CITY OF VANCOUVER

COUNCIL REPORT

Report Date: May 5, 2026
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Meeting Date: June 2, 2026
Submit comments to Council

TO: Vancouver City Council

FROM: General Manager of Planning, Urban Design and Sustainability

SUBJECT: Buildings Seismic Risk Reduction Action Plan

Recommendations

THAT Council adopt the Buildings Seismic Risk Reduction Action Plan described within this report and direct staff to report back on its implementation.

Purpose and Executive Summary

Vancouver is located in Canada's most earthquake-prone region, placing it at daily risk of a highly damaging earthquake. In November 2024, staff reported to Council on the significant seismic risk posed by the city's uniquely high concentration of vulnerable existing, private buildings. Staff were directed to meet with interest-holders and to develop a strategy that begins to reduce this critical risk. This report outlines a five-year plan to improve the near-term safety of residents and lay the foundation for a long-term, community-supported approach to risk reduction. This approach has been intentionally tailored to balance the constraints on local government and the community with the pressing need to begin reducing citywide risk.

Ultimately, seismic risk reduction is complex, generational work. As Vancouver developed, the city's seismic risk increased, with nearly 70% of buildings built prior to the introduction of early modern seismic standards (i.e., 1990) and half of all buildings built prior to any seismic standards (i.e., 1973). From work in other cities, we know that effective, sustained action requires a solid foundation built on partnership as well as carefully planned, integrated approaches. In Vancouver, careful action considers not only the ever-present threat of a major earthquake, but also near-term affordability and upgrade costs, as well as the potential for building upgrades to cause displacement. To begin the work of seismic risk reduction, this plan prioritizes actions that support community-guided policy development, encourage private building upgrades, and generate a strong case for senior government action. While this plan will not earthquake-proof Vancouver, it initiates this critical work and positions the City to leverage senior government action to achieve substantial reductions in seismic risk over time.

Council Authority/Previous Decisions

- City of Vancouver Official Development Plan (2026)
- Seismic Risk and Risk Reduction in Existing Privately Owned Buildings (2024)
- Updated Hazard, Risk and Vulnerability Analysis (2024)
- Resilient Vancouver Strategy (2019)

City Manager's Comments

The City Manager concurs with the foregoing recommendations.

Context and Background

Seismic Risk in Vancouver's Existing Private Buildings

Vancouver's considerable seismic risk is primarily driven by the seismic vulnerability of its older buildings stock. The City's 2024 seismic risk assessment shows that a Magnitude 7.2 earthquake occurring in the Georgia Strait–comparable in intensity to the design-level forces new buildings are designed to withstand under the 2025 Vancouver Building Bylaw (VBBL)—would result in over 6,080 buildings damaged beyond repair or requiring extensive repairs. This level of building damage would cause as many as 1,370 severe injuries and fatalities, 365,340 residents, workers, and visitors disrupted or displaced for longer than three months, and over $17B in direct financial losses in Vancouver alone. A report from the Insurance Bureau of Canada indicated that a major earthquake would expand these losses to over $130B in total fiscal impacts province wide. The City's modelling additionally shows that over 65% of citywide risk is concentrated within six neighbourhoods and nearly 80% of seismic risk is driven by five types of buildings: concrete residential and commercial towers, wood apartment buildings, unreinforced masonry residential buildings, and small commercial buildings. Analysis of these findings concluded that higher risk areas were comprised of 70% renters, of which as many as 20% were low income, seniors, and other populations that face the most barriers to recovery from an earthquake. Full modelling results are available in Appendix A.

Seismic Risk Reduction – International Case Studies and Ongoing, Local Work

Governments across the world, including along the west coast of North America, have undertaken varying levels of seismic risk reduction planning and policymaking. New Zealand and the cities of San Francisco, Los Angeles, and Santa Monica require the assessment and retrofit of commonly at-risk building types as part of decades-long programs. San Francisco's success in sustaining its 30-year Earthquake Safety Implementation Program is based on its continuous partnership with community organizations and its local engineering community. While some cities mandate upgrades, others have enacted voluntary retrofit programs and public at-risk building inventories to drive action. Last year, an inventory of at-risk concrete buildings supported the development of a voluntary retrofit program in San Francisco. Seattle, Everett, and Tacoma have developed public inventories of unreinforced masonry buildings to establish their work on buildings seismic risk reduction. These examples underscore the importance of public risk awareness, clear and achievable risk reduction planning, and taking multiple, concurrent approaches. They illustrate that collaborative policy development and an explicit, long-term commitment from government are needed to for seismic risk to be broadly reduced.

In BC, existing, private building seismic risk reduction has largely been confined to local risk assessments and provincial technical tools, apart from the City of Victoria's use of a tax incentive program to incent the upgrade of historic, downtown buildings. Leveraging a simplified vulnerability assessment and upgrade design tool, many public schools have been replaced or

upgraded through the BC Schools Seismic Mitigation Program. This tool has been used to assess non-school buildings in Vancouver and can be helpful as we implement this plan. Additionally, both the Province and the City have adopted the National Building Code 2020 into their building codes within the last two years, introducing advanced considerations of seismic design and performance into building design and construction.

To drive risk reduction in buildings, the City currently relies on retrofits triggered by significant renovations (i.e., VBBL Part 11) and the replacement of buildings through redevelopment. Beyond private buildings, the City has several ongoing programs that address earthquake risk, response, and recovery. The City's Real Estate and Facilities Management and Engineering Departments maintain ongoing capital improvement and asset upgrade programs to manage the seismic vulnerabilities in City-owned buildings, bridges, and pipes. Additionally, the Vancouver Emergency Management Agency advances City response plans and community preparedness programs while working with the Department of Development, Buildings and Licencing to develop the City's capacity to rapidly assess building damage following a damaging earthquake.

Engagement Learnings

To develop this action plan, staff engaged a broad cohort of impacted community groups and industry association representatives throughout the fall of 2025 into early 2026. Staff found deep interest in seismic risk and general support for government-led seismic risk reduction. The City's engagement at the early stage of action planning and collaborative approach was appreciated by participants and established the foundation for this plan's recommendation to form a technical working group to guide City action. To improve the feasibility of building upgrades, interest holders emphasized the need to phase building upgrades, clarify tenant protections, and revise the City's current seismic upgrade requirements triggered by larger renovation projects (e.g., VBBL, Part 11). Additionally, building owners and operators indicated that achieving significant building upgrades will require new or expanded financial tools, meaningful incentives, and direct funding support, as well as clear, practical guidance on building upgrade approaches. For more details from engagement, see Appendix B.

Building Seismic Risk Reduction Action Plan

The following action plan sets out a five-year, seven-action policy and program development path that begins the critical work of seismic risk reduction in buildings. Actions that effectively leverage City government tools to build partnership, increase risk awareness, and create incremental and cost-effective paths to building upgrades or replacements were prioritized. This plan also lays the foundation for a lasting, community-based mandate to protect public safety and ensure recovery from major earthquakes. It does not contain every potential action that reduces risk, nor does it contain mandated seismic retrofits. Additionally, the city's stock of older residential and commercial buildings face many challenges, including affordability pressures, overheating, and maintenance issues common to older buildings. Seismic risk is one pressure amongst many. Ultimately, to achieve deep levels of seismic risk reduction, as well as broader resilience in the city's buildings, this plan's set of initial actions will require additional tools and action from senior government.

1. Establish a Seismic Risk Reduction Technical Working Group

Seismic risk reduction is complex, challenging, and long-term work, requiring not only technical solutions but a collective approach built on lasting partnership and trust. As the first action taken to implement this plan, staff will establish a technical working group of interest holder and industry group representatives, community members, and seismic engineering

experts to guide staff in the development of plan actions into policies and programs. This group will meet regularly throughout the implementation of this plan, ensuring that policies and programs are practical, timely, and responsive to changes and needs as they arise. Experience from other cities shows that this approach not only produces community-supported policies, it also fosters the trust needed to maintain lasting action on seismic risk reduction.

2. Develop an inventory of at-risk buildings through seismic screening

The City's risk assessment provides a comprehensive understanding of Vancouver's seismic risk, at both the building type and neighbourhood-scale. This information has supported the development of this action plan, but its usability is limited. Each building within the model is considered as a generalized type (see Appendix A), requiring on-site exterior screening and a building record review to determine its individual seismic risk rating. The proposed at-risk building inventory would be comprised of ratings for each building. A public inventory would sharpen our understanding of risk, improve policy and program development, and allow for more targeted funding asks to senior government. Critically, the inventory would advance public awareness, thereby facilitating lasting support for risk reduction. Public inventories of at-risk buildings are currently in use in cities throughout the world. Seattle's public inventory of unreinforced masonry buildings is being used to guide their efforts to reduce risk, while community and government-led inventory efforts in Everett and Tacoma, Washington are underway. San Francisco and New Zealand both use inventories to support policy development and retrofit programs. Subject to approval of this report, staff will work with the technical working group and draw on best practices elsewhere to determine how best to develop and communicate such an inventory.

3. Develop a voluntary seismic retrofit program that supports incremental upgrades and promotes action

To complement the at-risk building inventory and its findings, building owners need achievable pathways to reduce the risk in their building. While building retrofits are currently possible, engagement showed that upgrades are largely regarded as all-or-nothing, all-at-once projects that are difficult to fund and undertake. To reduce this challenge, staff will leverage the expertise of the technical working group to develop costed standards that pair common building maintenance and improvements with incremental seismic upgrades. Taking an approach that shows owners how to integrate smaller upgrades or components of a larger upgrade into their long-term capital planning prioritizes incremental improvement, lowers the cost barrier, and fosters closer City-owner partnership on risk reduction. Voluntary retrofit programs in other cities, such as Berkeley, where the public was aware of the specific risks within buildings, have generated significant uptake. These programs are often the foundation for lasting seismic risk reduction programs. Pilot projects, incentives, and public awareness are critical to the success of this program and are considered in the following tasks:

- ***(a) Develop a building seismic retrofit pilot program***
  A pilot program can be used to demonstrate the viability and benefits of voluntary seismic upgrades while delivering direct risk reduction outcomes. City investment in the program will focus on civic facility pilots, encouraging broader private sector upgrades and attracting senior government action. Additionally, as projects are undertaken, learnings from pilots will guide updates and improvements to the voluntary seismic retrofit program. Staff will develop a detailed proposed structure for this program, with a focus on coordinating with other programs to avoid duplication and to leverage existing funding where possible.

- ***(b) Develop incentives to accelerate building upgrades***
  Incenting upgrades through removing barriers and providing meaningful financial tools can significantly increase voluntary upgrades. In San Francisco, regulatory relaxations that allowed for additional residential units in existing buildings aided the viability of mandated retrofits there. Numerous cities, including Seattle, are exploring or have implemented permit processing priority and fee waivers, rebates, transfer of development rights, and property tax or transfer tax waivers, and other approaches to help finance retrofits. As the landscape of available incentives continues to shift, staff will explore opportunities with the technical working group that prioritize high-risk buildings.

- ***(c) Support City risk communication work to include more information on building seismic risk and risk reduction***
  Awareness of Vancouver's significant seismic risk in its buildings is growing. Broadening that awareness to include individual building risk and the potential of reducing that risk will promote voluntary building upgrades and broader risk reduction action. The Vancouver Emergency Management Agency (VEMA) has regular community engagement programs and campaigns each year, with information on buildings seismic risk. As programs and policies within the program are developed, staff will expand the City's current messages and programs to include more detailed information for residents.

4. Explore redevelopment as a risk reduction approach

Many neighbourhoods in Vancouver are actively undergoing change and redevelopment, where each building replaced with a new building achieves a reduction in seismic risk. Currently, nearly 60% of buildings of a risk-driving building type (See Appendix A) are within areas where policy allows for additional height and density as part of redevelopment. Many sites, however, are still constrained by market conditions and restrictions on development. Integrating risk assessment and inventory findings into the City's land use planning tools can carefully promote redevelopment on some sites, to enable new, safer buildings to be built. Given the potential for renter and small-business displacement from redevelopment, however, redevelopment-based risk reduction will require prioritising affordability and protections for tenants in seismically at-risk buildings.

5. Identify building regulatory refinements that advance risk reduction and improve new building seismic performance

Through engagement, staff have identified the following four strategic points within our current building regulation where refinements would advance risk reduction, improve the seismic performance of new buildings, and increase the effectiveness of other plan actions:

- ***(a) Identify and advance refinements to VBBL-triggered seismic upgrades***
  Triggered building upgrades has been a feature of the VBBL since 1973, requiring seismic improvements at the time of significant building renovations. Despite advancements to this policy, many building owners and operators identified the ambiguity and intensity of the City's triggered upgrade process (i.e., VBBL, Part 11) as a significant challenge during engagement. The VBBL 2025 sought to address these concerns, and staff will build on this work by using at-risk building inventory data, upgrade standards from the voluntary retrofit program, and engagement with the technical working group to identify approaches that result in quicker, more feasible renovation projects and more seismically improved buildings. Many cities

rely on triggered upgrades to improve their building stocks over time. As part of San Francisco's work on concrete structures, the government there is considering expanding triggers to require seismic evaluations for more buildings and at the time of sale or lease, focusing required upgrades largely on collapse-prone buildings. In Vancouver, inventory data and upgrade standards from the voluntary retrofit program could support more targeted engagement with building owners regarding long-term upgrade planning. Part 11 refinements also present an opportunity to consider the City's current approaches to reducing risk from non-structural elements and masonry chimneys. Another possibility is to include buildings that have undergone collapse-prevention upgrades within DBL's existing Tenant Improvement Program (TIPs), which expedites permitting for minor interior renovation projects in qualified buildings. Staff will consider these approaches and others that emerge through the technical working group.

- ***(b) Improve City building records keeping to directly track seismic risk and building upgrades***
  The City's record-keeping system currently does not track the seismic risk status and seismic improvement history of buildings, as there is no dedicated field or flag for this information within the current system. If added, this tracking would enable comprehensive engagements with building owners and provide staff with an easily accessible location to identify, record, and track inventory results, voluntary upgrade opportunities, and long-term upgrade plans. Staff will explore adding this capacity within the City's current system.

- ***(c) Integrate the City's Official Development Plan seismic hazard map into City building records***
  The City currently tracks building sites in liquefaction-susceptible areas, allowing staff to engage with project proponents about the seismic hazards on their site. Staff will update this tracking to include findings from the Official Development Plan's seismic hazard map. This will increase the ability of project proponents to improve building design early on, increasing the feasibility of acting to reduce site risks.

- ***(d) Partner with industry to identify opportunities to advance repairability and functional recovery within new building design***
  Buildings constructed under the VBBL are required to protect the life safety of building occupants during a code-level earthquake. This approach does not explicitly consider the repairability of the building nor the return of its functionality, potentially causing many new buildings to require extensive repairs or replacement following an earthquake. This would lead to significant resident and business displacement. Work in the United States and New Zealand is addressing this gap by advancing functional recovery design standards within new code development, targeting improved performance at lower intensity earthquakes. Staff will work directly with the technical working group and senior government to identify opportunities and to develop a long-term strategy that advances feasible and cost-effective approaches to enhancing the recoverability of new buildings, while recognizing the importance of housing affordability.

6. Identify and reduce the impacts of seismic risk and building upgrades on disproportionately impacted populations

Technical standards and owner-focused programs and policies are essential to advancing effective near and long-term risk reduction, but equal attention must be given to the

residents and small businesses within high-risk buildings. Analysis showed that many of the city's residents who are least able to recover from an earthquake often live in the city's most at-risk neighbourhoods and buildings, including many of the city's densest apartment areas and single room occupancy buildings (SROs). Many of these residents, as well as the small businesses within their communities, face additional and disproportionate barriers to manage the impacts of extensive, potentially displacement-inducing upgrades and redevelopment. The following actions focus on identifying and reducing the impacts of both seismic risk and building upgrades on disproportionately impacted populations and small businesses:

- ***(a) Identify opportunities to reduce the impacts of seismic upgrades on renters and small businesses***
  While interest holder input carefully guided the development of this plan, deeper consideration for renter impacts and the development of upgrade approaches that minimized tenant displacement were flagged as ongoing concerns. Staff will evaluate the specific impacts of building upgrades to renters and community-serving small businesses, to identify specific support measures and other approaches needed to reduce those impacts. Results of this evaluation and specific recommendations will be reported back to Council as part of the implementation of this plan.

