristics (including structural system defined based on ASCE-41 model building types);
- Identification of critical, structural seismic deficiencies;
- Identification of nonstructural seismic deficiencies (even though not considered in the SRR calculations);
- Identification of site geo-hazards (even though not considered in the SRR calculations); and
- DSA seismic rating.

The table below presents a summary of the Seismic Risk Rating (SRR) ranking criteria. Input parameters used for calculation of the SRR values as well as the description of these input parameters and a glossary of key terminology are included in a separate volume.

Table 5: Rankings of Seismic Risk Rating (SRR)		
VHR	SRR > 10	Buildings of **Very High Risk** recommended as highest priority for mitigation of risk.
HR	2 < SRR <10	Buildings of **High Risk** recommended as high priority for mitigation of risk.
MR	SRR < 2	Buildings of **Moderate Risk** recommended as intermediate priority for mitigation of risk compared to the others.
NR/PR	Building Structures that were not evaluated or the seismic evaluation was incomplete due to inadequate information to allow assessment of the building structures. Furthermore, these structures are expected to be replaced when the capital project ready to start construction is funded.	
AR	Retrofitted buildings or buildings meeting SB 1732 Seismic Safety Criteria as determined by an evaluation report are categorized as **Acceptable Rating.**	

The following should be noted with regard to the information contained in this table:

- The 2003 *Superior Courts of California Seismic Assessment Program* involved the seismic evaluation of courts facilities based on ASCE 31, *Standards for Seismic Evaluation of Buildings.* Court buildings were assigned seismic risk levels from I to VII: Risk Level I representing the best performance and VII representing the worst performance. Buildings that met the ASCE 31 standard for life safety were assigned Risk Level IV or better. On the other hand, buildings that did not meet the ASCE 31 life-safety standard were assigned a Risk Level V or worse. ASCE 31 has now been updated and replaced by ASCE 41-13, *Standards for Seismic Evaluation and Retrofit of Existing Buildings*. The ASCE 31 life-safety (structural and selective nonstructural) performance is similar to life-safety (structural and nonstructural) performance at BSE-1E in accordance with ASCE 41-13.
- All buildings with VHR/HR/MR/NR-PR rankings have a Risk Level V (or worse) rating, meaning they do not meet the SB 1732 Seismic Safety Criteria (ASCE 31 life-safety performance). An MR ranking simply means that it has a lower risk compared to buildings with VHR and HR rankings.
- The dividing line between VHR/HR and MR rankings is set for purposes of this methodology to be consistent with rankings used by other agencies (e.g., State of California DGS, OSHPD, University of California, and Stanford University) as having high risk to life safety;

- The dividing line between VHR and HR rankings is set for purposes of this methodology to identify buildings of known high collapse potential, such as Unreinforced Masonry Bearing Walls (URM) and Nonductile Concrete Frames (C1) in high and very high seismic regions, which are assigned to the VHR category; and

The HAZUS-based SRR methodology, although a powerful tool for seismic risk assessment of the Judicial Council's court facilities, has limitations as noted below:

- The Seismic Risk Rating is best used for comparison of relative risk among a large number of buildings, rather than for determining a seismic risk value for an individual building;
- The SRR does not consider the seismic hazard associated with nonstructural components, such as partitions, ceilings, and cladding. The basis of the seismic risk rating system is the probability of complete structural damage and the resulting probability of collapse for a building calculated based on the lateral drift capacity of the structure vs. drift demand imposed by an earthquake hazard level. The nonstructural components are only considered in this methodology if they influence the global capacity of the structure;
- The SRR does not consider the impact of Geological Site Hazards, such as liquefaction, slope stability, and surface fault rupture. The sites with potential geo-hazard deficiencies are identified in the Expanded Database and recommended for further study; and
- The SRR values are not calibrated to any particular performance objectives of ASCE 31, ASCE 41, or other rating systems. A low SRR value does not necessarily indicate conformance to the life-safety objective per SB 1732 or other rating systems, since a building with a low SRR may have nonstructural deficiencies or geological site hazard issues that may pose risk to life safety.

COST MODEL METHODOLOGY

In order to gauge the financial impact of performing structural strengthening for those buildings in the inventory that represent the greatest seismic risk, a rough-order-of-magnitude retrofit cost was developed to improve 10 of the 15 Risk Level V structures assigned to the Very High Risk category and 50 of the 51 Risk Level V structures that have been assigned to the High Risk category for which the Judicial Council would be entitled to fund the work. It is important to understand the ownership type of a particular court building when determining if the seismic risk could be mitigated by a retrofit financed by the Judicial Council. Certain court buildings, historic structures and those where the Court was a minor tenant in a County building, did not transfer to the Judicial Council. The transfer of certain other court buildings from the counties to the state, in accordance with SB 1732, resulted in ownership conditions which would preclude the Judicial Council from funding structural strengthening or other building improvements such as:

- The county has ownership (or title transfer to the Judicial Council will not occur even after retirement of bond indebtedness); or
- The building is defined as a Historic Building & County Owned where transfer of responsibility is defined in a "Historic MOU."

For all of these buildings, the cost for structural strengthening is listed as not applicable (N/A) in the database. In addition, there are a few instances where the court has a very small occupancy (e.g., 10%) in a county-owned building with deferred transfer of title. As such it may be difficult for the Judicial Council to justify funding their strengthening, though those costs are included herein. Court buildings in another ownership class—Delayed Title Transfer to the Judicial Council until after retirement of bond indebtedness—are included in the cost model since eventually the Judicial Council will assume the seismic safety risk for these buildings. Regardless of the ownership conditions, the Judicial Council is still exposed to risk due to life-safety concerns, court fixture damage, and business interruption from earthquakes.

Generally speaking, the cost model, where employed, identifies total project costs associated with mitigation of all seismic-related structural and critical nonstructural deficiencies (e.g., plaster ceilings) of the subject buildings, including restoration of collateral architectural, mechanical, and electrical elements that are impacted in the process. The cost model also includes soft costs, such as fees and miscellaneous project expenses. These costs should not be taken as accurately identifying the cost of individual building retrofits given all of the uncertainties involved at this stage, but rather they should be taken as representative of program-wide budget requirements. Due to the considerable uncertainty associated with estimating mitigation costs associated with geologic site hazards without access to site-specific geotechnical information, the cost model does not include these costs. According to the database, cost premiums for mitigating geologic site hazards may apply at 8 of the building sites.

DIRECT COSTS

The direct costs are derived from seismic retrofit construction costs using data from the DGS-administered State Building Seismic Program gathered by the Turner/Vanir Joint Venture, as well as from other retrofit cost studies performed by Vanir Construction Management. Further, these costs have been spot-checked for applicability to the court's inventory by comparing them with budgets developed for selected AOC Planning Studies performed in 2009. The unit costs (per gross building area) are based on the structural building type, the single parameter which best characterizes retrofit construction cost at a conceptual level. Following is a detailed description of the approach and assumptions:

- Given the limited information available to characterize the structural work scope at this stage, the cost model incorporates a 15% design/estimating contingency.
- The cost model reflects costs for a generic, conventional retrofit solution, rather than a customized retrofit solution such as base isolation. More detailed study will be required in order to optimize the actual retrofit scheme and construction approach.
- Given the significant costs and disruption associated with relocating building occupants and establishing suitable temporary relocation facilities, it has been assumed that the work within these fully occupied buildings will generally be phased and performed during off-hours (after work hours); hence unit costs reflect these premiums. Additionally, the cost model considers loss of contractor productivity due to access restrictions and security measures associated with working in a secure, occupied building.

If court operations in a candidate building were relocated (to another superior court building) during the retrofit, construction duration as well as costs would be reduced considerably.

- The cost model reflects appropriate subcontractor and general contractor mark-ups, including but not limited to:
  - Mark-up on labor, material, and equipment;
  - Mark-up on labor supervision;
  - Sales tax on material and equipment;
  - General Conditions/Contractor's Overhead;
  - Bond and Insurance; and
  - Subcontractor and General Contractor Profit.
- The cost model includes a 20% premium which, at a programmatic level, represents the potential cost associated with incorporating upgrades mandated by building codes such as ADA improvements and fire/life-safety improvements;
- Since building-specific characteristics and deficiencies have a significant impact on the application of the cost model, information available from the 2003 Superior Courts of California Seismic Assessment Program was used to adjust the retrofit costs up or down to the extent feasible. Factors which have been considered include:

- Complexities associated with high-rise construction.
- Geographical complexities, including those associated with inner-city construction.
- Increased finish costs in buildings with a large percentage of court area.
- Increased structural costs in buildings subjected to very high seismic forces.
- Increased structural costs for buildings identified as having cladding deficiencies.
- Increased foundation costs in buildings supported upon deep foundations.
- Increased finish costs associated with historic buildings.
- Increased demolition costs associated with buildings which require remediation of asbestos-containing materials (ACM).
- Adjustments associated with limited, localized retrofit as gleaned from the evaluation reports from the 2003 seismic assessment program. The project costs for 10 structures have been reduced by 20% to 60% as a result of this adjustment.

- The cost model includes a construction contingency of 10% for unforeseen conditions during construction.

SOFT COSTS

In addition to the direct cost described above, the cost model also adds fees and miscellaneous project expenses (soft costs) in order to afford a more complete picture of total project costs. These costs average approximately 35%, and are based on historic percentages, which include the following:

- Design fees, peer review fees, and special consultant fees;
- Project and construction management fees;
- Regulatory agency fees;
- Environmental documentation fees;
- Advertising, printing, and mailing fees;
- Construction inspection and material testing expenses; and
- Minimal swing space and temporary relocation expenses (to house the occupants in the immediate vicinity of the work who need to be vacated in order to accomplish the retrofit work). Note that an accurate building-specific assessment of this cost would require the development of a more detailed retrofit scheme and the conducting of an interdisciplinary review of the impact of the retrofit on the building function.

TOTAL PROJECT COSTS

Total project costs are taken as the sum of Direct Costs and Soft Costs which are subsequently multiplied by 90% to establish a lower bound and by 115% to establish an upper bound when presented herein.

Table 6: Cost Model of Total Project Unit Costs (Before Consideration of Building-Specific Characteristics)	
Building Type	**Unit Cost** (4 Q 2016 dollars)
Wood	N/A
Structural Steel	$210 /sf
Concrete	$240 /sf
Precast Concrete	$240 /sf
Structural Steel/Concrete	$225 /sf
Reinforced Masonry	$275 /sf
Reinforced Masonry/Structural Steel	$240 /sf
Unreinforced Masonry	$355 /sf
Unreinforced Masonry/Concrete	$320 /sf

SUMMARY DATABASE OF SEISMIC RISK RATINGS

The Summary Database follows. It presents all 225 (nonexempt) building structures currently in the court building seismic assessment inventory ranked in order of seismic risk. Key building characteristics are provided for each building structure as well as a lower bound and upper bound rough-order-of-magnitude estimate of total project costs associated with retrofitting buildings in the Very High and High Risk categories for which the Judicial Council would be able to fund the work.

Definition of notations in database:

Ci	Civil cases heard
Cr	Criminal cases heard
DToT	Delayed Transfer of Title (bond debt)
F	Family cases heard
FTBR	To Be Replaced if capital project ready to start construction document phase is funded in FY 2017–2018
JV	Juvenile cases heard
MH	Mental Health cases heard
MOU	Memorandum of Understanding
P	Probate cases heard
PR	Potential Replacement or Retrofit if capital project ready to start bidding or construction is funded in FY 2017–2018.
SC	Small Claim cases heard
T	Traffic cases heard
ToR	Transfer of Responsibility
ToT	Transfer of Title

