



Melody

GREETINGS FROM



MELODY

Alwalid Dhafer
Energy

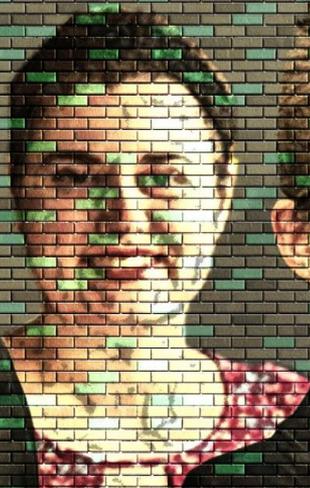
Erica Acton
MEP

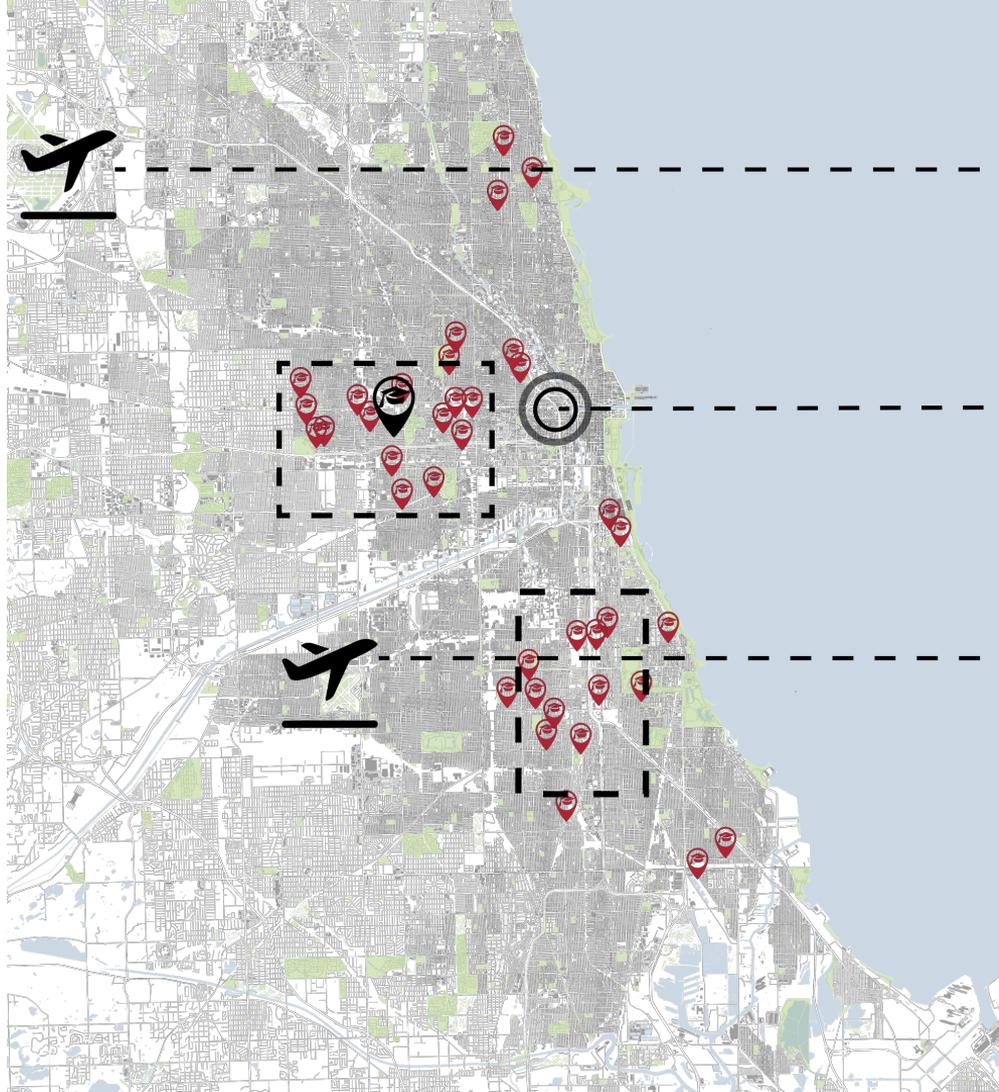
Brianna Galvan
Energy, Team Lead

Areej Siddiqui
Architecture

Gracelyn Attablayo
Enclosure

Enrique Orts
Architecture





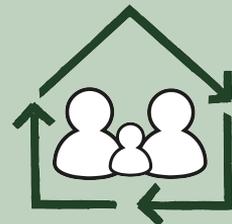
O'Hare International Airport

Chicago Downtown Loop

Midway Airport


Abandoned
CPS Building


Melody



MELODY



CONTEXT



CONCEPT



DESIGNING



ENERGY





Affordable housing development



Micro market recovery program



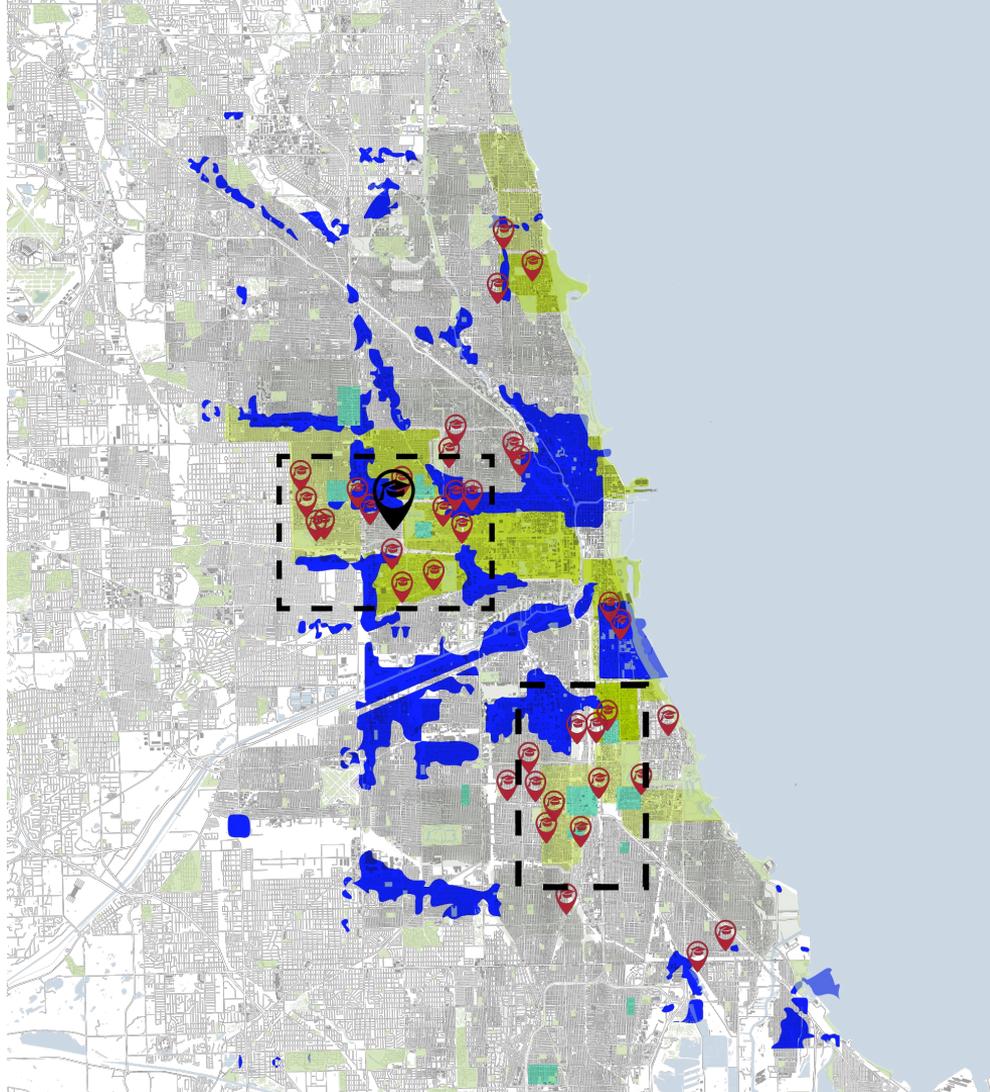
Industry and innovation



Abandoned CPS Building



Melody



MELODY



CONTEXT



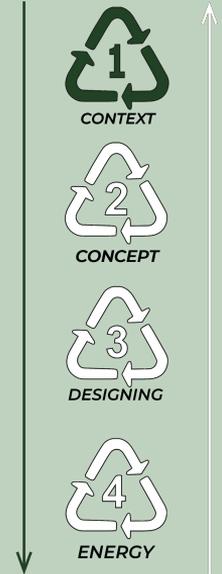
CONCEPT



DESIGNING



ENERGY



Neighborhood Analysis



 Metro Station  Bus Stop



 School  Daycare  Learning Center  Shelter



MELODY



CONTEXT



CONCEPT



DESIGNING

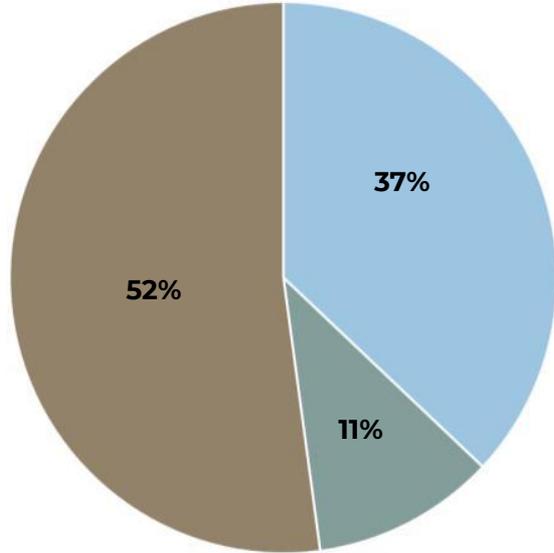


ENERGY



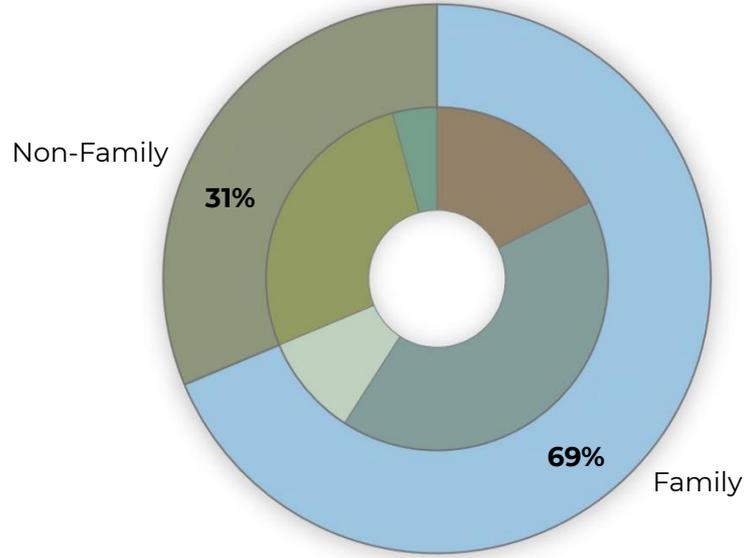
Community Statistics

Employment Statistics

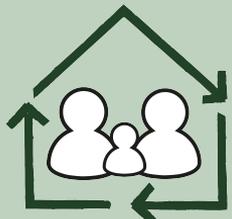


■ Employed ■ Unemployed ■ Not in Labor Force

