

## Notes from Kumsheen Resort Gathering (Friday November 12, 2021).

### Awareness

Is there any doubt (regarding climate change)? No!

Extreme weather events (heat, rain, wind and cold) is occurring in greater frequency duration and intensity. Time between events is also shortening (consecutive) and overlapping (concurrent).

We are seeing many impacts in our region and communities:

- Drought, uncontrolled fire and significant infrastructure loss
- Flood, landslides
- Freeze and thaw events
- Water supply and infrastructure failures
- Short and long-term road closures
- Power outages, supply change disruption
- Community-wide evacuations

Choice: Invest in resiliency or be overwhelmed by emergency response mode.

Partners: We all benefit from the study and a test project:

- Federal, provincial, municipal, industry, NGO's and the impacted themselves.

### Applied Research

Information is needed. What are our collective options?

A study by Canadian schools to support and complement the Lytton Recovery (short term solutions) and the options for the actual rebuild (longer term).

There are global materials and suppliers that exist, who can help protect built assets (homes, businesses, administration, and service centers) and essential supporting infrastructure (energy, water, waste (solid and liquid) roads and communications. Who are they, where are they and how much?

Challenge:

- Who is going to participate and conduct the research, the build and reporting?
- Who is going to pay for the study and the build and the monitoring and reporting?

1. A Desk Exercise: Locate, review and report on available data from websites, research and written materials submitted:

- Global materials and suppliers: to be determined
  - examples include AAC, Nexi, ZS2, MGO, Cinder Block...
- What did the worlds manufacturers/suppliers do to test their stuff (ask for it):
  - Who has said what and examine the testing that corroborates their assertions?
- Assess completed projects elsewhere:
  - to determine known pros and cons and options!

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A Desk Exercise Road map:

- who, time, test criteria, cost, scope increase
- first draft expected in early December, 2021
- Desk Exercise to be completed by end of January 2022

2. A Controlled Environment: testing of components and systems:

- Keep it simple – see draft table below
- Don't need to re-create the testing criteria – use the industries

A Controlled Environment Study Road map:

- who, time, test criteria, cost, scope increase
- first draft expected in early December, 2021
- Controlled study to be completed by end of March 2022

### **Constructing the Buildings of Tomorrow, Today**

Chosen participants who supply Desk Exercise and Controlled Environment materials will be invited to design and construct a “showcase” project in our region.

- New Buildings:
  - floors, walls, ceilings, roofs & penetration points
- Supporting systems:
  - energy, heat/cool, air circulation, water in, waste out
- What size is an appropriate base “square foot” size
  - external building length and width?

A Road Map:

- Global invitation to be extended by study team from studies above.
- Participation determined in February 2022
- Targeting construction start:
  - April 4, 2022
- How many and how big?
- Where will the new test buildings be located?
- Who will own and manage?
- Who can stay there?

### **People, Time, Technology and Money**

Between now and the end of January 2022. Partners will be approached and asked to share their insights on the study and build.

- Who is going to pay for the study?
- What about the costs of land, clearing, water in, sewage out, access roads, energy sources and foundations,
- Then there is the actual build costs.
- How are operating, maintenance and reporting costs going to be covered.

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To be fair and to produce meaningful and reliable data and options for everyone – what can be compared “desk” and “onsite”?

