George Brown College – The Arbour

Schematic Design

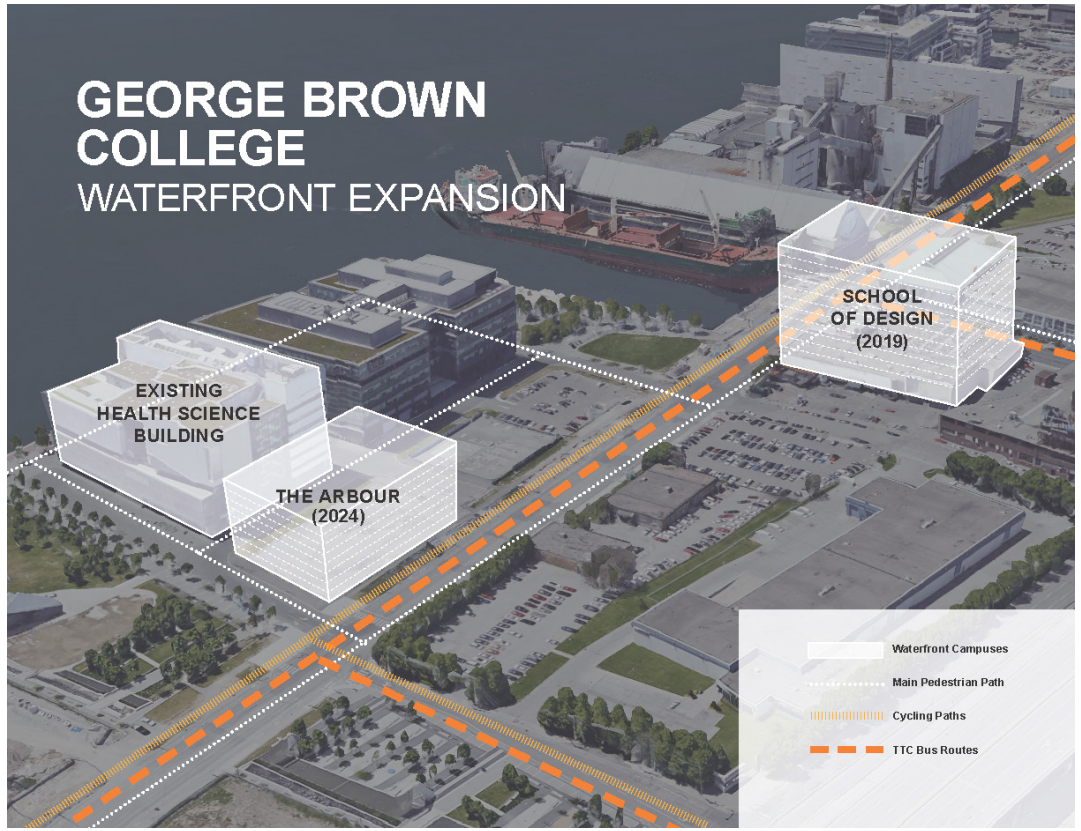
July 25, 2018

Project Description & Background

George Brown College: The Arbour

Proponent: George Brown College
Design Team: Moriyama & Teshima Architects + Acton Ostry Architects
Review Stage: Schematic Design

- Site was purchased by GBC in March 2017
- This will be the expansion of GBC's waterfront campus in Dockside
- Site located directly north of the existing health and sciences building – the buildings will be connected by an overhead bridge
- This is the project's second time presenting at the DRP (previously for Issues Identification in July 2017)
- The team is presenting Schematic Design



Key Dates for The Arbour:

- Construction start 2021
- Project Completion 2024

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- GBC launched an international design competition in fall 2017, asking architects to submit concepts for a 12-storey timber–framed building – the first institutional building of this type in Ontario
- Moriyama & Teshima Architects and Acton Ostry Architects were selected to design The Arbour
- The Arbour will serve as an educational and research hub, and will also be home to a new child care facility to serve the growing East Bayfront community.

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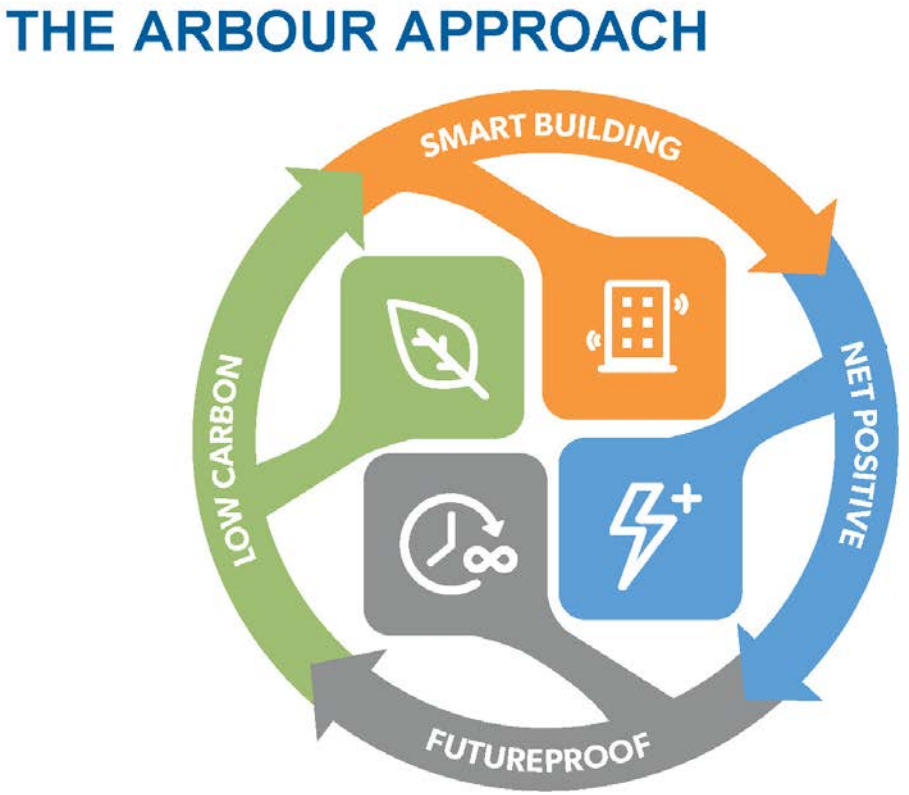
- The Arbour will be flexible and future proof, equipped with smart building systems that are networked, intelligent and adaptable. The building will also be designed to adjust to changing academic uses and a changing climate.

- The building will house George Brown's School of Information Computer Technology, a new child care facility and Tall Wood Research Institute.



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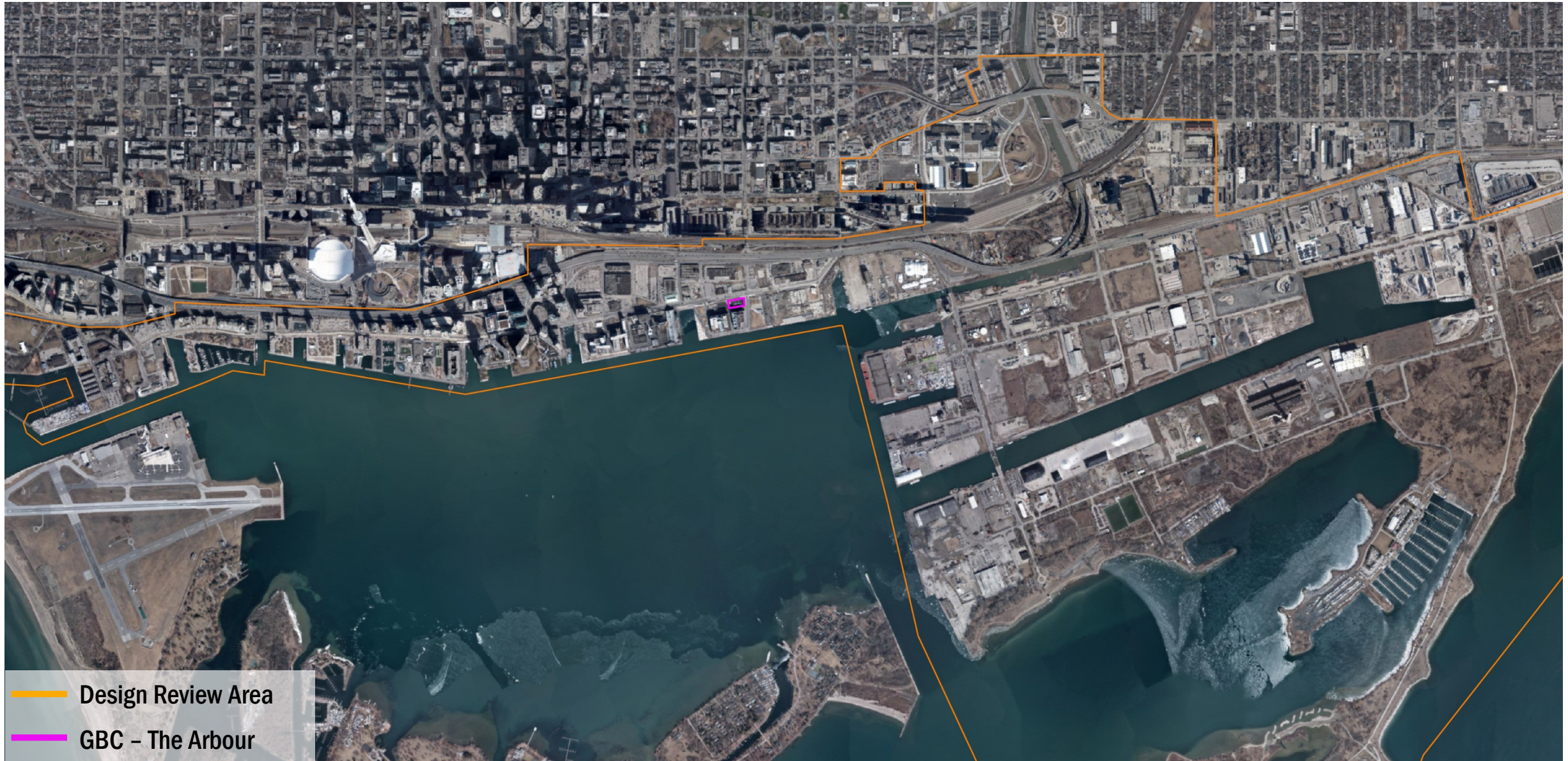

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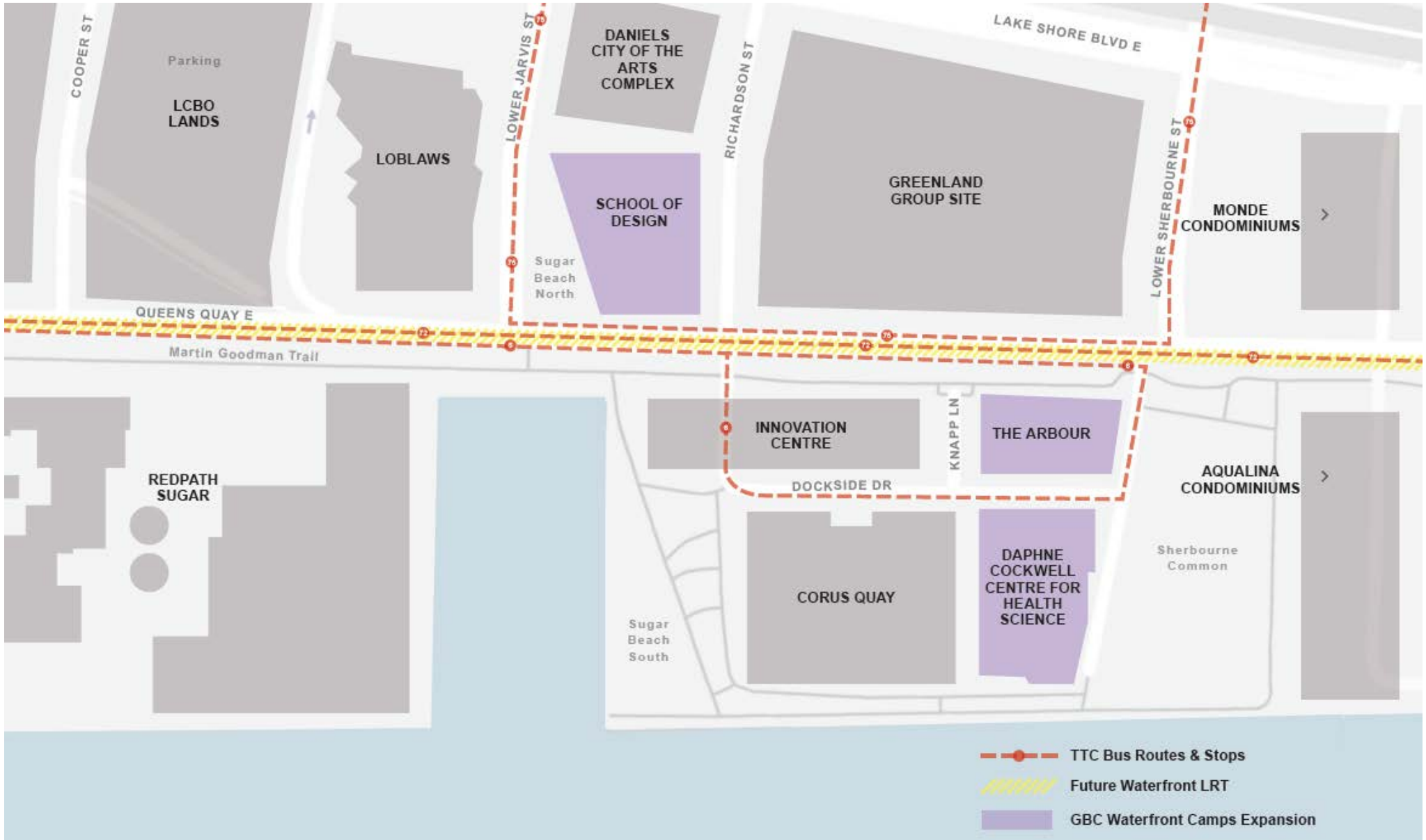


Policy Context - Central Waterfront Secondary Plan

D24 - THE EAST BAYFRONT, A PROMINENT NEW NEIGHBOURHOOD
The East Bayfront will become a prominent waterfront address for working and living amid the energy and abundance of waterfront activities, including a new water's edge promenade and other public activities in the series of new East Bayfront public spaces. Development adjacent to the water's edge promenade shall consist of low and medium scale buildings that will reinforce the safety and usability of the public spaces.

(P32) New development will be **located, organized and massed to protect view corridors**, **frame and support the adjacent public realm** and discourage privatization of public spaces. Built form will result in **comfortable micro-climates** on streets, plazas and other parts of the public realm.

(P34) Schools and other **community services** and facilities will be **integral components of new waterfront communities** and will be provided in conjunction with new development.

Areas for Panel Consideration

- Program and adjacencies with surrounding buildings, including ground floor porosity and engagement with the public realm
- The relationship of the daycare to the service entrances on Knapp Lane
- Options for layby (for daycare drop off/pickup) location
- The form of the upper massing / dormer

“THE ARBOUR”

Schematic Design DRP
July 25TH, 2018

George Brown College

THE ARBOUR

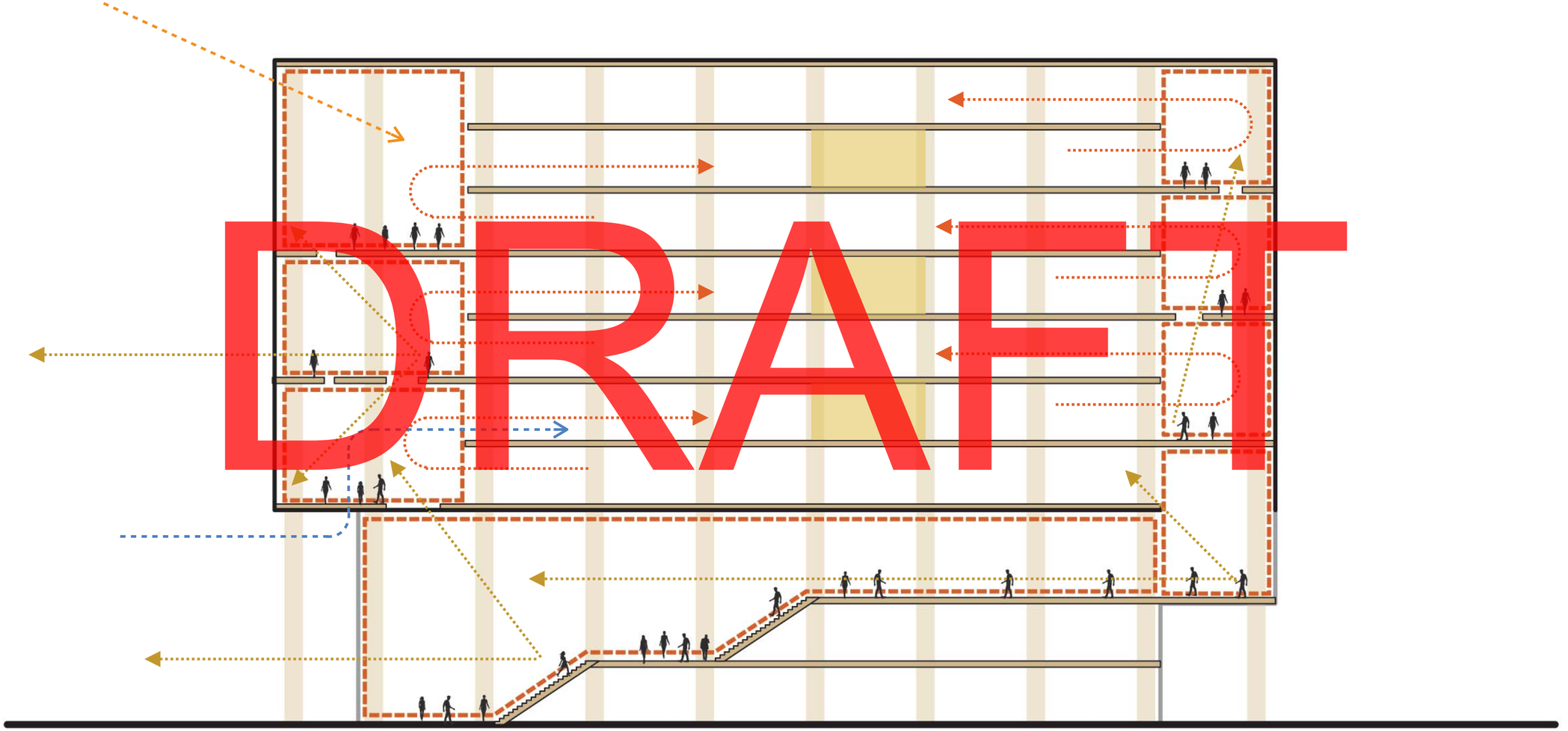
1. Design

- Vision
- Site Relationships + Exterior
- Interior + Form

2. Sustainability + Carbon Sequestration

3. Structural Innovation

4. Landscape Strategy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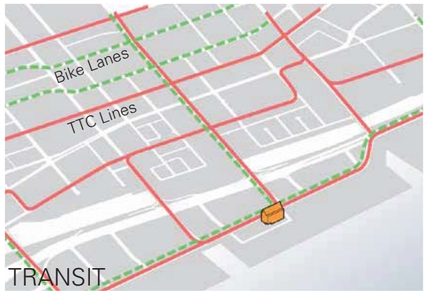
George Brown College

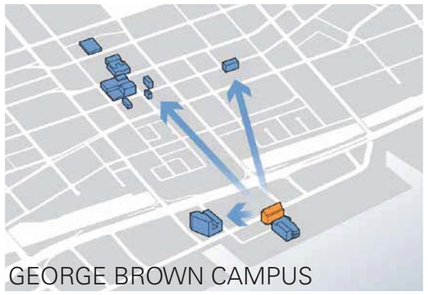
THE ARBOUR

1. Design

- Vision
- Site Relationships + Exterior

URBAN CONTEXT





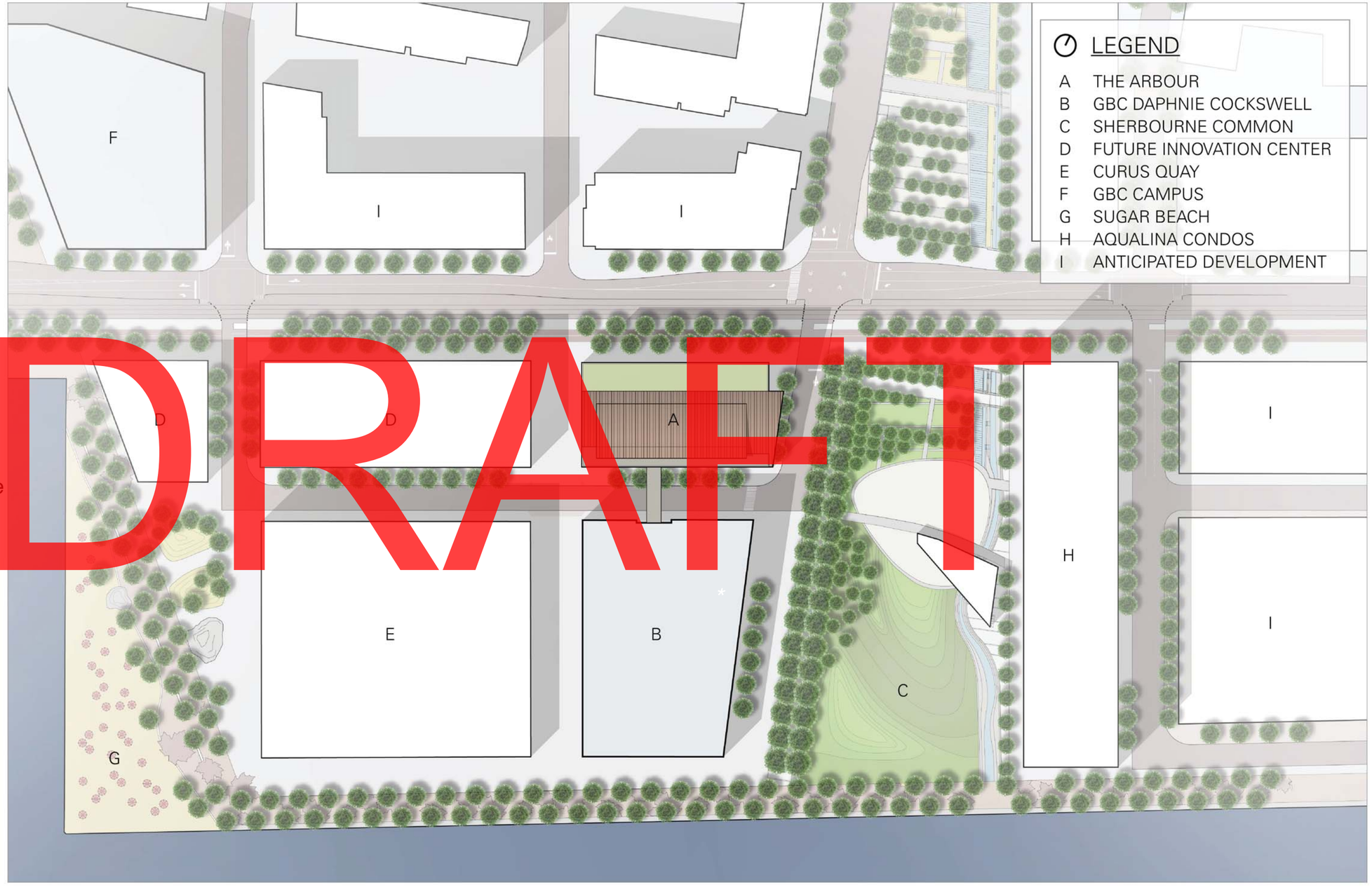
SITE CONTEXT

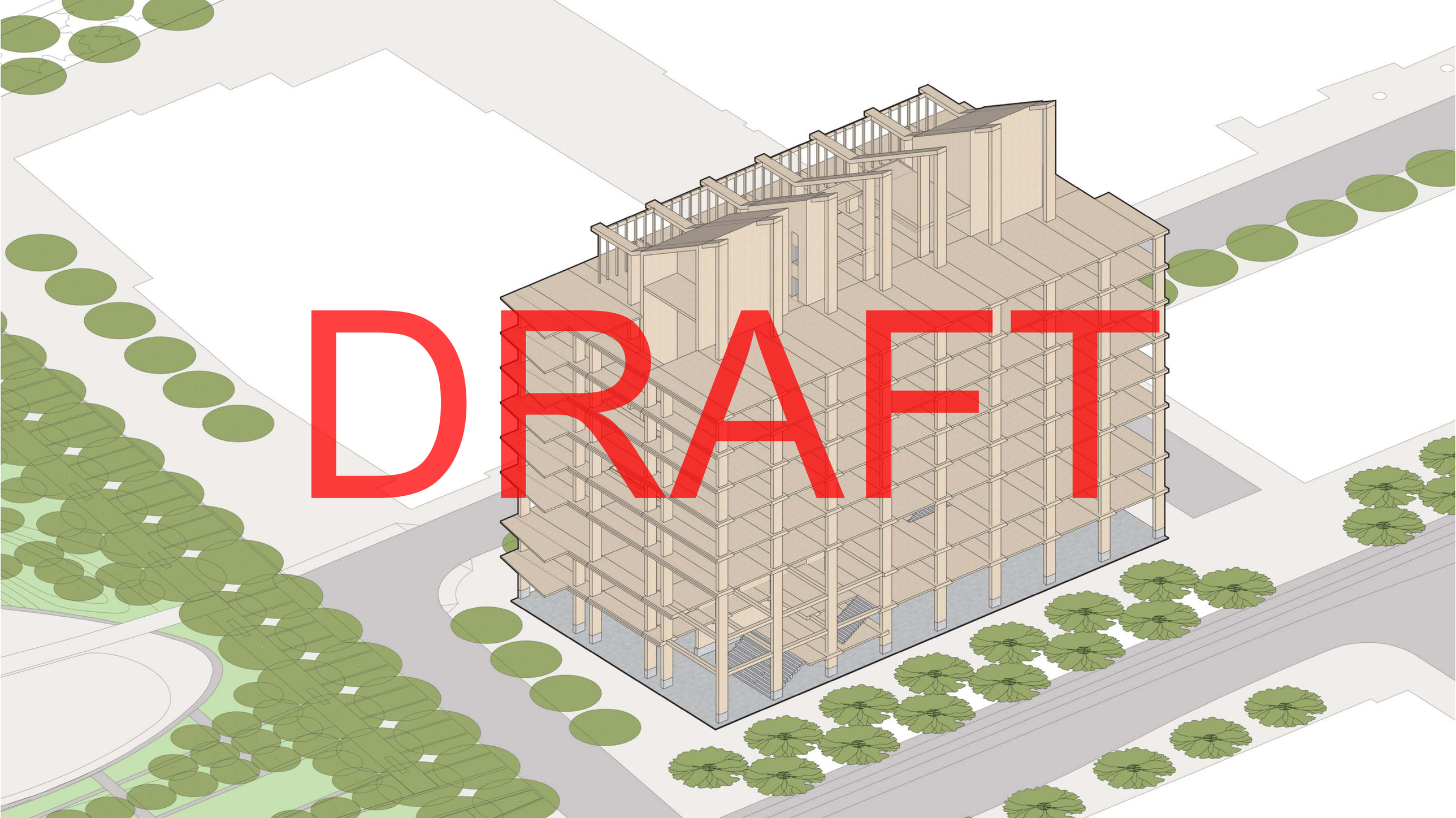
The Arbour seeks to:

Connect the social spaces of the building to the unique Waterfront Context

Reinforce the street wall with robust massing anchoring scale of the block

Present a striking purposeful silhouette derived from the sustainable features executed with strong material presence befitting of Sherbourne Common as the building's forecourt

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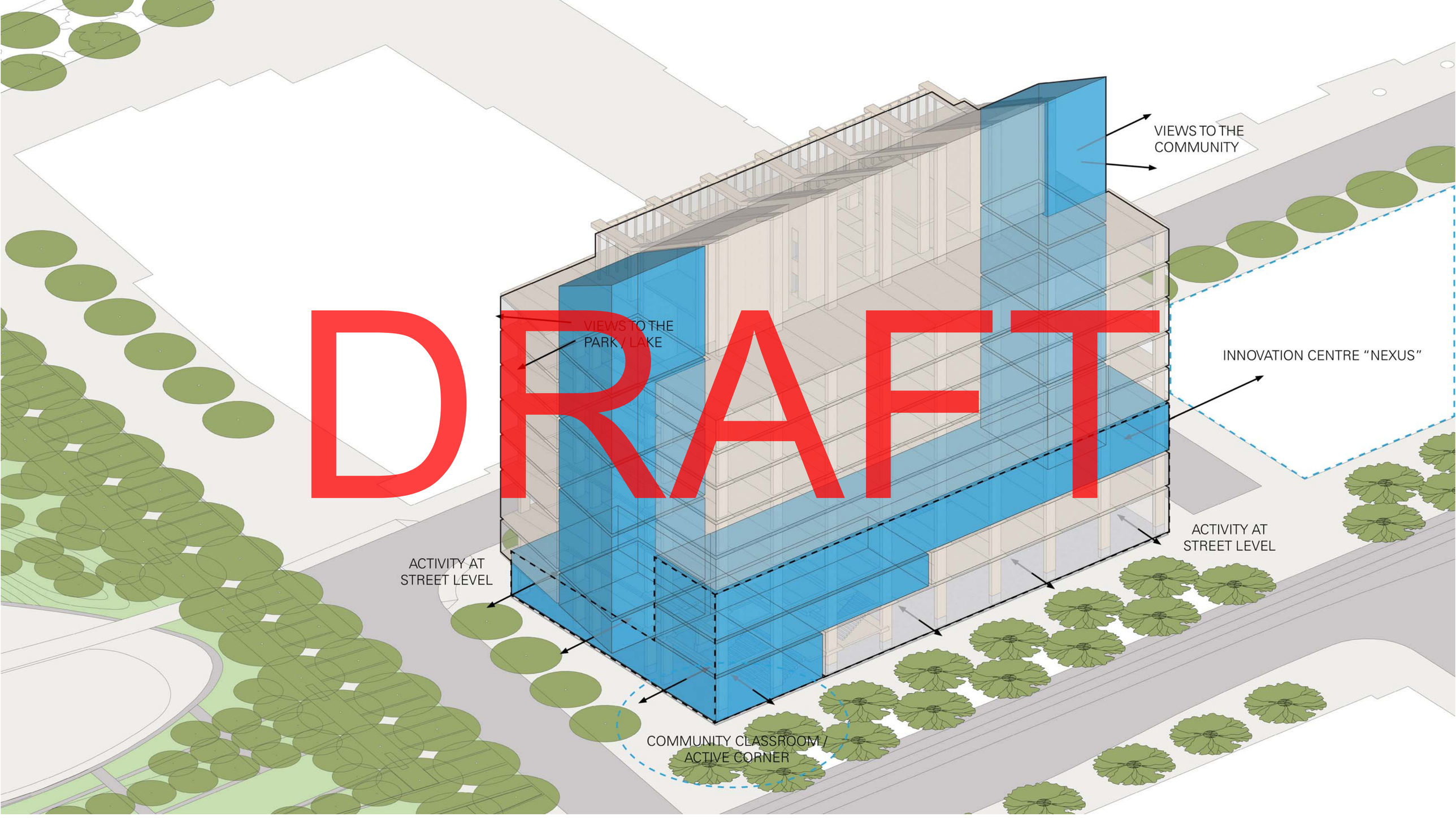
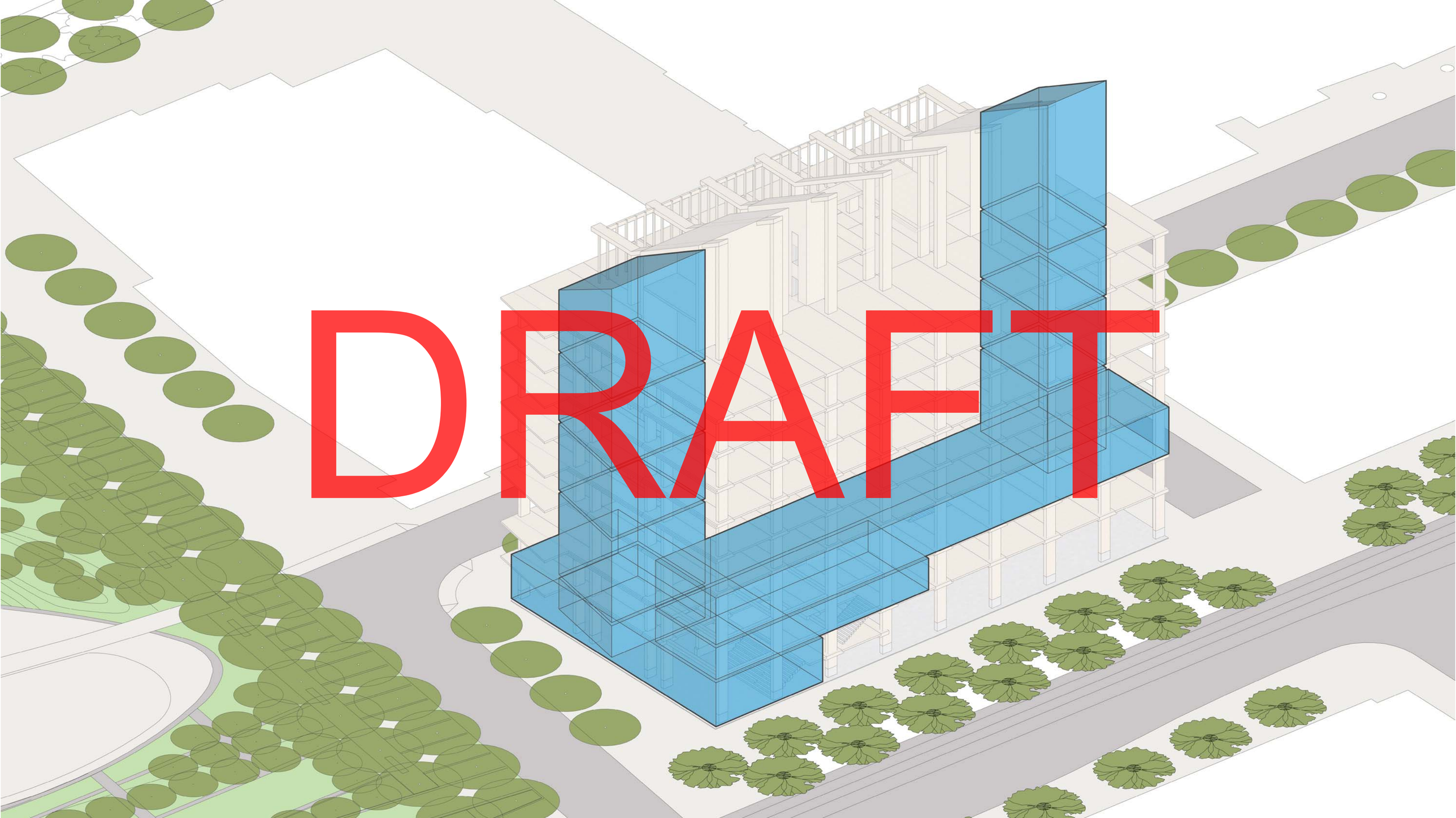

VIEWS TO THE COMMUNITY
VIEWS TO THE PARK / LAKE
INNOVATION CENTRE "NEXUS"
ACTIVITY AT STREET LEVEL
ACTIVITY AT STREET LEVEL
COMMUNITY CLASSROOM / ACTIVE CORNER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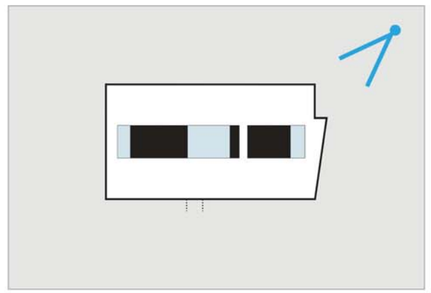
VIEW FROM QUEENS QUAY

The Arbour seeks to:

Inspire big changes through considered integrated approach

Create an great learning environment that evokes the an “Arbour” - a quintessentially green shelter

Innovate a transferrable structural model that is not the exception to the rule but one that sets pathways for widespread implementation of mass timber



a about the park rolling up to the learning landscape

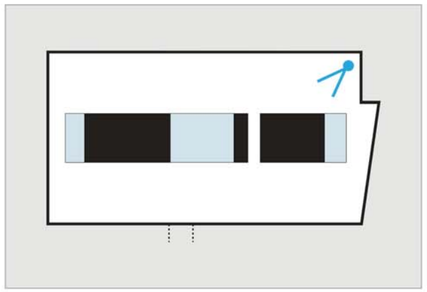
LEARNING LANDSCAPE

The Primary public space:

Animates Sherbourne Common Queen's Quay

Anchors the corner with a "community classroom" one that is generous and inclusive

Inhabits the super structure with a variety of spaces welcoming both the individual and the collective making the experience of the building intuitively didactic

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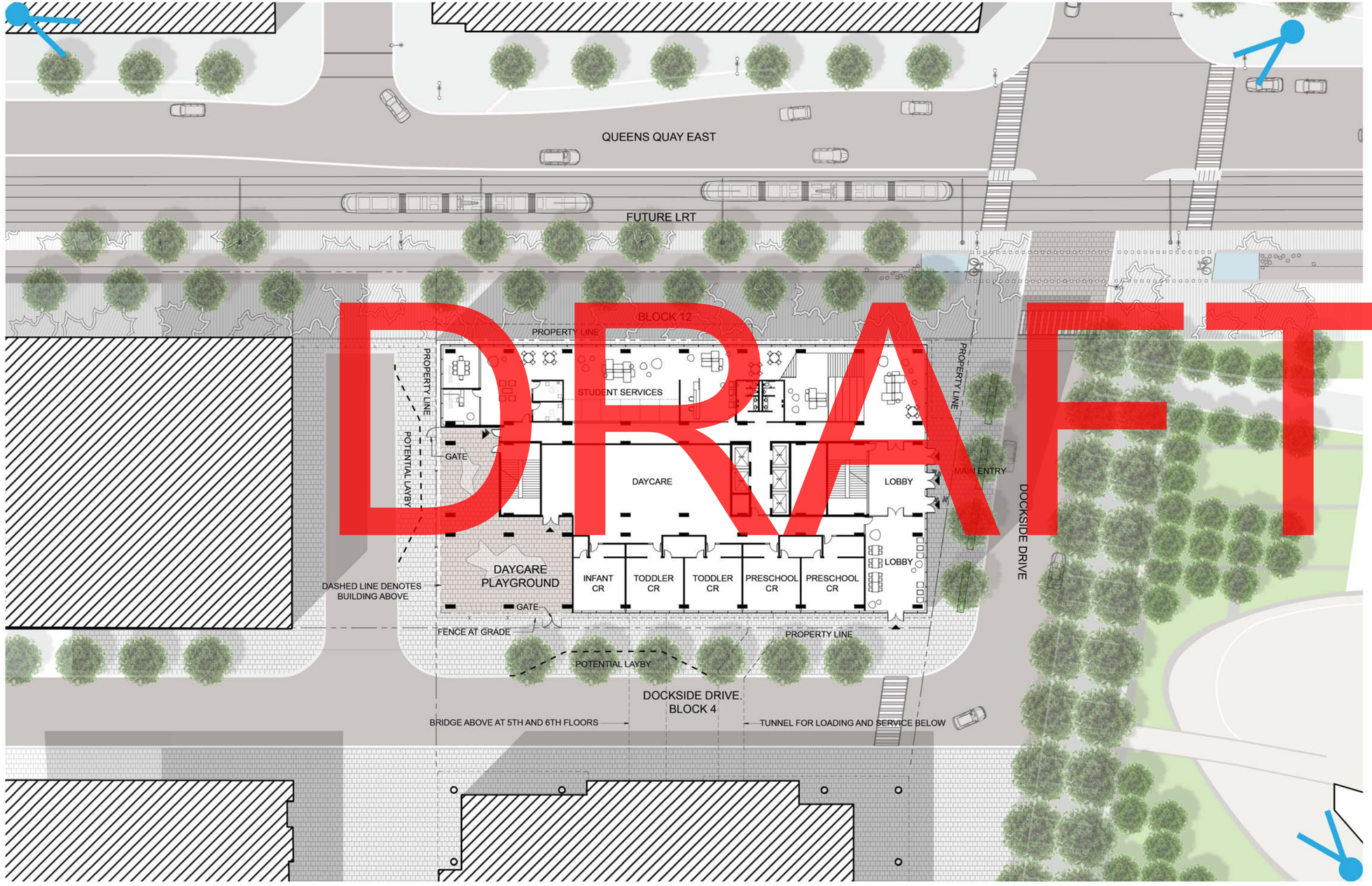
FUTURE SITE PLAN WITH PROPOSED PUBLIC REALM

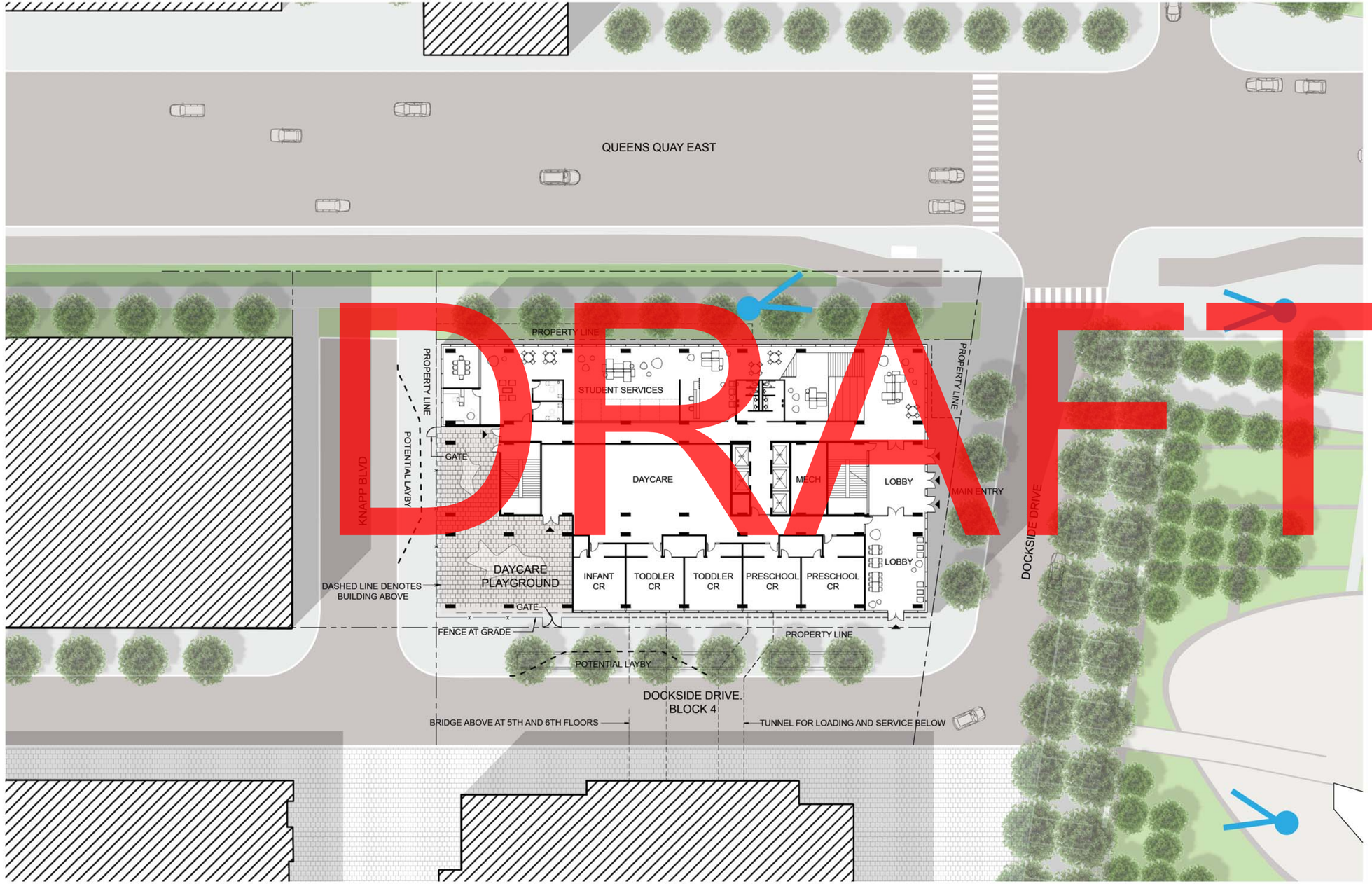


FUTURE CONTEXT RENDER 1

FUTURE CONTEXT RENDER 2

FUTURE CONTEXT RENDER 3

EXISITING SITE PLAN

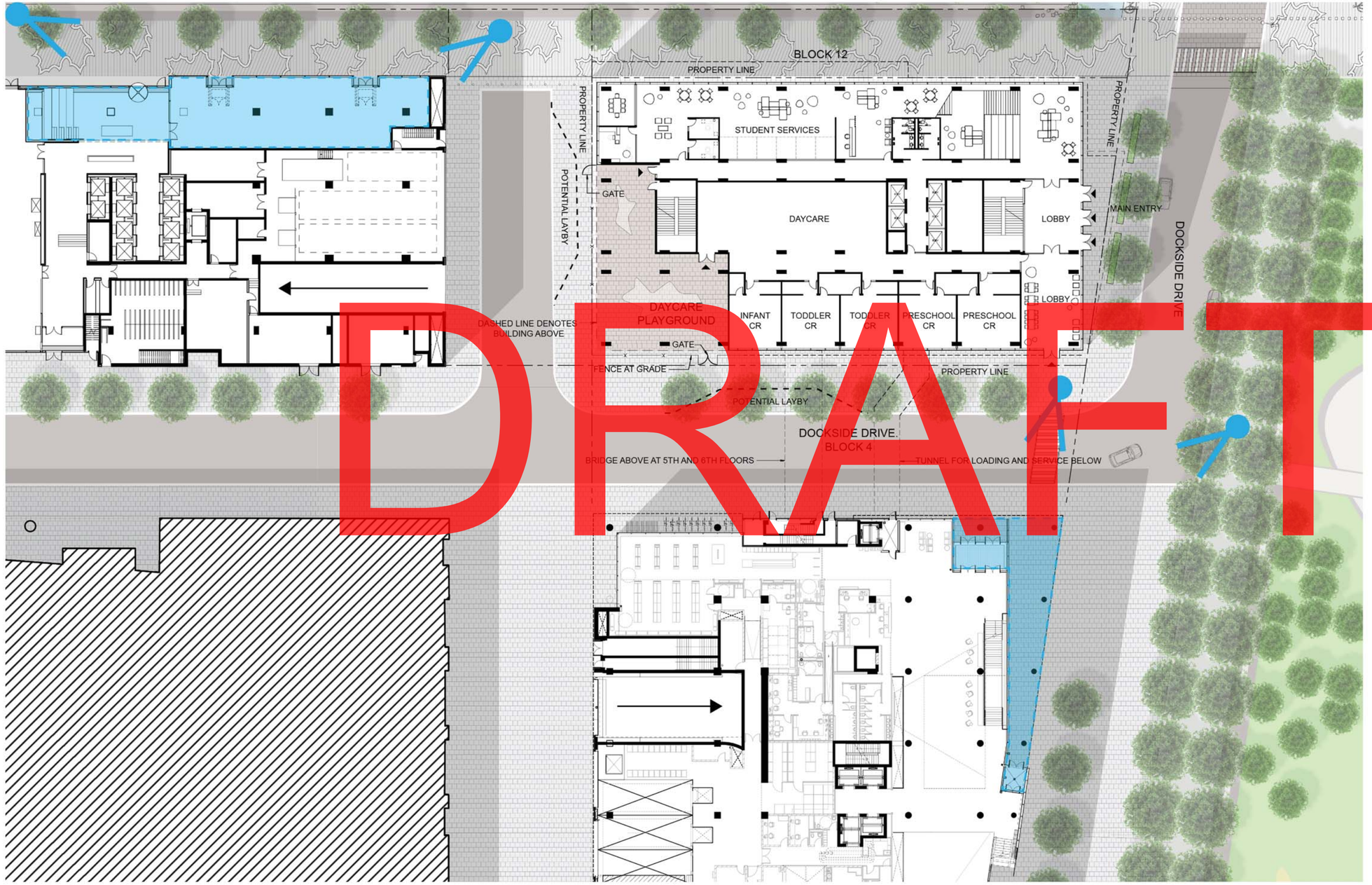


SITE PHOTO 1

SITE PHOTO 2

SITE PHOTO 3

CONTEXT CONNECTIONS



CONTEXT PHOTO 1

CONTEXT PHOTO 2

CONTEXT PHOTO 3

CONTEXT PHOTO 4

ZONING ANALYSIS AND SITE STATISTICS

Legal Description of the Property
Block 3, Plan 66M-2476
City of Toronto

Site Information	
Lot Area	2,324.4 m²
Ground Floor GFA	1,741.4 m²
Lot Coverage (Total Ground Floor Area / Lot Area)	75%
Lot Frontage on Queens Quay	67.1 m
Lot Frontage on Dockside Drive E.	36.4 m
Lot Frontage on Dockside Drive S.	61.9 m