- ***(b) Support the implementation of the SRO Revitalization Framework***
  Nearly all SROs were built fifty years prior to the introduction of seismic design into the VBBL, making them amongst the most critically at-risk buildings in Vancouver. SROs are increasingly experiencing building failures leading to poor liveability, displacement of tenants, and the even demolition of buildings from fires and other demolition orders. These buildings house residents disproportionately facing barriers to earthquake recovery and for whom housing and rehousing is amongst the most challenging in the city. Staff will use at-risk building inventory findings and seismic risk assessment data to support the ongoing implementation of the Council-approved SRO Revitalization Framework. In partnership with senior government, this framework is focused on accelerating SRO replacement through delivering new supportive and shelter rate social housing units, while securing and improving existing SROs through safety and operability-focused upgrades

7. ***Develop approaches that accelerate post-earthquake building re-occupancy and citywide recovery***

Reducing Vancouver's significant seismic risk will take time and seismic risk can never be altogether eliminated. Holistic seismic risk reduction planning requires looking beyond building upgrades and replacements to support a quick and complete recovery. The following actions aide post-earthquake recovery:

- ***(a) Develop post-earthquake building re-occupancy and repair standards, balancing building safety and a quick recovery***
  DBL and VEMA have partnered to train staff and improve the City's approach to post-earthquake rapid damage assessment (RDA). RDA advances a critical first step taken after an earthquake, quickly assessing and rating the safety of buildings. These assessments are followed by more detailed engineering reviews, repairs if needed, and re-occupancy when safe. Staff will build on and support this work, using at-risk building inventory data to guide quick post-earthquake assessments and to create detailed post-earthquake re-occupancy and repair standards. These standards will balance the need for safe buildings following a damaging earthquake

with the imperative to reoccupy home and businesses quickly. In California, post-earthquake repair standards have been developed, setting standards for buildings requiring repairs following an earthquake. In instances where a building is disproportionately damaged—experiencing a high level of damage from a relatively low-intensity earthquake—the required upgrade is greater.

- ***(b) Support ongoing earthquake response and recovery planning using at-risk building inventory and seismic risk assessment findings***
  The City is continually advancing its plans for post-earthquake response and recovery, including those focused on debris clearance, infrastructure and building evaluation, repair, and demolition, and other post-earthquake work to restore services and communities. Staff will support this planning work by leveraging seismic risk assessment and at-risk building inventory data to identify concentrations of building damage, areas at risk for post-earthquake cordoning, and concentrations of residential displacement. These studies will provide details to guide planning, with the goal of shortening response time and advancing more rapid recovery.

- ***(c) Explore and support measures that reduce the risk of fire following earthquakes***
  A 2020 report from the Institute for Catastrophic Loss Reduction showed that Vancouver is at significant risk of fires caused by earthquake-induced building failure. In many cities the impact of fires following earthquakes has been significant. While the City has a highly advanced Dedicated Fire Protection System that provides a secondary water source for post-earthquake firefighting, there are two recommended building-related actions the City can take to further reduce the risk of fires. The first is to support FortisBC's ongoing work to install building and neighbourhood-scale earthquake and failure-sensitive gas shutoff valves, to ensure their program reaches all high-risk areas and risk-driving building types. Second, staff will explore the potential of secondary water tanks in new and existing large downtown buildings, to increase the availability of post-earthquake firefighting water on site.

- ***(d) Support REFMs work to upgrade and replace at-risk civic facilities***
  Beginning in 2011, the City's Real Estate, Environment, and Facilities Management (REFM) department conducted seismic risk screenings of City-owned buildings. These screenings led to several detailed assessments, as well as the demolition of the City Hall's East Wing, and significant upgrades of Fire Hall #12 and the West Annex as part of the City's ongoing capital spending. These facilities, and many of the City's portfolio of nearly 700 buildings, play essential roles in post-earthquake response and citywide recovery, especially in neighbourhoods with high concentrations of damaged buildings. Currently, staff are working to update REFM's process of identifying upgrade and replacement priorities. This process includes identifying opportunities to advance seismic improvements in a broader set of projects. Staff will use at-risk building inventory data and the work to develop incremental building upgrade standards within the voluntary retrofit program to support this work.

Financial Implications

There are no financial requests being made as part of this report. Any funding needs will be brought forward through the regular budgeting and capital plan processes.

Legal Implications

There are no legal implications associated with this report's recommendations.

Conclusions

The risk of fatalities, long-term displacement, and economic losses from a major earthquake threatens the safety of Vancouver residents and jeopardizes the city's ability to recover. Ultimately, protecting the lives and safety of residents requires eliminating catastrophic building collapses, and the city's recovery depends on widespread building upgrades and replacements. Reducing risk is challenging, and careful governance requires balancing many priorities and working within the constraints of local government. Seismic resilience for Vancouver requires a clear plan, strong risk awareness alongside close partnership with the community, and coordinated prioritization and investment across all levels of government. This five-year plan begins this critical work.

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Council date November 12, 2024

APPENDIX A

Seismic Risk in Vancouver, Canada's Existing Buildings

A Seismic Risk Assessment of Existing Privately Owned Buildings

Prepared by

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CITY OF VANCOUVER

This report provides a detailed seismic risk assessment of the approximately 90,000 existing privately-owned buildings within the municipal boundaries of the City of Vancouver, British Columbia, Canada.

Report Objective

This risk assessment supports the City of Vancouver's (the City) ***Seismic Risk Reduction in Existing, Privately Owned Buildings*** program, a multi-year staff effort to identify, evaluate, and engage stakeholders on seismic risk reduction actions for at-risk, existing, privately buildings. This work is connected to the City's 2019 Resilient Vancouver Strategy, which calls for the completion of a seismic risk assessment, as a first step to engage stakeholders regarding seismic risk reduction. This first step is foundational to the City's resilience objective of improving building performance to protect lives, decrease displacement, and accelerate recovery following an earthquake[i]. Additionally, this study expands upon the City's 2024 Hazard, Risk, and Vulnerability Analysis (HRVA).[ii] This report also directly supports the British Columbia Emergency and Disaster Management Act directive to create comprehensive emergency management plans that respond to HRVA risks and to include mitigation, preparedness, and recovery plans and actions.[iii] More broadly, this quantitative assessment is a critical first step toward implementation of a core goal of the United Nations Sendai Framework for Disaster Risk Reduction 2015-2030: to understand and reduce community disaster risk[iv].

Risk Assessment Details

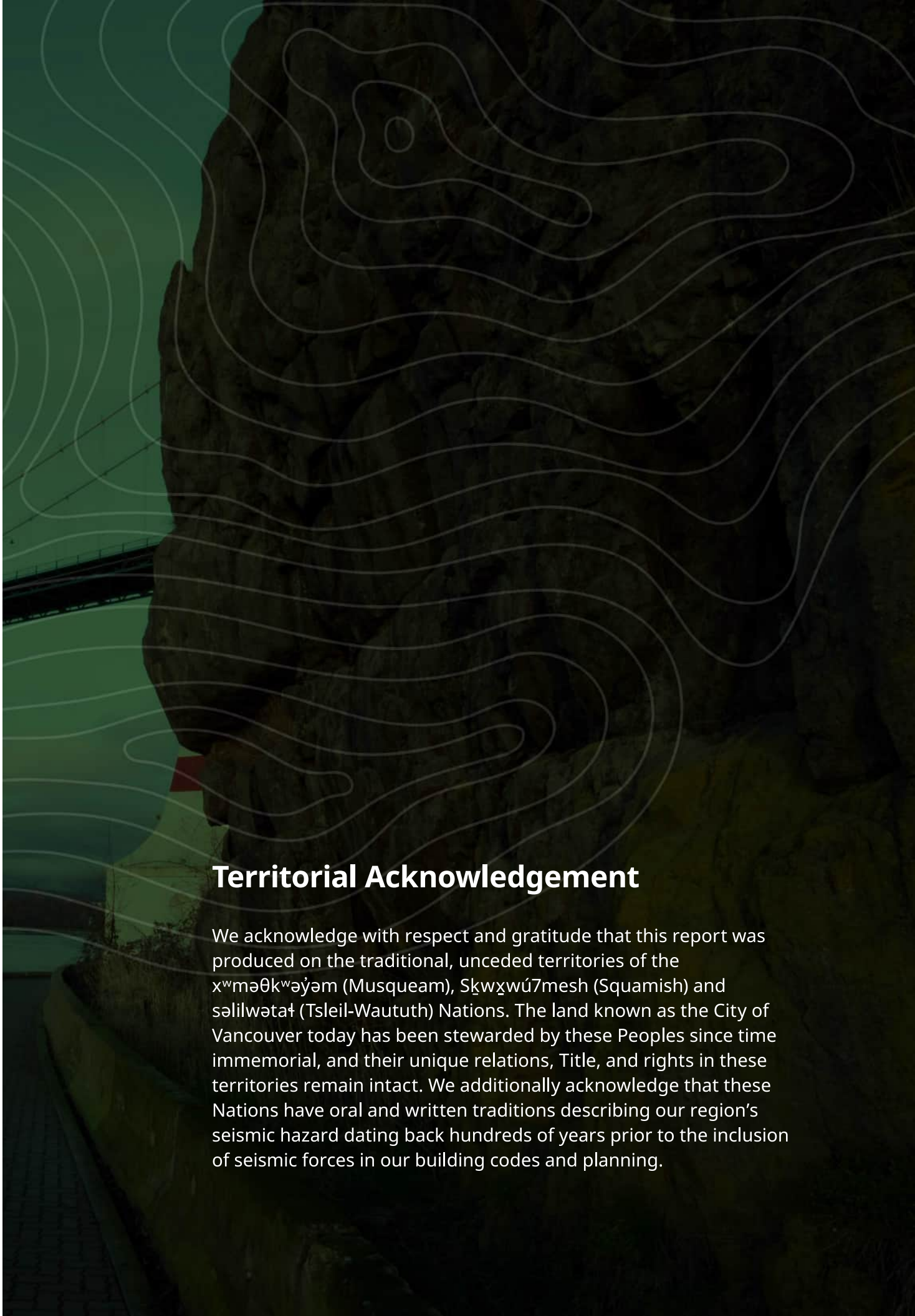
This risk assessment reflects an ongoing partnership between the Geological Survey of Canada within Natural Resources Canada the Department of Civil Engineering at the University of British Columbia, and the City. Following a brief description of seismic risk reduction planning at the City and the technical details of this assessment's seismic risk modelling, this report examines seismic risk in Vancouver's existing buildings in terms of both risk-driving building types (Section 5) and the at-risk neighbourhoods (Section 6) in which they are located. Finally, building on the analysis within this risk assessment, this report concludes (Section 7) by considering the potential for seismic risk reduction and seismic resilience in Vancouver.

This report additionally incorporates early findings from an ongoing study with Ausenco Engineering Canada ULC, bringing together 19 local and international earthquake engineering experts to assess the specific vulnerabilities of six key building types in Vancouver. The Ausenco Supporting Analysis for Seismic Risk Reduction Planning study (the Ausenco Study) assesses and illustrates the potential for upgrades in these building types and includes estimates for the costs of upgrades as well as the associated occupant impacts.[v] This study is expected to be finalized in 2025.

Limitations

Citywide risk modelling findings within this report describe risk from all existing buildings, including Vancouver School Board facilities and City owned and operated buildings. However, the policy effort driving this risk assessment is focused on reducing the risk contributed by existing privately owned buildings alone, at points narrowing this assessment's consideration by prioritising private building contributions to Vancouver's seismic risk.

Additionally, this assessment focuses on building damage from ground shaking from three earthquake planning scenarios, to understand the impacts to building occupants, Vancouver's neighbourhoods, and the city. As such, it does not include assessments of the impacts of infrastructure failure, delayed emergency response and recovery, business interruption, surge pricing, aftershocks, liquefaction, landslide, tsunami, or fire following earthquake. Those considerations will add additional levels of risk to the results of this assessment.



Territorial Acknowledgement

We acknowledge with respect and gratitude that this report was produced on the traditional, unceded territories of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish) and səlilwətaɬ (Tsleil-Waututh) Nations. The land known as the City of Vancouver today has been stewarded by these Peoples since time immemorial, and their unique relations, Title, and rights in these territories remain intact. We additionally acknowledge that these Nations have oral and written traditions describing our region's seismic hazard dating back hundreds of years prior to the inclusion of seismic forces in our building codes and planning.

Executive Summary

Vancouver is located in Canada's most earthquake-prone region, placing it at daily risk from a highly damaging earthquake. While it is not possible to predict the exact timing or magnitude of the earthquake Vancouver will ultimately experience, Natural Resources Canada (NRCan) estimates there to be a one-in-five chance of a very strong earthquake in the next fifty years.[vi] Following direction from the City of Vancouver's (the City) Resilient Vancouver Strategy, staff are working to develop potential actions to reduce the risks faced from heavy earthquake damage to Vancouver's existing, privately owned buildings. In support of that work, the City partnered with NRCan and the University of British Columbia to develop a comprehensive seismic risk assessment. This assessment, documented in this report, provides clear direction on which privately owned building types are most at risk and where they are found throughout Vancouver.

Modelling shows that a highly damaging, magnitude (M) 7.2 Georgia Strait planning scenario earthquake could result in nearly 6,100 heavily damaged buildings, as many as 1,350 severe injuries and fatalities, the disruption and displacement of over one-third of residents and workers for more than three months, and over $17B in direct financial losses. Even a less intense earthquake, like the one used in the City's 2019 VanSlam earthquake exercise, could leave as many as 25,000 residents and workers disrupted and displaced for more than three months and cause as many as 200 severe injuries and fatalities. This assessment further shows that a set of five building types, described in Table E-1, drive nearly 80% of citywide risk, in terms of both daytime and nighttime (residential) severe injuries and fatalities (casualties) and daytime and nighttime disruption and displacement lasting longer than three months (long-term).

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Table E-1: Risk-Driving Building Types, based on M7.2 Georgia Strait Planning Scenario Earthquake

Building Type	Risk Assessment Findings
Concrete mid- and high-rise multiunit residential buildings (MURBs)	• Concentrated in the West End and Downtown, containing many strata and 30% of purpose-built rental units. Nearly 50% were constructed prior to 1990. • Highest contributor to risk of residential casualties, driving nearly 40% (230) of modelled total. • Drive nearly 40% (85,200) of modelled long-term residential disruption and displacement. • Some buildings, particularly those built prior to 1990, are at risk for partial or complete collapse, and many older and some newer buildings are expected to be badly damaged, requiring replacement.
Unreinforced masonry (URM) MURBs	• Older brick residential buildings, concentrated in the Downtown Eastside and Gastown. Many single room occupancy (SRO) buildings are URM MURBs. • Drive nearly 30% (180) of modelled residential casualties. • Drive 10% (23,800) of modelled long-term residential disruption and displacement. • Very prone to partial or complete collapse, with additional severe impacts to sidewalk occupants and streets from falling debris.
Wood-framed MURBs	• Older wood apartment buildings, concentrated in the West End, Kitsilano, Fairview, and Mount Pleasant, containing 40% of the city's purpose-built rental units. 50% were constructed prior to 1973. • Highest contributor to risk of residential disruption and displacement, driving 45% (103,900) of modelled residential disruption and displacement. • Drive 20% (125) of modelled residential casualties. • Many buildings are expected to be uninhabitable or not repairable following an earthquake.
URM, wood, and low-rise concrete commercial buildings	• Contain nearly all small businesses, located along neighbourhood commercial corridors and arterials, and throughout Downtown. Over 70% were constructed prior to 1973. • Drive nearly 30% (380) of modelled daytime casualties. • Drive nearly 25% (85,900) modelled daytime long-term disruption and displacement. • One in three buildings are modelled to be heavily damaged, with additional severe impacts from falling debris to sidewalk occupants and emergency response.
Concrete mid- and high-rise commercial buildings	• Concentrated in Downtown and along Broadway, containing many of the city and province's major employers. Over 70% were constructed prior to 1990. • Drive 8% (110) of modelled daytime casualties. • Drive 8% (28,400) of modelled daytime long-term disruption and displacement. • Some buildings of this type, particularly those built prior to 1990, are at risk for partial or complete collapse, and many older and some newer buildings are expected to be badly damaged, requiring replacement.