Table 7: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Building Address	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	Evaluation Level	DSA Rating [2016]	Court Exclusive Area [JCC CAFM]	Title Ownership JCC or County [JCC CAFM]	JCC Acquisition Type (Title or Responsibility) [JCC CAFM]	County SB10 Indemnity [Transfer Agreemts]	Type of Cases [Court's websites]	Seismic Risk Rating	Status	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
19-H1-A	Los Angeles	Glendale Superior and Municipal Courthouse	600 E. Broadway, Glendale	1956	7,400	2	S4/C1	Tier 1	V	31795	JCC	ToR/ToT	Yes	Ci/Cr/T	44.2		$2,020,000	$2,550,000
01-A2-E	Alameda	County Administration Bldg.	1221 Oak St., Oakland	1961	196,850	5	C2	Tier 2	V	33329	County	ToR	Yes	Ci	37.4		$64,420,000	$81,500,000
19-W2-E	Los Angeles	Pomona Courthouse North	350 W. Mission Blvd., Pomona	circa 1955	36,904	2	RM2/RM1/	Tier 1	V	33183	JCC		Yes		27.6		$12,750,000	$16,130,000
19-K1-A	Los Angeles	Stanley Mosk Courthouse, West Wing	110 N. Grand Ave., Los Angeles	1955	220,860	9	S4	Tier 2	V	475865	JCC	ToR/ToT	Yes	Ci/F/P/SC/A	23.4		$60,230,000	$76,200,000
19-K1-B	Los Angeles	Stanley Mosk Courthouse, East Wing	111 N. Hill St., Los Angeles	1955	515,340	7	S4	Tier 2	V	Ownership & courtroom quantity & other data shown in 19-K1-A					23.1		$140,550,000	$177,790,000
28-B1-E	Napa	Historical Courthouse	825 Brown St., Napa	circa 1878	16,000	2	URM	Tier 1	V	33569	County	ToR	Yes	Ci/F/SC	22.9		N/A	N/A
32-A1	Plumas	Courthouse	520 Main St., Quincy	1919	36,187	4	C2	Tier 1	V	12541	County	MOU-Histori	No	Cr/Ci/T/F	22.7		$11,190,000	$14,150,000
27-C1	Monterey	Monterey Courthouse	1200 Aguajito Rd., Monterey	1965	65,334	3	C1	Screening	V	33463	County	ToR	Yes	Ci/DV/F/P/SC	14.1		$21,980,000	$27,800,000
48-A1-A	Solano	Hall of Justice, 1973 Addition	600 Union Ave., Fairfield	1973	74,740	3	C2	Tier 2	V						14.1		$23,100,000	$29,220,000
01-A1	Alameda	Rene C. Davidson	1225 Fallon St., Oakland	1934	284,120	13	S4	Tier 2	V	102040	County	MOU-Histori	No	Ci/CR/F/JV/MH	12.4		N/A	N/A
29-A1-E & C	Nevada	Courthouse & 1936 Addition	201 Church St., Nevada City	1850's	16,425	3	URM	Tier 1	V	11304	County	ToR	Yes		11.2		$7,760,000	$9,820,000
42-A1	Santa Barbara	Santa Barbara County Courthouse	1100 Anacapa St., Santa Barbara	1926	134,729	4	S4	Tier 1	V	40341	County	NON-TRANSF	No	Ci/Cr/F/JV/P/SC	10.8		N/A	N/A
02-A1	Alpine	Alpine County Courthouse	99 Water St., Markleeville	1927	7,326	1	URM/C2A	Tier 1	V	2552	County	MOU-Histori	No	Cr/Ci/T/JV	10.8		N/A	N/A
53-A1-E	Trinity	Trinity County Courthouse	11 Court St., Weaverville	circa 1857	11,276	2	URM	Tier 1	V	9493	County	MOU-Histori	No	Ci/Cr/F/JV/P/SC/T	10.7		N/A	N/A
13-A1	Imperial	Imperial County Courthouse	939 W. Main St., El Centro	1923	66,000	2	C2	Tier 2	V	24568	County	ToR/ToT	Yes	T/Cr/JV/F/Ci/P	10.5		$21,000,000	$26,570,000
											Programmatic Retrofit Cost for **VERY HIGH** Risk Rated Buildings						**$365,000,000**	**$461,730,000**
23-A1-E	Mendocino	County Courthouse	100 N. State St., Ukiah	circa 1928	12,000	3	C2 or S4	Tier 1	P(V)	28407	County	ToR	Yes	Ci/Cr/F/JV/P/SC/T	9.96		$3,930,000	$4,970,000
19-R1-B	Los Angeles	Eastlake Juvenile Courthouse, North Portion	1601 Eastlake Ave., Los Angeles	1951	10,064	1	RM2	Tier 2	V	19022	County	ToR	Yes	JV	9.8		$3,110,000	$3,940,000
49-A1-A	Sonoma	Hall of Justice	600 Administration Dr., Santa Rosa	1962	180,188	2	C2	Tier 2	V	58099	County	ToR	Yes	Ci/Cr/F/JV/P/T	9.3	FTBR	$34,400,000	$43,520,000
33-F1	Riverside	Hemet	880 N. State St., Hemet	1969	31,720	1	RM1	Tier 2	V	26511	County	DToT	Yes	F/SC/T	8.2	FTBR	$11,530,000	$14,590,000
19-L1	Los Angeles	Criminal Courts Bldg.	210 W. Temple St., Los Angeles	1968	1,020,266	19	S1/S4	Tier 2	V	355151	JCC	ToR/ToT	Yes	Criminal	7.3		$204,050,000	$258,130,000
45-A7	Shasta	Main Courthouse Annex	1451 Court St., Redding	1965	35,445	3	S4	Tier 2	V		County	ToR	Yes	Closed/Retired	7.2	PR	$8,700,000	$11,010,000
19-AO1-E	Los Angeles	Whittier Courthouse	7339 Painter Ave., Whittier	1953	12,242	1	RM1	Screening	V	45085	JCC	ToR/ToT	Yes	Closed	6.4		$3,780,000	$4,790,000
53-A1-A	Trinity	Trinity County Courthouse, 1950's Addition	11 Court St., Weaverville	circa 1950	16,924	2	RM2	Tier 1	V	Ownership & courtroom quantity & other data shown in 53-A1-E					6.4		$4,920,000	$6,230,000
44-A1	Santa Cruz	Main Courthouse	701 Ocean St., Santa Cruz	1965	37,585	1	C1a	Tier 2	V	41307	County	ToR	Yes	Ci/Cr/P/T	6.3		$12,980,000	$16,420,000
48-B1-E	Solano	Hall of Justice	321 Tuolumne St. Vallejo	circa 1955	24,000	2	C2A	Tier 1	P(V)	51399	County		No		6.3		$7,640,000	$9,660,000
01-F1	Alameda	George E. McDonald Hall of Justice	2233 Shoreline Dr., Alameda	circa 1970	25,850	2	S1	Tier 1	V	17844	County		Yes		6.2		$7,990,000	$10,110,000
19-AO1-A	Los Angeles	1959 Addition	7339 Painter Ave., Whittier	1959	17,151	1	RM1	Tier 1	V	Ownership & courtroom quantity & other data shown in 19-AO1-E					6.2		$5,300,000	$6,710,000
23-A1-A	Mendocino	County Courthouse, Addition	100 N. State St., Ukiah	1946	45,979	4	S4	Tier 1	V	Ownership & courtroom quantity & other data shown in 23-A1-E					6.0		$11,290,000	$14,280,000
19-AF1	Los Angeles	San Fernando Valley Juvenile Court	16350 Filbert St., Sylmar	1976	38,902	1	RM2	Tier 1	P(V)	10981	County		Yes		5.7		$12,380,000	$15,660,000
11-A1	Glenn	Historic Courthouse	526 Sycamore St., Willows	circa 1894	30,031	2	URM	Tier 1	V	11510	JCC	ToR/ToT	Yes	T/Cr/F/JV	5.7	PR	$13,100,000	$16,580,000
17-B1	Lake	South Civic Center	7000A S. Center Dr., Clearlake	1971	8,385	1	RM1	Screening	V	5080	JCC	ToR/ToT	Yes	T/SC/Child Support	5.6		$2,820,000	$3,570,000
19-J2	Los Angeles	Pasadena Municipal Courthouse	301 E. Walnut St., Pasadena	1952	36,572	2	C2	Tier 2	V		County	ToR/ToT	Yes	Closed	5.4		$6,650,000	$8,410,000
42-B1	Santa Barbara	Santa Barbara Municipal Court	118 E. Figueroa St., Santa Barbara	circa 1953	44,470	2	S4/C2	Tier 2	V	47370	JCC		Yes	Cr/T/SC	5.2	FTBR	$12,940,000	$16,360,000
07-F1	Contra Costa	Richmond-Bay District	100 37th St., Richmond	1953	76,462	2	S1/S4	Tier 2	V	40976	JCC	ToR/ToT	Yes	F/Ci/SC/Cr/T/J	5.1		$20,160,000	$25,500,000
19-AQ1	Los Angeles	Beverly Hills Courthouse	9355 Burton Way, Beverly Hills	1967	184,882	4	C2	Tier 2	V	37859	JCC	ToR/ToT	Yes	T	5.1		$55,460,000	$70,160,000
19-O1	Los Angeles	Rio Hondo Court	11234 E. Valley Blvd., El Monte	1974	129,176	4	S1	Tier 2	V	45993	JCC	ToR/ToT	Yes	Cr/T	5.1		$35,230,000	$44,570,000
19-G1-E	Los Angeles	Burbank Superior and Municipal Courthouse	300 E. Olive Ave., Burbank	1952	37,280	2	C2	Tier 1	V	44404	County	DToT	Yes	Ci/Cr/T	5.0		$10,170,000	$12,860,000
19-R1-A	Los Angeles	Eastlake Juvenile Courthouse	1601 Eastlake Ave., Los Angeles	1951	18,000	1	RM2	Tier 2	V	Ownership & courtroom quantity & other data shown in 19-R1-B					5.0		$4,420,000	$5,590,000
19-R1-C	Los Angeles	Eastlake Juvenile Courthouse, 1958 Addition	1601 Eastlake Ave., Los Angeles	1958	18,100	1	S2A/RM1	Tier 2	V	Ownership & courtroom quantity & other data shown in 19-R1-B					5.0		$3,950,000	$5,000,000
50-A2	Stanislaus	Hall of Records	1100 I St., Modesto	1938	45,600	4	C2	Tier 2	V	21207	JCC	ToR/ToT (see	?? Bonded	Probate	4.7	FTBR	$12,850,000	$16,260,000
19-X1-E	Los Angeles	Citrus Municipal Court, Phase I	1427 W. Covina Pkwy., West Covina	1957	31,368	1	RM1	Tier 2	V	64204	County	ToR	Yes	Cr/T	4.7		$9,410,000	$11,900,000
19-H1-E	Los Angeles	Glendale Superior and Municipal Courthouse	600 E. Broadway, Glendale	1956	48,000	2	S4	Tier 2	V	Ownership & courtroom quantity & other data shown in 19-H1-A					4.5		$11,560,000	$14,630,000
30-C2-ARCADE	Orange	North Justice Center Annex	1276 N. Berkeley Ave., Fullerton	1972	1,000	2	PC1A	Tier 2	V	27680	County	ToR/ToT	Yes	T/Cr/Ci/SC	4.4		$280,000	$360,000
19-AR1-E	Los Angeles	West Los Angeles Courthouse	1633 Purdue Ave., Los Angeles	1958	20,000	2	C2/C2A	Screening	V	45129	JCC	ToR/ToT	Yes	Closed	4.4		$5,450,000	$6,900,000
17-A3-E	Lake	Courthouse	255 N. Forbes St., Lakeport	1966	47,323	4	S1	Tier 2	V	15480	County	ToR	No	Cr/J/SC/T/M	4.3	FTBR	$11,830,000	$14,970,000
36-L1-A	San Bernardino	Victorville Court	14455 Civic Dr., Victorville	circa 1973	40,000	1	RM1	Screening	V	48380	County	ToR	Yes	F/Ci/JV/	4.3		N/A	N/A
19-AE1	Los Angeles	Lancaster Courthouse Main Bldg.	1040 W. Ave. J, Lancaster	1960	42,388	2	RM1	Tier 1	V	19595	County	ToR	Yes	JV	4.1		$9,250,000	$11,700,000
19-I1	Los Angeles	Alhambra Superior and Municipal Court	150 W. Commonwealth Ave., Alhambra	1971	110,174	4	S4	Tier 2	V	56327	County	DToT	Yes	Cr/SC	3.9		$28,040,000	$35,480,000
19-AD1	Los Angeles	New Hall Municipal Court	23747 W. Valencia Blvd., Santa Clarita	1969	32,124	1	RM1	Tier 1	V	18229	County	ToR	Yes	Cr/T	3.7		$11,100,000	$14,040,000
19-AK1	Los Angeles	Norwalk Courthouse	12720 Norwalk Blvd., Norwalk	1965	208,195	7	S2/S4	Tier 2	V	117157	County	ToR/ToT	Yes	Ci/Cr/F	3.4		$60,570,000	$76,620,000
19-AV1-B	Los Angeles	Hall of Records, Records Bldg	320 West Temple St., Los Angeles	1958	97,000	13	C2	Tier 1	V	26700	County	ToR	Yes	?	3.3		$13,230,000	$16,730,000
30-B1	Orange	Lamoreaux Justice Center	341 The City Dr. S, Orange	1988	248,676	8	S1	Tier 2	V	127655	County	DToT	Yes	JV/F/DV	3.3		$67,820,000	$85,790,000
19-AX2	Los Angeles	Van Nuys Branch Court	14400 Erwin St. Mall, Van Nuys	1985	284,102	10	S1	Tier 3 NDP	V	134551	JCC	ToR/ToT	Yes	Cr/T	3.3		$87,810,000	$111,080,000
40-A1-A	San Luis Obispo	San Luis Obispo Government Center	1035 Palm St., San Luis Obispo	1980	66,000	3	S2/S2A	Tier 2	V	40867	County	ToR	Yes	Ci/Cr/F/T	3.1		$17,400,000	$22,010,000
19-AV1-A	Los Angeles	Hall of Records, Administration Bldg	320 West Temple St., Los Angeles	1958	350,000	11	S4	Tier 2	V	Ownership & courtroom quantity & other data shown in 19-AV1-B					3.0		$63,640,000	$80,500,000
44-A2	Santa Cruz	County Administration Bldg.	701 Ocean St., Santa Cruz	1965	206,400	5	C1	Tier 2	V	14775	County	ToR	Yes	Ci/Cr/P/T	2.7		$63,800,000	$80,700,000
17-A3-B	Lake	South Wing Addition	255 N. Forbes St., Lakeport	1982	7,775	3	S2	Tier 2	V	Ownership & courtroom quantity & other data shown in 17-A3-E					2.7	FTBR	$2,050,000	$2,590,000
07-A2	Contra Costa	Wakefield Taylor Courthouse	725 Court St., Martinez	1931	100,657	4	S4	Tier 2	V	100687	JCC	ToR/ToT	Yes	Ci/Cr/JV/P	2.7		$30,200,000	$38,200,000
48-A1-E	Solano	Hall of Justice	600 Union Ave., Fairfield	1923	65,000	3	C2A	Tier 1	V						2.7		$21,270,000	$26,910,000

