

APPENDIX A

Table A-I List of Strong-Motion Records Used in This Study

357 strong motion records obtained at 33 observation sites

Observation site list

NO	SITE NAME
1	KUSHIRO
2	CHIYODA
3	TOKACHI
4	HOROMAN
5	SHIN ISHIKARI
6	TOMAKOMAI
7	MURORAN
8	AOMORI
9	HACHINOHE
10	MAZAKI
11	MIYAKO
12	OFUNATO (Reference site: hard slate)
13	SHIOGAMA
14	TAIRA
15	SHINTONE
16	KASHIMA JIMU
17	KASHIMA PWR
18	TONE ESD
19	OMIGAWA
20	CHIBA
21	YAMASHITA HEN
22	KANNONZAKI
23	OCHIAI
24	KINOKAWA
25	ITAJIMA
26	HOSOSHIMA
27	SOMA
28	SHINAGAWA
29	ONAHAMA JI
30	AKITA
31	CHIBA S
32	HITACHI NAKA
33	KASHIMA ZOKAN

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D (KM)	R _e (KM)	r (KM)	A _{max} (cm/sec ²)	V _{max} (cm/sec)	D _{max} (cm)
1	1	7.0	60.0	209.0	217.4	98.700	7.040	1.770
2	1	7.0	60.0	209.0	217.4	79.900	7.210	1.790
3	1	5.8	60.0	61.0	85.6	155.100	5.960	2.900
4	1	5.8	60.0	61.0	85.6	87.100	5.890	0.720
5	1	7.1	26.0	191.0	193.3	77.100	5.140	2.720
6	1	7.1	26.0	191.0	193.3	56.800	5.620	1.690
7	1	7.4	40.0	128.0	134.1	224.600	29.270	6.300
8	1	7.4	40.0	128.0	134.1	125.400	15.220	2.860
9	7	7.9	0.0	285.8	285.8	252.300	22.090	8.580
10	7	7.9	0.0	285.8	285.8	240.000	19.790	6.720
11	7	7.5	40.0	216.0	219.7	191.600	6.950	1.280
12	7	7.5	40.0	216.0	219.7	123.700	5.550	3.050
13	7	6.9	80.0	170.0	174.6	70.400	3.290	0.880
14	7	6.9	80.0	170.0	174.6	47.800	3.430	1.820
15	7	7.1	130.0	103.0	165.9	155.400	15.550	3.560
16	7	7.1	130.0	103.0	165.9	237.800	9.670	1.490
17	8	7.9	0.0	244.0	244.0	319.500	45.980	18.690
18	8	7.9	0.0	244.0	244.0	200.000	39.710	13.790
19	8	7.5	40.0	219.0	222.6	82.600	9.060	2.620
20	8	7.5	40.0	219.0	222.6	106.000	9.670	2.520
21	8	6.4	80.0	103.0	130.4	70.600	3.780	1.090
22	8	6.4	80.0	103.0	130.4	86.900	3.310	0.670
23	8	7.2	0.0	293.0	293.7	22.000	4.530	1.730
24	8	7.2	0.0	293.0	293.7	29.400	4.580	1.670
25	8	6.9	80.0	212.0	215.7	32.400	5.480	2.170
26	8	6.9	80.0	212.0	215.7	35.700	5.630	2.900
27	9	7.2	0.0	150.0	151.3	46.800	3.460	0.910
28	9	7.2	0.0	150.0	151.3	41.600	3.020	1.920
29	9	6.9	80.0	150.0	155.2	42.100	4.080	1.510
30	9	6.9	80.0	150.0	155.2	30.600	3.270	2.000
31	9	6.6	40.0	75.0	85.0	71.200	5.960	2.010
32	9	6.6	40.0	75.0	85.0	62.800	4.910	1.590
33	9	7.9	0.0	185.0	185.0	327.300	27.580	10.780
34	9	7.9	0.0	185.0	185.0	209.500	32.280	12.180
35	9	6.4	80.0	59.0	99.4	93.100	4.420	1.320
36	9	6.4	80.0	59.0	99.4	88.400	3.100	1.020
37	9	5.6	40.0	49.5	53.4	116.300	3.890	1.010
38	9	5.6	40.0	49.5	53.4	107.600	3.300	0.910
39	9	7.4	40.0	273.0	275.9	75.300	8.160	1.780
40	9	7.4	40.0	273.0	275.9	73.200	8.660	2.010
41	11	7.9	0.0	191.0	191.0	179.000	7.440	3.120
42	11	7.9	0.0	191.0	191.0	196.100	5.910	1.610
43	11	7.5	40.0	214.0	217.7	161.100	5.350	1.310
44	11	7.5	40.0	214.0	217.7	138.300	4.500	1.170
45	11	6.3	30.0	94.0	98.7	87.400	2.930	0.620

