MURPHY BURR CURRY, INC.
STRUCTURAL ENGINEERS

November 16, 2012 **Project Number 212-306**

Ms. Val Agostino
Vice President
Mercy Housing California
1360 Mission Street, Suite 300
San Francisco, CA 94103

Tel: (415) 355-7117, email: dwade@mercyhousing.org

Midtown Apartments, 1415 Scott Street, San Francisco, CA - PML

Dear Ms. Agostino,

At your request we have performed a structural Probable Maximum Loss (PML) Evaluation of the subject property. For our evaluation we were provided with a set of available construction, architectural and structural drawings for the property and we also performed a walk-through observation on October 16, 2012.

The Midtown Apartment building complex is located at 1415 Scott Street, San Francisco and occupies a city block bounded by Scott Street, O'Farrell Street, Divisadero Street and Geary Blvd. The complex consists of six buildings denoted 1 through 6 in the Pyatok feasibility study dated November 2012. All the buildings contain four floors of multi-family housing above a single level of parking. Buildings 2 & 3 and 5 & 6 are connected at the parking garage which is continuous between the two pairs of buildings. The parking garages below each building are typically either at or partially below grade.

The buildings overall appearance is in good condition with no signs of significant deterioration of the existing structure, except as described below. However, we understand that there have been some cracks in the buildings finishes reported by the Management, which have been patched and not visible at the time of our observation. We are not aware of any mandatory code requirements for seismic retrofit work to the buildings.

1. Building Description

1.1. Our evaluation is based on a review of the original structural documents created for the construction of the property in 1962 by Skidmore, Owings and Merrill and on the walk-through observation noted above. The apartment complex consists of six five-story buildings with identical gravity and seismic load-resisting systems. Building 1 (labeled as Building F on the 1962 drawings) has a dimension of 64'x152' and the other five buildings (labeled A thru E) have dimensions of 64'x115'.

1.2. In the following property description the first residential level above the garages is noted as the first floor, with the floors above noted as the second, third and fourth floors. This is consistent with the original building drawings.

1.3. At the first floor above the garages, the buildings are constructed with 3" reinforced concrete slabs over 5½"x12" concrete pan joists at 3'-0" on center supported by concrete girders and columns. The second, third and fourth floors are constructed with 1$^{1}/_{8}$" T&G plywood over 2x12 wood joists supported by steel girders and columns. At the third floor there is a layer of 1$^{5}/_{8}$" unreinforced nonstructural concrete topping (Elasticell) over 5/8" plywood. The third floor level is the demising floor between the townhomes above and below this level. The roof construction consists of concrete over metal deck on 2x10 wood joists. The joists are supported by steel beams and columns.

1.4. The floors and roof comprise the horizontal structural diaphragms spanning between a lateral system of solid single-bay concrete shear walls along each exterior elevation in both longitudinal and transverse directions. Each longitudinal elevation has two 10'-8" long bays of concrete walls while each transverse elevation has two 20'-9" long walls.

1.5. During our site visit hairline diagonal cracks were observed at the base of some of the longitudinal shear walls.

1.6. The lateral system also provides support for gravity loads in conjunction with interior reinforced concrete and steel columns as noted above. The walls and columns are supported by reinforced concrete foundations. The perimeter walls have grade beam-type footings and perimeter columns have pad footings connected by a continuous grade beam. Most of the interior columns have isolated square pads. Some interior columns have combined footings for two columns.

1.7. The floors and roof have numerous openings for stairs, etc. In addition, at the second and fourth levels, the floors above the balconies at the first and third floors are omitted to create a double-height space over the balconies. At these locations the floors typically extend to the perimeter of the building only at the concrete shear walls, creating a discontinuity in the floor diaphragm.

1.8. This condition occurs on one side of each building. At the opposite side there are metal deck and concrete balconies at the end bays but there is no floor above the balconies in the middle three bays. The third floor has concrete and metal deck balconies on both sides of the buildings over the balconies below.

1.9. From the available drawings it is not clear if the metal deck and concrete bays have a sufficient connection to the main floor structure to act as extensions to the wood diaphragms. Since the floors and roof act as structural diaphragms that transfer seismic forces to the shear walls, the Probable Maximum Loss analysis has taken this into account.

1.10. Based upon our research for the site using available United States Geological Survey (USGS) maps (see Appendix C), we assumed that the site is in an area of low liquefaction potential and that there is very low potential for landslide and no potential for surface rupture.

2. Seismic Deficiencies

2.1. It should be noted that while the buildings were originally designed to comply with the 1962 Uniform Building Code (UBC) for seismic resistance, it has a reasonably well detailed concrete shear wall lateral system. The major elements found to be deficient are as follows:

2.1.1. The shear walls do have confined boundary elements at each end and horizontal and vertical wall reinforcement that meets the minimum reinforcement quantity requirements. However the confinement reinforcement size and spacing is inadequate and the wall flexural strength does not meet current code standards.

2.1.2. The wall to diaphragm in-plane and out-of-plane anchorage at all the floors and roof is inadequate.

2.1.3. The diaphragm reinforcing at re-entrant corners and openings at the second and fourth floors is inadequate.

2.1.4. There are insufficient collectors and cross-ties at the wood floors and roof.

2.1.5. Diaphragm openings immediately adjacent to the shear walls are more than 25% of the wall length at the second and fourth floors.

2.1.6. Non-bearing CMU partitions are not anchored at the top to the concrete slab at the garage floor.

2.1.7. There are captive columns at the building's exterior due to partial height CMU retaining walls.

3. Probable Maximum Loss (PML) Evaluation

3.1. The PML calculations are based upon a probability of exceedance of 10% in 50 years (475 year return period) for both the scenario upper loss (SUL) and scenario expected loss (SEL). The SUL represents the value that has a 90% confidence level that the damage will be less than the presented value. The SEL represents the value that has a 50% confidence level that the damage will be less than the presented value. The scenario was compiled using the commercially available software program ST Risk version 4.51 (see Appendix A), which is based on the Federal Emergency Management Agency Handbook for the Seismic Evaluation of Buildings; FEMA 310.

3.2. To determine the average PML for the buildings which consist of one level of reinforced concrete construction (Building type C2(4B), Concrete Shear Walls with Stiff Diaphragms) and four levels of wood framing with concrete shear walls (Building type C2A(4B), Concrete Shear Walls with Flexible Diaphragms) we calculated separate PML values for the concrete parking level and for the upper four stories and combined the results in proportion to the ratio of the number of floors of each building type. Since all buildings are constructed identically, the PML results presented are applicable to each building.

3.3. PML values for the Midtown Apartments buildings as is:

3.3.1. SUL = 27%
SEL = 17%

3.4. Upon further evaluation of the Retrofit Benefits to reduce the SUL PML value to below 20% we recommend the following:

3.4.1. Retrofit connection of existing concrete walls to wood diaphragms at all floors and roof (tension and shear) to comply with 2010 California Building Code/ASCE 41-06 Seismic Rehabilitation of Existing Buildings.