Table 7: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Building Address	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	Evaluation Level	DSA Rating [2016]	Court Exclusive Area [JCC CAFM]	Title Ownership JCC or County [JCC CAFM]	JCC Acquisition Type (Title or Responsibility) [JCC CAFM]	County SB10 Indemnity [Transfer Agreemts]	Type of Cases [Court's websites]	Seismic Risk Rating	Status	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
29-A1-D	Nevada	Courthouse, 1936 Addition	201 Church St., Nevada City	circa 1936	1,648	1	C2	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 29-A1-E &C					2.7		$480,000	$610,000
19-X1-A	Los Angeles	Citrus Municipal Court, Phase II	1427 W. Covina Pkwy., West Covina	1967	33,250	1	RM1	Tier 1	V	Ownership & courtroom quantity & other data shown in 19-X1-E					2.6		$9,670,000	$12,240,000
19-AP1-B	Los Angeles	Santa Monica Courthouse, Central Wing	1725 Main St., Santa Monica	1950	33,855	2	C2/C2A	Tier 2	V	76222	JCC	ToR/ToT	Yes	Ci/F/T	2.6		$5,850,000	$7,400,000
01-H1	Alameda	Fremont Hall of Justice	39439 Paseo Padre Pkwy., Fremont	1976	124,100	3	RM2	Tier 1	V	61632	JCC	ToR	Yes	Cr/T	2.4		$20,310,000	$25,690,000
38-B1	San Francisco	Hall of Justice	850 Bryant St., San Francisco	1958	711,889	8	C2	Tier 1	V	118247	County	ToR	Yes	Cr/T/	2.3		$200,620,000	$253,790,000
30-A1-C	Orange	Central Justice Center	700 Civic Center Dr. West, Santa Ana	1966	179,000	3	S1	Tier 2	P(V)	322724	JCC	ToR/ToT	No	Cr/Ci/SC/P/MH	2.1		$47,190,000	$59,700,000
10-A1	Fresno	Fresno County Courthouse	1100 Van Ness Ave., Fresno	1964	213,687	9	S1/S4	Tier 2	V	153887	County	ToR/ToT	Yes	Cr/DV/JV/T	2.1		$56,340,000	$71,260,000
												Programmatic Retrofit Cost for **HIGH** Risk Rated Buildings					**$1,364,920,000**	**$1,726,680,000**
19-S1	Los Angeles	Hollywood Branch Courthouse	5925 Hollywood Blvd, Los Angeles	1984	57,772	2	RM2	Tier 2	V	23820	JCC	ToR/ToT	Yes		1.9			
33-J1-B	Riverside	Corona	505 S. Buena Vista, Corona	1974	9,470	1	S2	Tier 2	V	20517	County	ToR	Yes		1.9			
17-A3-A	Lake	Pedestrian Bridge/Walkway	255 N. Forbes St., Lakeport	-	490	1	Varies	Tier 2	V	Ownership & courtroom quantity & other data shown in 17-A3-E					1.9	FTBR		
15-A1-A	Kern	Bakersfield Superior Court, Central Wing	1415 Truxtun Ave., Bakersfield	1956	97,210	7	S2/S4	Tier 2	V	118198	County	ToR	Yes		1.9			
36-E1	San Bernardino	Joshua Tree Courthouse	6527 White Feather Rd., Joshua Tree	1982	37,340	1	S3/RM2	Tier 1	P(V)	10867	County		Yes		1.7			
07-C1	Contra Costa	Danville District Courthouse	640 Ygnacio Valley Rd., Walnut Creek	1973	37,104	2	RM1	Screening	V	24469	JCC	ToR/ToT	Yes		1.7			
09-A1	El Dorado	Main St. Courthouse	495 Main St., Placerville	1911	17,951	3	S5	Tier 1	V	18560	County	ToR/ToT	??		1.6			
30-D1-A	Orange	West Justice Center	8141 13th St., Westminster	1966	115,150	2	C2/RM2	Tier 2	V	83288	County		Yes		1.5			
19-X1-B	Los Angeles	Citrus Municipal Court, Phase III	1427 W. Covina Pkwy., West Covina	1973	43,380	1	RM1	Tier 1	V	Ownership & courtroom quantity & other data shown in 19-X1-E					1.5			
30-E1-A	Orange	Harbor Justice Center, Phase II	4601 Jamboree, Newport Beach	1985	44,060	2	S1	Tier 2	V	73166	County	ToR/ToT	Yes		1.5			
33-J1-A	Riverside	Corona	505 S. Buena Vista, Corona	1974	40,300	2	S1	Tier 2	V	Ownership & courtroom quantity & other data shown in 33-J1-B					1.5			
19-AM1-A	Los Angeles	Downey Courthouse	7500 Imperial Hwy., Downey	1986	103,553	4	S1	Tier 2	V	64450	County	DToT	Yes		1.4			
37-F3	San Diego	Annex	325 S. Melrose, San Diego	circa 1964	21,895	1	C2A	Tier 1	V	16804	JCC		Yes		1.4			
29-A1-B	Nevada	Courthouse, Stairwell to Jail	201 Church St., Nevada City	1930's	960	3	C2	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 29-A1-E &C					1.2			
19-J1	Los Angeles	Pasadena Superior Courthouse	300 E. Walnut St., Pasadena	1968	187,120	6	S4	Tier 2	V	88008	County	ToR/ToT	Yes		1.2			
29-A1-A	Nevada	Courthouse, Old Jail	201 Church St., Nevada City	1850's	3,450	3	URM	Tier 1	V	Ownership & courtroom quantity & other data shown in 29-A1-E &C					1.0			
19-U1	Los Angeles	Central Arraignment Courthouse	429 E. Bauchet St., Los Angeles	1970	67,719	3	C2	Tier 2	V	41902	County	ToR	Yes		1.0			
19-E1	Los Angeles	Inglewood Juvenile Court-Superior	110 Regent St., Inglewood	1950	18,791	2	C2b	Tier 1	P(V)	10801	JCC	ToR/ToT	Yes		0.9			
30-C1-E	Orange	North Justice Center	1275 N. Berkeley Ave., Fullerton	1968	64,225	2	PC1A	Tier 2	V	89544	County	ToR/ToT	Yes		0.9			
25-A2	Modoc	Barclay Justice Center	205 S East St., Alturas	1914	8,482	3	C2	Tier 2	V	5730	County	MOU-Histori	No (court r		0.9			
58-A1-E	Yuba	Yuba County Courthouse	215 Fifth St., Marysville	1960	97,460	3	S4	Tier 2	P(V)	25015	County	ToR	Yes		0.8			
56-B1	Ventura	East County Courthouse	3855 Alamo St., Simi Valley	1989	84,252	2	PC1	Tier 1	V	41416	County		Yes		0.7			
19-W1	Los Angeles	Pomona Superior Court	400 Civic Center Plaza, Pomona	1965	194,000	7	S4	Tier 2	V	106339	JCC	ToR/ToT	Yes		0.6			
46-A1-E	Sierra	Courthouse/Sheriff Station-Jail	100 Courthouse Square, Downieville	1950	18,181	2	C2A	Tier 2	V	5440	County	ToR	Yes		0.6			
45-A1	Shasta	Main Courthouse	1500 Court St., Redding	1954	44,528	3	S4	Tier 2	V	40266	County	ToR	Yes		0.6	PR		
19-C2	Los Angeles	South Bay Courthouse Annex-Municipal	3221 Torrance Blvd., Torrance	1964	15,126	1	RM1	Tier 1	V	5110	JCC	ToR/ToT	Yes		0.6			
27-D1	Monterey	King City Courthouse	250 Franciscan Way, King City	1973	12,163	1	W1A/RM1	Tier 1	V	6654	County	ToR	Yes		0.6			
29-A2	Nevada	Annex	201 Church St., Nevada City	1962	40,024	3	C1	Tier 1	V	12753	County		Yes		0.6			
41-C1-B	San Mateo	Municipal Court Bldg., Detention Cen ter	1050 Mission Rd., South Francisco	1981	10,497	1	RM1	Tier 1	V	34825	JCC	ToR/ToT	Yes		0.5			
30-C2-MAIN BLD	Orange	North Justice Center Annex	1276 N. Berkeley Ave., Fullerton	1972	34,600	2	S4/PC1	Tier 2	V	Ownership & courtroom quantity & other data shown in 30-C2-ARCADE					0.5			
30-A1-B	Orange	Central Justice Center	700 Civic Center Dr. West, Santa Ana	1966	59,000	2	S1	Tier 2	P(V)	Ownership & courtroom quantity & other data shown in 30-A1-C					0.4			
39-D2	San Joaquin	Lodi Branch- Dept. 2	315 W. Elm St., Lodi	1969	6,844	1	RM1	Tier 2	P(V)	6844	JCC	ToT	?? Bonded		0.4			
19-F1	Los Angeles	Inglewood Municipal Court	1 East Regent St., Inglewood	circa 1975	174,041	6	S1	Tier 2	P(V)	66721	JCC	ToR/ToT	Yes		0.4			
30-A1-A	Orange	Central Justice Center	700 Civic Center Dr. West, Santa Ana	1966	300,000	11	S1	Tier 2	P(V)	Ownership & courtroom quantity & other data shown in 30-A1-C					0.4			
19-T1	Los Angeles	Metropolitan Courthouse	1945 S. Hill St., Los Angeles	1968	250,000	8	S4	Tier 2	V	128980	JCC	ToR/ToT	Yes		0.3			
41-C1-A	San Mateo	Municipal Court Bldg., Addition	1050 Mission Rd., South Francisco	1970	31,110	1	RM1	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 41-C1-B					0.3			
41-C1-E	San Mateo	Municipal Court Bldg., Northern Branch	1050 Mission Rd., South Francisco	1960	15,040	1	RM1	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 41-C1-B					0.3			
04-A1-E	Butte	Butte County Courthouse, Original	1 Court St., Oroville	1970	18,810	1	S2A	Tier 2	P(V)	72474	County		Yes		0.3			
37-H1	San Diego	South County Regional Center	500 Third Ave., Chula Vista	1978	142,253	3	S1/C2	Tier 2	P(V)	97600	County	ToR	No		0.3			
14-A1	Inyo	Independence Superior Court	168 N. Edwards St., Independence	1920	20,846	2	C2	Tier 2	V	5615	County	ToR	Yes		0.3			
34-A1	Sacramento	Sacramento Superior Court	720 Ninth St., Sacramento	1962	288,896	6	C2	Tier 2	V	291083	JCC	ToR/ToT	Yes		0.3			
19-AG1	Los Angeles	Compton Courthouse	200 W. Compton Blvd., Compton	1975	417,159	12	S1	Tier 2	P(V)	170103	JCC	ToR/ToT	Yes		0.3			
19-C1	Los Angeles	South Bay Courthouse Superior and Municipal	825 Maple Dr., Torrance	1967	146,711	5	C2	Tier 2	V	84710	JCC	ToR/ToT	Yes	Ci/Cr/F/T	0.3			
54-A1-A	Tulare	Visalia Superior Court	221 South Mooney Blvd., Visalia	1955	185,111	4	S1	Tier 2	V	67804	County	ToR	Yes		0.3			
45-B1	Shasta	Shasta County Superior Court/Sheriff's Station	20509 Shasta St., Burney	1964	4,867	1	W1	Tier 1	V	1643	County	ToR	No		0.2			
37-F2-A	San Diego	North County Regional Center - Vista Center Addition	325 S. Melrose, San Diego	circa 1972	97,000	1	S2	Tier 1	V	95212	JCC	ToR/ToT	Yes		0.2			
15-B1	Kern	Bakersfield Justice Bldg.	1215 Truxtun Ave., Bakersfield	1977	125,783	4	S4	Tier 2	V	56923	County	ToR	Yes		0.2			
29-A1-F	Nevada	Courthouse, Addition	201 Church St., Nevada City	1900's	980	1	C2A	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 29-A1-E &C					0.2			
19-V1	Los Angeles	East Los Angeles Municipal Court	214 S. Fetterly Ave., Los Angeles	1986	105,627	5	S1	Tier 2	V	52854	County	ToR	Yes	Closed	0.1			
30-D1-B	Orange	West Justice Center	8141 13th St., Westminster	1969	32,000	2	C2/RM2	Tier 2	P(V)	Ownership & courtroom quantity & other data shown in 30-D1-A					0.1			
33-A2	Riverside	1903/33 Courthouse	4050 Main St, Riverside	1903	138,551	3	C2b	Tier 1	P(V)	108043	County		No		0.1			
20-D1	Madera	Sierra Courthouse	40601 Road 274, Bass lake	1974	5,884	1	W2/RM1	Tier 1	P(V)	5104	County		No		0.1			

Table 7: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Building Address	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	Evaluation Level	DSA Rating [2016]	Court Exclusive Area [JCC CAFM]	Title Ownership JCC or County [JCC CAFM]	JCC Acquisition Type (Title or Responsibility) [JCC CAFM]	County SB10 Indemnity [Transfer Agreemts]	Type of Cases [Court's websites]	Seismic Risk Rating	Status	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
15-H1	Kern	Arvin/ Lamont Branch	12022 Main St., Lamont	1988	26,680	1	RM1	Tier 2	V	13263	County	ToR	Yes		0.1			
30-C1-A- MAIN	Orange	North Justice Center Addition	1275 N. Berkeley Ave., Fullerton	1981	71,200	4	S4	Tier 2	V	Ownership & courtroom quantity & other data shown in 30-C1-E					0.1			
26-A1	Mono	Bridgeport County Courthouse	State Hwy 395 North, Bridgeport	circa 1881	11,689	2	W2	Tier 1	P(V)	3729	County				0.1			
41-A2	San Mateo	Traffic/ Small Claims Annex	500 County Center, Redwood City	circa 1960	9,714	1	C2A	Screening	P(V)	10604	County	ToR/ToT	No		0.1			
40-A1-E	San Luis Obispo	San Luis Obispo Government Center	1035 Palm St., San Luis Obispo	1963	46,000	3	C2/RM2	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 40-A1-A					0.1			
42-F3	Santa Barbara	Santa Maria Muni Clerk	314 E. Cook St., Santa Maria	1953	4,400	1	W1	Tier 1	V	1941	County	DToT	Yes		0.1			
25-A1-B	Modoc	Barclay Justice Center, East Wing Addition	205 S East St., Alturas	circa 1990	3,660	1	W1/RM1	Tier 1	V	7800	JCC		No		0.1			
53-A1-B	Trinity	Trinity County Courthouse, West Addition	11 Court St., Weaverville	1977	14,589	1	RM1	Tier 1	V	Ownership & courtroom quantity & other data shown in 53-A1-E					0.1			
42-F1-C	Santa Barbara	Santa Maria Courts, North Wing	312 E. Cook St., Santa Maria	1953	16,000	2	W1A	Tier 2	V	15927	County	DToT	Yes		0.04			
34-D1	Sacramento	Carol Miller Justice Center Court Facility	301 Bicentennial Circle	1990	98,628	3	S1	Tier 2	V	96834	JCC	ToR/ToT	?? Bonded		0.04			
54-A1-B	Tulare	Visalia Superior Court, Addition	221 South Mooney Blvd., Visalia	1988	58,000	4	S1	Tier 2	V	Ownership & courtroom quantity & other data shown in 54-A1-A					0.03			
19-W2-A	Los Angeles	Pomona Courthouse North -1990 Addition	350 W. Mission Blvd., Pomona	circa 1990	10363	2	RM2/RM1	Tier 1	V	Ownership & courtroom quantity & other data shown in 19-W2-E					0.03			
28-B1-B	Napa	Historical Courthouse, 1977 Addition	825 Brown St., Napa	1977	14,109	3	RM2	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 28-B1-E					0.02			
42-F1-D	Santa Barbara	Santa Maria Courts, South Wing	312 E. Cook St., Santa Maria	1963	14,000	2	W1A	Tier 2	V	Ownership & courtroom quantity & other data shown in 42-F1-C					0.01			
09-E1	El Dorado	Johnson Bldg.	1354 Johnson Blvd., South Lake Tahoe	1979	37,453	2	W2	Tier 2	V	22974	County	ToR	Yes		0.01			
28-B1-A	Napa	Historical Courthouse, 1916 Building	825 Brown St., Napa	1916	6,000	2	C2	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 28-B1-E					0.01			
42-D1-B	Santa Barbara	Lompoc Municipal Court	115 Civic Center Plaza, Lompoc	-	10,787	2	W2	Tier 1	P(V)	8106	County		Yes		0.01			
22-A1	Mariposa	Mariposa County Courthouse	5088 Bullion St., Mariposa	circa 1854	5,920	2	W2	Tier 1	P(V)	3119	County	MOU-Histori	No		0.0002			
47-A1-A	Siskiyou	Siskiyou County Courthouse, 1952 Building	311 Fourth St., Yreka	1952	28,350	2	C2	Tier 1	P(V)	9449	County	ToR	Yes		NR/PR	PR		
47-A1-E	Siskiyou	Siskiyou County Courthouse, 1908 Building	311 Fourth St., Yreka	1908	7,906	2	S5	Tier 1	P(V)	Ownership & courtroom quantity & other data shown in 47-A1-A					NR/PR	PR		
55-A1	Tuolumne	Historic Courthouse	41 W. Yaney, Sonora	circa 1897	23,120	3	URMA	Tier 1	P(V)	20160	County		No		NR/PR	PR		
01-A2-A	Alameda	Vertical Addition	1221 Oak St., Oakland	1982	11,296	1	S1A	Tier 2	IV	Ownership & courtroom quantity & other data shown in 01-A2-E					AR			
01-B3	Alameda	Wiley W. Manuel Courthouse	661 Washington St., Oakland	1977	196,277	7	S1	Tier 3 FEMA	IV	112096	JCC		No		AR			
01-D1	Alameda	Hayward Hall of Justice	24405 Amador St., Hayward	1974	184,785	5	S4b	Screening	IVb	116563	JCC		No		AR			
03-C1	Amador	John C. Begovich Building	500 Argonaut Lane, Jackson	1985	19,010	1	W2	Tier 1	IV	20346	JCC		No		AR			
07-A3	Contra Costa	Bray Courts	1020 Ward St., Martinez	1986	48,883	3	S1	Tier 3 NSP	IV	33861	County		Yes		AR			
07-A4	Contra Costa	Jail Annex	1010 Ward St., Martinez	1977	12,843	1	S1/S1A	Tier 2	IV	10895	County		Yes		AR			
07-D1	Contra Costa	Concord-Mt. Diablo District	2970 Willow Pass Rd., Concord	1980	7,938	1	W1A	Screening	IVb	7938	JCC		No		AR			
08-A1	Del Norte	Del Norte County Superior Court	450 'H' St., Crescent City	circa 1950	29,008	1	W2	Screening	IVb	13637	JCC		Yes		AR			
09-C1	El Dorado	Superior Court	3321 Cameron Park Dr., Cameron Park	1983	7,834	1	W2	Screening	IVb	5618	JCC		??		AR			
10-B1	Fresno	North Annex Jail	1255 M St., Fresno	circa 1985	25,667	2	C2c	Screening	IVb	8144	County		No		AR			
10-C1	Fresno	Juvenile Delinquency Court	742 South Tenth St., Fresno	1978	121,076	2	W1A	Screening	IVb	61936	County		No		AR			
11-B1	Glenn	Orland Superior Court	821 E. South St., Orland	1965	9,845	1	RM1	Tier 1	IV	2267	County		Yes		AR	PR		
15-A1-B	Kern	Bakersfield Superior Court, West Wing	1415 Truxtun Ave., Bakersfield	1956	73,850	2	C2	Tier 2	IV	Ownership & courtroom quantity & other data shown in 15-A1-A					AR			
15-A1-C	Kern	Bakersfield Superior Court, Jury Services	1415 Truxtun Ave., Bakersfield	1955	52,590	2	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 15-A1-A					AR			
15-C1	Kern	Bakersfield Juvenile Center	2100 College Ave., Bakersfield	1987	82,680	4	S2/C2	Tier 2	IV	27605	County		No		AR			
15-D1	Kern	Delano/North Kern Court	1122 Jefferson St., Delano	1983	14,377	1	RM1	Tier 1	IV	9397	JCC		No		AR			
15-E1	Kern	Shafter/Wasco Courts Bldg.	325 Central Valley Hwy., Shafter	1988	16,836	1	RM1/W2	Tier 1	IV	12465	JCC		No		AR			
15-F1	Kern	Taft Courts Bldg.	311 Lincoln St., Taft	1982	6,127	1	W1A	Screening	IVb	5105	JCC		No		AR			
15-G1	Kern	East Kern Court-Lake Isabella Branch	7046 Lake Isabella Blvd., Lake Isabella	1988	14,154	1	RM1/W2	Tier 1	IV	4730	County		No		AR			
15-I1	Kern	Mojave-Main Court Facility	1773 Hwy. 58, Mojave	1974	12,112	1	RM1	Tier 1	IV	4612	County		No		AR			
15-I2	Kern	Mojave-County Administration Bldg.	1775 Hwy. 58, Mojave	circa 1978	8,538	1	RM1	Screening	IV	2782	County		No		AR			
15-J1	Kern	Ridgecrest-Main Facility	132 E. Coso St., Ridgecrest	1976	9,340	1	RM1	Tier 1	IV	6251	County		No		AR			
19-AC1	Los Angeles	San Fernando Courthouse	900 Third St., San Fernando	1976	187,874	4	C2	Tier 1	IV	110212	County		?? Bonded		AR			
19-AI1	Los Angeles	Los Padrinos Juvenile Courthouse	7281 E. Quill Dr., Downey	1955	34,167	1	C2	Tier 1	IV	6786	County		No		AR			
19-AM1-B	Los Angeles	Mechanical Tower	7500 Imperial Hwy., Downey	1986	7,670	4	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 19-AM1-A					AR			
19-AO1-B	Los Angeles	1972 Addition	7339 Painter Ave., Whittier	1969	58,502	3	C2	Tier 2	IV	Ownership & courtroom quantity & other data shown in 19-AO1-E					AR			
19-AP1-A	Los Angeles	Santa Monica Courthouse, North Wing	1725 Main St., Santa Monica	1962	36,855	2	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 19-AP1-B					AR			
19-AP1-C	Los Angeles	Santa Monica Courthouse, South Wing	1725 Main St., Santa Monica	1962	51,855	2	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 19-AP1-B					AR			
19-AR1-A	Los Angeles	West Los Angeles Courthouse, Addition	1633 Purdue Ave., Los Angeles	1976	25,129	3	C2/C2A	Screening	IVb	Ownership & courtroom quantity & other data shown in 19-AR1-E					AR			
19-AX1	Los Angeles	Van Nuys Courthouse	6230 Sylmar Ave., Van Nuys	1963	178,048	7	S4	Tier 2	IV	104502	JCC		Yes		AR			
19-N1	Los Angeles	Santa Anita Court	300 W. Maple Ave., Monrovia	1953	19,440	1	W2	Tier 1	IV	8306	JCC		No		AR			
19-Q1	Los Angeles	Children's Court	201 Centre Plaza Dr., Monterey Park	1990	263,623	6	S1	Tier 2	IV	143669	JCC		?? Bonded		AR			
23-B1	Mendocino	Justice Center	700 S. Franklin St., Fort Bragg	1989	12,586	1	W1A	Screening	IVb	4225	County		?? Bonded		AR			
24-A1	Merced	New Courts Bldg.	627 W. 24th St., Merced	1949	17,716	1	C2	Tier 1	IV	17716	JCC		No		AR			
25-A1-A	Modoc	Barclay Justice Center, East Wing	205 S East St., Alturas	1967	4,080	1	RM1	Tier 1	IV	Ownership & courtroom quantity & other data shown in 25-A1-B					AR			
27-A1	Monterey	Salinas Courthouse- North Wing	240 Church St., Salinas	1966	97,630	3	S1	Tier 1	IV	97394	County	DToT	?? Bonded	Cr/Mh/JV	AR			
29-B1-E	Nevada	Superior Court in Truckee	10075 Levon Ave, Truckee	1974	10,000	2	Varies	Tier 1	IV	5850	County		No		AR			
30-C1-A- JURY A	Orange	North Justice Center Addition	1275 N. Berkeley Ave., Fullerton	1981	2,100	1	S4	Tier 2	IV	Ownership & courtroom quantity & other data shown in 30-C1-E					AR			
30-D1-C	Orange	West Justice Center	8141 13th St., Westminster	1978	18,820	2	PC1	Tier 2	IV	Ownership & courtroom quantity & other data shown in 30-D1-A					AR			

