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### Team MKS Oakvillage Hackathon Submission

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# TEAM MKS Oakvillage

BUILDING



Pavel Denisov

INFRASTRUCTURE



Dave Clark    Nicole Bermudez  
Huang Chen    Majdi Haddad  
Shannon Pirie

WASTE

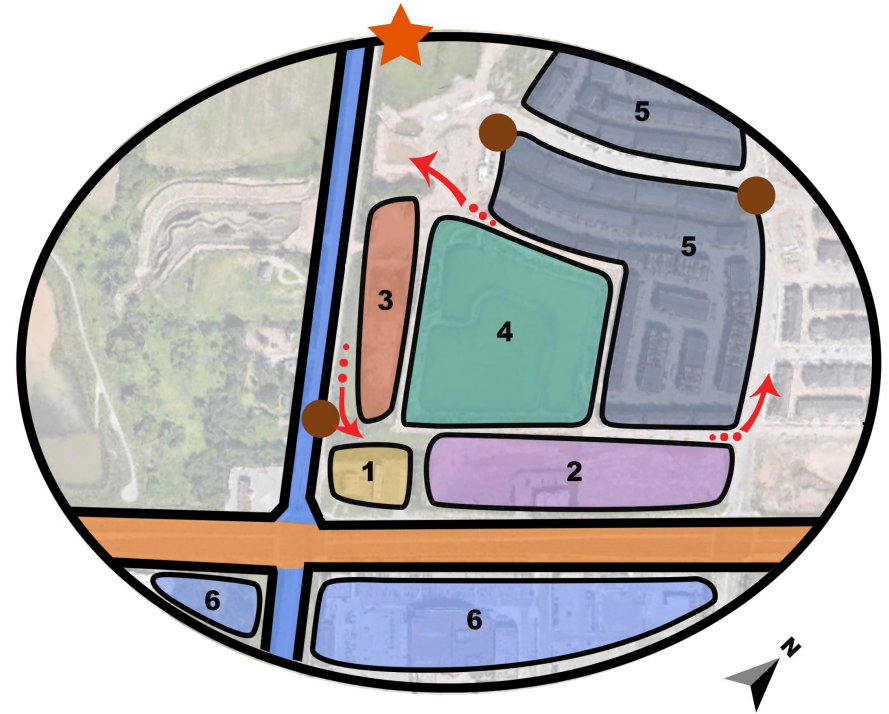