Short Form	Comments
Affordability (investment)	Capital (installed cost per sq foot) <ul style="list-style-type: none"> <li>• Depreciation?</li> <li>• Capital gain later?</li> </ul>
Affordability (maintenance)	Operating Costs (wash, paint, repair, replace) <ul style="list-style-type: none"> <li>• Access Management Plan - when things need to be replaced.</li> </ul>
Air (quality)	Envelope sealed space: <ul style="list-style-type: none"> <li>• Air movement in and out.</li> <li>• Allergens, smoke, smells, heat, moisture</li> <li>• blower door testing?</li> </ul>
Air (Smells)	Off gassing: What is released by the component or built structure in manufacturing, construction, use por after an extreme weather event? <ul style="list-style-type: none"> <li>• Allergens and or toxicity or just smells funny</li> <li>• Soaking up of “air” by the built structure itself <ul style="list-style-type: none"> <li>○ grease, smoke</li> </ul> </li> </ul>
Base/Source materials	Where are the materials coming from to manufacture/build? <ul style="list-style-type: none"> <li>• are we creating Canadian jobs and taxes?</li> <li>• Are we breaking import dependency?</li> </ul>
Building Permit & Occupancy	Depending on where a build occurs – who issues the building permit and occupancy ticket? <ul style="list-style-type: none"> <li>• What are the usual requirements of a BP? <ul style="list-style-type: none"> <li>○ example civic address, sealed design drawings</li> </ul> </li> <li>• Delay is a regular BP occurrence - is it getting worse?</li> <li>• Expedient review and approval?</li> <li>• Who applies for the BP and Occupancy ticket? <ul style="list-style-type: none"> <li>○ In particular – a Lytton new build project?</li> </ul> </li> </ul>
Climate (carbon sequestration)	Do the materials allow for anthropogenic carbon sequestration?
Climate (GHG in construction)	How dirty is the construction in terms of GHG emissions or other contaminants? <ul style="list-style-type: none"> <li>• The individual materials that make a component.</li> </ul>
Climate (GHG in production)	Carbon impacts – exacerbate – neutral or reversal?
Climate (GHG in transportation)	Closer the source material – logical less carbon in transportation
Construction Schedule	Time to build
CSA/Building Code (approved)	Meet or exceed the BC Building Code! <ul style="list-style-type: none"> <li>• CSA to be changed next fall</li> </ul>
Durability (Air)	How do you rate a component or a build against wind? <ul style="list-style-type: none"> <li>• Tornado, hurricane, extreme winds... <ul style="list-style-type: none"> <li>○ Shoot a 2x4 at a wall....?</li> </ul> </li> </ul>
Durability (Earthquake)	California/Coastal
Durability (Maintenance)	Normal wear and tear, weathering <ul style="list-style-type: none"> <li>• UV, wind, heat &amp; grandchildren</li> </ul>

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Energy (Efficiency)	<p>Interior:</p> <ul style="list-style-type: none"> <li>• Is R-Value an appropriate measure?</li> <li>• Its walls, floors, ceilings, and penetration points</li> <li>• Cost of heating, cooling, lighting, air circulation</li> <li>• Appliances and plug ins: <ul style="list-style-type: none"> <li>• can use behind the meter hardware (CURB or Sense tech)</li> </ul> </li> </ul>
Insurance (Mortgage)	<p>Can you get a mortgage without insurance?</p> <ul style="list-style-type: none"> <li>• Where else can we get the money to build new homes or renovate/retrofit existing ones?</li> </ul>
Insurance (Premiums)	<p>How much and what is covered?</p> <ul style="list-style-type: none"> <li>• for older builds (assuming higher if you can get)</li> <li>• for new fire-resistant homes or retrofitted homes <ul style="list-style-type: none"> <li>○ lower and affordable?</li> </ul> </li> </ul>
Mould (resistance)	<p>What produces mould (air, water, heat, food)</p> <ul style="list-style-type: none"> <li>• How do we test for this?</li> <li>• How do we clean if it happens?</li> </ul>
Penetration Points	<p>Windows, doors, vents, water, sewage, electrical, renewables</p> <ul style="list-style-type: none"> <li>• Why do we need so many?</li> <li>• They make the durability weaker.</li> <li>• They make energy efficiency weaker</li> </ul>
Rodent/Insect	<p>What can get into the house</p> <ul style="list-style-type: none"> <li>• assuming windows and doors are closed</li> <li>• see other penetration points</li> </ul>
Sound Transfer (exterior)	<p>Seismic/sonic:</p> <ul style="list-style-type: none"> <li>• Can you hear a train or vehicles going by?</li> <li>• Interior sound measurement devices/software</li> </ul>
Sound Transfer (interior)	<p>Seismic/sonic:</p> <ul style="list-style-type: none"> <li>• TV, microwaves, grandchildren</li> </ul>
Strength (durability - years)	<p>Straw, wood, or brick.... how do we determine "length of usability?"</p> <ul style="list-style-type: none"> <li>• moisture, dry rot and gradual failure of shell and systems</li> </ul>
Strength (flexible – tension etc))	<p>If it is moved or flexes</p> <ul style="list-style-type: none"> <li>• damage and repair requirements</li> </ul>
Strength (i.e. foundations)	<p>Lateral/Side forces</p> <ul style="list-style-type: none"> <li>• keeping the house shell up</li> <li>• basements, crawlspaces issues</li> </ul>
Strength (load – bearing walls)	<p>Exterior versus interior</p> <ul style="list-style-type: none"> <li>• pretty important – keeping the ceiling up</li> <li>• dry load versus rain &amp; snow loads</li> </ul>