Table 7: Seismic Risk Rating Database

County/ Bldg ID	County	Building Name	Building Address	Year from Construction Documents	Building Gross Area (JCC masterdatabase)	No. of Stories above ground	ASCE 31 Bldg. Type	Evaluation Level	DSA Rating [2016]	Court Exclusive Area [JCC CAFM]	Title Ownership JCC or County [JCC CAFM]	JCC Acquisition Type (Title or Responsibility) [JCC CAFM]	County SB10 Indemnity [Transfer Agreemts]	Type of Cases [Court's websites]	Seismic Risk Rating	Status	Total Project Retrofit Cost - Low Range (-10%)	Total Project Retrofit Cost - High Range (+15%)
30-D1-D	Orange	West Justice Center	8141 13th St., Westminster	1978	5,210	3	C2A	Tier 2	IV	Ownership & courtroom quantity & other data shown in 30-D1-A					AR			
30-D1-E	Orange	West Justice Center	8141 13th St., Westminster	1978	18,820	2	PC1	Tier 2	IV	Ownership & courtroom quantity & other data shown in 30-D1-A					AR			
30-E1-E	Orange	Harbor Justice Center, Phase I	4601 Jamboree, Newport Beach	1973	62,530	2	PC1A	Tier 1	IV	Ownership & courtroom quantity & other data shown in 30-E1-A					AR			
31-A1	Placer	Historic Courthouse	101 Maple Ave, Auburn	circa 1894	24,918	3	URMA	Tier 2	IV	17057	County		No		AR			
33-A3	Riverside	Hall of Justice	4100 Main St., Riverside	1989	167,386	7	S1	Tier 2	IV	167386	County		No		AR			
33-E1	Riverside	Palm Springs Court	3255 E. Tahquite Canyon Way, Palm Springs	circa 1962	51,336	1	RM1/W1	Tier 1	IV	15878	County		No		AR			
33-H1	Riverside	Temecula	41002 County Center Dr., Temecula	1988	12,557	1	W2	Tier 1	IV	8899	County		No		AR			
33-N1	Riverside	Juvenile Justice Center	9991 Country Farm Rd., Riverside	1986	6,614	1	C2A	Tier 1	IV	14400	County		Yes		AR			
36-A1	San Bernardino	Central Courthouse	351 N. Arrowhead Ave, San Bernadino	1926	118,580	4	C2	Tier 1	IV						AR			
36-A2	San Bernardino	Central Courthouse - Annex	351 N. Arrowhead Ave, San Bernadino	1958	79,667	6	C3	Tier 2	IV						AR			
36-B1	San Bernardino	Juvenile Court	900 E. Gilbert St., San Bernadino	1968	8,149	1	RM2	Screening	IVb						AR			
36-F1	San Bernardino	Rancho Cucamonga Courthouse	8303 Haven Ave., Rancho Cucamonga	1984	261,155	4	Base Isolat	Screening	IVb	138225	County		No		AR			
36-G1	San Bernardino	Chino Courthouse	13260 Central Ave., Chino	1976	47,261	2	RM1	Tier 1	IV	17389	City		No		AR			
36-J1	San Bernardino	Barstow Courthouse	235 E. Mountain View Ave., Barstow	1975	35,702	2	RM2	Tier 1	IV	20185	County		No		AR			
36-K1	San Bernardino	Needles Courthouse	1111 Bailey St., Needles	1972	12,574	1	RM1	Screening	IVb	2583	County		No		AR			
37-C1	San Diego	Kearny Mesa Court	8950 Clairemont Mesa Blvd., San Diego	circa 1960	41,450	1	RM1	Tier 1	IV	39897	JCC		Yes		AR			
37-E1	San Diego	Juvenile Court	2851 Meadowlark Dr., San Diego	1977	46,759	2	RM1	Screening	IVb	30738	JCC		No		AR			
37-F2-B	San Diego	North County Regional Center - Vista Center Addition	325 S. Melrose, San Diego	circa 1972	12,500	1	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 37-F2-A					AR			
37-F2-C	San Diego	North County Regional Center - Vista Center Addition	325 S. Melrose, San Diego	circa 1972	58,150	1	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 37-F2-A					AR			
37-F2-D	San Diego	North County Regional Center - Vista Center Addition	325 S. Melrose, San Diego	1986	48,000	2	C2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 37-F2-A					AR			
37-I1-A	San Diego	East County Regional Center	250 E. Main St., El Cajon	1980	230,000	10	S1	Tier 2	IV	137824	JCC		Yes		AR			
37-I1-B	San Diego	East County Regional Center	250 E. Main St., El Cajon	1980	44,230	5	S2/S4	Tier 2	IV	Ownership & courtroom quantity & other data shown in 37-I1-A					AR			
37-I1-C	San Diego	East County Regional Center	250 E. Main St., El Cajon	1980	30,000	2	S2/S4	Tier 2	IV	Ownership & courtroom quantity & other data shown in 37-I1-A					AR			
37-J1	San Diego	Ramona Courthouse	1425 Montecito Rd., Ramona	1972	17,315	1	W1A	Tier 1	IV	3622	County		No		AR			
39-B1	San Joaquin	Juvenile Justice Center	535 W. Mathews Rd., French Camp	1982	12,740	1	RM1	Tier 1	IV	11497	County		No		AR			
39-C1	San Joaquin	Manteca Branch Court	315 E. Center St., Manteca	1970	6,425	1	RM1	Tier 1	IV	15010	JCC		No		AR			
39-E1	San Joaquin	Tracy Branch Courthouse	475 E. 10th St., Tracy	circa 1968	6,714	1	RM1	Tier 1	IV	6900	JCC		No		AR			
41-A1	San Mateo	Hall of Justice	400 County Center, Redwood City	1954	316,515	8	S1	Tier 2	IV	141227	County		?? Bonded		AR			
41-B1	San Mateo	Central Branch	800 North Humbolt St., San Mateo	1960	17,438	1	RM1/W2	Tier 1	IV	17507	County	ToR/ToT	Yes	CLOSED - No court service offe	AR			
42-D1-A	Santa Barbara	Lompoc Municipal Court, South Wing	115 Civic Center Plaza, Lompoc	1956	14,800	1	W2	Tier 1	IV	Ownership & courtroom quantity & other data shown in 42-D1-B					AR			
43-A1	Santa Clara	Hall of Justice	190 W. Hedding, San Jose	1988	127,139	6	S1/S2	Tier 2	IV	138900	County		??Bonded		AR			
43-A2	Santa Clara	San Jose Municipal Court	200 W. Hedding, San Jose	1960	69,810	4	C2	Tier 2	IV	70100	County		??Bonded		AR			
43-B1	Santa Clara	Downtown Superior Courthouse	191 N. First St., San Jose	1962	126,005	5	C2b	Tier 1	IV	82819	JCC		No		AR			
43-B2	Santa Clara	Old County Courthouse	161 N. First St., San Jose	circa 1866	33,557	3	S4b	Screening	IVb	30600	JCC		No		AR			
43-D1	Santa Clara	Palo Alto Facility	270 Grant St., Palo Alto	1960	83,451	4	C2	Tier 2	IV	40878	County		No		AR			
43-F1	Santa Clara	Sunnyvale Facility	605 W. El Camino Real, Sunnyvale	1966	19,994	1	W2	Tier 1	IV	13372	JCC		No		AR			
43-G1	Santa Clara	Santa Clara Municipal Courts	1095 Homestead Rd., Santa Clara	1974	33,559	2	S2	Tier 2	IV	19112	JCC		No		AR			
46-A1-A	Sierra	Courthouse/Sheriff Station-Jail, Stairwell	100 Courthouse Square, Downieville	1993	1,000	2	RM1	Tier 1	IV	Ownership & courtroom quantity & other data shown in 46-A1-E					AR			
47-B1	Siskiyou	Dorris	324 N. Pine St., Dorris	circa 1974	2,585	1	W1	Tier 1	IV	1647	JCC		No		AR			
48-A2	Solano	Law and Justice Center - Fairfield	530 Union Ave., Fairfield	1988	258,850	5	C2b	Screening	IVb						AR			
48-B1-A	Solano	Hall of Justice, 1974 Addition	321 Tuolumne St. Vallejo	1974	30,400	1	C2	Tier 2	IV	Ownership & courtroom quantity & other data shown in 48-B1-E					AR			
50-A1	Stanislaus	Modesto Main Courthouse	1100 I St., Modesto	1958	60,404	2	C2	Tier 1	IV	63957	JCC		?? Bonded		AR	FTBR		
50-B1	Stanislaus	Modesto Juvenile Court	2215 Blue Gum, Modesto	1976	9,200	1	RM1/RM2	Tier 1	IV	2085	County		No		AR			
50-D1	Stanislaus	Turlock Municipal Court	300 Starr Ave., Turlock	1975	4,735	1	W2	Tier 1	IV	2851	County		No		AR			
54-A1-A1	Tulare	Visalia Superior Court, East Wing	221 South Mooney Blvd., Visalia	1955	20,000	1	S1	Tier 2	IV	Ownership & courtroom quantity & other data shown in 54-A1-A					AR			
56-A1-A	Ventura	Hall of Justice, Second Wing	800 S. Victoria Ave., Ventura	1975	150,057	3	S2	Tier 2	IV	193044	County		?? Bonded		AR			
56-A1-B	Ventura	Hall of Justice, Main Wing	800 S. Victoria Ave., Ventura	1975	200,000	4	S2	Tier 2	IV	Ownership & courtroom quantity & other data shown in 56-A1-A					AR			

RECOMMENDED ACTION PLANS AND FOLLOW-UP ACTIVITIES

The following action plans are provided to guide follow-up activities associated with development of detailed plans for mitigation of seismic risk for selected buildings in the VHR and HR categories.

ACTION PLAN FOR DEVELOPING SEISMIC RISK MITIGATION SCHEMES FOR BUILDINGS DESIGNATED AS VHR AND HR

Activity	Tasks	Resources
1. Select	☐ From Very High and High Risk buildings, choose 20–25 highest SRR structures, for which Judicial Council has: o Responsibility or title, and is a majority occupant	• Judicial Council Capital Program staff • Judicial Council Real Estate staff
2. Research	☐ Building condition: On-site visits; Deficiency Report (2005) ☐ Court Master Plan (2002–2004) ☐ Previous retrofit studies (if any)	• Judicial Council Capital Program staff • Judicial Council FMU staff
3. Decision	☐ Is building a Good Candidate for Investment? ☐ Proceed with Feasibility Studies–Yes / No ☐ Determine purpose of Feasibility Studies ☐ Participation and responsibility of the court in studies	• Judicial Council Capital Program staff and director
4. Feasibility Studies–Project Specific	☐ Determine scope of retrofit o Structural only? o Court operations–relocate? ☐ Create cost model ☐ Determine project schedule ☐ Publish reports–one per building in standard format	Retain Consultant = an architect, a structural engineer, and a CM cost estimator.

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2. American Society of Civil Engineers (ASCE), *Seismic Evaluation of Buildings,* ASCE 31-02 Structural Engineering Institute of the American Society of Civil Engineers, Reston, VA, 2002

3. HAZUS (earthquake), Federal Emergency Management Agency (FEMA), 1997

4. HAZUS AEBM (Advanced Engineering Building Module), 2003

Seismic Risk Rating of California Superior Court Buildings Volume 2

PREPARED BY
RUTHERFORD+CHEKENE

OCTOBER 23, 2017

JUDICIAL COUNCIL
OF CALIFORNIA

INTRODUCTION

The proposed seismic rating system utilizes the HAZUS AEBM methodology as a tool to define the relative seismic risk among buildings in JCC's inventory.

HAZUS is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods and hurricanes. HAZUS (seismic) was launched in 1997 by the Federal Emergency Management Agency (FEMA). HAZUS AEBM (Advanced Engineering Building Module) was released in 2003, as an adaptation of HAZUS earthquake methodology for use in single buildings.