Tim Corcoran  
Mark Hillis

# Introduction - Site Plan

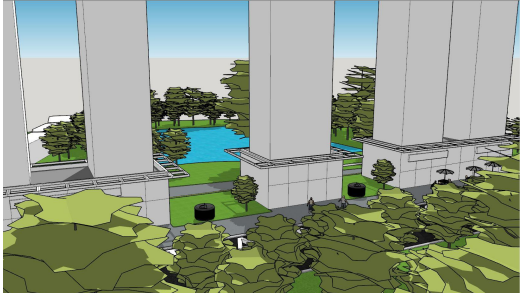
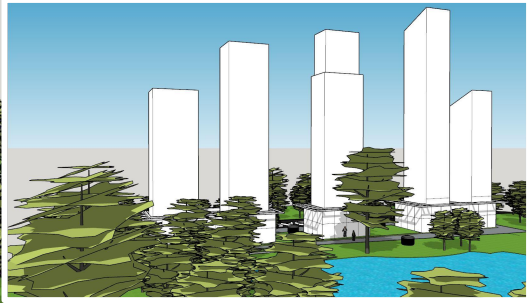
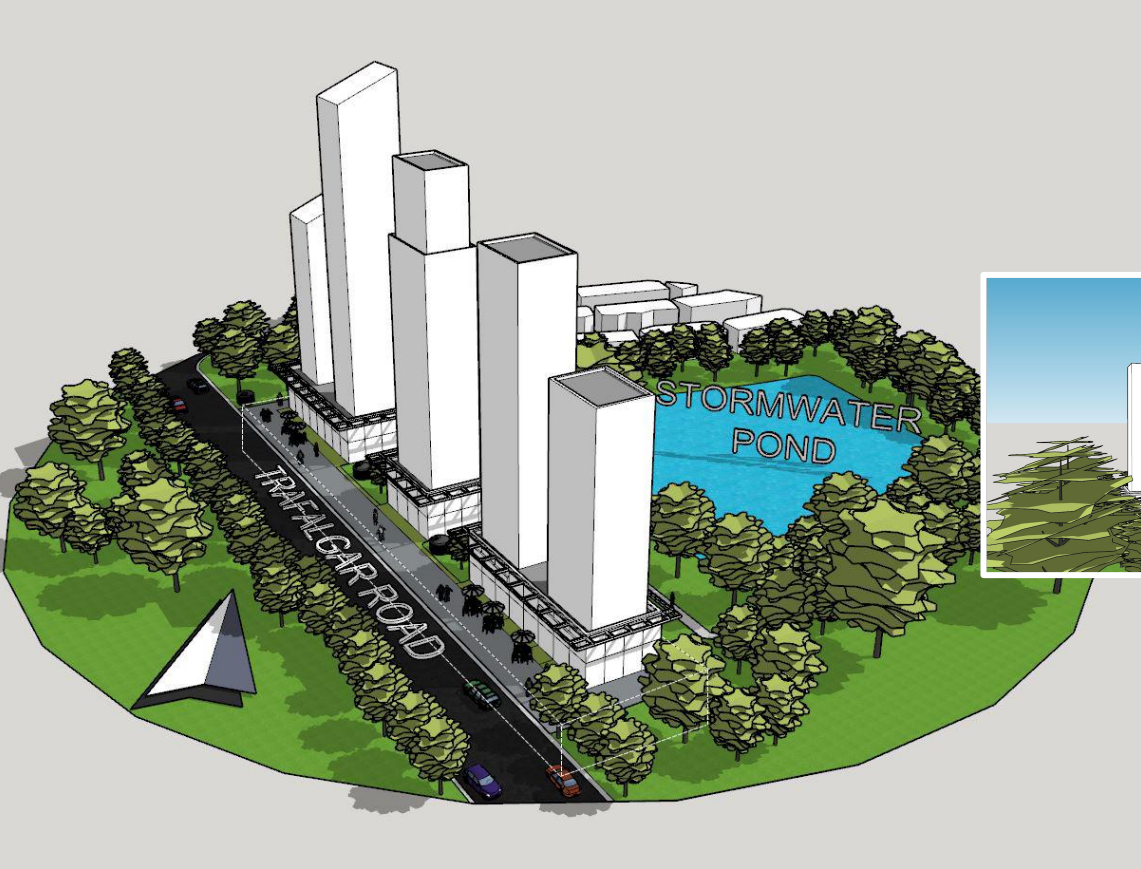


- 1 GAS STATION
- 2 MIXED USE AREA
- 3 PHASE FOUR AREA
- 4 STORMWATER POND
- 5 EXISTING RESIDENTIAL
- 6 EXISTING COMMERCIAL



