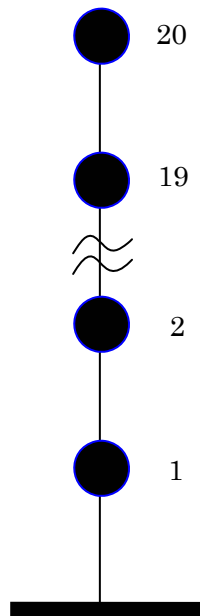


## **20-STORY MDOF MODEL WITH ELASTIC STIFFNESS**

20-Story MDOF (Multi-Degree of Freedom) model with elastic stiffness



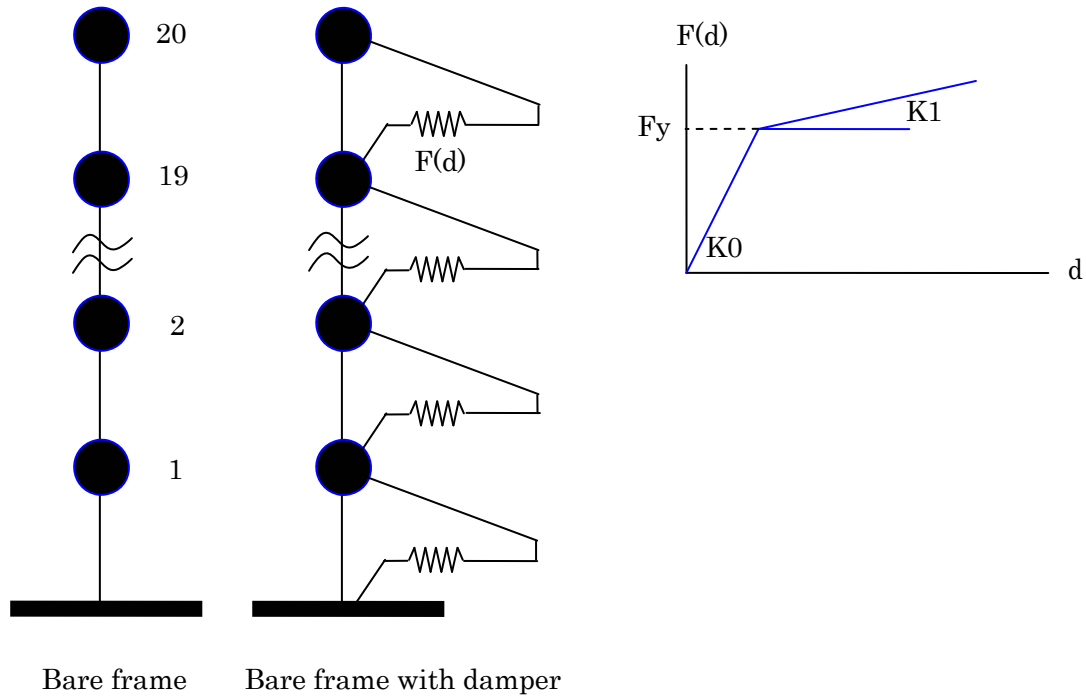
Bare frame

	W (kN)	H (mm)	K (kN/mm)
20	17937	4000	278.9
19	13363	4000	292.9
18	13410	4000	312.5
17	13410	4000	342.8
16	13565	4000	443.9
15	13613	4000	453.0
14	13613	4000	473.3
13	13739	4000	491.3
12	13790	4000	599.2
11	13842	4000	613.9
10	13895	4000	630.6
9	13895	4000	638.1
8	13928	4000	694.7
7	13975	4000	729.1
6	13975	4000	736.7
5	14020	4000	854.9
4	14092	4000	875.9
3	14148	4000	930.8
2	14203	4000	974.2
1	14653	6000	842.9