In mid to late 2000's, the California Office of Statewide Health Planning and Development (OSHPD), the Agency responsible for seismic safety of hospitals in California, adapted HAZUS AEBM as a "screening tool" to evaluate life safety risk to occupants of California Acute Care Hospitals. In 2010, HAZUS AEBM methodology was adapted by the Department of Veterans Affairs for seismic risk assessment of (VA) Hospital Buildings.

The HAZUS AEBM methodology has been adapted to this project as follows:

- The methodology follows the modifications as outlined by OSHPD in the California Administrative Code 2013 Appendix H to Chapter 6.

- Adjustments have been made to capture multi-story wood frame buildings with severe weak story deficiencies.

- For Buildings that are designed after 1975, the methodology follows the modifications as outlined in "Seismic Risk Assessment of VA Hospital Buildings - Risk Assessment Methods Phase 1 Report" prepared by the National Institute of Building Sciences dated April 13, 2010.

The Seismic Risk Rating (SRR) is established for each building based on the probability of collapse (POC) values determined from the HAZUZ AEBM methodology mentioned above. The POC values are calculated based on the following key parameters:

- Structural capacity of each building: The structural capacity is derived from the seismic design coefficient (base shear - Cs) determined for each building based on the lateral force resisting system (Model Building Type), size, location and the age of the building.

- Seismic Hazard: BSE-2E seismic hazard level at each site determined based on ASCE 41-13, "Seismic Evaluation and Retrofit of Existing Buildings" was used. BSE-2E is taken as a seismic hazard with 5 % probability of exceedance in 50 years at a site.

- Significant Structural Deficiencies that influence building capacity and building response (degradation, maximum drift, modal shape factor, complete structural damage fragilities, and the collapse factor.)

The description of input parameters for calculation of Seismic Risk Rating (SRR) along with a glossary of key terminology has been provided in the following pages. For the HAZUS AEBM parameters used to calculate the SRR, please refer to Attachments 1 & 2.

Rankings of Seismic Risk Rating (SRR)		
VHR	SRR > 10	Buildings of **Very High Risk** recommended as highest priority for mitigation of risk.
HR	2 < SRR <10	Buildings of **High Risk** recommended as high priority for mitigation of risk.
MR	SRR < 2	Buildings of **Moderate Risk** recommended as intermediate priority for mitigation of risk compared to the others.
NR/PR	Building Structures that were not evaluated or the seismic evaluation was incomplete due to inadequate information to allow assessment of the building structures. Furthermore, these structures are expected to be replaced when the capital project ready to start construction is funded.	
AR	Retrofitted buildings or buildings meeting SB 1732 Seismic Safety Criteria as determined by an evaluation report are categorized as **Acceptable Rating.**	

Seismic Risk Rating and Ranking Notes:

1. SB 1732 Seismic Safety Criteria was established in 2003 as part of Superior Courts of California Seismic Assessment Program, in accordance with the Trial Court Facilities Act of 2002. The Program involved the seismic evaluation of courts facilities based on ASCE 31, Standards for Seismic Evaluation of Buildings. Court-buildings were assigned seismic risk level from I to VII (Risk Level I representing the best performance and VII representing the worst performance). Buildings that met the ASCE 31 standard for life-safety were assigned Risk Level IV or better. On the other hand, buildings that did not meet the ASCE 31 life-safety standard were assigned a Risk Level V or worse. Risk Level V or worse represents an “unacceptable seismic safety rating”. The ASCE 31 has now been updated and replaced by ASCE 41-13, Standards for Seismic Evaluation and Retrofit of Existing Buildings. The ASCE 31 life-safety (structural and selective nonstructural) performance is similar to life-safety (structural and nonstructural) performance in BSE-1E in accordance with ASCE 41-13.

2. All buildings in MR/HR/VHR rankings have a DSA Rating V or worse, meaning they do not meet the JCC Seismic Safety Criteria (ASCE 31 life-safety performance). A “MR” ranking simply means that it has a lower risk compared to the others.

3. The dividing line between VHR/HR and MR ranking is set for purpose of this methodology to be consistent with rankings used by other agencies (e.g. State of

California DGS, OSHPD, University of California, and Stanford University) as having high risk to life safety.

4. The dividing line between VHR and HR rankings is set for purpose of this methodology to identify buildings of known high collapse potential such as Unreinforced Masonry Bearing Walls (URM) and Non-ductile Concrete Frames (C1) in high seismic regions.

5. The Seismic Risk Rating is best used for comparison of relative risk of many buildings, rather than evaluation of individual buildings. The SRR is not calibrated to performance objectives of ASCE 31, ASCE 41 or other rating systems.

6. The SRR does not consider the seismic hazard associated with nonstructural components.

7. The SRR does not consider the impact of Geological Site Hazards (such as Liquefaction, Slope Stability, and Surface Fault Rupture).

8. Extraction of data from evaluation reports:

- For calculation of SRR values, building data is extracted from existing seismic evaluation reports.

- Structural drawings are not reviewed as the intent of this Report was to develop ratings quickly, and not to engage in re-evaluation of the buildings

DESCRIPTION OF INPUT PARAMETERS FOR CALCULATION OF SEISMIC RISK RATING:

BSE2E- S_{XS}: From USGS website
http://earthquake.usgs.gov/designmaps/us/application.php
Design Code Reference Document: 2013 ASCE 41
Earthquake Hazard Level: BSE-2E

BSE2E-S_{X1}: From USGS website
http://earthquake.usgs.gov/designmaps/us/application.php
Design Code Reference Document: 2013 ASCE 41
Earthquake Hazard Level: BSE-2E

Long Period Transition Period T_L: From USGS website
http://earthquake.usgs.gov/designmaps/us/application.php
Design Code Reference Document: 2010 ASCE 7 (w/March 2013 errata)
T_L is included in the detailed report

Seismicity for determination of Kappa Factor: Seismicity (Low, Moderate, Moderately High, High or Very High) determined from following table. (Table 5-1 of FEMA P-155)

Table 5-1 Range and Median MCE_R Spectral Response Acceleration Values in Each Seismicity Region

Seismicity Region	Range of Response Values for Each Region		Median Response Values for Each Region	
	S_S (g)	S_1 (g)	$S_{S,avg}$ (g)	$S_{1,avg}$ (g)
Low (L)	$S_S < 0.250g$	$S_1 < 0.100g$	0.20	0.08
Moderate (M)	$0.250g \leq S_S < 0.500g$	$0.100g \leq S_1 < 0.200g$	0.40	0.16
Moderately High (MH)	$0.500g \leq S_S < 1.000g$	$0.200g \leq S_1 < 0.400g$	0.80	0.32
High (H)	$1.000g \leq S_S < 1.500g$	$0.400g \leq S_1 < 0.600g$	1.20	0.48
Very High (VH)	$S_S \geq 1.500g$	$S_1 \geq 0.600g$	2.25	0.90

S_S and S_1 are determined from USGS website:
http://earthquake.usgs.gov/designmaps/us/application.php
Design Code Reference Document: 2010 ASCE 7 (w/March 2013 errata)
Risk Category: I or II or III

- For low and moderate seismicity kappa factor is based on Minimum distance to fault > 50 km
- For moderately high seismicity, kappa factor is based on Minimum distance to fault= 25-50 km, Maximum Magnitude > 7.0

- For high and very high seismicity, kappa factor is based on Minimum distance to fault= 10-25 km, Maximum Magnitude > 7.0

Number of stories above ground: Does not include small penthouses.

Design Year: Year of the California Building Code (CBC/UBC) used for the original building design; for pre-1933 buildings the design year is reported.

UBC Seismic Zone: Based on the location of the building, UBC Zone is determined from CBC 98. Refer to Figure-1.

Model Building Type: Refer to Table-1.

Deficiencies: Refer to Table-2. "TRUE" means deficiency exists. "FALSE" means deficiency does not exist.

Important Note:

- For C1 buildings with shear failure deficiency, weak story irregularity and deflection incompatibility deficiencies is considered to be "TRUE".
- For S1 buildings, that are Pre-Northridge, soft story irregularity deficiency is considered to be "TRUE".

Optional input as such:

Building height above ground: An entry for H_r indicates that H_r in equation A6-.6 of Appendix H to Chapter 6 of 2013 California Building Code is overwritten.

C_s: An entry for C_s indicates that C_s in equation A6-2 of Appendix H to Chapter 6 of 2013 California Building Code is overwritten.

T_e: An entry for T_e indicates that T_e in equation A6-3 of Appendix H to Chapter 6 of 2013 California Building Code is overwritten.

Seismic Design Level: For post-1975 buildings, an entry for Seismic Design Level indicates that the Seismic Design Level per Table 2.2 of HAZUS AEBM Technical is overwritten.

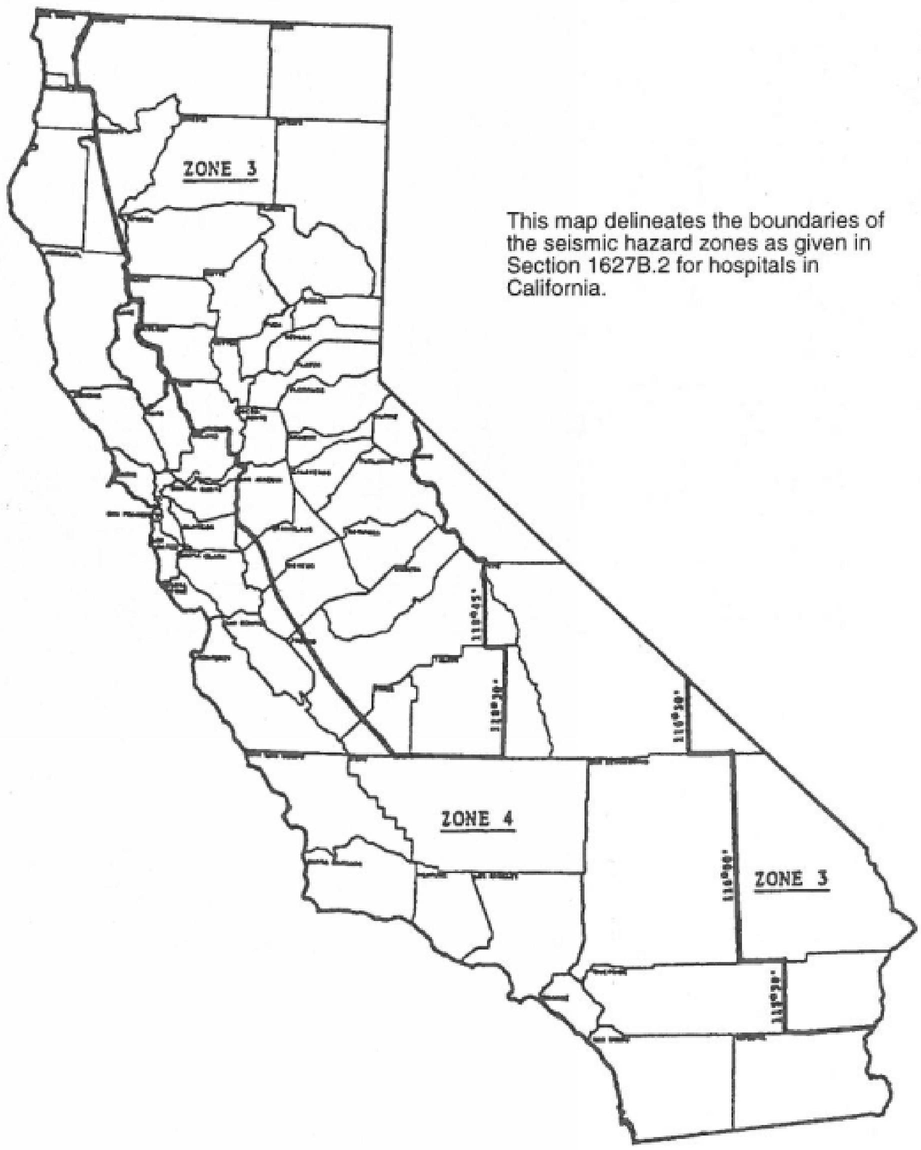

FIGURE 16B-2—SEISMIC *HAZARD* ZONE MAP *FOR HOSPITALS IN CALIFORNIA*

Figure 1 – Seismic Zone Map

Table-1: Model Building Type (From ASCE 41-13 Table 3-1)	
W1 Wood Light Frames	These buildings are single- or multiple-family dwellings one or more stories high. Building loads are light, and the framing spans are short. Floor and roof framing consists of wood joists or rafters on wood studs spaced no more than 24 in. apart. The first-floor framing is supported directly on the foundation system or is raised up on cripple studs and post-and-beam supports. The foundation may consist of a variety of elements. Chimneys, where present, consist of solid brick masonry, masonry veneer, or wood frame with internal metal flues. Seismic forces are resisted by wood frame diaphragms and shear walls. Floor and roof diaphragms consist of straight or diagonal lumber sheathing, tongue-and-groove planks, oriented strand board, or plywood. Shear walls consist of straight or lumber sheathing, plank siding, oriented strand board, plywood, stucco, gypsum board, particle board, or fiberboard. Interior partitions are sheathed with plaster or gypsum board.
W2 Wood Frames, Commercial and Industrial	These buildings are commercial or industrial buildings with a floor area of 5,000 ft^2 or more. There are few, if any, interior walls. The floor and roof framing consists of wood or steel trusses, glulam or steel beams, and wood posts or steel columns. The foundation system may consist of a variety of elements. Seismic forces are resisted by wood diaphragms and exterior stud walls sheathed with plywood, oriented strand board, stucco, plaster, or straight or diagonal wood sheathing, or they may be braced with rod bracing. Wall openings for storefronts and garages, where present, are framed by post-and-beam framing.
S1 (with Stiff Diaphragms)	These buildings consist of a frame assembly of steel beams and steel columns. Floor and roof framing consists of cast-in-place concrete slabs or metal deck with concrete fill supported on steel beams, open web joists, or steel trusses. Seismic forces are resisted by steel moment frames that develop their stiffness through rigid or semi-rigid beam– column connections. Where all connections are moment-resisting connections, the entire frame participates in seismic force resistance. Where only selected connections are moment-resisting connections, resistance is provided along discrete frame lines. Columns are oriented so that each principal direction of the building has columns resisting forces in strong axis bending. Diaphragms consist of concrete or metal deck with concrete fill and are stiff relative to the frames. Where the exterior of the structure is concealed, walls consist of metal panel curtain walls, glazing, brick masonry, or precast concrete panels. Where the interior of the structure is finished, frames are concealed by ceilings, partition walls, and architectural column furring. The foundation system may consist of a variety of elements.
S1A Steel Moment Frames (with Flexible Diaphragms)	These buildings are similar to S1 buildings, except that diaphragms consist of wood framing; untopped metal deck; or metal deck with lightweight insulating concrete, poured gypsum, or similar nonstructural topping, and are flexible relative to the frames
S2 Steel Braced Frames (with Stiff Diaphragms)	These buildings have a frame of steel columns, beams, and braces. Braced frames develop resistance to seismic forces by the bracing action of the diagonal members. The braces induce forces in the associated beams and columns such that all elements work together in a manner similar to a truss; all element stresses are primarily axial. Diaphragms transfer seismic loads to braced frames. The diaphragms consist of concrete or metal deck with concrete fill and are stiff relative to the frames. The foundation system may consist of a variety of