- DUNDAS ST
- BUS STATION
- TRAFALGAR RD
- TRANSIT TERMINAL

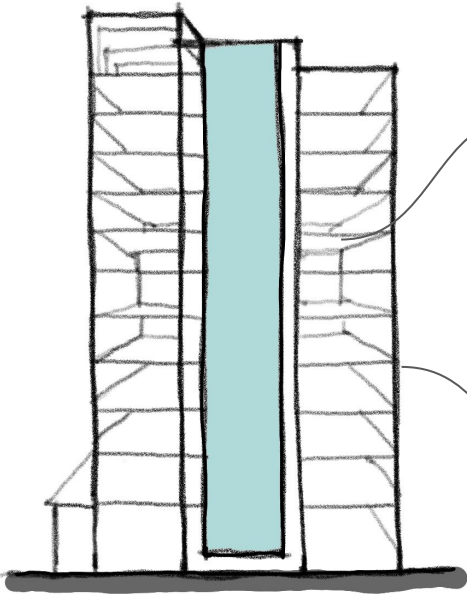
# Building Massing





# Building Components

**HIGH RISE PROPOSAL:** Mass timber prefab exterior using **Kontio** components + **concrete core, slab & structure**



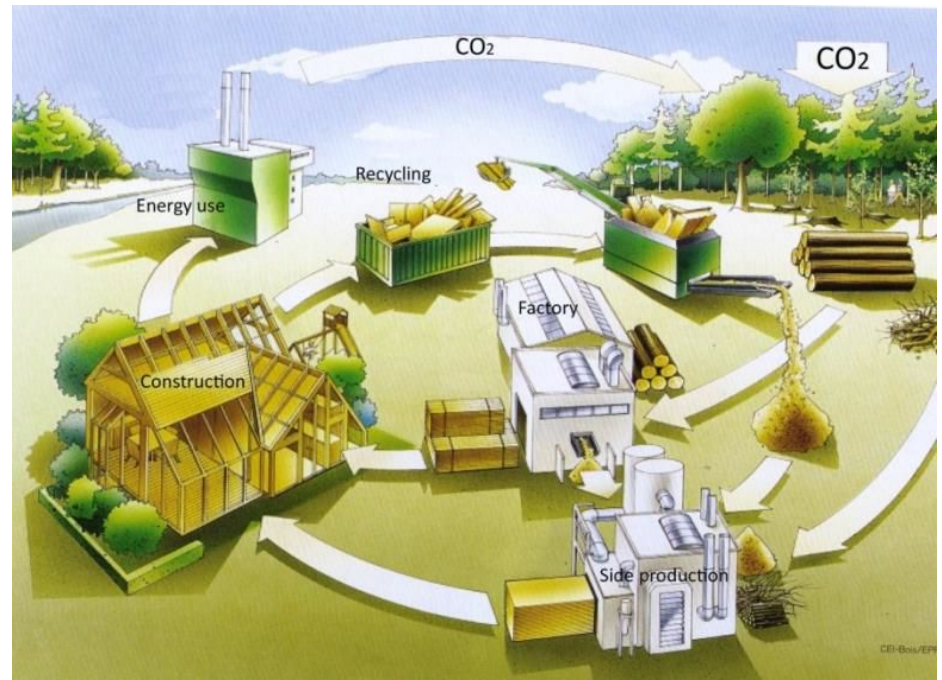
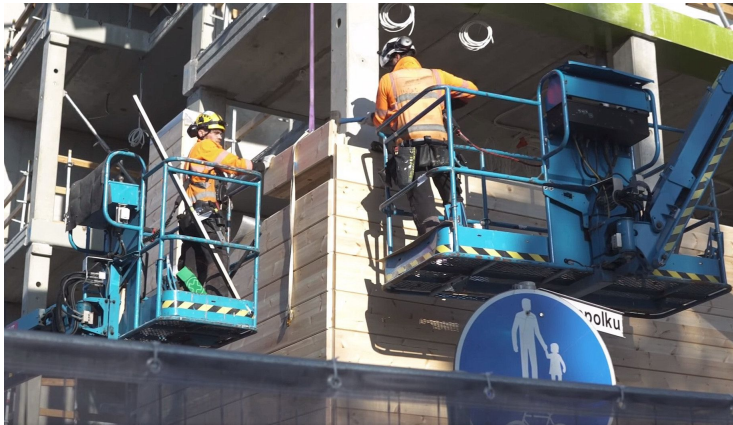
**FLY ASH + RECYCLED AGGREGATE in CONCRETE:** sustainable concrete types to limit carbon emissions

**KONTIO PREFAB:** exterior walls stack **cross-laminated wood** logs and are airtight, creating thermal mass + minimum construction waste



**KONTIO**

# Building Components



**Innovative** - unique technology to affix the **cross-laminated log wall** to each concrete storey creating hybrid 15-20 storey high rise

**Healthy** - organic materials - **better indoor air quality**, antibacterial and hypoallergenic environment, reduces stress by lowering blood pressure and heart rate

