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February 28, 2016

Honourable Naomi Yamamoto
Minister of State for Emergency Preparedness
PO Box 9046 Stn Prov Govt
Victoria, BC V8W 9E2

Re: Unreinforced Masonry Buildings Vulnerable to Seismic Destruction

Dear Minister:

I appreciated the opportunity to participate in your meeting with the Civic Affairs Committee of the Vancouver Board of Trade last year. This letter is intended to outline an initiative that could help to prevent some of the worst consequences of one of the most serious natural disasters that threatens our province – the major earthquake that sooner or later will strike Southwestern British Columbia.

As I mentioned in the meeting last summer, older buildings constructed with unreinforced masonry present a serious hazard that would contribute significantly to deaths and injuries in the event of a major earthquake. This point is emphasized in the Provincial *Earthquake Immediate Response Plan* released by your ministry several months ago. That report revealed a worst case scenario of 10,000 fatalities in the Greater Vancouver area, plus 128,000 injuries. A great many of the fatalities and injuries would likely occur in the more than 1,000 unreinforced masonry buildings in the area. The report projected proportionate casualties for Victoria.

Over the past several years, I and other members of our Civic Affairs Committee have visited, consulted and shared ideas with emergency preparedness authorities in Seattle, Portland, San Francisco and Los Angeles. Those visits proved to be very valuable and have significantly improved our grasp of emergency preparedness, particularly with respect to the hazards that stem from earthquakes.

It is clear that the principal factor holding back progress with respect to the problem of unreinforced masonry buildings is the cost that owners must bear to make the structural improvements needed so that the buildings will better resist the effects of an earthquake.

As evidence of the extent of the situation, enclosed is a map of the City of Vancouver on which each older building is marked. As shown, most of the vulnerable structures are located along major arterials. Typically the buildings in question have commercial use on the ground floor, and residential or commercial use for two or more floors above that.

More recently a potential solution to this dilemma became apparent. As you know, there will be a major increase in the population in Vancouver over the coming decades, at the same time as there is and likely will continue to be a very significant housing shortage.

There appears to be an opportunity to increase the residential zoning of properties that have buildings constructed of unreinforced masonry. By adding an additional floor or two of permitted residential construction, rebuilding the structure may become economically attractive.

With that incentive, over a period of years owners would be motivated to replace their unreinforced masonry buildings with new structures designed to resist earthquake forces, and with additional residential accommodation. At the same time, the corresponding population increases would be along major arterials where the capacity of services and transportation is much better than in single family areas away from the arterials.

From past activity involving the B.C. Chamber of Commerce among other organizations you will be aware of my extensive background as a consultant. I believe that I am well equipped to assist your ministry by pursuing this subject and identifying the steps required for implementation.

I would welcome the opportunity to discuss the potential for the initiative outlined above. With the involvement of planners, architects, developers, associations and municipalities, I would be happy to explore the economic perspective of the situation and hopefully demonstrate that there is potential to make progress on the replacement of hazardous unreinforced masonry structures. It is important that this be undertaken before the inevitable major earthquake strikes southwestern British Columbia.

Attached is a brief resume that outlines my relevant experience and qualifications to undertake this work. I would be happy to develop a succinct proposal to pursue this.

I look forward to discussing this with you.

Sincerely,

D.E. Park & Associates Ltd.



David E. Park
FCMC
P.Eng., MBA

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Woodcock, Danielle TRAN:EX

From: Denlinger, Becky TRAN:EX
Sent: Tuesday, October 18, 2016 10:23 AM
To: Brown, Tom G TRAN:EX
Subject: RE: Buildings and Cost to Upgrade to Seismic

I spoke with Andy.