Table-1: Model Building Type (From ASCE 41-13 Table 3-1)	
	elements. Three variations in the configuration and design of braced frames exist. These variations are • Concentrically braced frames: Component work lines intersect at a single point or at multiple points such that the distance between intersecting work lines (or eccentricity) is less than or equal to the width of the smallest component connected at the joint. • Eccentrically braced frames: Component work lines do not intersect at a single point, and the distance between the intersecting work lines (or eccentricity) exceeds the width of the smallest component connecting at the joint. Some of the members are subjected to shear and flexural stresses because of that eccentricity. • Buckling restrained braced frames: Special types of concentrically braced frames where the steel bracing members are encased within a rigid casing that is intended to prevent buckling of the steel brace.
S2A Steel Braced Frames (with Flexible Diaphragms)	These buildings are similar to S2 buildings, except that diaphragms consist of wood framing; untopped metal deck; or metal deck with lightweight insulating concrete, poured gypsum, or similar nonstructural topping, and are flexible relative to the frames
S3 Steel Light Frames	These buildings are pre-engineered and prefabricated with transverse rigid steel frames. They are one-story high. The roof and walls consist of lightweight metal, fiberglass, or cementitious panels. The frames are designed for maximum efficiency, and the beams and columns consist of tapered, built-up sections with thin plates. The frames are built-in segments assembled in the field with bolted or welded joints. Seismic forces in the transverse direction are resisted by the rigid frames. Seismic forces in the longitudinal direction are resisted by wall panel shear elements or rod bracing. Diaphragm forces are resisted by untopped metal deck, roof panel shear elements, or a system of tension-only rod bracing. The foundation system may consist of a variety of elements
S4 Dual Frame Systems with Backup Steel Moment Frames and Stiff Diaphragms	These buildings consist of a frame assembly of steel beams and steel columns. The floor and roof diaphragms consist of cast-in-place concrete slabs or metal deck with or without concrete fill. Framing consists of steel beams, open web joists, or steel trusses. Seismic forces are resisted primarily by either steel braced frames or cast-in-place concrete shear walls in combination with backup steel moment frames. These walls are bearing walls where the steel frame does not provide a complete vertical support system. The steel moment frames are designed to work together with the steel braced frames or concrete shear walls in proportion to their relative rigidity. The steel moment frames provide a secondary seismic-force- resisting system based on the stiffness of the frame and the moment capacity of the beam–column connections. The moment frames are typically capable of resisting 25% of the building 's seismic forces. The foundation system may consist of a variety of elements.
S5 Steel Frames with Infill Masonry Shear Walls (with Stiff Diaphragms)	This is an older type of building construction that consists of a frame assembly of steel beams and steel columns. The floor and roof diaphragms consist of cast-in-place concrete slabs or metal deck with concrete fill and are stiff relative to the walls. Framing consists of steel beams, open web joists, or steel trusses. Walls consist of infill panels constructed of solid clay brick, concrete block, or hollow clay tile masonry. Infill walls may completely encase the frame members and present a smooth masonry exterior with no indication of the frame. The seismic performance of this type of construction depends on the interaction between the

Table-1: Model Building Type (From ASCE 41-13 Table 3-1)	
	frame and infill panels. The combined behavior is more like a shear wall structure than a frame structure. Solidly infilled masonry panels form diagonal compression struts between the intersections of the frame members. If the walls are offset from the frame and do not fully engage the frame members, diagonal compression struts do not develop. The strength of the infill panel is limited by the shear capacity of the masonry bed joint or the compression capacity of the strut. The post-cracking strength is determined by an analysis of a moment frame that is partially restrained by the cracked infill. The foundation system may consist of a variety of elements.
S5A Steel Frames with Infill Masonry Shear Walls (with Flexible Diaphragms)	These buildings are similar to S5 buildings, except that diaphragms consist of wood sheathing or untopped metal deck, or have large aspect ratios and are flexible relative to the walls.
C1 Concrete Moment Frames	These buildings consist of a frame assembly of cast-in-place concrete beams and columns. Floor and roof framing consists of cast-in-place concrete slabs, concrete beams, one-way joists, two-way waffle joists, or flat slabs. Seismic forces are resisted by concrete moment frames that develop their stiffness through monolithic beam–column connections. In older construction, or in levels of low seismicity, the moment frames may consist of the column strips of two-way flat slab systems. Modern frames in levels of high seismicity have joint reinforcing, closely spaced ties, and special detailing to provide ductile performance. This detailing is not present in older construction. The foundation system may consist of a variety of elements.
C2 Concrete Shear Walls (with Stiff Diaphragms)	These buildings have floor and roof framing that consists of cast-in-place concrete slabs, concrete beams, one-way joists, two-way waffle joists, or flat slabs. Buildings may also have steel beams, columns, and concrete slabs for the gravity framing. Floors are supported on concrete columns or bearing walls. Seismic forces are resisted by cast-in-place concrete shear walls. In older construction, shear walls are lightly reinforced but often extend throughout the building. In more recent construction, shear walls occur in isolated locations, are more heavily reinforced, and have concrete slabs that are stiff relative to the walls. The foundation system may consist of a variety of elements.
C2A Concrete Shear Walls (with Flexible Diaphragms)	These buildings are similar to C2 buildings, except that diaphragms consist of wood sheathing, or have large aspect ratios, and are flexible relative to the walls.
C3 Concrete Frames with Infill Masonry Shear Walls (with Stiff Diaphragms)	This is an older type of building construction that consists of a frame assembly of cast-in-place concrete beams and columns. The floor and roof diaphragms consist of cast-in-place concrete slabs and are stiff relative to the walls. Walls consist of infill panels constructed of solid clay brick, concrete block, or hollow clay tile masonry. The seismic performance of this type of construction depends on the interaction between the frame and the infill panels. The combined behavior is more like a shear wall structure than a frame structure. Solidly infilled masonry panels form diagonal compression struts between the intersections of the frame members. If the walls are offset from the frame and do not fully engage the frame members, the diagonal compression struts do not develop. The strength of the infill panel is limited by the shear capacity of the masonry bed joint or the compression capacity of the strut. The postcracking strength is determined by an analysis of a moment frame that is partially restrained by the cracked infill. The shear strength of the concrete columns, after racking of the infill, may limit the

Table-1: Model Building Type (From ASCE 41-13 Table 3-1)	
	semiductile behavior of the system. The foundation system may consist of a variety of elements.
C3A Concrete Frames with Infill Masonry Shear Walls (with Flexible Diaphragms)	These buildings are similar to C3 buildings, except that diaphragms consist of wood sheathing or untopped metal deck or have large aspect ratios and are flexible relative to the walls.
PC1 Precast or Tilt-Up Concrete Shear Walls (with Flexible Diaphragms)	These buildings have precast concrete perimeter wall panels that are typically cast on-site and tilted into place. Floor and roof framing consists of wood joists, glulam beams, steel beams, or open web joists. Framing is supported on interior steel or wood columns and perimeter concrete bearing walls. The floors and roof consist of wood sheathing or untopped metal deck. Seismic forces are resisted by the precast concrete perimeter wall panels. Wall panels may be solid or have large window and door openings that cause the panels to behave more as frames than as shear walls. In older construction, wood framing is attached to the walls with wood ledgers. The foundation system may consist of a variety of elements.
PC1A Precast or Tilt-Up Concrete Shear Walls (with Stiff Diaphragms)	These buildings are similar to PC1 buildings, except that diaphragms consist of precast elements, cast-in-place concrete, or metal deck with concrete fill and are stiff relative to the walls.
PC2 Precast Concrete Frames (with Shear Walls)	These buildings consist of a frame assembly of precast concrete girders and columns with the presence of shear walls. Floor and roof framing consists of precast concrete planks, tees, or double-tees supported on precast concrete girders and columns. Seismic forces are resisted by precast or cast-in-place concrete shear walls. Diaphragms consist of precast elements interconnected with welded inserts, cast-in-place closure strips, or reinforced concrete topping slabs. The foundation system may consist of a variety of elements.
PC2A Precast Concrete Frames (without Shear Walls)	These buildings are similar to PC2 buildings, except that concrete shear walls are not present. Seismic forces are resisted by precast concrete moment frames that develop their stiffness through beam–column joints rigidly connected by welded inserts or cast-in-place concrete closures. Diaphragms consist of precast elements interconnected with welded inserts, cast-in-place closure strips, or reinforced concrete topping slabs. The foundation system may consist of a variety of elements.
RM1Reinforced Masonry Bearing Walls with Flexible Diaphragms	These buildings have bearing walls that consist of reinforced brick or concrete block masonry. The floor and roof framing consists of steel or wood beams and girders or open web joists and are supported by steel, wood, or masonry columns. Seismic forces are resisted by the reinforced brick or concrete block masonry shear walls. Diaphragms consist of straight or diagonal wood sheathing, plywood, or untopped metal deck and are flexible relative to the walls. The foundation system may consist of a variety of elements.
RM2 Reinforced Masonry Bearing Walls with Stiff Diaphragms	These building are similar to RM1 buildings, except that the diaphragms consist of metal deck with concrete fill, precast concrete planks, tees, or double-tees, with or without a cast-in-place concrete topping slab and are stiff relative to the walls. The floor and roof framing is supported on interior steel or concrete frames or interior reinforced masonry walls. The foundation system may consist of a variety of elements.

Table-1: Model Building Type (From ASCE 41-13 Table 3-1)	
URM Unreinforced Masonry Bearing Walls (with Flexible Diaphragms)	These buildings have perimeter bearing walls that consist of unreinforced clay brick, stone, or concrete masonry. Interior bearing walls, where present, also consist of unreinforced clay brick, stone, or concrete masonry. In older construction, floor and roof framing consists of straight or diagonal lumber sheathing supported by wood joists, which, in turn, are supported on posts and timbers. In more recent construction, floors consist of structural panel or plywood sheathing rather than lumber sheathing. The diaphragms are flexible relative to the walls. Where they exist, ties between the walls and diaphragms consist of anchors or bent steel plates embedded in the mortar joints and attached to framing. The foundation system may consist of a variety of elements.
URMA Unreinforced Masonry Bearing Walls (with Stiff Diaphragms)	These buildings are similar to URM buildings, except that the diaphragms are stiff relative to the unreinforced masonry walls and interior framing. In older construction or large, multi-story buildings, diaphragms consist of cast-in-place concrete. In levels of low seismicity, more recent construction consists of metal deck and concrete fill supported on steel framing. The foundation system may consist of a variety of elements.

Table-2: Structural Deficiencies (From ASCE 41-13)	
Redundancy	The number of lines of moment frames/shear walls/braced frames in each principal direction is greater than or equal to 2. The number of bays of moment frames in each line is greater than or equal to 2. The number of braced bays in each line is greater than 2.
Weak Story Irregularity	The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.
Soft Story Irregularity	The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force resisting system stiffness of the three stories above.
Mass Irregularity	There is no change in effective mass more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.
Vertical Discontinuity	All vertical elements in the seismic-force-resisting system are continuous to the foundation.
Torsional Irregularity	The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.
Deflection Compatibility	Secondary components have the shear capacity to develop the flexural strength of the components.
Short Column	There are no columns at a level with height/depth ratios less than 50% of the nominal height/depth ratio of the typical columns at that level.
Wood Deterioration	There shall be no signs of decay, shrinkage, spitting, fire damage. or sagging in any of the wood members and none of the metal connection hardware shall be deteriorated, broken or loose.
Steel Deterioration	There shall be no visible rusting, corrosion, cracking, or other deterioration in any of the steel elements or connections in the vertical-or lateral-force-resisting systems.
Concrete Deterioration	There shall be no visible deterioration of concrete or reinforcing steel in any of the vertical-or lateral-force-resisting elements.
Weak Column-Steel	The percentage of strong column-weak beam joints in each story of each line of moment frames is greater than 50 %.
Weak Column-Concrete	The sum of moment capacity of the columns is 20% greater than that of the beams at frame joints.
Cripple Wall Bracing	Cripple walls below first-floor-level shear walls are braced to the foundation with wood structural panels.
Topping Slab	Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab.
Wall Anchorage	Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 4.5.3.7. The connection between the wall panels and the diaphragm does not include cross-grain bending or tension in the wood ledgers.
Load Path Deficiency	The structure shall contain complete, well-defined load path, including structural elements and connections, that serves to transfer the internal forces associated with the mass of all elements of the building to the foundation.
URM Wall height to	The height-to-thickness ratio of the shear walls at each story is less than the

Table-2: Structural Deficiencies (From ASCE 41-13)	
thickness ratio	following: Top story of multi-story building :9 First story of multi-story building: 15 All other conditions: 13
URM parapets	Laterally unsupported unreinforced masonry parapets have height-to-thickness ratios no greater than 1.5
Openings in diaphragm at shear walls	Diaphragm openings immediately adjacent to the shear walls are less than 25% of the wall length.

GLOSSARY OF TERMS

S_{XS}: Short Period Spectral Response Acceleration in Basic Safety Earthquake 2 (E) (BSE-2E), adjusted for site class, for determining level of seismicity

S_{X1}: Spectral Response Acceleration at a one-second period in Basic Safety Earthquake 2 (E) (BSE-2E), adjusted for site class, for determining level of seismicity

BSE-2E: Basic Safety Earthquake-2 for use with Basic Performance Objective for Existing Buildings, taken as the seismic hazard with 5 % probability of exceedance in 50 years, but not greater than the BSE-2N, at a site.

BSE-2N: Basic Safety Earthquake-2 for use with the Basic Performance Objective Equivalent to New Building Standards, taken as the ground shaking based on the Risk-Targeted Maximum Considered Earthquake (MCE_R) per ASCE 7 at the site.

T_L: The long-period transition parameter, to be obtained from UGSG website.

C_s: Seismic Response Coefficient that the building was design to. "0" if default values are preferred.

T_e: Elastic period of the building. "0" if default values are preferred.

Seismic Design Level: Seismic Design Level that the building was design to. Options are HC (High Code), MC (Moderate Code), LC (Low Code), PC (Pre Code). "0" if default value per Table 2.2 is preferred.

A_y: Spectral Acceleration at Yield Point

D_y: Spectral Displacement at Yield Point

A_u: Spectral Acceleration at Ultimate Point

D_u: Spectral Displacement at Ultimate Point

Sd,CD: Median spectral displacement of the Complete Structural Damage

betaCD: Lognormal standard deviation- complete structural damage

P[COL|STR5]: Collapse factor

be: Elastic damping

kappa: Degradation factor

api: Spectral acceleration at the performance point

dpi: Spectral displacement at the performance point

P[STR5]: Probability of Complete Structural Damage (See HAZUS-MH MR1 AEBM Technical and User's Manual- Equation 2-2)

Seismic Risk Rating: P[COL|STR5] x P[STR5]

ATTACHMENT 1
HAZUS AEBM PARAMETERS

APPENDIX H TO CHAPTER 6
HAZUS AEBM REGULATIONS

6-A1 HAZUS AEBM technology. The Federal Emergency Management Agency (FEMA)/National Institute of Building Sciences (NIBS) Multi-Hazard Loss Estimation Technology (HAZUS-MH MR2) and, specifically, the HAZUS Advanced Engineering Building Module (AEBM) are used by the Office with building-specific parameters, described in this appendix, to evaluate the Probability of Collapse of SPC-1 buildings.

6-A2 Probability of collapse. The Probability of Collapse, P[COL], is calculated by Equation (A6-1):

$$P[COL] = P[COL|STR_5] \times P[STR_5] \qquad \text{(A6-1)}$$

where:

P[COL|STR_5] = collapse factor of the HAZUS AEBM, as modified herein, and

P[STR_5] = probability of Complete Structural Damage, based on HAZUS AEBM methods and parameters, as modified herein.

6-A3 Building-specific properties. Building-specific properties are based on the building type (structural system), or Model Building Type (MBT), building height (number of stories above seismic base), building age (pre-1933, 1933 – 1961 or post-1961 design vintage), availability of materials testing data, and Significant Structural Deficiencies.

Table A6-1 lists Significant Structural Deficiencies. Table A6-1 includes older buildings (pre-1933 buildings) and buildings that do not have available materials test data, and treats these conditions as Significant Structural Deficiencies.

SPC-1 buildings with no Significant Structural Deficiencies are evaluated using "Baseline" values of building-specific properties. SPC-1 buildings with one or more Significant Structural Deficiencies are evaluated using Sub-Baseline (SubBase), or Ultra-Sub-Baseline (USB) building-specific properties, as specified in Table A6-1.