Household Statistics



■ Married Family ■ Single Female Family ■ Single Male Family
■ Single Individual ■ Other Non-family



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CONTEXT



CONCEPT



DESIGNING



ENERGY

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



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CONTEXT



CONCEPT



DESIGNING

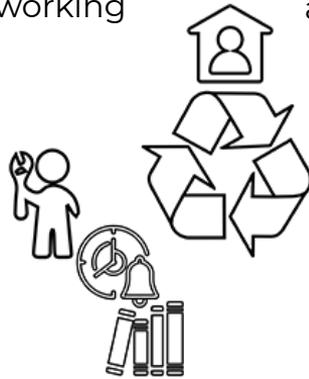


ENERGY

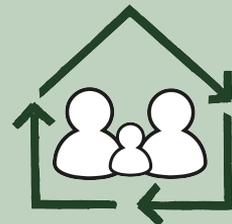
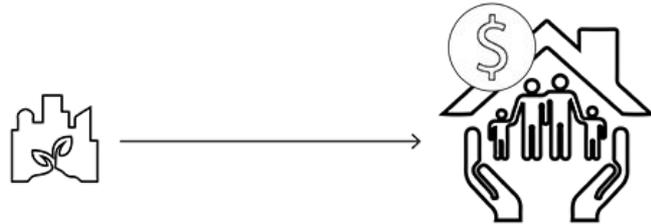


The “Loop”

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



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CONTEXT



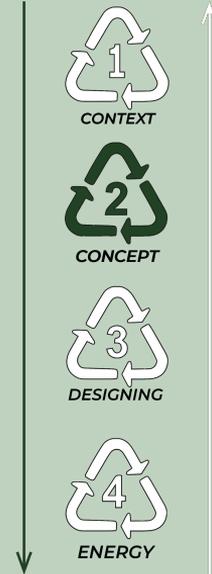
CONCEPT



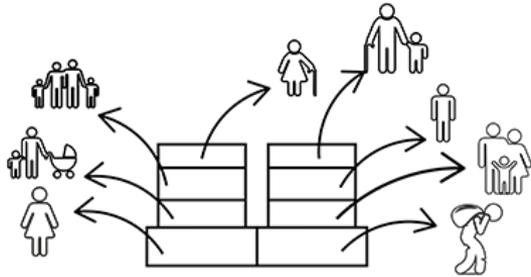
DESIGNING



ENERGY



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



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CONTEXT



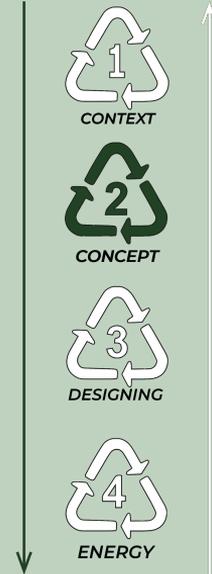
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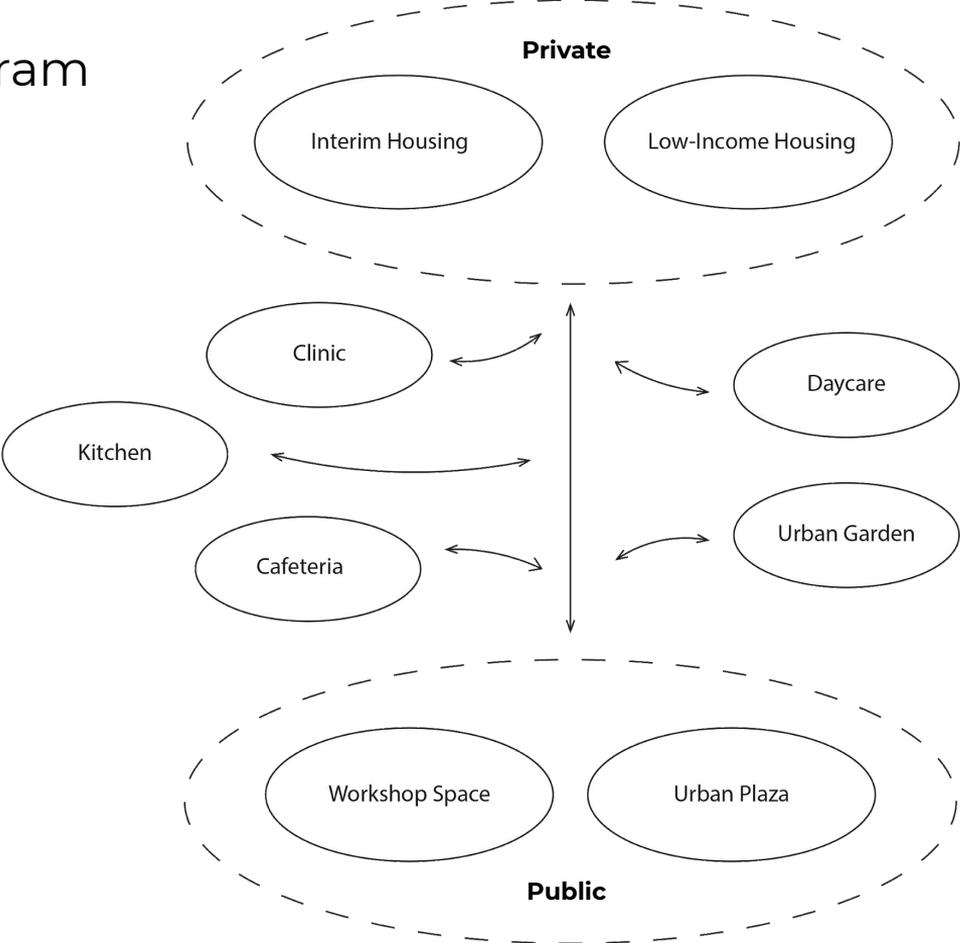
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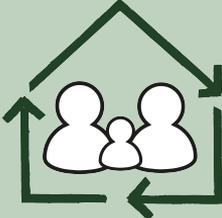
ENERGY



