

Project 1740 Polk Street, San Francisco
 Job No. 201720.10
 By AL
 Date 10/18/17
 Sheet _____ of _____

North Bay Seismic Design
 Structural Analysis and Design
 PO Box 55, Inverness CA 94937
 Tel/Fax (415) 663-8161
www.NorthBaySeismicDesign.com

DETERMINATION OF SEISMIC LOADS TO LFRS AT GRIDLINES - FLEXIBLE DIAPHRAGM ASSUMPTIONS
ASCE 7-10 CHAPTER 12 - SEISMIC REQUIREMENTS FOR BUILDING STRUCTURES
1740 POLK STREET, SAN FRANCISCO - SEISMIC RETROFIT

1. Input Data

$\rho = 1.30$ Redundancy Factor (ASCE 7-10 Section 12.3.4)

	Floors					
	Roof	Type A (Floors)	Type B (Stairs)	Deck	RC Slab	Fire Escape
DL (psf)	23	32				30
LL (psf)	-	-		-	-	-

Exterior Walls		
Type a	Type b	Type c
15		
-	-	-

Code Level Floor Loads		
Level	W _x (kips)	A _F (g's)
Roof	122	0.16
2	152	0.11
1	152	0.06

Where W_x = Story Weight at Level x

A_F = Floor Acceleration at Level x

Sum = 427 Kips

Weight Check:

N-S = 431.4 kips

W-E = 427.6 kips

(0.87 %)

V = 0.154 *W (Seismic Base Shear - Strength Level)
V = 0.116 *W (" " - 75% V for (E) Bldg per IEBC12 Section A4)
V = 0.150 *W (" " - adjusted for Redundancy Factor, ρ)
V = 0.107 *W (Seismic Base Shear - ASD Level)

2. Determination of Tributary Loads

Loading Direction	Wall Gridline Location	Floor Level	Tributary Area Segment	Floor Type	Diaphragm Loads					Wall Loads					Seismic Loads					
					Dead Load (psf)	Partition Loads (psf)	Length (feet)	Width (feet)	Area (ft ²)	DL	Wall Segment	Wall Dead Load (psf)	Length (feet)	Height (feet)	Wall Area (ft ²)	DL (lbs)	Seismic Weight		Code Level	
																	At Floor Level (lbs)	Sum (lbs)	Forces (lbs)	Shears (lbs)
N-S	1	R	TA41	R	23.0		38.00	18.00	684	15,732	a	15.00	18.00	5.25	95	1,418	24,515	24,515	3,924	3,924
			TA42	R	23.0		4.00	17.00	68	1,564	a	15.00	18.00	5.25	95	1,418				
			TA43	R	23.0		5.50	2.50	14	316	a	15.00	38.00	5.25	200	2,993				
			TA44	R	23.0		5.50	3.00	17	380										
			TA45	R	23.0		5.50	2.50	14	316										
			TA46	R	23.0		5.50	3.00	17	380										
	2	F	TA41	F	32.0		38.00	18.00	684	21,888	a	15.00	18.00	10.50	189	2,835	38,015	62,530	4,206	8,131
			TA42	F	32.0		4.00	17.00	68	2,176	a	15.00	18.00	10.50	189	2,835				
			TA43	F	32.0		5.50	2.50	14	440	a	15.00	38.00	10.50	399	5,985				
			TA44	F	32.0		5.50	3.00	17	528										
			TA45	F	32.0		5.50	2.50	14	440										
			TA46	F	32.0		5.50	3.00	17	528										
1	F	TA01	F	32.0		38.00	18.00	684	21,888	a	15.00	18.00	12.00	216	3,240	39,152	101,682	2,396	10,527	
		TA03	F	32.0		4.00	17.00	68	2,176	a	15.00	18.00	12.00	216	3,240					
		TA04	F	32.0		5.50	2.50	14	440	a	15.00	38.00	12.00	456	6,840					
		TA05	F	32.0		5.50	3.00	17	528											
		TA06	F	32.0		5.50	2.50	14	440											
		TA07	FS	30.0		3.00	4.00	12	360											
4	R	TA48	R	23.0		34.50	18.00	621	14,283	a	15.00	29.50	5.25	155	2,323	30,760	30,760	4,924	4,924	
		TA49	R	23.0		34.00	11.50	391	8,993	a	15.00	29.50	5.25	155	2,323					
		TA50	R	23.0		4.00	14.00	56	1,288	a	15.00	4.00	5.25	21	315					
		TA51	R	23.0		4.00	10.00	40	920	a	15.00	4.00	5.25	21	315					
	2	F	TA48	F	32.0		34.50	18.00	621	19,872	a	15.00	29.50	10.50	310	4,646	46,649	77,409	5,162	10,086
			TA49	F	32.0		34.00	11.50	391	12,512	a	15.00	29.50	10.50	310	4,646				
			TA50	F	32.0		4.00	14.50	58	1,856	a	15.00	4.00	10.50	42	630				
			TA51	F	32.0		4.00	14.50	58	1,856	a	15.00	4.00	10.50	42	630				
	1	F	TA08	F	32.0		42.00	18.00	756	24,192	a	15.00	29.50	12.00	354	5,310	50,540	127,949	3,093	13,179
			TA09	F	32.0		35.00	11.50	403	12,880	a	15.00	29.50	12.00	354	5,310				
			TA10	F	32.0		4.00	11.00	44	1,408	a	15.00	4.00	12.00	48	720				
											a	15.00	4.00	12.00	48	720				

