

RDA ELASTIC DISPLACEMENTS AT RC ELEMENTS - LEVEL 2
RIGID DIAPHRAGM ANALYSIS - DEFORMATIONS AND TORSIONAL IRREGULARITY CHECK
SAMPLE PROJECT, ANYTOWN - NEW DESIGN

Floor Level : 2

1. Check of Torsional Irregularity Check and Amplification of Accidental Torsion

Note : ASCE 7 Table 12.3-1 defines Horizontal Irregularity Type 1a (Torsional) as having Deformation Ratio > 1.2, Horizontal Irregularity Type 1b (Extreme Torsional) as having Def. Ratio > 1.4, requiring Amplification of Accidental Torsion (Section 12.8.4.3) in either case (must run macro **Ctrl-T** or input **A_x** values by hand in both directions in previous worksheet).

a) Check of Torsional Irregularity (Table 12.3-1)

- N-S Direction does not have Torsional Irregularity.

= > **A_{xy}** = 1.00

- W-E Direction does not have Torsional Irregularity.

= > **A_{xx}** = 1.00

	Deformation Ratio		
	N-S	W-E	
δ _{MAX}	0.495	0.443	inches
δ _{MIN}	0.392	0.346	inches
δ _{AVG}	0.426	0.386	inches
Ratio =	1.16	1.15	

OK OK

b) Amplification of Accidental Torsional Moment (Sect 12.8.4.3)

$A_x = [\delta_{MAX} / 1.2 \delta_{AVG}]^2$ (12.8-14)

	N-S	W-E
A_x	1.00	1.00

2. RDA Load Distribution to RC Elements - Elastic Displacements (δ_{xe})

LFRS Direction	RC Element ID	Fixity to Slab	Dimensions				Coordinates		Stiffness		V _c (kips)	V _c / h (Kip/in)	Drift Ratios			δ _{xe} (inches)
			H _{below} (feet)	H _{above} (feet)	L (feet)	t (inches)	x (feet)	y (feet)	K (kip/in)	Relative Stiffness			Beam	Column	Total	
N-S	1	F	14.00	12.00	2.00	24.0	0.00	0.00	75	1.00	30.7	0.20	0.0022	0.0004	0.0026	0.460
	2	F	14.00	12.00	2.00	24.0	26.00	0.00	75	1.00	30.1	0.19	0.0022	0.0004	0.0026	0.451
	3	F	14.00	12.00	2.00	24.0	52.00	0.00	75	1.00	29.4	0.19	0.0021	0.0004	0.0025	0.441
	4	F	14.00	12.00	2.00	24.0	78.00	0.00	75	1.00	28.7	0.18	0.0021	0.0004	0.0025	0.431
	5	F	14.00	12.00	2.00	24.0	104.00	0.00	75	1.00	28.1	0.18	0.0021	0.0003	0.0024	0.421
	6	F	14.00	12.00	2.00	24.0	130.00	0.00	75	1.00	27.4	0.18	0.0020	0.0003	0.0023	0.411
	7	F	14.00	12.00	2.00	24.0	156.00	0.00	75	1.00	26.8	0.17	0.0020	0.0003	0.0023	0.401
	8	F	14.00	12.00	2.00	24.0	182.00	0.00	75	1.00	26.1	0.17	0.0019	0.0003	0.0022	0.392
	9	F	14.00	12.00	2.00	24.0	0.00	24.00	131	1.75	53.2	0.34	0.0019	0.0007	0.0026	0.495
	10	F	14.00	12.00	2.50	30.0	26.00	24.00	154	2.05	61.4	0.39	0.0022	0.0003	0.0026	0.440
	11	F	14.00	12.00	2.50	30.0	52.00	24.00	154	2.05	60.0	0.38	0.0022	0.0003	0.0025	0.431
	12	F	14.00	12.00	2.50	30.0	78.00	24.00	154	2.05	58.7	0.38	0.0021	0.0003	0.0024	0.421
	13	F	14.00	12.00	2.50	30.0	104.00	24.00	154	2.05	57.3	0.37	0.0021	0.0003	0.0024	0.411
	14	F	14.00	12.00	2.50	30.0	130.00	24.00	154	2.05	56.0	0.36	0.0020	0.0003	0.0023	0.402
	15	F	14.00	12.00	2.50	30.0	156.00	24.00	154	2.05	54.6	0.35	0.0020	0.0003	0.0023	0.392
	16	F	14.00	12.00	2.00	24.0	182.00	24.00	131	1.75	45.2	0.29	0.0017	0.0006	0.0022	0.420
	17	F	14.00	12.00	2.00	24.0	0.00	48.00	131	1.75	53.2	0.34	0.0019	0.0007	0.0026	0.495
	18	F	14.00	12.00	2.50	30.0	26.00	48.00	154	2.05	61.4	0.39	0.0022	0.0003	0.0026	0.440
	19	F	14.00	12.00	2.50	30.0	52.00	48.00	154	2.05	60.0	0.38	0.0022	0.0003	0.0025	0.431
	20	F	14.00	12.00	2.50	30.0	78.00	48.00	154	2.05	58.7	0.38	0.0021	0.0003	0.0024	0.421
	21	F	14.00	12.00	2.50	30.0	104.00	48.00	154	2.05	57.3	0.37	0.0021	0.0003	0.0024	0.411
	22	F	14.00	12.00	2.50	30.0	130.00	48.00	154	2.05	56.0	0.36	0.0020	0.0003	0.0023	0.402
	23	F	14.00	12.00	2.50	30.0	156.00	48.00	154	2.05	54.6	0.35	0.0020	0.0003	0.0023	0.392
	24	F	14.00	12.00	2.00	24.0	182.00	48.00	131	1.75	45.2	0.29	0.0017	0.0006	0.0022	0.420
	25	F	14.00	12.00	2.00	24.0	0.00	72.00	75	1.00	30.7	0.20	0.0022	0.0004	0.0026	0.460
	26	F	14.00	12.00	2.00	24.0	26.00	72.00	75	1.00	30.1	0.19	0.0022	0.0004	0.0026	0.451
	27	F	14.00	12.00	2.00	24.0	52.00	72.00	75	1.00	29.4	0.19	0.0021	0.0004	0.0025	0.441
	28	F	14.00	12.00	2.00	24.0	78.00	72.00	75	1.00	28.7	0.18	0.0021	0.0004	0.0025	0.431
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	30	F	14.00	12.00	2.00	24.0	130.00	72.00	75	1.00	27.4	0.18	0.0020	0.0003	0.0023	0.411
	31	F	14.00	12.00	2.00	24.0	156.00	72.00	75	1.00	26.8	0.17	0.0020	0.0003	0.0023	0.401
	32	F	14.00	12.00	2.00	24.0	182.00	72.00	75	1.00	26.1	0.17	0.0019	0.0003	0.0022	0.392

