

**RDA DEMANDS TO SMRF ELEMENTS - LEVEL 2**  
**ASCE 7 SECTION 12.8 - EQUIVALENT LATERAL FORCE PROCEDURE - RIGID DIAPHRAGM ANALYSIS**  
**SAMPLE PROJECT, ANYTOWN - NEW DESIGN**

Floor Level : 2

**1. General Design Parameters**

H<sub>A</sub> = 12.00 feet (Height of Floor Level Above)  
 H<sub>B</sub> = 15.00 feet (Height of Floor Level Below)

**Story Shear - N-S Direction (Y)** for Loading Direction = + (+/-)  
 LFRS System: SMRF V<sub>S</sub> = 907 kips (Story Shear)  
 C<sub>S</sub> = 0.071 g's (Seismic Coefficient)

**Story Shear - W-E Direction (X)** for Loading Direction = + (+/-)  
 LFRS System: SMRF V<sub>S</sub> = 907 kips (Story Shear)  
 C<sub>S</sub> = 0.071 g's (Seismic Coefficient)

**Moment Frame Beams - N-S Direction (Y)** **Moment Frame Beams - W-E Direction (X)**  
 WF Shape = W30X116 WF Shape = W30X108

RC Diaphragm Dimensions						
Section	Length (feet)	Width (feet)	Thickness (inches)	x (feet)	y (feet)	Weight (kips)
1	92.00	152.00	9.00	-	-	1,521
2	0.00	0.00	0.00	0.00	0.00	0
3	0.00	0.00	0.00	0.00	0.00	0

for ρ = 145 pcf (Unit Weight)

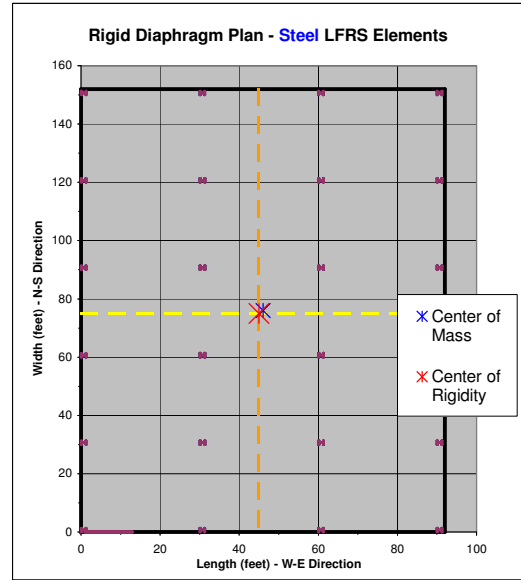
**Accidental Eccentricity (ASCE (Section 12.8.4.2):**

e<sub>MIN</sub> = 5.00 % (accidental eccentricity)

=> e<sub>AX</sub> A<sub>XY</sub> = 7.60 feet for A<sub>XY</sub> = 1.00 (N-S Amplification of Accidental Torsional Moment)

e<sub>AY</sub> A<sub>XX</sub> = 4.60 feet for A<sub>XX</sub> = 1.00 (W-E Amplification of Accidental Torsional Moment)