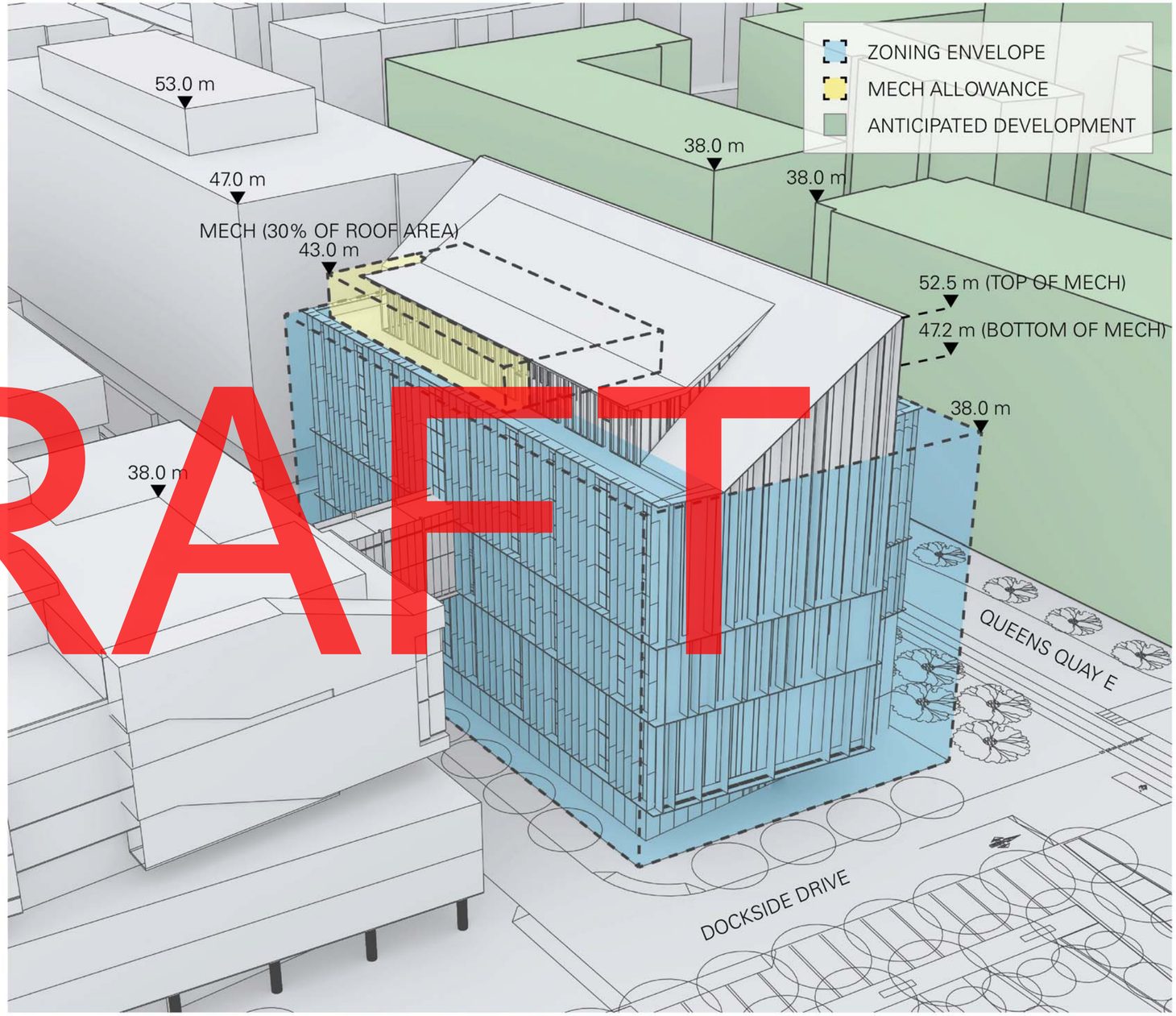
Building Information	
Building Gross Floor Area	16,680 m²
Floor Space Index (Total Gross Floor Area/Lot Coverage)	7.17
Green Roof Area	559.9m²
Solar Panel Area	1142.7 m²
Roof Terrace Area	367.4 m²
Total Roof Area	2070 m²

Building Height	
Max Zoning Height Requirement	38 m
Proposed Building Height (Bottom of Mech)	47.2 m
Proposed Building Height (Top of Mech)	52.5 m

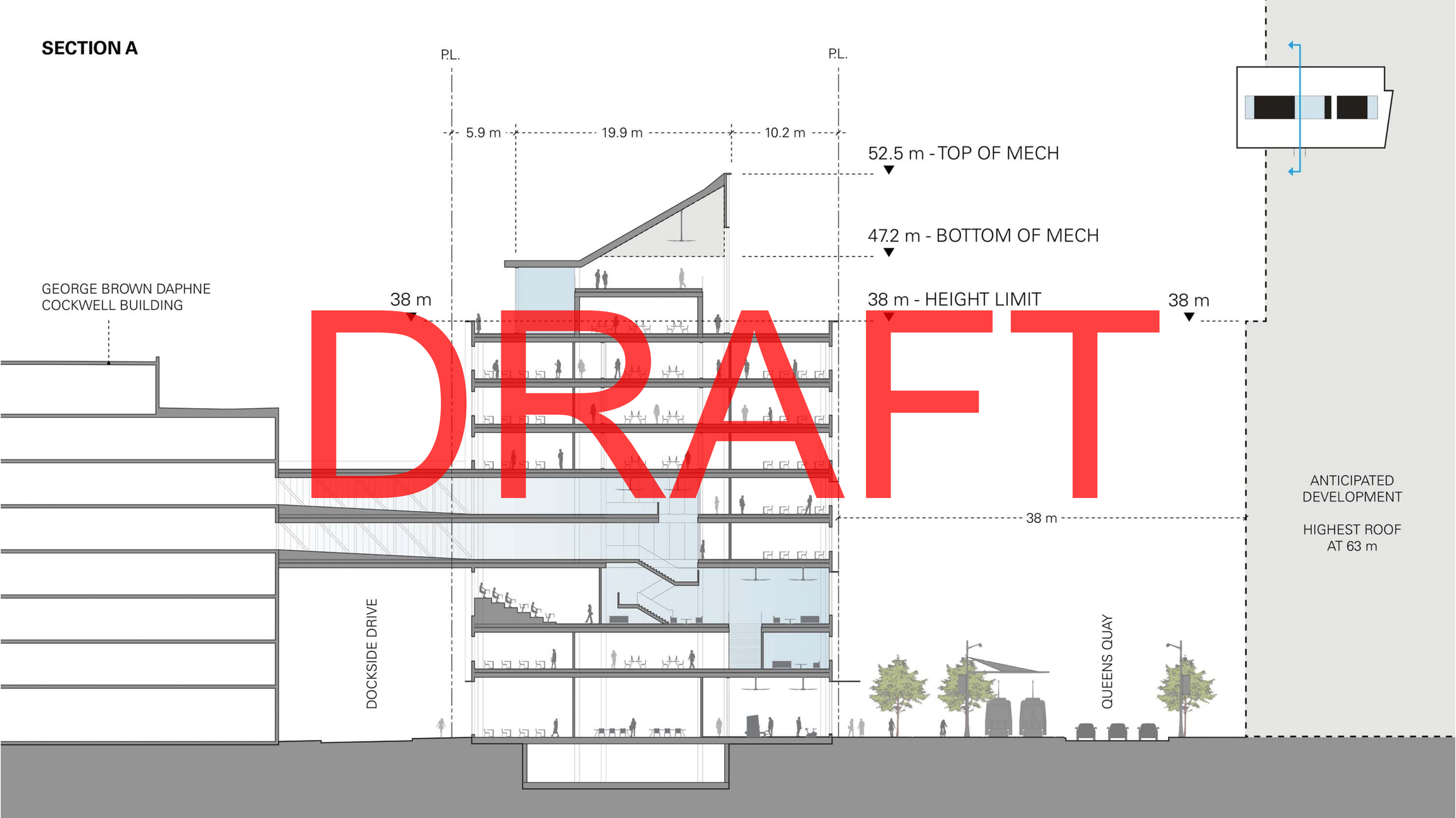
Vehicle Parking
Parking requirements satisfied on block 5.

Bicycle Parking
Bicycle parking requirements satisfied on block 5.

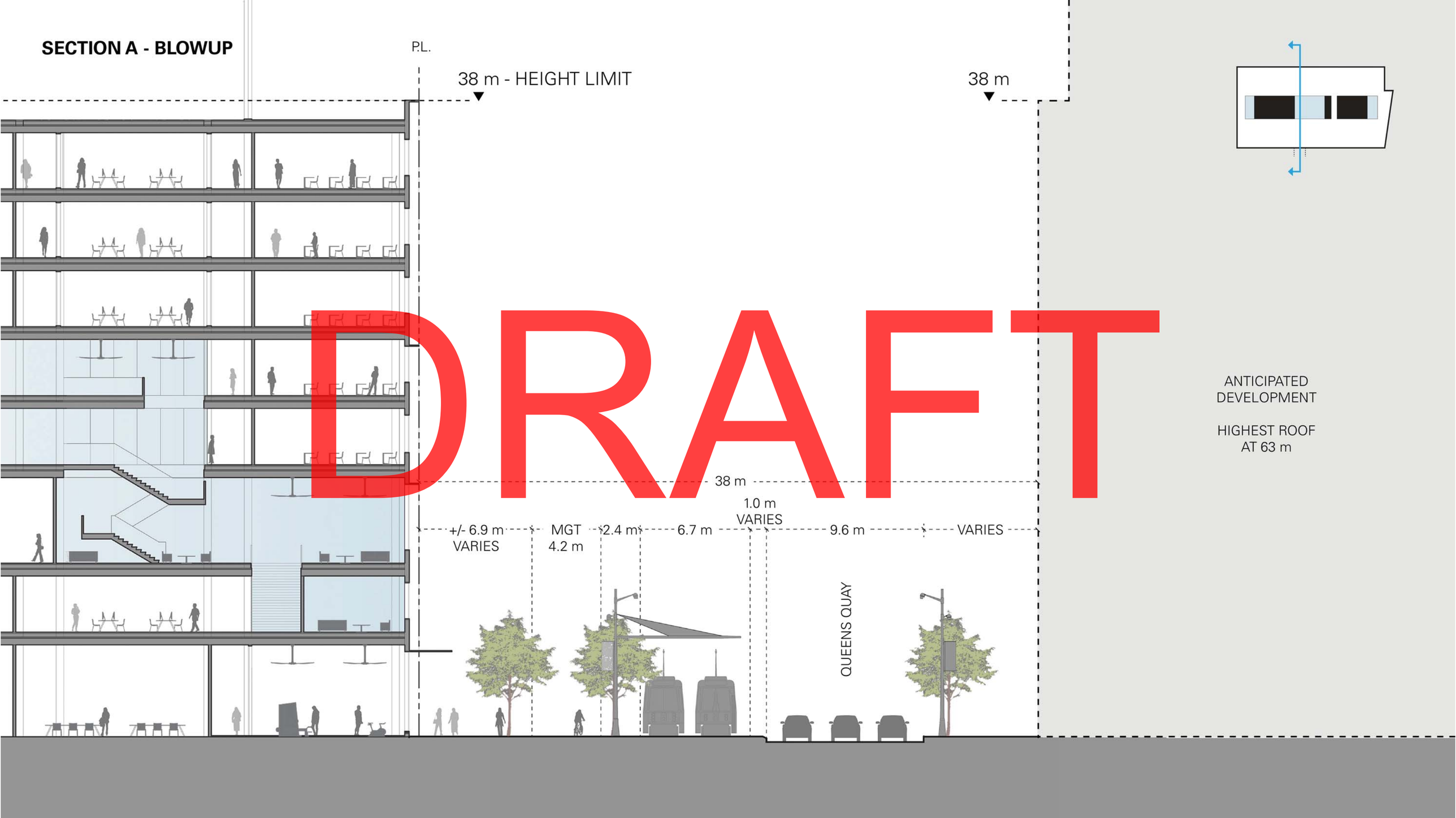
Loading
Loading provided through proposed basement tunnel to block 5.



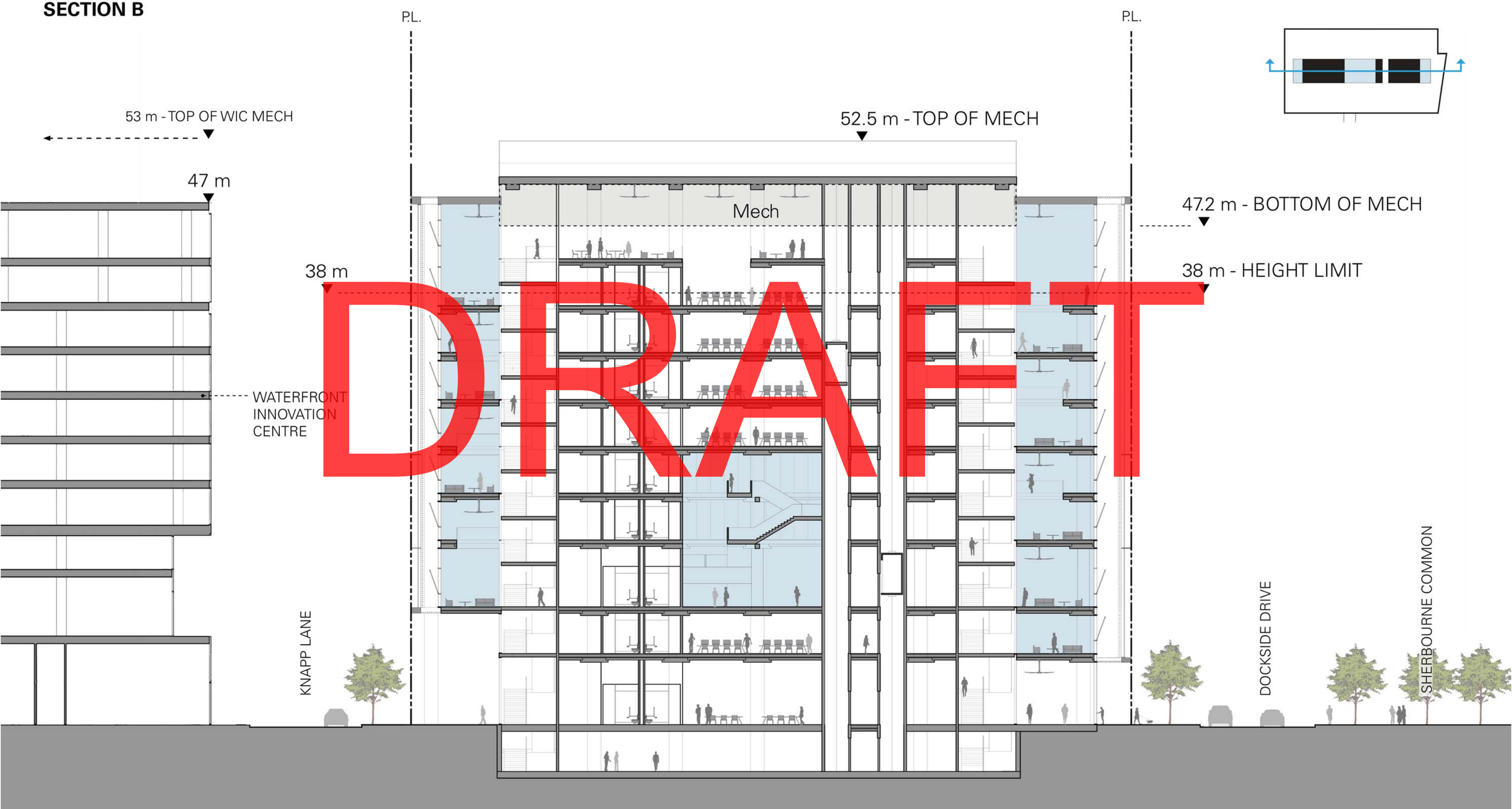
SECTION A


P.L.
P.L.
5.9 m
19.9 m
10.2 m
52.5 m - TOP OF MECH
47.2 m - BOTTOM OF MECH
38 m
38 m - HEIGHT LIMIT
38 m
GEORGE BROWN DAPHNE
COCKWELL BUILDING
DRAFT
38 m
ANTICIPATED
DEVELOPMENT
HIGHEST ROOF
AT 63 m
DOCKSIDE DRIVE
QUEENS QUAY