3.4.2. Correct the captive column deficiency by strengthening the columns with shotcrete or FRP (Fiber Reinforced Polymer) wrapping.

3.4.3. Verify construction details for the floors and roof metal deck and concrete bays along the longitudinal exterior walls. Provide necessary reinforcing for those bays and their connections to the floor/roof diaphragms as required to comply with 2010 California Building Code/ASCE 41-06 Seismic Rehabilitation of Existing Buildings.

3.4.4. Strengthen existing reinforced concrete shear walls and foundations to meet the demand in accordance with the 2010 California Building Code/ASCE 41-06.

3.4.5. Verify out-of-plane bracing connections for garage level non-bearing CMU partitions and provide necessary connections as required to comply with 2010 California Building Code/ASCE 41-06 Seismic Rehabilitation of Existing Buildings.

3.5. PML (SUL) values for the Midtown Apartments buildings with corrections:

3.5.1. SUL = 13%

3.6. Note that partial correction of the deficiencies or correction of only some of the deficiencies noted will result in a PML lower that the "as-is" PML and higher than the "with correction" PML quoted above. Once the preliminary seismic retrofit design has been completed we can evaluate the PML for the proposed strengthening.

Please contact the undersigned if you have any questions or require clarification.

Sincerely,

MURPHY BURR CURRY, INC.

REGISTERED PROFESSIONAL ENGINEER ALEX D. FILATOV No. C65023 EXP.: 06-30-13 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER ALAN CHARLES BURR No. S 5062 Exp. 12-31-2014 STRUCTURAL STATE OF CALIFORNIA

Alex D Filatov, CE 065023
Project Manager

Alan Burr, SE 5062
Vice President

Encl.

Appendix A: ST Risk Methodology
Appendix B: PML Evaluation
Appendix C: San Francisco Landslide and Liquefaction Map

Appendix A

ST Risk Methodology

Probable Maximum Loss (PML) Calculation Procedures

The PML was calculated using the ST Risk Program. The ST Risk programs combines well recognized seismic hazard procedures with structural engineering analysis to provide as complete a picture as possible in determining the PML number.

The structural analysis module calculates a building's expected loss for a given level of earthquake intensity. It combines the loss methodology originally developed by Karl Steinbrugge in his 1982 book Earthquakes, Volcanoes and Tsunamis (EV&T) with the structural evaluation procedures developed in the document FEMA 310: NEHRP Procedure for the Seismic Evaluation of Existing Structures. Since 1982, a substantial amount of reconnaissance data has been gathered from more recent events. This data has been used to adjust the original Steinbrugge loss functions.

The Loss Methodology in the EV&T

The loss methodology developed in EV&T estimates the loss expected for a class of buildings, given a prescribed level of earthquake damage in the surrounding area, called the Modified Mercalli Intensity (MMI). EV&T uses the term probable maximum loss to refer to the greatest monetary loss nine out of ten structures of a similar class will suffer when subjected to the maximum probable earthquake expected at the site.

It is generally assumed that there is a 10% probability that an earthquake larger than the maximum probable largest stated earthquake will occur within 50 years. The PML is initially calculated based on an assumed MMI of IX. The PML can be "factored" to represent the level of loss in earthquakes of different intensities. The use of the term PML in ST-Risk is consistent with this methodology. When PML values are given for intensities other than IX, they relate to the factored PML as described on the EV&T. EV&T's methodology is a widely recognized standard in the industry.

The FEMA 310 Methodology

The FEMA 310 methodology evaluates the expected performance of an individual building based on structural characteristics specific to that building using the Modified FEMA 310 work sheet. It consists of a series of checklists, which a structural engineer uses to evaluate the potential life-safety risk to a building in a given seismic event. FEMA 310 is also accepted as an industry standard for identifying significant structural and non-structural deficiencies within a building.

The St Risk Methodology

ST-Risk combines the FEMA 310 and EV&T methodologies, striving to remain consistent with the philosophies of each. Specifically, ST Risk is faithful to the PML as defined on the EV&T, which represents a unique loss value for unique earthquake intensity. It then creates relationships, also consistent with EV&T, between PMLs and other intensities. This has the value of offering the user a look at the loss associated with earthquakes of various return periods instead of just the maximum probable event. The use of FEMA 310 as the basis by which to quantify loss modifiers is also consistent with the EV&T philosophy, which recognizes that loss is a function of the quality and presence of structural characteristics that resist seismic forces.

Appendix B
PML Evaluation

Contents

Summary of PML Results for Building

Building / Lateral System Type	SUL (PML)	SEL	Retrofit SUL
Concrete Shear Walls w/ Stiff Diaphragms	27%	17%	13%
Concrete Shear Walls w/ Flexible Diaphragms	27%	18%	13%
Average PML	**27%**	**17%**	**13%**

MIDTOWN APARTMENTS - Seismic Risk Analysis

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments GARAGE	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

INFORMATION SOURCES

SiteVisit: Alan C. Burr SE
Interviewed:

Date: October 16, 2012
Docs Reviewed: 1962 Structural Drawings S1 - S7 by Skidmore, Owings .Merrill 1962 Architectural Drawings A1 - A10, A16 by Skidmore, Owings Merrill

BUILDING DESCRIPTION

Building Classification: C2(4B) - Concrete Shear Walls w/ Stiff Diaphragms
Occupancy: Habitational
Latitude/Longitude: 37.7828 -122.4377
Region: USA: California
Region Version: 3.10
Evaluation Lifetime (yrs): 50
Uniform Building Code Design Edition: 1962
Year Constructed: 1963
Year Retrofitted:
Building Height (ft): 45
Fundamental Period (s): 0.350000
Area (sf): 7,360
Replacement Cost ($):
Plan Dimensions: 64'x115'
Exterior North-South Walls: RC Concrete/Glass
Exterior East-West Walls: RC Concrete/Glass
Roof Deck/Framing: 5/8" Plywood over 2x10 @ 16" wood joists/steel beams
Intermediate Floors/Framing: 1 1/8" Plywood over 2x12 @ 16" wood joists/steel beams
Ground Floors: 3" Concrete slab over 5 1/2"x12" pan joists @ 36"+ concrete beams
Columns: RC basement, steel columns above 1st floor
Foundation: RC isolated pads at columns/Grade beams at walls
Basement Levels: Partial
Parking Structure: Basement

LATERAL FORCE RESISTING SYSTEM

Floors/Roof: 1 1/8" TG stapled plywood 2nd floor to Roof Concrete Slab
Walls/Braces: 2500 psi 10" RC at exterior only #$ @ 12" e.w. e.f. Boundary reinforcement: 4-#7 e.e. 2nd to 4th floors #3 ties at 14" 6-#7 e.e. 1st floor #3 ties at 14" 6-#8 e.e. basement floor #3 ties at 14"