W: floor weight, H: story height, K: story stiffness

## **20-STORY MDOF MODEL WITH STEEL DAMPER**

20-Story MDOF (Multi-Degree of Freedom) model with steel damper



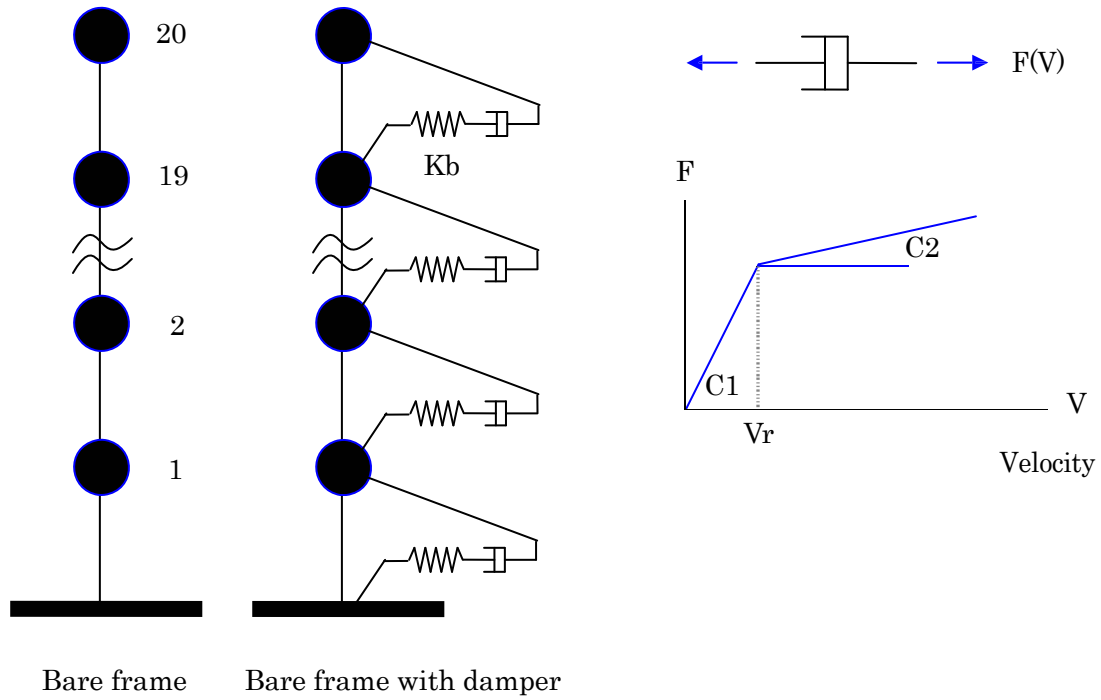
	W (kN)	H (mm)	K (kN/mm)	K0 (kN/mm)	Fy (kN)	K1/K0
20	17937	4000	278.9	(no damper)	(no damper)	0.02
19	13363	4000	292.9	315.5	2104	0.02
18	13410	4000	312.5	621.9	4146	0.02
17	13410	4000	342.8	844.7	5631	0.02
16	13565	4000	443.9	756.1	5041	0.02
15	13613	4000	453.0	1009.6	6731	0.02
14	13613	4000	473.3	1193.7	7958	0.02
13	13739	4000	491.3	1366.7	9111	0.02
12	13790	4000	599.2	1160.1	7734	0.02
11	13842	4000	613.9	1306.7	8711	0.02
10	13895	4000	630.6	1426.7	9511	0.02
9	13895	4000	638.1	1564.3	10429	0.02
8	13928	4000	694.7	1487.8	9919	0.02
7	13975	4000	729.1	1482.3	9882	0.02
6	13975	4000	736.7	1566.6	10444	0.02
5	14020	4000	854.9	1190.8	7939	0.02
4	14092	4000	875.9	1187.3	7915	0.02
3	14148	4000	930.8	1031.0	6873	0.02
2	14203	4000	974.2	903.9	6026	0.02
1	14653	6000	842.9	(no damper)	(no damper)	0.02

W: floor weight, H: story height, K: story stiffness

K0: initial stiffness of steel damper, Fy: yielding strength of steel damper

## **20-STORY MDOF MODEL WITH OIL DAMPER**

20-Story MDOF (Multi-Degree of Freedom) model with oil damper



	W (kN)	H (mm)	K (kN/mm)	Kb (kN/mm)	C1 (kN*s/mm)	C2/C1	Vr (mm/s)
20	17937	4000	278.9	281.0	88.	0.02	21.2
19	13363	4000	292.9	295.2	93.	0.02	21.2
18	13410	4000	312.5	314.9	99.	0.02	21.2
17	13410	4000	342.8	345.4	109.0	0.02	21.2
16	13565	4000	443.9	447.3	141.2	0.02	21.2
15	13613	4000	453.0	456.4	144.1	0.02	21.2
14	13613	4000	473.3	476.9	150.5	0.02	21.2
13	13739	4000	491.3	495.0	156.3	0.02	21.2
12	13790	4000	599.2	603.7	190.6	0.02	21.2
11	13842	4000	613.9	618.6	195.3	0.02	21.2
10	13895	4000	630.6	635.4	200.6	0.02	21.2
9	13895	4000	638.1	643.0	203.0	0.02	21.2
8	13928	4000	694.7	700.0	221.0	0.02	21.2
7	13975	4000	729.1	734.7	231.9	0.02	21.2
6	13975	4000	736.7	742.3	234.3	0.02	21.2
5	14020	4000	854.9	861.4	271.9	0.02	21.2
4	14092	4000	875.9	882.6	278.6	0.02	21.2
3	14148	4000	930.8	937.9	296.1	0.02	21.2
2	14203	4000	974.2	981.6	309.8	0.02	21.2
1	14653	6000	842.9	849.3	268.1	0.02	31.8

W: floor weight, H: story height, K: story stiffness

Kb: brace stiffness, C1, C2: damping coefficient, Vr: release velocity

## Reference

- 1) Design and Construction Manual for Passive Response Control Structure (2<sup>nd</sup> Edition),  
Japan Society of Seismic Isolation, 2005 (in Japanese)