Program



Supporting Services



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1

CONTEXT



2

CONCEPT



3

DESIGNING



4

ENERGY

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



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CONTEXT



CONCEPT



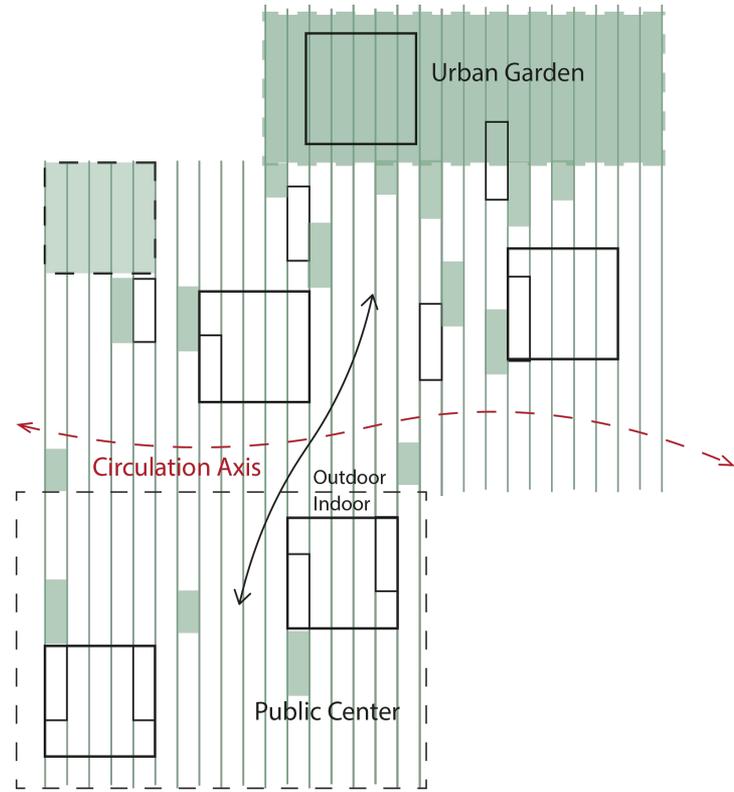
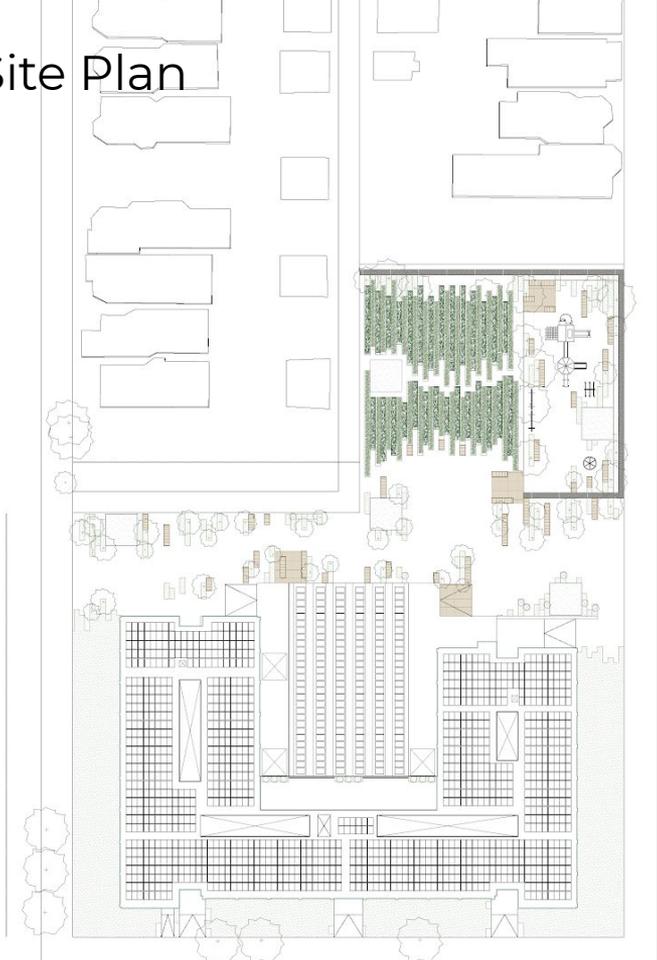
DESIGNING
THE SPACES



ENERGY



Site Plan



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CONTEXT



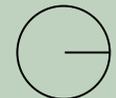
CONCEPT



DESIGNING
THE SPACES

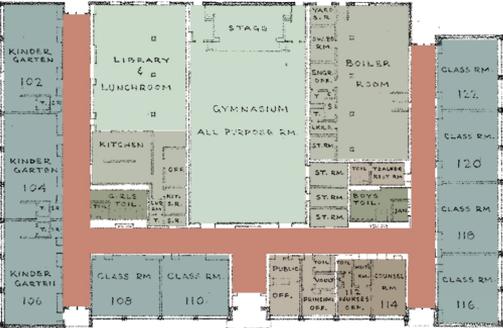


ENERGY



Existing vs Proposed

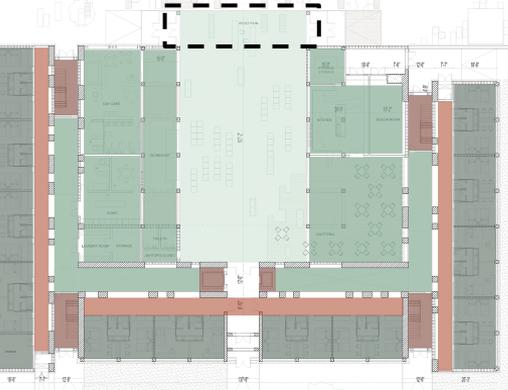
First Floor



Second Floor



Third Floor



MELODY



CONTEXT



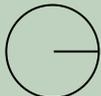
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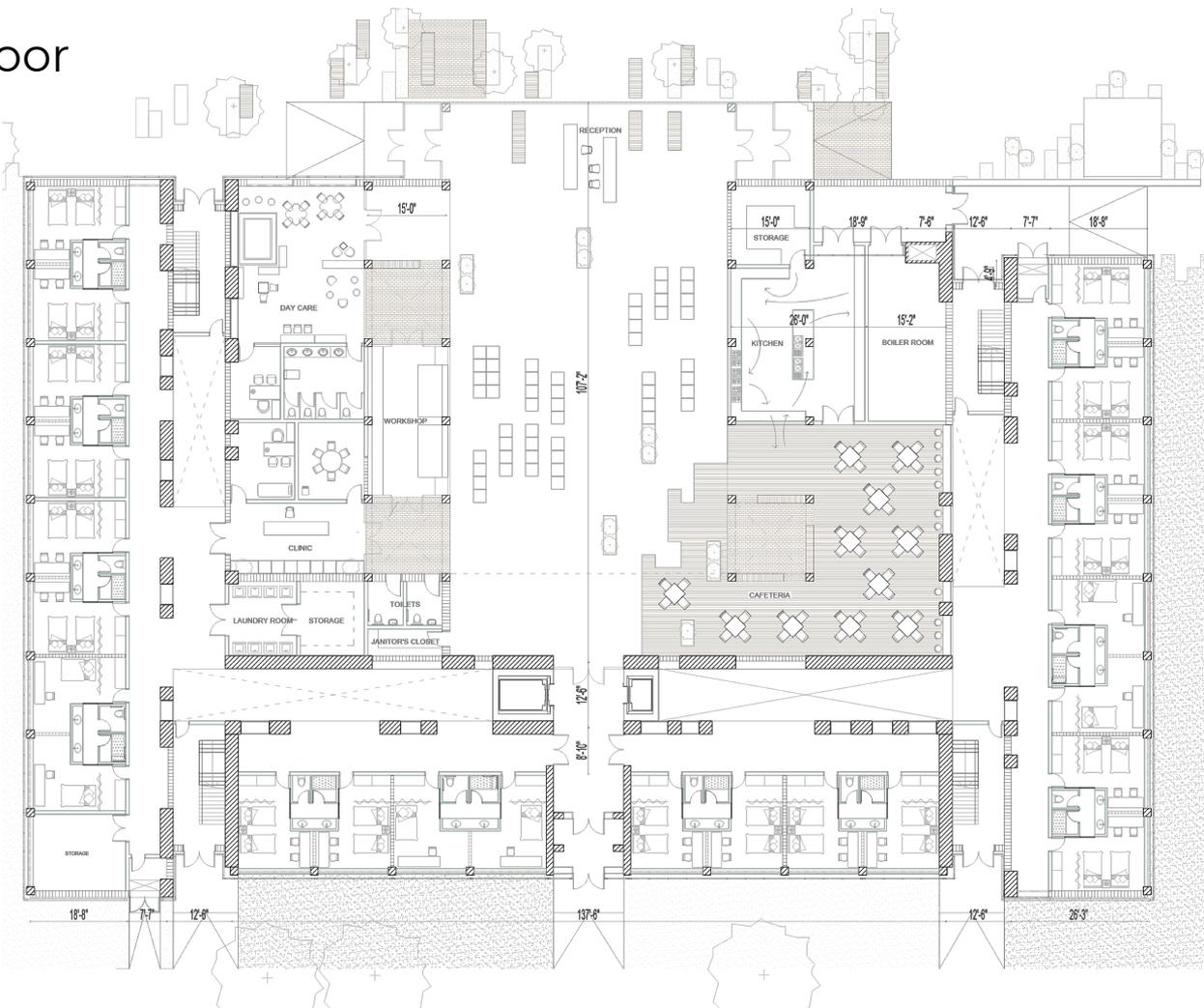
DESIGNING THE SPACES



