

# Hazard Resilience Strategies

## *Dam Failure and Structural Collapse*

Dam Failure  
Structural Collapse - Buildings  
Structural Collapse - Transportation

### Dam Failure

---

- Ensure flood control dams are part of an integrated water management plan for regulating seasonal variations and considerations for rainfall variability have been incorporated to prevent dam failures related to heavy rainfall events or to leverage dam capacity during droughts.
- Ensure community-based dam failure exercises have taken place in schools and the community-at-large (e.g., table-top or full-scale exercises).
- Ensure dam operators have an emergency response plan developed in conjunction with downstream communities, outlining what to do in the event of potential or actual dam failure.
- Ensure dams have spillways (parts of a dam designed to pass water from the upstream side of a dam to the downstream side) in place to catch overflow.
- Ensure dam reservoir operation restrictions are in place to minimize risks from over-exertion of the system.
- Ensure dam engineers and safety officials have recently inspected all dams which could affect the community and have retrofitted/or recommended retrofitting any dams that do not meet safety standards (including earthquake resistant upgrades).
- Ensure dam operators regularly monitor dams for compliance with safety protocols and ensure that the dams are well maintained.
- Ensure there is a warning system in place to notify community residents of a potential dam failure.
- Ensure there is a warning system in place to notify emergency response personnel of a potential dam failure.
- Ensure there is a warning system in place to notify transient, homeless migrant and visiting people of a potential dam failure.

## Structural Collapse – Buildings

---

- Ensure the appropriate community officials regularly inspect new buildings being constructed and enforce building code requirements throughout.
- Ensure community officials regularly perform safety checks on existing public buildings.
- Ensure community officials require unsafe structures to be modified/rebuilt to current standards.
- Ensure community-based structural collapse exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises).
- Ensure emergency response personnel have received light urban search and rescue (LUSAR) training and Swift Water Rescue training (where applicable).
- Ensure the community has a building retrofit (to equip with safety upgrades) policy in place (e.g., if more than 50% of the building is being retrofitted it has to be brought to code).
- Ensure the community has a retrofit policy in place for all unreinforced masonry buildings located in an earthquake hazard area.
- Ensure the community has an inventory of buildings not meeting modern building codes and posing a public risk; ensure an action plan for financing and retrofitting/rebuilding these buildings is underway.

## Structural Collapse – Transportation

---

- Ensure community officials regularly inspect new structures being constructed and enforce engineering code requirements.
- Ensure community officials regularly perform safety checks on existing transportation structures (e.g., bridge, overpasses).
- Ensure community officials require unsafe structures to be rebuilt to current engineering standards.
- Ensure community-based structural collapse exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises).
- Ensure emergency response team personnel have received heavy urban search and rescue (HUSAR) training.
- Ensure the community has a long-term mitigation strategy in place to replace aging structures.
- Ensure the community has an inventory of structures not meeting modern building codes and posing a public risk; ensure an action plan for financing and retrofitting/rebuilding these structures is underway.
- The community monitors and reviews on a regular basis: rising tides, increased storm ferocity, and flooding and their impact on bridges.

## References

- Alpsten, G. (n.d.). [Causes of structural failures with steel structures.](#)
- Civil Engineering Academy. (n.d.). [Preventing bridge collapse: The role of civil engineers.](#)
- Government of British Columbia. (2021). [Dam safety.](#)
- Johnstone, W. M., & Lence, B. J. (2009). Assessing the value of mitigation strategies in reducing rapid-onset, catastrophic floods. *Journal of Flood Risk Management*, 2(3), 209-221. <https://doi.org/10.1111/j.1753-318X.2009.01035.x>
- Lave, L. B., & Balvanyos, T. (2006). Risk analysis and management of dam safety. *Risk Analysis*, 18(4), 455-462. <https://doi.org/10.1111/j.1539-6924.1998.tb00360.x>
- Melchers, R. E. (2002). Safety and risk in structural engineering. *Progress in Structural Engineering Materials*, 4(2), 193-202. <https://doi.org/10.1002/pse.110>
- Miller, H. (2020). [Contributing to the field of dam removal science: Analyzing sediment characteristics in mill pond and Sawyer Mill.](#) *Inquiry Journal*.
- U.S. Fish and Wildlife Service. (2017). [The purpose of dam removals.](#) U. S. Government.
- US Army Corps of Engineers. Readiness Support Center. (2016). [Civil level one.](#)
- WorkSafe Victoria. (2020). [Preventing structural collapse.](#)