SFU RENEWABLE CITIES
MORRIS J. WOSK CENTRE FOR DIALOGUE

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

LOCAL PREFAB MASS TIMBER SOLUTIONS

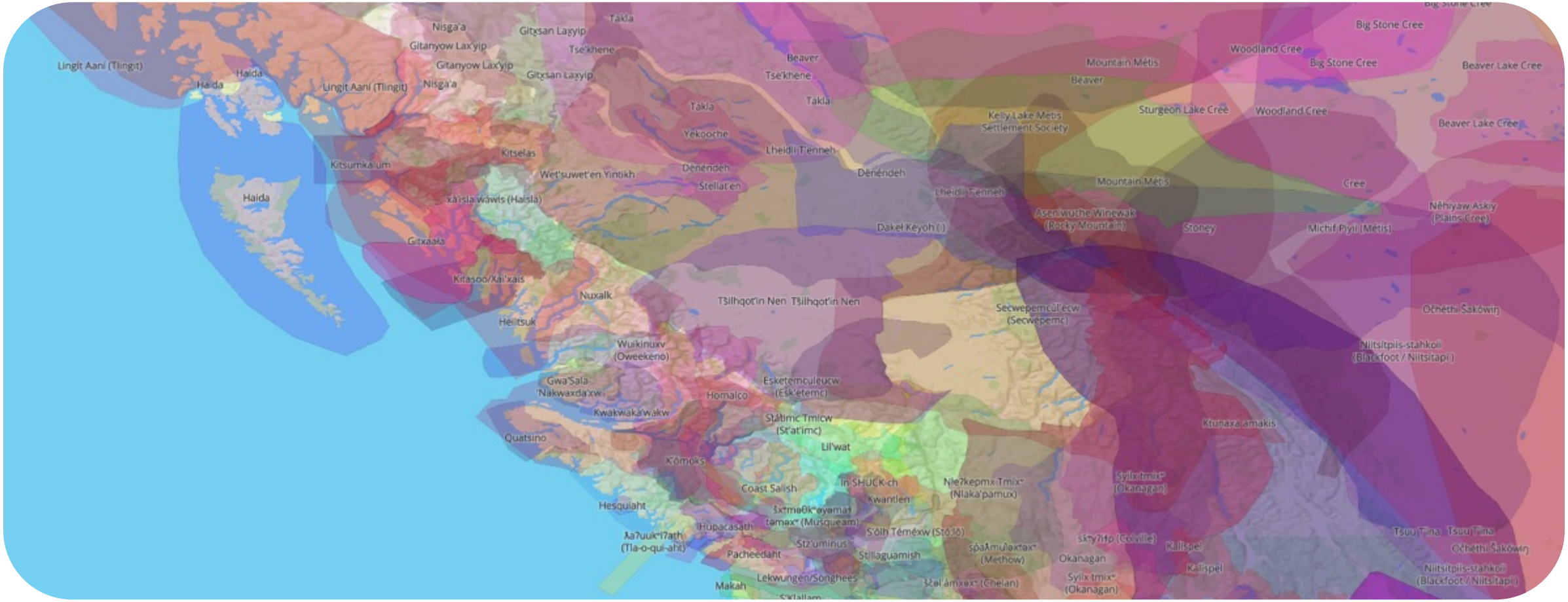
BOABC 2023 CONFERENCE

Presentation Overview

1. Introduction
2. Project Development & Guide Overview
3. Local Government Solutions
   a. OCP, Zoning Bylaws
   b. Building Permitting
   c. Developer Perspective
   d. Local Government (CNV) Perspective
4. Collaborative Action
5. Panel Discussion
6. Q/A - Discussion

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

Land Acknowledgment

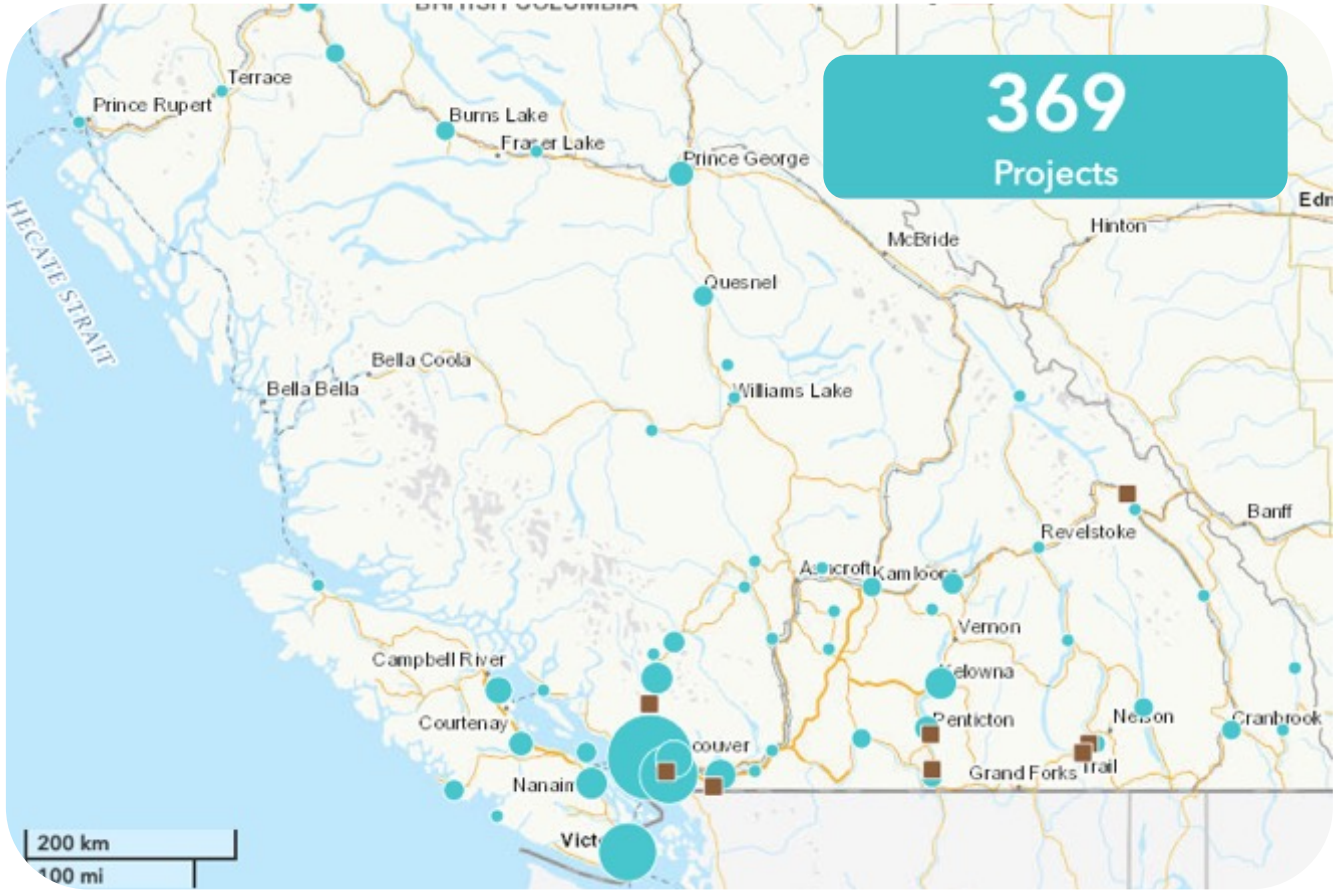


What is Mid-rise Prefab Mass Timber?

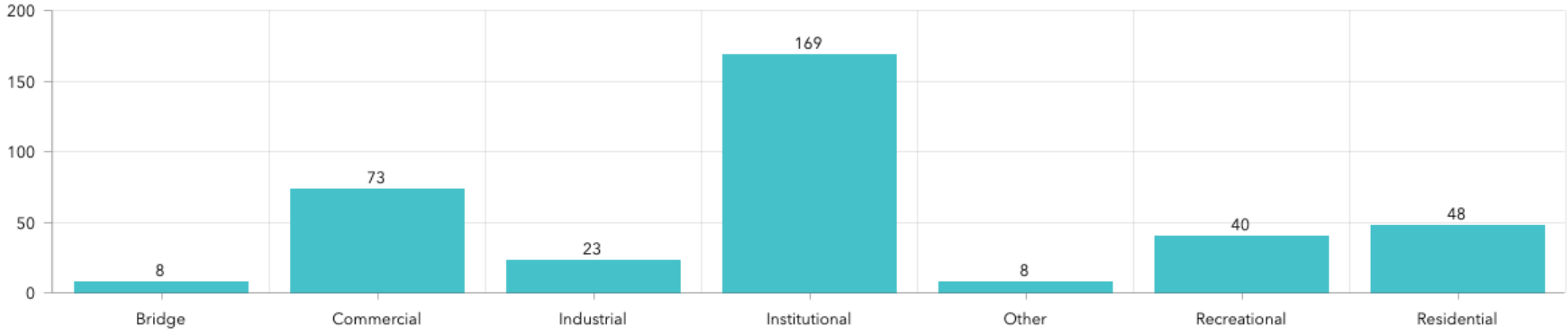
Brock Commons - UBC Student Housing

Vienna House. Images PUBLIC Architecture

State of Mass Timber in B.C.