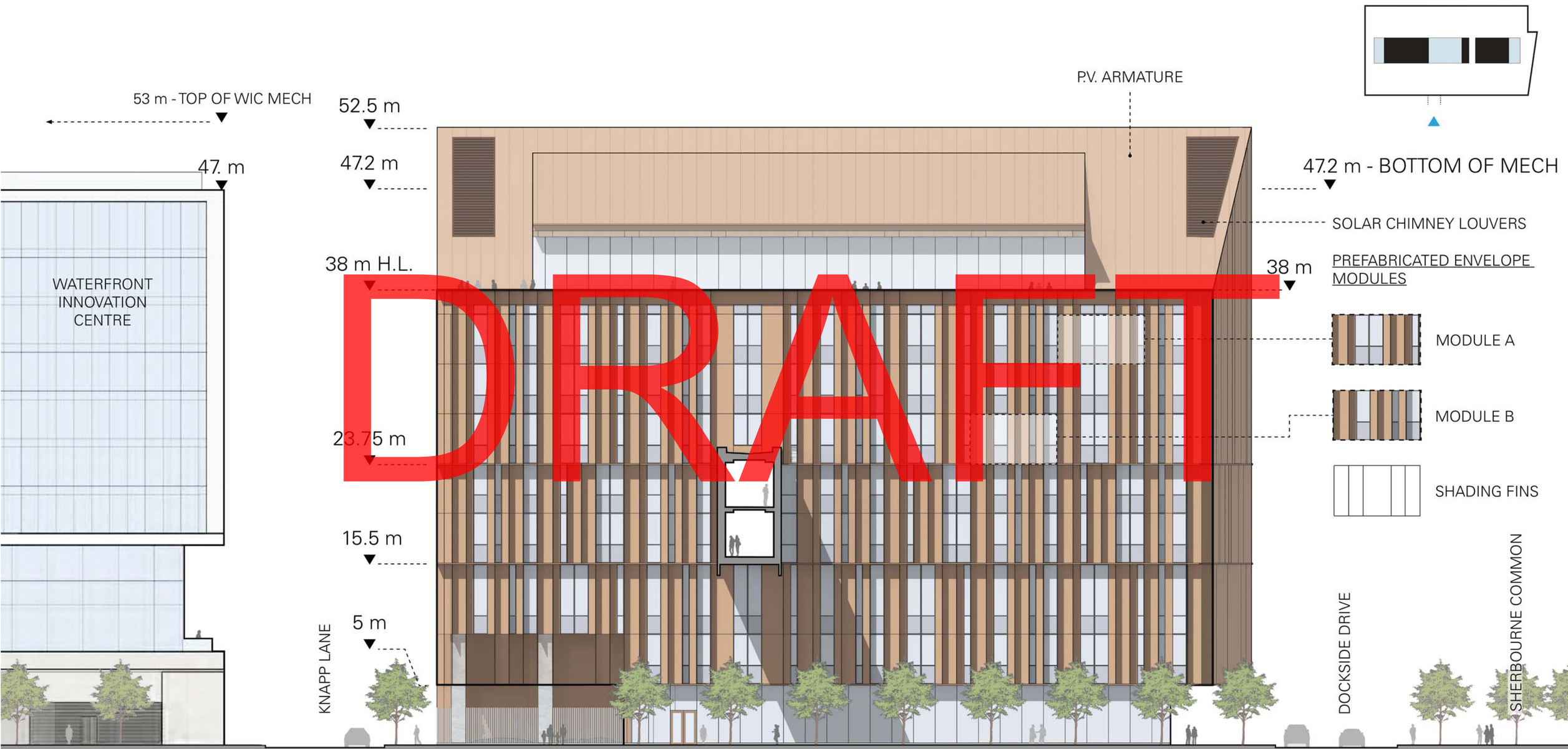
SECTION A - BLOWUP



SECTION B

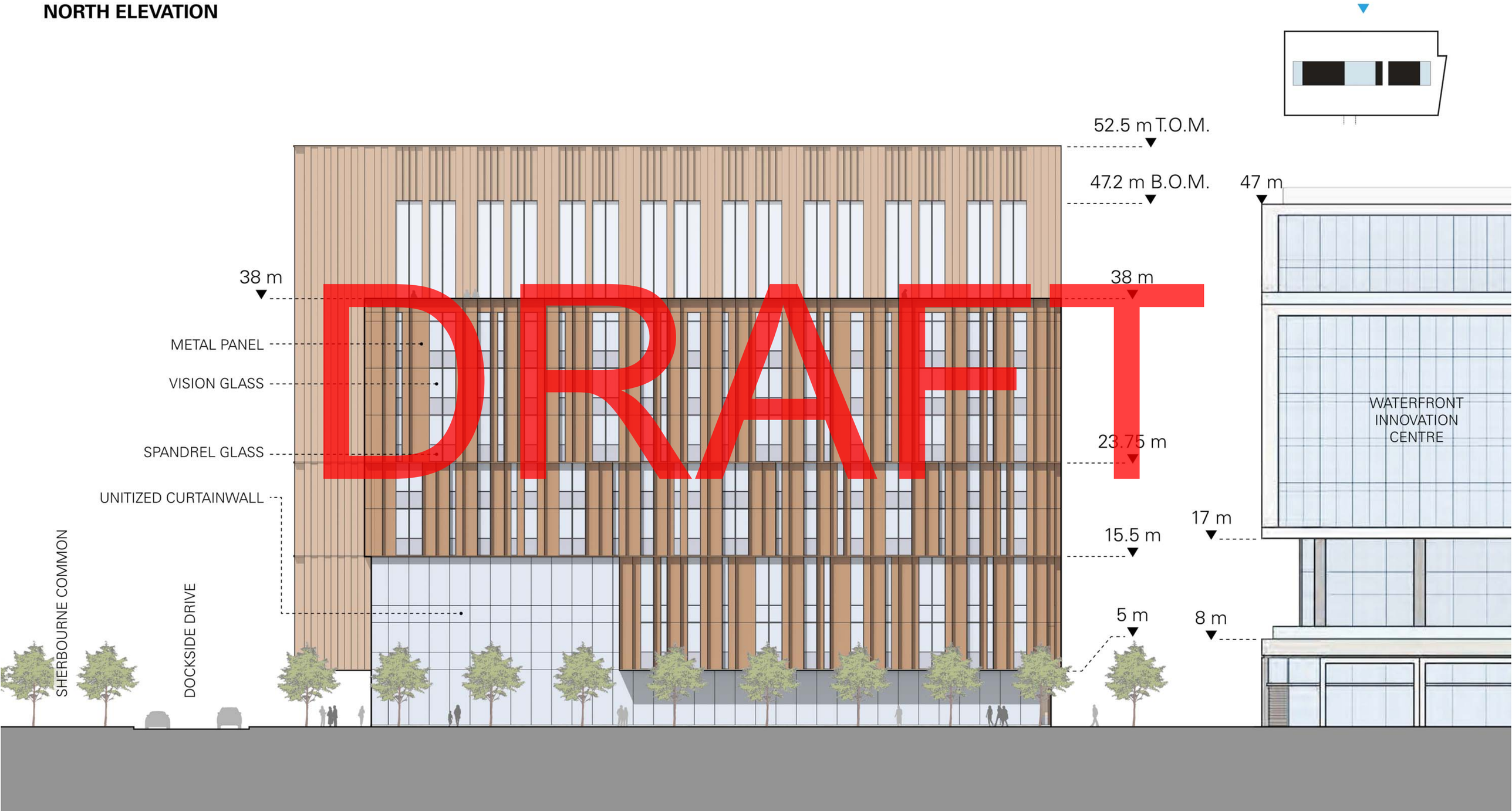


SOUTH ELEVATION

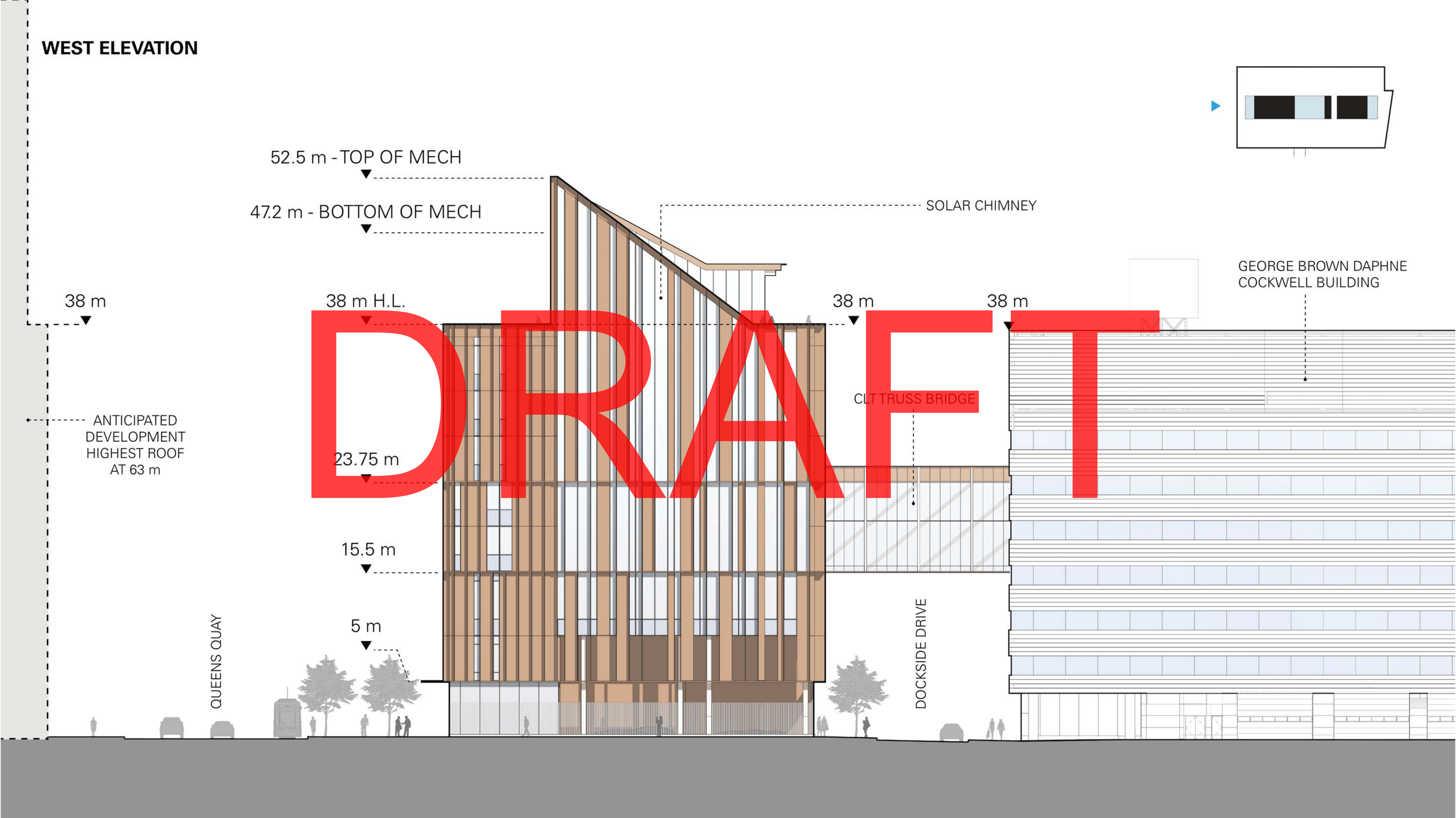


EAST ELEVATION

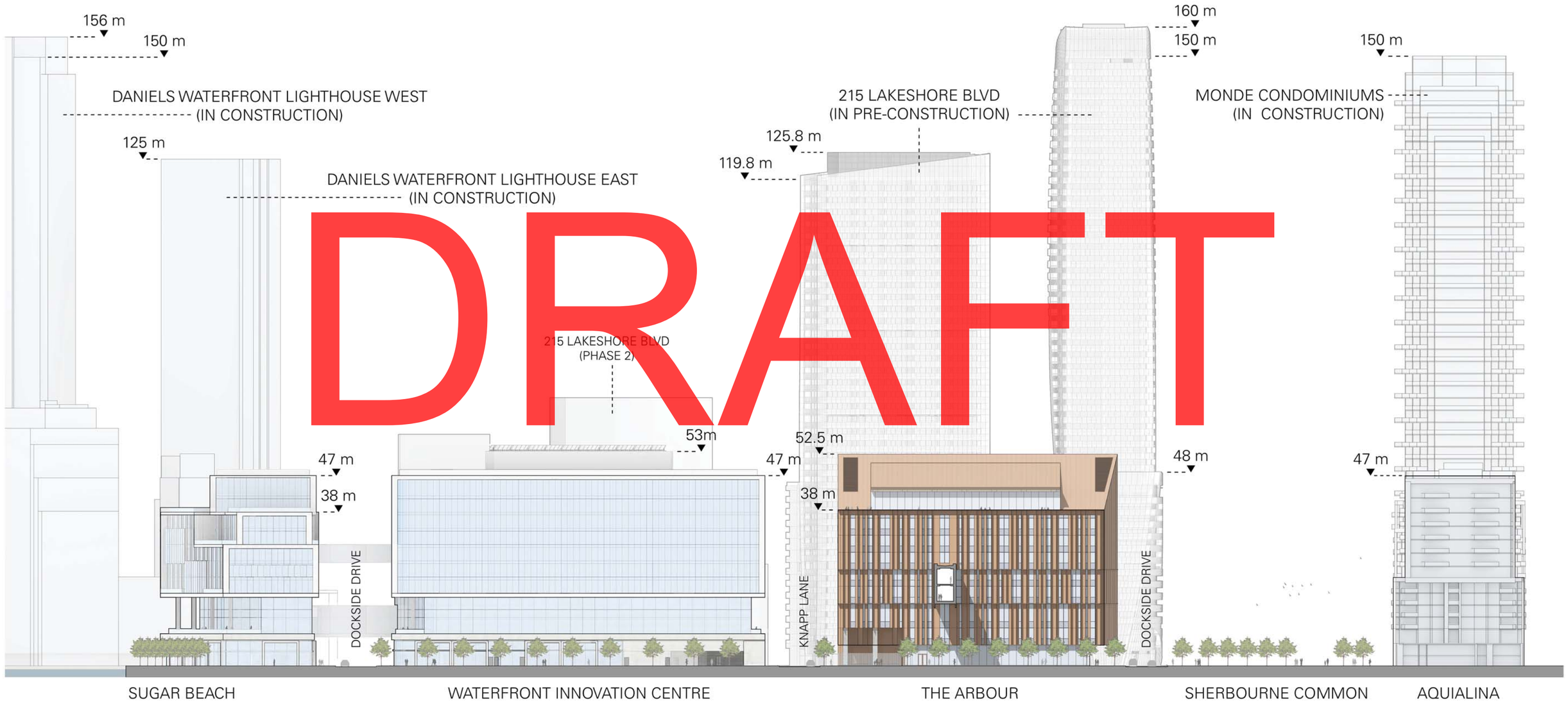
NORTH ELEVATION



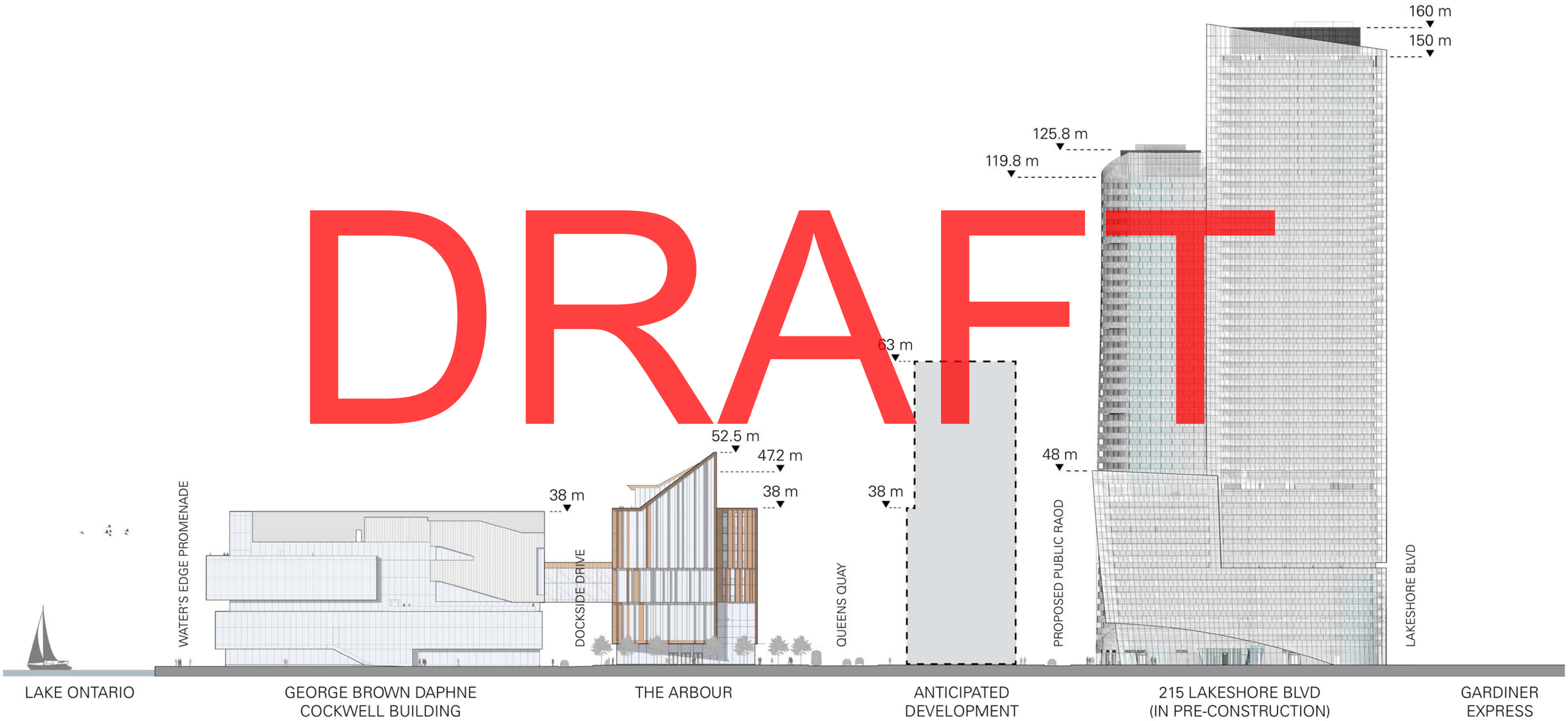
WEST ELEVATION



NEIGHBORHOOD HEIGHT TRANSITION - SOUTH ELEVATION



NEIGHBORHOOD HEIGHT TRANSITION - EAST ELEVATION



George Brown College

THE ARBOUR

1. Design

- Vision
- Site Relationships + Exterior
- Interior + Form

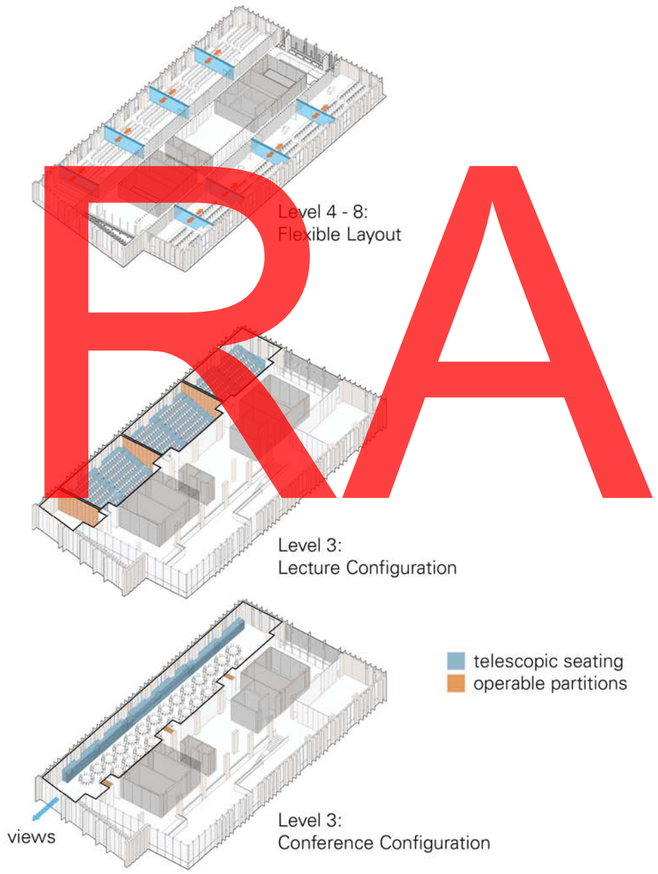
PROGRAM DIAGRAMS

The Arbour Organization is:

Flexible - organized in a 3 bar grid
the grid allows for change and adaptability
in the long term

Optimized to maximize daylight to the
teaching spaces

Generous positioning a variety of communal
and social spaces throughout the building
with views and connections to the
Waterfront

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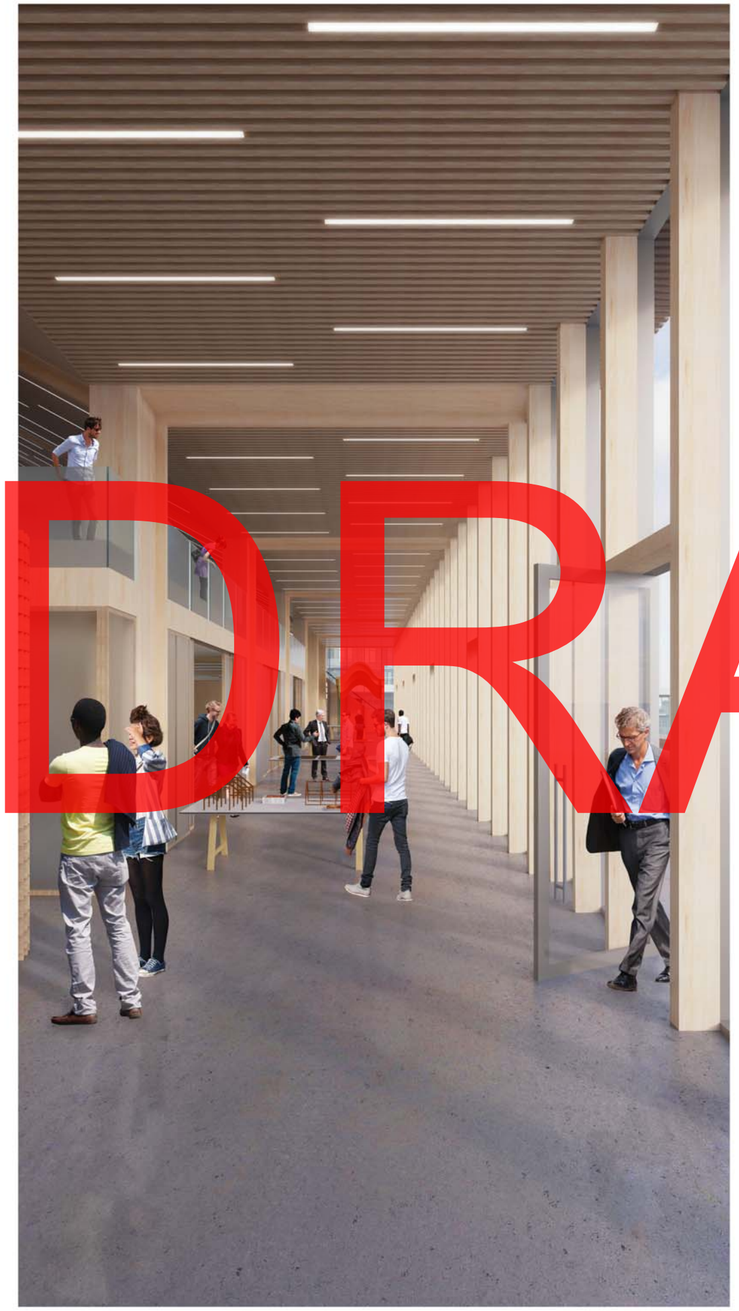
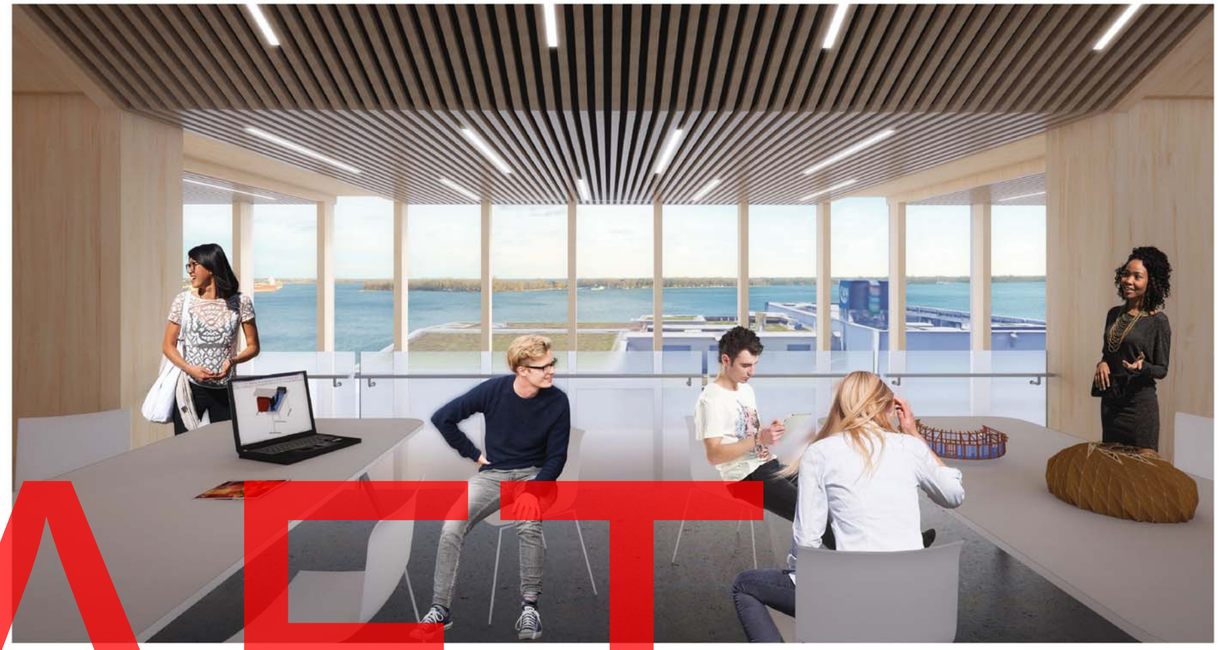
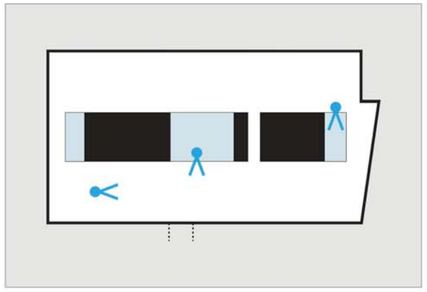
BREATHING ROOMS







SOLAR CHIMNEY

The Chimney is a:

Purposeful expressive element that extends past the highest floor creating natural convection

Passive driver for flushing fresh air through the building for its 3000+ inhabitants

Angled to contribute the framing of the over-all roof plane which is the armature for the photo-voltaic array

KEY PLAN

George Brown College
THE ARBOUR

1. Design

- Vision
- Site Relationships + Exterior
- Interior + Form

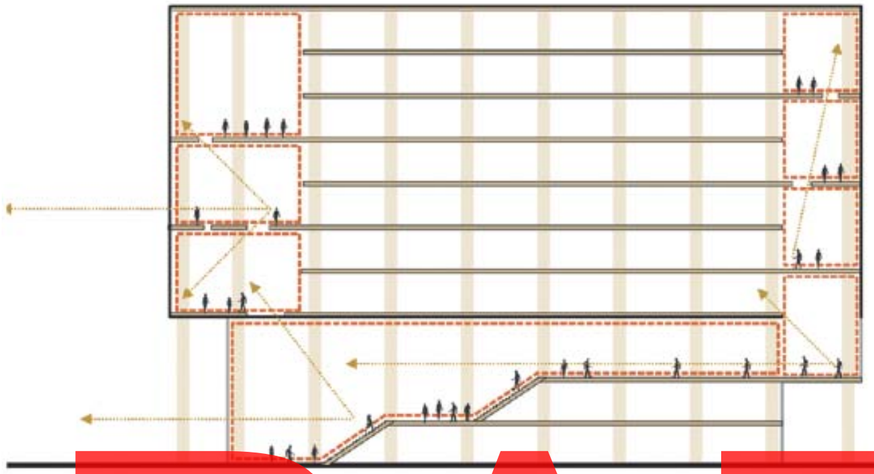
2. Sustainability + Carbon Sequestration

The Arbour's Sustainability Strategy is:

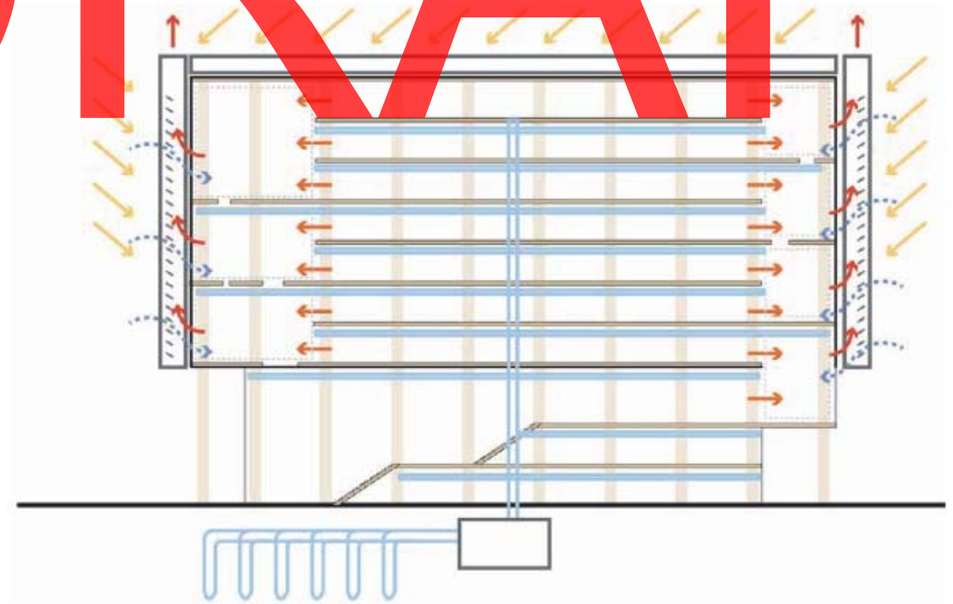
Integrated with the overall spatial and structural concept and symbiotically the architectural form is derived from it the systems