Material Data: E<sub>m</sub> = 29,000 ksi



**2. RDA Load Distribution to Steel Elements - SMRF Member Demands**

LFRS Direction	Steel Element ID	H (feet)	Steel Element Dimensions and Data								SMRF Column Demands				SMRF Beam Demands				
			LFRS Option Data			Coordinates <sup>1</sup>		Stiffness			P <sub>MAX</sub> (Kips)	V <sub>C</sub> (kips)	M <sub>TOP</sub> (Kip-in)	M <sub>BOT</sub> (Kip-in)	V <sub>BL</sub> (kips)	M <sub>BL</sub> (Kip-ft)	V <sub>BR</sub> (kips)	M <sub>BR</sub> (Kip-ft)	
			Column Type (I or E)	AISC Shape	Strong / Weak Axis	L or d (feet)	t or b <sub>t</sub> (inches)	x (feet)	y (feet)	K (kip/in)									Relative Stiffness
N-S	1	15.00	E	W14X233	W	1.33	15.90	0.00	0.00	60	1.00	110	31.7	189.9	237.4			20.1	287.5
	2	15.00	E	W14X233	W	1.33	15.90	30.00	0.00	60	1.00	110	29.7	178.0	222.5			18.8	269.5
	3	15.00	E	W14X233	W	1.33	15.90	60.00	0.00	60	1.00	110	27.7	166.1	207.7			17.5	251.5
	4	15.00	E	W14X233	W	1.33	15.90	90.00	0.00	60	1.00	110	25.7	154.3	192.8			16.3	233.5
	5	15.00	E	W14X233	W	1.33	15.90	0.00	30.00	86	1.43		45.2	270.9	338.6	21.0	300.9	17.4	249.7
	6	15.00	I	W14X257	W	1.37	16.00	30.00	30.00	92	1.52		45.1	270.7	338.4	22.2	318.5	18.5	264.3
	7	15.00	I	W14X257	W	1.37	16.00	60.00	30.00	92	1.52		42.1	252.7	315.8	20.8	297.2	17.2	246.7
	8	15.00	E	W14X233	W	1.33	15.90	90.00	30.00	86	1.43		36.7	220.1	275.1	17.1	244.4	14.2	202.9
	9	15.00	E	W14X233	W	1.33	15.90	0.00	60.00	86	1.43		45.2	270.9	338.6	21.0	300.9	17.4	249.7
	10	15.00	I	W14X257	W	1.37	16.00	30.00	60.00	92	1.52		45.1	270.7	338.4	22.2	318.5	18.5	264.3
	11	15.00	I	W14X257	W	1.37	16.00	60.00	60.00	92	1.52		42.1	252.7	315.8	20.8	297.2	17.2	246.7
	12	15.00	E	W14X233	W	1.33	15.90	90.00	60.00	86	1.43		36.7	220.1	275.1	17.1	244.4	14.2	202.9
	13	15.00	E	W14X233	W	1.33	15.90	0.00	90.00	86	1.43		45.2	270.9	338.6	21.0	300.9	17.4	249.7
	14	15.00	I	W14X257	W	1.37	16.00	30.00	90.00	92	1.52		45.1	270.7	338.4	22.2	318.5	18.5	264.3
	15	15.00	I	W14X257	W	1.37	16.00	60.00	90.00	92	1.52		42.1	252.7	315.8	20.8	297.2	17.2	246.7
	16	15.00	E	W14X233	W	1.33	15.90	90.00	90.00	86	1.43		36.7	220.1	275.1	17.1	244.4	14.2	202.9
	17	15.00	E	W14X233	W	1.33	15.90	0.00	120.00	86	1.43		45.2	270.9	338.6	21.0	300.9	17.4	249.7
	18	15.00	I	W14X257	W	1.37	16.00	30.00	120.00	92	1.52		45.1	270.7	338.4	22.2	318.5	18.5	264.3
	19	15.00	I	W14X257	W	1.37	16.00	60.00	120.00	92	1.52		42.1	252.7	315.8	20.8	297.2	17.2	246.7
	20	15.00	E	W14X233	W	1.33	15.90	90.00	120.00	86	1.43		36.7	220.1	275.1	17.1	244.4	14.2	202.9
	21	15.00	E	W14X233	W	1.33	15.90	0.00	150.00	60	1.00	-112	31.7	189.9	237.4	20.1	287.5		
	22	15.00	E	W14X233	W	1.33	15.90	30.00	150.00	60	1.00	-112	29.7	178.0	222.5	18.8	269.5		
	23	15.00	E	W14X233	W	1.33	15.90	60.00	150.00	60	1.00	-112	27.7	166.1	207.7	17.5	251.5		
	24	15.00	E	W14X233	W	1.33	15.90	90.00	150.00	60	1.00	-112	25.7	154.3	192.8	16.3	233.5		