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max}=Peak acceleration, V_{max}=Peak velocity, D_{max}=Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D (KM)	R _e (KM)	r (KM)	A _{max} (cm/sec ²)	V _{max} (cm/sec)	D _{max} (cm)
46	11	6.3	30.0	94.0	98.7	153.300	2.260	1.330
47	11	6.0	30.0	96.0	100.6	118.400	3.710	1.080
48	11	6.0	30.0	96.0	100.6	76.800	2.340	1.280
49	11	6.7	50.0	99.0	110.9	130.300	3.280	0.770
50	11	6.7	50.0	99.0	110.9	98.300	4.360	1.500
51	11	7.4	40.0	166.0	170.8	246.900	8.970	1.930
52	11	7.4	40.0	166.0	170.8	175.000	7.070	1.180
53	13	6.4	50.0	117.0	127.2	58.600	4.430	0.690
54	13	6.4	50.0	117.0	127.2	64.000	5.140	0.670
55	13	6.7	50.0	110.0	120.8	223.600	10.040	1.140
56	13	6.7	50.0	110.0	120.8	163.900	19.010	3.410
57	13	7.4	40.0	100.0	107.7	335.300	29.800	6.220
58	13	7.4	40.0	100.0	107.7	299.400	50.630	12.250
59	12	6.2	40.0	70.2	80.8	51.300	1.500	0.600
60	12	6.2	40.0	70.2	80.8	167.900	3.500	4.200
61	12	6.4	50.0	54.0	73.6	69.200	1.800	0.800
62	12	6.4	50.0	54.0	73.6	138.000	5.400	0.900
63	12	6.7	50.0	49.0	70.0	130.700	3.900	1.000
64	12	5.8	70.0	57.0	90.3	62.000	4.100	0.500
65	12	5.8	70.0	57.0	90.3	144.200	12.600	4.700
66	12	7.4	40.0	103.0	110.5	222.900	12.200	2.700
67	12	7.4	40.0	103.0	110.5	273.300	16.800	3.800
68	21	7.0	70.0	288.5	296.9	81.400	4.500	1.400
69	21	7.0	70.0	288.5	296.9	60.500	3.900	1.300
70	21	7.0	0.0	80.0	80.0	63.100	4.200	3.000
71	21	7.0	0.0	80.0	80.0	55.200	5.900	4.600
72	21	6.7	10.0	69.0	69.0	94.300	5.000	1.500
73	21	6.7	10.0	69.0	69.0	76.200	5.500	1.600
74	21	6.1	80.0	48.0	84.9	86.000	7.100	1.000
75	21	6.1	80.0	48.0	84.9	71.000	6.800	1.500
76	26	7.5	30.0	86.0	91.1	325.800	18.600	7.800
77	26	7.5	30.0	86.0	91.1	365.000	25.800	6.100
78	26	6.5	10.0	46.0	47.1	103.800	5.900	1.200
79	26	6.5	10.0	46.0	47.1	139.500	5.700	1.000
80	26	6.7	10.0	50.5	51.5	171.300	8.700	1.800
81	26	6.7	10.0	50.5	51.5	152.500	14.500	2.400
82	26	6.1	10.0	53.1	54.0	72.400	2.900	1.100
83	26	6.1	10.0	53.1	54.0	74.800	3.000	1.300
84	26	6.2	120.0	47.5	129.1	83.300	7.000	1.100
85	26	6.2	120.0	47.5	129.1	88.500	8.100	1.500
86	5	7.9	0.0	323.0	323.0	185.700	25.600	7.200
87	5	7.9	0.0	323.0	323.0	169.900	29.500	14.500
88	5	7.5	40.0	224.0	227.5	97.400	13.300	3.600
89	5	7.5	40.0	224.0	227.5	172.100	19.600	4.300
90	5	6.7	50.0	166.6	173.9	73.100	7.800	2.000
91	5	6.7	50.0	166.6	173.9	82.300	8.900	2.700
92	2	7.9	0.0	243.0	243.0	86.000	15.800	5.600

