



NEWS BULLETIN #2: SPRING 2011

NEWBuildS Activities



NEWBuildS Workshop – January 17th, 2011

- The NEWBuildS Workshop was held in Radisson Hotel Vancouver Airport. BC. It was attended by about 100 participants from within the Network, government departments, industry and researchers outside of the network. The response from the attendees was very positive.
- There were 21 presentations by professors, graduate students and PDF's. It provided an opportunity for NEWBuildS researchers to network with other researchers and representatives from industry and government.
- Presentations are available at Member Area @ <http://newbuildscanada.ca/members/researchers/>
- The Network workshop will be held annually and serve as a major event for networking and dissemination of research results to all stakeholders.

NEWBuildS Training Seminar for Graduate Students and PDF – January 18th, 2011

- FPIInnovations Scientists and Professor Hadjisophocleous hosted the Training Seminar on Design for Durable Buildings and Fire Safety in Buildings. The sessions were well attended as HQPs benefited from experience and efforts of researchers from Theme 3 and 4.

NEWBuildS Board of Directors Meeting - January 18th, 2011

- The Project Enhancement Fund program is intended to support activities to enhance research project. Total fund approved for year 2 is \$42,000. A panel will select the applications based on guidelines.
- A new category of network membership, Associate Network Partner, was created to recognize contributions to Network by institutions not formally bound by the Network Agreement.
- Outreach Committee will be established to provide guidance on various Outreach activities. CWC and FPIInnovations network participants will spearhead the initial discussion to formulate a work plan.
- An International Expert Panel will be established to provide impartial review of new project proposals, if necessary.

Interaction with external stakeholders by Management Team

- During 2010, NEWBuildS Network Liaison Manager and Scientific Director met with representatives from 7 government and semi-government agencies to introduce the network

- and develop potential partnership. They resulted in funding support and research cooperation. Such activities will be more focused in 2011 with the establishment of the Outreach Committee.
- The Construction Innovation is a news letter published by NRC Institute for Research in Construction. The Dec 2010 edition featured an article on NEWBuildS titled “Increasing the use of engineered wood in mid-rise buildings” @ <http://www.nrc-cnrc.gc.ca/eng/ci/v15n4/6.html>.
- In December 2010, NEWBuildS Scientific Director made presentations on NEWBuildS at five Chinese institutions. He also visited Canada Wood China, Shanghai and met its engineers regarding research needs for the Chinese markets.
- In January 2011, Scientific Director organized a special technical session on Multi-storey Wood Buildings at the Twelfth East Asia-Pacific Conference on Structural Engineering and Construction in Hong Kong, China. The session included 8 presentations from Canada, Australia, USA, China and Germany. The session presented an opportunity for participants to learn about research programs in Australia/New Zealand, Europe and China that are similar to NEWBuildS.

Future Network and related events

- NEWBuildS Theme II Research Exchange will be held on June 13-14, 2011 at NRC Institute for Research in Construction, Ottawa, Ontario.
- Cross Laminated Timber (CLT) Symposium, will be held on June 21-22, 2011, in Toronto, Ontario. [http://www.wood-works.org/Ontario Wood WORKS/](http://www.wood-works.org/Ontario%20Wood%20WORKS/)

Featured Project:

Project T2-5-C2: Measuring the dynamic characteristics of mid-rise wood & hybrid buildings

Lead Investigator: Dr. Ghyslaine McClure, McGill University
 Dr. Ying-Hei Chui, UNB
 Dr. Ghasan Doudak, University of Ottawa

FPInnovations Co-Investigator(s): Dr. Lin Hu and Dr. Chun Ni

HQP: Nidaa Alwan, Master student, University of Ottawa

As more innovative building solutions involving wood structural products are being developed worldwide, Canada is also showing leadership in the application of these solutions to mid-rise all-wood or hybrid construction projects. These projects provide a tremendous opportunity for researchers as “real-scale laboratory” specimens and we are thankful for the close collaboration we have had from building owners in this research project.

An important tool that is currently missing for designers to adopt these innovative building framework solutions is a reliable approach to predict their natural period. This information is required for the calculation of design forces under seismic and dynamic wind gust loads based on the simplified static procedures of the National Building Code of Canada 2005. The NBCC provides an empirical formula to estimate the natural periods of buildings as a function of building height. However this formula has not been calibrated to mid-rise wood frame buildings and its application is doubtful. Hybrid buildings constructed so far in Canada have not used the wood framework as their main lateral load resisting system (typically the wood frame was designed to resist gravity loads only) but the effect of system interaction on dynamic characteristics certainly deserves a reality check.

In Phase 1 of this project we are developing a database of “in situ” natural frequencies and internal damping of wood light-frame and hybrid structures, with a view to derive appropriate predictive models. These characteristics are extracted from ambient vibration measurements (AVM) made on

building floors using sensitive sensors (see Figure 1) that record the velocity of floors under ambient excitation. We currently have seven sensors available to conduct field and lab measurement and we can deploy them vertically on building floors and in-plane as well to capture the low frequency lateral modes (in sway motion and torsion) of the building response. Data analysis of the records relies on a proven technique called Frequency Domain Decomposition and is available in commercial software.

Figure 1: Compact seismic sensor



Source: <http://www.tromino.it/>

To date we have made measurements on typical residential wood light-frame constructions in Montreal (South Shore on soil Class D; post 1980 constructions) and Ottawa. Such tests on existing low-rise buildings also yielded valuable results for our study, especially to assess damping and its variability. However, structural details are not readily available for each building/house tested so only general results will be presented. The fundamental natural frequencies of these constructions varied from 6 to 9 Hz and damping in sway modes was in the range of 3 to 7%. We are collaborating with Dr. Lin Hu of FPInnovations for more measurements on the hybrid concrete and wood post-and-beam building (FondAction Building) located in Québec City.

Of note here is the AVM measurement performed by Dr. Doudak and Masters student, Ms. Nidaa Alwan last January in Kamloops, BC. AVM testing was carried out on the Library Square complex (see Figure 2). Library Square consists of a 20,000 square foot library with 140 condominiums and two commercial areas. Figure 2 shows the building when it was still under construction at the time of measurements. On one side of the building, the gypsum wallboard covering was complete. On the other side, only the structural systems were in place. The collected data is currently being processed by Ms. Alwan in the context of her master's thesis. We expect to extract natural frequencies, corresponding mode shapes and damping ratios. It is also planned to return to Kamloops and make a second series of measurements on the same buildings after construction is complete later in 2011.

Figure 2 : Library Square Project in Kamloops (BC) - January 2011



Photo Credits: Wood WORKS! BC