Building-specific properties include parameters related to (1) building capacity, (2) building response, (3) Complete Structural Damage, and (4) building collapse. Appendix H Sections 6-A4 through 6-A7, define the parameters of interest related to building capacity, building response, Complete Structural Damage and building collapse, respectively, and specify appropriate values of these parameters.

6-A4. Building capacity. Building-specific capacity properties of interest include the yield capacity control point (D_y, A_y) and the ultimate capacity control point (D_u, A_u), as calculated by Equations (A6-2 through A6-5, respectively):

$$A_y = C_s \cdot \gamma / \alpha_1 \qquad \text{(A6-2)}$$

$$D_y = 9.8 \cdot A_y \cdot T_e^2 \qquad \text{(A6-3)}$$

$$A_u = \lambda \cdot A_y \qquad \text{(A6-4)}$$

$$D_u = \lambda \cdot \mu \cdot D_y \qquad \text{(A6-5)}$$

where:

C_s = seismic design coefficient — values of C_s are given in Tables A6-2a and A6-2b, respectively,

α_1 = modal weight factor, Alpha 1 — values of α_1 are given in Table A6-4,

T_e = elastic period, in seconds — values of T_e are given in Table A6-3,

γ = yield strength factor, Gamma — values of γ are given in Table A6-5,

λ = "overstrength" factor, Lambda — values of λ are given in Table A6-5, and

μ = "ductility" factor, Mu — values of μ are given in Table A6-6.

6-A5 Building response. Building-specific response parameters of interest include the elastic damping factor, β_E, and the degradation factor, Kappa. Values of β_E are given in Table A6-7 and values of the Kappa factor are given in Table A6-8.

6-A-6 Complete structural damage. Building-specific damage parameters of interest include the median spectral displacement of the Complete Structural Damage state, S_{dC}, and the associated lognormal standard deviation (Beta) factor, β_C. Values of β_C are given in Table A6-11. Median spectral displacement at the Complete Structural Damage state, S_{dC}, is calculated using Equation (A6-6):

$$S_{d,C} = \Delta_C \cdot H_R \cdot \alpha_2 / \alpha_3 \qquad \text{(A6-6)}$$

where:

Δ_C = interstory drift ratio (of the story with maximum drift) at the threshold of Complete Structural Damage — values of Δ_C are given in Table A6-9,

H_R = height of building at the roof level, in inches — default values of H_R are given in Table A6-3 as a function of the number of stories above grade,

α_2 = modal height factor, Alpha 2 — values of α_2 are given in Table A6-4, and

α_3 = modal shape factor, Alpha 3, relating maximum-story drift and roof drift, values of α_3 are given in Table A6-10.

6-A-7 Building collapse. Building-specific values of the collapse factor, P[COL|STR_5], that describe the fraction of the building likely to be collapsed given that the building has reached the Complete Structural Damage state, STR_5, are given in Table A6-12.

TABLE A6-1—SIGNIFICANT STRUCTURAL DEFICIENCY MATRIX

SIGNIFICANT STRUCTURAL DEFICIENCY/CONDITION[1]	CAPACITY		RESPONSE		STRUCTURAL DAMAGE - COMPLETE DAMAGE STATE						COLLAPSE	
	Over-Strength		Duration		Fragility Curve Median[4]				Fragility Curve Variability - Beta Factor (β_c)		Collapse Factor (P[COL|STR$_5$])	
	Gamma and Lambda Factors		Degradation (Kappa) Factor		Maximum Story Drift Ratio (Δ_c)		Mode Shape (Alpha 3) Factor					
	SubBase	USB	SubBase	USB[5]	SubBase	USB	SubBase	USB[6]	SubBase	USB[5]	SubBase	USB[6]
Age (Pre-1933 buildings)	X	X[7]										
Materials Testing (None)	X								X			
No Redundancy									X		X	X[6]
Weak Story Irregularity					X		X	X[6]			X	X[6]
Soft Story Irregularity					X		X	X[6]			X	X[6]
Mass Irregularity					X							
Vertical Descontinuity	X				X							
Torsional Irregularity						X					X	X[6]
Deflection Incompatibility[2]					X				X		X	X[6]
Short Column[3]	X					X						
Wood Deterioration		X	X									
Steel Deterioration		X	X									
Concrete Deterioration		X	X									
Weak Column-Steel	X				X							
Weak Column-Concrete	X		X		X							
No Cripple Wall Bracing					X		X	X[6]			X	X[6]
Topping Slab	X		X						X		X	X[6]
Inadequate Wall Anchorage/Parapet Bracing		X							X			
Load Path/Diaphragm Openings									X		X	X[6]
URM Wall Thickness Ratio											X	X[6]

[1] Sub-Baseline (SubBase) and Ultra-Sub-Baseline (USB) properties are based on one, or more, significant structural deficiencies.
[2] The Deflection Incompatibility structural deficiency applies only to concrete systems (C1, C2 and C3).
[3] The Short Column structural deficiency applies only to concrete and masonry systems (C1, C2, C3, RM1 and RM2).
[4] Effects of deficiencies related to drift and mode shape limited to a combined factor of 5 reduction in Complete median (of HAZUS default value).
[5] Grey shading indicates USB performance is not defined/used for deficiencies related to degradation (kappa) and fragility curve (beta) factors.
[6] USB performance required for systems with multiple, SubBase deficiencies related to either the mode shape (Alpha 3) factor or the collapse rate.
[7] USB performance required for pre-1933 buildings with other over-strength-related deficiencies (else use SubBase performance for pre-1933 buildings).

TABLE A6-2a—SEISMIC DESIGN COEFFICIENT, C_s UBC SEISMIC ZONE 4

No. of Stories	Seismic Design Coefficient, C_s - UBC Seismic Zone 4 Locations (Zone 3 of older editions of the UBC)					
	Structural System (MBT)					
	S1 and C1		S2, S3, S4, S5, C2 and C3 (MH)		W1, W2, PC1, PC2, RM1, RM2, URM	
	Post-61	Pre-61	Post-61	Pre-61	Post-61	Pre-61
1	0.072	0.109	0.100	0.109	0.133	0.109
2	0.057	0.092	0.100	0.092	0.133	0.092
3	0.050	0.080	0.086	0.080	0.114	0.080
4	0.045	0.071	0.078	0.071	0.104	0.071
5	0.042	0.063	0.073	0.063	0.098	0.063
6	0.040	0.057	0.069	0.057	0.092	0.057
7	0.038	0.052	0.066	0.052	0.088	0.052
8	0.036	0.048	0.064	0.048	0.085	0.048
9	0.035	0.044	0.062	0.044	0.082	0.044
10	0.034	0.041	0.060	0.041	0.080	0.041
11	0.032	0.039	0.058	0.039	0.078	0.039
12	0.032	0.036	0.057	0.036	0.076	0.036
13	0.031	0.034	0.056	0.034	0.074	0.034
14	0.030	0.032	0.055	0.032	0.073	0.032
15	0.029	0.031	0.054	0.031	0.072	0.031
16	0.029	0.029	0.053	0.029	0.070	0.029
17	0.028	0.028	0.052	0.028	0.069	0.028
18	0.028	0.027	0.051	0.027	0.068	0.027
19	0.027	0.026	0.051	0.026	0.067	0.026
> = 20	0.027	0.024	0.050	0.024	0.067	0.024

Note (JCC SRR): *For Post 1975 Buildings, "High-Code" values from Table 5-4 of HAZUS MR-4 TECHICAL MANUAL is used.Please refer to Attachment 2.*

TABLE A6-2b—SEISMIC DESIGN COEFFICIENT, C_s UBC SEISMIC ZONE 3

No. of Stories	Seismic Design Coefficient, C_s - UBC Seismic Zone 3 Locations (Zone 2 of older editions of the UBC)					
	Structural System (MBT)					
	S1 and C1		S2, S3, S4, S5, C2 and C3 (MH)		W1, W2, PC1, PC2, RM1, RM2, URM	
	Post-61	Pre-61	Post-61	Pre-61	Post-61	Pre-61
1	0.036	0.055	0.050	0.055	0.066	0.055
2	0.028	0.046	0.050	0.046	0.066	0.046
3	0.025	0.040	0.043	0.040	0.057	0.040
4	0.023	0.035	0.039	0.035	0.052	0.035
5	0.021	0.032	0.037	0.032	0.049	0.032
6	0.020	0.029	0.035	0.029	0.046	0.029
7	0.019	0.026	0.033	0.026	0.044	0.026
8	0.018	0.024	0.032	0.024	0.043	0.024
9	0.017	0.022	0.031	0.022	0.041	0.022
10	0.017	0.021	0.030	0.021	0.040	0.021
11	0.016	0.019	0.029	0.019	0.039	0.019
12	0.016	0.018	0.029	0.018	0.038	0.018
13	0.015	0.017	0.028	0.017	0.037	0.017
14	0.015	0.016	0.027	0.016	0.036	0.016
15	0.015	0.015	0.027	0.015	0.036	0.015
16	0.014	0.015	0.026	0.015	0.035	0.015
17	0.014	0.014	0.026	0.014	0.035	0.014
18	0.014	0.013	0.026	0.013	0.034	0.013
19	0.014	0.013	0.025	0.013	0.034	0.013
> = 20	0.013	0.012	0.025	0.012	0.033	0.012

Note (JCC SRR): *For Post 1975 Buildings, "Moderate-Code" values from Table 5-4 of HAZUS MR-4 TECHICAL MANUAL is used. Please refer to Attachment 2.*

TABLE A6-3—DEFAULT BUILDING HEIGHTS AND ELASTIC PERIODS

	DEFAULT BUILDING HEIGHT, H_R, AND ELASTIC PERIOD, T_e. PROPERTIES													
	Structural System (MBT)													
	W1 AND W2 (MH)		S1		C1		S2		S4 and S5		C2, C3, PC2, RM1, RM2, URM		S3 and PC1	
No. of Stories	H_R (ft)	T_e (sec)	H_R (ft)	T_e (sec)	H_R (ft)	T_e (sec)	H_R (ft)	T_e (sec)	H_R (ft)	T_e (sec)	H_R (ft)	T_e (sec)	H_R (ft)	T_e (sec)
1	14	0.35	14	0.40	12	0.40	14	0.40	14	0.35	12	0.35	15	0.35
2	24	0.38	24	0.50	20	0.40	24	0.43	24	0.35	20	0.35	25	0.39
3	34	0.49	36	0.69	30	0.48	36	0.59	36	0.44	30	0.39	35	0.50
4	44	0.60	48	0.87	40	0.62	48	0.73	48	0.55	40	0.48		
5	54	0.70	60	1.04	50	0.76	60	0.86	60	0.65	50	0.57		
6			72	1.20	60	0.89	72	0.99	72	0.74	60	0.65		
7			84	1.36	70	1.03	84	1.11	84	0.84	70	0.73		
8			96	1.51	80	1.16	96	1.22	96	0.92	80	0.81		
9			108	1.66	90	1.29	108	1.34	108	1.01	90	0.88		
10			120	1.81	100	1.41	120	1.45	120	1.09	100	0.95		
11			132	1.95	110	1.54	132	1.55	132	1.17	110	1.02		
12			144	2.09	120	1.67	144	1.66	144	1.25	120	1.09		
13			156	2.23	130	1.79	156	1.76	156	1.33	130	1.16		
14			168	2.36	140	1.91	168	1.86	168	1.40	140	1.23		
15			180	2.50	150	2.04	180	1.96	180	1.48	150	1.29		
16			192	2.63	160	2.16	192	2.06	192	1.55	160	1.35		
17			204	2.76	170	2.28	204	2.15	204	1.62	170	1.42		
18			216	2.89	180	2.40	216	2.25	216	1.70	180	1.48		
19			228	3.02	190	2.52	228	2.34	228	1.77	190	1.54		
>= 20			240	3.14	200	2.64	240	2.43	240	1.84	200	1.60		

TABLE A6-4—ALPHA 1 AND ALPHA 2, MODAL FACTORS

	ALPHA 1 (α_1) - MODAL WEIGHT FACTOR				ALPHA 2 (α_2) - MODAL HEIGHT FACTOR	
	Structural System (MBT)				Structural System (MBT)	
No. of Stories	S1 and C1	W1, W2, S2, S3, S4, C2, C3, PC2, RM1 and RM2	PC1 and URM	MH	MH	All Systems (except MH)
1	0.75	0.8	0.75	1.00	1.00	0.75
2	0.75	0.8	0.75			0.75
3	0.75	0.8	0.75			0.75
4	0.75	0.8				0.75
5	0.75	0.8				0.75
6	0.73	0.79				0.72
7	0.71	0.78				0.69
8	0.69	0.77				0.66
9	0.67	0.76				0.63
10	0.65	0.75				0.60
11	0.65	0.75				0.60
12	0.65	0.75				0.60
13	0.65	0.75				0.60
14	0.65	0.75				0.60
>= 15	0.65	0.75				0.60

TABLE A6-5—LAMBDA FACTOR

No. of Stories	Gamma Factor (γ)	LAMBDA FACTOR (γ)														
		Baseline Performance					SubBase Performance					USB Performance				
		Structural System (MBT)					Structural System (MBT)					Structural System (MBT)				
		W1, S1, C1	W2, C2	S4, C3	Other MBT	PC1, URM	W1, S1, C1	W2, C2	S4, C3	Other MBT	PC1, URM	W1, S1, C1	W2, C2	S4, C3	Other MBT	PC1, URM
1	2.70	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
2	2.50	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
3	2.25	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
4	2.00	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
5	1.88	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
6	1.80	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
7	1.75	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
8	1.71	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
9	1.69	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
10	1.67	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
11	1.65	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
12	1.65	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
13	1.65	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
14	1.65	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17
> = 15	1.65	2.00	2.00	1.83	1.67	1.33	1.75	1.75	1.63	1.50	1.25	1.50	1.50	1.42	1.33	1.17

TABLE A6-6—DUCTILITY FACTOR *Mu*

NO. OF STORIES	Mu (μ) FACTOR (All Systems)
1	6.00
2	6.00
3	4.94
4	4.41
5	4.07
6	3.82
7	3.63
8	3.48
9	3.35
10	3.24
11	3.15
12	3.07
13	3.00
14	3.00
> = 15	3.00

TABLE A6-7—ELASTIC DAMPING

STRUCTURAL SYSTEM (MBT)	β_E ELASTIC DAMPING (% of Critical)
S1, S2, S3 and S4	5
C1, C2, PC1 and PC2	7
RM1 and RM2	7
C3 and S5	7
W1 and W2	10

TABLE A6-8—DEGRADATION KAPPA FACTORS

SCENARIO EARTHQUAKE CRITERIA		DEGRADATION (Kappa) FACTORS - (κ_S, κ_M and κ_L)			
		Baseline Performance		SubBase Performance	
Minimum Distance Site to Fault[1] (km)	Maximum Magnitude[2]	Post-61	Pre-1961	Post-61	Pre-1961
< 5	All	0.8	0.7	0.6	0.5
5 - 10	$M_{max} \leq 6.5$	0.8	0.7	0.6	0.5
5 - 10	$M_{max} > 6.5$	0.7	0.6	0.5	0.4
10 - 25	$M_{max} \leq 6.5$	0.7	0.6	0.5	0.4
10 - 25	$7.0 \geq M_{max} > 6.5$	0.6	0.5	0.4	0.3
10 - 25	$M_{max} > 7.0$	0.5	0.4	0.3	0.2
25 - 50	$M_{max} \leq 7.0$	0.5	0.4	0.3	0.2
25 - 50	$M_{max} > 7.0$	0.4	0.3	0.2	0.1
> 50	All	0.4	0.3	0.2	0.1

1. Minimum distance to the fault that controls 1-second period ground motions at the building site.
2. Maximum magnitude (M_{max}) of fault that controls 1-second ground motions at the building site.