BUSINESS INTERRUPTION

Max. Loss With No BI:
Min. Loss At Abandonment:
BI Months At Abandonment:
BI Revenue Loss Rate($/Month):

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GEOTECHNICAL DESCRIPTION

Provider: SF Seismic Hazard Zones Map and Geology of SF Map
Date: November 2000 and 1958

Topography: Relatively flat
Soil Conditions: Dune sand (47') per 1958 Geology of SF Map

UBC Soil Class: D
Liquefaction Resilience: Low
Liquefaction Susceptibility: Low
Depth to Water Table (ft): 30
Landslide Susceptibility: Very Low

COMMENTS

Comments: 1 5/8" concrete topping at 3rd floor

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MODIFIED FEMA-310 WORKSHEET

C2(4B)Concrete Shear Walls w/ Stiff Diaphragms

Category	Range	Typical	Modifier
GENERAL BUILDING FEATURES			
Complete load path	T, F	T	T
No strength irregularity	T, F	F	T
No soft story	T, F	T	T
No geometrical irregularities	T, F	T	T
No mass irregularity	T, F	T	T
No vertical discontinuities	T, F	F	T
Only minor torsion	T, F	T	T
No captive columns	T, F	T	F
Deflection compatibility	T, F	F	F
Interior mezzanines adequately braced	N/A, T, F	T	N/A
LATERAL FORCE RESISTING SYSTEM			
Redundancy	T, F, 0-10	5	T
Shear stress check of shear walls	T, F, 0-25	13	15
Complete frames	T, F, 0-5	2	2
Adequate wall thickness	T, F, 0-5	2	T
No flat slabs	T, F, 0-10	5	T
Reinforcing steel	T, F, 0-5	2	T
Adequate overturning strength	T, F, 0-10	5	5
Adequate confinement reinforcing	T, F, 0-5	5	5
Adequate reinforcing at openings	N/A, T, F, 0-5	2	N/A
Coupling beams properly reinforced	N/A, T, F, 0-5	5	N/A
CONNECTIONS			
Wall reinforcement doweled into footing	T, F, 0-5	0	T
Lateral load path at pile caps	N/A, T, F, 0-10	0	N/A
FLOOR DIAPHRAGMS			
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	N/A
Diaphragm continuity	T, F, 0-10	5	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	T
Collectors	T, F, 0-5	2	T
Limited diaphragm openings at shear walls	T, F, 0-5	2	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	T

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MODIFIED FEMA-310 WORKSHEET

Category	Range	Typical	Modifier
ROOF DIAPHRAGM (ONLY IF 5 STORIES OR LESS)			
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	N/A
Diaphragm continuity	T, F, 0-10	5	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	N/A
Collectors	T, F, 0-5	2	T
Limited diaphragm openings at shear walls	T, F, 0-5	2	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	T
UNUSUAL CONDITIONS			
Insignificant concrete wall cracks	T, F, 0-5	2	2
Little deterioration of concrete	T, F, 0-5	2	2
Little post-tensioning anchor deterioration	N/A, T, F, 0-5	2	N/A
Little foundation damage	T, F, 0-5	2	T
Little foundation deterioration	T, F, 0-5	2	T
Adequate overturning resistance	T, F, 0-5	2	4
Ties between foundation elements	N/A, T, F, 0-5	2	2
Lateral force on deep foundations	N/A, T, F, 0-5	2	N/A
Pole buildings	N/A, T, F, 0-5	0	N/A
Insignificant sloping at site	N/A, T, F, 0-5	0	T
SITE DEPENDENT HAZARDS - ACTIVE FAULTS			
Surface fault rupture	N/A, 0-50	0	N/A
NONSTRUCTURAL EXTERIOR 'WALLS'			
Cladding, glazing, veneer	N/A, T, F, 0-10	5	5
Chimneys	N/A, T, F, 0-5	5	N/A
NONSTRUCTURAL INTERIOR 'WALLS'			
Partitions (HC tile)	N/A, T, F, 0-10	0	F
Partitions (pre-cast panels..)	N/A, T, F, 0-10	5	N/A
EXTERIOR ORNAMENTATION			
Parapets, cornices, and appendages	N/A, T, F, 0-10	0	N/A
INTERIOR ORNAMENTATION			
Building contents and furnishings	T, F, 0-10	5	5
Ceiling systems	T, F, 0-5	5	2
Light fixtures	T, F, 0-5	5	2

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MODIFIED FEMA-310 WORKSHEET

Category	Range	Typical	Modifier
MECHANICAL AND ELECTRICAL SYSTEMS			
Mechanical and electrical equipment	T, F, 0-10	5	5
Piping and sprinklers	T, F, 0-5	2	2
Ducts	T, F, 0-5	2	2
Elevators	N/A, T, F, 0-5	2	2
HAZARDOUS EXPOSURES - POUNDING			
No adjacent buildings	N/A, T, F, 0-5	0	N/A
HAZARDOUS EXPOSURES - MATERIALS			
No hazardous materials	N/A, T, F, 0-10	0	N/A
OCCUPANCY (TYPE: HABITATIONAL)			
Interior Construction	-5-5	0	0
SITE DEPENDENT CHARACTERISTICS			
UBC Soil Class	A - E	D	D
Liquefaction Resilience	Low - High	Low	Low
Liquefaction Susceptibility	V. Low-V. High	Moderate	Low
Depth to Water Table (ft)	0-1000+	30	30
Landslide Susceptibility	V. Low-V. High	Very Low	Very Low

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VULNERABILITY SUMMARY

Component Modifier Summary

Base Class 90% Fractile Loss at MMI=IX (% of Value): **37**

Modifiers to Base Class Loss

Item	Group Modifier (% of Loss)	Sigma (% of Loss)
1. Occupancy type:	0	1.0
2. Connections:	0	0.6
3. Walls:		
A. Exterior	0	3.4
B. Interior	7	3.8
4. Diaphragms:		
A. Floor(s)	-5	0.9
B. Roof	-5	0.9
5. Ornamentation:		
A. Exterior	0	0.0
B. Interior	-2	2.0
6. Mechanical/electrical systems:	0	3.4
7. Unusual conditions:	-1	2.6
8. Hazardous exposures:		
A. Tank and overhanging walls	0	0.0
B. Pounding and adjacent buildings	0	0.0
9. Site dependent hazards:		
A. Proximity of active fault	0	0.0
Total	-6	7.2

Modified Base Class 90% Fractile Loss at MMI=IX (% of Value): **35**

Loss vs MMI

MMI	Loss to Facilities (% of Value) 90% Frac. Loss	Mean
V	0	0
VI	3	2
VII	14	9
VIII	24	16
IX	35	23
X	40	26
XI	46	30
XII	51	33