**Sustainable** - **waste-free** production with minimum onsite waste

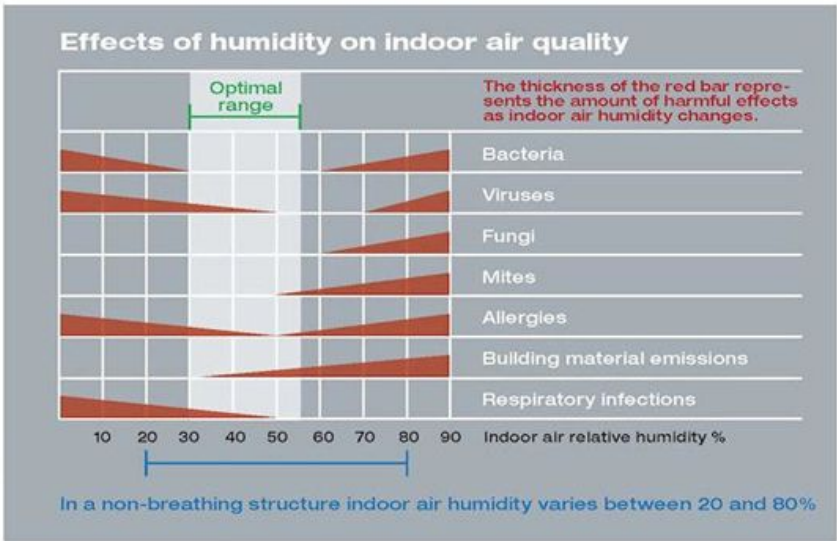
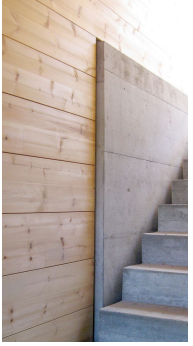


# Building Components

**Cool** - Reduced load for air conditioning

**Warm** - Excellent air tightness, near Passive House standards

**Breathable** - Moisture managed without risk of mould





# Energy Infrastructure



## District Energy Node

- Combined heat and power (CHP) units
- Flexible future fuel sources
- Retrofit potential - Phases 1-3
- Integration to Sheridan or future thermal utility?



# Energy Infrastructure - Heating and Ventilation



## Hydronic In-Floor Heating

- Connected to DE hot water loop
- Enhanced comfort
- Minimal maintenance / cost

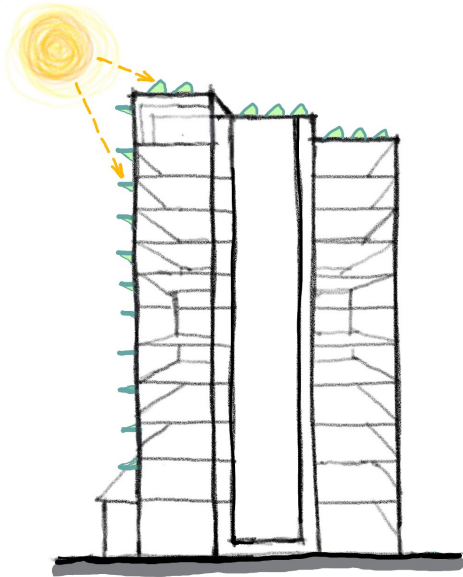


## Solar Thermal Ventilation Air

- Exterior cladding
- South to West exposure
- Reduced heating costs
- Enhanced comfort



# Energy Infrastructure - Solar



## Building Integrated Solar

- PV panel shading louvres
- Reduced summertime solar gain
- Offsets common area/irrigation electricity



## Solar Thermal Hot Water

- Passive evacuated tubes
- Compound parabolic concentrators
- Preheat municipal fresh water
- Low maintenance cost

# Energy and Stormwater Services



## Future-Proofed Underground Parking

- 25%+ spaces with EV charging
- Cable installed for future expansion
- Communication signage
- “EV Only” parking level could reduce need for ventilation air