Note (JCC SRR): For Post-1975 buildings, Table 4.7 of VA Phase 1 Report is used. Please refer to Attachment 2.

TABLE A6-9—INTERSTORY DRIFT RATIO — MEDIAN COMPLETE STRUCTURAL DAMAGE

STRUCTURAL SYSTEM (MBT)	INTERSTORY DRIFT RATIO (max story) - MEDIAN COMPLETE STRUCTURAL DAMAGE (Δ_C)					
	Baseline Performance		SubBase Performance		USB Performance	
	Post-61	Pre-61	Post-61	Pre-61	Post-61	Pre-61
W1 and W2 (MH)	0.075	0.075	0.060	0.060	0.038	0.038
S1, C1, S2 and C2	0.060	0.050	0.050	0.040	0.030	0.025
S3, S4, PC1, PC2, RM1 and RM2	0.053	0.044	0.044	0.035	0.027	0.022
S5, C3 and URM		0.035		0.028		0.018

Note (JCC SRR): For Post-1975 buildings, Table 5.3 a to 5.3 h of VA Phase 1 Report is used. Please refer to Attachment 2.

TABLE A6-10—ALPHA 3 (A3) MODAL SHAPE FACTOR

No. of Stories	ALPHA 3 (α_3) MODAL SHAPE FACTOR - RATION OF MAXIMUM INTERSTORY DRIFT TO AVERAGE INTERSTORY DRIFT								
	When Combined with Baseline Interstory Drift Ratios (Table A6-9)			When Combined with SubBase Interstory Drift Ratios (Table A6-9)			When Combined with USB Interstory Drift Ratios (Table A6-9)		
	Baseline Performance	SubBase Performance	USB Performance	Baseline Performance	SubBase Performance	USB Performance	Baseline Performance	SubBase Performance	USB Performance
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.21	1.62	2.03	1.21	1.62	2.03	1.21	1.62	2.03
3	1.35	2.04	2.73	1.35	2.04	2.73	1.35	2.04	2.50
4	1.45	2.36	3.27	1.45	2.36	3.27	1.45	2.36	2.50
5	1.54	2.63	3.72	1.54	2.63	3.72	1.54	2.50	2.50
6	1.62	2.87	4.11	1.62	2.87	4.00	1.62	2.50	2.50
7	1.69	3.07	4.46	1.69	3.07	4.00	1.69	2.50	2.50
8	1.75	3.26	4.77	1.75	3.26	4.00	1.75	2.50	2.50
9	1.81	3.43	5.00	1.81	3.43	4.00	1.81	2.50	2.50
10	1.86	3.59	5.00	1.86	3.59	4.00	1.86	2.50	2.50
11	1.91	3.73	5.00	1.91	3.73	4.00	1.91	2.50	2.50
12	1.96	3.87	5.00	1.96	3.87	4.00	1.96	2.50	2.50
13	2.00	4.00	5.00	2.00	4.00	4.00	2.00	2.50	2.50
14	2.04	4.12	5.00	2.04	4.00	4.00	2.04	2.50	2.50
> = 15	2.08	4.23	5.00	2.08	4.00	4.00	2.08	2.50	2.50

TABLE A6-11—LOGNORMAL STANDARD DEVIATION (BETA) VALUES — COMPLETE STRUCTURAL DAMAGE

NO. OF STORIES	LOGNORMAL STANDARD DEVIATION (BETA) VALUES — COMPLETE STRUCTURAL DAMAGE (β_C)			
	Baseline Performance		SubBase Performance	
	Post-61	Pre-61	Post-61	Pre-61
1	0.85	0.90	0.95	1.00
2	0.85	0.90	0.95	1.00
3	0.85	0.90	0.95	1.00
4	0.84	0.89	0.94	0.99
5	0.83	0.88	0.93	0.98
6	0.82	0.87	0.92	0.97
7	0.81	0.86	0.91	0.96
8	0.80	0.85	0.90	0.95
9	0.79	0.84	0.89	0.94
10	0.78	0.83	0.88	0.93
11	0.77	0.82	0.87	0.92
12	0.76	0.81	0.86	0.91
13	0.75	0.80	0.85	0.90
14	0.75	0.80	0.85	0.90
> = 15	0.75	0.80	0.85	0.90

<u>*Note (JCC SRR):*</u> *For Post -1975 buildings, Table 5.5 c of VA Phase 1 Report is used. Please refer to Attachment 2.*

TABLE A6-12—COLLAPSE FACTOR

STRUCTURAL SYSTEM (MBT)	COLLAPSE FACTOR - LIKELIHOOD OF COLLAPSE GIVEN COMPLETE STRUCTURAL DAMAGE - P[COL|STR_5]		
	Baseline Performance	SubBase Performance	USB Performance
W1 and W2	0.05	0.10	~~0.20~~ XX 0.4 See Note
S1, S2, S3, S4 and S5	0.08	0.15	0.30
C1, C2 and C3	0.13	0.25	0.50
RM1 and RM2	0.13	0.25	0.50
PC1 and PC2	0.15	0.30	0.60

<u>*Note (JCC SRR):*</u> *For W1 and W2 MBT's, Collapse Factor = 0.4. This is to capture multistory wood buildings with weak story deficiency.*

ATTACHMENT 2

ADDITIONAL HAZUS AEBM PARAMETERS FOR POST 1975 BUILDINGS

Table 2.2. Recommended Seismic Design Level for Existing Buildings (w/o Retrofit)

UBC Seismic Zone (*NEHRP* Map Area)	Design Vintage		
	Post-1975	1941 - 1975	Pre-1941
Zone 4 (MA 7)	High-Code	Moderate-Code	Pre-Code[1]
Zone 3 (MA 6)	Moderate-Code	Moderate-Code	Pre-Code[1]
Zone 2B (MA 5)	Moderate-Code	Low-Code	Pre-Code[2]
Zone 2A (MA 4)	Low-Code	Low-Code	Pre-Code[2]
Zone 1 (MA 2/3)	Low-Code	Pre-Code[2]	Pre-Code[2]
Zone 0 (MA 1)	Pre-Code[2]	Pre-Code[2]	Pre-Code[2]

1. Assume Moderate-Code design for residential wood-frame buildings (W1).
2. Assume Low-Code design for residential wood-frame buildings (W1).

Table 5.4 Code Building Capacity Parameters - Design Strength (C_S)

Building Type	Seismic Design Level (Fraction of Building Weight)			
	High-Code	Moderate-Code	Low-Code	Pre-Code
W1	0.200	0.150	0.100	0.100
W2	0.200	0.100	0.050	0.050
S1L	0.133	0.067	0.033	0.033
S1M	0.100	0.050	0.025	0.025
S1H	0.067	0.033	0.017	0.017
S2L	0.200	0.100	0.050	0.050
S2M	0.200	0.100	0.050	0.050
S2H	0.150	0.075	0.038	0.038
S3	0.200	0.100	0.050	0.050
S4L	0.160	0.080	0.040	0.040
S4M	0.160	0.080	0.040	0.040
S4H	0.120	0.060	0.030	0.030
S5L			0.050	0.050
S5M			0.050	0.050
S5H			0.038	0.038
C1L	0.133	0.067	0.033	0.033
C1M	0.133	0.067	0.033	0.033
C1H	0.067	0.033	0.017	0.017
C2L	0.200	0.100	0.050	0.050
C2M	0.200	0.100	0.050	0.050
C2H	0.150	0.075	0.038	0.038
C3L			0.050	0.050
C3M			0.050	0.050
C3H			0.038	0.038
PC1	0.200	0.100	0.050	0.050
PC2L	0.200	0.100	0.050	0.050
PC2M	0.200	0.100	0.050	0.050
PC2H	0.150	0.075	0.038	0.038
RM1L	0.267	0.133	0.067	0.067
RM1M	0.267	0.133	0.067	0.067
RM2L	0.267	0.133	0.067	0.067
RM2M	0.267	0.133	0.067	0.067
RM2H	0.200	0.100	0.050	0.050
URML			0.067	0.067
URMM			0.067	0.067
MH	0.100	0.100	0.100	0.100

Table 4.7. Values of the degradation parameter, κ, as a function of ground motion parameters (maximum magnitude and minimum fault rupture distance) or seismic design level, and building age and performance (structural deficiencies), adapted from Table A6-8, OSHPD, 2007.

Ground Motion Criteria				Degradation Factor - κ					
Scenario Earthquake		Seismicity[3]	Kappa Index, k	Baseline Performance - Building Age					
Minimum Distance Site to Fault[1] (km)	Maximum Magnitude, M_{max}[2]			Post-1975	1960-1975	1941-1960	Pre-1941		
						SubBase Performance - Building Age			
						Post-1975	1960-1975	1941-1960	Pre-1941
< 5	All		1	0.9	0.8	0.7	0.6	0.5	0.4
5 - 10	M_{max} <= 6.5		2	0.9	0.8	0.7	0.6	0.5	0.4
5 - 10	M_{max} > 6.5		3	0.8	0.7	0.6	0.5	0.4	0.3
10 - 25	M_{max} <= 6.5		4	0.8	0.7	0.6	0.5	0.4	0.3
10 - 25	7.0 >= M_{max} > 6.5		5	0.7	0.6	0.5	0.4	0.3	0.2
10 - 25	M_{max} > 7.0	VH, H	6	0.6	0.5	0.4	0.3	0.2	0.1
25 - 50	M_{max} <= 7.0		7	0.6	0.5	0.4	0.3	0.2	0.1
25 - 50	M_{max} > 7.0	MH	8	0.5	0.4	0.3	0.2	0.1	0.1
> 50	All	L, ML	9	0.5	0.4	0.3	0.2	0.1	0.1

1. Minimum distance to the fault that controls short-period ground motions (used to determine response of MBTs with Te < 0.8 Ts) or 1-second response (used to determine response of MBTs with Te > 0.8 Ts) at the building site.

2. Maximum magnitude (Mmax) of fault that controls short-period or 1-second ground motions at the building site

3. Use VA Seismicity Index (Table 1.1) when scenario properties unknown.

Table 5-3a Values of median structural drift ratios as a function of model building type, buildings with Baseline performance and Special High Code seismic design.

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1, W2	0.005	0.015	0.050	0.125
S1	0.008	0.015	0.038	0.100
C1, S2	0.006	0.013	0.038	0.100
C2	0.005	0.013	0.038	0.100
S3, S4, PC1, PC2, RM1, RM2	0.005	0.010	0.030	0.088
S5, C3, URM	0.003	0.006	0.015	0.035

Table 5-3b Values of median structural drift ratios as a function of model building type, buildings with Baseline performance and High Code seismic design.

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1, W2	0.004	0.012	0.040	0.100
S1	0.006	0.012	0.030	0.080
C1, S2	0.005	0.010	0.030	0.080
C2	0.004	0.010	0.030	0.080
S3, S4, PC1, PC2, RM1, RM2	0.004	0.008	0.024	0.070
S5, C3, URM	0.003	0.006	0.015	0.035

Table 5-3c Values of median structural drift ratios as a function of model building type for buildings with Baseline performance and Moderate Code seismic design (and SubBase performance/High Code design)

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1, W2	0.004	0.010	0.031	0.075
S1	0.006	0.010	0.024	0.060
C1, S2	0.005	0.009	0.023	0.060
C2	0.004	0.008	0.023	0.060
S3, S4, PC1, PC2, RM1, RM2	0.004	0.007	0.019	0.053
S5, C3, URM	0.003	0.006	0.015	0.035

Table 5-3d Values of median structural drift ratios as a function of model building type for buildings with Baseline performance and Low Code seismic design (and SubBase performance/Moderate Code design)

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1, W2	0.004	0.010	0.025	0.060
S1	0.006	0.010	0.020	0.050
C1, S2	0.005	0.008	0.020	0.050
C2	0.004	0.008	0.020	0.050
S3, S4, PC1, PC2, RM1, RM2	0.004	0.006	0.016	0.044
S5, C3, URM	0.003	0.006	0.015	0.035

Table 5-3e Values of median structural drift ratios as a function of model building type for buildings with Baseline performance and Pre-Code seismic design (and SubBase performance/Low Code design or USB performance/High Code design)

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1,W2	0.003	0.008	0.020	0.050
S1	0.005	0.008	0.016	0.040
C1, S2	0.004	0.006	0.016	0.040
C2	0.003	0.006	0.016	0.040
S3, S4, PC1, PC2, RM1, RM2	0.003	0.005	0.013	0.035
S5, C3, URM	0.002	0.005	0.012	0.028

Table 5-3f Values of median structural drift ratios as a function of model building type for buildings with SubBase performance and Pre-Code seismic design (and USB performance/Moderate Code design)

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1,W2	0.003	0.008	0.018	0.045
S1	0.005	0.008	0.012	0.030
C1, S2	0.004	0.006	0.012	0.030
C2	0.003	0.006	0.012	0.030
S3, S4, PC1, PC2, RM1, RM2	0.003	0.005	0.010	0.027
S5, C3, URM	0.002	0.005	0.008	0.018

Table 5-3g Values of median structural drift ratios as a function of model building type for buildings with USB performance and Low Code seismic design

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1,W2	0.003	0.008	0.015	0.038
S1	0.005	0.008	0.010	0.025
C1, S2	0.004	0.006	0.010	0.025
C2	0.003	0.006	0.010	0.025
S3, S4, PC1, PC2, RM1, RM2	0.003	0.005	0.008	0.022
S5, C3, URM	0.002	0.005	0.008	0.018

Table 5-3h Values of median structural drift ratios as a function of model building type for buildings with USB performance and Pre-Code seismic design

Model Building Type	Structural Damage State			
	Slight	Moderate	Extensive	Complete
W1,W2	0.003	0.008	0.015	0.030
S1	0.005	0.008	0.010	0.020
C1, S2	0.004	0.006	0.010	0.020
C2	0.003	0.006	0.010	0.020
S3, S4, PC1, PC2, RM1, RM2	0.003	0.005	0.008	0.018
S5, C3, URM	0.002	0.005	0.008	0.014

Table 5-5c. Values of lognormal standard deviation, β_{ds}, as a function of building height, design vintage and related structural deficiencies (performance) for "Good" quality data.

No. of Stories	Baseline Performance				SubBase Performance			
	Post-1975	1960-1975	1941-1960	Pre-1941	Post-1975	1960-1975	1941-1960	Pre-1941
1	0.80	0.85	0.90	0.95	0.90	0.95	1.00	1.05
2	0.80	0.85	0.90	0.95	0.90	0.95	1.00	1.05
3	0.80	0.85	0.90	0.95	0.90	0.95	1.00	1.05
4	0.79	0.84	0.89	0.94	0.89	0.94	0.99	1.04
5	0.78	0.83	0.88	0.93	0.88	0.93	0.98	1.03
6	0.77	0.82	0.87	0.92	0.87	0.92	0.97	1.02
7	0.76	0.81	0.86	0.91	0.86	0.91	0.96	1.01
8	0.75	0.80	0.85	0.90	0.85	0.90	0.95	1.00
9	0.74	0.79	0.84	0.89	0.84	0.89	0.94	0.99
10	0.73	0.78	0.83	0.88	0.83	0.88	0.93	0.98
11	0.72	0.77	0.82	0.87	0.82	0.87	0.92	0.97
12	0.71	0.76	0.81	0.86	0.81	0.86	0.91	0.96
13	0.70	0.75	0.80	0.85	0.80	0.85	0.90	0.95
14	0.70	0.75	0.80	0.85	0.80	0.85	0.90	0.95
15	0.70	0.75	0.80	0.85	0.80	0.85	0.90	0.95
Factor	Approximate Value or Range of Contributing Factor							
κ	0.5-0.8	0.4-0.7	0.3-0.6	0.2-0.5	0.4-0.7	0.3-0.6	0.2-0.5	0.1-0.4
β_C	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
$\beta_{T,ds}$	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5