Project count by occupancy/use



Why Mid-Rise Prefab Mass Timber

Brock Commons Tallwood House - Tall Wood Building progress. Credit: naturallywood.com Photographer: KK Law (flickr.com)

ECONOMIC DEVELOPMENT

- **Support B.C.'s forestry sector and an evolving value-added pre-manufacturing sector that uses less raw materials**
- Create industrial and community economic opportunities
- Enhance worker safety and **productivity in a climate controlled environment**
- Build resilience to declining fiber quantity & quality

LIVEABLE COMMUNITIES

- Support transit-oriented development at densities beyond 6 storey wood frame buildings
- Use this new density, wood mid-rise building form to **deliver more housing affordably**
- Build faster, reduce constructions disruptions, waste and environmental impacts

CLIMATE AND ENVIRONMENT

- Lower carbon footprint than concrete or steel
- **Supports the delivery of top tiers of the Energy Step Code**
- Encourages wiser use of fibre with a diminishing supply of renewable wood

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

Project Evolution & Guide Overview

T3 Mount Pleasant, PC URBAN

Vienna House. Images PUBLIC Architecture

Capstone, Society of Hope - NOvation Architecture Ltd.

Challenges at a Variety of Levels

- Human Resource Capacity
- Demand/Supply Dynamics
- Provincial and Federal Policy
- Local Government Policy

Team

PROJECT TEAM

Brad Doff
Senior Program Manager,
Renewable Cities, SFU
Senior Project Manager

Arjun Singh
Community Builder
Better Citizen Consulting
Local Government Advisor

Gary Penway
MCIP, Principal,
Gary Penway Consulting
Land Use Policy
Specialist

Helen Goodland
Principal, Head of Research
& Innovation,
Scius Advisory
Building Innovation Advisor

Norm Couttie
President,
Ecosse Development
MT Developer Specialist

John de Ruiter
Chief Building Inspector
(former), CNV
Permitting & Inspection
Specialist

Alex Boston,
Exec. Dir. (former),
Fellow, RC, SFU
Project Advisor

Daniel Wilson
Architect, Associate,
ZGF Architects
Design Guideline Advisor

Marie Bednash
Principal,
ZGF Architects
Design Guideline Advisor

ADVISORS

Tim Ryce
Professional Engineer &
Chief Building Official,
CNV
Local Government &
Building Official Advisor

Catherine Ernst
Building Official (former),
BOABC
Building Official
Advisor

Geoff Triggs
Evolution Building Science
Owner/Principal
Building Code
Advisor

Building Capacity - Project Overview

TIMELINE

PHASE 1

Land Use Policy

Winter 2022

PHASE 2

Design Guidelines & Permitting

Spring-Fall 2022

PHASE 3+

Outreach & Engagement

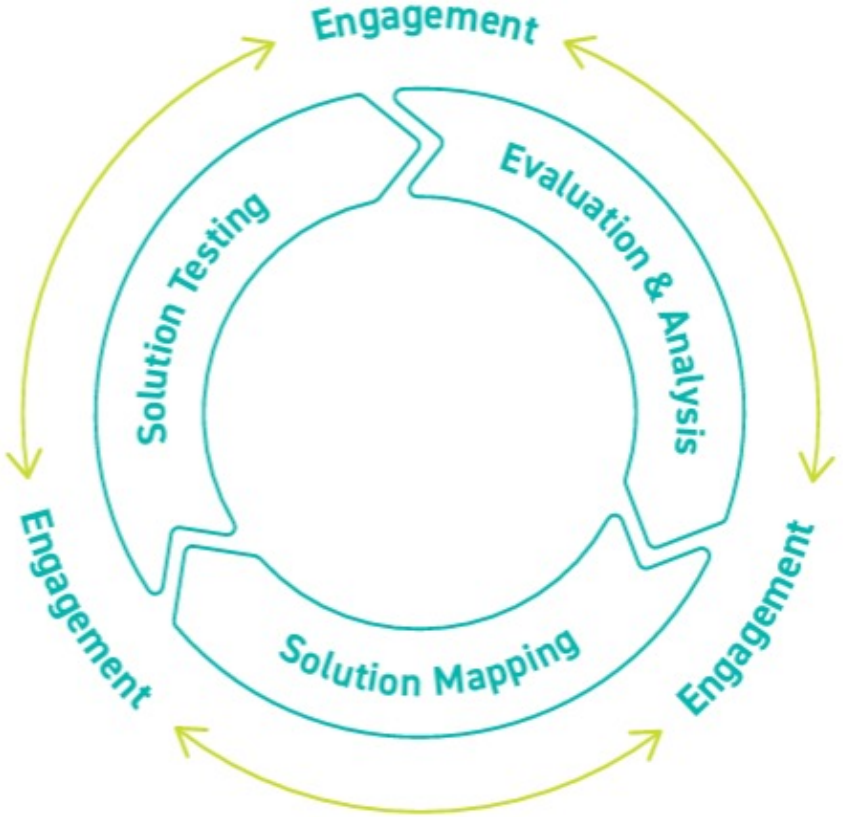
Winter 2023+

FUNDERS

Building Capacity - Project Overview

Approach

- Year-long engagement and analysis
- Engagement with 250 local government, building design consultants, developer, manufacturer, provincial government and non-profit stakeholders
  - 2 LG and industry stakeholder workshops
  - Stakeholder semi-structure interviews (including BO's)
  - 3 stakeholder surveys



Project Overview

Organizations Engaged

Building Industry

Adera Development
Aspect Structural Engineers
Axiom Builders
D'Ambrosio architecture + urbanism
DIALOG
Ecosse
EllisDon
Evolution Building Science Ltd.
Fast + Epp
Gary Penway Consulting
GHL Consultants Ltd.
Glotman Simpson
Henriquez Partners Architects
Integra Architecture
Intelligent City Inc.
Kalesnikoff Inc.
Kindred Construction Ltd.
Kinsol Timber Ltd.
Ledcor Group
LWPAC Inc.
MA+HG Architects
Mackin + Associates
McFarland Marceau Architects Ltd
MCM Architects
Meiklejohn Architects Inc.
NOvation Architecture
PC Urban Properties Inc.
PCI Developments
Perkins & Will
Prock Ltd
RDH Building Science Inc.
RH Architects
ROV Engineering Consultants
Ryder Architecture
Scius Advisory
Scuka Construction
Seagate Mass Timber
StructureCraft Inc.
Urban One Builders Inc.
Ventana Construction
WHM Structural Engineers
ZGF Architects Inc.

Local and Senior Governments & Agencies

City of Abbotsford
BC Hydro
British Columbia Institute of Technology
City of Burnaby
City of Campbell River
City of Colwood
City of Coquitlam
City of Delta
Forestry Innovation Investment
City of Kelowna
City of Langford
City of Langley
Office of Mass Timber Implementation
City of Mission
Ministry of Jobs, Economic Recovery and Innovation
City of Nanaimo
City of New Westminster
City of North Vancouver
City of Port Moody
District of Squamish
The University of British Columbia
City of Vancouver
City of Victoria
District of West Vancouver

Building Capacity - Project Overview

Mass Timber Project's Engaged

Project Name	Municipality	Floors
2150 Keith Drive	Vancouver	10
2933-3005 Murray Street	Port Moody	12
820/826 Dogwood St. and 615/633 Lea Ave	Coquitlam	12
BCIT Student Housing	Burnaby	12
Capstone	Kelowna	9
Crest	North Vancouver	7
MAC, 305 Main Street	Vancouver	11
Sophia, 304 East 1st Avenue	Vancouver	9
T3 Mount Pleasant, 304 East 1st Avenue	Vancouver	12
Tallwood I at District 56	Langford	12
Vancouver Island University Student Residence	Nanaimo	9
Tresah West - Mixed-Use Condo Development	Victoria	12