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max} =Peak acceleration, V_{max} =Peak velocity, D_{max} =Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D (KM)	R _e (KM)	r (KM)	A _{max} (cm/sec ²)	V _{max} (cm/sec)	D _{max} (cm)
93	2	7.9	0.0	243.0	243.0	110.400	17.900	7.600
94	2	6.7	50.0	62.7	80.2	139.600	6.500	2.300
95	2	6.7	50.0	62.7	80.2	120.900	6.200	2.300
96	2	7.4	40.0	228.7	232.2	108.700	6.700	2.300
97	2	7.4	40.0	228.7	232.2	93.400	8.300	2.400
98	4	7.9	0.0	156.4	156.4	133.100	7.100	3.200
99	4	7.9	0.0	156.4	156.4	107.900	6.600	2.200
100	4	7.5	40.0	74.7	84.7	104.600	4.200	2.300
101	4	7.5	40.0	74.7	84.7	97.400	4.800	2.100
102	4	6.7	50.0	35.4	61.3	246.500	8.200	1.700
103	4	6.7	50.0	35.4	61.3	191.800	8.200	2.100
104	14	5.4	50.0	85.1	98.7	60.600	3.100	1.300
105	14	5.4	50.0	85.1	98.7	57.600	3.700	1.300
106	14	5.1	50.0	59.7	77.9	65.300	3.300	0.800
107	14	5.1	50.0	59.7	77.9	74.800	4.000	0.900
108	14	5.5	40.0	60.7	72.7	58.900	3.100	0.800
109	14	5.5	40.0	60.7	72.7	48.300	3.400	2.100
110	14	5.5	50.0	20.2	53.9	90.000	4.700	1.100
111	14	5.5	50.0	20.2	53.9	85.200	3.100	0.500
112	14	7.4	40.0	165.6	170.4	97.700	12.000	2.400
113	14	7.4	40.0	165.6	170.4	104.300	9.800	2.100
114	17	5.2	40.0	9.4	41.1	67.600	4.800	0.800
115	17	5.2	40.0	9.4	41.1	257.300	13.800	1.000
116	17	5.9	50.0	26.8	56.7	105.400	13.100	2.800
117	17	5.9	50.0	26.8	56.7	96.200	6.100	1.200
118	17	5.8	60.0	33.2	68.6	103.300	8.600	1.400
119	17	5.8	60.0	33.2	68.6	92.900	5.100	0.900
120	17	6.1	60.0	41.4	72.9	90.600	7.000	2.000
121	17	6.1	60.0	41.4	72.9	71.700	5.000	1.100
122	17	6.1	40.0	55.4	68.3	176.000	12.600	1.500
123	17	6.1	40.0	55.4	68.3	174.200	12.300	1.800
124	20	5.1	50.0	11.0	51.2	83.400	2.700	1.200
125	20	5.1	50.0	11.0	51.2	92.900	5.200	3.100
126	20	6.1	50.0	74.4	89.6	94.900	10.000	2.800
127	20	6.1	50.0	74.4	89.6	57.600	3.400	1.700
128	20	5.3	70.0	12.9	71.2	87.500	3.700	0.600
129	20	5.3	70.0	12.9	71.2	71.300	4.400	1.300
130	20	5.4	60.0	20.6	63.4	94.100	6.600	1.500
131	15	6.1	50.0	29.4	58.0	84.100	7.600	1.400
132	15	6.1	50.0	29.4	58.0	89.700	12.500	3.100
133	15	5.6	100.0	71.3	122.8	49.600	5.000	1.200
134	15	5.6	100.0	71.3	122.8	81.300	5.400	0.900
135	15	5.8	50.0	23.6	55.3	130.800	8.400	1.500
136	15	5.8	50.0	23.6	55.3	86.600	3.400	0.800
137	22	5.2	100.0	46.6	110.3	57.600	2.200	0.300
138	22	5.2	100.0	46.6	110.3	60.300	3.600	0.500
139	22	7.1	70.0	266.4	275.4	85.200	4.400	1.100

