Project Team

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A Trip Down Memory Lane... to the 1970s
Tinbury Place, Toronto
Overall Floor Plan

Existing

Proposed

Building Area
4,812 ft²

Gross Floor Area
11,670 ft²
Unit Gross Area
1,945 ft²

Unit Density
4 people
(486 ft²/person)
Design Drivers

- Housing
- Energy
- Climate Change

Projected $ / MWh

Canadian sentiment on Climate Change
- Extremely Serious Problem: 82%
- Not Serious Problem: 18%
Design Goals
Design Goals

Scalable Design

Net-Zero Energy Performance
Design Goals

Scalable Design

Net-Zero Energy Performance

Occupant Wellbeing
Energy Model

Verified energy model to within 8% of actual use
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Verified energy model to within 8% of actual use
Existing Energy Data

Energy Use by Category
- Space Conditioning: 60%
- Lighting: 14%
- Equipment: 12%
- DHW System: 7%
- Cooking (Gas): 7%

Energy Use by Fuel Type
- Natural Gas: 73%
- Electricity: 27%
Energy Budget

Monthly Solar Production (kWh) / Unit

- January: 200 kWh
- February: 400 kWh
- March: 600 kWh
- April: 800 kWh
- May: 1000 kWh
- June: 1200 kWh
- July: 1400 kWh
- August: 1600 kWh
- September: 800 kWh
- October: 600 kWh
- November: 400 kWh
- December: 200 kWh

- 10.3 kW Module Size / Unit
- 11,530 kWh Annual Production / Unit
EXISTING

REMOVE & REPAIR

IMPROVE

ARCHITECTURE ENGINEERING MARKET ANALYSIS DURABILITY & RESILIENCY EMBODIED ENVIRONMENTAL IMPACT INTEGRATED PERFORMANCE COMFORT & ENVIRONMENTAL QUALITY OCCUPANT EXPERIENCE ENERGY PERFORMANCE
Ψ-Value
0.116 BTU/h·ft·°F

Ψ-Value
0.008 BTU/h·ft·°F
**R-62 Effective**
Roof

**R-8 Effective**
Windows

**R-20 Effective**
Below Grade Slab

**R-38 Effective**
Above Grade Walls

**R-42 Effective**
Below Grade Walls

**R-20 Effective**
Below Grade Slab
54% Reduction in Fresh Water Consumption
Typical Retrofit
$156 / ft²

30 Year Operation & Maintenance Cost / Unit
$147,603

Solar Row Retrofit
$51 / ft²

Solar Row Retrofit Cost / Unit
$99,354

30 Year Savings with Solar Row
$48,249
29 lbm CO₂e/ft²  
Original 1975 Build

+  

6 lbm CO₂e/ft²  
Only 2022 Retrofit

35 lbm CO₂e/ft²  
Total post-retrofit embodied carbon
Potential For Changes

Cost to Change

Potential synergies and savings

Time

Pre-Design  Schematic Development  Design Development  Construction  Occupancy

Ability to Impact Design

Cost of Making Changes

Optimal Zone

Optimal Zone

Cost of Making Changes

Potential synergies and savings

Pre-Design  Schematic Development  Design Development  Construction  Occupancy

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Cost of Making Changes

Potential synergies and savings
72°F
Temperature

42%
Humidity

550 ppm
Carbon Dioxide

95%
Current Energy Demand Met by Solar Generation

2%
Energy Demand On This Day 2022 vs. 2023

Carbon Dioxide

2%
Energy Consumption by Category (kBtu / Year) for 6 Units

- **Baseline**
- **Solar Row Retrofit**

### Categories
- **Space Conditioning (Heating and Cooling)**: 81%
- **Lighting**: 86%
- **Equipment**: 35%
- **Domestic Hot Water System**: 36%
- **Cooking (By Natural Gas)**: 100%
- **Heat Recovery**: 100%

### Energy Consumption
- **0** to **450,000 kBtu / Year**
EUI (kBtu / ft² / year)

Baseline

54.5

60
50
40
30
20
10
0
-10
EUI (kBtu / ft² / year)

Baseline
Solar Row (Excluding PV Generation)

54.5
18.2

66% Reduction

Baseline
-10
0
10
20
30
40
50
60

Solar Row
54.5
18.2

66% Reduction
EUI (kBtu / ft² / year)

- Baseline: 54.5
- Solar Row (Excluding PV Generation): 18.2 (66% Reduction)
- Solar Row (Including PV Generation): -2

Net-Zero Energy
Solar Row is

a **Scalable, Net-Zero Energy** design template ensuring **Occupant Wellbeing** using proven techniques for meaningful change.
Thank You!
References

Slide 3:


Slide 25:

Slide 26: