Seismic Risks: The Parliament Building

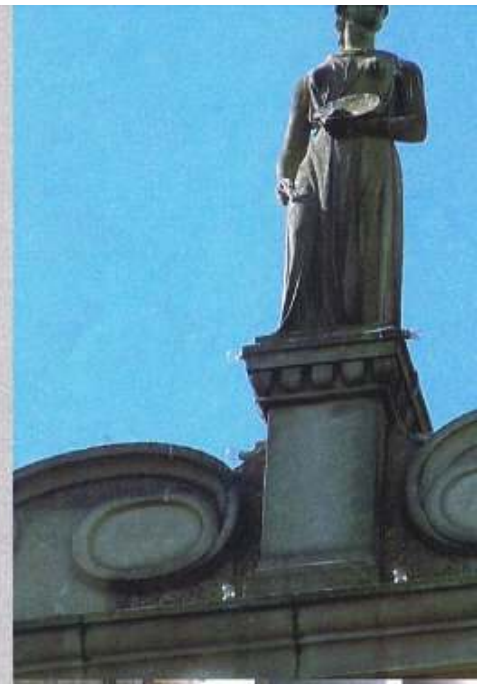
Findings:

Seismic codes have been considerably stiffened in the past 30 years due to experiences, particularly of heritage buildings, of a variety of earthquakes, including relatively recent events in nearby Washington State. The Parliament Building:

- is constructed in a manner which is below acceptable seismic standards set by the 2005 National Building Code and has only nominal capacity to resist the damaging effects of earthquakes. The un-reinforced brick masonry walls are brittle, and will fracture during large building movements during an earthquake. The structure, lacking strength and stiffness against collapse, can expect to sustain significant structural and non-structural damage during a moderate earthquake, and will sustain major damage resulting in loss of life in a significant earthquake, which is predicted for the Victoria area.
- can be upgraded to improve seismic life safety and damage control.

Recommendations:

- The buildings should be upgraded to achieve a seismic performance level for life safety and damage control in accordance with the BC Building Code for historic buildings.
- Using standard seismic upgrading construction practices, the work can be undertaken with local construction expertise and a manageable workforce. Proposed upgrade methods include insertion of special tie rods and stiff concrete bracing walls to limit building movement during an earthquake.
- The statues, on and above the walls, and the front steps, are most vulnerable to collapse in a small to moderate earthquake. These are readily accessible and their reinforcement will have minimum impact on occupants (other than scheduling times for noisy work). Due to their high life safety risk, statues and front steps should be of first priority and completed to BC Building Code standards.
- Seismic restraints are required on most mechanical equipment and should be installed as soon as possible.



The Victorian sponsors and designers of the British Columbia Parliament Building were keenly aware of the symbolic role that such a structure plays in the life of a stable society. It was a symbol of governance drawing connections and strength from much larger and more powerful forces in the country and empire in which it resided. It still is.

The outcome of the Legislative Block Study 2002 by British Columbia Buildings Corporation (BCBC) determined a need for a more comprehensive review of the entire precinct to ensure the site's buildings and grounds are brought into compliance with life safety and building codes, that they are preserved and rehabilitated for future generations while ensuring respect for their iconic and historical significance, that the internal infrastructures of the buildings are brought up to date, and that current and future space requirements are accommodated. This will ensure the stability and maintenance of the mechanisms which permit the survival of the state.

From the original architect, Francis M. Rattenbury, to individuals including Alan J. Hodgson MAIBC, and other groups who have cared for this site, our work today continues the work of our predecessors forming a continuing sequence of capital and maintenance interventions. Our findings were subjected to cross-disciplinary deliberations to ensure that implications of observations were clearly understood and solutions appropriately prescribed.

The importance and value of this site as a symbol of government, particularly the Parliament Building, cannot be minimized when coupled with its physical attributes and attraction to the public and tourists. Yet, our analysis has determined that the site and its buildings are at risk. There is currently no long term comprehensive asset maintenance program in place for the BC Parliament Precinct. The most recent upgrade and remediation works undertaken on the precinct date back over twenty years. Our studies have confirmed physical risks to occupants from Building Code-mandated health and safety risks, and risks to the asset due to mechanisms of deterioration. These results confirm comments by building users, occupants and maintenance staff, with long-standing concerns including deterioration of building envelopes, health and safety risks, and spatial and infrastructure constraints despite frequent minor 'patching' work over the past decades. The 30 year cyclical maintenance required to maintain a site of this type has been delayed, with the rate of deterioration accelerating to the level of "limit of useful condition" as per the graph of the Tuutti cyclical maintenance model to the right.

Despite its highly symbolic value, this site is also a place of work and center of provincial government operations for a large geographic area. It is essential that it operate in an efficient and safe manner and our study demonstrates that this can be achieved with the existing buildings.

Those who occupy this site have a key role in governing the province and should have the best and most efficient facilities to be effective. Unlike typical administrative centers, sites of this type experience frequent relocation of occupants due to political change. With personnel expansion in response to changing and increasing government operations, the Parliament Building, in particular, has reached its occupancy limit. The number of MLAs is increasing to serve an expanding population. More ministries and services have been established requiring more staff. The 2002 study by BCBC found space shortfall in the Parliament Buildings Precinct of 9.5%, a figure that is increasing. The Space Planning work in this study demonstrates an opportunity to utilize on-precinct space resources in the under-utilized library and the Armoury which can relieve the spatial pressures in the Main Building.

Recommendations for resolution of the above issues form a part of the Capital and Long Term Asset Maintenance Plan developed from both the condition analysis and the planning work. It identifies a first year program of $2 million

for 'immediate works'. Immediately following are the proposed renovations to the Armoury and Library Buildings for a projected three year implementation to the end of the fourth year for $55 million ($42 million is the current value; $55 million includes escalation). Finally, an eight year capital rehabilitation project valued at $182 million and a long term asset maintenance program of $69 million over twenty years (with yearly supporting cash flows of $3.45 million) is outlined.

This site must continue to provide facilities for day to day governance of the province and allow for expansion into the future. Its facilities must be of the highest standard, not only to permit efficient operations, but also to protect occupants in order to protect the society which they serve. It is what must be planned for and what must be considered in all of the actions and expenditures which apply here. **The public might wrongly assume that the funding of this important work was in the interest of the individuals forming the government; however, the public must be educated that the well-being and safety of the government will help ensure the well-being and safety of the community at large.**

Buildings of 1898 had symbolic as well as practical roles in society – banks were re-constituted Roman temples, churches expressed gothic roots of the Western European Christian tradition, and houses and farms evoked an ideal of rural and domestic life by the use of domestic Arts and Crafts motifs. The Parliament Building, with its Beaux Arts plan, roof top dome and cupolas, grand entrance stair, and harbor site (facing, when constructed, the primary entry point – the "front door" – of Victoria) was intended not just as an actual palace of government, but also as the workplace of those who run the province. In the event of social disorder, seismic event, terrorist act, major accident or fire, it was understood that the public would look to these buildings and their occupants to provide symbolic strength and the direction to assist those affected and to protect society. If the buildings are destroyed, whether as a result of a significant event or slow erosion, a disheartened public could more easily turn to civil disorder resulting from the loss of a focal symbol. If a sudden event compromises the government, critical leadership could be lost and disaster magnified with serious implications related to governance of the province (as it very nearly did for Canada, as a result of the fire on Parliament Hill in 1916, and for Washington State during a sitting of the Legislature during the recent near-collapse of the Capitol dome in the earthquake of February 2001). The prospect of serious loss of life at this site, with consequential of loss of leadership in the event of a major tragedy, is unthinkable – but it is a real and increasing threat.

We strongly urge the members of the Legislative Assembly Management Committee to consider and act on these recommendations. Immediate implementation of both the eight year Capital Rehabilitation Projects Plan and the twenty year Long Term Asset Maintenance Plan is vital to achieve life safety, preservation and functionality of these priceless buildings and to ensure security for the legislative environment on which the citizens of British Columbia depend.

Escalation

GFA (m²) 32,429

Long Term Rehabilitation and Asset Maintenance Plan

INFLATIONARY EFFECT IF IMMEDIATE CAPITAL CONSTRUCTION IS DEFERRED OVER TIME

LONG-TERM EFFECT OF ESCALATION

	PROJECT START:	2006 PRESENT DAY COST	2016 FUTURE COST (10 years)	2018 FUTURE COST (12 years)	2020 FUTURE COST (14 years)	2033 FUTURE COST (27 years)
Note						
	The following tests the effect of escalation (inflation in the construction industry) on the estimated project cost of the phased immediate capital items at an average annual escalation rate of 12%					
1	Year One (2006)	$10,257,000	$22,565,000	$25,027,000	$27,489,000	$43,490,000
2	Year Two (2007)	$14,668,000	$32,270,000	$35,790,000	$39,310,000	$62,192,000
3	Year Three (2008)	$15,033,000	$33,073,000	$36,681,000	$40,288,000	$63,740,000
4	Year Four (2009)	$15,796,000	$34,751,000	$38,542,000	$42,333,000	$66,975,000
5	Year Five (2010)	$15,803,000	$34,767,000	$38,559,000	$42,352,000	$67,005,000
6	Year Six (2011)	$10,600,000	$23,320,000	$25,864,000	$28,408,000	$44,944,000
7	Year Seven (2012)	$10,606,000	$23,333,000	$25,879,000	$28,424,000	$44,969,000
8	Year Eight (2013)	$13,226,000	$29,097,000	$32,271,000	$35,446,000	$56,078,000
	Project and construction contingency	$5,300,000	$11,659,000	$12,931,000	$14,203,000	$22,470,000
	Allowance for escalation to project midpoint	$71,084,000	$117,521,000	$130,341,000	$143,161,000	$226,494,000
	TOTAL PROJECT COST	**$182,373,000**	**$362,356,000**	**$401,885,000**	**$441,414,000**	**$698,357,000**
		100%	*199%*	*220%*	*242%*	*383%*

Detailed Findings

Health and Safety Risks and Code Issues

Fire Risks: The Parliament Building

Findings:

Despite significant renovations in the 1970's and 80's, due to its age, construction and configuration, the Parliament Building does not comply with current building codes related to risks arising from fire.

Risks include:

- Smoke and fire spread from floor to floor through the interconnection resulting from the open stairs and the floor opening at the rotunda (no zoning)
- fire spread in individual floor areas
- life safety due to lack of protected exits
- outdated detection systems
- Exits not meeting code requirements (door swings in opposite direction of travel) inadequate landings
- Inadequate quantity and inconvenient locations of barrier free exits for handicapped occupants.

Recommendations:

Upgrades, in keeping with the heritage quality of the building, are proposed to provide an acceptable level of life safety with regard to:

- Ensuring fire separations constructed as per code with all architectural upgrade works (It is noted that although the metal doors down the corridor wings of the building are on magnetic hold open hardware, they are not rated and thus pose an indeterminable risk; new rated doors and separations at these locations are required.)
- Installing automatic sprinkler protection (see also mechanical)
- Rationalized interconnected floors
- Upgrading of fire alarm and detection systems
- Upgrading of guards and handrails
- Providing new exits where possible (location as per plan; east and west wing locations at south stairs)
- Modifying and upgrading existing exit conditions; door swings and landings as per code
- Providing new exits to accommodate barrier free requirements
- Additional barrier free exits where possible.

'Equivalency' Recommendations:

To preserve heritage character, additional solutions have been examined which will provide augmented safety levels that strive for equivalency with Building Code requirements. For example, as an alternative to constructing new exit enclosures it is proposed to subdivide the building into independent smoke / fire zones in conjunction with the provision of 'water curtain' sprinkler protection around unprotected floor openings. As an example, the rotunda openings at the dome and the open stairwells would otherwise require architectural treatment and physical separation that would utterly destroy their wonderful heritage character. A water curtain system could address and mitigate this concern. Other provisions may include:

- Construction of fire separations within floor area
- Upgrading exiting
- Staff training
- Voice communication system
- Construction of additional exterior exits.

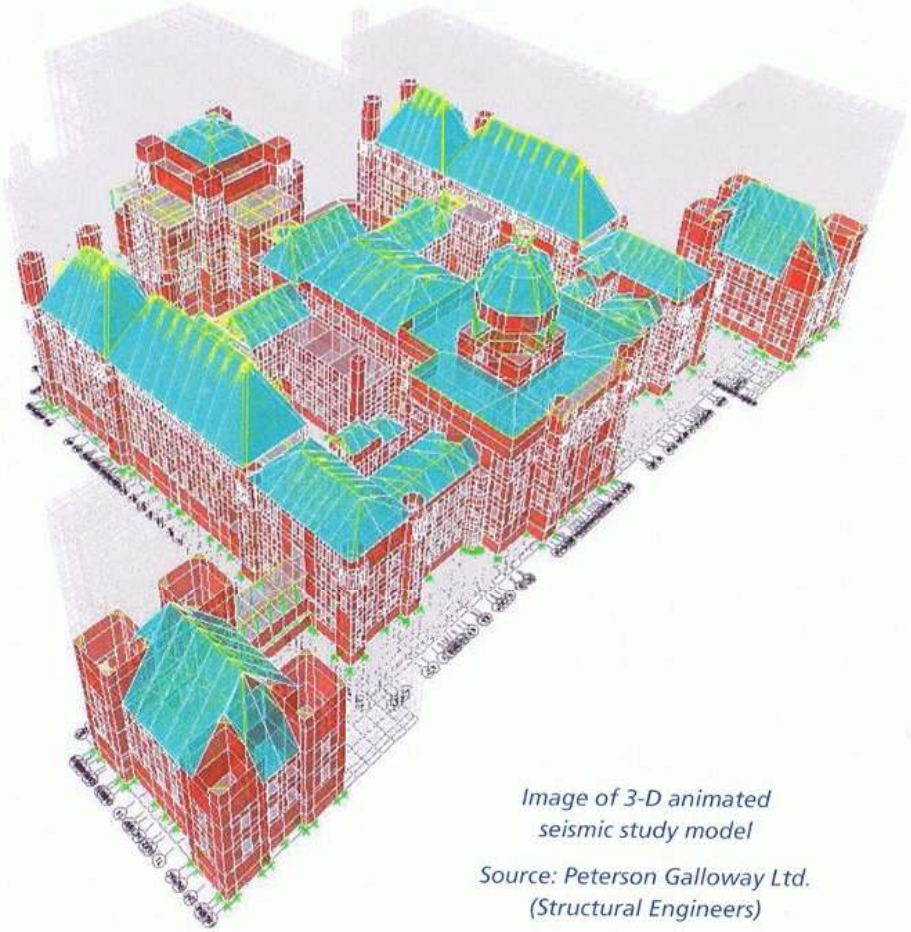
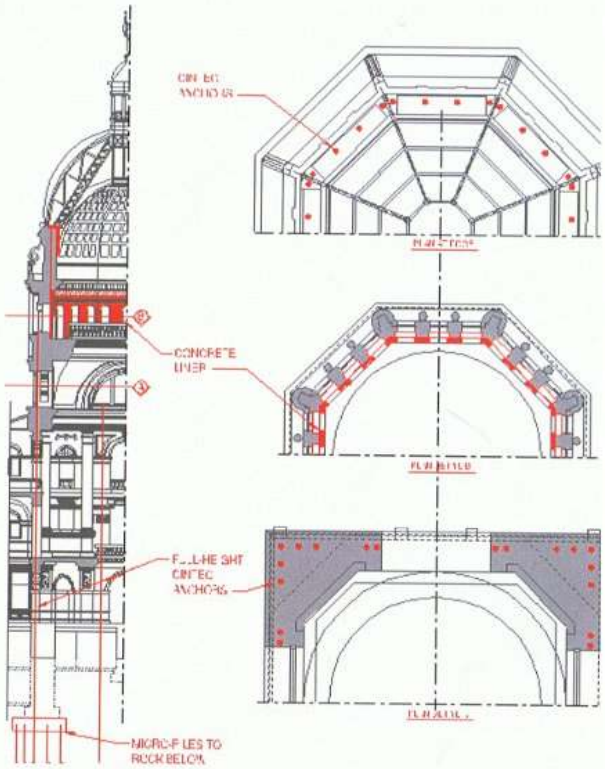
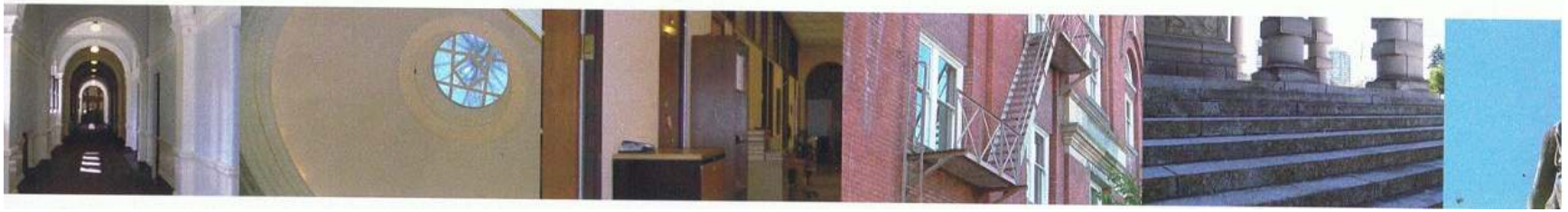


Image of 3-D animated seismic study model

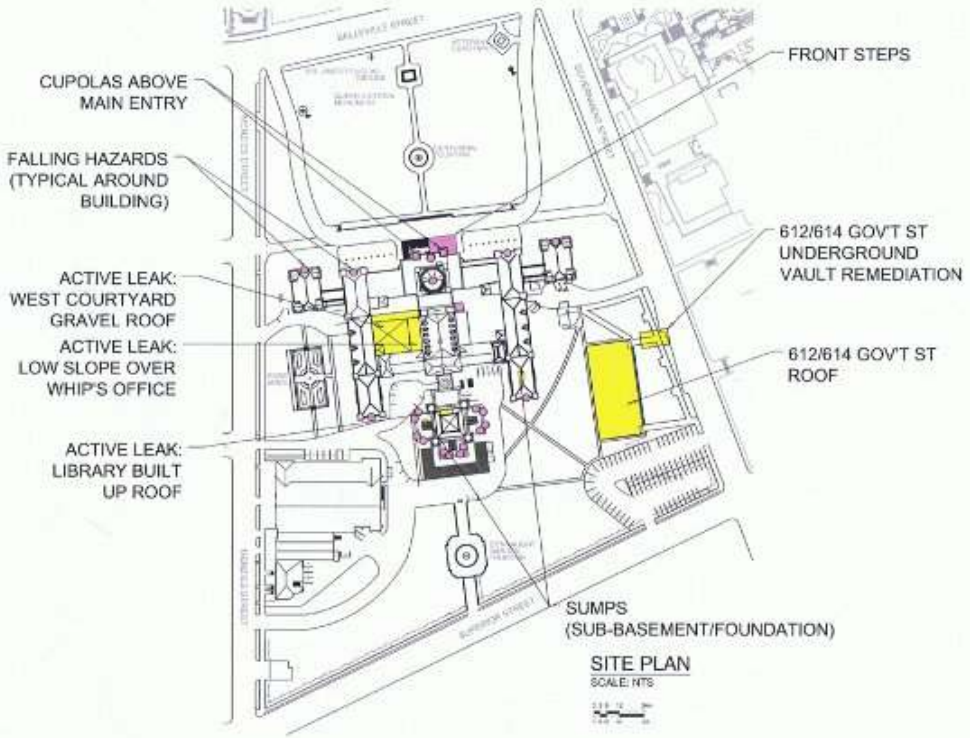
Source: Peterson Galloway Ltd. (Structural Engineers)



Dome Section



Phasing Plans



SCOPE OF WORK – YEAR ONE

YEAR ONE APRIL 2006-MARCH 2007

- *Front Steps (partial only)*
- *Groundwater testing and Sump Installation (x2)*
- *Seismic Hazards:*
  - *statues*
  - *stone balustrades*
  - *cap flashings*
  - *two cupolas above entry*
  - *east courtyard chimney*
- *cap flashings*
- *Active leaks:*
  - *West Courtyard gravel roof*
  - *Low slop over Whip's Office (do not replace copper)*
  - *Library built-up roof*
- *612/614 Government Street roof*
- *Radiator shrouds (throughout interior)*