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max} =Peak acceleration, V_{max} =Peak velocity, D_{max} =Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D	R _e	r	A _{max}	V _{max}	D _{max}
			(KM)	(KM)	(KM)	(cm/sec ²)	(cm/sec)	(cm)
140	22	7.1	70.0	266.4	275.4	62.600	3.600	0.800
141	22	7.2	50.0	256.7	261.5	67.000	3.000	1.600
142	22	7.2	50.0	256.7	261.5	54.500	3.200	1.400
143	22	4.9	60.0	33.9	68.9	259.500	6.000	0.500
144	22	4.9	60.0	33.9	68.9	176.500	3.000	0.700
145	22	6.9	10.0	113.7	114.1	62.100	4.300	1.400
146	22	6.9	10.0	113.7	114.1	46.200	3.300	0.900
147	22	7.0	0.0	69.8	69.8	140.900	4.400	1.100
148	22	7.0	0.0	69.8	69.8	88.200	3.300	1.100
149	23	4.5	0.0	11.4	11.4	97.900	2.800	0.500
150	23	4.5	0.0	11.4	11.4	102.300	5.200	0.800
151	23	4.5	0.0	10.3	10.3	76.400	3.300	0.900
152	23	4.5	0.0	10.3	10.3	76.400	3.400	0.700
153	23	4.3	10.0	7.7	12.6	115.800	4.200	0.500
154	23	4.3	10.0	7.7	12.6	197.000	3.300	0.300
155	24	5.0	0.0	5.5	5.5	96.200	6.100	1.100
156	24	5.0	0.0	5.5	5.5	138.300	6.600	2.000
157	24	5.9	60.0	46.3	75.8	63.000	4.300	0.700
158	24	5.9	60.0	46.3	75.8	59.500	4.000	0.900
159	24	5.8	60.0	41.6	73.0	81.300	3.600	0.700
160	24	5.8	60.0	41.6	73.0	45.700	3.300	0.600
161	24	4.1	0.0	8.9	5.4	90.900	1.100	0.200
162	24	4.1	0.0	8.9	5.4	73.700	1.600	0.700
163	10	5.6	40.0	45.9	60.9	107.300	4.960	3.300
164	10	5.6	40.0	45.9	60.9	92.400	2.960	1.350
165	10	6.7	50.0	115.0	125.4	25.900	2.910	2.020
166	10	7.4	40.0	180.5	184.9	102.100	4.890	5.150
167	19	6.1	60.0	39.8	72.0	108.400	9.460	5.270
168	19	6.1	60.0	39.8	72.0	133.900	13.770	6.440
169	19	6.3	40.0	81.2	90.5	35.100	3.800	1.940
170	19	6.3	40.0	81.2	90.5	36.700	3.860	2.250
171	19	5.8	50.0	65.1	82.1	49.100	7.060	2.840
172	19	5.8	50.0	65.1	82.1	29.000	5.220	2.220
173	19	6.1	40.0	57.6	70.1	112.500	11.120	7.160
174	19	6.1	40.0	57.6	70.1	111.600	10.300	6.690
175	19	5.4	60.0	44.9	74.9	134.200	7.210	2.350
176	19	5.4	60.0	44.9	74.9	85.800	6.030	1.500
177	18	5.2	40.0	12.8	42.0	103.900	10.800	4.040
178	18	5.2	40.0	12.8	42.0	109.700	7.710	5.540
179	18	6.1	60.0	35.3	69.6	101.800	16.930	6.810
180	18	6.1	60.0	35.3	69.6	85.800	11.110	5.260
181	18	6.3	40.0	80.3	89.7	42.700	3.760	1.890
182	18	6.3	40.0	80.3	89.7	49.100	4.170	1.900
183	18	6.1	40.0	52.9	66.3	120.800	13.150	5.340
184	18	6.1	40.0	52.9	66.3	155.600	16.640	6.270
185	3	7.1	130.0	95.0	161.0	92.800	6.300	2.500
186	3	7.1	130.0	95.0	161.0	121.500	6.300	1.900