Guide Overview

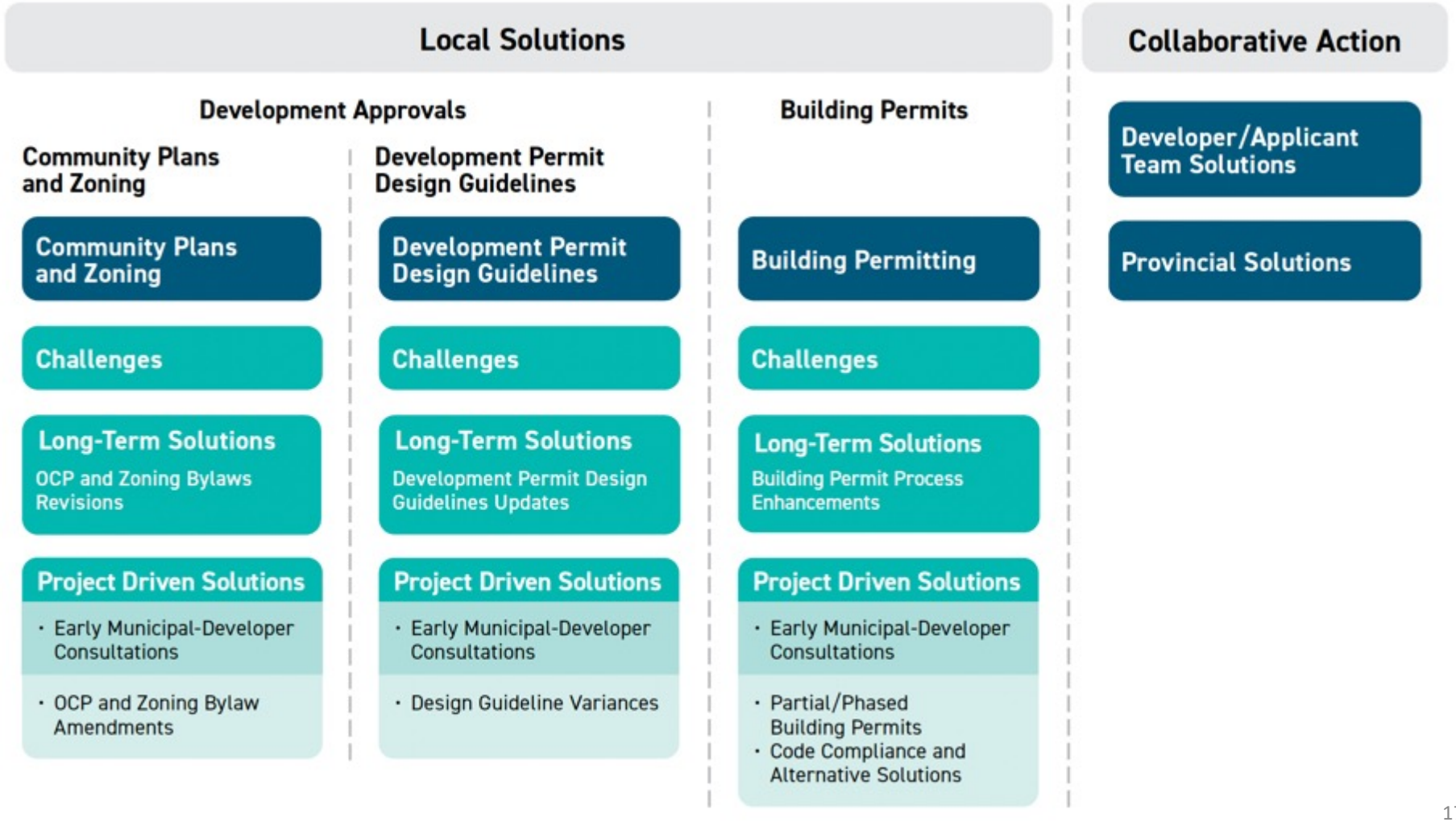
Guide Overview

LONG-TERM SOLUTIONS

Actions local governments can take to tune policy and processes for the future.

PROJECT DRIVEN SOLUTIONS

Actions local governments can take for specific projects.

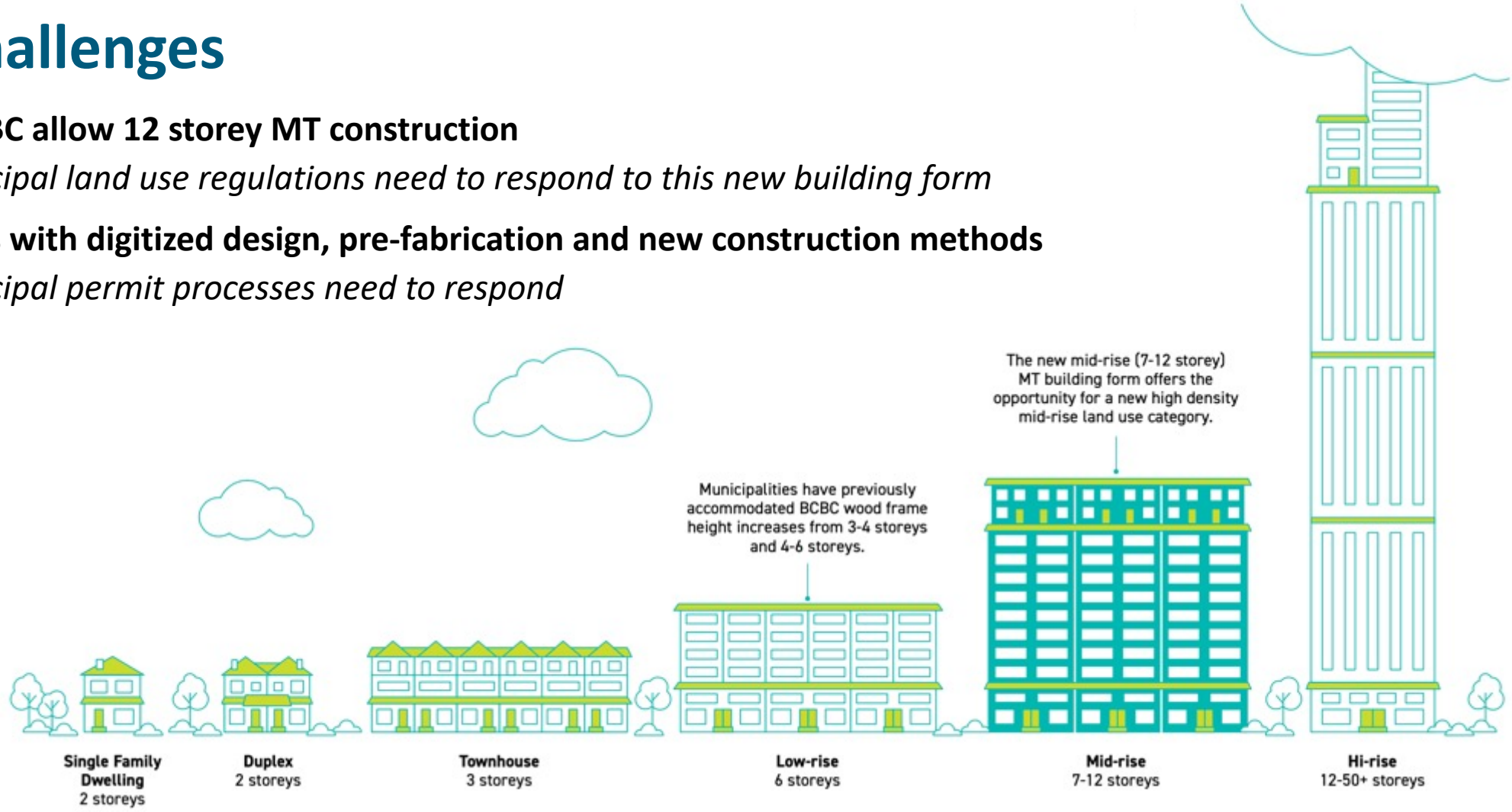


BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

Getting Ready for Mass Timber:
Local Government Challenges and Solutions

Local Challenges

- **BCBC & NBC allow 12 storey MT construction**
  - *Municipal land use regulations need to respond to this new building form*
- **MT comes with digitized design, pre-fabrication and new construction methods**
  - *Municipal permit processes need to respond*



MT and Land Use Regulations

1. Education for Council and staff

2. New OCP/ Zoning categories for 7-12 storey / high density buildings (3.5 FSR - 5.0 FSR)

4. Adjust zoning height measurements to accommodate thicker mass timber floor assemblies.

5. Adjust Design Guidelines to accommodate MT design features and construction efficiencies

Community Plans and Zoning

Challenges

Long-Term Solutions

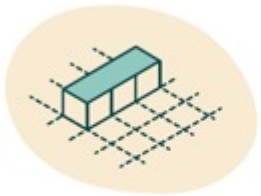
OCP and Zoning Bylaws Revisions

Project Driven Solutions

- Early Municipal-Developer Consultations
- OCP and Zoning Bylaw Amendments

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

Mass Timber: Design Characteristics & Building Implications



Mass Timber Structural Logic

The logic of a cost-competitive mass timber structure tends not to be as responsive as required by existing zoning bylaws.

Pre-determined constraints or design expectations can erode the efficiency of structures conceived with repetitive, standard dimensions of engineered timber products.

Building Height

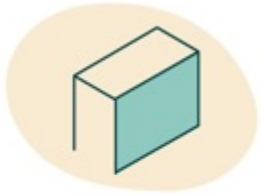
Mass timber floor assemblies are thicker than concrete, translating to comparatively taller buildings to achieve the same interior clearances.

Thus, a Timber project may not fit under the same height restrictions as an equivalent building in concrete.

Prescribed Articulation of Massing

Design guidelines and OCPs frequently request upper storey setbacks to provide massing relief and articulation of a base, middle and top of a building.

Such massing modulation can be difficult and costly to accommodate with a mass timber structure.



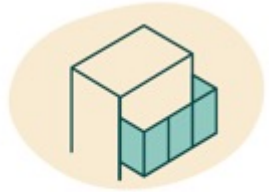
Massive Bar

Bar-type buildings built on long lots with densities conducive to encapsulated mass timber construction often present an over-bearing, heavily shadowing building form.

These attributes may meet stiff public resistance.

Public / Ground Interface

Consideration for varied ground plane responses which embrace the inherent vertical lines and material logic of timber towards creating activated street interfaces.



