

Project Sample Project, Anytown  
 Job No. 202322.1  
 By AL  
 Date 11/27/23  
 Sheet \_\_\_\_ of \_\_\_\_

**Company Name**  
 Company Address  
 Company Tel/Fax  
 Company Website

NBSD-Software.com

**RDA ELASTIC DISPLACEMENTS AT STEEL 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	
$\delta_{MAX}$	0.714	0.600	inches
$\delta_{MIN}$	0.534	0.455	inches
$\delta_{AVG}$	0.627	0.524	inches
<b>Ratio =</b>	<b>1.14</b>	<b>1.14</b>	

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 Floor Displacements ( $\delta_{ve}$ )**

LFRS Direction	Steel Element ID	H (feet)	Braced Frame	LFRS Option Data			Coordinates <sup>1</sup>		Stiffness		V <sub>c</sub> (kips)	V / h (Kip/in)	Drift Ratios				$\delta_{ve}$ (inches)	
				Column Type (I or E)	AISC Shape	Strong / Weak Axis	x (feet)	y (feet)	K (kip/in)	Relative Stiffness			Beam	Column	Panel	Total		
N-S	1	15.00		E	W14X233	W	0.00	0.00	60	1.00	32	31.7	0.0019	0.0011	0.0002	0.0032	0.657	
	2	15.00		E	W14X233	W	30.00	0.00	60	1.00	30	29.7	0.0018	0.0011	0.0002	0.0030	0.616	
	3	15.00		E	W14X233	W	60.00	0.00	60	1.00	28	27.7	0.0017	0.0010	0.0001	0.0028	0.575	
	4	15.00		E	W14X233	W	90.00	0.00	60	1.00	26	25.7	0.0016	0.0009	0.0001	0.0026	0.534	
	5	15.00		E	W14X233	W	0.00	30.00	86	1.43	45	45.2	0.0014	0.0016	0.0002	0.0032	0.714	
	6	15.00		I	W14X257	W	30.00	30.00	92	1.52	45	45.1	0.0014	0.0014	0.0002	0.0030	0.661	
	7	15.00		I	W14X257	W	60.00	30.00	92	1.52	42	42.1	0.0013	0.0013	0.0002	0.0028	0.616	
	8	15.00		E	W14X233	W	90.00	30.00	86	1.43	37	36.7	0.0011	0.0013	0.0002	0.0026	0.580	
	9	15.00		E	W14X233	W	0.00	60.00	86	1.43	45	45.2	0.0014	0.0016	0.0002	0.0032	0.714	
	10	15.00		I	W14X257	W	30.00	60.00	92	1.52	45	45.1	0.0014	0.0014	0.0002	0.0030	0.661	
	11	15.00		I	W14X257	W	60.00	60.00	92	1.52	42	42.1	0.0013	0.0013	0.0002	0.0028	0.616	
	12	15.00		E	W14X233	W	90.00	60.00	86	1.43	37	36.7	0.0011	0.0013	0.0002	0.0026	0.580	
	13	15.00		E	W14X233	W	0.00	90.00	86	1.43	45	45.2	0.0014	0.0016	0.0002	0.0032	0.714	
	14	15.00		I	W14X257	W	30.00	90.00	92	1.52	45	45.1	0.0014	0.0014	0.0002	0.0030	0.661	
	15	15.00		I	W14X257	W	60.00	90.00	92	1.52	42	42.1	0.0013	0.0013	0.0002	0.0028	0.616	
	16	15.00		E	W14X233	W	90.00	90.00	86	1.43	37	36.7	0.0011	0.0013	0.0002	0.0026	0.580	
	17	15.00		E	W14X233	W	0.00	120.00	86	1.43	45	45.2	0.0014	0.0016	0.0002	0.0032	0.714	
	18	15.00		I	W14X257	W	30.00	120.00	92	1.52	45	45.1	0.0014	0.0014	0.0002	0.0030	0.661	
	19	15.00		I	W14X257	W	60.00	120.00	92	1.52	42	42.1	0.0013	0.0013	0.0002	0.0028	0.616	
	20	15.00		E	W14X233	W	90.00	120.00	86	1.43	37	36.7	0.0011	0.0013	0.0002	0.0026	0.580	
	21	15.00		E	W14X233	W	0.00	150.00	60	1.00	32	31.7	0.0019	0.0011	0.0002	0.0032	0.657	
	22	15.00		E	W14X233	W	30.00	150.00	60	1.00	30	29.7	0.0018	0.0011	0.0002	0.0030	0.616	
	23	15.00		E	W14X233	W	60.00	150.00	60	1.00	28	27.7	0.0017	0.0010	0.0001	0.0028	0.575	
	24	15.00		E	W14X233	W	90.00	150.00	60	1.00	26	25.7	0.0016	0.0009	0.0001	0.0026	0.534	
	25																	
	26																	
	27																	
	28																	
	29																	
	30																	
	31																	
	32																	