## Onsite Energy Storage

- Future-proof energy supply
- Peak shaving
- Smart-grid applications
- Eliminates diesel gen-sets



Source: <http://www.pngio.com>

## Rainwater Harvesting

- Cistern collection of rainwater
- Landscape irrigation (powered by PV+battery)
- Greywater applications
- Water features/fountains



# Stormwater Infrastructure and Ecological Harmony



## Permeable Paving / Walkways

- Stormwater Management
- Occupant wellbeing
- Reduced pooling = less slip and fall
- Tie into rainwater harvesting system



## Community Garden

- Food security
- Connection to nature
- Mental health
- Community building

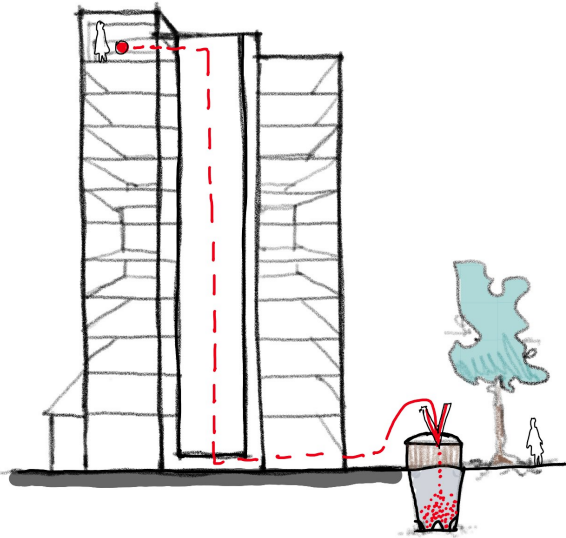


## Bioswales/Constructed Wetland

- Natural on-site stormwater management
- Ecological impact
- Wildlife habitat
- Potential black/grey water natural water filtration

# Waste Infrastructure

**PROPOSAL:** Molok North America Ltd. semi-underground waste containment system. Eliminates garbage chutes and climate-controlled waste rooms, enlarges living space + eliminates odours.



**Quality** - Plastic, stainless steel, and aluminum. First residential applications in Turku, Finland. More than 29-years later 10,000 residents use them today.



**Environmental** - Semi-underground design, gravity and the coolness of the earth allows for larger, odour free capacities in a smaller footprint.

Accepts all waste and recyclables, including organics and textiles. Encourages maximum recycling. More than 60% diversion in a Toronto multi-residential pilot project (Biocycle Magazine, 2002). Containers remain in use today. Larger capacities, and enhanced collection routing reduces empty frequencies, collection costs and carbon emissions.

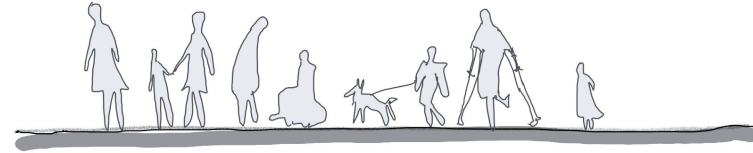
# Waste Infrastructure Implementation + Benefits

## Site Planning

Crane-lifted – allows for greater placement flexibility and better use of space

## User / Municipal Centric

Meets or exceeds Canadian accessibility guidelines. The low, round profile and highly visible locations satisfies the requirements of CPTED, Crime Prevention Through Environmental Design. In Finland and Sweden, 98% of single family and 86% of multi-family users had a positive to very positive view of the system.



**MOLOK**<sup>®</sup>  
North America Ltd.

In a commercial installment in Raleigh NC **collections times were reduced by 90%** and **service truck fuel reduced by 92%** over conventional collection.

## Summary

The benefits can be seen in developments such as:

1. Oakvillages Park
2. Aalto University in Finland
3. Sheridan College
4. Earth Rangers – one of the highest LEED-rated buildings in North America



**THANK YOU!**



# Appendix

## Company Profiles

### Kontio

Pavel Denisov - [info@denisov-arch.com](mailto:info@denisov-arch.com)



Log homes are the whole foods of housing, an organic alternative to the overprocessed, off-gassing modern construction ingredients. But log homes have health benefits most people don't know about. That has inspired customers worldwide to build innovative homes with special logs from the Arctic Circle.

