



Structure Monitoring Technology

**ACADEMIC
RESEARCH
MONITORING**

**Highlights from our recent
research partnerships with
higher learning institutions**

The Living Lab

SKILLED TRADES AND TECHNOLOGY CENTRE, RED RIVER COLLEGE, MB

One of our most outstanding academic partners, Winnipeg's Red River College has transformed its most innovative structure into a living lab.

Our regional project manager applied SMT's years of experience to instrument the conventional roof assembly with a suite of moisture sensors. This system is being actively used to provide moisture data for the roof, and guide any maintenance efforts required.

This structure also features differentiated wall assemblies which are being monitored for a number of key performance indicators, correlated to weather events specific to the site.

The primary purpose of this research was to explore the potential of interoperable building components unified by a single building information model (BIM). SMT contributed many innovations to the project, including new sensor configurations, and Augmented / Virtual Reality data visualization tools.



Sandstone Moisture Monitoring

UNIVERSITY OF MANITOBA / SIMTREC

SMT has specialised in moisture monitoring for over 15 years, a field that is always innovating and changing. In collaboration with Simtrec, based out of the University of Manitoba, we developed a brand new sensor by adapting "duff gauge" surrogate moisture sensors. Our study found that dielectric based moisture content measurement is an effective method to monitor moisture conditions inside building materials. The sensor was so successful that it was used to monitor renovation efforts at the Canadian Parliament buildings.



First Nation Pilot Home Study

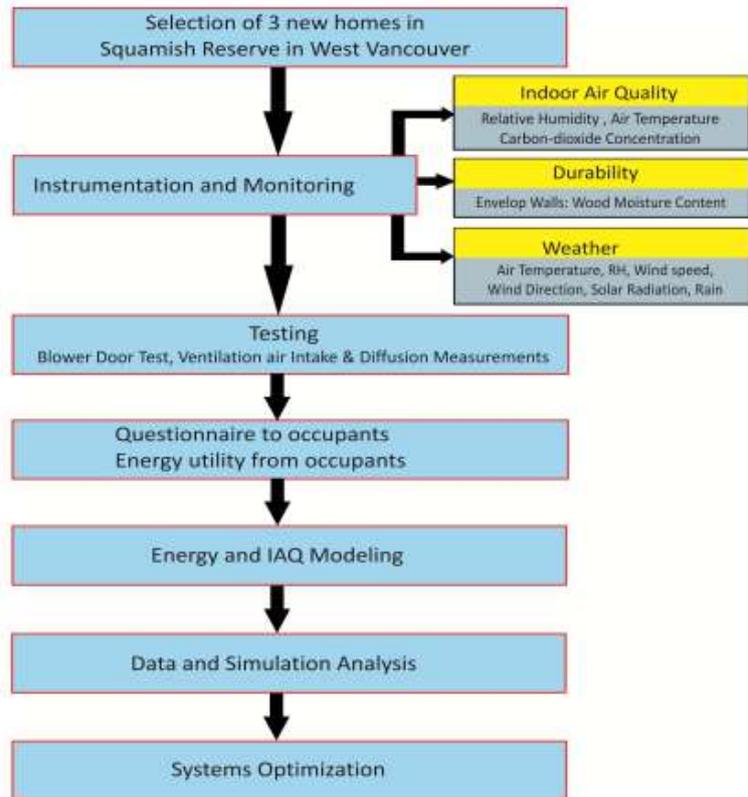
BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Aboriginal families are significantly more likely to live in poor housing conditions than the general population. In Canada, most of these houses are often located in colder regions, which challenge the construction, the indoor air quality and the energy consumption.

With Loveleen Atwal from BCIT, in collaboration with BC Housing, SMT Research supported a pilot study with the following goals:

- Monitor a group of urban aboriginal homes to obtain preliminary durability, indoor air quality and energy performance data
- Use this data to propose a cost-effective solution to optimize the quality & resiliency of these homes
- Study remote communities in the far north and investigate construction systems and Technologies that are resilient and responsive to the unique conditions

Research Methodology



Wood Roof Attic Hurricane Performance

UNIVERSITY OF FLORIDA

With Climate Change bringing us increasingly frequent extreme weather events, resiliency has become a building science buzzword. The east coast of the United States is particularly vulnerable to high winds and driving rain due to hurricane season.

An SMT Attic Moisture Monitoring System was provided to the University of Florida for their research into increasing wood-roof attic strength and resistance to the forces of hurricanes by the application of closed-cell spray applied polyurethane on the interior sheathing surface.



Mass Timber Monitoring

OREGON STATE UNIVERSITY

SMT worked with OSU to instrument Peavy Hall - an 80,000 sq ft structure in the Forest Sciences Complex which allows students, faculty and staff to see and explore first hand the potential of wood.

With the help of SMT sensors and data loggers, the team at OSU have been able to capture and analyse valuable data which benefits its students, faculty, and the larger construction industry.

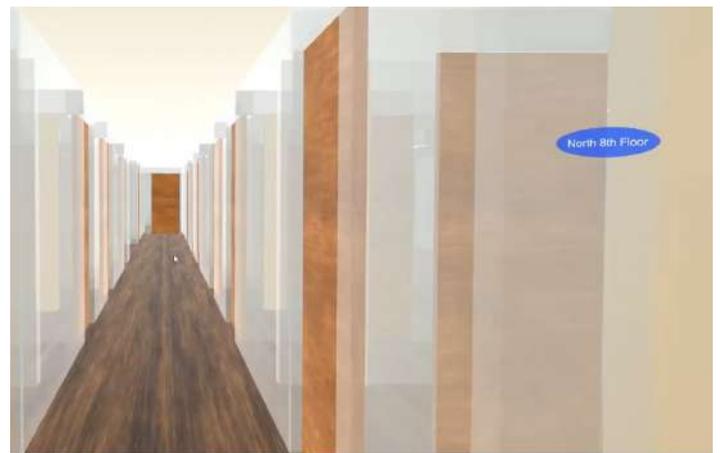


Data Visualization

UNIVERSITY OF BRITISH COLUMBIA

On the subject of Mass Timber monitoring, SMT was heavily involved with the groundbreaking work done at UBC to monitor their hybrid concrete / CLT student residence - Brock Commons.

In addition to providing sensors and data loggers, as well as guiding instrumentation, SMT designed a custom application to let those inside, study and monitor the performance, seeing sensor data in real time. Using the Unity Game engine, the building can be virtually explored in a first person, augmented reality mode, where sensors can be identified and engaged. After identification, users can analyze the installed sensors in real time to see how the building is operating.



Golf Course Monitoring

RED RIVER COLLEGE, MB

SMT designed custom wireless CO2 sensors to monitor winterization techniques on golf greens in Manitoba. The study involves observing three of the in-play greens at five Manitoba golf courses – those being Boissevain, Elmhurst, St. Charles, Pinawa, and Bel Acres – under three different environments.