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Test Project (Location)	The new builds testing can be built temporarily or be installed permanently. Possible sites include: <ul style="list-style-type: none"> <li>• Lower Kanaka, Old Mill Site, Airport or LFN lands</li> <li>• Location is important – it determines BP</li> </ul>
Test Project (own/manage)	Should be an independent body: <ul style="list-style-type: none"> <li>• fair, consistent, transparent and honest</li> </ul>
Test Project (who can use)	Depends on purposes – focus on residential. <ul style="list-style-type: none"> <li>• It's for the residents who were evacuated, displaced, and dispersed – then they can apply and rent the completed units</li> </ul>
Thermal (exterior flame)	Direct flame versus radiant heat. <ul style="list-style-type: none"> <li>• Resistance versus</li> </ul>
Thermal temp transfer)	Cool in summer/warm in winter? <ul style="list-style-type: none"> <li>• External cold and heat stays out – <ul style="list-style-type: none"> <li>○ allowing internal temperature to be controlled.</li> </ul> </li> <li>• Walls, floor and ceiling thermometers? <ul style="list-style-type: none"> <li>○ consider components in direct sun or facing north</li> </ul> </li> </ul>
Transportation	Fuel and other haul costs
Use (who can install)	Shell and Systems <ul style="list-style-type: none"> <li>• Human Resources – layperson, experience, or school?</li> <li>• Regular or specialized tools and equipment?</li> </ul>
Versatility (ceiling)	It's where the heat and cold escapes – often overlooked. <ul style="list-style-type: none"> <li>• This is where R rating shod be at</li> </ul>
Versatility (cladding)	External look
Versatility (floor)	Can the walls and ceiling products be extended to the floor?
Versatility (new build)	Component versus system (wholistic)
Versatility (renovations)	For the buildings that survived the fire and flooding. <ul style="list-style-type: none"> <li>• how do we bring them up a resiliency code (retrofitting)</li> </ul>
Versatility (roof)	Peaked versus flat <ul style="list-style-type: none"> <li>• Venting, repairs, maintenance, R factor &amp; heat transfer</li> </ul>
Versatility (thickness)	Bricks, panels or sheeting
Versatility (wall components)	Interior walls <ul style="list-style-type: none"> <li>• vapour barrier, insulation, drywalls, painting, hanging pictures, attaching cabinets....</li> </ul>
Water (resistance)	Seepage, leaks (not a flood) <ul style="list-style-type: none"> <li>• Is there truly a hydrophobic material (absorption)?</li> <li>• How do we seal the build to minimize? <ul style="list-style-type: none"> <li>○ getting into ceilings walls, basement</li> <li>○ Wicking – drawn into cracks and gaps</li> </ul> </li> </ul>
Weight	<ul style="list-style-type: none"> <li>• Pound per square foot.</li> <li>• Bulk?</li> </ul>