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RISK SUMMARY

Expected Loss Table

Probability of Exceedence	MMI	Loss to Facilities (% of Value)			BI (months)
		PL	SUL	SEL	
50.0% in 30 years 43 year return period	VI-VII	3	9	6	N/A
10.0% in 30 years 285 year return period	VIII	14	23	15	N/A
2.0% in 30 years 1485 year return period	VIII-IX	25	33	22	N/A
10.0% in 50 years 475 year return period	VIII	17	PML 27	17	N/A
2.0% in 50 years 2475 year return period	IX	29	36	23	N/A

Event and Fault Table

Close and Significant Seismic Sources	Maximum Magnitude	Closest Distance (km)	Max. MMI	Max. SUL *	Max. SEL *	Maximum Business Interuption (months)	Percent Contribution **
California Gridded***	7.0	5.0	VIII-IX	29	19	N/A	4
N. San Andreas;SAO+SAN+SAP	8.0	9.8	VIII	26	17	N/A	<1
N. San Andreas;SAN+SAP	7.7	9.8	VIII	25	16	N/A	<1
N. San Andreas;SAP	7.2	9.8	VIII	22	14	N/A	2
N. San Andreas;SAO+SAN+SAP+SAS	8.1	9.8	VIII	27	17	N/A	25
N. San Andreas	8.0	9.8	VIII	26	17	N/A	9
N. San Andreas;SAN+SAP+SAS	7.9	9.8	VIII	26	17	N/A	<1
N. San Andreas;SAP+SAS	7.5	9.8	VIII	23	15	N/A	18
N. San Andreas;SAO+SAN	7.8	12.0	VIII	24	16	N/A	20
N. San Andreas;SAN	7.5	12.0	VIII	22	14	N/A	<1
San Gregorio Connected	7.5	15.3	VII-VIII	20	13	N/A	8
Hayward-Rodgers Creek;RC+HN	7.2	19.2	VII	16	10	N/A	<1
Hayward-Rodgers Creek	7.3	19.2	VII-VIII	17	11	N/A	1
Hayward-Rodgers Creek;RC+HN+HS	7.3	19.2	VII-VIII	17	11	N/A	<1
Hayward-Rodgers Creek;HN+HS	7.0	19.3	VII	14	9	N/A	3
Hayward-Rodgers Creek;HN	6.6	19.3	VI-VII	11	7	N/A	1

* Losses to individual events are from shaking only.
** Percent contributions are for the probabilistic 475 year return period risk.
*** Event causing highest loss (from shaking only)

Average Annual Loss (% of Repl. Cost): 0.295612
Return Period of Major Liquefaction/Landslide: 4674 Years

Business Interruption Average Annual Loss ($): 0

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RETROFIT BENEFIT ANALYSIS

C2(4B)Concrete Shear Walls w/ Stiff Diaphragms

Category	Range	Typical	Without Retrofit	With Retrofit
GENERAL BUILDING FEATURES				
Complete load path	T, F	T	T	T
No strength irregularity	T, F	F	T	T
No soft story	T, F	T	T	T
No geometrical irregularities	T, F	T	T	T
No mass irregularity	T, F	T	T	T
No vertical discontinuities	T, F	F	T	T
Only minor torsion	T, F	T	T	T
No captive columns	T, F	T	F	T
Deflection compatibility	T, F	F	F	T
Interior mezzanines adequately braced	N/A, T, F	T	N/A	N/A
LATERAL FORCE RESISTING SYSTEM				
Redundancy	T, F, 0-10	5	T	T
Shear stress check of shear walls	T, F, 0-25	13	15	T
Complete frames	T, F, 0-5	2	2	2
Adequate wall thickness	T, F, 0-5	2	T	T
No flat slabs	T, F, 0-10	5	T	T
Reinforcing steel	T, F, 0-5	2	T	T
Adequate overturning strength	T, F, 0-10	5	5	T
Adequate confinement reinforcing	T, F, 0-5	5	5	T
Adequate reinforcing at openings	N/A, T, F, 0-5	2	N/A	N/A
Coupling beams properly reinforced	N/A, T, F, 0-5	5	N/A	N/A
CONNECTIONS				
Wall reinforcement doweled into footing	T, F, 0-5	0	T	T
Lateral load path at pile caps	N/A, T, F, 0-10	0	N/A	N/A
FLOOR DIAPHRAGMS				
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	N/A	N/A
Diaphragm continuity	T, F, 0-10	5	T	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	T	T
Collectors	T, F, 0-5	2	T	T
Limited diaphragm openings at shear walls	T, F, 0-5	2	T	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	T	T

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments GARAGE	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

RETROFIT BENEFIT ANALYSIS

Category	Range	Typical	Without Retrofit	With Retrofit
ROOF DIAPHRAGM (ONLY IF 5 STORIES OR LESS)				
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	N/A	N/A
Diaphragm continuity	T, F, 0-10	5	T	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	N/A	N/A
Collectors	T, F, 0-5	2	T	T
Limited diaphragm openings at shear walls	T, F, 0-5	2	T	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	T	T
UNUSUAL CONDITIONS				
Insignificant concrete wall cracks	T, F, 0-5	2	2	2
Little deterioration of concrete	T, F, 0-5	2	2	2
Little post-tensioning anchor deterioration	N/A, T, F, 0-5	2	N/A	N/A
Little foundation damage	T, F, 0-5	2	T	T
Little foundation deterioration	T, F, 0-5	2	T	T
Adequate overturning resistance	T, F, 0-5	2	4	4
Ties between foundation elements	N/A, T, F, 0-5	2	2	2
Lateral force on deep foundations	N/A, T, F, 0-5	2	N/A	N/A
Pole buildings	N/A, T, F, 0-5	0	N/A	N/A
Insignificant sloping at site	N/A, T, F, 0-5	0	T	T
SITE DEPENDENT HAZARDS - ACTIVE FAULTS				
Surface fault rupture	N/A, 0-50	0	N/A	N/A
NONSTRUCTURAL EXTERIOR 'WALLS'				
Cladding, glazing, veneer	N/A, T, F, 0-10	5	5	5
Chimneys	N/A, T, F, 0-5	5	N/A	N/A
NONSTRUCTURAL INTERIOR 'WALLS'				
Partitions (HC tile)	N/A, T, F, 0-10	0	F	F
Partitions (pre-cast panels..)	N/A, T, F, 0-10	5	N/A	N/A
EXTERIOR ORNAMENTATION				
Parapets, cornices, and appendages	N/A, T, F, 0-10	0	N/A	N/A
INTERIOR ORNAMENTATION				
Building contents and furnishings	T, F, 0-10	5	5	5
Ceiling systems	T, F, 0-5	5	2	2
Light fixtures	T, F, 0-5	5	2	2