Analogous to a tree utilizing ground source, sun air and orientation

3 Part in its approach: Passive, Active and Renewable



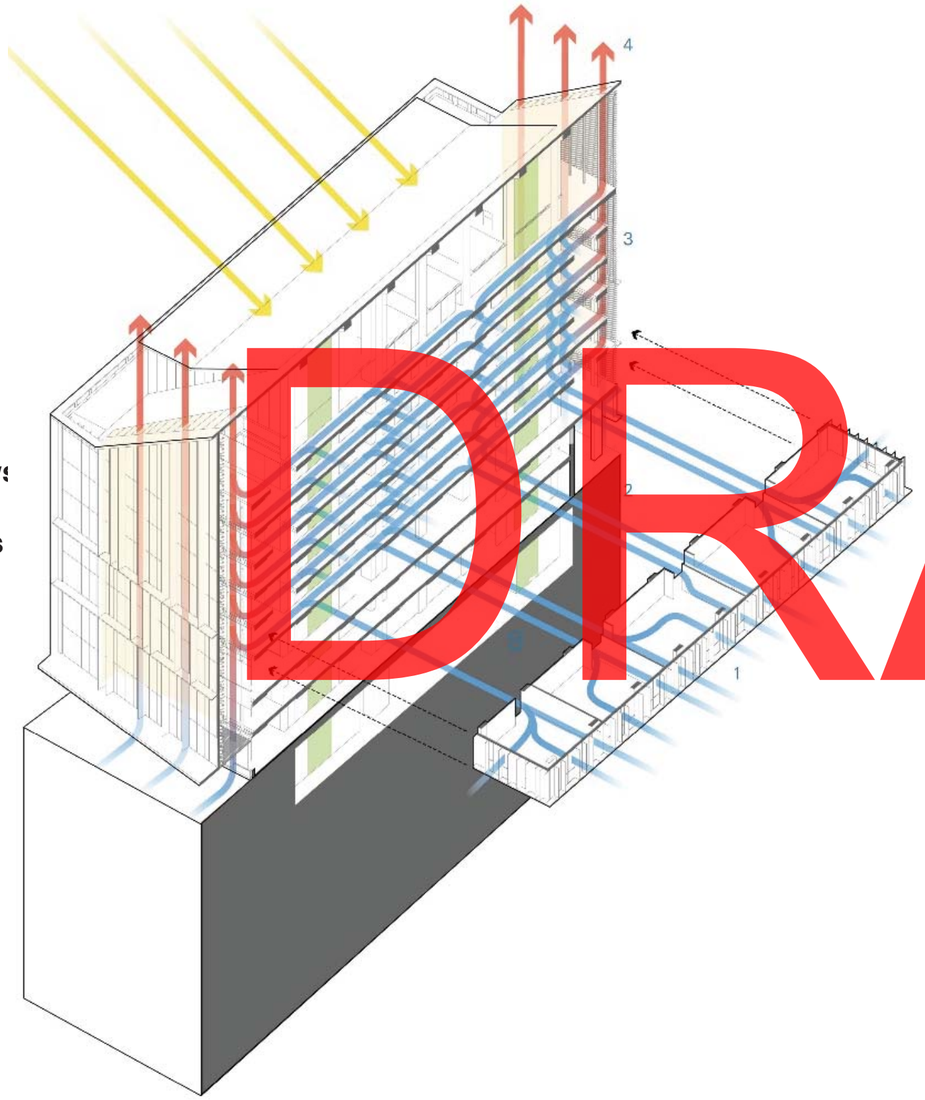
Structural and social diagram



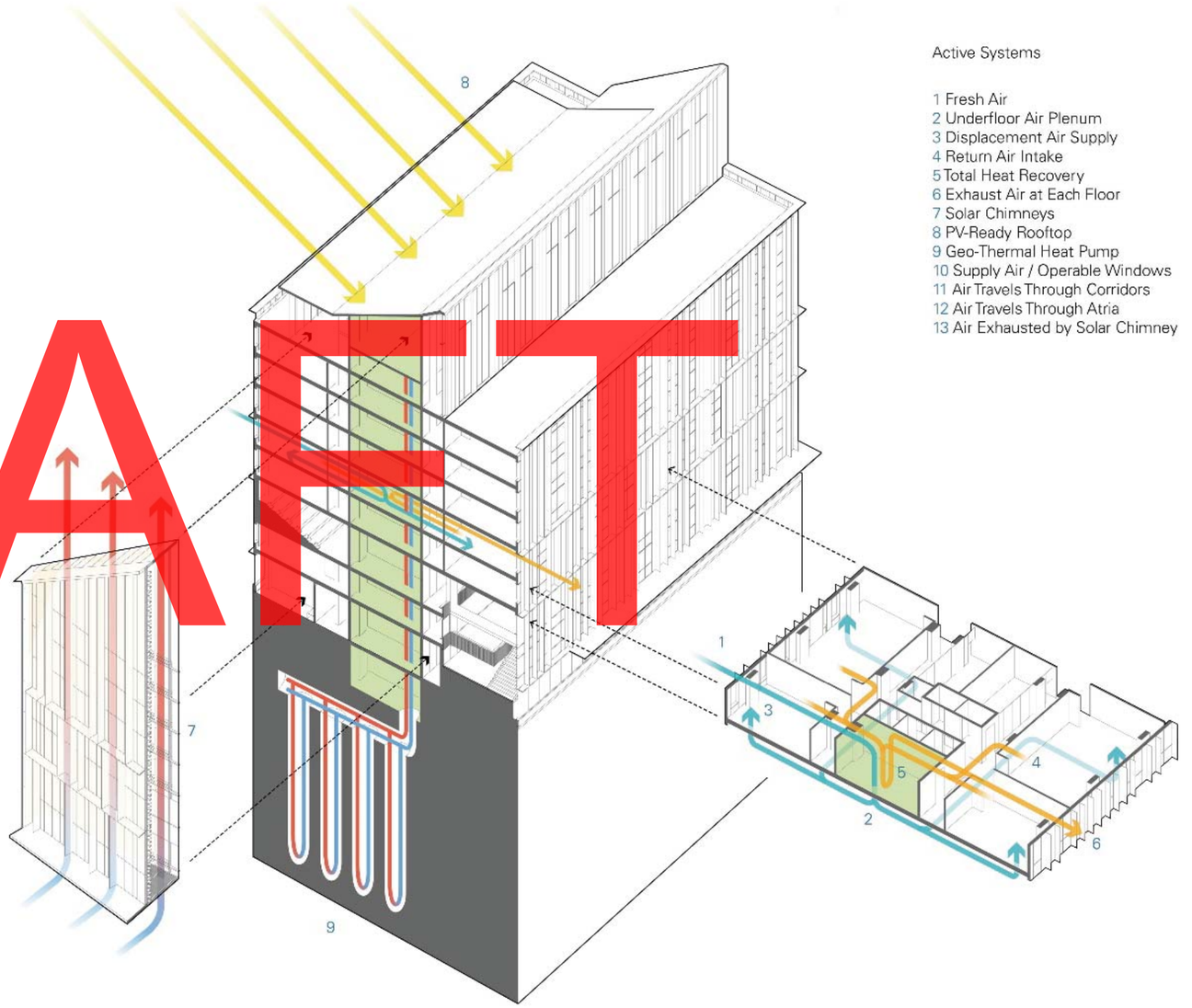
Systems diagram

PASSIVE SUSTAINIBILITY STRATEGIES

Solar Chimney
Operable windows
Vented hallways
Breathing Rooms
Solar harvesting

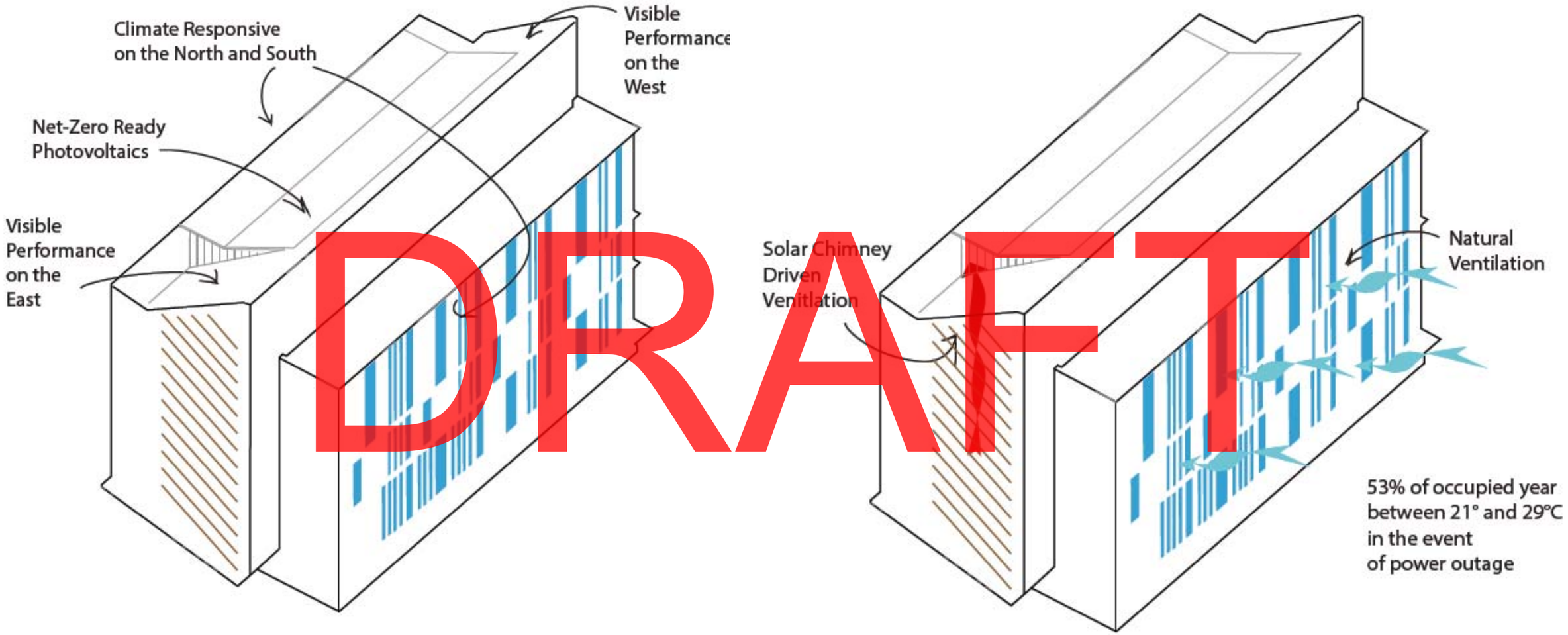


ACTIVE SUSTAINIBILITY STRATEGIES

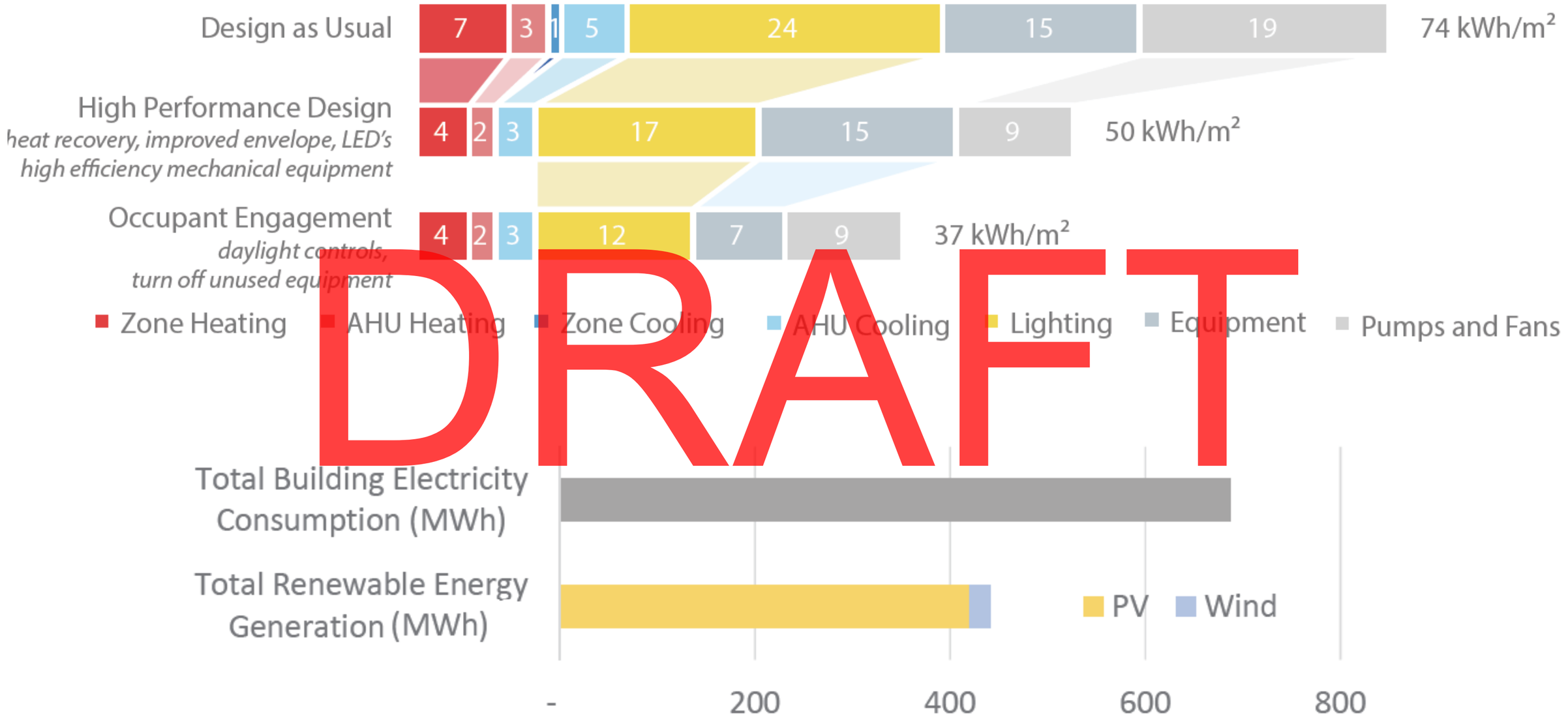


Active Systems

1 Fresh Air
2 Underfloor Air Plenum
3 Displacement Air Supply
4 Return Air Intake
5 Total Heat Recovery
6 Exhaust Air at Each Floor
7 Solar Chimneys
8 PV-Ready Rooftop
9 Geo-Thermal Heat Pump
10 Supply Air / Operable Windows
11 Air Travels Through Corridors
12 Air Travels Through Atria
13 Air Exhausted by Solar Chimney



SIMPLE, SMART DESIGN + RESILIENCE


Design as Usual
7
3
1
5
24
15
19
74 kWh/m²
High Performance Design
heat recovery, improved envelope, LED's
high efficiency mechanical equipment
4
2
3
17
15
9
50 kWh/m²
Occupant Engagement
daylight controls,
turn off unused equipment
4
2
3
12
7
9
37 kWh/m²
Zone Heating
AHU Heating
Zone Cooling
AHU Cooling
Lighting
Equipment
Pumps and Fans
Total Building Electricity Consumption (MWh)
Total Renewable Energy Generation (MWh)
PV
Wind
-
200
400
600
800

Sustainability Innovations

- Mass Timber Construction
- Low Carbon Building Materials
- Net Zero Carbon Emissions
- Smart Building Systems and Technology
- LEED Gold Certification
- Resiliency In Design - Long Term Flexibility
- Toronto Green Building Standards - Version 3, Tier 4
- Green Roof w/ Future Renewable Energy Production
- Geothermal or Deep Water Cooling

THE ARBOUR - DRAFT CHARTER FOR SUSTAINABILITY AND ENRGY GOALS

The Arbour – George Brown College

Draft Project Charter v2

EO KP
20 June 2018

Purpose

The charter identifies the project team's shared understanding of the principal goals and intent for The Arbour. It describes project outcomes, not design solutions. It forms the basis for the detailed development of the competition design. The project team (both design team and George Brown College) uses the criteria defined in the project charter as a reference point in all decision-making.

Demonstrating a Vision

Reflecting The Arbour's Purpose and Vision in its Design

The design of the Arbour will visually and physically represent the possibilities and future of tallwood construction, its role as a tool in the fight against climate change, and how safe and sustainable it is as a building practice. Occupants will experience the beauty and tactility of wood as a material and its inherent abilities to create calming, regenerative spaces.

Groundbreaking and Inspiring Architectural Landmark

A bold, innovative, iconic building design will serve to build audiences for the Arbour's message, encouraging global uptake of tall wood construction.

Vehicle for Demonstration and Education

The Arbour will educate its visitors, users, critics and admirers in the ideas of sustainable and intelligent building design. Every building visitor – whether a one-time visitor or a permanent faculty, will have opportunities for learning about the building design.

Student, Faculty, and Visitor Experience

Support Collaboration and Innovation

Effective education will take top priority in the daily functioning of the Arbour. The Arbour will support collaborative education and research that fosters creativity and innovation. Welcoming, diverse and exciting spaces – including instructional, study, Tall Wood Research Institute, and service spaces will appeal to and accommodate all building users.

Healthy and Productive Environment

The Arbour will take full advantage of the outdoor environment to provide access to daylight, fresh air, and views for the benefit of occupants' comfort, health and productivity. Occupants will have control of their environment and connection to outdoors without compromising the building's energy performance. The Arbour's design will encourage physical activity while accommodating all users.

Intuitive Operation & Visibility

The functioning of the building to maintain a comfortable working environment will be self-evident through architecturally integrated solutions and avoid reliance on hidden technical systems. User interaction with the building to assist in modifying the environment will be prioritized over centrally controlled building systems.

The performance and functioning of the building will be continuously displayed with creative and engaging methods (both physical and digital). Every day will provide the opportunity for new discoveries through engagement.

Campus Ecosystem

The Arbour will establish a sense of place, emphasizing physical and visual connections to the surrounding natural spaces, campus and community. It will be an active participant in a diverse and vibrant neighborhood.

Performance

Low Embodied Carbon

The Arbour will reduce the building's carbon footprint through the use of mass timber construction and the resulting assembly and construction efficiencies. The embodied carbon of the building's structure, envelope, and interior finishes will be less than XX.

Zero Carbon Emissions

The building will apply a holistic approach to design, engineering, and operations to target zero annual Scope 1 and 2 carbon emissions. The foundation of this approach will be exceptionally low energy performance, targeting annual site electricity consumption of 55-60 kWh/m². As much electricity will be produced on-site as is economically feasible.

Smart Operations

The Arbour will operate as it was designed. The building design, embedded technology, the construction and commissioning process, and continuous planning for operations will support the successful long-term operation of the building.

Future Proof & Building Resilience

Flexibility and adaptability in interior design and layout will allow The Arbour to accommodate future changes in use. The Arbour will accommodate the long-term effects of climate change, maintaining its intended use under future climate scenarios and recovering quickly after severe weather events. Although it is not a formal area of refuge, it will remain habitable for several days during power failures – without emergency power. The Arbour will incorporate durable materials and systems, including a structural system intended to last more than 100 years.

Life Cycle Cost

The Arbour will be a cost-effective and sound financial investment, evaluated with a holistic understanding of all costs, benefits, and risks over a 60-year life cycle.

Certification

The building will achieve a level of certification that reflects and projects its commitment to sustainability and occupant well-being: LEED Gold Certification and City of Toronto Green Building Standard Version 3, Tier 4.

The Arbour as a Research Object

In addition to supporting research on building technologies, the entire building will function as a research object. Detailed data on the building performance will be available to internal and external researchers.

ZERO CARBON EMISSIONS:
Target 55-60 kWh/m2 annually

SEQUESTERED CARBON:
Target 9,000 c.u. sequestered carbon

LOW EMBODIED CARBON:
Target under development

SMART: combination of embedded technology and intuitive operations

BUILDING RESILIENCE: elevated vulnerable systen and future-proof long term flexibility

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Y	?	N			
			Credit	Integrative Process	1

0	0	0	Location and Transportation		16
			Credit	LEED for Neighborhood Development Location	16
			Credit	Sensitive Land Protection	1
			Credit	High Priority Site	2
			Credit	Surrounding Density and Diverse Uses	5
			Credit	Access to Quality Transit	5
			Credit	Bicycle Facilities	1
			Credit	Reduced Parking Footprint	1
			Credit	Green Vehicles	1

0	0	0	Sustainable Sites		10
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Site Assessment	1
			Credit	Site Development - Protect or Restore Habitat	2
			Credit	Open Space	1
			Credit	Rainwater Management	3
			Credit	Heat Island Reduction	2
			Credit	Light Pollution Reduction	1

0	0	0	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
			Credit	Outdoor Water Use Reduction	2
			Credit	Indoor Water Use Reduction	6
			Credit	Cooling Tower Water Use	2
			Credit	Water Metering	1

0	0	0	Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
			Credit	Enhanced Commissioning	6
			Credit	Optimize Energy Performance	18
			Credit	Advanced Energy Metering	1
			Credit	Demand Response	2
			Credit	Renewable Energy Production	3
			Credit	Enhanced Refrigerant Management	1
			Credit	Green Power and Carbon Offsets	2

0	0	0	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
			Credit	Building Life-Cycle Impact Reduction	5
			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
			Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
			Credit	Building Product Disclosure and Optimization - Material Ingredients	2
			Credit	Construction and Demolition Waste Management	2

0	0	0	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
			Credit	Enhanced Indoor Air Quality Strategies	2
			Credit	Low-Emitting Materials	3
			Credit	Construction Indoor Air Quality Management Plan	1
			Credit	Indoor Air Quality Assessment	2
			Credit	Thermal Comfort	1
			Credit	Interior Lighting	2
			Credit	Daylight	3
			Credit	Quality Views	1
			Credit	Acoustic Performance	1

0	0	0	Innovation		6
			Credit	Innovation	5
			Credit	LEED Accredited Professional	1

0	0	0	Regional Priority		4
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1

0	0	0	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Achieving LEED GOLD:

Status: **LEED** charette pending highlighted areas will be areas of primary focus for achieving LEED GOLD with significant focus on Optimizing Energy targets

WT Minimum Green Building Standards

LEED Gold Certification	Version 4 - New Construction Water Efficiency and Water Use Reduction Optimize Energy Efficiency
Smart Building	Infrastructure to support WTIC network Metering and data collection
Electrical Vehicles Infrastructure	under review
Green Roof	60% of available green roof future renewable energy production
Engagement and Support	
Bicycle Parking and Support	
Waste Managment	Segregated waste collection
District Energy	Geothermal or Deep Water Cooling - under review
High Efficiency Appliances	Energy star compliant
Community Integration	Integration of the urban design elements, landscaping and materials consistency with public realm plans Primary entrances on east, in close proximity to
Long-Term Flexibility	Slab & column structure - live load capacity at 4.8 kPA (min.), 7.2 kPA slab on grade Ground floor height - 5m (min)
Progress Tracking System	Future reporting as per MGBR Reporting requirements
Integrated Design Process	Collaboration and working together Team meetings