From: Brown, Tom G TRAN:EX
Sent: Tuesday, October 18, 2016 9:56 AM
To: Denlinger, Becky TRAN:EX
Cc: Woodcock, Danielle TRAN:EX
Subject: FW: Buildings and Cost to Upgrade to Seismic

Hi Becky – any thoughts on how to approach the original questions posed by Andy?
Thanks Becky
Tom

From: Nacey, Sean TRAN:EX
Sent: Monday, October 17, 2016 9:53 PM
To: Brown, Tom G TRAN:EX
Subject: Fwd: Buildings and Cost to Upgrade to Seismic

Hi Tom,
Have you seen any info that could help with this?

Sent from my iPhone

Begin forwarded message:

From: "Jabs, Ryan GCPE:EX" <Ryan.Jabs@gov.bc.ca>
Date: October 17, 2016 at 11:47:12 AM EDT
To: "Livolsi, Patrick C TRAN:EX" <Patrick.Livolsi@gov.bc.ca>, "Nacey, Sean TRAN:EX" <Sean.Nacey@gov.bc.ca>
Subject: FW: Buildings and Cost to Upgrade to Seismic

Morning Patrick and Sean,

Any chance we have info that can provide this perspective handy?

Thanks,

Ryan

From: Watson, Andy GCPE:EX
Sent: Monday, October 17, 2016 8:31 AM
To: Jabs, Ryan GCPE:EX; Ash, Christine GCPE:EX
Subject: Buildings and Cost to Upgrade to Seismic

Question from our Chief of Staff – government has received some criticism from critics (for example, most recently, in CBC *Faultlines* series) about housing stock and building code not being strong enough to advocate for seismic improvements and mandatory improvements for existing buildings etc....

Can either of your teams help with a figure – we’re trying to figure out what the cost would be approximately in percentage to move a building from surviving a major earthquake (seismic improvements/retrofits) to a building that would survive a major earthquake with new standards. Essentially, what is the cost to tear down and build a new rather than renovate in percentage. Thinking as a starting point, something like this:

- The housing market with the highest risk in an earthquake in the province in a seismic event also has the hottest housing market.
- To move a building from surviving a major earthquake to post-seismic will significantly increase cost in the market
- It’s a balance that has to be carefully weighed by government

Jabs – I understand Patrick Livolsi might have some figures on this that can be generally conveyed from engineers.

Chris – given this might be a housing specific Q and scenario wanted your thoughts.

Andy Watson

Manager, Communications

Emergency Management BC - Government Communications and Public Engagement

Work: 250 952-4881 / Cell: 778 679-5667

Woodcock, Danielle TRAN:EX

Subject: FW: Nicholas Le Pan article re earthquake risk

From: Brown, Tom G TRAN:EX
Sent: Thursday, September 1, 2016 6:49 PM
To: Denlinger, Becky TRAN:EX
Subject: Re: Nicholas Le Pan article re earthquake risk

Will do Becky.
Thanks, Tom

From: Denlinger, Becky TRAN:EX
Sent: Thursday, September 1, 2016 5:46 PM
To: Brown, Tom G TRAN:EX
Subject: FW: Nicholas Le Pan article re earthquake risk

Tom, please phone Art to update him on our work in the seismic risk management arena. Art called and left me a voice mail, saying that he and Peter will be in our area this month and he would like to meet to understand where we are on all this.

Thanks,
Becky

From: Art Ringwald [<mailto:art.ringwald@yanev.com>]
Sent: Thursday, August 4, 2016 1:11 PM
To: Denlinger, Becky TRAN:EX
Cc: peter@yanev.com
Subject: Nicholas Le Pan article re earthquake risk

Good afternoon Becky,

We met briefly when Yanev Associates gave a presentation in Vancouver a while back. I ran across the following very recent article written by Nicholas Le Pan which supports virtually everything we talked about in our presentation. It seems clear to us that the most important things that need to be done to mitigate the prospective disaster are precisely the things that we do best. I placed a call to you earlier today to discuss several things and look forward to talking with you when you have time.