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DL (psf)	23	32				30
LL (psf)	-	-				-

Exterior Walls		
Type a	Type b	Type c
15		
-	-	-

Code Level Floor Loads		
Level	W _x (kips)	A _F (g's)
Roof	122	0.16
2	152	0.11
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Where W_x = Story Weight at Level x

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Sum = 427 Kips

Weight Check:

N-S = 431.4 kips

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(0.87 %)

V = 0.154 *W (Seismic Base Shear - Strength Level)
V = 0.116 *W (" " - 75% V for (E) Bldg per IEBC12 Section A4)
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V = 0.107 *W (Seismic Base Shear - ASD Level)

2. Determination of Tributary Loads

Loading Direction	Wall Gridline Location	Floor Level	Tributary Area Segment	Floor Type	Diaphragm Loads					Wall Loads					Seismic Loads									
					Dead Load (psf)	Partition Loads (psf)	Length (feet)	Width (feet)	Area (ft ²)	DL (lbs)	Wall Segment	Wall Dead Load (psf)	Length (feet)	Height (feet)	Wall Area (ft ²)	DL (lbs)	Seismic Weight		Code Level					
																	At Floor Level (lbs)	Sum (lbs)	Forces (lbs)	Shears (lbs)				
N-S (Cont)	6	R	TA52 TA53	R	23.0		34.00	9.50	323	7,429	a	15.00	27.00	5.25	142	2,126	28,902	28,902	4,627	4,627				
				R	23.0		42.00	17.50	735	16,905	a	15.00	27.00	5.25	142	2,126								
		2	TA52 TA53	F	32.0		34.00	9.50	323	10,336	a	15.00	27.00	10.50	284	4,253					42,991	71,893	4,757	9,383
				F	32.0		42.00	17.50	735	23,520	a	15.00	27.00	10.50	284	4,253								
		1	TA12 TA13	F	32.0		34.00	9.50	323	10,336	a	15.00	27.00	12.00	324	4,860					44,296	116,189	2,711	12,095
				F	32.0		42.00	17.50	735	23,520	a	15.00	27.00	12.00	324	4,860								
	10	R	TA54	R	23.0		42.00	14.50	609	14,007	a	15.00	14.50	5.25	76	1,142	19,598	19,598	3,137	3,137				
				a	15.00	14.50	5.25	76	1,142															
				a	15.00	42.00	5.25	221	3,308															
		2	TA54 TA55	F	32.0		42.00	14.50	609	19,488	a	15.00	14.50	10.50	152	2,284	31,503	51,101	3,486	6,623				
				F	32.0		6.50	4.00	26	832	a	15.00	14.50	10.50	152	2,284								
				a	15.00	42.00	10.50	441	6,615															
1	TA14 TA15	F	32.0		42.00	15.50	651	20,832	a	15.00	14.50	12.00	174	2,610	34,444	85,545	2,108	8,731						
		F	32.0		6.50	4.00	26	832	a	15.00	14.50	12.00	174	2,610										
		a	15.00	42.00	12.00	504	7,560																	