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max} =Peak acceleration, V_{max} =Peak velocity, D_{max} =Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D (KM)	R _e (KM)	r (KM)	A _{max} (cm/sec ²)	V _{max} (cm/sec)	D _{max} (cm)
187	3	5.5	70.0	17.0	72.0	84.400	2.600	0.800
188	3	5.5	70.0	17.0	72.0	63.300	2.200	1.100
189	3	7.1	40.0	64.0	75.5	164.000	8.500	3.300
190	3	7.1	40.0	64.0	75.5	259.600	13.400	1.400
191	7	7.1	40.0	137.0	142.7	172.600	11.100	2.100
192	7	7.1	40.0	137.0	142.7	183.100	17.400	2.400
193	16	5.9	40.0	48.0	62.5	49.900	4.900	1.300
194	16	5.9	40.0	48.0	62.5	82.800	9.500	2.200
195	16	6.1	60.0	50.0	64.0	48.900	4.900	1.600
196	16	6.1	60.0	50.0	64.0	116.300	11.200	1.800
197	16	6.3	40.0	90.0	98.5	75.500	3.900	0.700
198	16	6.3	40.0	90.0	98.5	54.300	4.000	1.100
199	16	6.1	40.0	55.0	234.9	72.500	7.200	1.100
200	16	6.1	40.0	55.0	234.9	92.100	5.700	0.900
201	6	7.1	40.0	102.0	109.6	89.800	7.700	3.200
202	6	7.1	40.0	102.0	109.6	93.200	8.700	4.800
203	6	6.5	130.0	22.4	169.7	101.600	3.900	1.000
204	6	6.5	130.0	22.4	169.7	98.500	3.700	1.600
205	15	4.8	50.0	20.2	53.9	67.500	2.600	0.600
206	15	4.8	50.0	20.2	53.9	51.600	2.100	0.400
207	15	5.4	80.0	41.0	72.7	64.900	3.900	0.600
208	15	5.4	80.0	41.0	72.7	41.900	3.000	0.900
209	15	6.1	80.0	83.7	109.1	40.100	6.600	1.300
210	15	6.1	80.0	83.7	109.1	24.200	3.500	0.700
211	14	5.9	70.0	45.1	83.3	54.800	4.100	0.700
212	14	5.9	70.0	45.1	83.3	76.600	3.800	0.600
213	14	5.4	90.0	41.7	99.2	49.600	2.700	0.600
214	14	5.4	90.0	41.7	99.2	83.300	3.300	0.800
215	22	6.1	80.0	49.0	85.4	65.500	3.800	0.800
216	22	6.1	80.0	49.0	85.4	109.500	5.300	0.700
217	24	4.5	0.0	3.4	3.4	127.200	3.100	0.400
218	24	4.5	0.0	3.4	3.4	148.500	5.700	0.500
219	25	7.5	30.0	103.0	107.3	201.300	14.400	3.240
220	25	7.5	30.0	103.0	107.3	213.200	19.560	3.990
221	25	6.6	40.0	18.7	44.2	699.100	33.020	9.300
222	25	6.6	40.0	18.7	44.2	810.600	24.650	4.340
223	25	5.3	40.0	18.3	44.0	213.800	8.250	1.930
224	25	5.3	40.0	18.3	44.0	298.600	12.930	2.310
225	25	6.7	10.0	135.4	135.8	141.000	2.890	0.310
226	25	6.7	10.0	135.4	135.8	126.800	2.350	0.630
227	25	4.7	10.0	137.5	137.9	125.500	3.790	0.750
228	25	4.7	10.0	137.5	137.9	78.100	2.470	0.500
229	28	6.1	70.0	41.0	81.2	140.000	12.900	1.260
230	28	6.1	70.0	41.0	81.2	102.000	10.500	1.480
231	28	4.9	78.0	28.0	82.9	29.500	2.470	0.640
232	28	4.9	78.0	28.0	82.9	33.100	1.330	0.420
233	28	6.1	78.0	46.0	90.6	73.500	4.610	0.840