ENERGY



First Floor



MELODY



CONTEXT



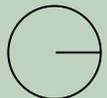
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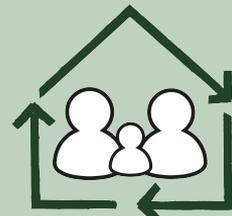
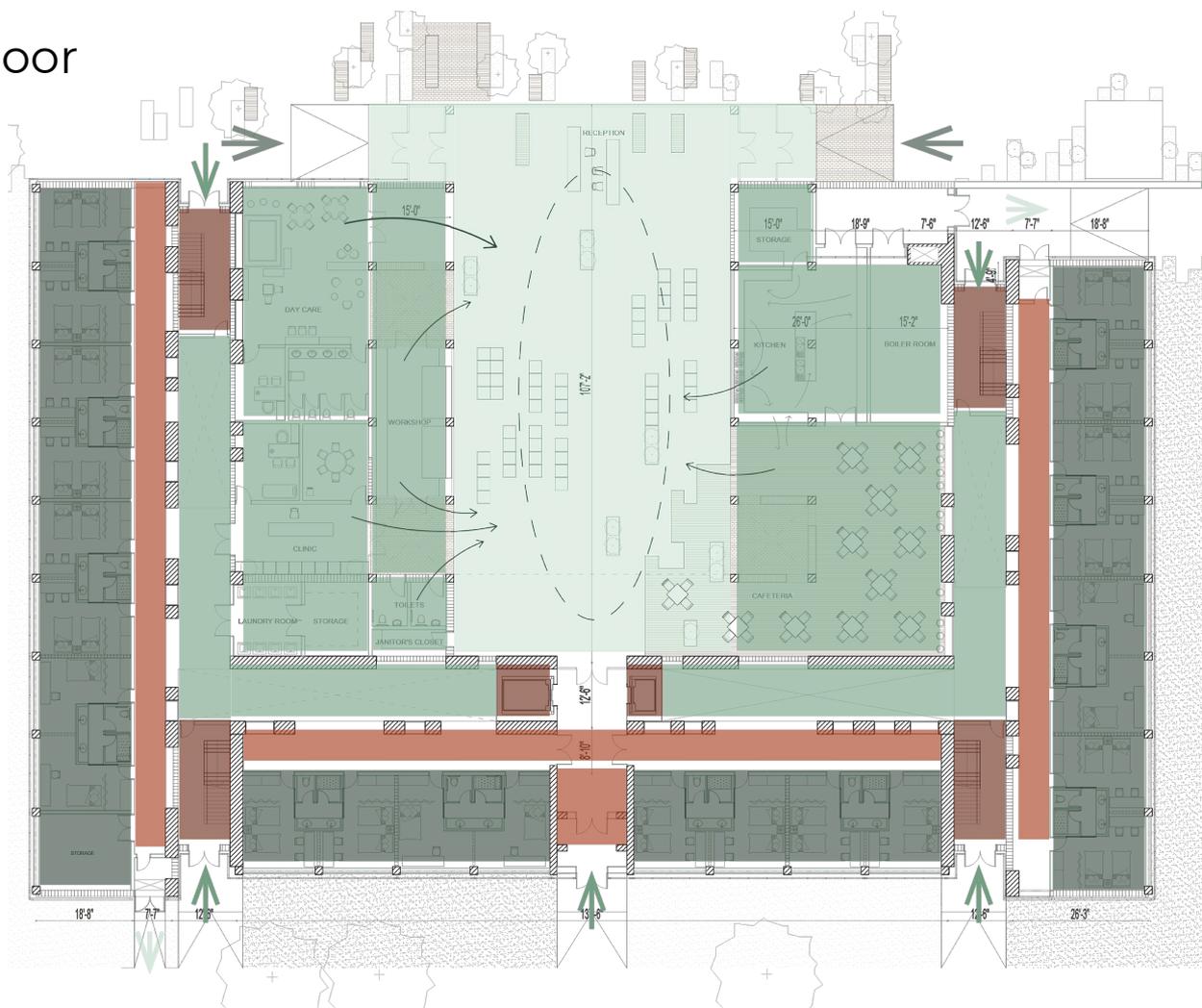
DESIGNING THE SPACES



ENERGY



First Floor



MELODY



CONTEXT



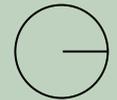
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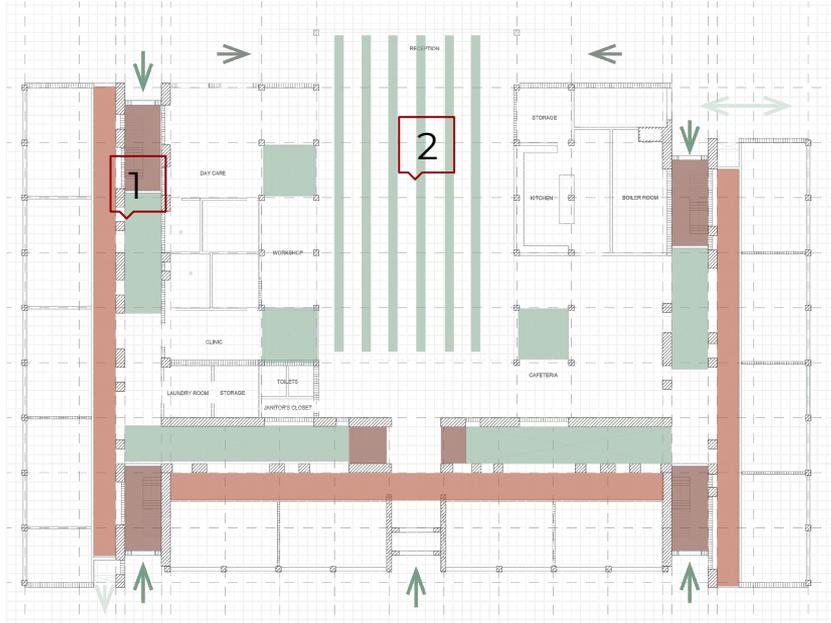


DESIGNING
THE SPACES



ENERGY

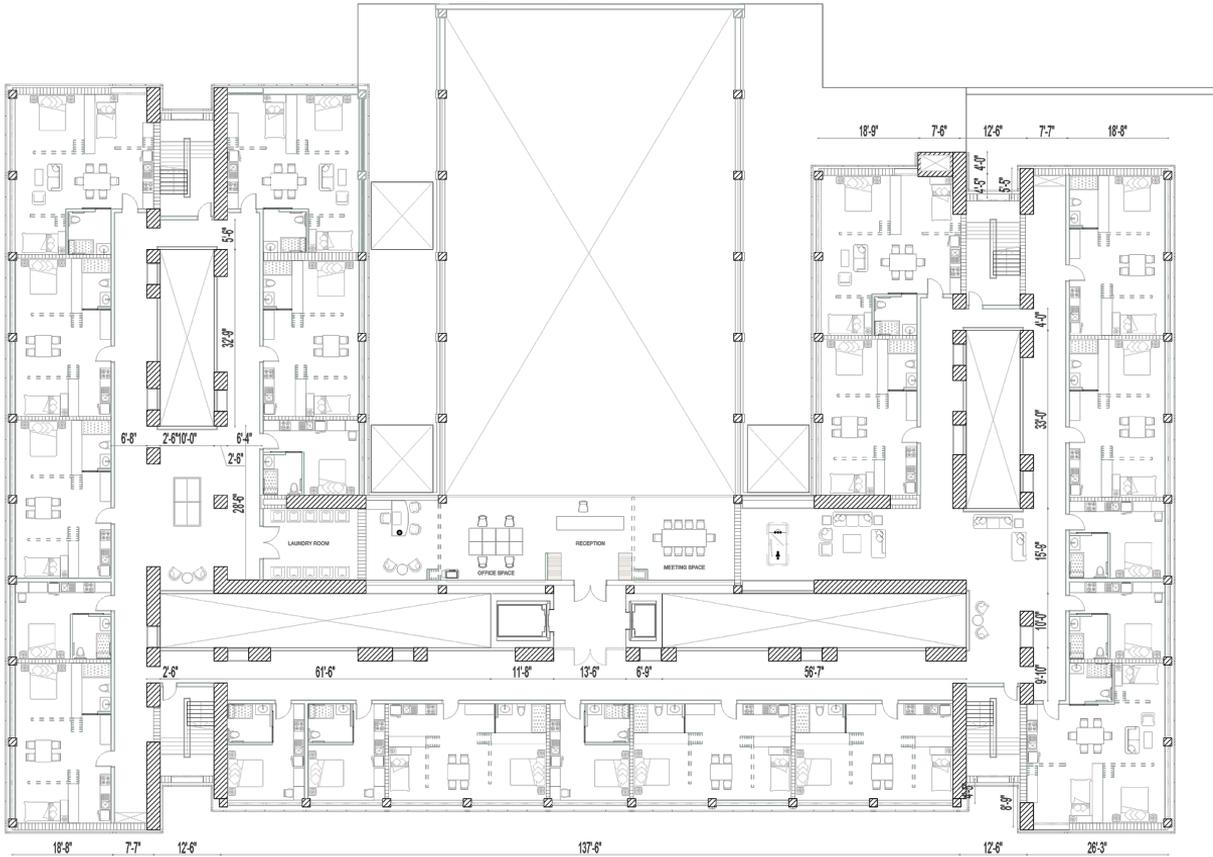






2

Second Floor



MELODY



CONTEXT



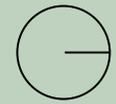
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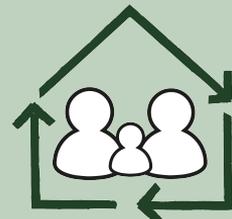
DESIGNING
THE SPACES