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments GARAGE	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

RETROFIT BENEFIT ANALYSIS

Category	Range	Typical	Without Retrofit	With Retrofit
MECHANICAL AND ELECTRICAL SYSTEMS				
Mechanical and electrical equipment	T, F, 0-10	5	5	5
Piping and sprinklers	T, F, 0-5	2	2	2
Ducts	T, F, 0-5	2	2	2
Elevators	N/A, T, F, 0-5	2	2	2
HAZARDOUS EXPOSURES - POUNDING				
No adjacent buildings	N/A, T, F, 0-5	0	N/A	N/A
HAZARDOUS EXPOSURES - MATERIALS				
No hazardous materials	N/A, T, F, 0-10	0	N/A	N/A
OCCUPANCY (TYPE: HABITATIONAL)				
Interior Construction	-5-5	0	0	0
SITE DEPENDENT CHARACTERISTICS				
UBC Soil Class	A - E	D	D	
Liquefaction Resilience	Low - High	Low	Low	
Liquefaction Susceptibility	V. Low-V. High	Moderate	Low	
Depth to Water Table (ft)	0-1000+	30	30	
Landslide Susceptibility	V. Low-V. High	Very Low	Very Low	

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments GARAGE	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

RETROFIT BENEFIT ANALYSIS

Retrofit Expected Loss Table

Probability of Exceedence	MMI	Loss to Facilities (SUL - % of Value)		Business Interuption (months)	
		Without Retrofit	With Retrofit	Without Retrofit	With Retrofit
50.0% in 30 years 43 year return period	VI-VII	9	5	N/A	N/A
10.0% in 30 years 285 year return period	VIII	23	12	N/A	N/A
2.0% in 30 years 1485 year return period	VIII-IX	33	16	N/A	N/A
10.0% in 50 years 475 year return period	VIII	27	13	N/A	N/A
2.0% in 50 years 2475 year return period	IX	36	17	N/A	N/A

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
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Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

RETROFIT BENEFIT ANALYSIS

Retrofit Event and Fault Table

	Mag	Dist (km)	MMI*	SUL (% of value)		Business Interruption (months)	
				Without Retrofit	With Retrofit	Without Retrofit	With Retrofit
CLOSEST FAULTS							
California Gridded	7.0	5.0	VIII-IX	29	14	N/A	N/A
N. San Andreas;SAO+SAN+SAP	8.0	9.8	VIII	26	13	N/A	N/A
N. San Andreas;SAN+SAP	7.7	9.8	VIII	25	13	N/A	N/A
N. San Andreas;SAP	7.2	9.8	VIII	22	11	N/A	N/A
N. San Andreas;SAO+SAN+SAP+SAS	8.1	9.8	VIII	27	13	N/A	N/A
N. San Andreas	8.0	9.8	VIII	26	13	N/A	N/A
N. San Andreas;SAN+SAP+SAS	7.9	9.8	VIII	26	13	N/A	N/A
N. San Andreas;SAP+SAS	7.5	9.8	VIII	23	12	N/A	N/A
N. San Andreas;SAO+SAN	7.8	12.0	VIII	24	12	N/A	N/A
N. San Andreas;SAN	7.5	12.0	VIII	22	11	N/A	N/A
San Gregorio Connected	7.5	15.3	VII-VIII	20	11	N/A	N/A
Hayward-Rodgers Creek;RC+HN	7.2	19.2	VII	16	9	N/A	N/A
Hayward-Rodgers Creek	7.3	19.2	VII-VIII	17	9	N/A	N/A
Hayward-Rodgers Creek;RC+HN+HS	7.3	19.2	VII-VIII	17	9	N/A	N/A
Hayward-Rodgers Creek;HN+HS	7.0	19.3	VII	14	8	N/A	N/A
Hayward-Rodgers Creek;HN	6.6	19.3	VI-VII	11	6	N/A	N/A
Hayward-Rodgers Creek;HS	6.8	20.5	VII	12	7	N/A	N/A
Hayward-Rodgers Creek;RC	7.1	33.9	VI-VII	10	6	N/A	N/A

* MMIs represent mean values due to shaking only

RESULTS DISCLAIMER
This report, and the analyses, estimates and conclusions are based on scientific data, mathematical and empirical models, and experience of engineers, geologist and geotechnical during any earthquake may differ substantially from these estimates.

MIDTOWN APARTMENTS - Seismic Risk Analysis

Company Name: Murphy Burr Curry Inc.
Building Name: Midtown Apartments floors 1-4
Street Address: 1415 Scott Street
San Francisco, CA 94115

Date: November 6, 2012
Job Number: M212-306
Engineer: Alex D. Filatov
PE Number/State: C65023 CA

INFORMATION SOURCES

SiteVisit: Alan C. Burr SE
Interviewed:

Date: October 16, 2012
Docs Reviewed: 1962 Structural Drawings S1 - S7 by Skidmore, Owings _Merrill
1962 Architectural Drawings A1 - A10, A16 by Skidmore, Owings Merrill

BUILDING DESCRIPTION

Building Classification: C2A(4B) - Concrete Shear Walls w/ Flexible Diaphragms
Occupancy: Habitational
Latitude/Longitude: 37.7828 -122.4377
Region: USA: California
Region Version: 3.10
Evaluation Lifetime (yrs): 50
Uniform Building Code Design Edition: 1962
Year Constructed: 1963
Year Retrofitted:
Building Height (ft): 45
Fundamental Period (s): 0.350000
Area (sf): 29,440
Replacement Cost ($):
Plan Dimensions: 64'x115'
Exterior North-South Walls: RC Concrete/Glass
Exterior East-West Walls: RC Concrete/Glass
Roof Deck/Framing: 5/8" Plywood over 2x10 @ 16" wood joists/steel beams
Intermediate Floors/Framing: 1 1/8" Plywood over 2x12 @ 16" wood joists/steel beams
Ground Floors: 3" Concrete slab over 5 1/2"x12" pan joists @ 36"+ concrete beams
Columns: RC basement, steel columns above 1st floor
Foundation: RC isolated pads at columns/Grade beams at walls
Basement Levels: Partial
Parking Structure: Basement

LATERAL FORCE RESISTING SYSTEM

Floors/Roof: 1 1/8" TG stapled plywood 2nd floor to Roof Concrete Slab
Walls/Braces: 2500 psi 10" RC at exterior only #$ @ 12" e.w. e.f. Boundary reinforcement: 4-#7 e.e. 2nd to 4th floors #3 ties at 14" 6-#7 e.e. 1st floor #3 ties at 14" 6-#8 e.e. basement floor #3 ties at 14"

BUSINESS INTERRUPTION

Max. Loss With No BI:
Min. Loss At Abandonment:
BI Months At Abandonment:
BI Revenue Loss Rate($/Month):