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max}=Peak acceleration, V_{max}=Peak velocity, D_{max}=Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D (KM)	R _e (KM)	r (KM)	A _{max} (cm/sec ²)	V _{max} (cm/sec)	D _{max} (cm)
234	28	6.1	78.0	46.0	90.6	68.700	6.160	0.870
235	28	6.7	58.0	73.0	93.2	122.900	14.940	2.160
236	28	6.7	58.0	73.0	93.2	109.200	10.530	1.660
237	28	6.0	96.0	11.0	96.6	190.200	7.480	0.840
238	28	6.0	96.0	11.0	96.6	65.100	3.410	0.650
239	27	6.4	52.0	84.0	98.8	107.800	2.910	0.720
240	27	6.4	52.0	84.0	98.8	78.000	2.430	0.460
241	27	6.7	35.0	127.0	131.7	123.800	3.610	0.590
242	27	6.7	35.0	127.0	131.7	145.300	5.370	1.000
243	27	6.6	44.0	99.0	108.3	355.100	9.120	2.520
244	27	6.6	44.0	99.0	108.3	220.900	11.910	1.390
245	27	6.5	47.0	102.0	112.3	130.700	3.280	0.530
246	27	6.5	47.0	102.0	112.3	117.100	3.720	0.990
247	29	5.4	90.0	29.0	94.6	94.600	3.460	1.020
248	29	5.4	90.0	29.0	94.6	90.000	2.270	0.630
249	29	4.9	60.0	25.0	65.0	57.300	1.910	0.500
250	29	4.9	60.0	25.0	65.0	66.400	1.360	0.310
251	29	5.8	54.0	25.0	59.5	152.200	5.250	0.950
252	29	5.8	54.0	25.0	59.5	164.600	7.030	1.320
253	29	5.2	49.0	31.0	58.0	84.300	2.080	0.860
254	29	5.2	49.0	31.0	58.0	112.200	2.980	0.510
255	29	5.7	53.0	30.0	60.9	52.000	1.810	0.710
256	29	5.7	53.0	30.0	60.9	90.900	3.250	0.430
257	13	6.7	35.0	168.0	171.6	66.200	4.090	0.970
258	13	6.7	35.0	168.0	171.6	75.300	8.440	0.870
259	13	6.6	44.0	134.0	141.0	76.900	5.010	0.830
260	13	6.6	44.0	134.0	141.0	95.900	9.460	1.110
261	6	7.1	130.0	50.0	139.3	167.000	15.200	3.150
262	6	7.1	130.0	50.0	139.3	169.000	10.400	2.870
263	6	7.0	119.0	108.0	160.7	76.500	5.130	1.950
264	6	7.0	119.0	108.0	160.7	66.400	4.790	0.910
265	30	7.4	40.0	249.0	252.2	27.900	3.650	2.410
266	30	7.4	40.0	249.0	252.2	26.200	4.030	1.500
267	30	7.7	14.0	107.0	107.9	219.100	27.940	11.550
268	30	7.7	14.0	107.0	107.9	235.300	24.480	10.720
269	30	6.1	23.0	113.0	115.3	63.600	5.200	1.500
270	30	6.1	23.0	113.0	115.3	49.400	3.910	1.150
271	30	6.0	14.0	115.0	115.8	75.600	2.060	0.430
272	30	6.0	14.0	115.0	115.8	43.300	2.530	0.540
273	31	7.4	40.0	345.0	347.3	31.900	4.150	1.280
274	31	7.4	40.0	345.0	347.3	30.000	3.570	1.630
275	31	6.1	70.0	18.0	72.3	99.700	11.800	1.540
276	31	6.1	70.0	18.0	72.3	161.000	12.400	2.210
277	31	6.0	72.0	38.0	81.4	30.400	4.640	1.120
278	31	6.0	72.0	38.0	81.4	55.900	8.520	1.730
279	31	6.1	78.0	30.0	83.6	72.900	4.880	0.720
280	31	6.1	78.0	30.0	83.6	75.000	8.010	1.250