Discussion Point:
Extensive Green Roof Requirement + Mass Timber presents challenge

red bubble indicates areas of challenge

TGS - Green Building Standards

Toronto Green Standards - Version 3, Tier	
Air Quality	
Low-Emissions Transportation	Tier 1
Cycling Infrastructure	Tier 1
Pedestrian Infrastructure	Tier 1
Urban Heat Island	Tier 2
Energy Efficiency, GHG & Resilience	
Energy Efficiency	Tier 4
Renewable Energy	Tier 2
District Energy Systems	Tier 2
Operational Systems	Tier 2
Building Resilience	Tier 2
Water Balance, Quality and Efficiency	
Construction Activity	Tier 1
Water Balance, Stormwater Retention	Tier 3
Water Quality, Stormwater Run-Off	Tier 1
Water Efficiency	Tier 3
Ecology	
Urban Forest: Increase Tree Canopy	Tier 1
Natural Heritage	Tier 1
Biodiversity in Landscapes	Tier 1
Bird Collision Deterrence	Tier 2
Light Pollution	Tier 2
Solid Waste	
Storage and Collection of Recycling and	Tier 2
Building Reuse	Tier 2
Construction Waste Management	Tier 3
Sustainable Building Materials	Tier 2

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THE ARBOUR

1. Design

- Vision
- Site Relationships + Exterior
- Interior + Form

2. Sustainability + Carbon Sequestration

3. Structural Innovation

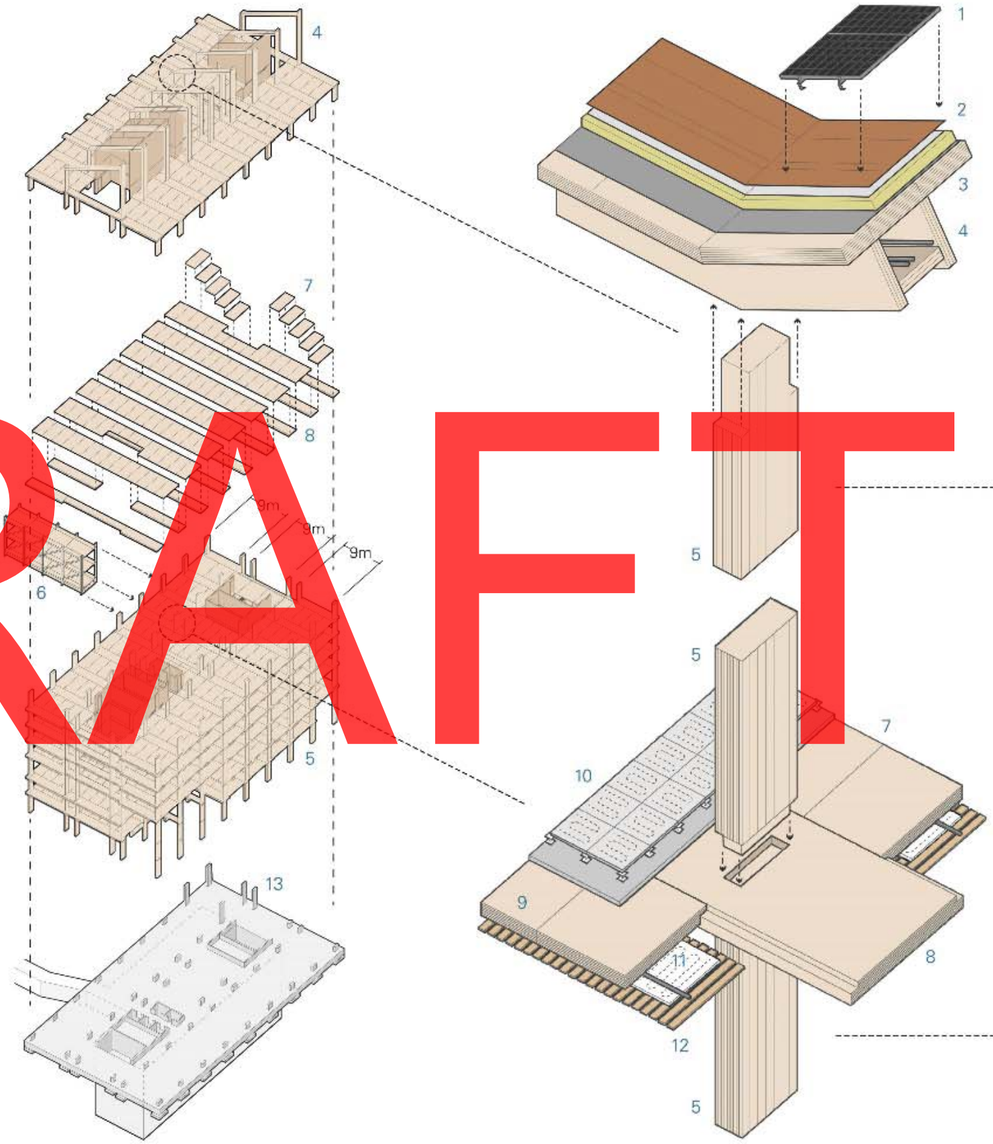
TALL WOOD CONCEPT (KEEPING IT SIMPLE)

The Tall Wood Vision is:

Revolutionarily Innovative and is intended to break new ground in the proliferation of CLT

Transferable to applications where flat thin and wide span are desirable

Canadian

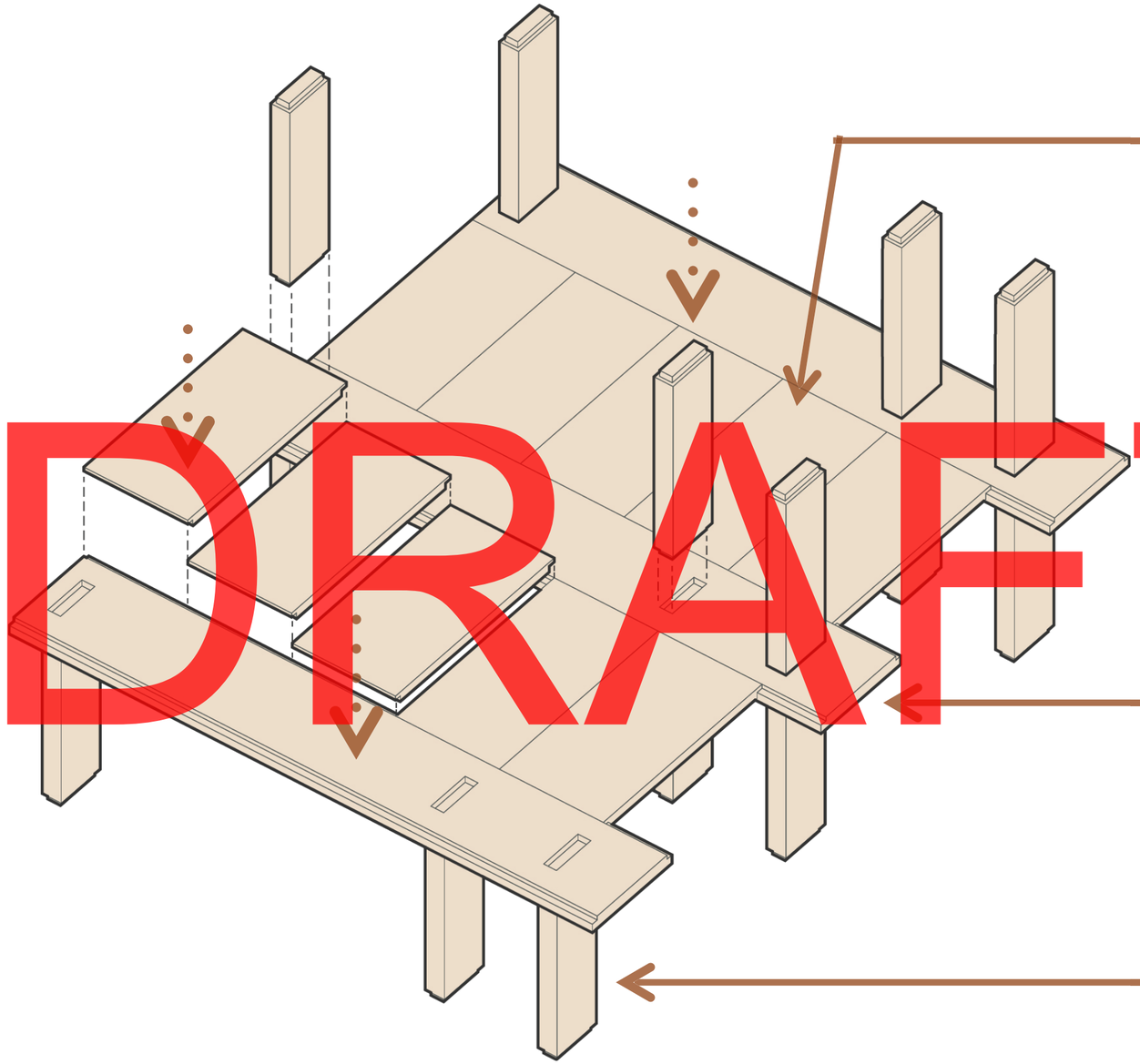


LEGEND

1 Potential PV Panels
2 Standing Seam Roof Assembly
3 CLT Roof Deck
4 3-Ply CLT Sloped Box Beam
5 500mm x 1200mm CLT Column
6 CLT Truss Bridge
7 5-Ply CLT Slab
8 9-Ply CLT Slab Beam
9 Concrete Topping
10 Shallow Raised Floor with Integrated Radiant Heating
11 Radiant Cooling Panels
12 Acoustic Wood Baffles
13 Concrete Column Bases, Slab on Grade, Basement and Tunnel

CLT box beam with CLT roof deck and roof assembly

CLT slab band, infill panels and wallumn connection



3

2400 wide x 245 thick 7-lam CLT infilll panels

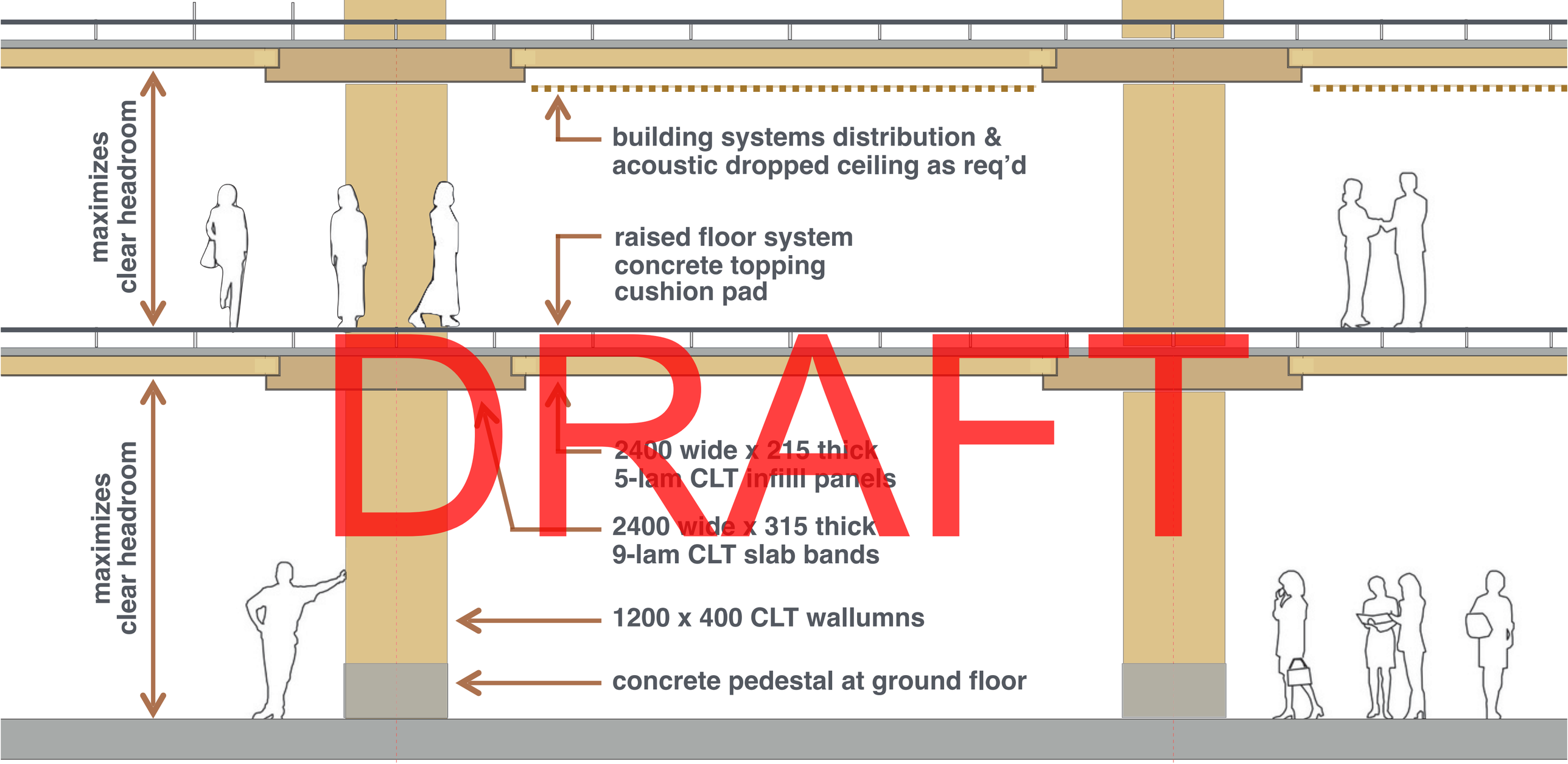
2

2400 wide x 315 thick 9-lam CLT slab bands

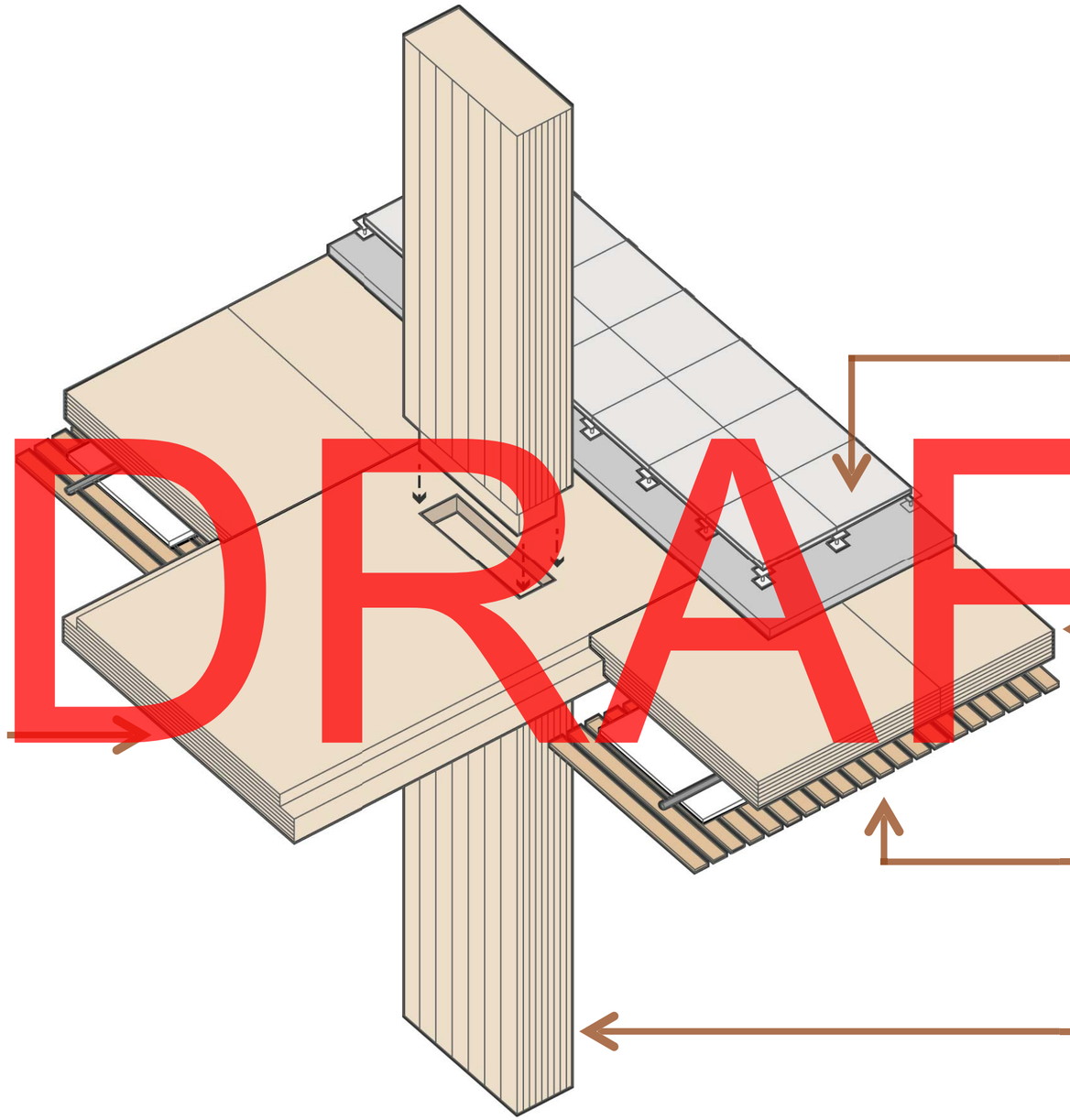
1

1200 x 400 CLT wallumns

Made in Canada mass wood components



large span slab band CLT superstructure section



raised floor system
concrete topping
cushion pad

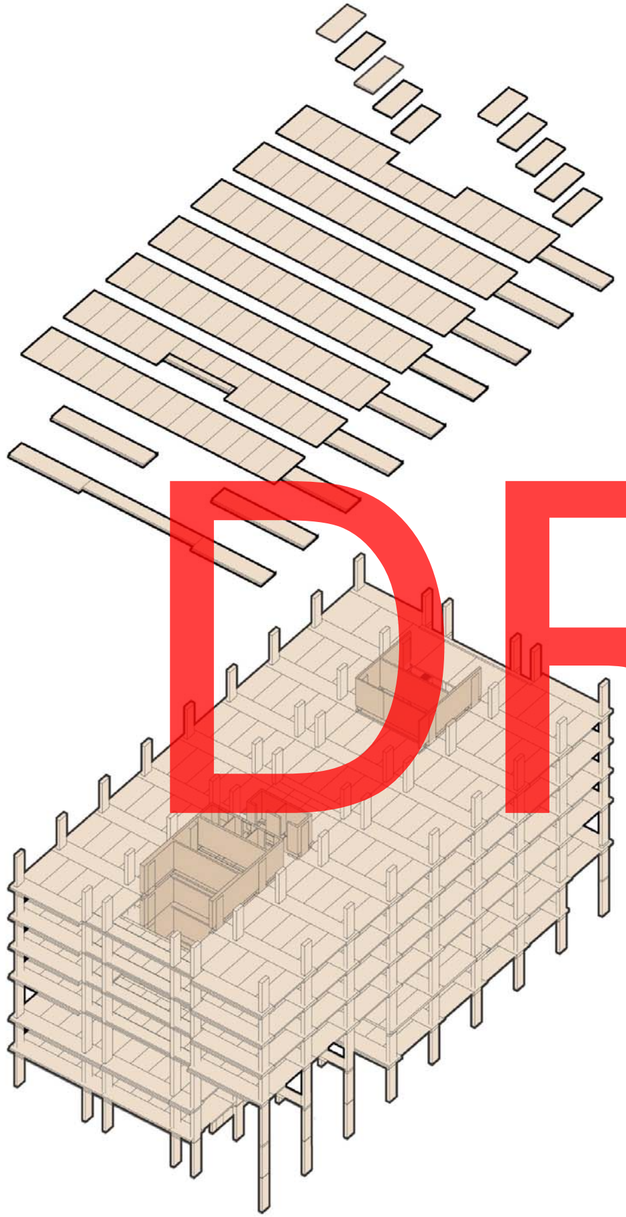
2400 wide x 215 thick 5-
lam CLT infilll panels

2400 wide x 315 thick 9-
lam CLT slab bands

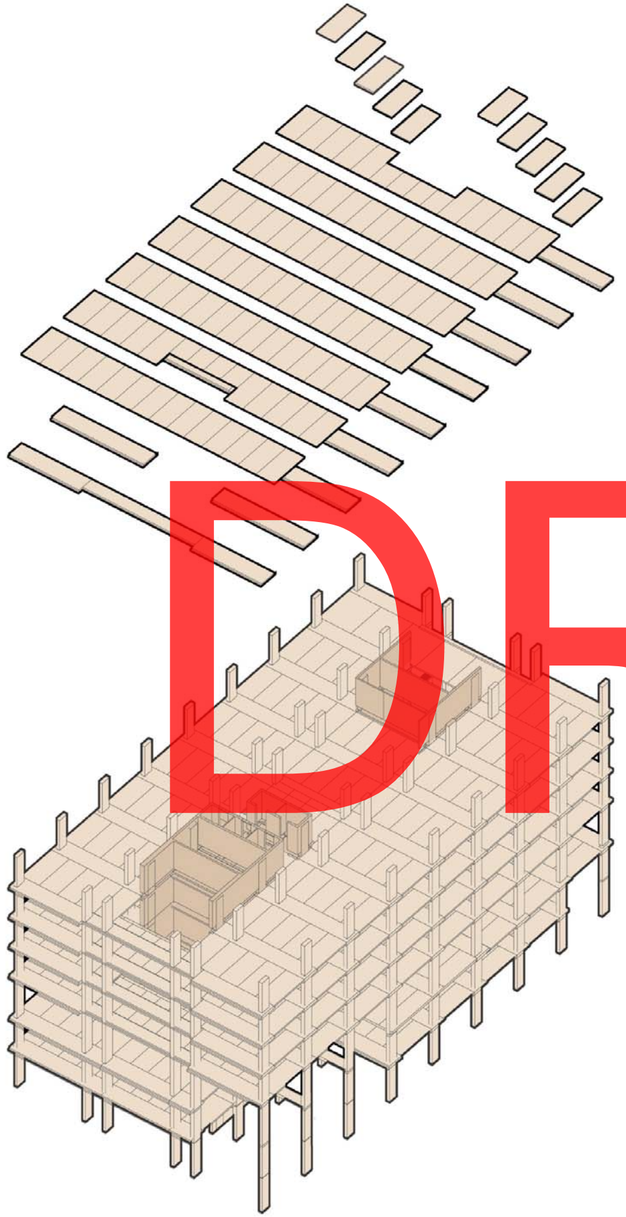
building systems distribution
& acoustic ceiling as req'd

1200 x 400 CLT wallumns

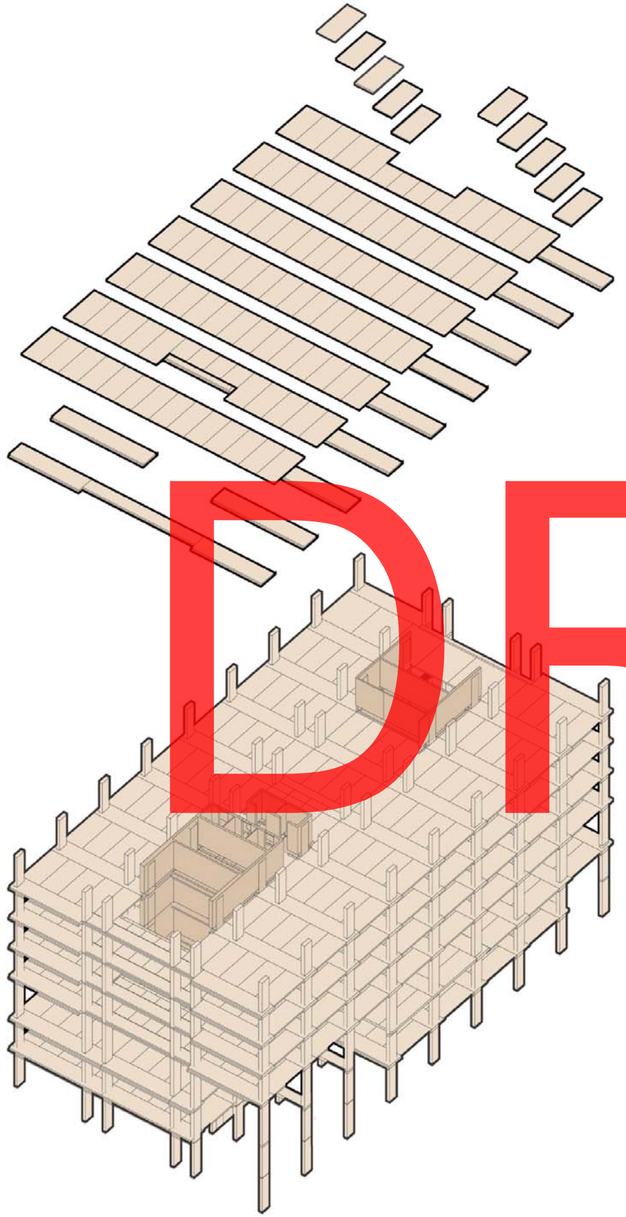
CLT superstructure fit-out



atrium breathing room(s)



social breathing room(s)



circulation breathing room(s)