Best regards,
Art

Art Ringwald | Partner

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o +1.704.378.8585
Skype artringwald

Yanev Associates, LLC

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From: Denlinger, Becky TRAN:EX
Sent: Sunday, May 15, 2016 5:23 PM
To: 'Peter Yanev'
Subject: RE: M7.0 April 16 Kumamoto, Japan earthquake investigations by Yanev Associates

Peter, what a treasure trove of information – thanks very much for sharing!
Becky

From: Peter Yanev [<mailto:peter@yanev.com>]
Sent: Sunday, May 15, 2016 4:22 PM
To: Cooper, Tracy J TRAN:EX; Denlinger, Becky TRAN:EX; Quealey, Pat TRAN:EX; Brown, Tom G TRAN:EX; Baskin, Kevin TRAN:EX; Gaib, Sarah E TRAN:EX; Dacho, Frank H TRAN:EX; Livolsi, Patrick C TRAN:EX; Bennetto, Jack D TRAN:EX
Cc: Art Ringwald; Alex Yanev
Subject: M7.0 April 16 Kumamoto, Japan earthquake investigations by Yanev Associates

Dear colleagues,

I would have sent this email sooner,^{s.22}
^{s.22}

Below are the four papers I wrote right after our investigation of the very recent M7.0 and M6.3 earthquakes in Kumamoto, Japan. We got there the day after the big (M7.0) earthquake, so all of the observations are fresh and from the immediate conditions following the earthquake(s). It was a truly interesting and challenging earthquake, even after so many other ones in Japan and elsewhere. **Many new lessons, especially about the ground motion and its strength.**

The schools, the hospital and the newer parts of the airport that we investigated did very, very well, especially the ones that had been strengthened, so I am pleased even more with our work in many countries for the World Bank and others, including Turkey, Romania, Philippines, Armenia, etc... I mentioned our World Bank work in Turkey in the school paper. In Turkey alone we have strengthened more than 1,000 school and hospital buildings. The results in Japan, where they use similar shear wall strengthening, were very encouraging.

We looked at lots of **bridges**, with and without serious damage. No new lessons from a technical perspective, really, but interesting from the disaster response perspective because of the many rivers in the cities and the area. Most of the significant damage was due to settlement of backfills at abutments (the soils in the area are generally volcanic and quite good); I have not summarized that yet.

The poor performance of **wood frame buildings** was unprecedented and calls into question many of the assumptions and modeling in the insurance and other industries. Minor ground settlements, especially in the hills near the fault, caused surprisingly heavy damage.

Please feel free to forward the material to any and all of your colleagues and anyone else that may be interested.

I will send you our team's report shortly. It is a bigger file and includes the four papers below but the formatting is not as good. It also includes our observations on the power system, but because of the ongoing repair and recovery work, we did not get good access. We did get access to some of the affected industrial facilities.

Any and all comments and questions are welcome.

Peter

Peter Yanev | Founder

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Woodcock, Danielle TRAN:EX

Subject: FW: M7.0 April 16 Kumamoto, Japan earthquake investigations by Yanev Associates
Attachments: Schools M7 April 16 Quake, Yanev.pdf; ATT00001.htm; The Kumamoto Airport M7 April 16 Yanev.pdf; ATT00002.htm; The Nishikumamoto Hospital M7 April 16, Yanev.pdf; ATT00003.htm; Houses-Where Else Can This Happen M7 Quake, Yanev.pdf; ATT00004.htm

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From: Denlinger, Becky TRAN:EX
Sent: Monday, May 16, 2016 8:50 AM
To: Peter Yanev
Subject: Re: M7.0 April 16 Kumamoto, Japan earthquake investigations by Yanev Associates

Peter, is it possible that the unusually severe damage to wood frame houses was due to the successive events? That is, are the effects of a 7.0 that quickly follows a 6.3 worse than just a 7.0?
Can you tell I am not very experienced at this?
Thanks,
Becky

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