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max}=Peak acceleration, V_{max}=Peak velocity, D_{max}=Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D	R _e	r	A _{max}	V _{max}	D _{max}
			(KM)	(KM)	(KM)	(cm/sec ²)	(cm/sec)	(cm)
281	31	6.7	58.0	44.0	72.8	300.700	13.250	2.340
282	31	6.7	58.0	44.0	72.8	262.700	19.400	3.910
283	8	7.4	40.0	319.0	321.5	22.100	6.120	2.650
284	8	7.4	40.0	319.0	321.5	24.600	5.820	2.600
285	8	7.7	14.0	156.0	156.6	121.500	21.810	7.680
286	8	7.7	14.0	156.0	156.6	168.000	28.770	11.680
287	8	7.1	6.0	160.0	160.1	65.500	7.540	2.790
288	8	7.1	6.0	160.0	160.1	73.700	9.550	3.390
289	9	7.7	14.0	204.0	204.5	22.600	5.480	3.590
290	9	7.7	14.0	204.0	204.5	24.000	5.260	3.970
291	32	5.0	56.0	10.0	56.9	84.700	1.460	0.050
292	32	5.0	56.0	10.0	56.9	94.500	1.500	0.100
293	32	5.0	43.0	28.0	51.3	181.100	3.280	0.130
294	32	5.0	43.0	28.0	51.3	170.500	3.590	0.070
295	32	5.8	42.0	51.0	66.1	104.100	2.590	0.290
296	32	5.8	42.0	51.0	66.1	113.300	2.980	0.340
297	32	4.6	61.0	74.0	95.9	31.100	0.780	0.030
298	32	4.6	61.0	74.0	95.9	53.100	1.000	0.060
299	32	5.2	48.0	48.0	67.9	67.300	1.240	0.080
300	32	5.2	48.0	48.0	67.9	59.300	1.060	0.120
301	32	4.8	66.0	14.0	67.5	75.200	1.460	0.060
302	32	4.8	66.0	14.0	67.5	82.900	1.760	0.090
303	32	6.6	44.0	151.0	157.3	52.600	1.610	0.460
304	32	6.6	44.0	151.0	157.3	39.100	2.340	0.600
305	32	4.9	61.5	38.0	72.3	61.400	1.100	0.050
306	32	4.9	61.5	38.0	72.3	36.500	0.570	0.040
307	32	4.7	49.0	11.0	50.2	132.400	2.740	0.150
308	32	4.7	49.0	11.0	50.2	107.800	2.670	0.170
309	26	6.8	116.0	125.0	170.5	75.200	6.940	1.150
310	26	6.8	116.0	125.0	170.5	61.500	4.830	0.970
311	26	7.1	33.0	47.0	57.4	248.800	19.740	2.470
312	26	7.1	33.0	47.0	57.4	358.200	29.050	4.850
313	33	7.4	40.0	281.0	283.8	53.400	4.190	1.830
314	33	7.4	40.0	281.0	283.8	39.100	4.500	1.370
315	33	7.0	30.0	118.0	121.8	87.600	5.000	2.000
316	33	7.0	30.0	118.0	121.8	106.500	4.820	2.080
317	33	5.6	43.0	76.0	87.3	114.200	4.100	0.720
318	33	5.6	43.0	76.0	87.3	51.600	1.710	0.710
319	33	5.0	43.0	61.0	74.6	117.700	4.090	0.740
320	33	5.0	43.0	61.0	74.6	47.700	1.450	0.420
321	33	6.1	44.0	64.0	77.7	125.800	4.870	0.450
322	33	6.1	44.0	64.0	77.7	61.300	3.500	0.740
323	33	5.8	42.0	68.0	79.9	105.700	3.790	0.530
324	33	5.8	42.0	68.0	79.9	66.700	3.740	0.700
325	33	6.7	58.0	65.0	87.1	133.100	8.600	3.180
326	33	6.7	58.0	65.0	87.1	134.600	7.010	1.960
327	33	5.6	54.0	71.0	89.2	69.200	3.870	0.370

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max} =Peak acceleration, V_{max} =Peak velocity, D_{max} =Peak displacement

Table A-I List of Strong-Motion Records Used in This Study (Cont'd)

