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Re: 6/16/15 Balcony Collapse Incident at 2020 Kittredge St., Berkeley, CA

Dear City of Berkeley Officials:

This letter is written in response to the June 23, 2015 "Staff Recommendation Memorandum" from the City of Berkeley Planning & Development Department, Building & Safety Division. As you are aware, our office represents the Donohoe family who lost their daughter, Ashley Donohoe, on June 16, 2015 in the tragic balcony collapse at the Library Gardens apartment complex at 2020 Kittredge Street.

The Donohoe family wants to do everything in its power to ensure that this type of tragedy never occurs again.

In an effort to avoid another tragedy like this, we provide the following analysis of the suggested changes to the Berkeley Housing Code as it relates to the frequency of maintenance inspections post construction. (See the City of Berkeley Building and Safety Division's proposed amendment to Berkeley Municipal Code Chapter 19.40, Berkeley Uniform Housing Code, to add section "Section 601.4 Structural Maintenance.") This section appropriately calls for maintenance inspections to "verify that the elements are in general safe condition, in adequate working order, and free from hazardous dry rot, fungus, deterioration, decay or improper alteration." However, the proposed Code Section only calls for these inspections to be performed every 5 years. We believe this is completely inadequate.

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The various inspectors for the City of Berkeley determined that there was severe dry rot present in the balcony structure. In order to assess what the necessary frequency for inspections must be, the City of Berkeley must look to the known science behind how dry rot forms and how quickly it can appear and damage wood structures.

Rains Lucia Stern, PC has retained experts to provide some initial analysis on the structural collapse. According to these experts, the scientific analysis that has been done in the engineering field on dry rot concludes that the conditions necessary for dry rot to occur are as follows: wood structures, oxygen, moisture content above 30%, a temperature between 30-90 degrees Fahrenheit and the presence of dry rot fungi spores. Once these conditions for dry rot exist, there are several basic stages of development: (1) there are the spores; (2) the development of the white threads called hyphae; (3) the massing of the hyphae into the mycelium; and (4) the distribution of more spores. During this process, the wood will have a white film and then become darker and crumbly in appearance. As the fungus causes decay to the wood structure, it causes cracking and the cellulose of the wood begins to break down leading to structural weakness. Eventually, the wood fibers become brittle and feel like powder.

There are several names for the species of fungi that generally cause dry rot: *Serpula lacrymans*, *Meruliporia incrassate*, *Poria incrassate*, and *Serpula incrassata*. "It is very apparent that the natural environment of [*Serpula lacrymans*] is not one that would be expected within a well maintained and designed building, viz. free moisture, high humidity, low ventilation. ...The decay of timber by *S. lacrymans* is crucially dependent upon the levels of humidity."¹

In other studies, it has been found that decay "initially affects the toughness, or ability of wood to withstand impacts," but "[e]ventually, all strength properties are seriously reduced." Considerable strength loss can occur during the early stages of decay and tests have found that "losses in toughness ranged from 6% to >50% by the time 1% weight loss had occurred in the wood as a result of fungal attack. By the time weight losses resulting from decay have reached 10%, most strength losses may be expected to exceed 50%....It may be assumed that wood with visually discernable decay has been greatly reduced in all strength values."² The loss of strength analysis has yielded additional results that wood composite materials, such as laminate, that are used more frequently now in construction projects, "have a greater influence on the susceptibility of the wood to fungal attack" and have a much more extensive rate of degradation compared to treated wood. While there are a number of variables involved, lab studies show that the fungus can take hold in as little as 12 weeks and can cause damage in under a year.³

¹ "The Domestic Dry Rot Fungus, *Serpula lacrymans*, its natural origins and biological control," John W. Palfreyman, Dry Rot Research Group, University of Abertay Dundee, Bell Street, Dundee, Scotland

² Wood Handbook Chapter 17 "Biodeterioration of Wood," Carol A. Clausen, Supervisory Research Microbiologist

³ "Wood-Based Composites Exposed to Fungal Degradation: Laboratory Results," Vina W. Yang, Barbara L. Illman, Leslie A. Ferge, and Robert J. Ross

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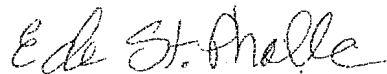
The point of inspections are to identify faulty design or construction that may lead to failure prior to the failure occurring. Due to the fact that there are, on occasion, problems with improperly constructed wood buildings, it would seem necessary to identify these problems as soon as possible after new construction. "Serious decay problems are almost always a sign of faulty design or construction, lack of reasonable care in the handling of wood, or improper maintenance of the structure." At the construction phase, there are a number of principles that ensure long service and avoid decay, including, but not limited to, not enclosing wet or infected wood until the wood is thoroughly dried. Subsequent interior moisture issues, such as humidity and plumbing leaks, can result in serious decay problems if they are undetected for long periods of time. "In making repairs necessitated by decay, every effort should be made to correct the moisture condition that led to the damage" and if successful, then "it is necessary only to replace the weakened wood with dry lumber."⁴

The City of Berkeley must take all measures to ensure this does not happen again. The exact timing of how long it will take for a wood structure to be damaged by dry rot depends on all the variables for its growth. However, it is known that under the right circumstances the fungi can take hold within a matter of weeks and can progress very quickly. It is certainly believed that you can have significant growth of the fungus within a year. **Therefore, if the City of Berkeley truly wants to prevent another tragedy, these required maintenance inspections should be done, at a minimum, every year.** If the City allows the maintenance inspections to be done every 5 years, then the City is creating the possibility that a building structure could be infested and compromised in the period between the required inspections.

On behalf of the Donohoe family, we ask that the City please respond to this office immediately to confirm that you will be implementing and/or proposing a further amendment to Berkeley Municipal Code Chapter 19.40, Berkeley Uniform Housing Code, to add section "Section 601.4 Structural Maintenance" that **requires annual maintenance inspections be done at least once a year.**

Very truly yours,

RAINS LUCIA STERN, PC



Eustace de Saint Phalle

ESP:mhg

⁴ Wood Handbook Chapter 17 "Biodeterioration of Wood," Carol A. Clausen, Supervisory Research Microbiologist