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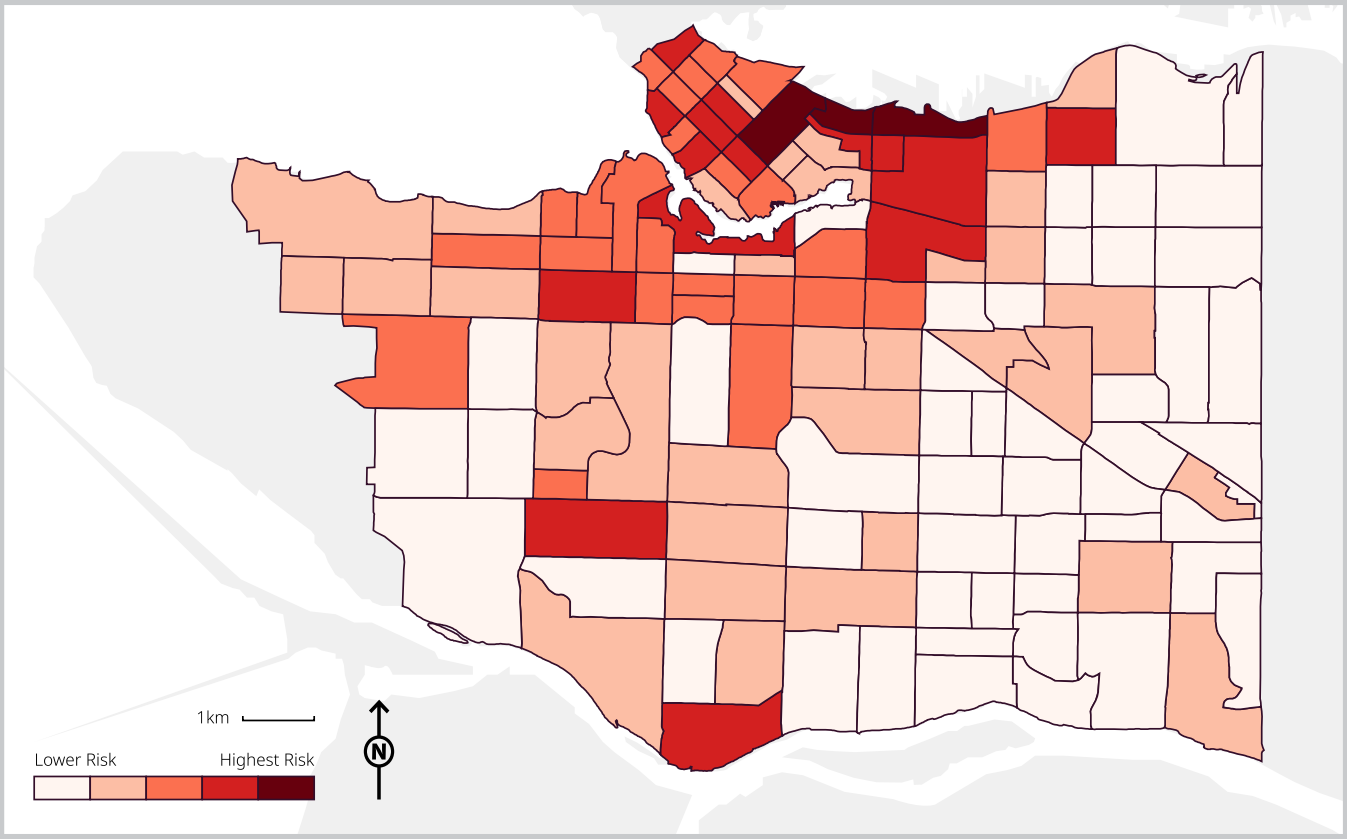
Critically, these risk-driving building types contain the majority of the city's total housing units, including 80% of purpose-built rental units, as well as downtown offices and neighbourhood-serving small businesses. Within these five types, not all buildings are equally at risk. We know from modelling and engineering expertise that buildings built prior to early modern seismic design requirements (1990) and, even more critically, buildings built prior to the introduction of seismic design requirements (1973) are at the highest risk of heavy damage resulting in casualties and long-term occupant disruption and displacement. This finding is concerning as existing older purpose-built rental buildings provide relatively affordable housing options in the private market due to their age and longer tenancies. A recent Canada Mortgage and Housing Corporation survey recently found that average rents in Vancouver for units built pre-1960 are approximately 35% less than rents for units built from 2015 onwards.

A limited number of neighbourhoods in Vancouver contribute the bulk of citywide seismic risk. Figure E-1 below illustrates the distribution of risk throughout the city, showing the relative risk amongst Census tracts as the average contribution of each tract to daytime and nighttime casualties and long-term disruption and displacement. The highest concentration of risk is found in the West End, the Downtown Eastside (including Chinatown, Strathcona), Downtown, Kitsilano, Fairview, and Mount Pleasant. These six highest-risk neighbourhoods collectively contribute an average of 65% of citywide seismic risk while containing the city and region's two largest employment districts and over two-thirds of purpose-built market rental units in the city's densest residential neighbourhoods.

Figure E-1: Relative Seismic Risk, M7.2 Georgia Strait Earthquake, by Census Tract



Relative seismic risk mapping is based on the outputs of the OpenQuake earthquake modelling engine and does not include the contribution of infrastructure failure, delayed emergency response and recovery, aftershocks, fire following earthquake, tsunami, landslides, or liquefaction (See section 3.1.6).

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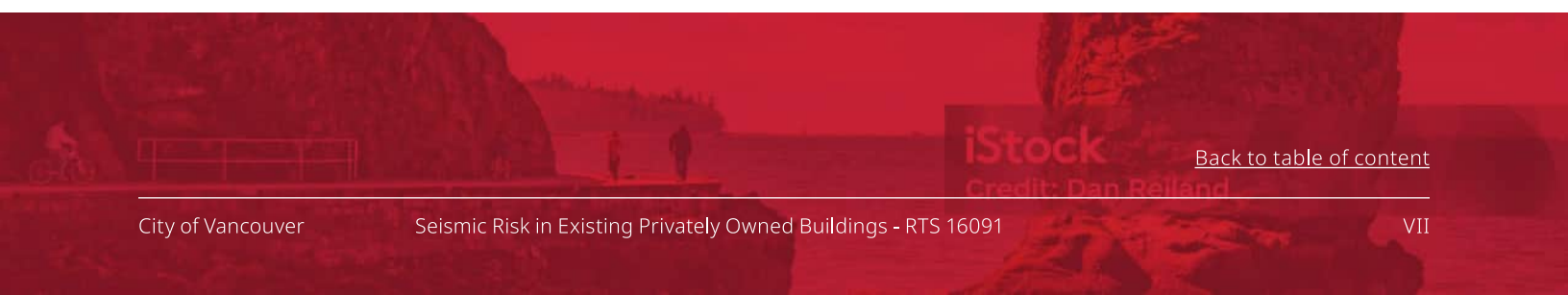
Analysis of Census data from moderate- to highest-risk tracts within these neighbourhoods indicates that, on average, nearly 70% of the population are renters. Among these renters, nearly 20% are low-income, over 10% are seniors, 30% identify as visible minorities, and 4% are Indigenous Peoples. These groups may face additional challenges and structural barriers in preparing their households and recovering from an earthquake, exposing them to potentially greater risk than other residents.

From past earthquakes elsewhere, we know that cordoning off areas of the city is often required. Cordoning is where areas with high concentrations of damage are closed to access by the government for weeks, months, or even years at a time. In cordoned areas are unsafe for any movement, with damaged buildings impacting the safety of undamaged buildings. Areas like the West End, containing many older mid- and high-rise concrete multiunit residential buildings, and the Downtown Eastside, containing many unreinforced masonry (URM) MURBs, are particularly at risk for cordoning. Cordoning preserves life safety during earthquake response but extends the duration and difficulty of recovery, increasing long-term social and economic impacts.

Commercial high streets and arterials throughout the city, containing many unreinforced masonry, wood, and low-rise concrete commercial buildings, are also at high risk. These streets, as well as streets throughout the Downtown Eastside and Downtown, have an additional risk of on-street injuries and fatalities from falling building debris. Along many arterials, such as Hastings Street, Kingsway, and others, on-street debris is likely to cause emergency response and transportation blockages as well. These blockages both increase the impacts of earthquake damage and, like cordoning, extend the duration and difficulty of recovery, and increase long-term social and economic impacts.

Vancouver's Seismic Resilience – Reducing Risk

The analysis within this report presents a clear picture of the impacts of a large earthquake on Vancouver. The risk of fatalities, long term displacement, and both direct and long-term economic losses threaten Vancouver communities, residents, and businesses. A large earthquake is one of the most significant risks to public safety Vancouver faces, but it is a risk that is well understood following detailed risk assessment and analysis. This assessment, in addition to describing the consequences of a large earthquake, prioritises several areas of the city and several specific types of buildings, allowing careful work to reduce risk to begin. Seismic risk reduction action need not be taken all at once. It can start with small, strategic actions in a limited number of highest-risk buildings and in a limited set of at-risk areas of the city. Small actions that quickly build on existing City policies and programs have the added advantage of promoting awareness and positioning the City well to pursue additional provincial and federal government funding and tools in support of further, more challenging risk reduction action. The sooner Vancouver begins to take action to reduce risk, even if initially modest, the less challenging it will be to protect residents and ensure recovery in the long term.



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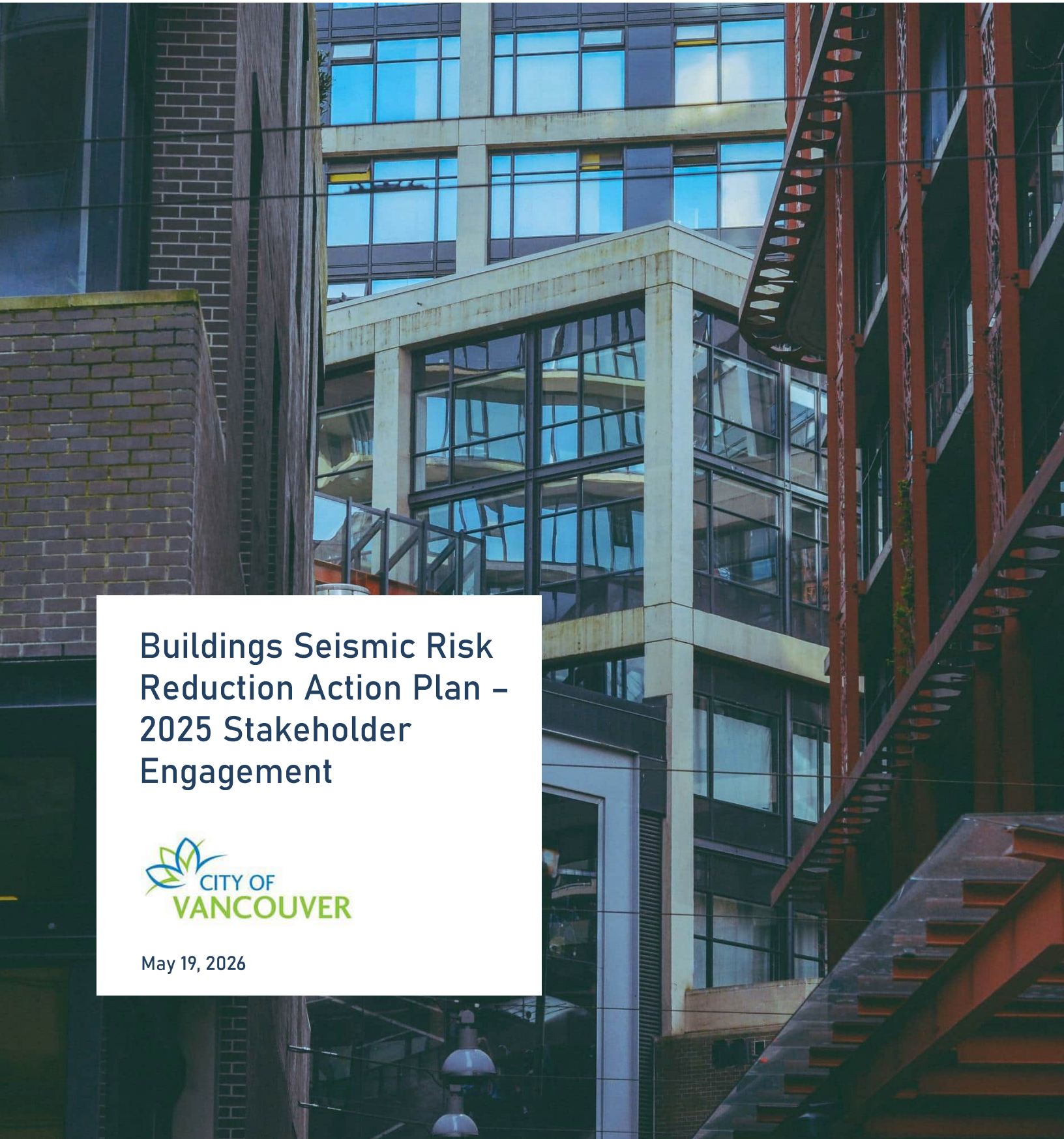

Buildings Seismic Risk Reduction Action Plan – 2025 Stakeholder Engagement

CITY OF VANCOUVER

May 19, 2026

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Prism Engineering is a consulting firm committed to helping organizations achieve energy, climate, and asset renewal objectives by integrating engineering, energy management, and sustainability services.

1. Executive Summary

Vancouver is in Canada's most earthquake-prone region, placing it at ongoing risk from a highly damaging earthquake. Following direction from the Resilient Vancouver Strategy and informed by the City's updated Hazard, Risk, and Vulnerability Analysis (HRVA), which identifies earthquakes as one of Vancouver's most significant risks, City staff have been working to better understand seismic vulnerabilities in existing privately owned buildings and explore options to reduce risk over time.

In November 2024, Vancouver City Council received the Seismic Risk and Risk Reduction in Existing Privately Owned Buildings report and directed staff to engage key stakeholders on seismic risk and potential risk-reduction actions, and return to Council in 2025 with a seismic risk reduction strategy. This direction included engaging existing building owners, operators, tenants, technical experts, and other partners on potential near- to mid-term actions the City can take to begin reducing seismic risk.

The 2024 Council report highlights that a major earthquake could result in nearly 6,100 heavily damaged buildings, over 1,350 severe injuries and fatalities, and long-term displacement affecting over one-third of residents and workers, alongside more than $17 billion in direct financial losses. The report also identifies that five privately owned building types account for nearly 80% of citywide seismic risk and that risk is highly concentrated within six neighbourhoods with high proportions of renters, seniors, low-income households, visible minorities, and Indigenous residents. These populations may face additional challenges in preparing for and recovering from a major earthquake.

In response, City staff developed a draft five-year Buildings Seismic Risk Reduction Action Plan to conduct targeted engagement aimed at gathering input on the feasibility, impacts, opportunities, and supports needed to advance the proposed actions. Engagement sessions were held in fall 2025 with key stakeholder groups, including landlord and property management associations, strata and commercial property representatives, non-market housing operators, a tenant advocacy organization, and technical experts and industry bodies.

Sessions were held by sector (e.g., rental building owners, strata and commercial property representatives, etc.), using approaches co-developed with participants through pre-engagement conversations. Each engagement session included a presentation on Vancouver's seismic risk and the draft plan, as well as time for clarifying questions, facilitated discussion, and live polling to gather structured input on action feasibility, risks, challenges, and supports needed.

While all sessions focused on presenting the City's draft thinking and inviting feedback, the engagement approach evolved over time. As sessions progressed, City staff increasingly inviting participants to consider how they would approach seismic risk reduction if they were leading this work, and how proposed actions connect to day-to-day challenges in their roles and sectors. This shift to a more collaborative, problem-solving format enabled more generative discussions and supported shared exploration of practical solutions that could be advanced together.

Across all engagement activities, participants showed strong interest in seismic risk and broad support for government-led action to reduce risk and improve public safety. Participants expressed appreciation for being engaged early in the policy development process and for the City's open, co-creative, and collaborative approach. This approach helped ground discussions in real-world conditions and supported more constructive dialogue on feasible, phased pathways to risk reduction.

Participants also highlighted key challenges and considerations, including the need for clear and accessible information, concerns about retrofit feasibility and affordability, and the importance of phased, practical approaches that account for the diversity of buildings and operating contexts across Vancouver.

Feedback from this engagement is informing refinements to the draft Seismic Risk Reduction Action Plan, including organizing core and enabling actions into implementable and collaborative approaches. Input has also helped shape communications needs, policy considerations, and opportunities for ongoing collaboration with partners. A central recommendation from engagement is to establish a committee to advise the City actions are developed into policies and programs.

A summary of key themes and how feedback will inform next steps (“You said/We did”) is included at the end of this report. City staff will bring a refined Seismic Risk Reduction Action Plan to Council in May 2026.

2. Introduction

2.1 Project Context and Background

Vancouver is in a region with significant seismic hazards, including the potential for large subduction zone earthquakes and nearby, highly damaging shallow crustal earthquakes. More than half of the city's approximately 90,000 existing buildings were constructed before modern seismic codes, leaving them highly vulnerable to extensive damage or collapse during a major earthquake. Recent modelling shows that a major earthquake could result in widespread building damage, long-term disruption and displacement, and serious injury or loss of life. Reducing this risk is a key public safety priority.

In November 2024, Vancouver City Council directed staff to engage stakeholders on potential seismic risk reduction actions and to return to Council with a Buildings Seismic Risk Reduction Action Plan. During that presentation, staff suggested four potential risk reduction action options:

- Developing an at-risk building inventory through seismic screening,
- Co-funding pilot and support programs,
- Exploring land-use planning tools for at-risk building sites, and
- Simplifying and enhancing the Vancouver Building By-law (Part 11).

Through pre-engagement and work with the Seismic Working Group, City staff developed a draft Buildings Seismic Risk Reduction Action Plan. This work refined the initial risk reduction options into a set of four core actions for engagement alongside 10 enabling actions. This draft Action Plan is guided by two overarching goals:

1. To begin reducing seismic risk quickly yet carefully in ways that save lives and supports post-earthquake recovery, and
2. To establish a long-term, City-led approach to seismic risk reduction in existing buildings.

Seismic risk reduction exists along a spectrum, from the status quo to more complex and highly impactful actions. The draft Action Plan for 2026-2030 focuses on capacity-building and enabling measures that reduce barriers to seismic upgrades and building replacement, while laying the groundwork for deeper, long-term risk reduction. The core and enabling actions identified are not individual policies or programs, but commitments to advance defined areas of work, including research, technical development, and continued engagement, leading to future policy and program decisions.

Core actions presented to stakeholders included developing an inventory of at-risk buildings, advancing voluntary building upgrade programs, exploring redevelopment as a tool to replace the highest-risk buildings, and advancing a Vancouver-specific approach to recoverable and functional building design.

2.2 About this Report

This report summarizes what the City heard through engagement activities conducted in support of the draft Buildings Seismic Risk Reduction Action Plan. The purpose of this report is to:

- Document who participated and how engagement was conducted
- Summarize the key themes and perspectives shared by participants
- Describe how feedback will inform refinements to the Action Plan

- Support transparent reporting to Council, stakeholders, and the public

The report is organized into five sections: project context, engagement overview, key themes, feedback on specific actions, and next steps.

2.3 Buildings Seismic Risk Reduction Action Plan Overview

Why this Action Plan?

Vancouver's seismic risk is the cumulative result of decades of building and development. Achieving broad, citywide seismic risk reduction is complex, challenging, and costly. Meaningful risk reduction requires careful, sustained action over time.

The five-year Building Seismic Risk Reduction Action (2026-2030) includes 15 actions and marks an important evolution of the City's effort to reduce risk in existing, privately owned buildings.

How the Action Plan Works

The Action Plan intentionally takes an iterative approach. Early actions are designed to begin reducing risk while generating learnings that will inform and strengthen future policy and program development. Each action represents a commitment to collaboratively explore, pilot, or develop all policies and programs with stakeholders following plan adoption.

Implementation of the Action Plan will be supported by a community technical advisory committee. A set of implementation guiding principles provide a clear north star, helping directs decisions and actions toward a long-term vision for equitable, effective seismic risk reduction.

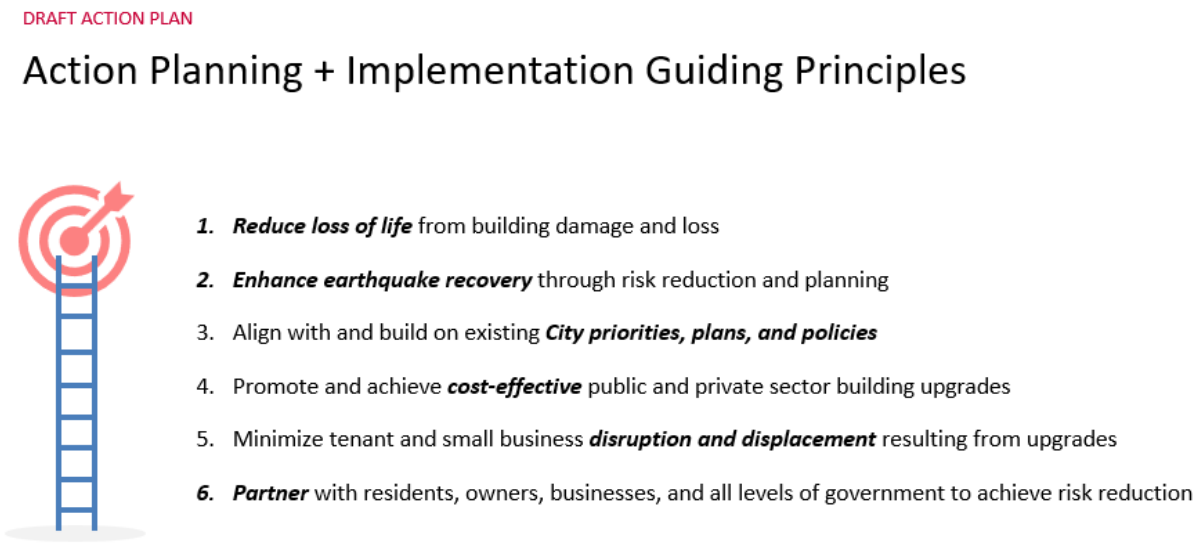


Figure 1: Engagement Slide of Guiding Principles

Core and enabling actions were shared with participants as near-term steps designed to both meaningfully reduce seismic risk in the short term and lay the groundwork for deeper, long-term risk reduction. Participants were asked to consider the actions as part of a phased and iterative approach that balances urgency with feasibility.

DRAFT BUILDINGS SEISMIC RISK REDUCTION ACTION PLAN

Core Actions	***Enabling Actions***	
1. Develop an at-risk building ***inventory*** through seismic screening 2. Develop a ***voluntary retrofit program*** that achieves upgrades through standardization and incentives 3. Explore ***redevelopment*** as a risk reduction tool 4. Partner with industry to develop a practical approach to a ***functional recovery code*** for new building construction	Establish a ***Technical Advisory Committee*** of staff, industry, and stakeholder representatives to support policy and program development ***Advocate to senior government*** for the financial and regulatory supports needed to advance high levels of risk reduction Develop ***owner and tenant risk awareness + upgrade education resources***; to help residents understand their risk and steps they can take to reduce it	Develop enhancements and simplifications that ***make VBBL (Part 11) triggered upgrades more achievable*** Support ongoing City initiatives to seismically ***upgrade and replace SROs and municipal buildings*** Explore expanding tall building secondary water supplies and the deployment of automatic gas shutoff technology to reduce the risk of ***fire following earthquakes*** Support ongoing City efforts to improve ***post-earthquake building assessment and recovery planning***, enabling building recovery following earthquakes

Figure 2: Draft Action Plan Core and Enabling Actions

These proposed actions leverage existing City tools, while also identifying areas where additional funding, regulatory tools, and partnerships with senior governments, industry, and community partners will be required. Together, the actions are intended to support sustained risk reduction over time, strengthen recovery planning, and advance a coordinated, citywide approach to seismic resilience.

3. Engagement Overview

3.1 Engagement Approach

Following Council's direction, City staff worked with engagement consultant Prism Engineering to design a focused engagement process to gather input from key stakeholder representative groups on the draft Action Plan. Engagement activities included a mix of targeted interviews, convened small-group sessions, presentations to existing advisory groups, and were held both online and in person to maximize accessibility and participation.

Throughout June and July 2025, one-on-one pre-engagement and follow-up meetings were conducted with stakeholders to inform engagement design, test emerging ideas, and deepen understanding of opportunities and challenges across sectors. These conversations helped shape session formats, discussion questions, and framing.

Following this initial outreach, six small-group engagement sessions were scheduled with representatives from rental housing providers, condominium and strata representatives, commercial building owners and operators, non-market housing operators, tenant advocates, and technical experts.

In parallel with these sessions, the City's seismic lead also presented and engaged multiple times with the Climate Friendly Building Advisory Committee, a group of diverse Vancouver residents convened to explore equity considerations related to the City's green and resilient building policies and regulations, including to safeguard tenants against seismic risks. In addition, the City of Vancouver Renters Advisory Committee and the Condominium Homeowners Association of BC (CHOA) were engaged to provide additional perspectives and input.

3.1 Engagement Objectives

Through the consultation process, City staff integrated input from interviews, advisory committees, and small-group sessions on the draft Action Plan. This feedback is informing refinements to actions, identifying implementation supports, and shaping the recommendations being brought forward to Council to guide the City's ongoing work to reduce seismic risk in existing buildings.

Engagement objectives across all phased was intended to:

- Build relationships to support City-stakeholder partnerships on seismic risk reduction in buildings
- Share information on Vancouver's seismic risk, modelling, and the draft Action Plan
- Provide opportunities for clarification questions and facilitated dialogue
- Gather perspectives from groups most affected by potential risk-reduction measures
- Identify feasibility considerations, risks, and unintended impacts
- Surface opportunities to refine actions, supports, and implementation pathways
- Inform refinements to the draft Action Plan in advance of reporting back to Council

The range of engagement activities also allowed staff to observe which messages, framing, and approaches resonated with different audiences, and to adjust content, questions, and facilitation over the course of the process. This iterative approach helped identify gaps in understanding and improve the clarity and accessibility of technical information.

3.2 Participation Summary

Methods

Engagement was conducted through a combination of:

- Individual pre-engagement meetings and follow-up meetings to inform approach and test ideas
- Small-group sector-based sessions (online and in-person)
- Presentations on seismic modelling, building vulnerabilities, the Action Plan approach, and draft actions
- Facilitated question-and-answer and technical discussion periods
- Facilitated dialogue tailored to each audience
- Live polling (Slido) on standardized questions to capture immediate reactions, perceived feasibility, priorities, and to allow direct comparisons between groups

Sessions were designed to balance information-sharing with opportunities for facilitated and open-ended feedback, ensuring participants could both understand the modelling and reflect on implications for their buildings, organizations, and communities. Throughout the process, an openness to collaborative solution-building was maintained, recognising the complexity of seismic risk reduction and the challenges associated with changes to existing buildings.

Key Audiences and Approach

Engagement focused on groups with direct experience operating, managing, regulating, or living in buildings at higher seismic risk. The approach was intentionally iterative and relationship-based, combining early one-on-one conversations with representatives from key sectors to understand priorities, test emerging ideas, and surface concerns related to risk, feasibility, and equity.

This early input informed the design of subsequent engagement activities, including presentations to existing advisory committees and facilitated small-group sessions. Together, these formats created opportunities to both share information and gather feedback, test and refine draft actions, and deepen shared understanding across diverse perspectives. Engagement activities were held both online and in person to support accessibility and participation.

The table below summarizes the key audiences engaged and the primary formats used.

Table 1: Key Audiences Engaged

Stakeholder Audience	Description of Session Attendees	Engagement Format(s)
Climate Friendly Buildings Advisory Committee (CFBAC)	A City of Vancouver advisory committee convened to explore equity considerations related to the City's green and resilient building policies and regulations, including climate change mitigation and adaptation measures and advancing seismic risk reduction.	The City's seismic lead presented and engaged with CFBAC members at three committee meetings.
Renter's Advisory Committee	Advises Committee focused on strategic priorities related to renters. This group monitors and responds to impacts of provincial and federal legislation affecting tenants, and provides	The City's seismic lead presented and engaged with committee members during one meeting.

Stakeholder Audience	Description of Session Attendees	Engagement Format(s)
	guidance on access, inclusion, and participation of renters in City policy and civic life.	
BC Housing	A provincial Crown corporation that develops, manages, and administers a wide range of housing options, from emergency shelters to affordable home ownership.	One online small-group session.
Non-Market Housing	Housing owned or operated by government agencies, non-profit organizations, or housing co-operatives.	One online small-group session.
Technical	Local and international engineering, academic, and policy experts with insights into seismic risk reduction.	One online small-group session.
Building Owners and Managers Association (BOMA)	Commercial and mixed-use property owners and representatives of the commercial real estate sector.	One pre-engagement meeting and one in-person group session.
Landlord BC	Rental housing providers, landlords, and property managers	Three pre-engagement meetings and one in-person group session.
Tenant Resource and Advisory Centre (TRAC)	A non-profit organization providing free legal education, representation, and advocacy for tenants in British Columbia.	Two pre-engagement meetings and one online group-session.
Condominium Homeowners Association of BC (CHOA)	A non-profit association that supports strata property owners and the strata industry by promoting understanding of strata living and providing education, resources, and advocacy.	A one-on-one presentation and discussion.

Sequencing and Diversity of Perspectives

Engagement was intentionally sequenced to build depth over time. Early conversations, leveraging City-led or partner organization and pre-engagement discussions, informed the design of subsequent sessions, refined draft actions and materials, and identified where additional outreach or clarification was needed.

Collectively, participants represented a diverse range of lived experience, professional expertise, and organizational mandates, including renters, tenant advocates, non-market housing providers, commercial and residential property owners and managers, strata representatives, and technical experts. This diversity helped surface differing priorities, constraints, and risk perspectives across housing tenures, building types, and roles.

Insights were shared back with participants through follow-up conversations and ongoing communication between City staff and Prism, supporting a collaborative and trust-building approach. This process helped cultivate an informed and engaged cohort that will continue to guide the City's seismic risk reduction work beyond this phase.

3.3 Key Themes and Insights

Across all engagement activities, participants shared valuable insights about seismic risk, building conditions, and the feasibility of proposed actions.

Overall Reaction

Participants in the engagement sessions showed strong interest in seismic risk and risk reduction, as well as appreciation for being involved early in shaping the Action Plan and the City's commitment to taking a sustained, collaborative approach to risk reduction. The sentiment was broadly positive, and participants agreed that seismic risk is real, significant, and not in dispute. There was general support for the City taking a leadership role and for a targeted, evidence-based focus on highest-risk buildings.

The majority of participants saw the draft Action Plan as a reasonable starting point that balances risk reduction with economic and social impacts. Participants also highlighted key challenges and considerations, including the need for clear government communication about risk and risk reduction, phasing, funding and supports, and better management of the tenant-owner relationship during large-scale capital improvements.

Engagement Questions and Responses

During each engagement session, several questions were raised using Slido to gather responses, followed by a facilitated discussion to understand the reasoning behind responses and explore concerns, ideas and opportunities in greater depth.

The tables below summarize the questions asked, votes received, and the key themes that emerged from participant responses.

Table 2: Slido Question: How achievable are the core and enabling actions?

Response Options	Votes	%	Summary of Themes
Very highly achievable	0	0%	-
Highly achievable	14	32%	Seen as achievable with clear guidance, phasing, and resourcing.
Moderately achievable	25	57%	Majority felt actions are feasible but depend on clarity, supports, and alignment with industry capacity.

Response Options	Votes	%	Summary of Themes
Minimally achievable	5	11%	Concerns about feasibility for older/complex buildings and cost implications.
Unlikely	0	0%	-

Follow-up Discussion Themes

- Strong support for the Action Plan's overall direction, with the caveat that implementation details matter.
- Financial feasibility is the primary determinant of achievability. Many actions are technically feasible but financially out of reach without external support, especially for rental and older buildings.
- Achievability improves with voluntary, incremental, and bundled approaches. Participants stressed that implementation must align with capital cycles and avoid triggering unnecessary additional upgrades.
- Avoid over-prescriptive requirements that may stall momentum.
- Industry capacity and City code triggers to require upgrades (i.e., VBBL Part 11) remain barriers, often derailing even modest work.
- Clear, practical, plain-language guidance is essential. Owners need to understand the range of typical retrofit actions, timelines, cost ranges, and any available support for owners.
- Collaboration across governments and partners will determine success.

Table 3: Slido Question: Does this approach effectively begin reducing seismic risk?
Note: Some participants selected more than one response, so percentages reflect the proportion of total responses, not participants.

Response Options	Votes	%	Summary of Themes
This approach is far too aggressive	0	0%	-
This approach balances the need to reduce risk with the impacts of risk reduction	28	50%	Broad agreement that this strikes the right balance between action and feasibility.
This approach sets the City up well	17	30%	Recognized as a strong foundation for future work.
This approach is not nearly aggressive enough	4	7%	Reflects desire for faster or more mandatory action, especially for high-risk typologies.
The approach is incomplete	7	13%	Participants noted uncertainties around timelines, supports, long-term requirements, and owner responsibilities.

Discussion Themes

- General agreement that the approach balances urgency with feasibility, but effectiveness depends on the City (and potential partners) addressing financial barriers.
- Cautious support for early inventory work, with strong emphasis on how the data will be handled, communicated, and potentially protected to avoid impacts on leaseability and asset financial competitiveness and viability.
- Recognition that voluntary and incentivized pathways are essential at this stage and that they must align with how building owners actually plan capital improvements.
- Concerns about renter displacement and equity. Some participants stressed that seismic upgrades must not accelerate renovictions or affordability loss.
- Need for partnerships with senior governments, insurers, and lenders to meaningfully move the needle.
- Request for more specifics on support and guidance for different ownership types and situations (e.g., strata, heritage).
- Desire for continuity through involvement in a technical advisory committee and future engagement as the approach evolves.
- Questions about where this approach is heading, in terms of the City's long-term regulatory pathway.

Follow-up Discussion Questions (Qualitative)

The following table summarizes the discussion question asked during the small-group sessions and the key themes explored during facilitated discussion, including questions raised by participants, clarifications provided by City staff, and suggestions that helped refine understanding of the draft approach.

Table 4: Follow-Up Discussion Questions

Discussion Question	How Participants Engaged with this Topic – Key Perspectives and Clarification
Would you alter or add any actions?	• Participants emphasized that many buildings cannot afford major upgrades without financial support, and requested clearer information on available funding, incentives, and how owners might practically approach upgrades. • There was strong interest in starting with voluntary, smaller, and more manageable steps before moving to more complex or capital-intensive actions. • Participants encouraged tailoring actions by ownership type (e.g., rental, strata, heritage), recognizing differences in governance, financing, and decision-making. • Clear guidance on sequencing and bundling seismic upgrades with planned energy, envelope, or capital renewal work was seen as critical to reducing costs and minimizing disruption. • Participants noted that combining seismic upgrades with other planned work could help lower overall costs and reduce impacts on tenants.

Discussion Question	How Participants Engaged with this Topic – Key Perspectives and Clarification
Are there unintended consequences?	• Participants raised concerns that seismic upgrade requirements could contribute to rent increases or renovictions, particularly in older rental buildings, if not paired with strong tenant protections and financial supports. • Some participants noted that labeling buildings as “high risk” could have unintended impacts on property values, insurance, or financing, depending on how information is communicated and used. • Participants highlighted that current City code triggers can turn relatively small or routine projects into much larger and more expensive undertakings than anticipated. • There was concern that unpredictable costs or requirements could leave some owners feeling overwhelmed or discouraged from taking action, potentially slowing progress on risk reduction.
What additional clarity or support would strengthen this approach?	• Participants asked for simple, plain-language communications materials that illustrate the range of typical seismic upgrades by building type, how actions could be bundled with other projects, and indicative cost ranges. • There was a strong request for clearer timelines so owners understand what is expected in the near term and how requirements may evolve over time. • Participants sought more clarity on what supports or protections are available, or could be developed, for renters and other vulnerable tenants during seismic upgrades. • Many emphasized that stronger partnerships with senior governments, insurers, and funding programs will be critical to improving feasibility and accelerating action. • Participants raised questions about how an at-risk building inventory would be developed, managed, and communicated, and emphasized the importance of clear rules to avoid unintended impacts on owners, landlords, or tenants. • There was interest in continued collaboration through a potential Technical Advisory Committee and other engagement opportunities as the approach is refined and implemented.

How we Analyzed Results

Feedback was analyzed throughout the engagement period from the comments, questions, and suggestions provided during the engagement sessions, interviews and conversations. Responses were reviewed and considered, and trends were aggregated for each recommendation. Feedback provided was used to inform the final recommendations.

Top Cross-Cutting Themes from Across Sessions

Key themes emerged across the engagement sessions:

- Financial feasibility is the dominant concern.
- Cautious support for an at-risk building inventory, when its development is guided by detailed stakeholder engagement.
- Voluntary, incremental, and bundled approaches to building seismic upgrades are preferred.

- Concern about renter displacement and equity.
- Current City code-triggered seismic upgrades can be unclear and can add a great deal of expense to renovation projects.
- Senior government and long-term partnership are essential to reducing seismic risk.
- Need for clear, practical public communication is strong, given the public safety threat seismic poses and the challenges to reducing risk.
- Strong desire for continued collaboration.

Table 5: Key Engagement Sessions

Theme	Description
Financial feasibility is the dominant constraint	Owners, operators, and industry stakeholders consistently flagged rising construction and operating costs, limited revenue tools (especially under the Residential Tenancy Act), vacancies in some segments, and stacked regulatory requirements (GHG reduction requirements, safety, accessibility) as major barriers, especially with current economic uncertainty and pressures. There is concern that, without significant external support, many buildings simply cannot absorb additional seismic requirements.
Cautious support for an at-risk building inventory	Most groups agreed an inventory is essential to understand and target risk. However, there was also concern about how it is produced and when/how it is made public, citing potential impacts on insurance, lending, property values, leasing, and stigma for certain neighbourhoods and building types.
Voluntary, incremental, and bundled approaches are preferred	Stakeholders favoured starting with voluntary, incentivized upgrades and clear pathways for “low-hanging fruit” (e.g., correcting weak ground-floor parking in wood buildings, roof and corridor strengthening, exoskeleton solutions in some concrete towers). There was strong interest in bundling seismic work with planned capital, energy, or envelope projects so upgrades do not derail existing plans or add extra cost pressures.
Concern about renter displacement and equity	Tenant advocates and non-market providers stressed that seismic upgrades and redevelopment can easily translate into renovictions, permanent displacement, and loss of affordability, particularly in older rental buildings, SROs, and housing for low-income and disabled tenants. There was strong emphasis on robust tenant protection, alignment with provincial legislation, and prioritizing “ageing in place” and accessibility where possible.
Current City code triggers can be counter productive	Stakeholders in multiple sessions raised concerns about how Part 11 and other triggers can turn necessary, modest work (e.g., elevator modernization, limited interior work) into large, costly projects (e.g., full sprinkler or fire panel replacements), sometimes without visible tenant benefits. Participants asked the City to explore making triggered upgrades more strategic, predictable, and better aligned with seismic priorities.
Senior government and other partners are essential.	There was wide agreement that the City cannot meaningfully reduce risk alone. Participants highlighted the need for: senior government funding and tax tools, alignment with BC Housing and federal programs, thoughtful insurance-sector

Theme	Description
	involvement, and co-funded pilot projects to demonstrate feasibility and make the case for larger investments
Need for clear, practical information and tools.	Both owners and tenant advocates asked for plain-language resources explaining: • What a "typical" retrofit looks like by building type, and the range of possible actions • Realistic cost ranges and timelines, • How to identify low-cost/high-impact measures, • How seismic work can be coordinated with energy and capital planning, and • What protections and supports are (or could be) in place for tenants and small businesses.
Desire for continued collaboration.	Participants expressed interest in ongoing involvement through a potential future Technical Advisory Committee as well as future engagement.

Notable Differences Across Stakeholder Groups

While there was general agreement on the overall direction of the Action Plan and on many cross-cutting themes, perspectives varied across stakeholder groups. These differences largely reflected participants' roles, responsibilities, and proximity to financial, operational, and lived-experience risk.

- **Emphasis on financial feasibility versus tenant protections**
  Commercial building owners and operators, residential rental property owners, and some strata and industry representatives consistently emphasized financial feasibility, code triggers, and market competitiveness. Rising operating costs, capped or uncertain revenues, and cumulative regulatory requirements were seen as a constraint on their ability to undertake seismic work.

  Tenant advocates, renter representatives, and non-market housing providers placed greater emphasis on preventing displacement, protecting long-term and below-market renters, and ensuring that seismic risk reduction does not lead to renovictions or rent shocks. While they recognized cost constraints, their primary lens was tenant stability, accessibility, and trust in City processes.

- **Views on voluntary versus mandatory approaches**
  Technical experts and many owners and operators supported starting with voluntary, incentivized upgrades, combined with clear, standardized "menus" of retrofit options and pathways to bundle seismic work with planned capital projects. They cautioned that poorly designed or premature mandates could stall progress, especially in the current economic context.

  Some non-market housing providers and renter advocates questioned whether voluntary approaches alone would be sufficient to address the highest-risk building stock over time, particularly where buildings house vulnerable populations. These groups expressed openness to future mandates or regulatory requirements for the highest-risk buildings, provided they are paired with strong funding, tenant protections, and clear implementation pathways.

- **Perspectives on the at-risk building inventory**
  Across groups, there was broad agreement that an at-risk building inventory is essential for understanding and prioritizing seismic risk. Technical experts and public sector housing providers emphasized the value of a defensible, typology-first inventory that can guide targeted action and support funding requests.

  Commercial and rental property owners expressed significant concern about publishing building-level risk information, citing potential impacts on leasing, branding, insurance, lending, and the widening gap between higher- and lower-grade buildings. Tenant and renter advocacy groups, by contrast, highlighted the importance of transparent risk information for renters and communities, while acknowledging the need for careful communication and safeguards. There was broad support for co-designing inventory methods and any publication approach through a Technical Advisory Committee (TAC).

- **Role of redevelopment versus incremental upgrades**
  Many owners and operators, as well as technical experts, recognized that redevelopment can, in some cases, be an effective seismic risk-reduction tool, particularly where buildings are at the end of their useful life. However, they stressed that redevelopment is slow, complex, and often constrained by permitting, financing, and heritage considerations.

  Non-market housing providers and renter advocates consistently flagged redevelopment as high-risk for tenants, particularly in older rental and SRO buildings. They emphasized that any use of redevelopment as a risk-reduction strategy must incorporate strong relocation, return, and rent protections and must not undermine affordability or long-term housing stability.

- **Expectations of City leadership and regional alignment**
  Technical experts and public sector housing partners generally supported the City of Vancouver taking a leadership role in seismic risk reduction, including exploring functional recovery requirements for new construction and modernizing the Vancouver Building By-law.

  Commercial building owners and some rental providers expressed concern about Vancouver acting in isolation, noting the risk that City-specific requirements could affect competitiveness relative to other municipalities in the region. These groups stressed the importance of regional and provincial alignment, particularly for any future regulatory changes.

- **Confidence in voluntary retrofit uptake**
  Technical stakeholders and some owners were cautiously optimistic that a well-designed voluntary retrofit program with clear menus, incentives, and alignment with planned capital work could achieve meaningful uptake over time.

  Tenant advocates, particularly those working with SRO tenants and lower-income renters, were more skeptical that voluntary programs would lead to substantial retrofits in the absence of strong, predictable incentives and enforceable protections. They emphasized the importance of monitoring uptake, learning from early experience, and remaining open to stronger policy tools if voluntary approaches prove insufficient.

These differences underscore the importance of ongoing engagement and co-design as the City refines its approach. While participants started from different lenses, there was shared recognition that seismic risk is real and significant, and that a balanced, collaborative path forward is needed.

4. Key Takeaways and Next Steps

The engagement process reinforced that seismic risk reduction in existing buildings is both necessary and complex. Participants across all groups agreed that seismic risk in Vancouver is significant and not in dispute, and that the City has an important leadership role to play in addressing it. At the same time, they were clear that success will depend on careful implementation: aligning actions with financial realities, protecting tenants and vulnerable populations, and working in partnership with other governments and institutions.

Three Key Takeaways Emerged from this Phase of Engagement

- **The Action Plan's direction is broadly supported, but details matter.**
  Participants generally viewed the draft Action Plan as a reasonable and balanced starting point, particularly its focus on the highest-risk building types, voluntary and incremental upgrades, and enabling actions. However, they stressed that the effectiveness of the approach will depend on how the inventory is designed and communicated, how voluntary programs are structured and incentivized, and how City code triggers and permitting processes are aligned with seismic priorities.

- **Financial feasibility and equity must be addressed together.**
  Owners and operators emphasized that many buildings cannot absorb additional seismic costs without external support, especially in the current economic context and under existing rent and revenue constraints. Tenant advocates and non-market providers highlighted that, without strong protections, seismic upgrades and redevelopment can lead to renovictions, displacement, and loss of affordability. Participants consistently called for funding, financing tools, tax measures, and tenant protections to be developed in parallel with technical solutions.

- **Long-term, collaborative governance will be required.**
  Seismic risk reduction was widely understood as a multi-decade effort that cannot be achieved by the City alone. Participants emphasized the need for sustained collaboration through a Technical Advisory Committee and other ongoing forums, and for strong partnerships with senior governments, insurers, lenders, utilities, and community organizations.

Recommended Next Steps, Subject to Council Direction

Recommendations from the engagement discussions to support the success of the Buildings Seismic Risk Reduction Action Plan are provided below.

- **Establish a Technical Advisory Committee (TAC).**
  If Council endorses the Action Plan's direction, City staff have indicated they will convene a TAC comprised of technical experts, non-market and public housing providers, commercial and rental property owners, renter advocates, strata representatives, and other partners. The TAC would play a central role in shaping implementation, including inventory development, voluntary retrofit pathways, and enabling policies.

- **Co-design the at-risk building inventory and publication approach.**
  City staff have indicated they will work with the TAC to develop a defensible inventory methodology that prioritizes the highest-risk buildings and areas first, uses building records and engineering best practices to guide rating, limits walk-throughs where feasible and primarily relies on exterior assessments, and is designed to be refined over time. Together with stakeholders, the City will also determine how information is appropriately made public, how it should be

communicated, and how to ensure the inventory is used to motivate action and inform recovery planning, rather than to inadvertently penalize or stigmatize owners.

- **Develop standardized voluntary retrofit menus and incentives.**
  Through the engagement process, City staff indicated they will collaborate with the TAC and industry partners to design standardized "menus" of retrofit options by building type, with clear hierarchies of low-cost and higher-impact measures. These menus will be designed to align with planned capital, mechanical, electrical, envelope, heritage, and energy work, and to support phased implementation over time. In parallel, the City will explore and advance incentives, financing tools, and partnerships with senior governments and financial institutions to improve feasibility.

- **Advance code and policy alignment, including Part 11.**
  In response to feedback on code triggers and clarity, City staff will explore options to better align the Vancouver Building By-law, particularly Part 11, with seismic risk-reduction priorities and performance-based objectives, while avoiding unintended cascade upgrades that could delay or deter projects. This work will be informed by technical input from the TAC and by lessons from existing programs such as the B.C. Schools Seismic Retrofit Guidelines.

- **Strengthen tenant protections and equity considerations through collaboration with senior governments.**
  Recognizing that many tenant-protection tools sit with the Province, the City will work with tenant advocates, non-market providers, and provincial partners to explore retrofit-specific displacement, return, and rent protection provisions, and to coordinate seismic risk-reduction efforts with broader housing and equity objectives. Accessibility and the needs of disabled renters will be integrated into preparedness, evacuation, and recovery planning where appropriate, in collaboration with Vancouver Emergency Management and community organizations.

- **Develop clear public communications and education resources.**
  City staff will prepare plain-language resources tailored to different audiences, including renters, small and large building owners, and industry partners. Communications will focus on explaining seismic risk, typical retrofit pathways, approximate cost ranges, and available supports. These materials will also clarify roles and responsibilities across the City, Province, and federal government and identify opportunities to coordinate seismic upgrades with other building work.

The engagement completed to date has already helped to refine the draft Action Plan and identify where further design and coordination are required. As this work progresses, City staff will continue to share updates with participants, invite ongoing feedback, and adjust the approach based on what is learned. Seismic risk reduction in existing buildings will be an iterative, long-term effort, and the relationships and insights developed through this engagement process provide a strong foundation for implementation and ongoing collaboration in the next phase.

5. Appendix A: Key points from each stakeholder group

Below is a summary of what we heard from each group during the engagement sessions.

BC Housing

Overall reaction: Participants viewed the core actions as moderately to highly achievable. They emphasized the importance of clear definitions, particularly around "functional recovery," and noted that additional time for discussion and reflection would support more informed feedback.

Key themes and discussion focus

- **Education and transparency**: Participants stressed the importance of education and training for the construction industry (including builders, architects, and contractors), as well as broader public education for residents and newcomers who may be less aware of Vancouver's earthquake risk. There was interest in greater transparency around seismic risk information for building owners and buyers over time.
- **High-risk buildings**: Participants highlighted concerns about older masonry and heritage residential buildings, particularly in the Downtown Eastside, where many vulnerable populations live and where redevelopment can be constrained by displacement risks and heritage considerations.
- **Practical solutions**: There was strong interest in identifying simple, practical, low-cost, and high-impact retrofit measures that could meaningfully reduce risk without triggering excessive cost or complexity. Participants encouraged the City to clearly communicate these options by building type.
- **Assessment methods and data integration:** Participants asked how damage and risk are estimated in the City's seismic assessment, including the use of typology-based models versus building-specific analysis. There was interest in understanding how existing portfolio-level studies, such as those held by BC Housing, could complement the City's high-level inventory over time.
- **Insurance and feasibility**: Participants noted that insurance availability and cost remain major feasibility drivers. They emphasized that improving one building at a time is unlikely to affect premiums, and that insurance outcomes are more likely to improve when overall neighbourhood or system-level risk is reduced. Upgrade costs and financial feasibility remain central concerns.

Non Market Housing Providers

Overall reaction: Participants expressed appreciation for the City's work and for being included early in the process. The draft Action Plan was seen as a strong starting point. At the same time, participants emphasized that seismic risk reduction in non-market housing cannot move forward without sustained capital and operating funding. There were questions about whether voluntary approaches alone will be sufficient to address the highest-risk buildings over time. Some participants also noted the Action Plan may not be aggressive enough, and mandates (or regulations) may be needed for highest-risk buildings.

Key themes and discussion focus

- **Core actions feedback**: Participants supported developing a seismic risk inventory and advancing industry collaboration on functional recovery. There were questions about the voluntary retrofit program, with some participants suggesting that voluntary framing may not be sufficient for the highest-risk building stock, particularly for publicly funded housing, unless paired with strong funding and regulation (i.e., mandate upgrades).
- **Redevelopment as a risk-reduction tool**: Participants cautioned that while redevelopment can reduce seismic risk, it often takes many years, can increase costs, and may result in tenant

displacement or loss of affordability. Heritage constraints were also noted as a complicating factor for some of the highest-risk buildings.

- Noted that while redevelopment may reduce seismic risk, it can cause displacement, increase costs, take years, or conflict with heritage rules.
- **Funding and affordability constraints**: Non-market providers consistently stressed that capital funding, operating impacts, and expiring housing subsidies are major barriers. Participants emphasized that strong advocacy to senior governments and alignment with funding programs will be essential to meaningfully reduce risk.
- **Risk information and inventory**: There was interest in progressively more detailed risk information, starting at a neighbourhood level, along with building-specific insights, to support planning, prioritization, and funding decisions. Participants emphasized the importance of careful handling and communication of risk data.
- **High-risk building types**: Participants highlighted concerns about specific building typologies, including weak first-storey configurations (e.g., wood-frame buildings over concrete parkades), older concrete buildings, unreinforced masonry, and heritage buildings.
- **Integration with broader emergency planning**: A participant suggested aligning seismic actions with broader emergency management frameworks (Mitigation, Preparedness, Response, and Recovery), and the group discussed the importance of clearly defining the level of service residents can expect following an earthquake. This feedback was not specific to the Action Plan, more a general comment of coordination and communications to increase awareness.
- **Education and engagement**: Participants valued owner and tenant education resources, targeted engagement with non-market providers, and clarity on how seismic work could be bundled with other life-safety upgrades. There was also interest in continued engagement, including through participation in a Technical Advisory Committee.
- **Insurance landscape**: A participant raised concerns that the availability of insurance, premiums, and market capacity could influence feasibility, and that both building-level upgrades and neighbourhood-level risk affect insurability. Staff responded that building upgrades (or lack thereof) have not been shown to impact insurance premiums and there's yet to be an instance where a building was less insurable or uninsurable due to seismic performance.

Technical: Seismic Engineering and Policy Experts

Overall reaction: Participants were very positive, eager to provide technical input, and appreciative of being involved early in shaping the City's approach to seismic risk reduction.

Key themes and discussion focus

- **At-Risk Building Inventory:** Participants expressed interest in supporting the development of the at-risk building inventory, and suggested a defensible, typology-first inventory approach. They recommended a tiered, archetype-based method that prioritizes the highest-risk building types and areas first and is refined over time as better data becomes available. Suggested approaches included using "reference portfolios" (example buildings) to anchor archetypes and, where feasible, conducting limited, owner-voluntary interior walk-throughs (e.g., corridors or parkades). Participants emphasized that the purpose of screening is to identify the highest-risk buildings, motivate action, and inform recovery planning, not to pursue a perfect, multi-year dataset.
- **Voluntary retrofit program**: There was strong support for a voluntary retrofit program built around standardized, typology-specific "menus" or bundles of upgrade options. Participants emphasized the value of clear hierarchies of actions by building type (e.g., addressing soft-storey conditions first in wood-frame walk-ups), and of bundling seismic upgrades with planned mechanical, electrical, envelope, heritage, or energy work to improve feasibility. Allowing phased implementation, such as at lease turnover, was also supported. Participants advised starting with

voluntary pathways, and cautioned that any mandatory elements should be limited to low-cost, high-impact measures and only introduced with industry buy-in.

- **Functional recovery**: Participants supported focusing functional recovery requirements on new buildings initially. They emphasized the need to clearly define target outcomes (e.g., repairability versus occupiability) at realistic performance thresholds, and to communicate expectations transparently. Many favoured an advisory or incentive-based pathway with industry rather than immediate code changes. Participants also noted the importance of addressing eccentric building designs, where damaging structural irregularities or certain design features can worsen seismic performance. There was interest in considering incentives for resilient massing and building systems. Alignment with provincial efforts was encouraged, while recognizing that national code timelines may be too slow to address near-term risk.
- **Code alignment and clarity**: Participants encouraged modernizing the Vancouver Building By-law (VBBL) and Part 11 language to focus on performance objectives (such as probability-of-exceedance targets) rather than percentages of code. There was interest in expanding and applying standardized approaches from the B.C. Schools Seismic Retrofit Guidelines where appropriate, as these have helped improve consistency and uptake.
- **Comms & engagement**: Participants stressed the importance of a clear communications and education strategy so residents, owners, and operators better understand seismic risk, building performance differences by typology, and available upgrade pathways. Ongoing engagement through a Technical Advisory Committee was strongly supported.

Commercial Building Owners and Operators

Overall reaction: Participants were constructive but cautious. They expressed willingness to engage with the City on seismic risk reduction, while emphasizing strong concern based on significant current market pressures, including financing constraints, leasing challenges, rising costs, and broader uncertainty in Vancouver's commercial real estate market, particularly in Vancouver's downtown.

Key themes and discussion focus

- **Public at-risk building inventory concerns**: Participants generally supported the idea of an at-risk building inventory in principle, but raised strong concerns about publishing building-level risk information. Key issues included potential impacts on leasing and branding, broker behaviour, insurer and lender responses, and the risk of widening gaps between A/AAA and B/C office space. Participants expressed a preference for a paced, carefully designed approach, with industry involvement in shaping scope, timelines, communication approach and materials, and any decisions about what information (if any) is made public.
- **Voluntary retrofit program**: There was appetite for a voluntary retrofit program built around standardized, typology-specific "menus" of upgrade options that can be phased over time. Participants emphasized the importance of aligning seismic upgrades with planned mechanical, electrical, envelope, heritage, or energy improvements to improve feasibility. Incentives, funding, and financing tools were viewed as essential to participation.
- **Functional recovery**: Participants supported pursuing functional recovery requirements for new buildings first, developed collaboratively with industry. There was concern that introducing new Vancouver-specific requirements could affect development competitiveness relative to other municipalities in the Lower Mainland, reinforcing the importance of regional or provincial alignment where possible.
- **Practical constraints**: Participants highlighted several factors that limit near-term action, including long redevelopment timelines, permitting complexity, lease restrictions related to tenant relocation, heritage constraints, and cumulative regulatory costs (e.g., the B.C. Energy Step Code, development cost charges and community amenity contributions, parking and transportation requirements).

- **Partnership asks**: Participants emphasized the need to establish a technical advisory body, engage insurers and lenders early, explore incentives and financing tools with other levels of government and institutions, align VBBL Part 11 with clearer performance-based targets, coordinate regionally or provincially where possible, and support public communication that clearly explains seismic risk and risk-reduction pathways.

Residential Rental Property Owners

Overall reaction:
Participants expressed cautious support for the approach. They generally felt the direction was reasonable and that the proposed actions could be moderately to highly achievable, provided that funding is available and City code triggers are better aligned with seismic priorities.

Key themes and discussion focus

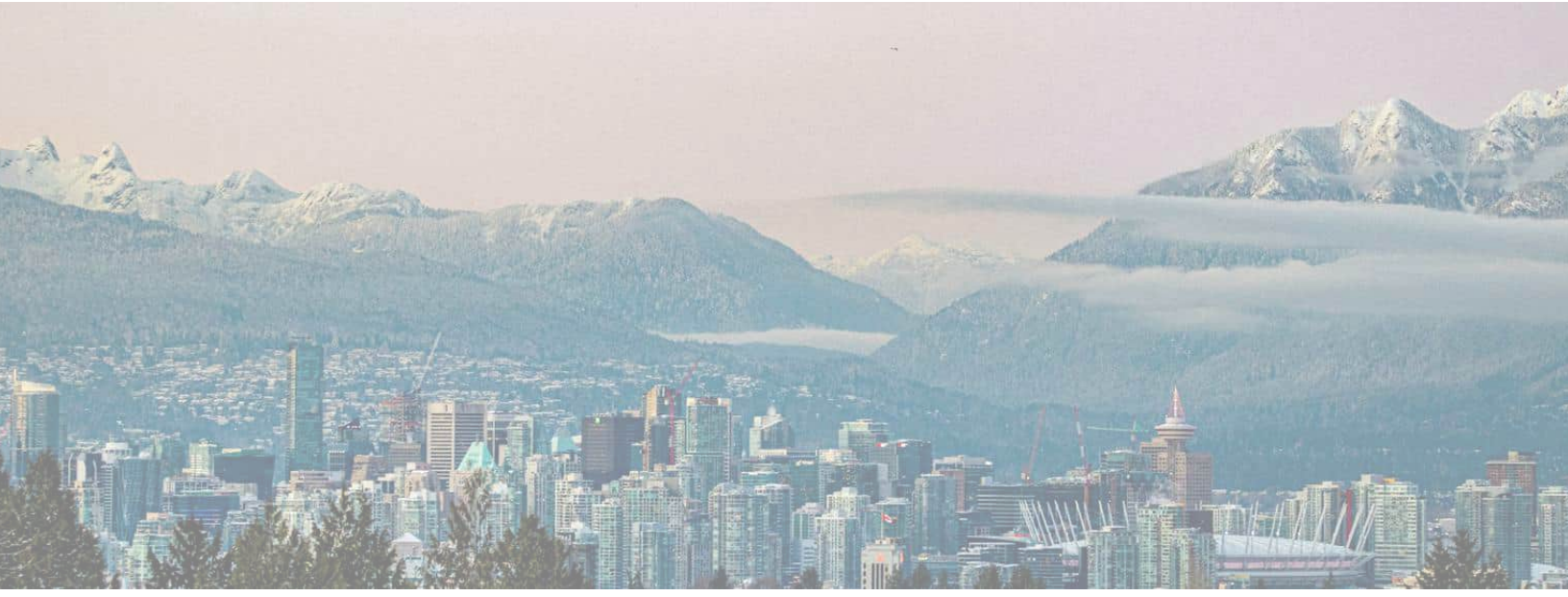
- **Costs and code triggers**: Participants consistently identified project "trigger" cascades as the biggest barrier to action i.e., requirements under Part 11, fire panels, and sprinkler upgrades can turn relatively small projects into multi-million-dollar undertakings, at a time when operating costs are rising and rental revenues are capped.
- **Alignment of City programs and policies:** Participants noted that multiple City programs and regulatory requirements are currently applied to existing rental buildings, and that better coordination and predictability would improve feasibility. Frequent regulatory changes or shifting requirements were described as time-consuming, costly, and difficult to plan for.
- **Incremental, plan-first pathways:** There was strong preference for phased, "while-you're-there" seismic upgrades tied to planned capital expenditures (e.g., roofing, corridors, tuck-under parking fixes, exterior strengthening). Participants supported a "plan-first" approach - where seismic work begins with a building-specific plan and is sequenced over 3, 5, 10, or 15 years - rather than prescriptive triggers that require everything at once.
- **Funding and equity considerations:** Participants emphasized the need for targeted grants, tax tools, and financing options, as well as tenant protections, to avoid unintended impacts on long-term and below-market renters. They noted that incentives framed as "up to" a certain dollar amount create uncertainty and often fall short of what is needed to support viable business cases.
- **Program bundling:** Participants supported linking seismic screening and upgrades with energy, electrical, and envelope programs (for example, a residential version of Continuous Optimization) to identify low-cost opportunities and improve the overall business case when buildings are already being opened up.
- **At-risk building inventory:** While there were concerns about insurance and lending optics, particularly if information is made public, participants acknowledged that insurers already model seismic risk. They expressed support for a transparent, priority-setting inventory that is co-designed with industry and used to guide funding, sequencing, and action, rather than to penalize owners.
- **Redevelopment versus upgrades:** Participants emphasized that redevelopment is a long-term and more limited pathway for most rental buildings. Clear guidance is needed on when redevelopment is preferred versus when incremental upgrades are encouraged, so owners and operators are not discouraged from undertaking modest, risk-reducing work in the near term.
- **How to proceed:** Participants supported establishing a Technical Advisory Committee that includes landlords, tenant representatives, and engineers to co-design the inventory, voluntary retrofit menus and incentives, and more targeted use of Part 11. They also emphasized the importance of engaging financial partners and advocating for senior-government funding and policy support.

Renter Advocacy

Overall reaction: Participants were generally supportive of the City's proposed approach, including the focus on an at-risk building inventory, voluntary upgrades, and enabling actions. At the same time, they expressed strong caution about tenant protections, affordability, and trust—particularly in light of past experiences such as the Broadway Tenant Relocation and Protection Policy.

Key themes and discussion focus

- **Risk framing and communications:** Participants found it helpful to see concrete, real-world examples of seismic upgrades (e.g., tuck-under parking fixes, corridor strengthening, roof-to-wall connections, and concrete exoskeletons). They emphasized the need for plain-language, renter-focused materials that explain seismic risk and typical upgrade pathways in accessible terms.
- **Feasibility of voluntary retrofits:** Participants generally felt that voluntary retrofit programs are feasible to design but questioned whether they would achieve meaningful uptake without predictable incentives, clear displacement protections, and well-sequenced approaches that avoid triggering costly cascade upgrades. Support for voluntary retrofits was strongest when paired with "while-you're-there" bundling (e.g., combining seismic work with roof, envelope, or electrical upgrades).
- **Redevelopment risks and tenant protections:** Redevelopment was consistently flagged as high-risk for tenants. Participants stressed that any use of redevelopment as a seismic risk-reduction tool must include robust tenant-first safeguards, including relocation and right-of-return protections and rent stability. Without these protections, redevelopment was seen as undermining trust and support for the overall approach.
- **Equity and accessibility considerations:** Participants emphasized the need to plan for renters with disabilities, including wheelchair users and people who are blind or have mobility challenges, across preparedness, evacuation, and post-event recovery. Coordination with Vancouver Emergency Management (VEMA) was identified as important to ensure disability-inclusive planning and guidance.
- **Education and jurisdictional clarity:** Participants noted frequent confusion among renters about which responsibilities sit with the City, the Province, or the federal government. They identified an opportunity to include clear "who-does-what" explanations related to seismic risk, tenant protections, and funding within renter-facing education materials.



Ausenco

City of Vancouver Supporting Analysis for Seismic Risk Reduction Policy Development

May 19, 2026

Executive Summary

Background and Scope of Work

The City of Vancouver (the City) retained Ausenco Engineering Canada ULC (Ausenco) in June of 2022 as the prime consultant to carry out the "Supporting Analysis for Seismic Risk Reduction Policy Development" study. The Ausenco-led team consisted of five local engineering consulting firms with extensive experience in seismic retrofits and a local cost consultant. The work presented in this report was peer reviewed by several local and US external reviewers.

This work is intended to support the City's ongoing effort to develop seismic risk reduction policy for its existing, privately held buildings, in partnership with the Province of British Columbia. A key outcome of this study is to help the City understand some of the key technical elements of seismic retrofitting of a set of building archetypes (representative of seismically vulnerable buildings commonly found in the city), and their cost-barrier and occupant relocation implications to support seismic risk reduction target setting and policy option development. This report also provides a variety of screening, assessment, and retrofit design strategies for the City's consideration.

Foundational Tasks – Archetypes and Hazard Levels

This study involves two foundational tasks:

1) Identifying site conditions and hazard levels in the City of Vancouver
2) Developing building archetypes representative of vulnerable buildings in the City

1) Site Conditions and Hazard Levels

Approximately 85% of the buildings in the City are situated on glaciated sediments (till), corresponding to Site Class C non-liquifiable soil, as defined in the National Building Code (NBC 2020). Therefore, this study uses Site Class C to develop retrofit designs.

The retrofits and cost estimates reported in this study are based on retrofitting for the 10% probability of exceedance in 50 years (annual exceedance probability of 1/475) hazard level. For reference, new buildings are designed for 2% probability of exceedance in 50 years (annual exceedance probability of 1/2475) which results in seismic forces approximately twice those used in this study. The 10% in 50-year hazard level was selected as this is consistent with many US retrofit programs including the ones with seismic retrofit ordinances.

2) Developing Archetypes

For the purpose of this study, six different building archetypes were developed by reviewing the database of the City buildings provided to the Ausenco team, and based on discussions with the team's peer reviewers and the City. Of the 90,000 buildings in the City database, this study addresses approximately 7,800 buildings built before 1990. Per the City's directive, this study excludes 79,000 single-family homes and excludes 3,200 other buildings (those built after 1990; educational, religious, and government buildings; and concrete precast, tilt-up, reinforced masonry, and steel framed buildings).

Table ES-1 identifies the six building archetypes, provides an acronym for each, indicates the storey range considered, and notes the occupancy of each archetype.

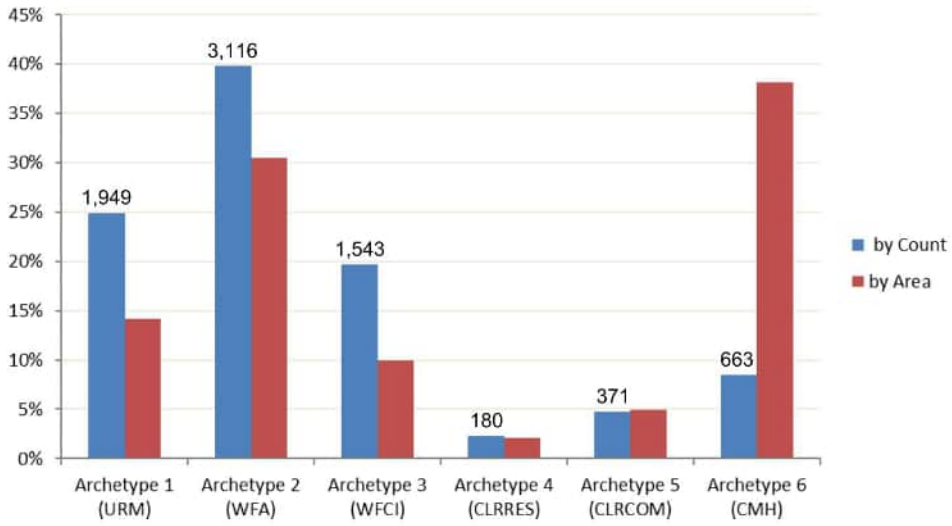
Table ES-1: Building Archetypes Developed in This Study

Building Archetype	Archetype Description	Considered Storey Range	Occupancy
(1) URM	Unreinforced masonry	1-6 [1]	Residential & Commercial
(2) WFA	Wood-frame multi-family apartments	1-4	Residential
(3) WFCI	Wood-frame commercial/institutional	1-4	Commercial
(4) CLRRES	Concrete low-rise residential	1-4	Residential
(5) CLRCOM	Concrete low-rise commercial	1-4	Commercial
(6) CMH	Concrete mid- and high-rise shear wall construction	5+	Residential & Commercial

[1] City database does include some URM buildings greater than six storeys.

Among the roughly 7,800 buildings separated into six archetypes, the most prevalent by total building area are CMH (35%), WFA (28%), and URM (13%), while the most prevalent by number of buildings are WFA (40%), URM (25%), and WFCI (20%). The prevalence of the archetypes by total area and number of buildings is presented in Figure ES-1. The number of the buildings in each archetype is indicated above the blue bars.

Figure ES-1: Prevalence of Archetype Buildings (% of total) by Count and Total Area



Key Findings

A total of 18 retrofit examples are presented for all six archetypes with four examples related to WFA, six examples related to CMH, three examples related to CLRCOM, one example related to CLRRES, two examples related to WFCI, and two examples related to URM. The number of examples is intended to be relatively proportional to the prevalence by area of each archetype shown Figure ES-1.

Table ES-2 indicates the approximate year of original construction and whether the structural retrofit example is all (or mostly) exterior, all (or mostly) interior, or a combination of the two, and the extent of occupant relocation. Some retrofits require partial relocation of occupants (e.g., phased relocation per floor or per suite), whereas others may require complete or no relocation. The extent and the impact of a retrofit depend on factors such as owner requirements, ease of access to building areas, construction method, architectural considerations, building envelope details, and existing mechanical/electrical constraints.

Table ES-2: Retrofit Examples Summary

Retrofit Examples	Original Construction	Location of Structural Retrofit Elements	Occupant Relocation
WFA – Scheme 1	Pre-1970 [1]	Exterior	None
WFA – Scheme 2	Pre-1970 [1]	Interior	Partial
WFA – Scheme 3	Pre-1970 [1]	Interior and exterior	Partial
WFA – Scheme 4	Pre-1970 [1]	Interior and exterior	Partial
CMH – Example 1a	1971	Mostly exterior	None
CMH – Example 1b	1971	Interior	None
CMH – Example 2a	1965	Mostly exterior	None
CMH – Example 2b	1965	Interior	Partial
CMH – Example 3	1968	Mostly exterior	None
CMH – Example 4	1968	Mostly exterior	None
CLRCOM – Example 1a	1955	Mostly interior	Partial
CLRCOM – Example 1b	1965	Mostly exterior	Partial
CLRCOM – Example 2	1965	Interior and exterior	Partial
CLRRES – Example 1	1961	Interior and exterior	Partial
WFCI – Example 1	1959	Interior and exterior	Complete
WFCI – Example 2	1968	Interior and exterior	Complete
URM – Example 1	1910	Interior	Complete
URM – Example 2	1912	Interior	Complete

[1] The building studied for this archetype is representative of pre-1970 construction.

Table ES-3 summarizes the cost of each retrofit and compares it with the cost of replacing the building with a new one. These costs have been prepared in conjunction with the team's cost consultant and are reported in Q4 2025 dollars excluding GST.

The direct retrofit costs are Class D-level estimates (i.e., +/-25% accuracy) and include construction labour and material, general requirements, contractor fees, and a 25% design contingency. The indirect retrofit costs are 37% of the direct costs and include building permits, engineering design, construction-phase fees, construction contingency, and the owner's project management fees, insurance, accounting, and general administration. Excluded are decanting costs for displaced occupants to facilitate construction, including temporary accommodation and any associated moving or living allowances; such costs may be different for owners versus renters.

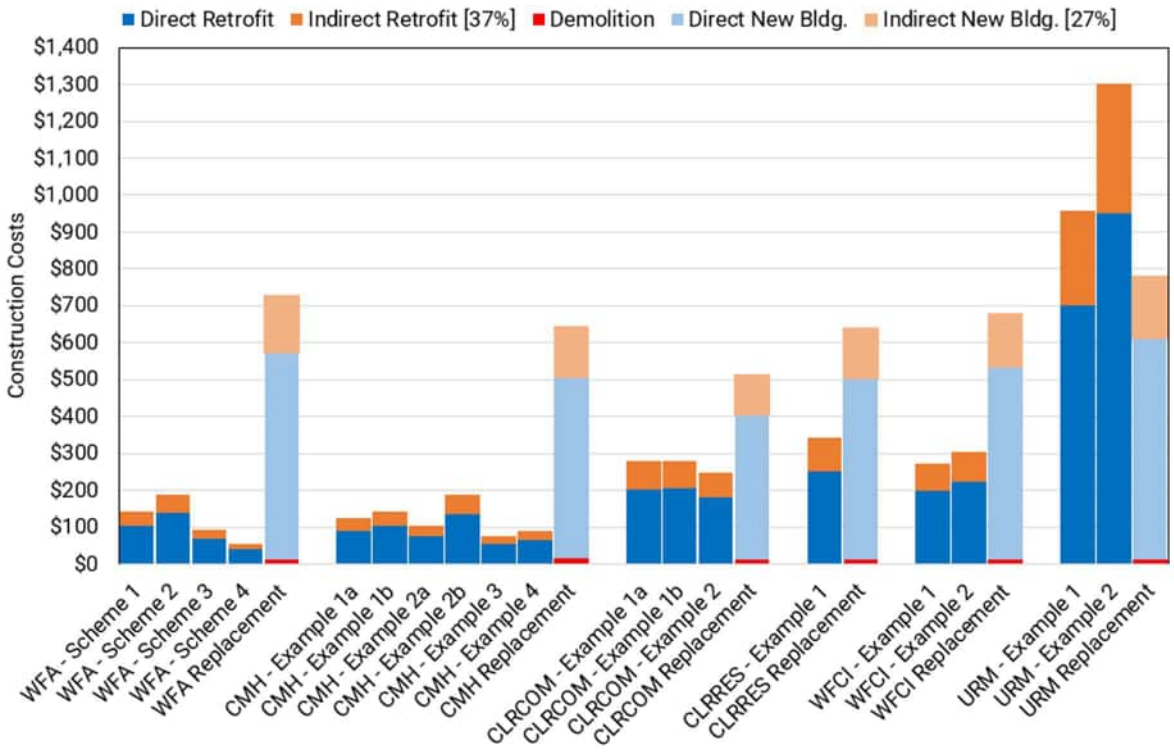
The replacement cost includes the cost of a new building of the same archetype (except for URM which would be replaced by a reinforced masonry building) and the demolition of the existing building. The direct costs of these two components are also Class D-level estimates with the design contingency of 10%. The related indirect replacement costs are 27% of the direct costs (sum of new building and demolition costs). All the retrofit cost estimates presented in this report should only be considered as 'representative' costs.

Table ES-3: Summary of Seismic Retrofit Costs and Comparisons

	Retrofit Costs ($/sf)			Replacement Costs ($/sf)			
Retrofit Examples	Direct	Indirect [37%]	Total	New Bldg. Direct	Demolition Direct	Indirect [27%]	Total
WFA – Scheme 1	104	38	142	560	13	155	728
WFA – Scheme 2	138	51	189				
WFA – Scheme 3	67	25	92				
WFA – Scheme 4	40	15	55				
CMH – Example 1a	90	33	123	CMHR: 490 CMHC: 390	16	137	CMHR: 643 CMHC: 515
CMH – Example 1b	104	38	142				
CMH – Example 2a	76	28	104				
CMH – Example 2b	137	51	188				
CMH – Example 3	55	20	75				
CMH – Example 4	65	24	89				
CLRCOM – Example 1a	203	75	278	390	13	109	512
CLRCOM – Example 1b	204	75	279				
CLRCOM – Example 2	180	67	247				
CLRRES – Example 1	250	93	343	490	13	136	639
WFCI – Example 1	200	74	274	520	13	144	677
WFCI – Example 2	223	83	309				
URM – Example 1	700	259	959	600	13	166	779
URM – Example 2	950	352	1302				

Figure ES-2 graphically illustrates the data in Table ES-3. Based on this study, the estimated retrofit cost of archetypes WFA and CMH ranges from 15-20% of the estimated replacement cost; the estimated retrofit cost of archetypes CLRCOM, CLRRES, and WFCI varies from 40-55% of the estimated replacement cost; the estimated retrofit cost of the URM archetype varies from 120-170% of the estimated replacement cost. The estimated URM retrofit costs are high due to the complexities of the particular real examples used in this study; retrofit costs for less complex URM buildings may be slightly lower.

Figure ES-2: Comparison of Estimated Retrofit Costs vs. Estimated Replacement Costs



Note that the retrofit design for a specific building will be unique to that building and will have a unique retrofit cost. The actual retrofit cost for a given building will be different from the cost estimates prepared for the 18 examples in this study. This is due to variations, including but not limited to type of retrofit (interior vs. exterior), area and shape per floor, number of storeys, existing construction material, type of exterior façade, and market conditions at time of construction.

The comparison of the retrofit costs with replacement costs for archetypes WFA, CMH, CLRCOM, CLRRES, and WFCI suggests that a stand-alone seismic retrofit remains more cost-effective than replacing the building. Whereas for the URM archetype, it may be more economical to replace the existing building with a new one, unless constraints, such as heritage status, require retaining it.

Every seismic retrofit is typically accompanied by the seismic restraints of non-structural items also referred to as Operation and Functional Components (OFCs). The cost of these restraints is in addition to the structural retrofit costs reported above and can vary from approximately $3/sf to $10/sf, depending on the extent of OFCs restrained. The restraint cost could be higher for URM buildings if parapets and gable

end walls are to be restrained. These costs exclude any costs for restraining personal items and indirect costs of 37%.

Key Recommendations

This section provides key recommendations regarding the hazard level to be used for assessment and retrofit design, considerations for partial and strategic retrofits, suggestions for a city-wide prioritization approach to retrofits, commentary on co-beneficial retrofits, references to financing programs, and suggestions for a screening program.

1. Balance Feasibility and Safety through Careful Hazard Level and Assessment/Retrofit Design Choices

1a. Following detailed analysis of the vulnerabilities and retrofit potential of all archetypes, the recommended hazard level for both assessment and retrofit design is 10% probability of exceedance in 50 years (annual exceedance probability of 1/475).

1b. The recommended assessment/retrofit design can be summarized as follows: the Seismic Retrofit Guidelines, 2023 Edition (SRG 2023) for buildings four storeys or fewer, and Seismic Evaluation Guidelines (SEG 2025 Edition) and the Seismic Upgrading Guidelines (SUG 2025 Edition) for buildings with five storeys and higher. These approaches are consistent with producing achievable upgrades that protect life and safety.

For low-rise residential and commercial buildings (WFA, WFCI, CLRRES, CLRCOM, and URM), SRG 2023, developed by EGBC for the BC Ministry of Education's seismic mitigation program, provides a suitable methodology and is recommended for assessing and retrofitting buildings with four storeys or fewer. This performance-based approach has been used in BC for the past 20 years.

For medium-to-high-rise concrete (CMH) and all other buildings above four storeys, design criteria such as those outlined in the SEG 2025 Edition and the SUG 2025 Edition developed by National Research Council Canada (NRC) are recommended for assessments and retrofit design of buildings five storeys and higher. This is similar to the US-based Seismic Evaluation and Retrofit of Existing Buildings standard (ASCE 41), which has been used globally since 2006; however, it is recommended to use the Canadian-specific guidelines.

1c. The above procedures are proposed for "stand-alone," voluntarily initiated seismic retrofits. For reference, the Vancouver Building By-law (VBBL) Part 11 currently specifies retrofit requirements only when certain renovations to an existing building are carried out. The focus of this study is not recommending changes to VBBL Part 11.

2. Consider Partial and Strategic Retrofits

This section offers considerations for partial and strategic retrofits for various archetypes. A partial/strategic retrofit should be considered as the first phase of a two-phase full retrofit. Table ES-4 illustrates the scopes and associated costs for a full stand-alone seismic retrofit and a partial/strategic retrofit for the WFA and CMH archetypes. This consideration and the developed costs were limited to only the two most prevalent archetypes by area.

Table ES-4: Full Retrofit vs. Partial/Strategic Retrofit

Archetype	Full Retrofit	Partial/Strategic Retrofit
WFA	Scope: Retrofit of the exterior and interior walls, roof, and foundations as required; including elimination of soft storey. Cost: Ranges between $67/sf and $138/sf for the superstructure.	Scope: Eliminate only soft storey; only one wall at one side of the building (either concrete at the basement level, or timber at the ground floor). Cost: $10/sf to $13/sf based on 5,000 sf/floor for a 3-storey WFA.
CMH	Scope: Retrofit of the entire building including new concrete walls and foundations; including elimination of soft storey and irregularities, and other work such as FRP reinforcing. Cost: Ranges between $55/sf and $137/sf.	Scope: Retrofit of the basement and ground floor only including new concrete walls and foundations, elimination of soft-storey and irregularities at the ground floor level, and other work such as FRP reinforcing at the ground floor level. Cost: Ranges between $25/sf to $40/sf (based on the total above-grade sf).

Figures ES-3 and ES-4 illustrate the scope of the retrofits noted in the table above (exterior view only). The partial/strategic retrofit scope is noted in blue text.

Figure ES-3: WFA Retrofit

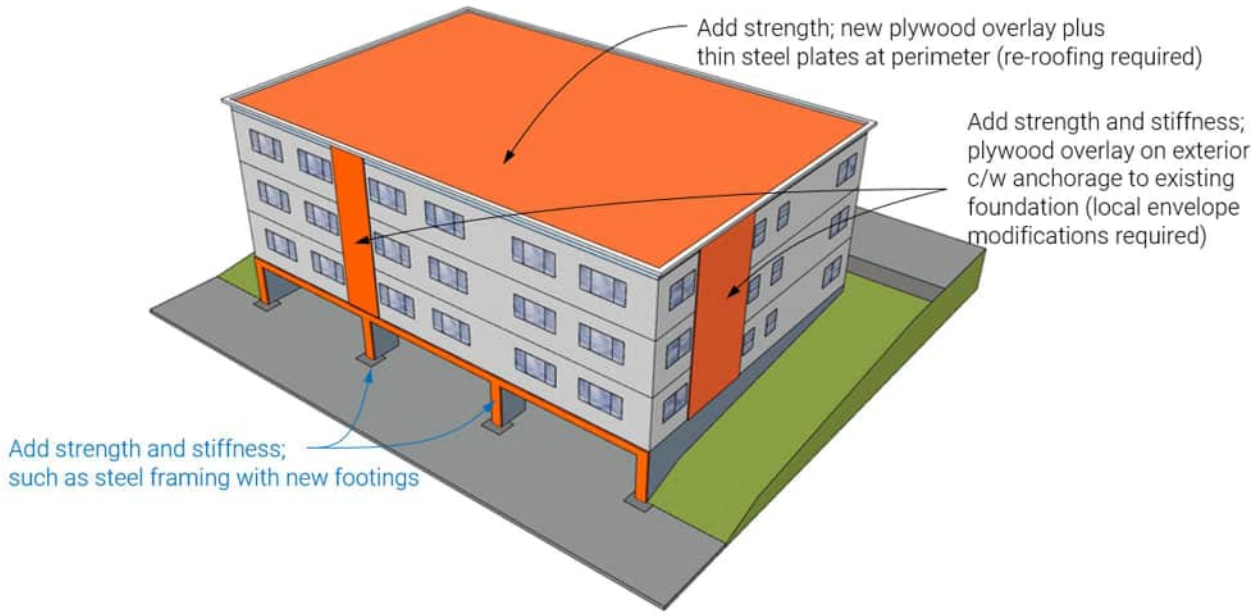
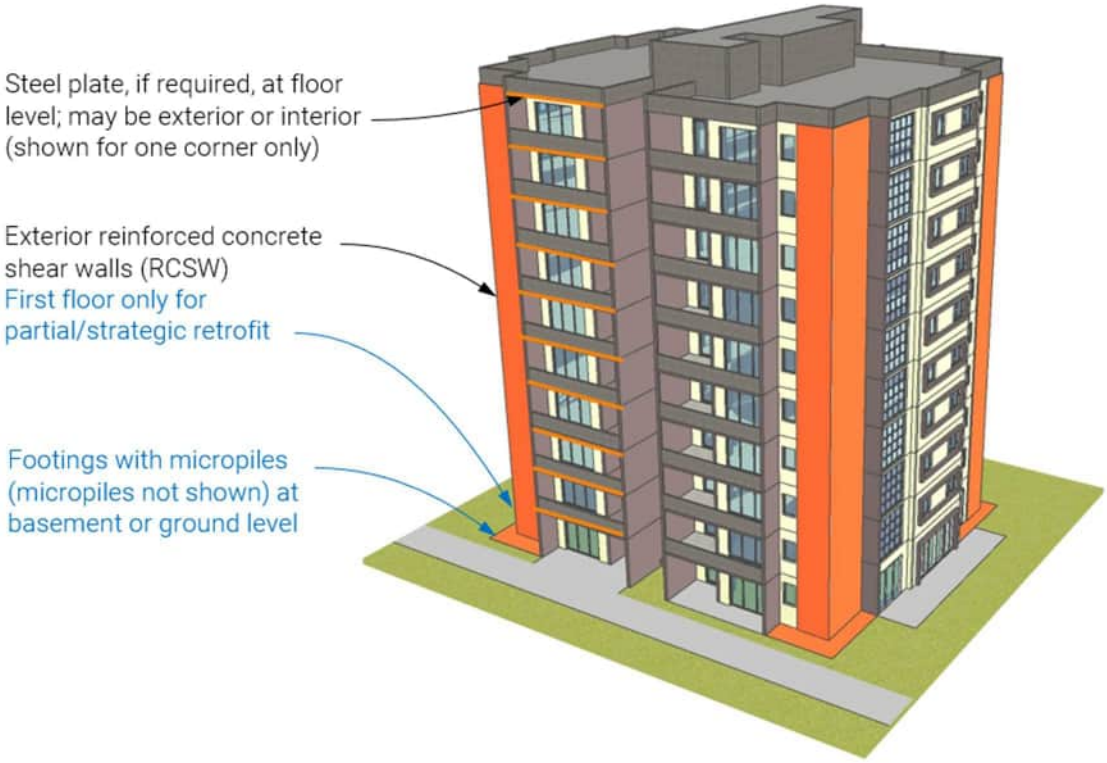


Figure ES-4: CMH Retrofit



3. Take a City-Wide Prioritization Approach

3a. Based on this study, below is a suggested city-wide prioritization approach to stand-alone seismic retrofits aimed at eliminating the most critical deficiencies affecting life-safety in buildings with the highest number of full-time occupants. The archetypes selected in each priority group are consistent with mandatory ordinances in the US.

First Priority Group:

- URM buildings: the full retrofit of the structural system or replacement. WFA buildings with tuck-under parking: a partial/strategic retrofit (see Table ES-4).
    - Proven in the US to be cost effective.
- CMH buildings: a partial/strategic retrofit (see Table ES-4).
    - Most applicable to CMHR buildings that have no occupancy at the ground floor.
    - May also be applicable to CMHC buildings if there is an option to retrofit on a floor-by-floor level when tenants change on those floors.
- CLRCOM, CLRRES, and WFCI buildings where soft storeys can be clearly identified

- The approach would be similar to the partial/strategic retrofit for WFA buildings (see Table ES-4).

Second Priority Group:

- CMH buildings:
  - Full retrofit as a stand-alone project,
  - and completing *First Priority Group* partial/strategic retrofits to a full retrofit.
- WFA, CLRCOM, CLRRES, and WFCI buildings:
  - Full retrofit as a stand-alone project,
  - and extending *First Priority Group* partial/strategic retrofits to a full retrofit.

3b. The seismic restraint of non-structural components is typically carried out at the same time as the structural retrofits listed above. A suggested priority of items to restraint are: URM parapets, URM Gable end walls, heavy URM partitions, brick veneer, and key non-structural components affecting egress from a building. Some North American cities, including Victoria, currently have programs to address the seismic restraint of some non-structural components independent from structural seismic retrofits. Such restraints can mostly be carried out with no relocation of occupants.

4. Consider Co-Beneficial Retrofits when Designing Upgrade Programs

While this study focuses on seismic retrofits, there is a trend for retrofits to be co-beneficial (holistic) incorporating some or all of the following six items along with increasing seismic resilience: 1) Building envelope opportunities, 2) Green buildings improvements, 3) Mechanical systems upgrades, 4) Interior upgrades (occupant health & comfort), 5) Resilience & safety, 6) Building renovations.

A co-beneficial approach includes some or all of the six upgrades listed above along with a partial or full seismic retrofit. The co-beneficial approach can be initiated in one of two ways:

- Initiated by one or more of the six upgrades listed above.
  - Then consideration for including a full or partial/strategic seismic retrofit as part of the building upgrade project.
- Initiated by a full or partial/strategic seismic retrofit.
  - Then consideration for including some or all of the six upgrades listed above.

The value of co-beneficial retrofits is reduced cost compared with some of the six upgrades and seismic retrofits being completed separately. A co-beneficial retrofit can address the key issues important to the owner, and limit construction disruption to the occupants to a one-time project.

5. Develop Incentive and Collaborate with Community to Achieve Risk Reduction

Various guidelines provide guidance on reducing the seismic risks of buildings and emphasize the importance of community outreach and financial incentives to encourage building owners to retrofit their properties. Many California cities, including Berkeley and San Francisco, have implemented programs that offer tax breaks, low-interest loans, and grants to help offset a portion of the retrofit costs.

A local example of a program that offers grants to help offset a portion of retrofit costs is administered by the Victoria Civic Heritage Trust.

6. Develop a Seismic Screening Program as a Foundational First Step

6a. It is suggested that the City consider a screening program for some or all of the 7,800 buildings covered in this study. Screening is a common first-step of a seismic retrofit program, and one should be developed in Vancouver.

A screening program would better identify the vulnerabilities and deficiencies in buildings and would augment the information in the existing database. The existing City database used in this study has limited information based on some visual sidewalk inspections and information from Google Maps; many assumptions had to be made regarding building type and original construction date. Many options are available for such a screening program. It is recommended that screening be customized for each archetype depending on whether it is carried out by a City-led team or by owners, and whether it is voluntary or mandatory.

Some existing screening tools are listed below and can be used to develop a customized screening program for the City.

- FEMA P-154 (2015): Rapid Visual Screening of Buildings for Potential Seismic Hazards
    - Applicable to all archetypes.
    - For use by trained personnel to perform walk-through exterior and limited interior inspections, assigning a seismic risk score.
    - It has been used by the City to screen approximately one-third of City-owned assets.
- NRC Level 2: Semi-Quantitative Seismic-Risk Screening Tool (SQST 2022)
    - Applicable to all archetypes.
    - It involves a site visit, review of existing drawings, and calculation of risk scores by a structural engineer. Scores are used to develop a risk ranking system.
    - This newer screening tool was developed in Canada for Canadian structures. It also includes a scoring system for non-structural components.
- Seismic Rapid Assessment (SRA) per BC Seismic Retrofit Guidelines (SRG 2023)
    - Applicable only to archetypes up to and including four storeys.
    - It involves a site visit, review of existing drawings and is typically carried out by a structural engineer. A risk rating is then developed.
    - This is the only performance-based assessment tool available.
- San Fransico Ordinance No. 70-25 regarding Existing Concrete Building (2025)
    - Applicable only to CMH, CLRCOM, and CLRRES.
    - It was developed as a mandatory screening.

6b. It is suggested that the most effective screening program would include access to drawings of existing buildings (structural and architectural as a minimum) and a short visual walkabout inside the

building. The screening program should determine the relative risk of the buildings and assign one of several risk ratings, such as Low, Moderate, or High.

It is suggested that a small group of engineers, collaborating with the City, could develop a customized screening template for each archetype followed by a trial run before implementation. The goal is to develop a screening template and methodology that are cost-effective, ranging from $3,000 to $10,000 per building, depending on the building's size and complexity. As a starting point, the screening could be limited to WFA and CMH archetypes, the most prevalent by area.

Additionally, the screening program could serve to identify the next steps for a building after a risk rating is assigned. It is suggested that a small group of engineers, collaborating with the City develop either a detailed evaluation program or a retrofit program that may be based on one or more of the following: detailed evaluations such as the NRC Level 3 Seismic Evaluation Guideline (SEG 2025), or a Seismic Project Identification Report (SPIR) per SRG 2023; detailed retrofit design and implementation using NRC Seismic Upgrading Guideline (SUGs 2025), SRG 2023, FEMA P-774 for URM buildings, or FEMA P-807-1 for WFA buildings with soft/weak first storeys.