Balconies / Private Outdoor Space

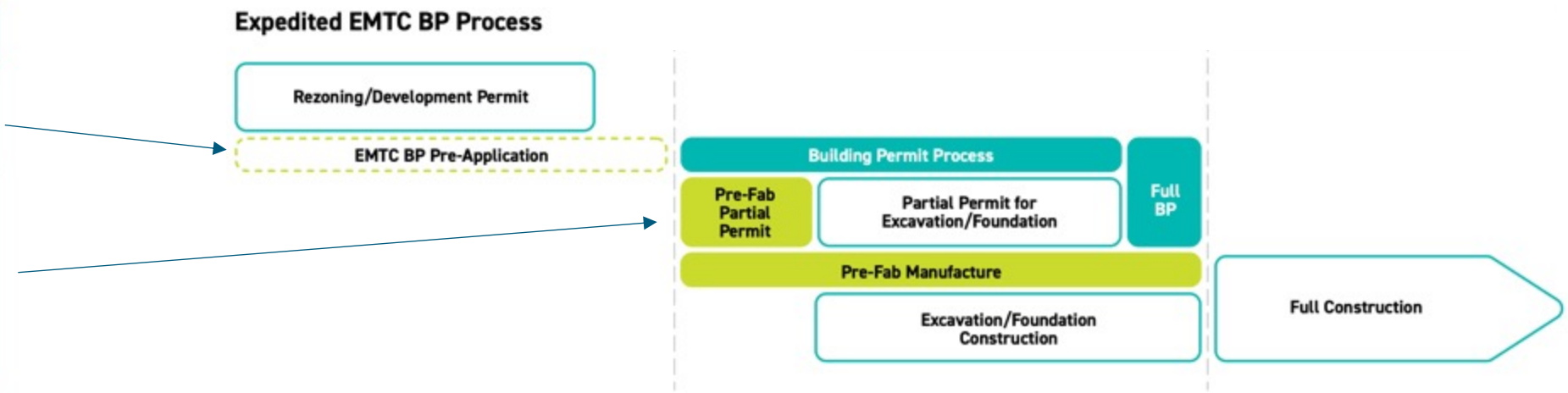
Multifamily residential buildings are often required to provide private outdoor space for family oriented units. Balconies can introduce significant complexity and cost on mass timber buildings.

Building Permit Process Solutions

Project Driven Solutions

Go to page 54

- Early Municipal-Developer Consultations
- Partial/Phased Building Permits
- Code Compliance and Alternative Solutions



Building Permit Solutions

Long-Term Solutions

Building Permit Process Enhancements

1. Education for staff.
2. Identify and support building code changes to reduce the need for alternative solutions.
3. Enhance the building permit process overall to speed applications.

Building Permit Solutions

Long-Term Solutions

Building Permit Process Enhancements

BUILDING PERMIT PROCESS ENHANCEMENT: GUIDING PRINCIPLES

- Develop Excellence and Transparency in Building Permit Process
- Seek Council's Direction on Roles and Responsibilities
- Create Corporate/Department Business and Strategic Plans
- Create a Comprehensive Building Permit Intake/Review/Issuance Business Process
- Upgrade Permitting Software and Technology
- Encourage Pre-permit Application Meetings
- Accelerate Review/Approval Process (including partial permits for pre-manufacturing)
- Client/Applicant Streamline the Building Permit Processes
- Local Governments Streamline the Permit Approval Process
- Encourage Solutions from Outside Approving Agencies

Solutions Guide Overview

LONG-TERM SOLUTIONS

Actions local governments can take to tune policy and processes for the future.

PROJECT DRIVEN SOLUTIONS

Actions local governments can take for specific projects.

Local Solutions

Development Approvals

Community Plans and Zoning

Community Plans and Zoning

Challenges

Long-Term Solutions

OCP and Zoning Bylaws Revisions

Project Driven Solutions

- Early Municipal-Developer Consultations
- OCP and Zoning Bylaw Amendments

Development Permit Design Guidelines

Development Permit Design Guidelines

Challenges

Long-Term Solutions

Development Permit Design Guidelines Updates

Project Driven Solutions

- Early Municipal-Developer Consultations
- Design Guideline Variances

Building Permits

Building Permitting

Challenges

Long-Term Solutions

Building Permit Process Enhancements

Project Driven Solutions

- Early Municipal-Developer Consultations
- Partial/Phased Building Permits
- Code Compliance and Alternative Solutions

Collaborative Action

Developer/Applicant Team Solutions

Provincial Solutions

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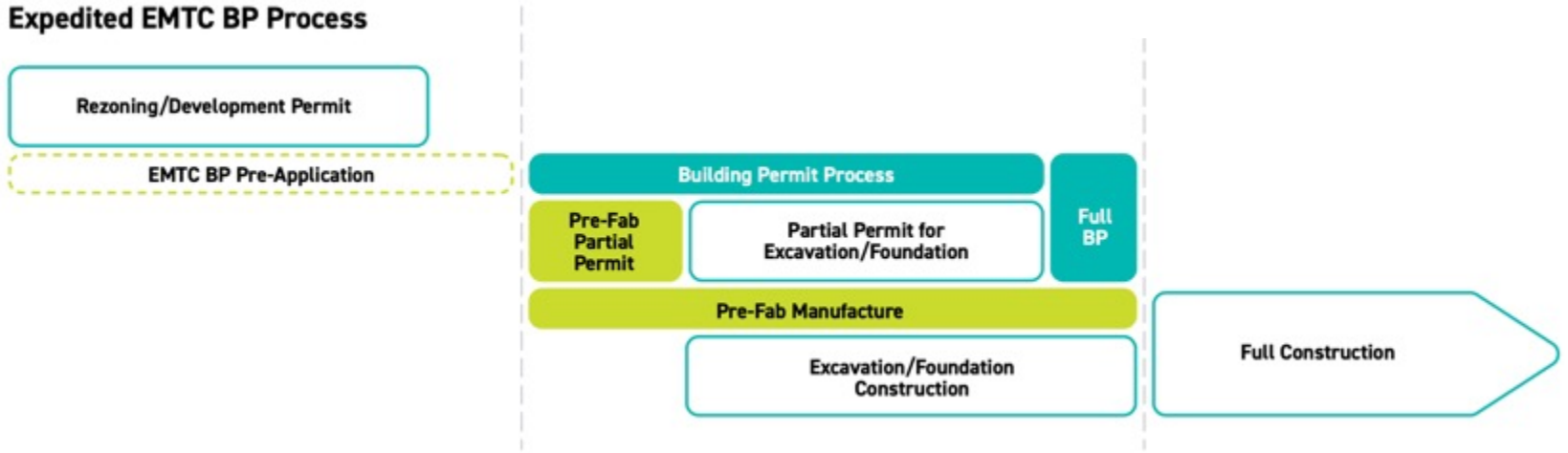
Developer Perspective

Permit Schedule

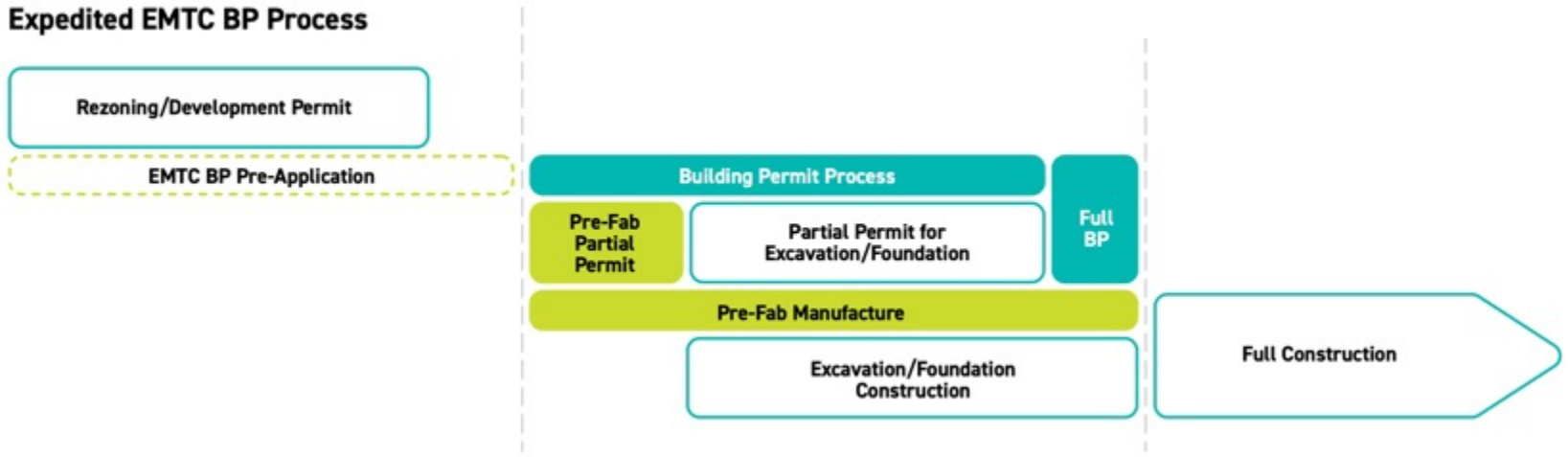


Permit must be > 2 months earlier or no point in doing MT/Prefab

The interest savings can be several $million

1. Today – that $ covers the extra cost of MT/Prefab.
2. Future - when MT/Prefab costs go down (with more supply), the interest saving will go towards lowering construction cost of homes (eventually).

