



Canada Games Pool Tank Leak

Results of the Investigation into Causation

ON TABLE
City Council Meeting
October 30, 2023
re: Item 3.3.a



NEW WESTMINSTER

Investigation Outcome

QUESTION:

What caused the Canada Games Pool tank to leak?

ANSWER:

The tank failure was caused by stress differential resulting from settlement of the sediments under the pool.

Investigation Analysis

GEOTECHNICAL ANALYSIS:

- Considerable variability in depths of fill and silt layers throughout the site;
- The soil types under the CGP building footprint have significant potential for long term settlements;
- Other buildings in the area utilize pile-supported foundations and suspended structural slabs, but the foundation of CGP was slab on grade with timber piles, which was likely the standard at the time of construction;
- Old reports showed evidence of voids in the soils beneath the slab and a previous significant repair to the pool tank and mechanical system that occurred in the early 1990's;
- Fine-grained silts in the soil beneath the pool slab had been experiencing ongoing settlement since its construction in 1972.

Investigation Considerations

CONSTRUCTION VIBRATIONS:

- TACC construction activities included excavation work, compaction, temporary dewatering, drilling and installation of Controlled Modulus Columns ground improvement;
- Noted that this activity could have caused sufficient disturbance to exacerbate pre-existing conditions, however;
- the MetroVan sewer line experienced vibrations within acceptable levels and was closer to the construction than CGP, indicating that the same levels of vibration if not less were experienced at the CGP building.

SUMP PUMP FAILURES:

- Ruled out uplift as the cause of the differential displacement, since the pool water level was always maintained above the groundwater table elevation;
- Very difficult to quantify what impact the change in groundwater hydrology (flooding and subsequent drawdown) would have on foundation soils;
- Concluded that it would be difficult to provide an engineering opinion that connects the sump pump failures as a direct cause to the cracking that was observed at the CGP.

Investigation Conclusion

CONCLUSION:

- The CGP Tank Leak was caused by stress differential resulting from settlement of the foundational soils under the pool.
- Due to a complex site history and the potential for multiple causes, expert analysis was unable to identify a clear cause or causes of the soil settlement and subsequent tank failure.

CONTRIBUTORY FACTORS:

- Age of the facility and its foundation;
- The earlier standard to which CGP was built;
- Prior damage caused to the pool tank;
- Construction vibrations from the adjacent TACC site;
- Weakening and consolidation of the foundation soils from seasonal changes in groundwater, including extreme wet and dry weather encountered immediately prior to the failure.