ENERGY



Second Floor



MELODY



CONTEXT



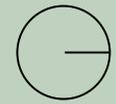
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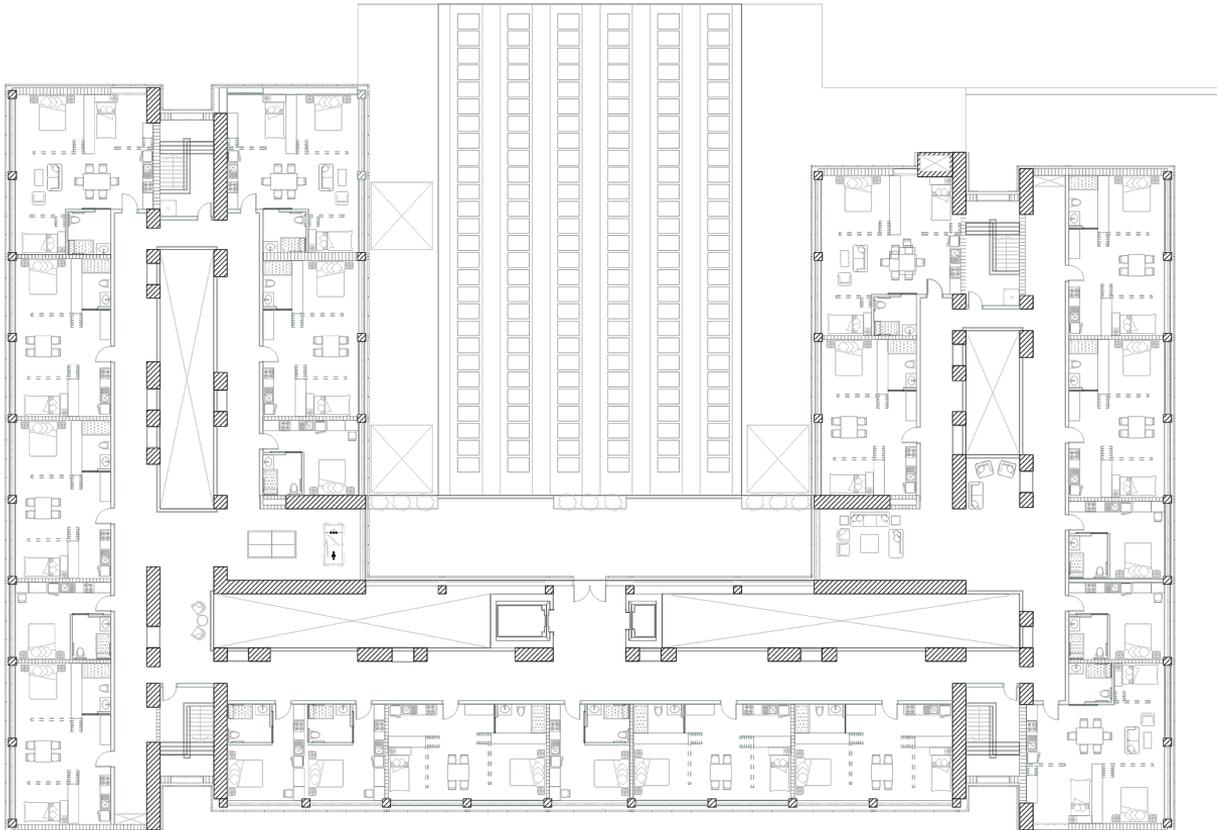
DESIGNING
THE SPACES



ENERGY



Third Floor



MELODY



CONTEXT



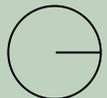
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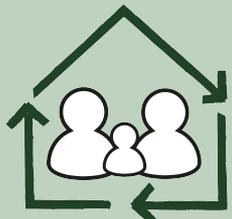
DESIGNING
THE SPACES



ENERGY



Third Floor



MELODY



CONTEXT



CONCEPT



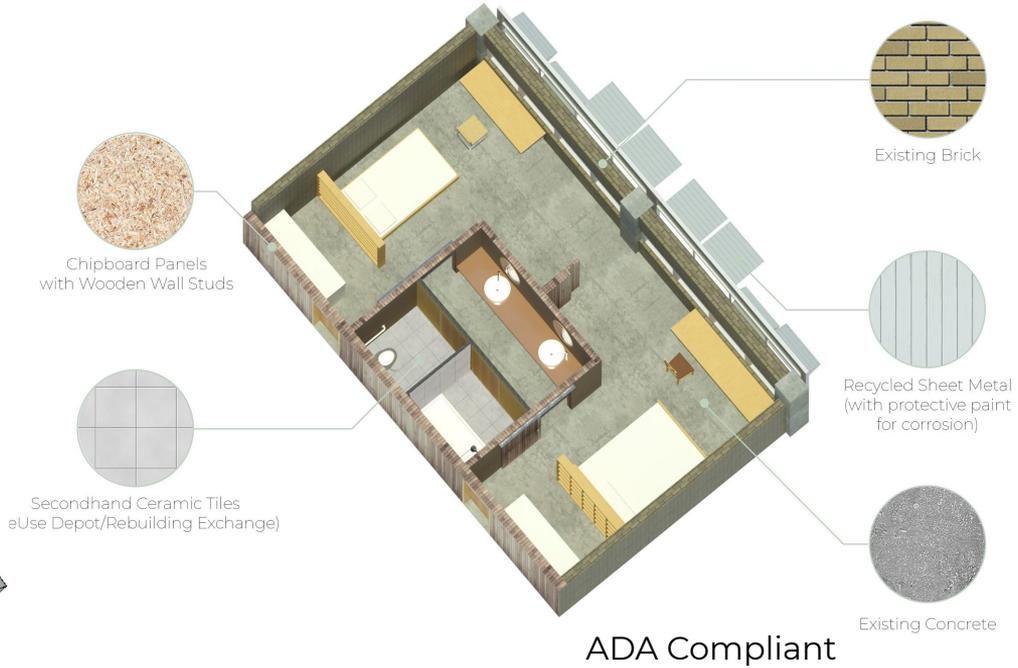
DESIGNING
THE SPACES



ENERGY



Interim Housing



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CONTEXT



CONCEPT



DESIGNING THE SPACES



ENERGY



Low-Income Housing



1-Bedroom



3-Bedroom



2-Bedroom



MELODY



CONTEXT



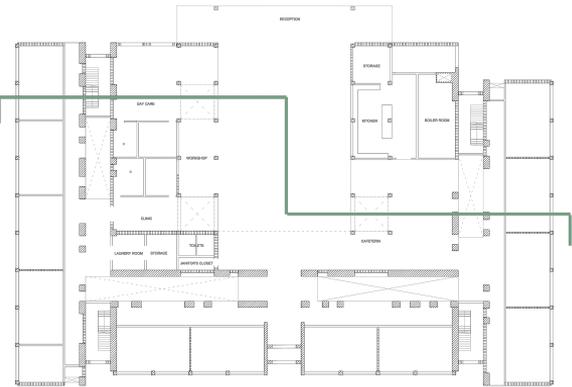
CONCEPT



DESIGNING THE SPACES



ENERGY



They All Help Each Other

They Live

They Eat

They Relax

They Manage

They Learn

They Work

They Grow

They Share



MELODY



CONTEXT



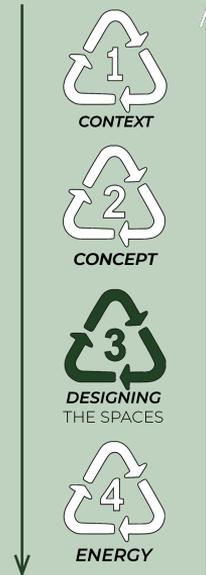
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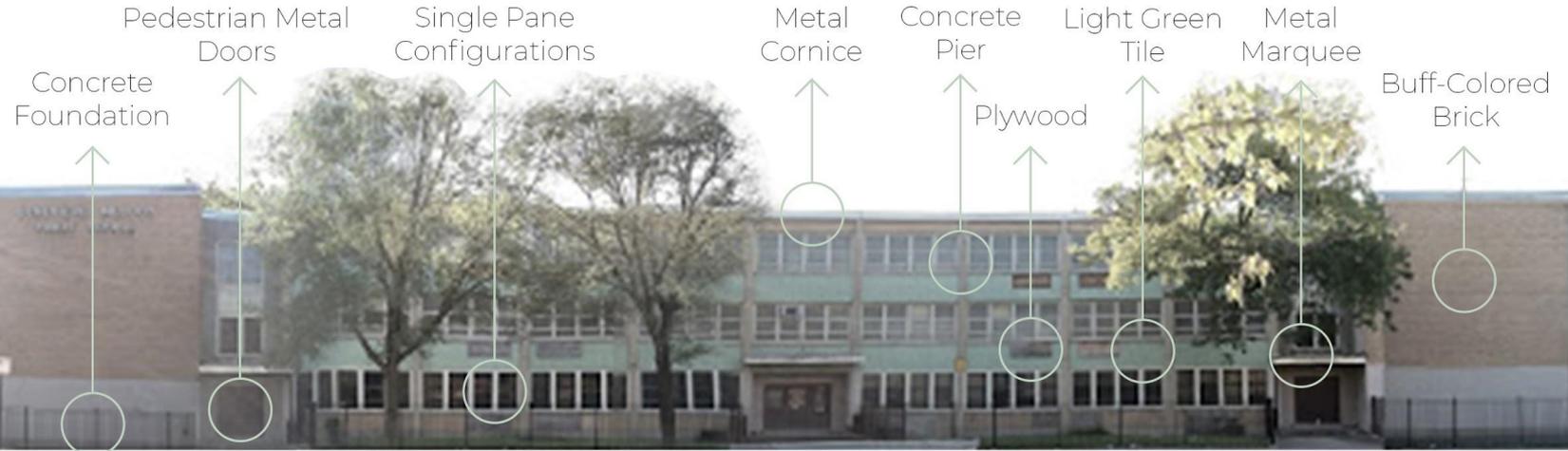
DESIGNING
THE SPACES



