Simulated Wind Driven Rain (WDR) will be introduced to walls’ sheathing at window’s sill height (Region of interest) 

- Incorporating a fabric with uniform water distribution and redistribution
- Introduction of rain penetration amounts based on prior research work that correlates WDR to Water Ingress into Walls from a typical interface defect

### Wall Panels (General)
- Six 4’x8’ Wall Panel Specimens
- All R-40 (effective)
- Advanced Framing System

### Instrumentation
- Test panels: moisture pins, thermistors, relative Humidity, and moisture detection tape sensors
- Boundary conditions: Outdoor temperature, relative humidity, wind speed and direction, wind-driven rain, solar radiation and indoor temperature and relative humidity conditions
- Record the hygrothermal performance (every five minutes) and boundary conditions (every one minute) data

### MOTIVATION
- Climate Change, Aggressive targets to lower CO2 emission
- Net-Zero Emission, Passive Design, ...
- More stringent Energy Standards & Codes
- Durability of super-insulated wall system initiative is unknown
- Hygrothermal design of walls with better drying capability

### OBJECTIVE
- To compare Drying Capability of the various walls under water ingress from a typical interface defect
- Will lead to choosing the best alternative, and/or improving each or the best option among the rest
- ...by enhancing the “Drying Capability” of the walls
- Results could also be used to validate or enhance the existing computer hygrothermal models (HAMFit)

### METHODOLOGY
- Research based on Long-term field Experimental study (at least one-year)
- Wall Assemblies will be built, instrumented and installed on the South-East side of BCIT Building Envelope Test Facility (BETF),
- Located in Burnaby, British Columbia, to be exposed to actual exterior weather conditions (similar to Marine Climate Conditions)

### Wall Assemblies (Types)

#### Type A: Double Stud with Dense Fill Cellulose Insulation
- Exterior:
  - B1t thresh. Fiber Cement Board
  - 19mm Ventilated Air Cavity
  - Tyvek Housewrap
  - 18mm Plywood Sheathing Board
  - 8mm Dense Fiber Insulation batt, 244 Studs
  - 24mm Gap between Dense Fill Insulation batts
  - 18mm Ventilated Air Cavity
  - Type A Cement Board
- Interior:
  - 13mm Opus Board Interior Sheathing

#### Type B: Double Stud with GF Batt Insulation
- Exterior:
  - 8mm Fiber Cement Cladding
  - 19mm Ventilated Air Cavity
  - Tyvek Housewrap
  - 13mm Plywood Sheathing Board
  - 8mm Glass Fiber Batt Insulation batt, 244 Studs
  - 24mm Gap between Glass Fiber Batt Insulation batts
  - 8mm Fiber Cement Cladding
- Interior:
  - 13mm Opus Board Interior Sheathing

#### Type C: Double Stud Wall with Low Density Sprayfoam and Glassfiber Batt Insulation
- Exterior:
  - 8mm Fiber Cement Cladding
  - 19mm Ventilated Air Cavity
  - Tyvek Housewrap
  - 13mm Plywood Sheathing Board
  - 51mm Low Density Sprayfoam
  - 39mm Glass Fiber Batt Insulation batt, 244 Studs
  - 10mm Gap between Glass Fiber Batt Insulation batts
  - 8mm GF Batt Insulation batt, 244 Studs
  - 8mm Polyethylene
  - 13mm Opus Board Interior Sheathing
- Interior:
  - 13mm Opus Board Interior Sheathing

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### EXPERIMENTAL SETUP

#### Wall Panels (General)
- Six 4’x8’ Wall Panel Specimens
- All R-40 (effective)
- Advanced Framing System

#### Experimental Variables
- Various VB/VR strategies
- Insulation Types
- Wall Assemblies Configuration
- Water Penetration Scenarios

#### Boundary Conditions
- Interior boundary conditions: BETF air conditions (45-55% RH, 21°C)
- Outdoor Boundary Conditions: Real climate exposure (Burnaby, BC)

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### Data Analysis

- Wetting & Drying trends of critical regions extracted from recorded data through DAQ
- Comparative analysis between walls
  - Mould, RHT, ICEM, ... Moisture Indicators
  - Or will be initiated (if needed)
- Conclusion over better choice of variables (Vapor Control, Insulation Type, and configuration of each) will be drawn
- Variables fed to hygrothermal models to validate the data as well as the models