**RDA ELASTIC DISPLACEMENTS AT STEEL 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	
$\delta_{MAX}$	0.714	0.600	inches
$\delta_{MIN}$	0.534	0.455	inches
$\delta_{AVG}$	0.627	0.524	inches
<b>Ratio =</b>	<b>1.14</b>	<b>1.14</b>	

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 Floor Displacements ( $\delta_{ve}$ )**

LFRS Direction	Steel Element ID	H (feet)	Braced Frame	LFRS Option Data			Coordinates <sup>1</sup>		Stiffness		V <sub>c</sub> (kips)	V / h (Kip/in)	Drift Ratios				$\delta_{ve}$ (inches)
				Column Type (I or E)	AISC Shape	Strong / Weak Axis	x (feet)	y (feet)	K (kip/in)	Relative Stiffness			Beam	Column	Panel	Total	
W-E	1	15.00		E	W14X233	S	0.00	0.00	63	1.04	33	32.6	0.0022	0.0004	0.0006	0.0032	0.572
	2	15.00		E	W14X233	S	30.00	0.00	95	1.58	50	49.6	0.0017	0.0007	0.0008	0.0032	0.600
	3	15.00		E	W14X233	S	60.00	0.00	95	1.58	50	49.6	0.0017	0.0007	0.0008	0.0032	0.600
	4	15.00		E	W14X233	S	90.00	0.00	63	1.04	33	32.6	0.0022	0.0004	0.0006	0.0032	0.572
	5	15.00		E	W14X233	S	0.00	30.00	63	1.04	31	31.3	0.0021	0.0004	0.0005	0.0031	0.549
	6	15.00		I	W14X257	S	30.00	30.00	101	1.67	50	50.4	0.0017	0.0006	0.0008	0.0031	0.570
	7	15.00		I	W14X257	S	60.00	30.00	101	1.67	50	50.4	0.0017	0.0006	0.0008	0.0031	0.570
	8	15.00		E	W14X233	S	90.00	30.00	63	1.04	31	31.3	0.0021	0.0004	0.0005	0.0031	0.549
	9	15.00		E	W14X233	S	0.00	60.00	63	1.04	30	29.9	0.0020	0.0004	0.0005	0.0029	0.525
	10	15.00		I	W14X257	S	30.00	60.00	101	1.67	48	48.2	0.0016	0.0006	0.0007	0.0029	0.546
	11	15.00		I	W14X257	S	60.00	60.00	101	1.67	48	48.2	0.0016	0.0006	0.0007	0.0029	0.546
	12	15.00		E	W14X233	S	90.00	60.00	63	1.04	30	29.9	0.0020	0.0004	0.0005	0.0029	0.525
	13	15.00		E	W14X233	S	0.00	90.00	63	1.04	29	28.6	0.0019	0.0004	0.0005	0.0028	0.502
	14	15.00		I	W14X257	S	30.00	90.00	101	1.67	46	46.1	0.0016	0.0006	0.0007	0.0028	0.521
	15	15.00		I	W14X257	S	60.00	90.00	101	1.67	46	46.1	0.0016	0.0006	0.0007	0.0028	0.521
	16	15.00		E	W14X233	S	90.00	90.00	63	1.04	29	28.6	0.0019	0.0004	0.0005	0.0028	0.502
	17	15.00		E	W14X233	S	0.00	120.00	63	1.04	27	27.3	0.0018	0.0004	0.0005	0.0027	0.478
	18	15.00		I	W14X257	S	30.00	120.00	101	1.67	44	43.9	0.0015	0.0005	0.0007	0.0027	0.497
	19	15.00		I	W14X257	S	60.00	120.00	101	1.67	44	43.9	0.0015	0.0005	0.0007	0.0027	0.497
	20	15.00		E	W14X233	S	90.00	120.00	63	1.04	27	27.3	0.0018	0.0004	0.0005	0.0027	0.478
	21	15.00		E	W14X233	S	0.00	150.00	63	1.04	26	25.9	0.0018	0.0004	0.0004	0.0025	0.455
	22	15.00		E	W14X233	S	30.00	150.00	95	1.58	39	39.4	0.0013	0.0005	0.0007	0.0025	0.477
	23	15.00		E	W14X233	S	60.00	150.00	95	1.58	39	39.4	0.0013	0.0005	0.0007	0.0025	0.477
	24	15.00		E	W14X233	S	90.00	150.00	63	1.04	26	25.9	0.0018	0.0004	0.0004	0.0025	0.455
	25																
	26																
	27																
	28																
	29																
	30																
	31																
	32																