GEOTECHNICAL DESCRIPTION

Provider: SF Seismic Hazard Zones Map and Geology of SF Map

Date: November 2000 and 1958

Topography: Relatively flat

Soil Conditions: Dune sand (47') per 1958 Geology of SF Map

UBC Soil Class: D

Liquefaction Resilience: Low

Liquefaction Susceptibility: Low

Depth to Water Table (ft): 30

Landslide Susceptibility: Very Low

COMMENTS

Comments: 1 5/8" 105 pcf topping at 3rd floor

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

MODIFIED FEMA-310 WORKSHEET

C2A(4B)Concrete Shear Walls w/ Flexible Diaphragms

Category	Range	Typical	Modifier
GENERAL BUILDING FEATURES			
Complete load path	T, F	T	T
No strength irregularity	T, F	F	T
No soft story	T, F	T	T
No geometrical irregularities	T, F	T	T
No mass irregularity	T, F	T	T
No vertical discontinuities	T, F	F	T
No captive columns	T, F	T	T
No adjacent buildings	T, F	T	T
Interior mezzanines adequately braced	N/A, T, F	T	N/A
Adequate wall anchorage	T, F	F	F
LATERAL FORCE RESISTING SYSTEM			
Redundancy	T, F, 0-10	5	T
Shear stress check of shear walls	T, F, 0-25	13	10
Adequate wall thickness	T, F, 0-5	2	T
Reinforcing steel	T, F, 0-5	2	T
Adequate overturning strength	T, F, 0-10	5	5
Adequate confinement reinforcing	T, F, 0-10	5	10
Adequate reinforcing at openings	N/A, T, F, 0-5	2	N/A
Coupling beams properly reinforced	N/A, T, F, 0-5	5	N/A
CONNECTIONS			
Wall reinforcement doweled into footing	T, F, 0-5	0	T
Lateral load path at pile caps	N/A, T, F, 0-10	0	N/A
FLOOR DIAPHRAGMS			
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	F
Diaphragm continuity	T, F, 0-10	5	5
Adequate reinforcing at openings	N/A, T, F, 0-5	0	F
Collectors	T, F, 0-5	2	2
Limited diaphragm openings at shear walls	T, F, 0-5	2	F
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	F
Cross ties	T, F, 0-10	5	5
Adequate straight sheathing aspect ratios	N/A, T, F, 0-5	2	N/A
Large spans adequately sheathed	N/A, T, F, 0-5	2	T
Unblocked diaphragms meet requirements	N/A, T, F, 0-5	2	N/A
Untopped diaphragms meet requirements	N/A, T, F, 0-5	2	N/A
Other diaphragms meet requirements	N/A, T, F, 0-5	2	N/A

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

MODIFIED FEMA-310 WORKSHEET

Category	Range	Typical	Modifier
ROOF DIAPHRAGM (ONLY IF 5 STORIES OR LESS)			
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	T
Diaphragm continuity	T, F, 0-10	5	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	N/A
Collectors	T, F, 0-5	2	2
Limited diaphragm openings at shear walls	T, F, 0-5	2	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	5
Cross ties	T, F, 0-10	5	5
Adequate straight sheathing aspect ratios	N/A, T, F, 0-5	2	N/A
Large spans adequately sheathed	N/A, T, F, 0-5	2	T
Unblocked diaphragms meet requirements	N/A, T, F, 0-5	2	N/A
Untopped diaphragms meet requirements	N/A, T, F, 0-5	2	N/A
Other diaphragms meet requirements	N/A, T, F, 0-5	2	N/A
UNUSUAL CONDITIONS			
Insignificant concrete wall cracks	T, F, 0-5	2	2
Little deterioration of concrete	T, F, 0-5	2	2
Little post-tensioning anchors deterioration	N/A, T, F, 0-5	2	N/A
Little deterioration of wood	T, F, 0-5	2	T
Little foundation damage	T, F, 0-5	2	T
Little foundation deterioration	T, F, 0-5	2	T
Adequate overturning resistance	T, F, 0-5	2	T
Ties between foundation elements	N/A, T, F, 0-5	2	2
Lateral force on deep foundations	N/A, T, F, 0-5	2	N/A
Pole buildings	N/A, T, F, 0-5	0	N/A
Insignificant sloping at site	N/A, T, F, 0-5	0	T
SITE DEPENDENT HAZARDS - ACTIVE FAULTS			
Surface fault rupture	N/A, 0-50	0	N/A
NONSTRUCTURAL EXTERIOR 'WALLS'			
Cladding, glazing, veneer	N/A, T, F, 0-10	5	5
Chimneys	N/A, T, F, 0-5	5	N/A
NONSTRUCTURAL INTERIOR 'WALLS'			
Partitions (HC tile)	N/A, T, F, 0-10	0	N/A
Partitions (pre-cast panels..)	N/A, T, F, 0-10	5	N/A
EXTERIOR ORNAMENTATION			
Parapets, cornices, and appendages	N/A, T, F, 0-10	0	N/A

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

MODIFIED FEMA-310 WORKSHEET

Category	Range	Typical	Modifier
INTERIOR ORNAMENTATION			
Building contents and furnishings	T, F, 0-10	5	5
Ceiling systems	T, F, 0-5	5	2
Light fixtures	T, F, 0-5	5	2
MECHANICAL AND ELECTRICAL SYSTEMS			
Mechanical and electrical equipment	T, F, 0-10	5	5
Piping and sprinklers	T, F, 0-5	2	2
Ducts	T, F, 0-5	2	2
Elevators	N/A, T, F, 0-5	2	N/A
HAZARDOUS EXPOSURES - MATERIALS			
No hazardous materials	N/A, T, F, 0-10	0	N/A
OCCUPANCY (TYPE: HABITATIONAL)			
Interior Construction	-5-5	0	0
SITE DEPENDENT CHARACTERISTICS			
UBC Soil Class	A - E	D	D
Liquefaction Resilience	Low - High	Low	Low
Liquefaction Susceptibility	V. Low-V. High	Moderate	Low
Depth to Water Table (ft)	0-1000+	30	30
Landslide Susceptibility	V. Low-V. High	Very Low	Very Low

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

VULNERABILITY SUMMARY

Component Modifier Summary

Base Class 90% Fractile Loss at MMI=IX (% of Value): **37**

Modifiers to Base Class Loss

Item	Group Modifier (% of Loss)	Sigma (% of Loss)
1. Occupancy type:	0	1.0
2. Connections:	0	0.6
3. Walls:		
A. Exterior	0	3.4
B. Interior	0	0.0
4. Diaphragms:		
A. Floor(s)	6	2.4
B. Roof	-2	1.4
5. Ornamentation:		
A. Exterior	0	0.0
B. Interior	-2	2.0
6. Mechanical/electrical systems:	0	3.2
7. Unusual conditions:	-4	2.0
8. Hazardous exposures:		
A. Tank and overhanging walls	0	0.0
B. Pounding and adjacent buildings	0	0.0
9. Site dependent hazards:		
A. Proximity of active fault	0	0.0
Total	-2	6.3