ENERGY



Existing Enclosure



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CONTEXT



CONCEPT



DESIGNING THE ENCLOSURE



ENERGY



Thought Process

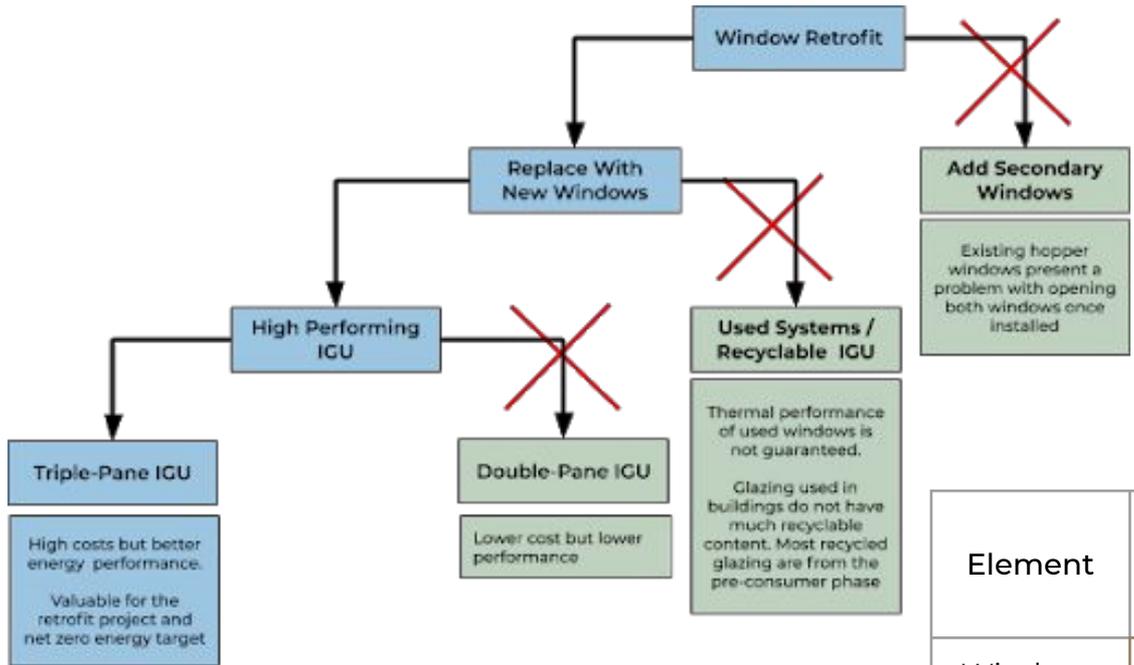
| Retrofit Option | Thermal Performance | Moisture Management | Cost Benefit (Initial + Lifetime) | Constructability & Recyclability | Architectural Flexibility | Air Leakage Improvement and Sound Transmission | Indoor Air Quality | Fire Resistance | Rank |
|--|---------------------|---------------------|-----------------------------------|----------------------------------|---------------------------|--|--------------------|-----------------|------|
| Retain Existing Wall | Low | Low | Moderate | High | None | Low | Low | Low | 5th |
| Existing + Interior Insulation | Moderate | Moderate | Moderate | Low | Low | High | Moderate | Low | 4th |
| Existing + Exterior Insulation Finish System | High | Low | High | Moderate | High | High | High | Low | 2nd |
| Existing + Rainscreen System | High | High | High | High | Moderate | Moderate | High | Moderate | 1st |
| Existing + Double Skin Facade | High | Moderate | Low | Low | High | High | Moderate | Not Clear | 3rd |



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Thought Process



| Element | Proposed U-value (BTU/ft ² ·°F·h) | Proposed SHGC |
|-----------|--|---------------|
| Windows | 0.18 | 0.17 |
| Skylights | 0.16-0.21 | 0.36 |



MELODY



CONTEXT



CONCEPT



DESIGNING THE ENCLOSURE



ENERGY

Enclosure Performance Summary

| Element | Original R-value (ft ² ·°F·h/BTU) | Proposed R-value(ft ² ·°F·h/BTU) |
|----------------------------|--|---|
| Above Grade Exterior Walls | 2 (Brick Wall) | 27 (6" Exterior Thermacork Insulation) |
| | New Construction (Wood Framed Wall) | 33 (6" Cavity Insulation + 2"ci) |
| Roof | 5 (Built-Up Roof) | 50 (8" Exterior Polyiso Insulation) |
| Foundation Wall | 3 (Concrete Wall) | 17 (2.5" Exterior XPS Insulation) |



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CONTEXT



CONCEPT

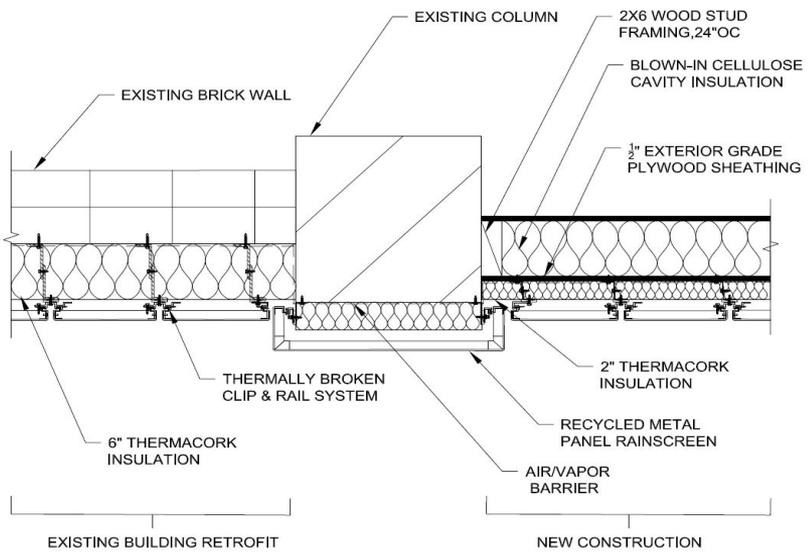
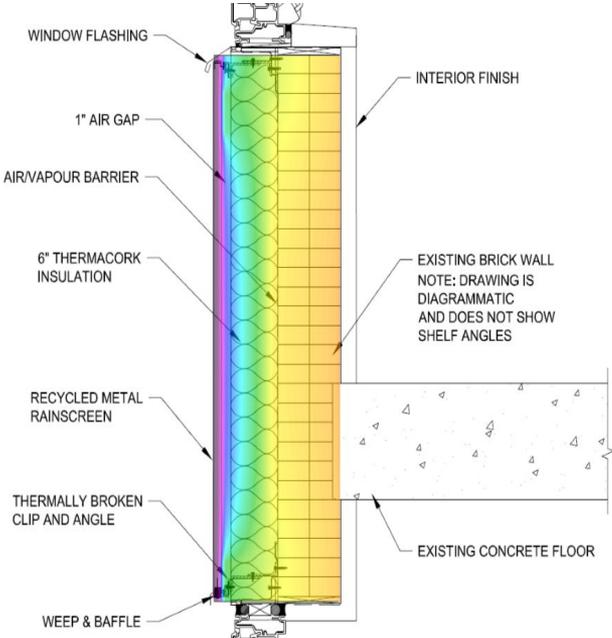