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W-E	1	F	14.00	12.00	2.00	24.0	0.00	0.00	75	1.00	23.1	0.15	0.0017	0.0003	0.0020	0.346
	2	F	14.00	12.00	2.00	24.0	26.00	0.00	131	1.75	39.9	0.26	0.0015	0.0005	0.0019	0.371
	3	F	14.00	12.00	2.00	24.0	52.00	0.00	131	1.75	39.9	0.26	0.0015	0.0005	0.0019	0.371
	4	F	14.00	12.00	2.00	24.0	78.00	0.00	131	1.75	39.9	0.26	0.0015	0.0005	0.0019	0.371
	5	F	14.00	12.00	2.00	24.0	104.00	0.00	131	1.75	39.9	0.26	0.0015	0.0005	0.0019	0.371
	6	F	14.00	12.00	2.00	24.0	130.00	0.00	131	1.75	39.9	0.26	0.0015	0.0005	0.0019	0.371
	7	F	14.00	12.00	2.00	24.0	156.00	0.00	131	1.75	39.9	0.26	0.0015	0.0005	0.0019	0.371
	8	F	14.00	12.00	2.00	24.0	182.00	0.00	75	1.00	23.1	0.15	0.0017	0.0003	0.0020	0.346
	9	F	14.00	12.00	2.00	24.0	0.00	24.00	75	1.00	24.6	0.16	0.0018	0.0003	0.0021	0.368
	10	F	14.00	12.00	2.50	30.0	26.00	24.00	154	2.05	50.2	0.32	0.0018	0.0003	0.0021	0.360
	11	F	14.00	12.00	2.50	30.0	52.00	24.00	154	2.05	50.2	0.32	0.0018	0.0003	0.0021	0.360
	12	F	14.00	12.00	2.50	30.0	78.00	24.00	154	2.05	50.2	0.32	0.0018	0.0003	0.0021	0.360
	13	F	14.00	12.00	2.50	30.0	104.00	24.00	154	2.05	50.2	0.32	0.0018	0.0003	0.0021	0.360
	14	F	14.00	12.00	2.50	30.0	130.00	24.00	154	2.05	50.2	0.32	0.0018	0.0003	0.0021	0.360
	15	F	14.00	12.00	2.50	30.0	156.00	24.00	154	2.05	50.2	0.32	0.0018	0.0003	0.0021	0.360
	16	F	14.00	12.00	2.00	24.0	182.00	24.00	75	1.00	24.6	0.16	0.0018	0.0003	0.0021	0.368
	17	F	14.00	12.00	2.00	24.0	0.00	48.00	75	1.00	26.0	0.17	0.0019	0.0003	0.0022	0.390
	18	F	14.00	12.00	2.50	30.0	26.00	48.00	154	2.05	53.2	0.34	0.0019	0.0003	0.0022	0.382
	19	F	14.00	12.00	2.50	30.0	52.00	48.00	154	2.05	53.2	0.34	0.0019	0.0003	0.0022	0.382
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	24	F	14.00	12.00	2.00	24.0	182.00	48.00	75	1.00	26.0	0.17	0.0019	0.0003	0.0022	0.390
	25	F	14.00	12.00	2.00	24.0	0.00	72.00	75	1.00	27.5	0.18	0.0020	0.0003	0.0023	0.413
	26	F	14.00	12.00	2.00	24.0	26.00	72.00	131	1.75	47.6	0.31	0.0017	0.0006	0.0023	0.443
	27	F	14.00	12.00	2.00	24.0	52.00	72.00	131	1.75	47.6	0.31	0.0017	0.0006	0.0023	0.443
	28	F	14.00	12.00	2.00	24.0	78.00	72.00	131	1.75	47.6	0.31	0.0017	0.0006	0.0023	0.443
	29	F	14.00	12.00	2.00	24.0	104.00	72.00	131	1.75	47.6	0.31	0.0017	0.0006	0.0023	0.443
	30	F	14.00	12.00	2.00	24.0	130.00	72.00	131	1.75	47.6	0.31	0.0017	0.0006	0.0023	0.443
	31	F	14.00	12.00	2.00	24.0	156.00	72.00	131	1.75	47.6	0.31	0.0017	0.0006	0.0023	0.443
	32	F	14.00	12.00	2.00	24.0	182.00	72.00	75	1.00	27.5	0.18	0.0020	0.0003	0.0023	0.413