Abandoned CPS Building
Affordable housing development
Micro market recovery program
Industry and innovation
Abandoned CPS Building
Melody
Neighborhood Analysis

- Metro Station
- Bus Stop
- School
- Daycare
- Learning Center
- Shelter

Distance Markings:
- 10 min
- 20 min
Existing Building

Location: 412 S Keeler Ave, Chicago, IL
Year: 1965
Climate Zone: 5A
Built Area: 66,450 sf
Plot Size: 79,500 sf
Stories: 3
EUI: 112.97 kBTU/sf /yr
The “Loop”

People without shelter come into the “Loop” system, take up housing and help to maintain the center working on the facilities.

As they acquire knowledge, the possibility of getting a job increases, allowing them freedom to move to the low-income housing system.
The “Loop”

**Community program** as a driving thread to bring cohesion to a wide range of people from diverse socioeconomic backgrounds

The center **acts as a catalyst**, encouraging activity and a sense of community in the neighborhood
Proposed Building

Covered Area: 75,890 sf
Plot Size: 79,500 sf
Stories: 3
Net EUI: -1.28 kBTU/sf/yr
Estimate: $5,250,000
Existing vs Proposed

First Floor

Second Floor

Third Floor
First Floor
Second Floor
Second Floor
Third Floor
Interim Housing

Chipboard Panels with Wooden Wall Studs

Secondhand Ceramic Tiles (eUse Depot/Rebuilding Exchange)

Existing Brick

Recycled Sheet Metal (with protective paint for corrosion)

Existing Concrete

ADA Compliant
Low-Income Housing

1-Bedroom

Collapsible Wall Partitions
Energy Star Appliances

2-Bedroom

Shading Devices
Reused Furniture
LED Light Fixtures

3-Bedroom

Low Flow Fixtures
They All Help Each Other

- They Live
  - They Eat
- They Relax
  - They Manage
- They Learn
  - They Work
- They Grow
  - They Share

MELODY
1. CONTEXT
2. CONCEPT
3. DESIGNING THE SPACES
4. ENERGY
Existing Enclosure

Concrete Foundation

Concrete Pier

Light Green Tile

Metal Cornice

Metal Pier

Buff-Colored Brick

Metal Marquee

Plywood

Single Pane Configurations

Pedestrian Metal Doors
## Thought Process

<table>
<thead>
<tr>
<th>Retrofit Option</th>
<th>Thermal Performance</th>
<th>Moisture Management</th>
<th>Cost Benefit (Initial + Lifetime)</th>
<th>Constructability &amp; Recyclability</th>
<th>Architectural Flexibility</th>
<th>Air Leakage Improvement and Sound Transmission</th>
<th>Indoor Air Quality</th>
<th>Fire Resistance</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td>Retain Existing Wall</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>None</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>5th</td>
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<tr>
<td>Existing + Interior Insulation</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Modera</td>
<td>Low</td>
<td>4th</td>
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<tr>
<td>Existing + Exterior Insulation Finish System</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>2nd</td>
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<tr>
<td>Existing + Rainscreen System</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
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<td>Moderate</td>
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<td>Existing + Double Skin Facade</td>
<td>High</td>
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<td>Low</td>
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<td>High</td>
<td>High</td>
<td>Moderate</td>
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Thought Process

<table>
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<tr>
<th>Element</th>
<th>Proposed U-value (BTU/ft²·°F·h)</th>
<th>Proposed SHGC</th>
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<tr>
<td>Windows</td>
<td>0.18</td>
<td>0.17</td>
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<tr>
<td>Skylights</td>
<td>0.16-0.21</td>
<td>0.36</td>
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</table>
## Enclosure Performance Summary

<table>
<thead>
<tr>
<th>Element</th>
<th>Original R-value ($\text{ft}^2\cdot{}^\circ\text{F}\cdot\text{h}/\text{BTU}$)</th>
<th>Proposed R-value ($\text{ft}^2\cdot{}^\circ\text{F}\cdot\text{h}/\text{BTU}$)</th>
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</thead>
<tbody>
<tr>
<td><strong>Above Grade Exterior Walls</strong></td>
<td>2 (Brick Wall)</td>
<td>27 (6” Exterior Thermacork Insulation)</td>
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<tr>
<td></td>
<td>New Construction (Wood Framed Wall)</td>
<td>33 (6” Cavity Insulation + 2”ci)</td>
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<td><strong>Roof</strong></td>
<td>5 (Built-Up Roof)</td>
<td>50 (8” Exterior Polyiso Insulation)</td>
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<tr>
<td><strong>Foundation Wall</strong></td>
<td>3 (Concrete Wall)</td>
<td>17 (2.5” Exterior XPS Insulation)</td>
</tr>
</tbody>
</table>
Enclosure Details

WINDOW FLASHING
1" AIR GAP
AIRVAPOUR BARRIER
6" THERMACORK INSULATION
RECYCLED METAL RAINSCREEN
THERMALLY BROKEN CLIP AND ANGLE
WEEP & BAFFLE
INTERIOR FINISH
EXISTING BRICK WALL
NOTE: DRAWING IS DIAGRAMMATIC AND DOES NOT SHOW SHELF ANGLES
EXISTING CONCRETE FLOOR
EXISTING BRICK WALL
EXISTING COLUMN
2X8 WOOD STUD FRAMING, 24" OC
BLOWN-IN CELLULOSE CAVITY INSULATION
3/8 EXTERIOR GRADE PLYWOOD SHEATHING
THERMALLY BROKEN CLIP & RAIL SYSTEM
6" THERMACORK INSULATION
EXISTING BUILDING RETROFIT
NEW CONSTRUCTION
2" THERMACORK INSULATION
RECYCLED METAL PANEL RAINSCREEN
AIRVAPOUR BARRIER
Proposed Enclosure