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THE ARBOUR

1. Design

- Vision
- Site Relationships + Exterior
- Interior + Form

2. Sustainability + Carbon Sequestration

3. Structural Innovation

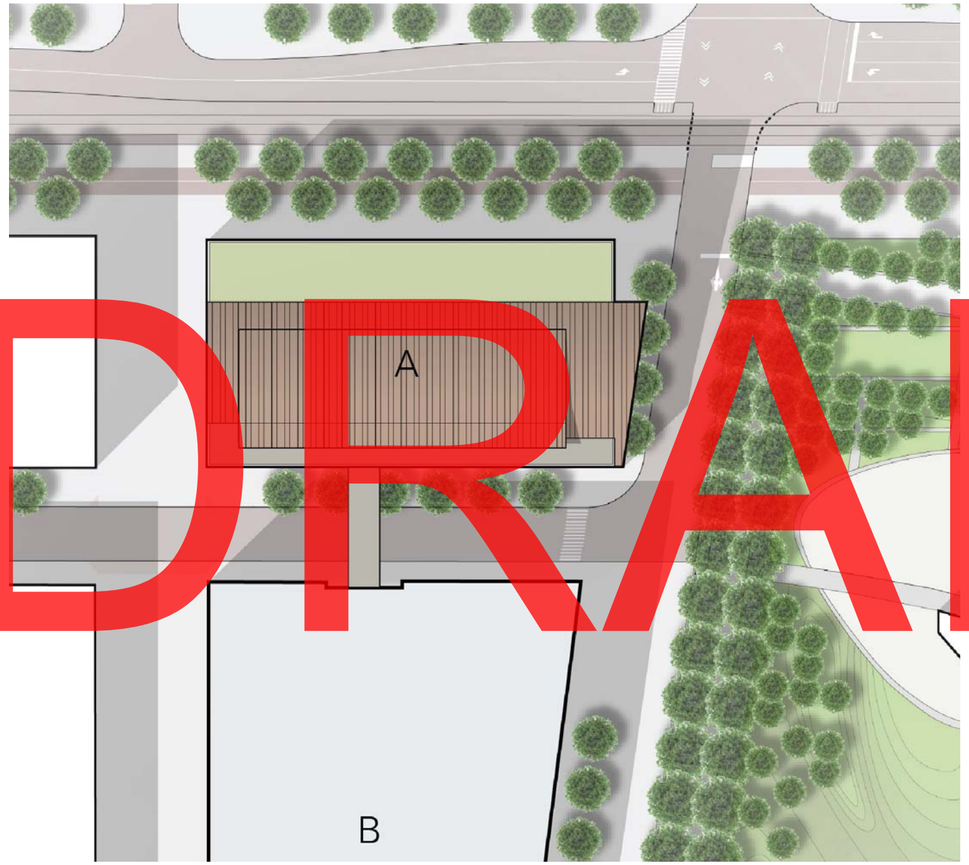
4. Landscape Strategy

LANDSCAPING CONCEPTS

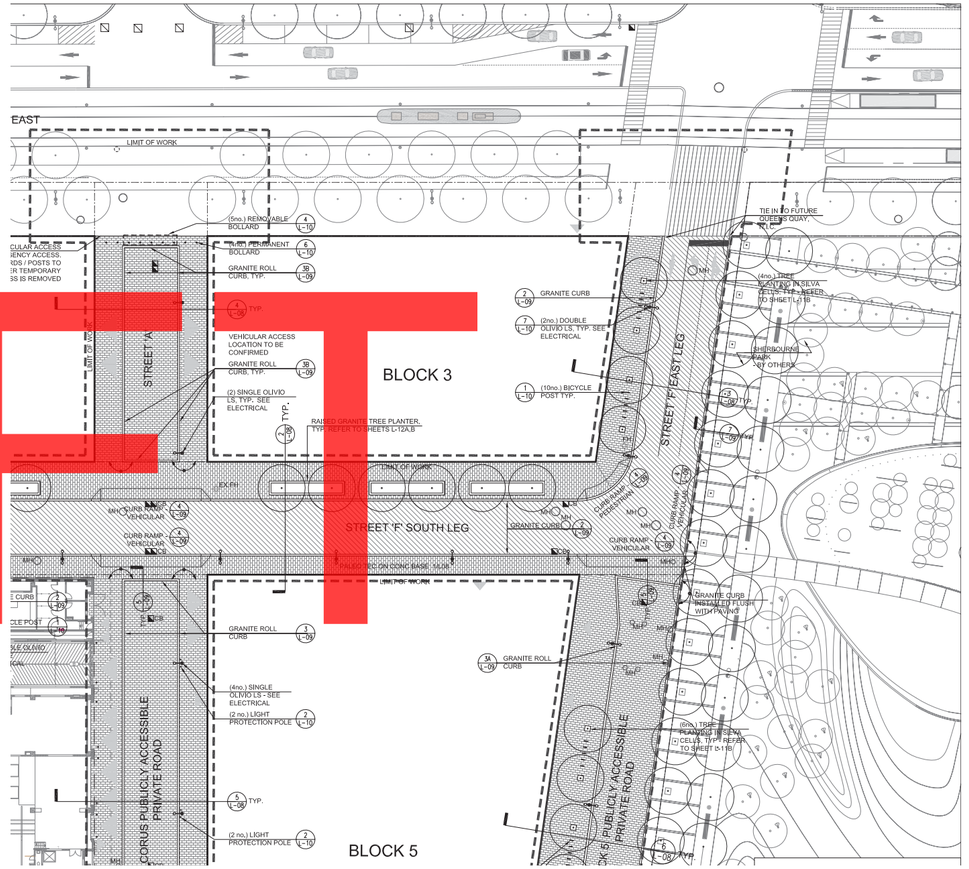
The Landscape Approach:

Will respect the East Bayfront Public Realm Plan -

Considerations will be:
- A possible layby for the GF daycare
- Access to daylight - daycare play-area



The Arbour Context Site Plan

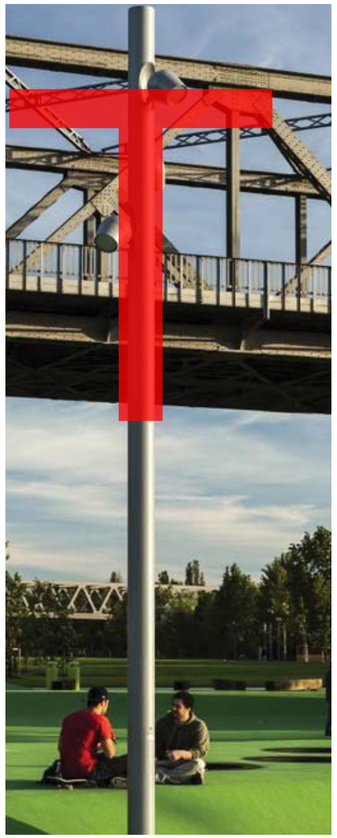


East Bayfront Public Realm Plan

LANDSCAPING CONCEPTS

East Bayfront Precinct:

Clarification:
Detailed Information is available for the Lower Yonge Precinct Planning are these standards and criteria applicable to our property?



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THE ARBOUR

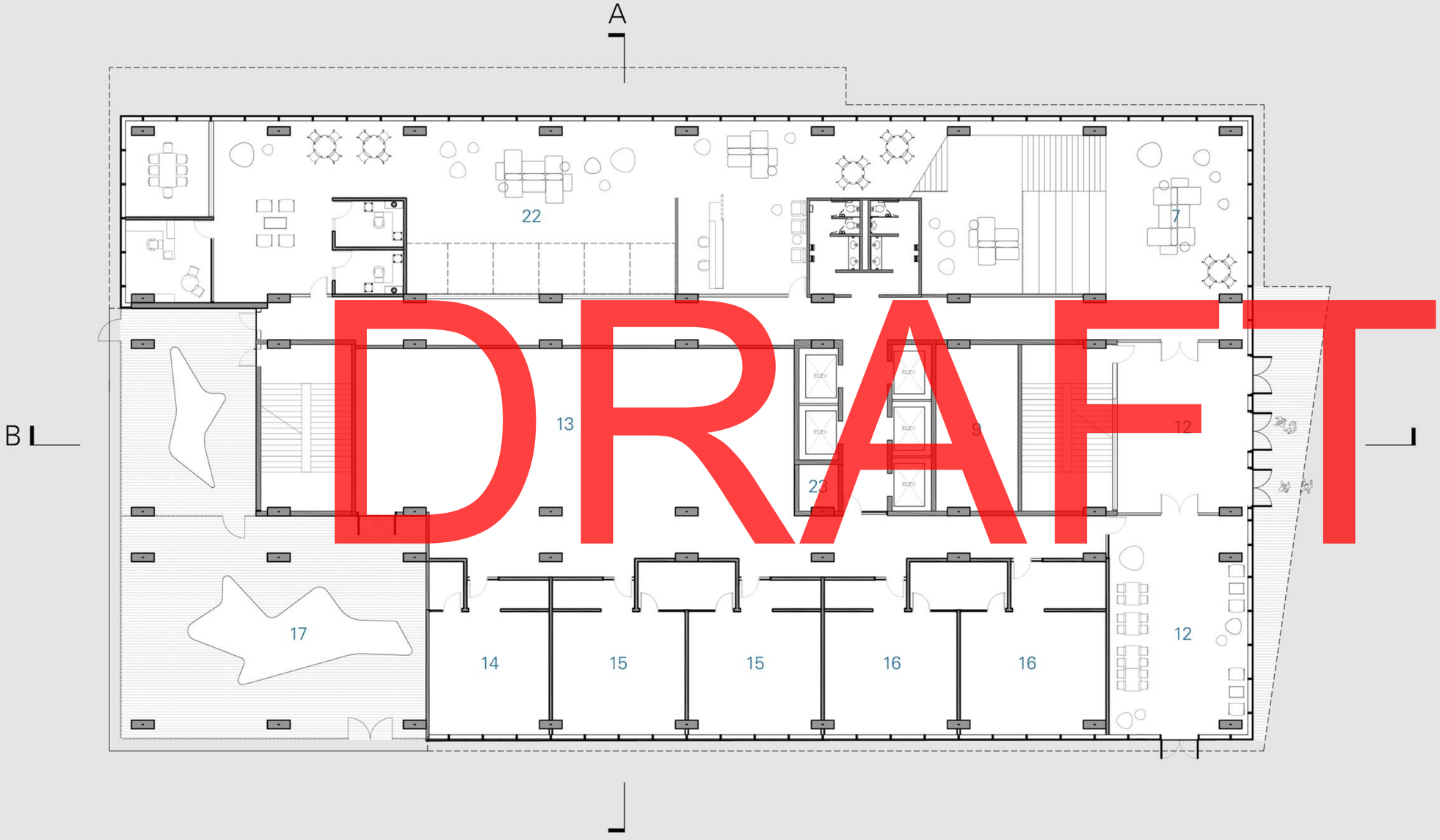
Breathing Room (s)

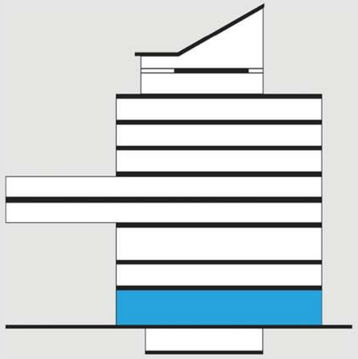
Appendix

1. Plans

2. Shadow Study

GROUND FLOOR PLAN

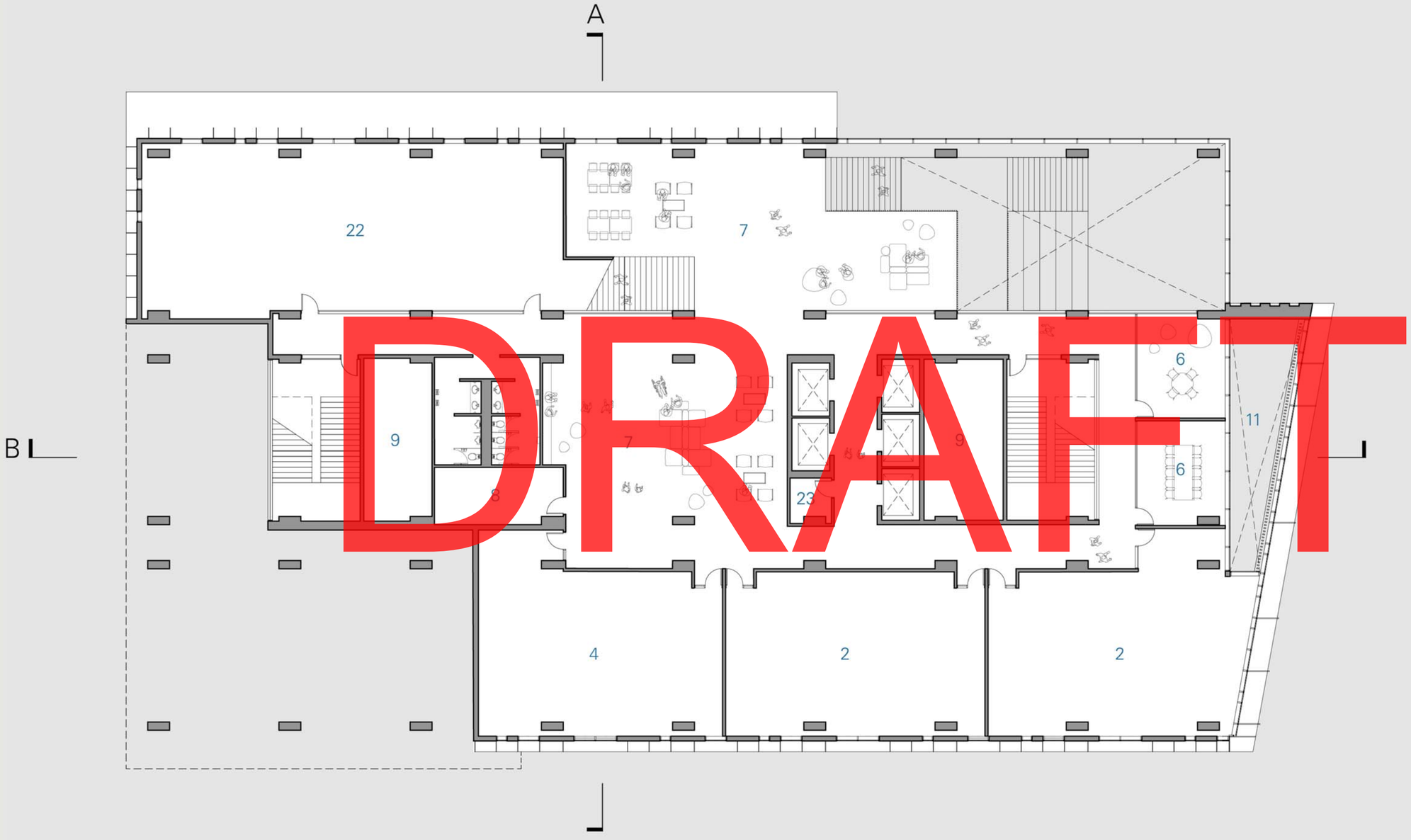


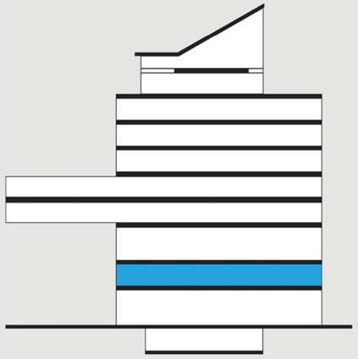


LEGEND

1 40 Person Classroom
2 60 Person Classroom
3 40 Person Computer Lab
4 60 Person Computer Lab
5 Lecture Hall
6 Meeting Room
7 Student Interaction Space
8 Electrical Room
9 Mechanical Room
10 A/V Room
11 Solar Chimney
12 Lobby
13 Day Care
14 Infant Classroom
15 Toddler Classroom
16 Preschool Classroom
17 Playground
18 Stroller Storage
19 Bridge
20 Faculty/Admin
21 Generator Room
22 Student Services
23 Janitor
24 Outdoor Patio
25 Tall Wood Institute
26 Green Roof

LEVEL 2 FLOOR PLAN





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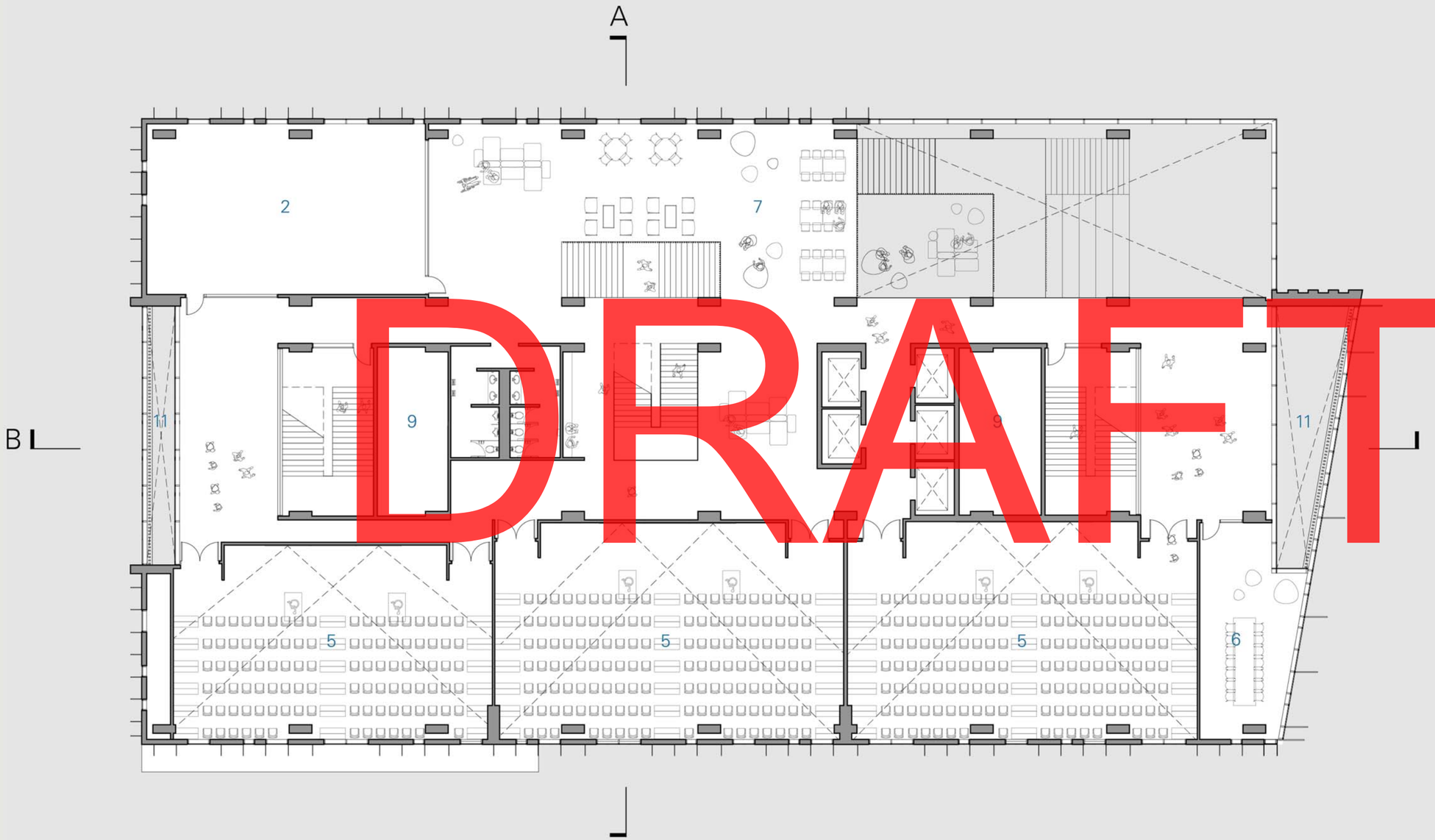
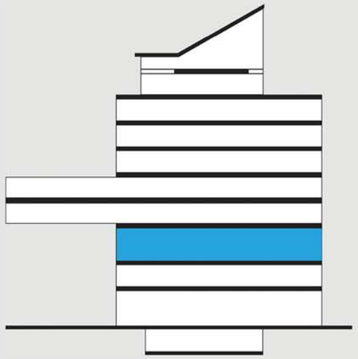
21 Generator Room
22 Fitness Centre
23 Janitor
24 Outdoor Patio
25 Tall Wood Institute
26 Green Roof

LEVEL 3 FLOOR PLAN





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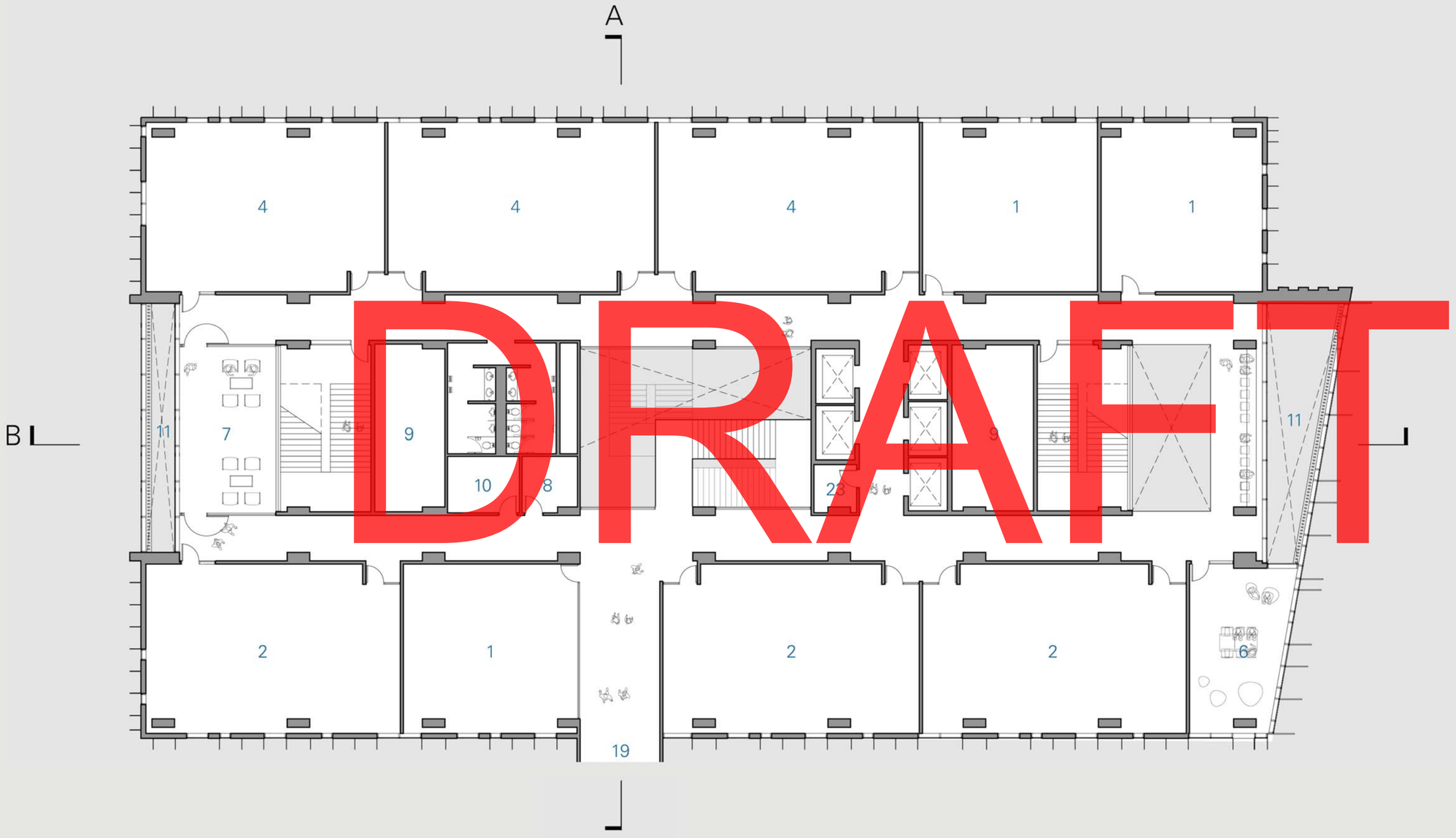
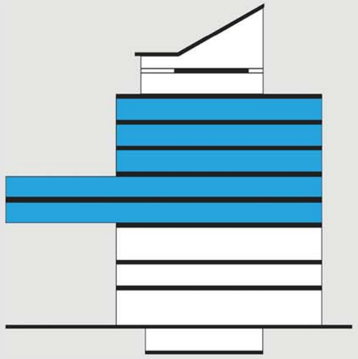
TYPICAL CLASSROOM / COMPUTER LAB FLOOR PLAN