Permit Schedule

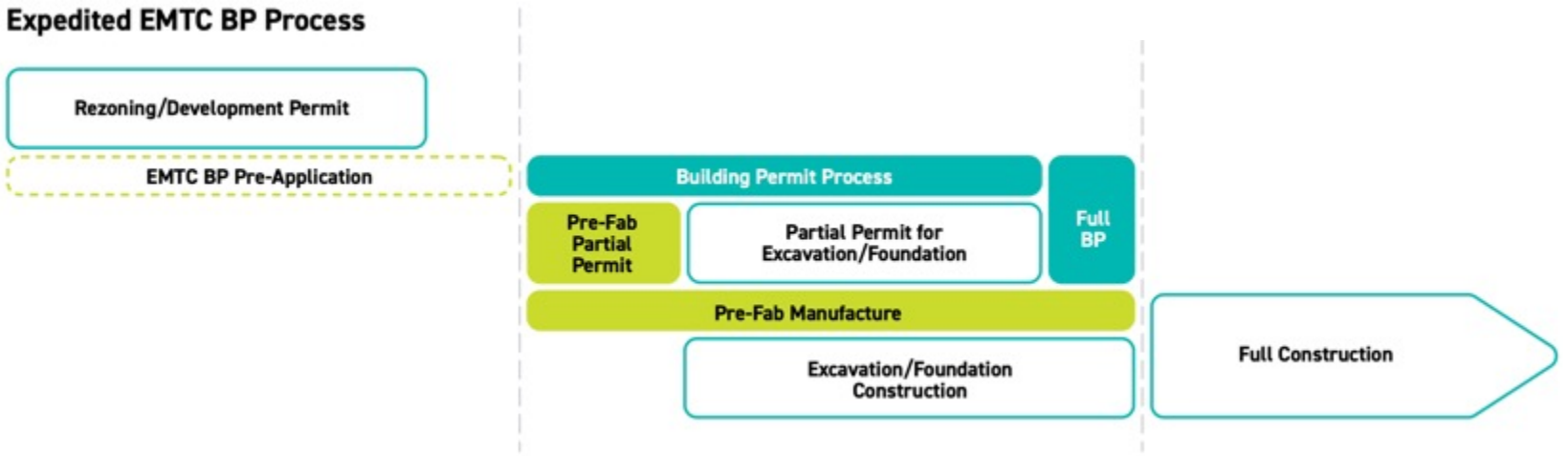


Early Prefab Partial Permit is essential. . . no time/cost saving . . . no MT/Prefab

The interest saving pays for the extra cost of MT/Prefab

1. Building Officials are essential to adoption of MT/Prefab – no early partial permit, no MT/Prefab.
2. Risk – the developer must be certain that he will get the time saving/interest saving – otherwise too risky to us MT/Prefab.

Permit Schedule



Lack of supply of MT/Prefab doesn't change your role . . . no time/cost saving . . . no MT/Prefab supply increase

Early Partial Permits must become the norm

1. Both MT/Prefab users and suppliers need to be confident that the time/cost savings will be there.
2. Building Official's credibility is essential to advancing MT/Prefab.

“Senior” Developer Perspective

The interest saving pays for the extra cost of MT/Prefab (yes, I’ve said this already)

Seen a lot of this kind of thing before . . . and smart people will work out all the technical issues (eventually)

1. So, to me, bylaws and code are not the enduring problem . . . assuring that the MT/Prefab purchase contract can be signed early enough to capture the time and cost saving is.
2. You are not the only ”barrier” . . . but you are a necessary condition to increasing the supply and adoption of MT/Prefab in British Columbia.