Created by Finland-based Kontio <https://www.kontio.com/en/>, the world's largest log house factory, these logs are engineered to be square-shaped and fit together with tongue-and groove Cross-Laminated System (CLL) ideal for home building. These logs last longer and are easier to work with, but they still preserve that special attribute that makes log homes healthier than the typical stick-frame houses. Log homes breathe. That simple fact solves one of the most confounding problems of modern construction. Houses today are carefully engineered and tightly regulated to ensure that moisture-creating humans — with their foggy breath, showers, and dishwashers — don't create tenacious fungal farms of toxic mould. When warm, moist air inside lands on cool walls, it condenses into water, feeding bacteria and mould in hidden cracks, under carpets, and behind drywall. To solve this problem, modern houses are built on the principles of total environmental control. Layers of protection isolate the inside from the outside environment. Exterior barriers block any moisture from coming in, with multiple vapour barriers installed to keep inside moisture from getting out. But layers of vinyl, wood, fibreglass, plastic, and drywall cannot match the perfectly regulated moisture control and trees' breathability. Log houses are also warmer in the winter, and cooler in the summer, with eight inches of solid pine wood insulating the home while regulating the moisture.

**You breathe healthier; you sleep better, you live longer in this home!**

# Appendix

## Company Profiles

### **MOLOK**



**Tim Corcoran - [tim.corcoran@molokna.com](mailto:tim.corcoran@molokna.com)**

**Mark Hillis - [mark.hillis@molokna.com](mailto:mark.hillis@molokna.com)**

Sustainability and the environment have been at the forefront of everything Molok stands for since it was developed in Finland in 1991. Having expanded to over 40 countries globally, units installed more than 25-years ago are still in use today, and through many iterations of R&D, even better design and quality have been achieved. Manufactured of 100% recycled or recyclable material, the semi-underground design has shifted the paradigm of waste and recycling collection on a global scale. The cylindrical semi-underground container keeps waste cool while densifying the waste through natural capaction, resulting in less frequent emptying. Less frequent emptying means less truck traffic and lower emissions. The highly aesthetic and visible design of the crane lifted containers tends to encourage waste diversion and maximizing recycling efforts. Specialty collection containers for organics and textiles round out the need for maximum waste collection and diversion.

# Appendix

## Company Profiles



### Sheridan College

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Founded in 1967, Sheridan has grown from a local college of 400 students to one of Ontario's leading postsecondary institutions, educating approximately 24,500 full-time and 18,500 continuing and part-time studies students every year on three campuses in three Ontario cities – Oakville, Brampton and Mississauga.

An award-winning institution, Sheridan attracts students from across Canada and around the world. Sheridan's 175,000 alumni play a critical role in shaping the future of our society in the fields of arts, business, community service, health, technology, and the skilled trades.

The Office for Sustainability at Sheridan has been focusing on carbon reduction strategies via its Integrated Energy and Climate Master Plan (IECMP). The aim of the IECMP was originally to decrease the institutions overall energy and carbon emissions by 50% by 2030 through a focused investment period of 5-7 years (starting in 2013). The carbon reduction goals have already been realized as of 2020.

# Appendix

## Web Sources

- <https://electricalacademia.com/>
- <https://inhabitat.com/>
- <http://www.merlo-brise-soleil.it/default.asp?l=3>
- <https://www.plugshare.com/>
- <http://www.pngio.com>
- <https://www.reliance-foundry.com/blog/bioswale-design#gref>
- <https://www.solarwall.com/case-study/toronto-community-housing/>

## Company Sources

Kontio Log Houses - Marketing Materials

Molok North America Ltd. - Marketing Materials

Molok Oy and the Swedish Waste Management & Recycling Corporation, in cooperation with Falu Energi Vatten & San Sac

Sheridan College, Facilities Management photograph archive

Sheridan Curiosities Blog