DESIGNING
THE ENCLOSURE



ENERGY

Enclosure Details



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CONTEXT



CONCEPT

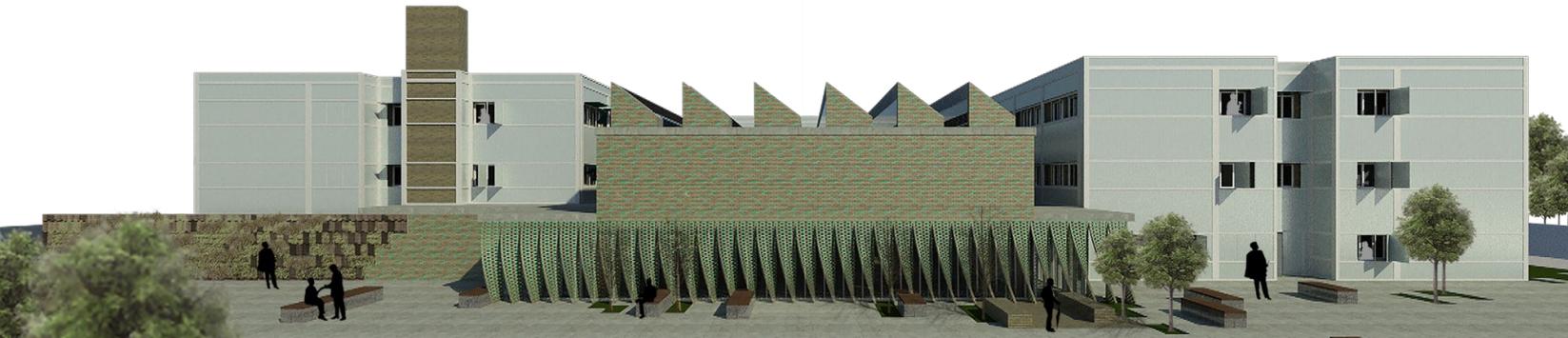


DESIGNING THE ENCLOSURE

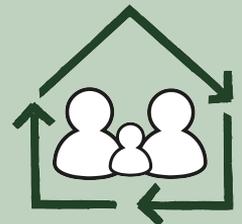
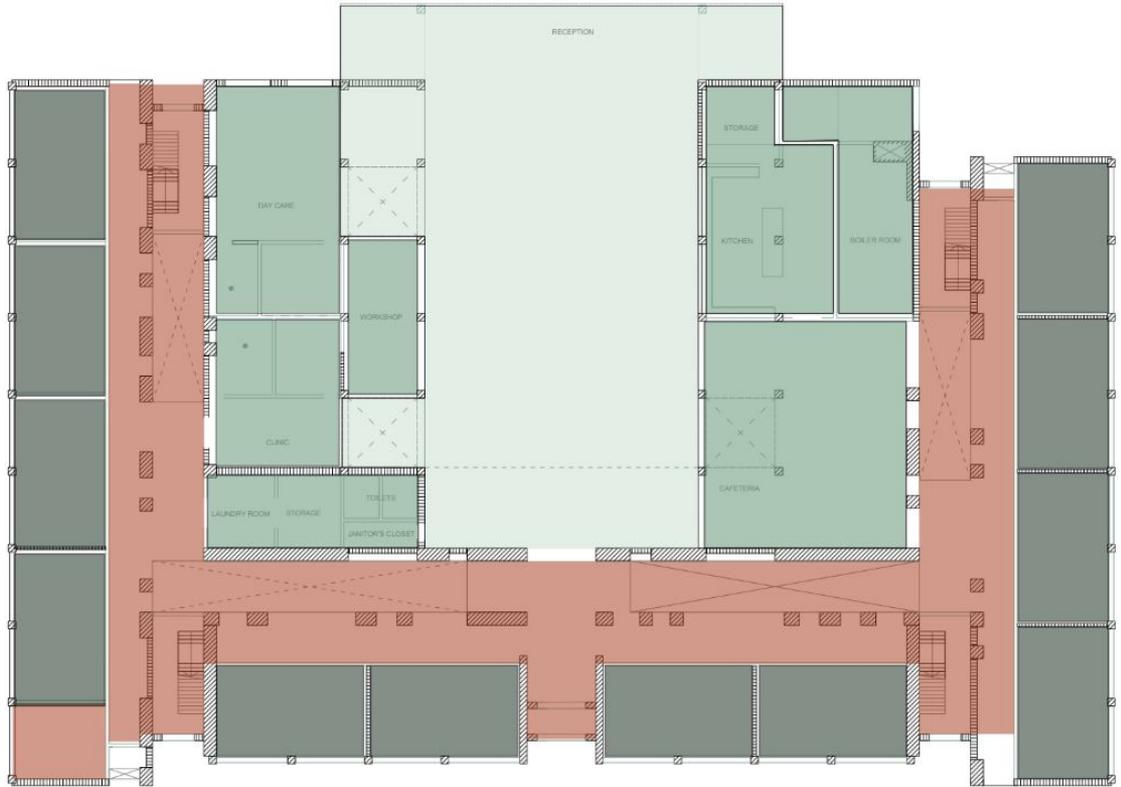