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

A Local Government Perspective

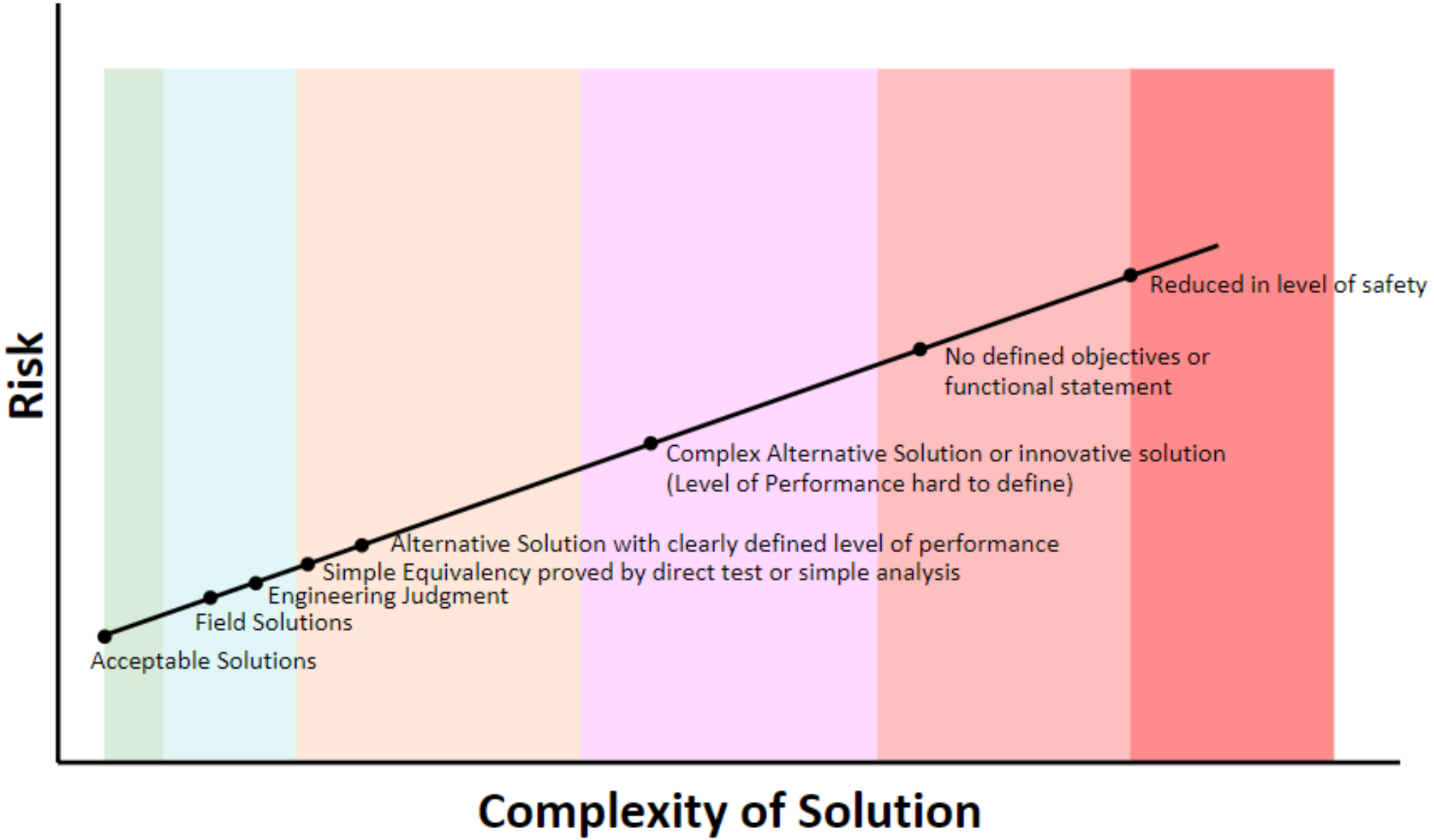
City of North Vancouver Perspective

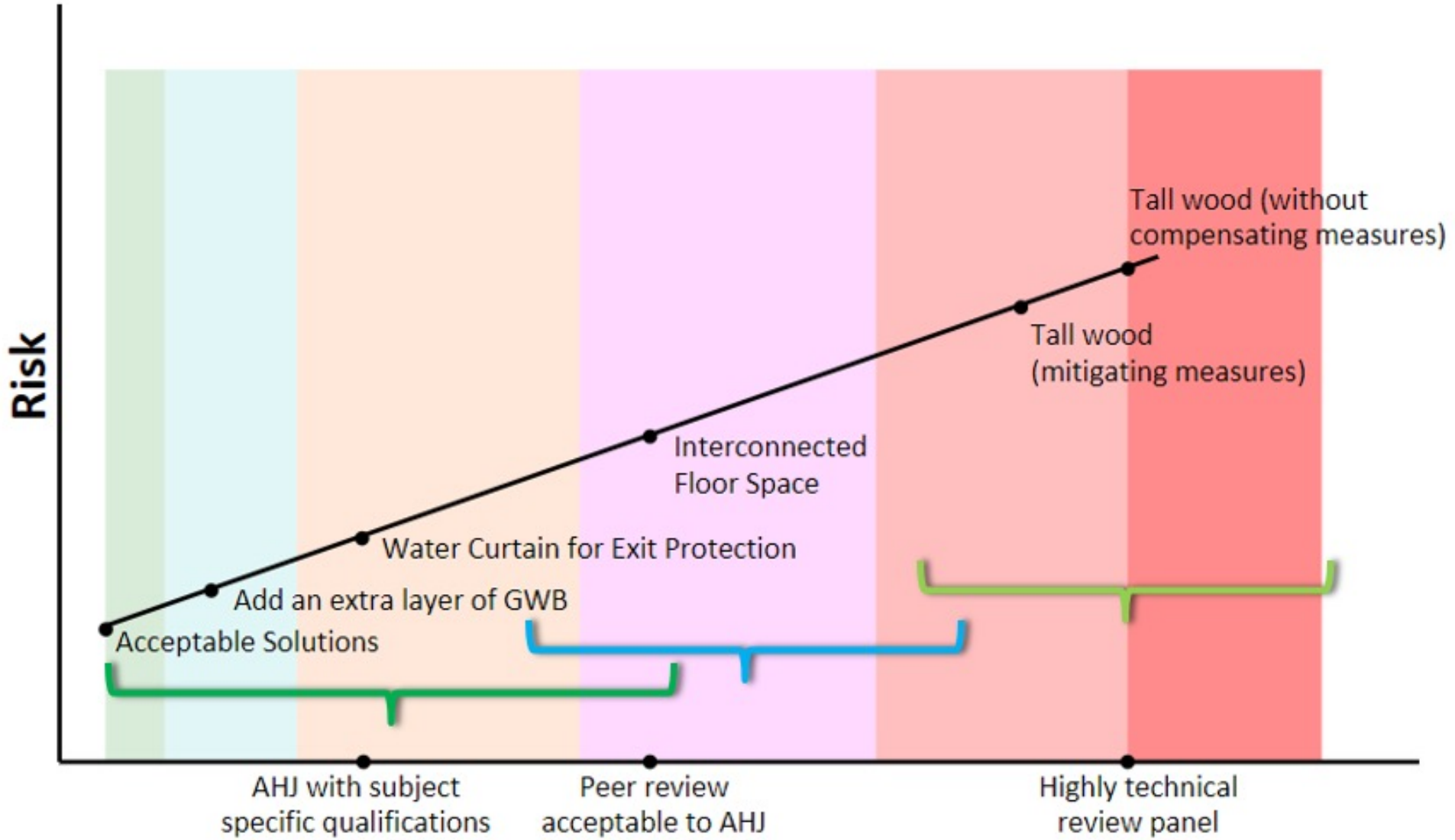
or

"How can I make this work for ME?"

Two Common Issues

1. Complex Technical Review Challenges
2. Permit Issuance Timelines


Risk
Reduced in level of safety
No defined objectives or functional statement
Complex Alternative Solution or innovative solution (Level of Performance hard to define)
Alternative Solution with clearly defined level of performance
Simple Equivalency proved by direct test or simple analysis
Engineering Judgment
Field Solutions
Acceptable Solutions
Complexity of Solution



Appropriate Level of Review

Peer Review

What

- Free and open exchange between the parties:
  - Proponent
  - Authority
  - Related Parties, such as Fire Department, Engineering
  - Sometimes user groups
  - Peer Reviewer

Peer Review

Why

- Registered Professional expertise limitations
- AHJ expertise limitations

Peer Review

How

- AHJ confirms need or desire for Peer Review
- Peer Reviewer selection
- Review completion
- Recommendation to AHJ
- AHJ determination

Peer Review

- Used effectively, Peer Reviews can be a gift to both the AHJ and the developer
  - Knowledge, confidence, time
- A clear process is critical for maximum effectiveness
- Competent peer reviewers are incredibly tough on each other

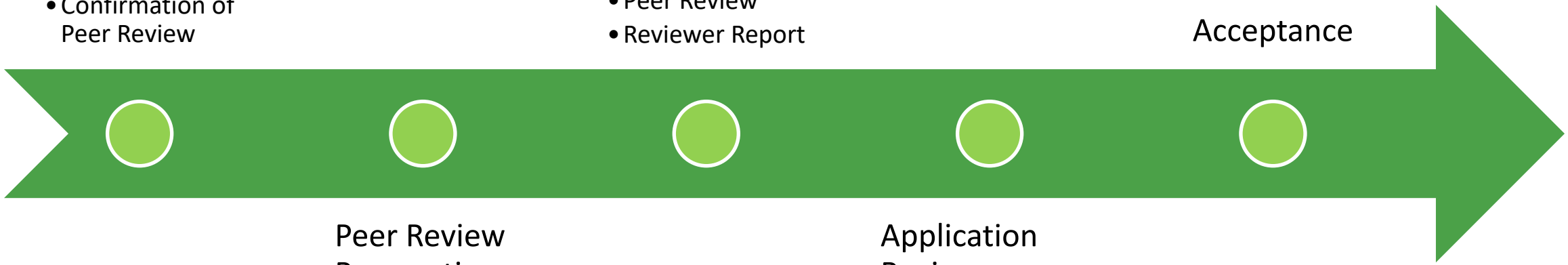
Role of the Building Official

- Confirm
- Collaborate
- Contribute

Crest (Adera)

- 7 storeys
- CLT floors & firewall
- 12 Alternative Solutions
  - CNV requested Peer Review of 5
- Firestopping – Engineering Judgments