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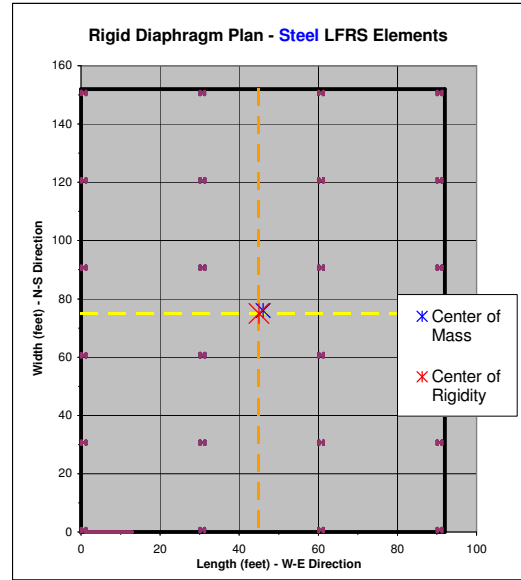
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			Column Type (I or E)	LFRS Option Data			Coordinates <sup>1</sup>		Stiffness		P <sub>MAX</sub> (Kips)	V <sub>C</sub> (kips)	M <sub>TOP</sub> (Kip-in)	M <sub>BOT</sub> (Kip-in)	V <sub>BL</sub> (kips)	M <sub>BL</sub> (Kip-ft)	V <sub>BR</sub> (kips)	M <sub>BR</sub> (Kip-ft)	
				AISC Shape	Strong / Weak Axis	L or d (feet)	t or b <sub>t</sub> (inches)	x (feet)	y (feet)	K (kip/in)									Relative Stiffness
W-E	1	15.00	E	W14X233	S	1.33	15.90	0.00	0.00	63	1.04	122	32.6	195.6	244.5	22.4	321.6	24.8	354.9
	2	15.00	E	W14X233	S	1.33	15.90	30.00	0.00	95	1.58		49.6	297.5	371.9	26.1	373.6	24.8	354.9
	3	15.00	E	W14X233	S	1.33	15.90	60.00	0.00	95	1.58		49.6	297.5	371.9	26.1	373.6	24.8	354.9
	4	15.00	E	W14X233	S	1.33	15.90	90.00	0.00	63	1.04	-126	32.6	195.6	244.5	22.4	321.6		
	5	15.00	E	W14X233	S	1.33	15.90	0.00	30.00	63	1.04	122	31.3	187.6	234.5			21.5	308.4
	6	15.00	I	W14X257	S	1.37	16.00	30.00	30.00	101	1.67		50.4	302.2	377.8	18.6	266.0	17.7	252.7
	7	15.00	I	W14X257	S	1.37	16.00	60.00	30.00	101	1.67		50.4	302.2	377.8	18.6	266.0	17.7	252.7
	8	15.00	E	W14X233	S	1.33	15.90	90.00	30.00	63	1.04	-126	31.3	187.6	234.5	21.5	308.4		
	9	15.00	E	W14X233	S	1.33	15.90	0.00	60.00	63	1.04	122	29.9	179.6	224.5			20.6	295.2
	10	15.00	I	W14X257	S	1.37	16.00	30.00	60.00	101	1.67		48.2	289.3	361.6	17.8	254.6	16.9	241.9
	11	15.00	I	W14X257	S	1.37	16.00	60.00	60.00	101	1.67		48.2	289.3	361.6	17.8	254.6	16.9	241.9
	12	15.00	E	W14X233	S	1.33	15.90	90.00	60.00	63	1.04	-126	29.9	179.6	224.5	20.6	295.2		
	13	15.00	E	W14X233	S	1.33	15.90	0.00	90.00	63	1.04	122	28.6	171.5	214.4			19.7	282.0
	14	15.00	I	W14X257	S	1.37	16.00	30.00	90.00	101	1.67		46.1	276.3	345.4	17.0	243.2	16.1	231.1
	15	15.00	I	W14X257	S	1.37	16.00	60.00	90.00	101	1.67		46.1	276.3	345.4	17.0	243.2	16.1	231.1
	16	15.00	E	W14X233	S	1.33	15.90	90.00	90.00	63	1.04	-126	28.6	171.5	214.4	19.7	282.0		
	17	15.00	E	W14X233	S	1.33	15.90	0.00	120.00	63	1.04	122	27.3	163.5	204.4			18.8	268.8
	18	15.00	I	W14X257	S	1.37	16.00	30.00	120.00	101	1.67		43.9	263.4	329.2	16.2	231.8	15.4	220.2
	19	15.00	I	W14X257	S	1.37	16.00	60.00	120.00	101	1.67		43.9	263.4	329.2	16.2	231.8	15.4	220.2
	20	15.00	E	W14X233	S	1.33	15.90	90.00	120.00	63	1.04	-126	27.3	163.5	204.4	18.8	268.8		
	21	15.00	E	W14X233	S	1.33	15.90	0.00	150.00	63	1.04	122	25.9	155.5	194.3			17.8	255.6
	22	15.00	E	W14X233	S	1.33	15.90	30.00	150.00	95	1.58		39.4	236.4	295.5	20.7	296.9	19.7	282.1
	23	15.00	E	W14X233	S	1.33	15.90	60.00	150.00	95	1.58		39.4	236.4	295.5	20.7	296.9	19.7	282.1
	24	15.00	E	W14X233	S	1.33	15.90	90.00	150.00	63	1.04	-126	25.9	155.5	194.3	17.8	255.6		
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