Modified Base Class 90% Fractile Loss at MMI=IX (% of Value): **36**

Loss vs MMI

MMI	Loss to Facilities (% of Value) 90% Frac. Loss	Mean
V	0	0
VI	3	2
VII	14	9
VIII	25	16
IX	36	23
X	42	27
XI	47	30
XII	53	34

MIDTOWN APARTMENTS

Company Name: Murphy Burr Curry Inc.
Building Name: Midtown Apartments floors 1-4
Street Address: 1415 Scott Street
San Francisco, CA 94115

Date: November 6, 2012
Job Number: M212-306
Engineer: Alex D. Filatov
PE Number/State: C65023 CA

RISK SUMMARY

Expected Loss Table

Probability of Exceedence	MMI	Loss to Facilities (% of Value)			BI (months)
		PL	SUL	SEL	
50.0% in 30 years 43 year return period	VI-VII	3	9	6	N/A
10.0% in 30 years 285 year return period	VIII	15	24	16	N/A
2.0% in 30 years 1485 year return period	VIII-IX	26	34	22	N/A
10.0% in 50 years 475 year return period	VIII	18	PML 27	18	N/A
2.0% in 50 years 2475 year return period	IX	30	37	24	N/A

Event and Fault Table

Close and Significant Seismic Sources	Maximum Magnitude	Closest Distance (km)	Max. MMI	Max. SUL *	Max. SEL *	Maximum Business Interuption (months)	Percent Contribution **
California Gridded***	7.0	5.0	VIII-IX	29	19	N/A	4
N. San Andreas;SAO+SAN+SAP	8.0	9.8	VIII	27	17	N/A	<1
N. San Andreas;SAN+SAP	7.7	9.8	VIII	26	17	N/A	<1
N. San Andreas;SAP	7.2	9.8	VIII	22	14	N/A	2
N. San Andreas;SAO+SAN+SAP+SAS	8.1	9.8	VIII	27	18	N/A	25
N. San Andreas	8.0	9.8	VIII	27	18	N/A	9
N. San Andreas;SAN+SAP+SAS	7.9	9.8	VIII	26	17	N/A	<1
N. San Andreas;SAP+SAS	7.5	9.8	VIII	24	16	N/A	18
N. San Andreas;SAO+SAN	7.8	12.0	VIII	25	16	N/A	20
N. San Andreas;SAN	7.5	12.0	VIII	23	15	N/A	<1
San Gregorio Connected	7.5	15.3	VII-VIII	21	13	N/A	8
Hayward-Rodgers Creek;RC+HN	7.2	19.2	VII	16	11	N/A	<1
Hayward-Rodgers Creek	7.3	19.2	VII-VIII	17	11	N/A	1
Hayward-Rodgers Creek;RC+HN+HS	7.3	19.2	VII-VIII	18	11	N/A	<1
Hayward-Rodgers Creek;HN+HS	7.0	19.3	VII	15	10	N/A	3
Hayward-Rodgers Creek;HN	6.6	19.3	VI-VII	11	7	N/A	1

* Losses to individual events are from shaking only.
** Percent contributions are for the probabilistic 475 year return period risk.
*** Event causing highest loss (from shaking only)

Average Annual Loss (% of Repl. Cost): 0.300650
Business Interruption Average Annual Loss ($): 0
Return Period of Major Liquefaction/Landslide: 4674 Years

MIDTOWN APARTMENTS

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

RETROFIT BENEFIT ANALYSIS

C2A(4B)Concrete Shear Walls w/ Flexible Diaphragms

Category	Range	Typical	Without Retrofit	With Retrofit
GENERAL BUILDING FEATURES				
Complete load path	T, F	T	T	T
No strength irregularity	T, F	F	T	T
No soft story	T, F	T	T	T
No geometrical irregularities	T, F	T	T	T
No mass irregularity	T, F	T	T	T
No vertical discontinuities	T, F	F	T	T
No captive columns	T, F	T	T	T
No adjacent buildings	T, F	T	T	T
Interior mezzanines adequately braced	N/A, T, F	T	N/A	N/A
Adequate wall anchorage	T, F	F	F	T
LATERAL FORCE RESISTING SYSTEM				
Redundancy	T, F, 0-10	5	T	T
Shear stress check of shear walls	T, F, 0-25	13	10	T
Adequate wall thickness	T, F, 0-5	2	T	T
Reinforcing steel	T, F, 0-5	2	T	T
Adequate overturning strength	T, F, 0-10	5	5	T
Adequate confinement reinforcing	T, F, 0-10	5	10	T
Adequate reinforcing at openings	N/A, T, F, 0-5	2	N/A	N/A
Coupling beams properly reinforced	N/A, T, F, 0-5	5	N/A	N/A
CONNECTIONS				
Wall reinforcement doweled into footing	T, F, 0-5	0	T	T
Lateral load path at pile caps	N/A, T, F, 0-10	0	N/A	N/A
FLOOR DIAPHRAGMS				
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	F	F
Diaphragm continuity	T, F, 0-10	5	5	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	F	F
Collectors	T, F, 0-5	2	2	2
Limited diaphragm openings at shear walls	T, F, 0-5	2	F	F
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	F	T
Cross ties	T, F, 0-10	5	5	5
Adequate straight sheathing aspect ratios	N/A, T, F, 0-5	2	N/A	N/A
Large spans adequately sheathed	N/A, T, F, 0-5	2	T	T
Unblocked diaphragms meet requirements	N/A, T, F, 0-5	2	N/A	N/A
Untopped diaphragms meet requirements	N/A, T, F, 0-5	2	N/A	N/A
Other diaphragms meet requirements	N/A, T, F, 0-5	2	N/A	N/A

MIDTOWN APARTMENTS

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street	**Engineer:**	Alex D. Filatov
	San Francisco, CA 94115	**PE Number/State:**	C65023 CA

