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POST-EARTHQUAKE FUNCTIONALITY OF OPERATIONAL AND FUNCTIONAL COMPONENTS IN BUILDINGS

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ABSTRACT: This oral presentation summarizes some of the work done at McGill University in the context of the Canadian Seismic Research Network activities related to operational and functional components of buildings and simplified seismic assessment of post-critical buildings in Montreal, Canada. A new assessment method was developed. It was combined with the current New Zealand best practice, and features of the FEMA 154, with a view to better assess low-rise buildings with irregularities that are common in public buildings forming post-critical shelters. The method was applied to 101 buildings that form part of 16 high school campuses. The seismic risk rating of the about 400 typical operational and functions components located in some of these buildings was also assessed according to the CAN CSA S832 Standard (Edition 2006-R2011) - *Seismic Risk Reduction of Operational and Functional Components (OFCs) of Buildings,* on the basis of on-site inspections. More typical components were also assessed in six Montreal hospitals.

Montreal being located in a region of moderate seismicity according to the Canadian seismic classification, the risk rating was found moderate for half of the components. The proportion of high risk components was found to be higher in hospitals (28%) than in school buildings (20%). The majority of the high risk components included mechanical components and those related to electric power supply and information technology. The main problems requiring mitigation were identified as follows:

- electric power emergency generators improperly anchored (or free standing) on floors
- unrestrained batteries for emergency generators
- slender electrical control panels unrestrained
- unbraced suspended piping and
- unbraced classical suspended ceilings.

A brief overview of experimental research on wall office partitions in interaction with suspended ceilings is also presented. Finally, efforts made by other researchers of the CSRN in the area of non-structural components are mentioned.

The CSRN research conducted on this subject was instrumental in raising awareness to seismic risk of OFCs not only in the structural engineering community but also among several other building stakeholders. This work has also helped refine the CSA-S832 edition (just published) as its technical committee comprises of several former CSRN members.

In conclusion, the challenges and opportunities identified to ensure the post-earthquake functionality of OFCs in buildings are:

- Ensure preparedness and encourage mitigation

- Prioritize since mitigation on a large scale cannot be afforded
- Recognize that moderate seismic hazard (in Eastern Canada) brings focus on functionality rather than building collapse prevention
- Strictly enforce functionality performance requirements in new constructions.