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					Dead Load (psf)	Partition Loads (psf)	Length (feet)	Width (feet)	Area (ft ²)	DL	Wall Segment	Wall Dead Load (psf)	Length (feet)	Height (feet)	Wall Area (ft ²)	DL (lbs)	Seismic Weight		Code Level	
																	At Floor Level (lbs)	Sum (lbs)	Forces (lbs)	Shears (lbs)
W-E	A	R	TA60	R	23.0		89.50	16.50	1,477	33,965	a	15.00	20.50	5.25	108	1,614	50,780	50,780	8,129	8,129
			TA61	R	23.0		17.50	4.00	70	1,610	a	15.00	20.50	5.25	108	1,614				
			TA62	R	23.0		14.00	4.00	56	1,288	a	15.00	89.50	5.25	470	7,048				
			TA63	R	23.0		32.00	4.00	128	2,944										
			TA64	R	23.0		2.50	5.50	14	316										
			TA65	R	23.0		3.00	5.50	17	380										
		2	TA60	F	32.0		89.50	16.50	1,477	47,256	a	15.00	20.50	10.50	215	3,229	77,502	128,282	8,575	16,704
			TA61	F	32.0		17.50	4.00	70	2,240	a	15.00	20.50	10.50	215	3,229				
			TA62	F	32.0		14.00	4.00	56	1,792	a	15.00	89.50	10.50	940	14,096				
			TA63	F	32.0		32.00	4.00	128	4,096										
			TA64	F	32.0		2.50	5.50	14	440										
			TA65	F	32.0		3.00	5.50	17	528										
	1	0.5 TA66	FS	30.0		1.25	5.50	7	206											
		0.5 TA67	FS	30.0		3.25	4.00	13	390											
		TA20	F	32.0		90.00	16.50	1,485	47,520	a	15.00	20.50	12.00	246	3,690	81,342	209,624	4,979	21,683	
		TA21	F	32.0		22.50	4.00	90	2,880	a	15.00	20.50	12.00	246	3,690					
		TA22	F	32.0		14.00	4.00	56	1,792	a	15.00	89.50	12.00	1,074	16,110					
		TA23	F	32.0		32.00	4.00	128	4,096											
	TA24	F	32.0		2.50	5.50	14	440												
	TA25	F	32.0		3.00	5.50	17	528												
	G	R	TA68	R	23.0		89.50	17.00	1,522	34,995	a	15.00	21.00	5.25	110	1,654	52,196	52,196	8,356	8,356
			TA69	R	23.0		28.00	4.00	112	2,576	a	15.00	21.00	5.25	110	1,654				
			TA70	R	23.0		32.00	4.00	128	2,944	a	15.00	89.50	5.25	470	7,048				
			TA71	R	23.0		3.00	5.50	17	380	a	15.00	4.00	5.25	21	315				
TA72			R	23.0		2.50	5.50	14	316	a	15.00	4.00	5.25	21	315					
2		TA68	F	32.0		89.50	17.00	1,522	48,688	a	15.00	21.00	10.50	221	3,308	79,904	132,099	8,841	17,197	
		TA69	F	32.0		28.00	4.00	112	3,584	a	15.00	21.00	10.50	221	3,308					
		TA70	F	32.0		32.00	4.00	128	4,096	a	15.00	89.50	10.50	940	14,096					
		TA71	F	32.0		3.00	5.50	17	528	a	15.00	4.00	10.50	42	630					
		TA72	F	32.0		2.50	5.50	14	440	a	15.00	4.00	10.50	42	630					
		0.5 TA66	FS	30.0		1.25	5.50	7	206											
0.5 TA67	FS	30.0		3.25	4.00	13	390													
1	TA28	F	32.0		90.00	17.00	1,530	48,960	a	15.00	21.00	12.00	252	3,780	85,874	217,974	5,256	22,453		
	TA29	F	32.0		47.00	4.00	188	6,016	a	15.00	21.00	12.00	252	3,780						
	TA30	F	32.0		33.00	4.00	132	4,224	a	15.00	89.50	12.00	1,074	16,110						
	TA31	F	32.0		3.00	5.50	17	528	a	15.00	4.00	12.00	48	720						
	TA32	F	32.0		2.50	5.50	14	440	a	15.00	4.00	12.00	48	720						
	0.5 TA66	FS	30.0		1.25	5.50	7	206												
0.5 TA67	FS	30.0		3.25	4.00	13	390													