- Recycled Metal Rainscreen Cladding
- Insulated Concrete Piers
- Externally Insulated Foundation Wall
- Fire Rated Metal Doors
- Triple Pane Window Configurations
- Recycled Metal Shading Devices
Ductwork HVAC Plan: First Floor
Piping HVAC Plan: First Floor
Mechanical Equipment

- Dedicated Outdoor Air Unit
- Outdoor Condensing Unit
- Cassette Type Indoor Fan Coil Unit
- Horizontal Type Indoor Fan Coil Unit
Lighting Fixtures

LF-1-Cafeteria

LF-2-Units
Plumbing Fixtures

SK-2

SK-1

SK-2

SK-1

MELODY

1. CONTEXT
2. CONCEPT
3. DESIGNING MEP
4. ENERGY
Solar Analysis

June 21

December 21
Roof PV Plan

**Upper Roof**
- East-West Panels
- Tilt: 10°

**Lower Roof**
- South Facing Panels
- Tilt: 36°
Energy Production

Monthly Energy Production

Annual Energy Production

Production: 491,630 kWh

EUI: 25.25 kBTU/sf/yr
End Use Intensity Comparison

Existing Building General End Use

- Interior Equipment: 13.4% (998,980)
- Interior Lighting: 9.4% (695,802)
- Cooling: 13.6% (1,007,748)

Total: 4,728,100

EUI: 112.97 kBTU/sf/yr

Design End Use

- Water Systems: 18.6% (295,473)
- Fans: 9.9% (157,480)
- Heating: 23.1% (368,729)
- Cooling: 5.8% (91,995)
- Interior Lighting: 13.2% (210,690)
- Interior Equipment: 29.4% (468,478)

Total: 2,334,800

EUI Consumption: 23.97 kBTU/sf/yr
Production vs Consumption

EUI Consumption: 23.97 kBTU/sf/yr
EUI Production: -25.25 kBTU/sf/yr
EUI Net: -1.28 kBTU/sf/yr
## RESNET HERS Index

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<tr>
<th>Annual Consumption</th>
<th>Melody (MBTU)</th>
<th>2018 IECC (MBTU)</th>
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<td>Heating</td>
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<td>Cooling</td>
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<td>Lights &amp; Appliances</td>
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<td>PV</td>
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Calculated HERS Index: **-13.19**

REM/Rate validates the net zero objective
### Financial Analysis

**Total estimate: $5,250,000 ($80/sf)**

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<tr>
<th>Type</th>
<th>Tab #</th>
<th>Division #</th>
<th>Description</th>
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<td>OTHER</td>
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</table>

**Cost Subtotal**

$78.99  
5,249,126
Points of Saving

Operations:
- Community education
- Resident incentives
- Low flow fixtures
- LED lighting
- Energy Star appliances

Second Hand Materials:
- 100% recycled metal cladding
- Reclaimed brick
- Reused furniture
- Reused cabinets
Points of Saving

Material Reuse & Recycling

Recycled Metal Rainscreen

Brise Soleil
**Life Cycle Analysis**

<table>
<thead>
<tr>
<th>Cradle to grave (A1-A4, B4-B5, C1-C4)</th>
<th>kg CO$_2$e/m$^2$</th>
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<tbody>
<tr>
<td>(&lt; 200)</td>
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<tr>
<td>(200-280)</td>
<td><strong>B</strong></td>
</tr>
<tr>
<td>(280-360)</td>
<td><strong>C</strong></td>
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<tr>
<td>(360-440)</td>
<td><strong>D</strong></td>
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<tr>
<td>(440-520)</td>
<td><strong>E</strong></td>
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<tr>
<td>(520-600)</td>
<td><strong>F</strong></td>
</tr>
<tr>
<td>(&gt; 600)</td>
<td><strong>G</strong></td>
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<tr>
<td></td>
<td><strong>340</strong></td>
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</table>
Long-Term Investments, Large Return

- **Openings**
  - Skylights & Windows
  - Improved indoor environmental quality

- **Envelope**
  - Improved thermal comfort
  - Aesthetics

- **Building Systems**
  - Targeted heat recovery
  - High-efficiency lighting

- **Solar Panels**
  - Long term energy savings
  - Reduced utilities
Comfort & Environmental Quality

THE 9 FOUNDATIONS OF A HEALTHY BUILDING

- Supply of Outdoor Air
- Fresh Air Schedules
- Individual Zoning
- Natural daylighting
- Sound insulation
- Wall of vegetation
- Shaft SCA Rated Windows
- Rain screen system
- Chilled Water Cooling

- Air Quality
- Thermal Health
- Moisture
- Lighting & Views
- Noise
- Water Quality
- Dust & Pests
- Safety & Security

- VENTILATION
- ACTIVE DESIGN
- MERV 8 & 12 Filters
- No Smoking Policy
- Encouraged Stair Use
- Community Garden & Playground

No Smoking Policy
Secure Entry Points 24/7 Video Surveillance
Encouraged Stair Use
Beyond the Building

Community Revitalization

Chicago Housing Crisis
Site energy production
Recycling of materials
Dry construction
Modularity
Flexibility
Neighborhood revitalization
Training workshops
The “Loop”
Model for the city
Recycling of materials
Dry construction
Site energy production
MELODY 5
A special thanks to our professors and industry partners
Thank you!