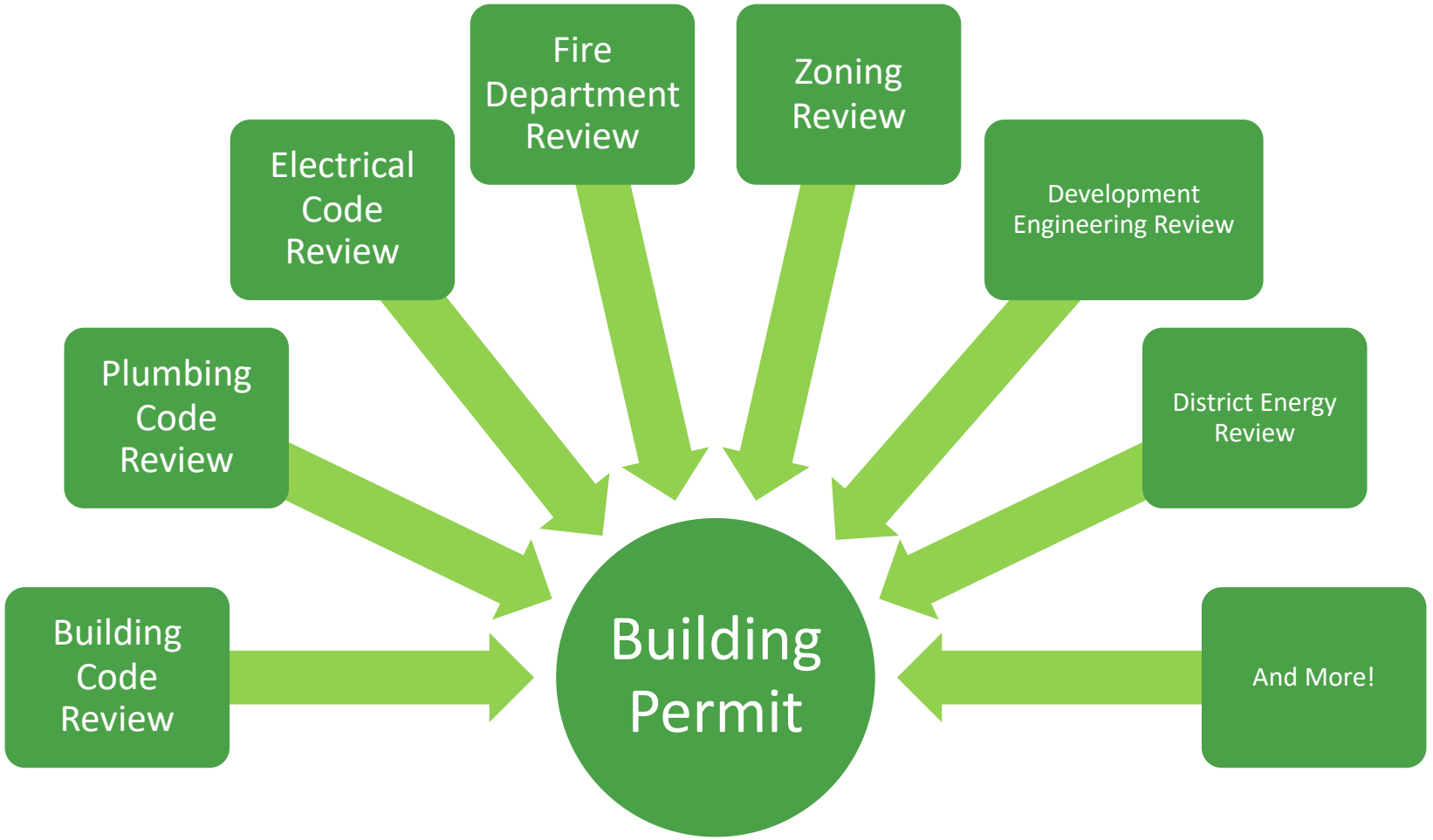
Crest – Peer Review Process



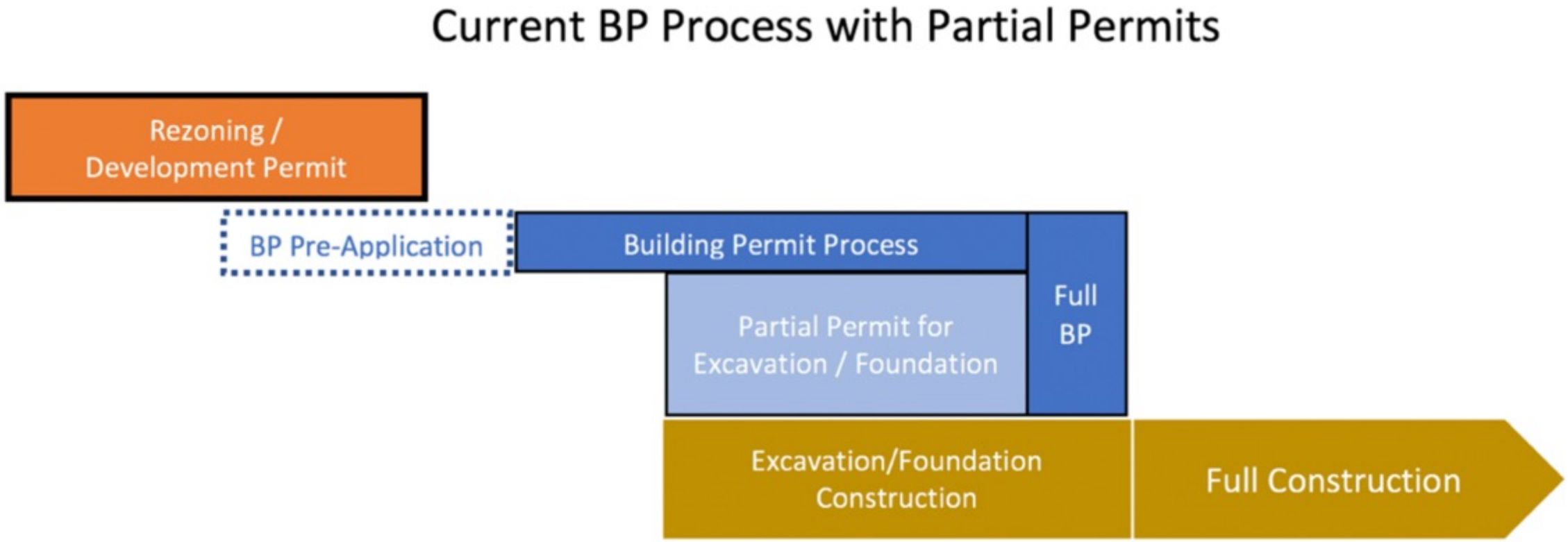
Two Common Issues

1. Complex Technical Review Challenges
2. Permit Issuance Timelines

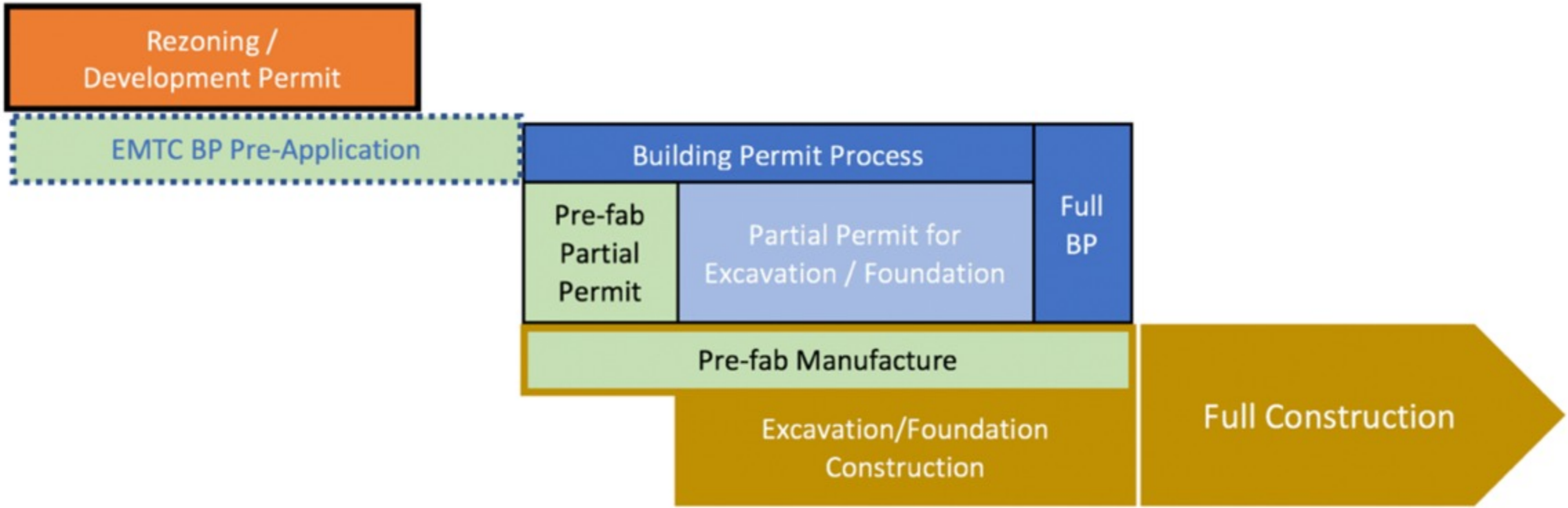
Permit Issuance Timelines



BP Process – Typical Phased



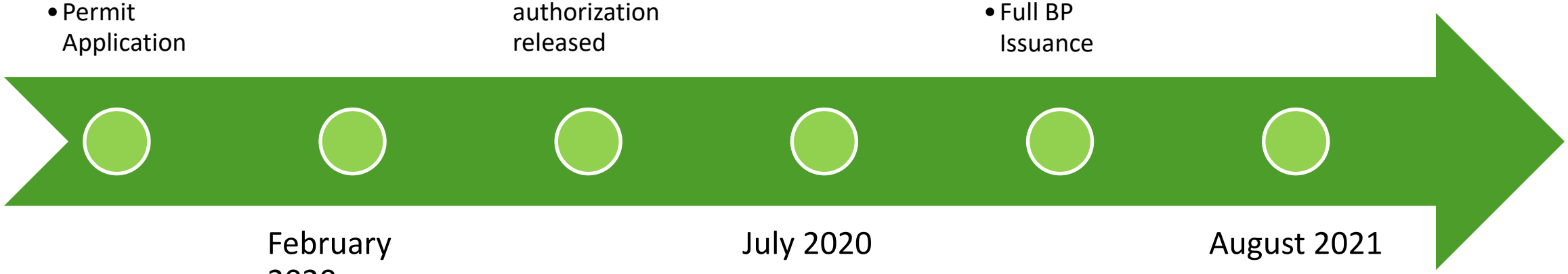
BP Process – Optimized for Offsite Construction



PH1

- 3-storey office & restaurant
- CLT (offsite prefab)
- Passive House
- (Only) 3 Alternative Solutions
- Firestopping – Engineering Judgments
- 9 days to lockup

PH1



June 2019
- Permit Application

February 2020
- Offsite Prefabrication Confirmation released

May 2020
- Excavation pre-BP authorization released

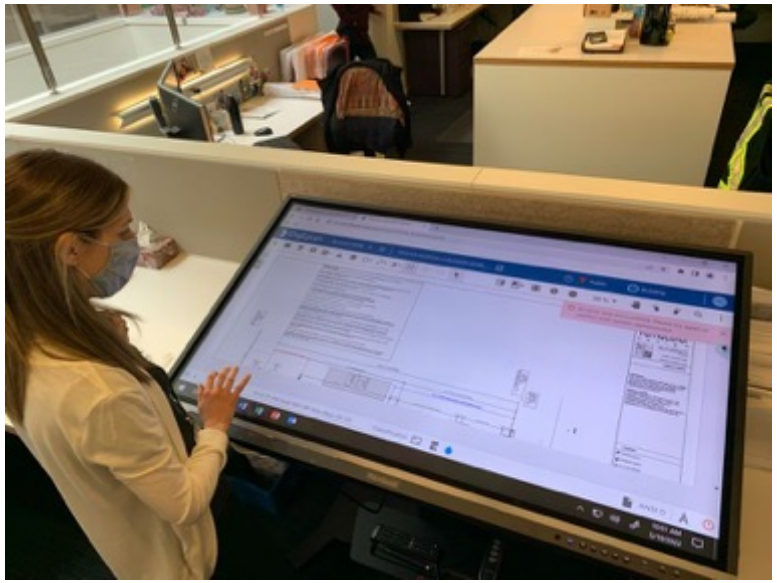
July 2020
- Above-grade pre-BP authorization released

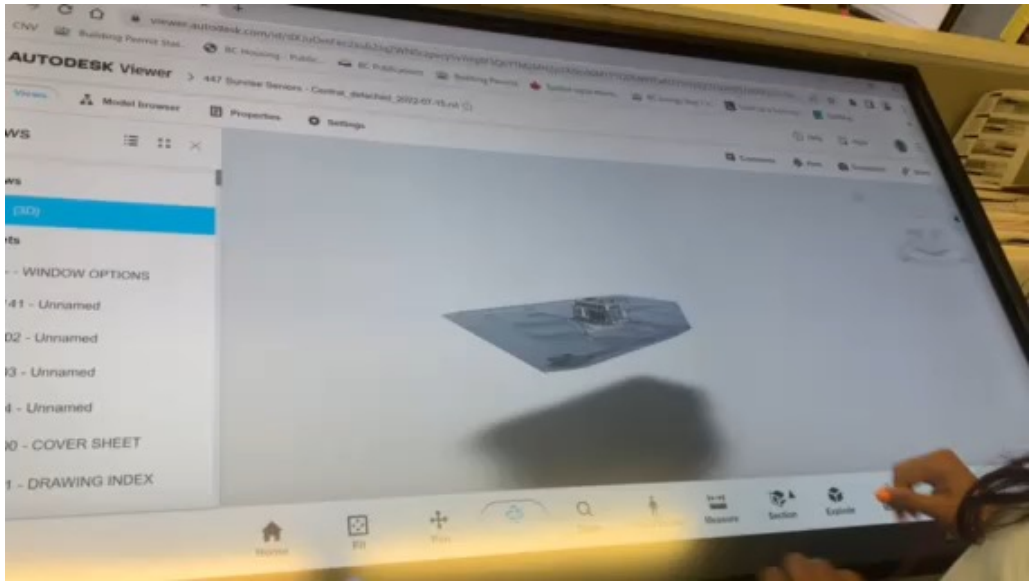
September 2020
- Full BP Issuance

August 2021
- Occupancy

Future Opportunities

- Municipal Process Modernization





Parting Thoughts

- It’s ok to be nervous!

- Mass Timber is a catalyst to better buildings and development processes

- Just because you can do something doesn’t mean that you should

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

Collaborative Action

Collaborative Action

During the engagement process, several other general solutions outside of the purview of local government were identified that apply to complementary key players

Collaborative Action

Developer/Applicant Team Solutions

Provincial Solutions

Collaborative Action

Early Municipal-Developer Consultations

Local Solutions

Development Approvals		Building Permits
Community Plans and Zoning	Development Permit Design Guidelines	
Community Plans and Zoning	**Development Permit Design Guidelines**	**Building Permitting**
Challenges	Challenges	Challenges
Long-Term Solutions OCP and Zoning Bylaws Revisions	Long-Term Solutions Development Permit Design Guidelines Updates	Long-Term Solutions Building Permit Process Enhancements
Project Driven Solutions • Early Municipal-Developer Consultations • OCP and Zoning Bylaw Amendments	**Project Driven Solutions** • Early Municipal-Developer Consultations • Design Guideline Variances	**Project Driven Solutions** • Early Municipal-Developer Consultations • Partial/Phased Building Permits • Code Compliance and Alternative Solutions

Early Municipal-Developer Consultations

An integrated design and consultation process is recommended between applicant teams and municipal planning/building /fire/engineering staff.

Collaborative Action

Developer / Applicant Team Actions

1. Commit to a mass timber method of construction.
2. Engage a qualified professional team at the outset of the design process (rezoning/Development Permit) to ensure smooth approvals.
3. Engage with municipal planning, building and engineering staff as early as possible in the design process.

Collaborative Action

Senior Government Actions

Building and Fire Code Revisions

1. Update codes to accommodate common alternative solutions for 7-12 storey buildings, reducing time and cost barriers.
2. Increasing height, accommodating high rise mass timber buildings.

Multi-Level, Multi-Sectoral Capacity Building

3. Establish a central clearing house of information on mass timber and prefabricated construction.
4. **Build local government building permitting capacity.**
5. Evaluate the need for certification of a code and standard professional to expedite and simplify approvals.

Collaborative Action

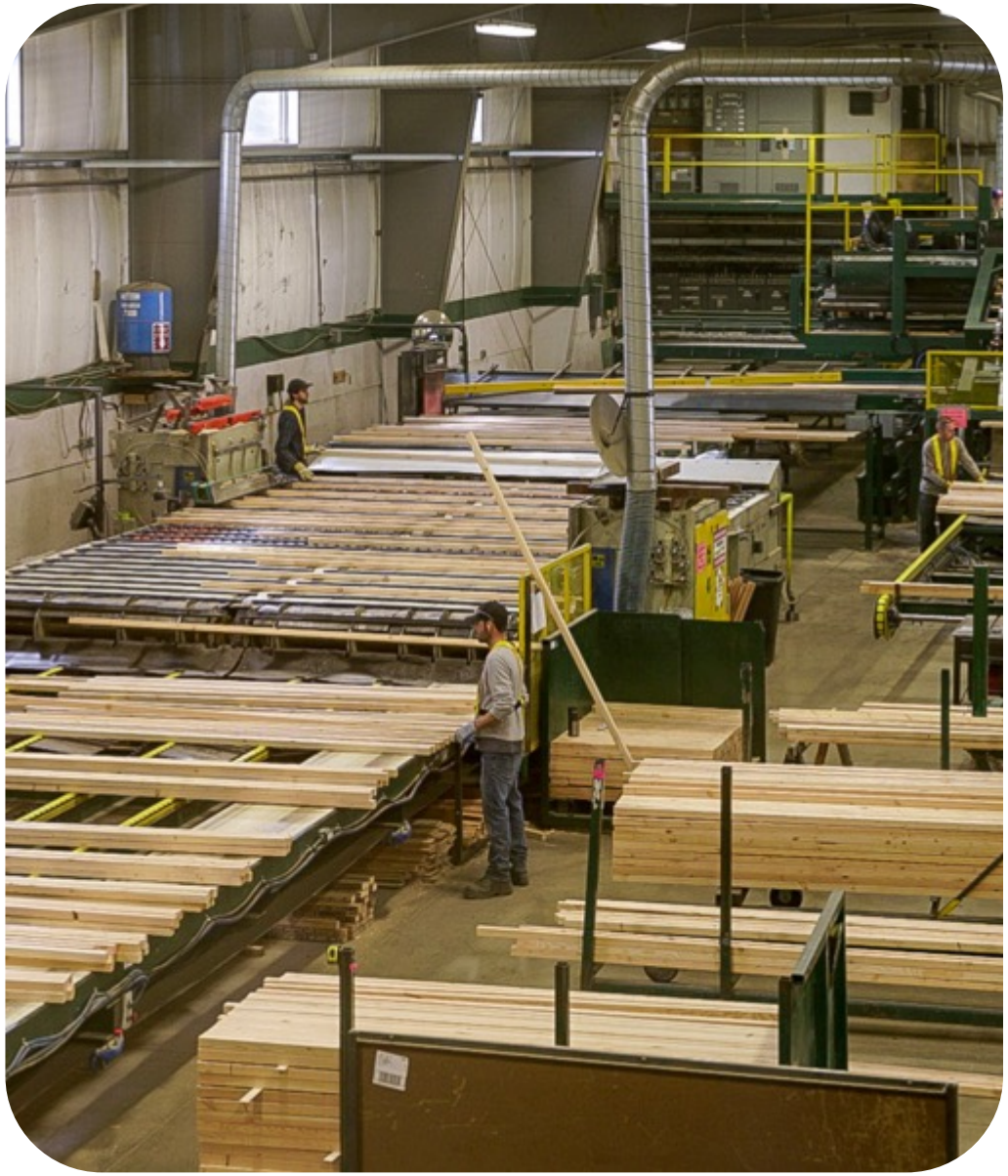
Senior Government Actions (cont'd)

Provincial Code and Standard Modernization

6. **Modernize the code update process to accommodate more frequent code changes.**
7. Accelerate building product certification and code integration.

Value Added Manufacturing Capacity

8. Simultaneously growing new prefabricated, MT construction starts (demand) and supporting expansion of prefabricated, MT manufacturing capacity (supply) is essential to grow this sector.



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Panel Discussion

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Next Steps

Outreach Phase & Beyond

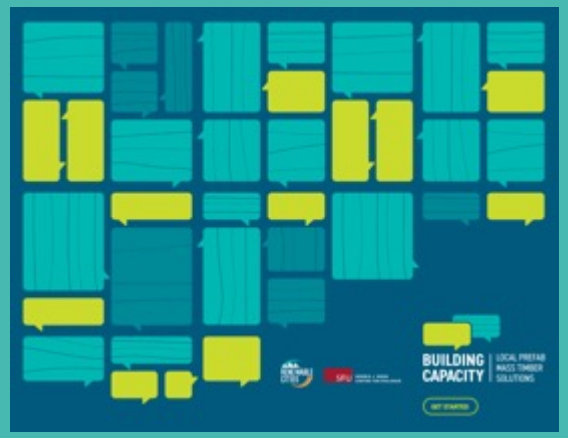
January – March 2024 (enhanced outreach)

- Enhanced engagement with building design community and beyond
    - Building Industry Associations/Non Profits (UDI, PIBC, AIBC, BC Construction Roundtable) and select conferences…

April 2023 – March 2024

- Elected Officials
- Design Guideline Development w/ LGs
- Advisory Design Panels

2 RESOURCES NOW AVAILABLE!



BUILDING CAPACITY:
LOCAL PREFAB MASS TIMBER SOLUTIONS

LOCAL GOVERNMENT
QUICK REFERENCE HANDBOOK

Next Steps

- ☑ **Take Action with these resources**
  - **Read key sections**
  - **Forward to key decision-makers**
- ☑ **Sign up for Newsletter/Update/ Upcoming Workshops**

SCAN TO DOWNLOAD
renewablecities.ca/prefabmasstimber

Funded by:
Forestry Innovation Investment
BC Hydro
Office of Mass Timber Implementation

BUILDING CAPACITY | LOCAL PREFAB MASS TIMBER SOLUTIONS

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