RETROFIT BENEFIT ANALYSIS

Category	Range	Typical	Without Retrofit	With Retrofit
ROOF DIAPHRAGM (ONLY IF 5 STORIES OR LESS)				
Reinforcing at re-entrant corner	N/A, T, F, 0-10	0	T	T
Diaphragm continuity	T, F, 0-10	5	T	T
Adequate reinforcing at openings	N/A, T, F, 0-5	0	N/A	N/A
Collectors	T, F, 0-5	2	2	2
Limited diaphragm openings at shear walls	T, F, 0-5	2	T	T
Adequate diaphragm transfer to shear walls	T, F, 0-10	5	5	T
Cross ties	T, F, 0-10	5	5	5
Adequate straight sheathing aspect ratios	N/A, T, F, 0-5	2	N/A	N/A
Large spans adequately sheathed	N/A, T, F, 0-5	2	T	T
Unblocked diaphragms meet requirements	N/A, T, F, 0-5	2	N/A	N/A
Untopped diaphragms meet requirements	N/A, T, F, 0-5	2	N/A	N/A
Other diaphragms meet requirements	N/A, T, F, 0-5	2	N/A	N/A
UNUSUAL CONDITIONS				
Insignificant concrete wall cracks	T, F, 0-5	2	2	2
Little deterioration of concrete	T, F, 0-5	2	2	2
Little post-tensioning anchors deterioration	N/A, T, F, 0-5	2	N/A	N/A
Little deterioration of wood	T, F, 0-5	2	T	T
Little foundation damage	T, F, 0-5	2	T	T
Little foundation deterioration	T, F, 0-5	2	T	T
Adequate overturning resistance	T, F, 0-5	2	T	T
Ties between foundation elements	N/A, T, F, 0-5	2	2	2
Lateral force on deep foundations	N/A, T, F, 0-5	2	N/A	N/A
Pole buildings	N/A, T, F, 0-5	0	N/A	N/A
Insignificant sloping at site	N/A, T, F, 0-5	0	T	T
SITE DEPENDENT HAZARDS - ACTIVE FAULTS				
Surface fault rupture	N/A, 0-50	0	N/A	N/A
NONSTRUCTURAL EXTERIOR 'WALLS'				
Cladding, glazing, veneer	N/A, T, F, 0-10	5	5	5
Chimneys	N/A, T, F, 0-5	5	N/A	N/A
NONSTRUCTURAL INTERIOR 'WALLS'				
Partitions (HC tile)	N/A, T, F, 0-10	0	N/A	N/A
Partitions (pre-cast panels..)	N/A, T, F, 0-10	5	N/A	N/A
EXTERIOR ORNAMENTATION				
Parapets, cornices, and appendages	N/A, T, F, 0-10	0	N/A	N/A

Company Name:	Murphy Burr Curry Inc.	**Date:**	November 6, 2012
Building Name:	Midtown Apartments floors 1-4	**Job Number:**	M212-306
Street Address:	1415 Scott Street San Francisco, CA 94115	**Engineer:**	Alex D. Filatov
		PE Number/State:	C65023 CA

RETROFIT BENEFIT ANALYSIS

Category	Range	Typical	Without Retrofit	With Retrofit
INTERIOR ORNAMENTATION				
Building contents and furnishings	T, F, 0-10	5	5	5
Ceiling systems	T, F, 0-5	5	2	2
Light fixtures	T, F, 0-5	5	2	2
MECHANICAL AND ELECTRICAL SYSTEMS				
Mechanical and electrical equipment	T, F, 0-10	5	5	5
Piping and sprinklers	T, F, 0-5	2	2	2
Ducts	T, F, 0-5	2	2	2
Elevators	N/A, T, F, 0-5	2	N/A	2
HAZARDOUS EXPOSURES - MATERIALS				
No hazardous materials	N/A, T, F, 0-10	0	N/A	N/A
OCCUPANCY (TYPE: HABITATIONAL)				
Interior Construction	-5-5	0	0	0
SITE DEPENDENT CHARACTERISTICS				
UBC Soil Class	A - E	D	D	
Liquefaction Resilience	Low - High	Low	Low	
Liquefaction Susceptibility	V. Low-V. High	Moderate	Low	
Depth to Water Table (ft)	0-1000+	30	30	
Landslide Susceptibility	V. Low-V. High	Very Low	Very Low	

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RETROFIT BENEFIT ANALYSIS

Retrofit Expected Loss Table

Probability of Exceedence	MMI	Loss to Facilities (SUL - % of Value)		Business Interuption (months)	
		Without Retrofit	With Retrofit	Without Retrofit	With Retrofit
50.0% in 30 years 43 year return period	VI-VII	9	5	N/A	N/A
10.0% in 30 years 285 year return period	VIII	24	12	N/A	N/A
2.0% in 30 years 1485 year return period	VIII-IX	34	16	N/A	N/A
10.0% in 50 years 475 year return period	VIII	27	13	N/A	N/A
2.0% in 50 years 2475 year return period	IX	37	17	N/A	N/A

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RETROFIT BENEFIT ANALYSIS

Retrofit Event and Fault Table

	Mag	Dist (km)	MMI*	SUL (% of value)		Business Interruption (months)	
				Without Retrofit	With Retrofit	Without Retrofit	With Retrofit
CLOSEST FAULTS							
California Gridded	7.0	5.0	VIII-IX	29	14	N/A	N/A
N. San Andreas;SAO+SAN+SAP	8.0	9.8	VIII	27	13	N/A	N/A
N. San Andreas;SAN+SAP	7.7	9.8	VIII	26	13	N/A	N/A
N. San Andreas;SAP	7.2	9.8	VIII	22	11	N/A	N/A
N. San Andreas;SAO+SAN+SAP+SAS	8.1	9.8	VIII	27	13	N/A	N/A
N. San Andreas	8.0	9.8	VIII	27	13	N/A	N/A
N. San Andreas;SAN+SAP+SAS	7.9	9.8	VIII	26	13	N/A	N/A
N. San Andreas;SAP+SAS	7.5	9.8	VIII	24	12	N/A	N/A
N. San Andreas;SAO+SAN	7.8	12.0	VIII	25	12	N/A	N/A
N. San Andreas;SAN	7.5	12.0	VIII	23	11	N/A	N/A
San Gregorio Connected	7.5	15.3	VII-VIII	21	11	N/A	N/A
Hayward-Rodgers Creek;RC+HN	7.2	19.2	VII	16	9	N/A	N/A
Hayward-Rodgers Creek	7.3	19.2	VII-VIII	17	9	N/A	N/A
Hayward-Rodgers Creek;RC+HN+HS	7.3	19.2	VII-VIII	18	9	N/A	N/A
Hayward-Rodgers Creek;HN+HS	7.0	19.3	VII	15	8	N/A	N/A
Hayward-Rodgers Creek;HN	6.6	19.3	VI-VII	11	6	N/A	N/A
Hayward-Rodgers Creek;HS	6.8	20.5	VII	12	7	N/A	N/A
Hayward-Rodgers Creek;RC	7.1	33.9	VI-VII	10	6	N/A	N/A

* MMIs represent mean values due to shaking only

RESULTS DISCLAIMER
This report, and the analyses, estimates and conclusions are based on scientific data, mathematical and empirical models, and experience of engineers, geologist and geotechnical during any earthquake may differ substantially from these estimates.

Appendix C
San Francisco Landslide and Liquefaction Map