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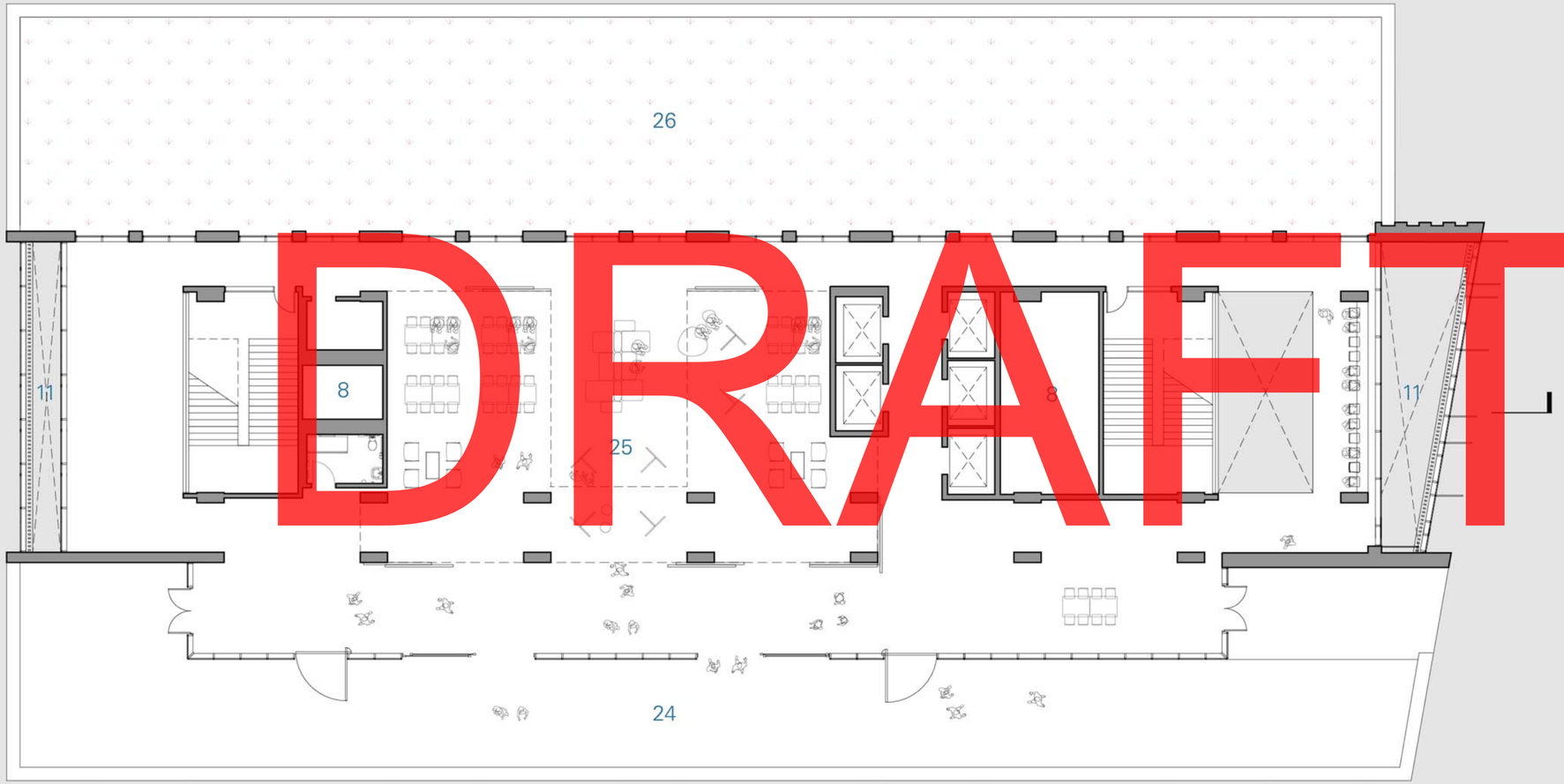
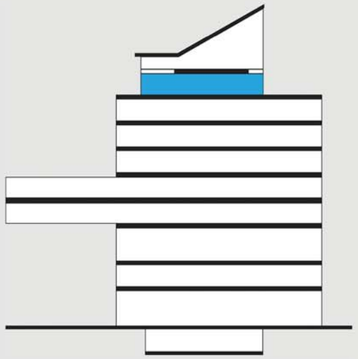
LEVEL 9 FLOOR PLAN (TALL WOOD INSTITUTE)





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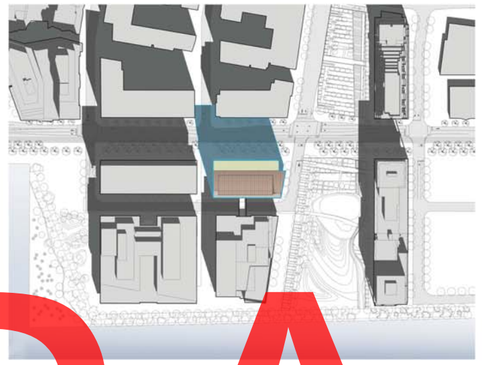
26 Green Roof

SHADOW STUDIES

VERNAL EQUINOX (MARCH 21ST)

9:18 AM

10:18 AM



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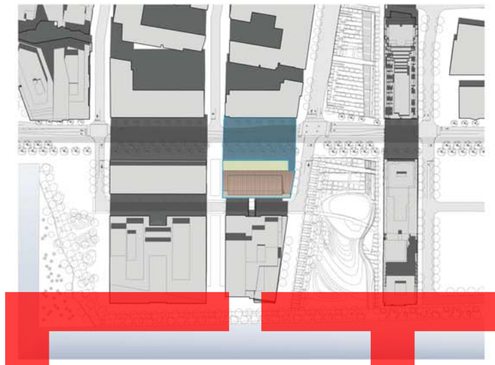

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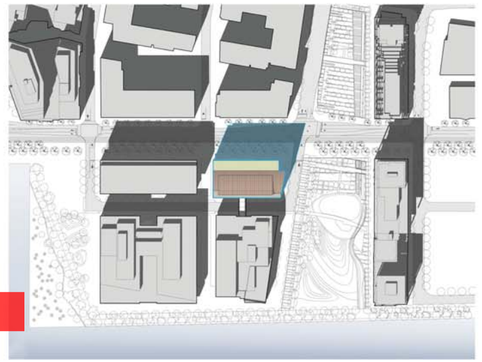

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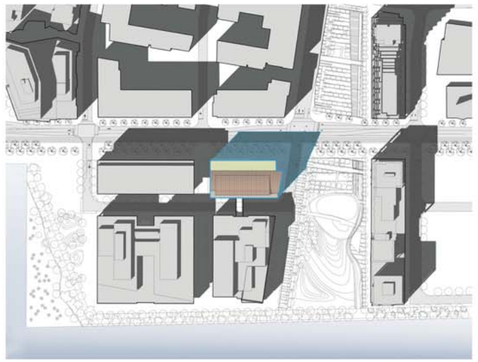

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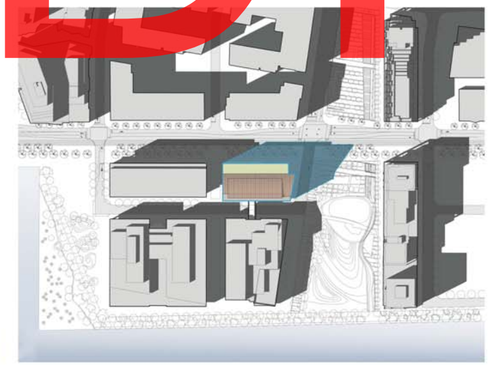

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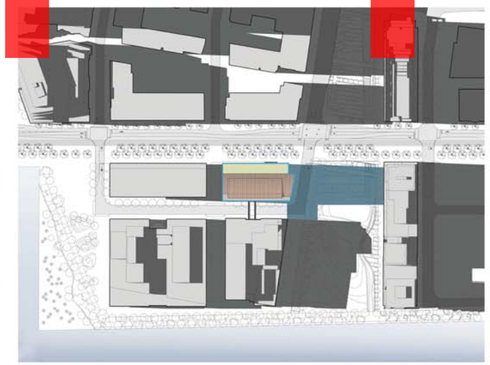

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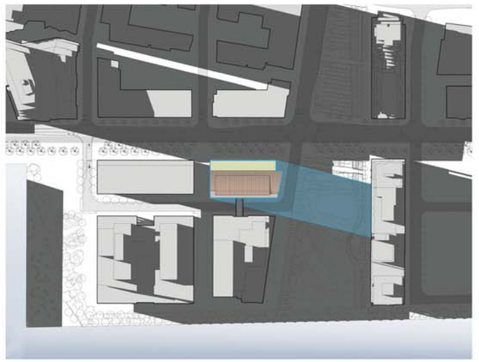

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SHADOW STUDIES

SUMMER SOLSTICE (JUNE 21ST)

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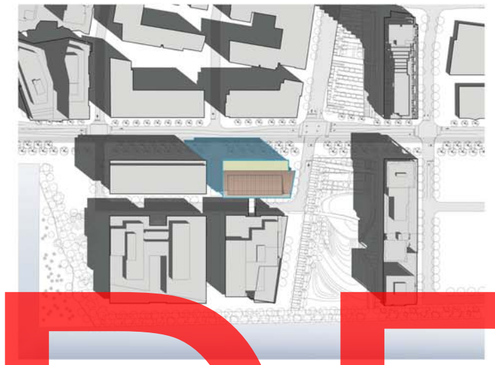

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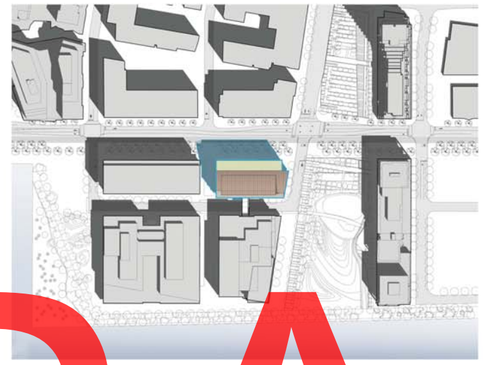

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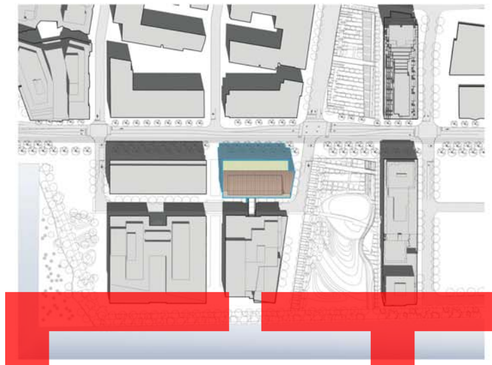

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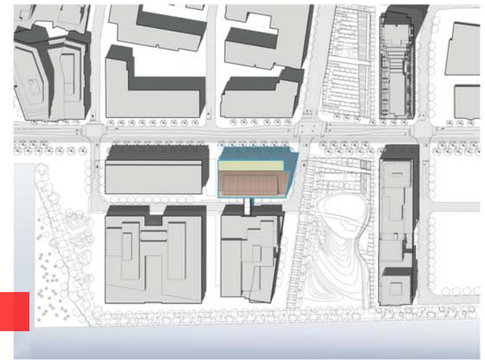

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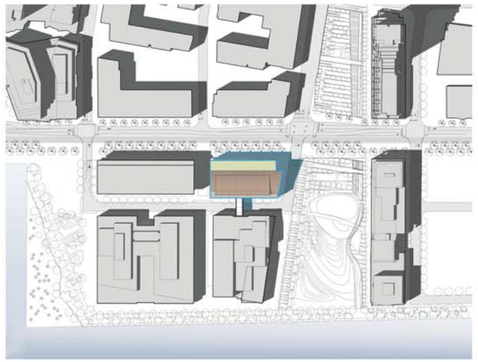

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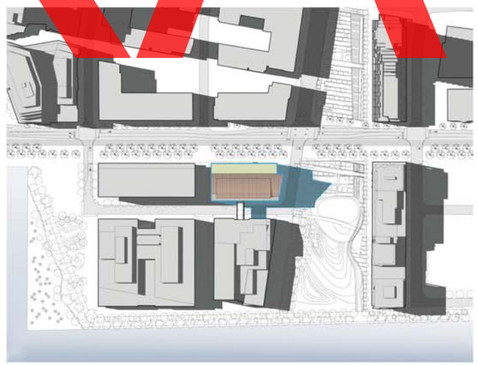

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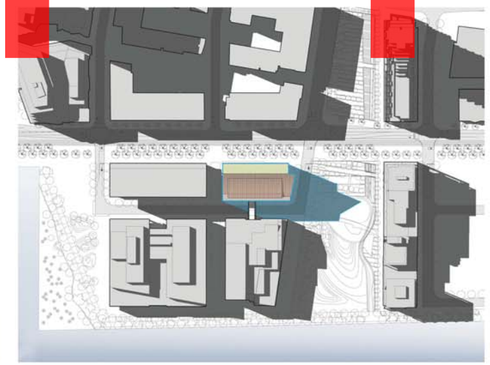

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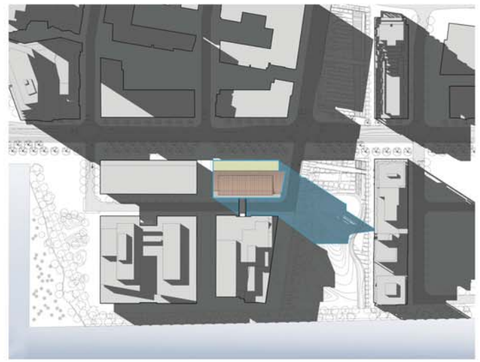

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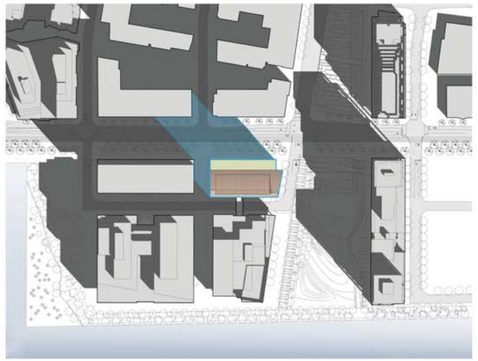
SHADOW STUDIES

AUTUMNAL EQUINOX (SEPTEMBER 21ST)



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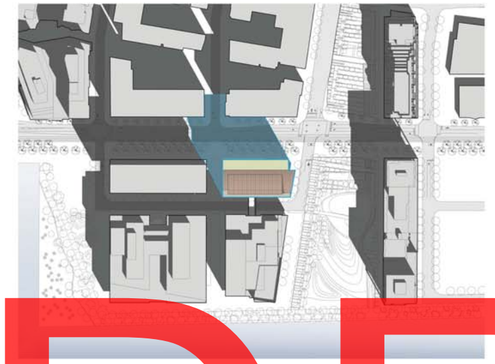

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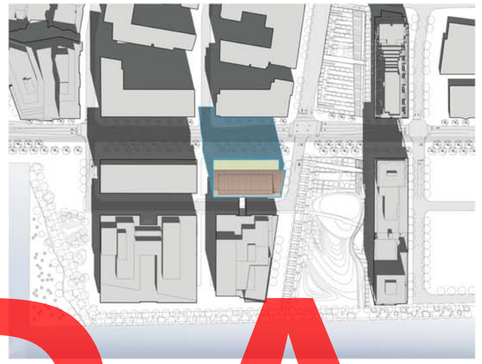

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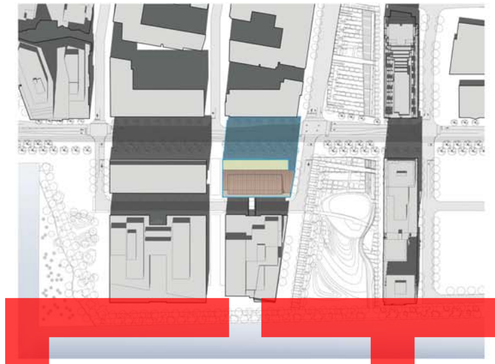

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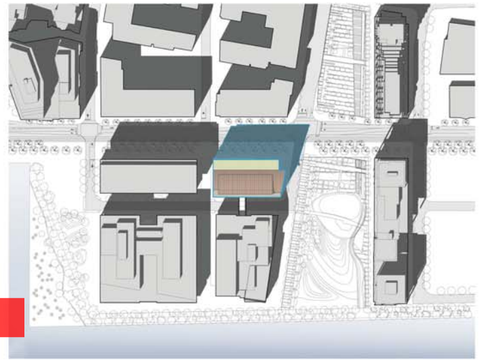

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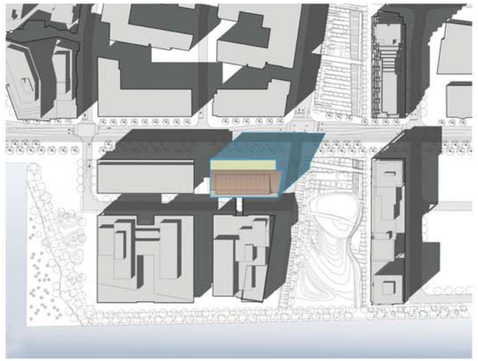

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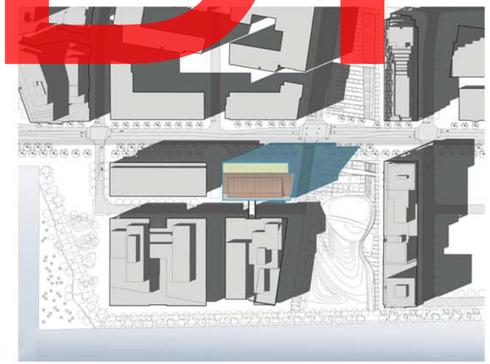

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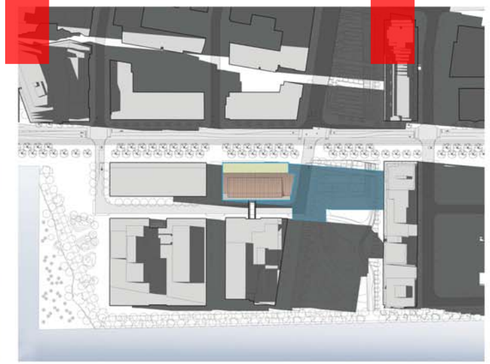

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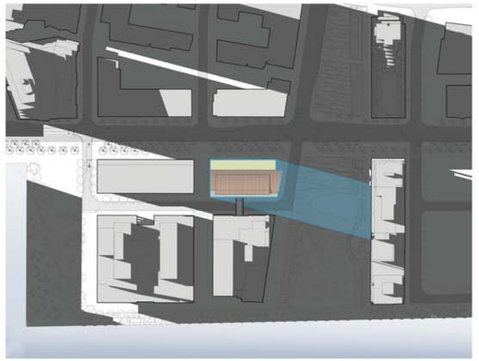

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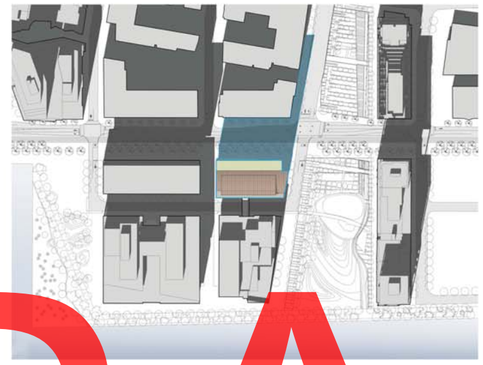
SHADOW STUDIES

WINTER SOLSTICE (DECEMBER 21ST)

9:18 AM

10:18 AM



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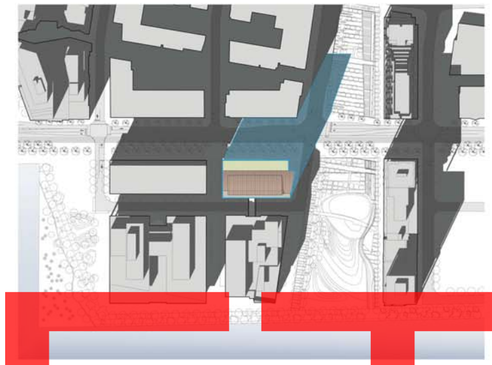

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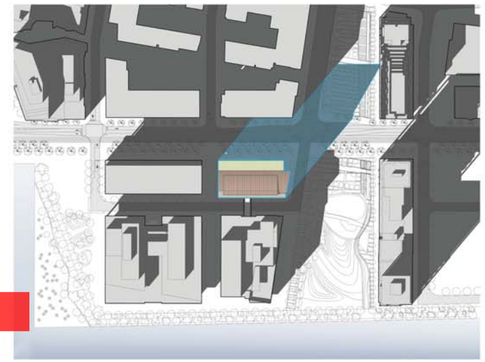

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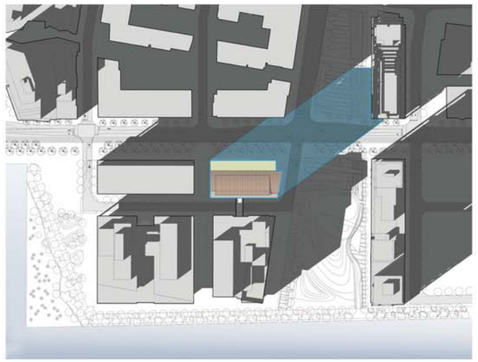

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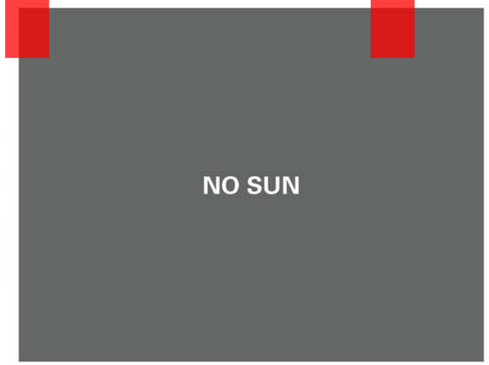

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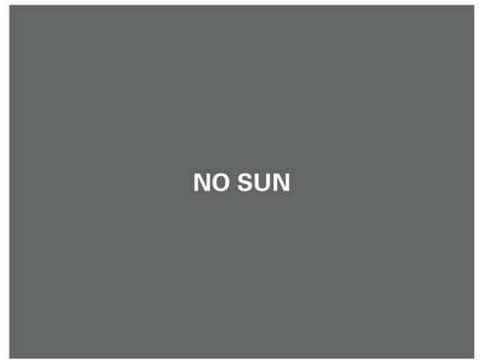

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