NO	SITE	M	D (KM)	R _e (KM)	r (KM)	A _{max} (cm/sec ²)	V _{max} (cm/sec)	D _{max} (cm)
328	33	5.6	54.0	71.0	89.2	56.500	2.230	0.340
329	33	4.9	42.0	12.0	43.7	87.600	2.530	0.410
330	33	4.9	42.0	12.0	43.7	34.900	1.100	0.280
331	11	6.6	72.0	27.0	76.9	231.600	9.140	2.210
332	11	6.6	72.0	27.0	76.9	230.500	9.510	1.980
333	11	7.1	0.0	95.0	95.0	183.100	7.040	1.760
334	11	7.1	0.0	95.0	95.0	137.400	5.560	1.710
335	7	7.7	14.0	270.0	270.4	39.900	2.550	1.240
336	7	7.7	14.0	270.0	270.4	30.000	2.420	1.660
337	7	7.1	6.0	201.0	201.1	70.900	4.300	0.830
338	7	7.0	119.0	164.4	202.6	56.200	3.080	0.880
339	7	7.0	119.0	164.0	202.6	127.800	4.590	0.750
340	3	7.7	100.0	401.0	413.3	47.300	2.280	1.090
341	3	7.7	100.0	401.0	413.3	64.200	2.390	1.280
342	3	6.1	60.0	85.0	104.0	41.800	2.450	0.630
343	3	6.1	60.0	85.0	104.0	62.500	3.170	0.580
344	3	5.7	84.0	42.0	93.9	61.500	2.960	1.370
345	3	5.7	84.0	42.0	93.9	96.800	3.610	1.930
346	3	7.0	119.0	42.0	126.2	150.200	8.250	3.120
347	3	7.0	119.0	42.0	126.2	197.900	5.910	1.680
348	3	6.4	92.8	48.0	104.5	81.700	2.930	0.660
349	3	6.4	92.8	48.0	104.5	116.900	3.370	0.870
350	3	6.0	78.0	106.0	131.6	54.800	2.570	0.770
351	3	6.0	78.0	106.0	131.6	74.200	3.220	1.000
352	21	7.4	40.0	374.0	376.1	26.000	3.350	0.640
353	21	7.4	40.0	374.0	376.1	18.300	1.930	0.740
354	21	6.0	22.0	60.0	63.9	110.300	6.720	0.760
355	21	6.0	22.0	60.0	63.9	68.300	3.920	0.470
356	21	6.7	58.0	77.0	96.4	115.100	8.000	2.120
357	21	6.7	58.0	77.0	96.4	74.900	8.700	2.440

M=Magnitude, D=Depth, R_e=Epicentral distance, r=Hypocentral distance
A_{max}=Peak acceleration, V_{max}=Peak velocity, D_{max}=Peak displacement

APPENDIX B

Based on Fig.9-3, we obtain the following values.

i	x_i	$N(x_i)$	$\frac{\sqrt{N(x_{i+1})}}{\sum_{j=1}^i \sqrt{N(x_j)}}$
1	1.5	24	0.456
2	2.5	5	0.627
3	3.7	5	0.784
4	5.0	6	0.830
5	7.0	6	1.402
6	8.0	16	1.469
7	9.0	20	1.192
8	10.0	15	1.344
9	12.0	20	1.357
10	13.0	22	1.186
11	14.0	18	1.347
12	15.5	24	1.362
13	17.5	26	1.246
14	18.5	23	1.574
15	20.0	38	1.650
16	21.0	45	1.671
17	23.0	50	

For example for $i=10$

$$\frac{\sqrt{N(x_{i+1})}}{\sum_{j=1}^i \sqrt{N(x_j)}} = 1.186$$

Since the maximum value of the fourth column is for $i=16$, that is, $M=16$,

$$x_M = 21.0$$

$$\frac{1}{M} \sum_{j=1}^M \sqrt{N(x_j)} = 4.230$$

$$\text{Max} \left[\frac{\sqrt{N(x_{i+1})}}{\frac{1}{M} \sum_{j=1}^M \sqrt{N(x_j)}} \right] = 1.671$$

and finally

$$C_{\text{emp}} = \text{Max} \left[\frac{\sqrt{N(x_{i+1})}}{\frac{1}{M} \sum_{j=1}^M \sqrt{N(x_j)}} \right] \times \frac{x_M}{\frac{1}{M} \sum_{j=1}^M \sqrt{N(x_j)}}$$

$$= 1.671 \times \frac{21.0}{4.230}$$

$$= 8.30$$

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