ENERGY

Proposed Enclosure



Thermal Zones: First Floor



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CONTEXT



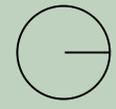
CONCEPT



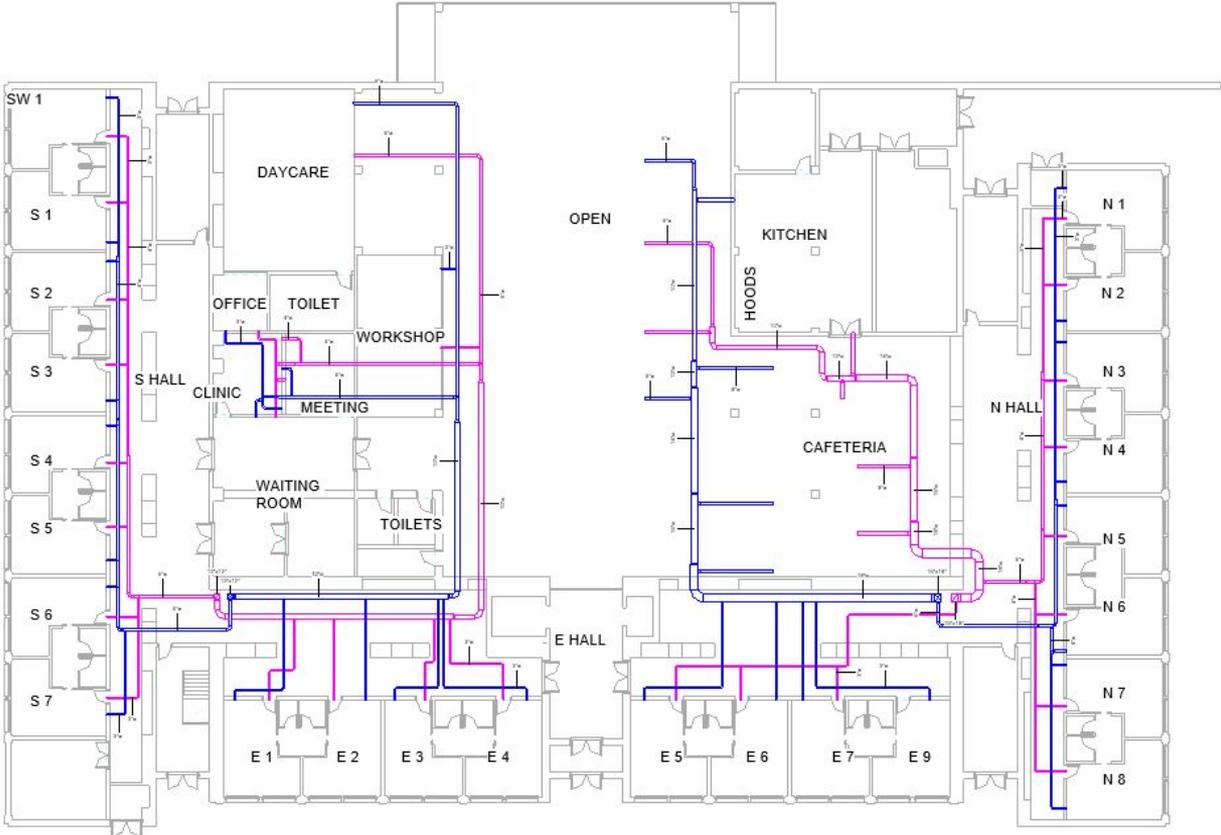
DESIGNING
MEP



ENERGY



Ductwork HVAC Plan: First Floor



MELODY



CONTEXT



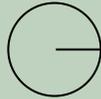
CONCEPT



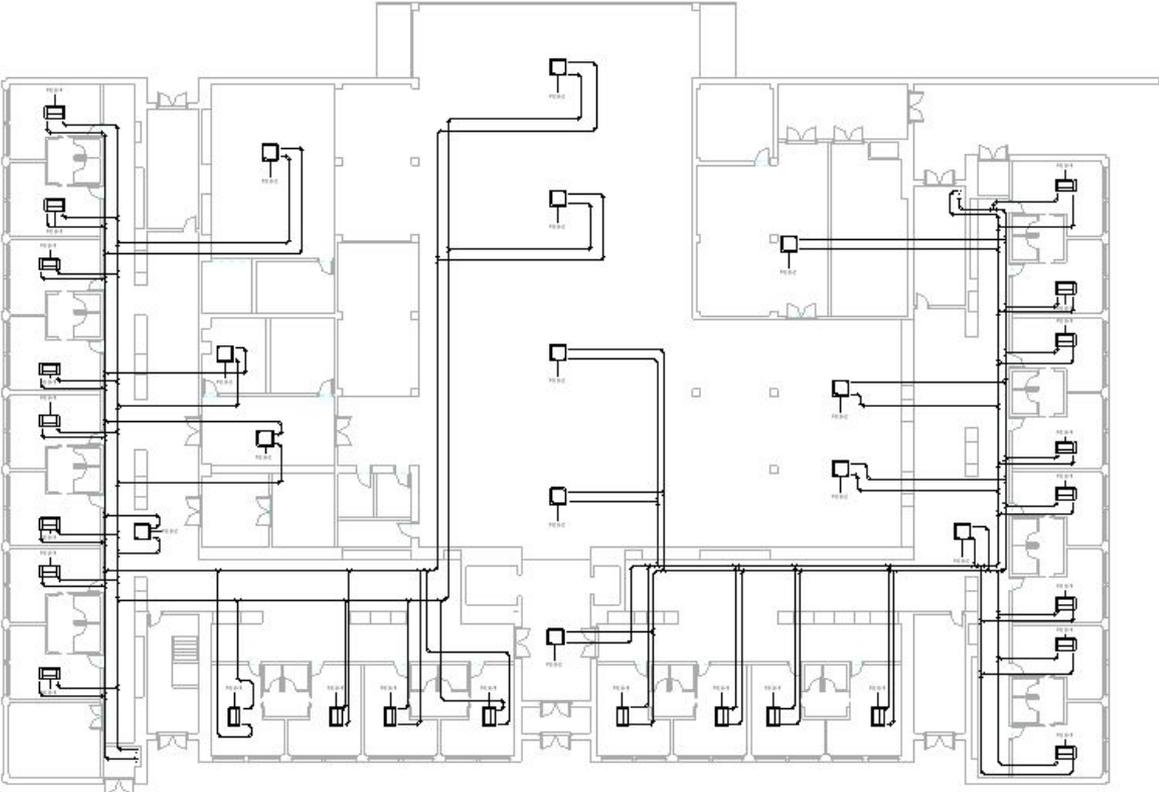
DESIGNING
MEP



ENERGY



Piping HVAC Plan: First Floor



MELODY



CONTEXT



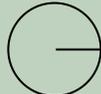
CONCEPT



DESIGNING
MEP



ENERGY



Mechanical Equipment



Dedicated Outdoor Air Unit



Outdoor Condensing Unit



Cassette Type
Indoor Fan Coil Unit



Horizontal Type
Indoor Fan Coil Unit



MELODY



CONTEXT



CONCEPT



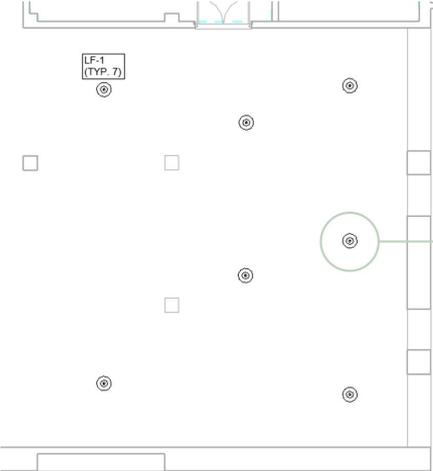
DESIGNING
MEP



ENERGY



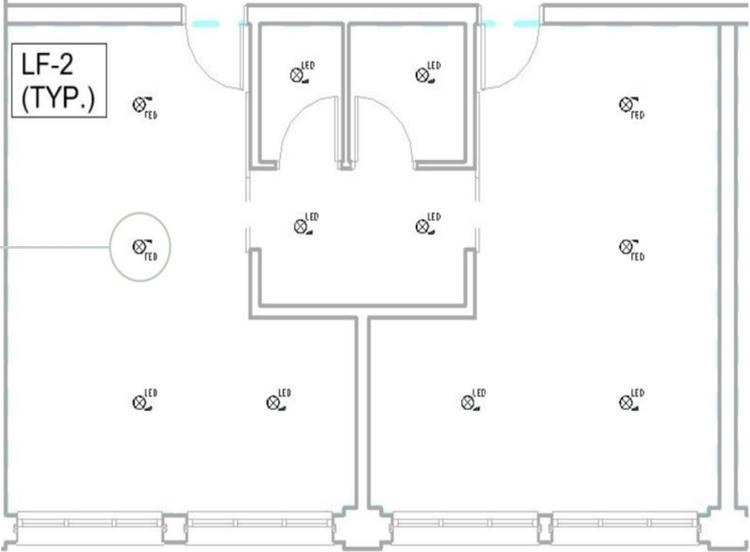
Lighting Fixtures



LF-1-Cafeteria



LF-2-Units



MELODY



CONTEXT



CONCEPT

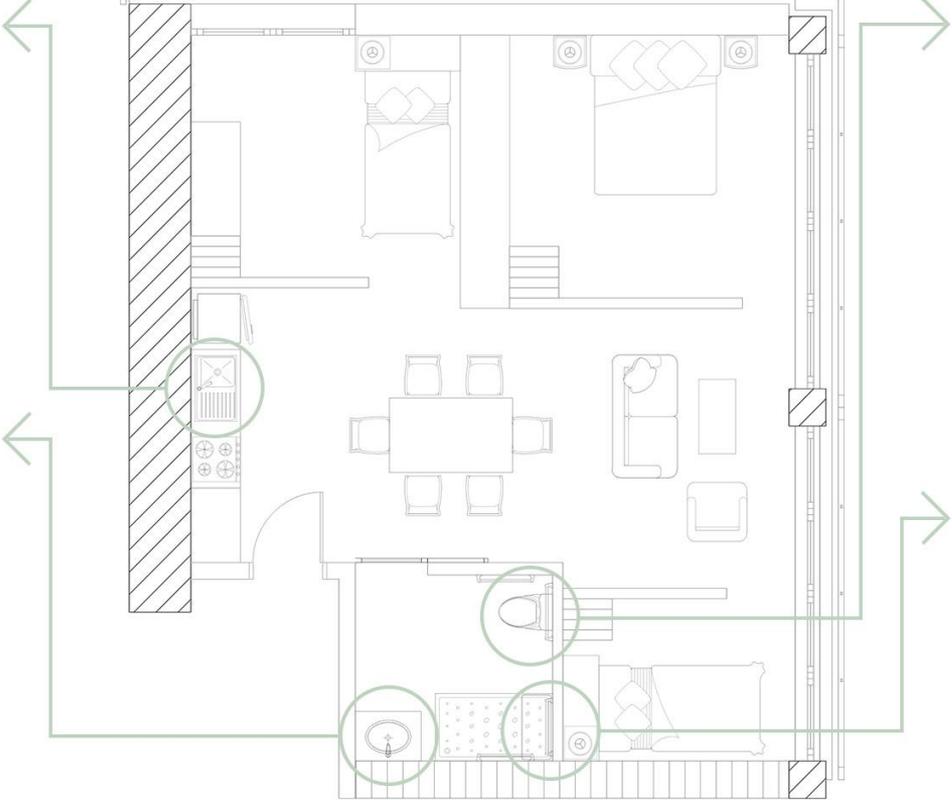


DESIGNING
MEP



ENERGY

Plumbing Fixtures



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CONTEXT



CONCEPT



DESIGNING
MEP



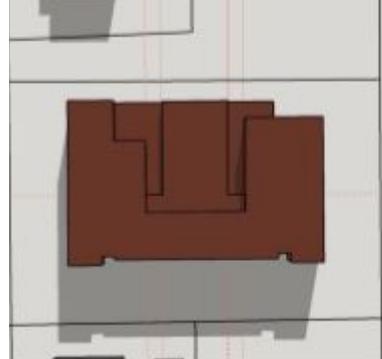
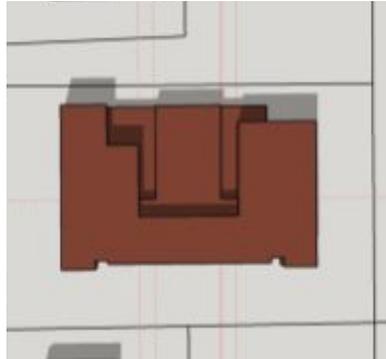
ENERGY

Solar Analysis

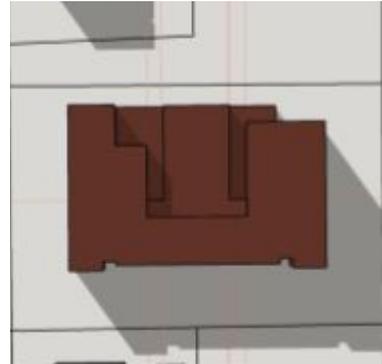
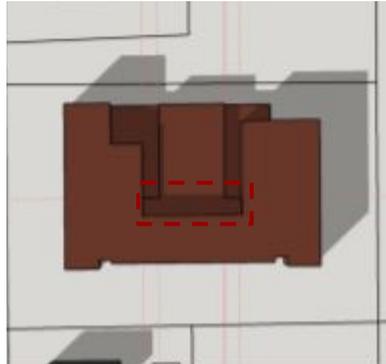
10 AM

6 PM

June 21



December 21



MELODY



CONTEXT



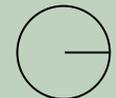
CONCEPT



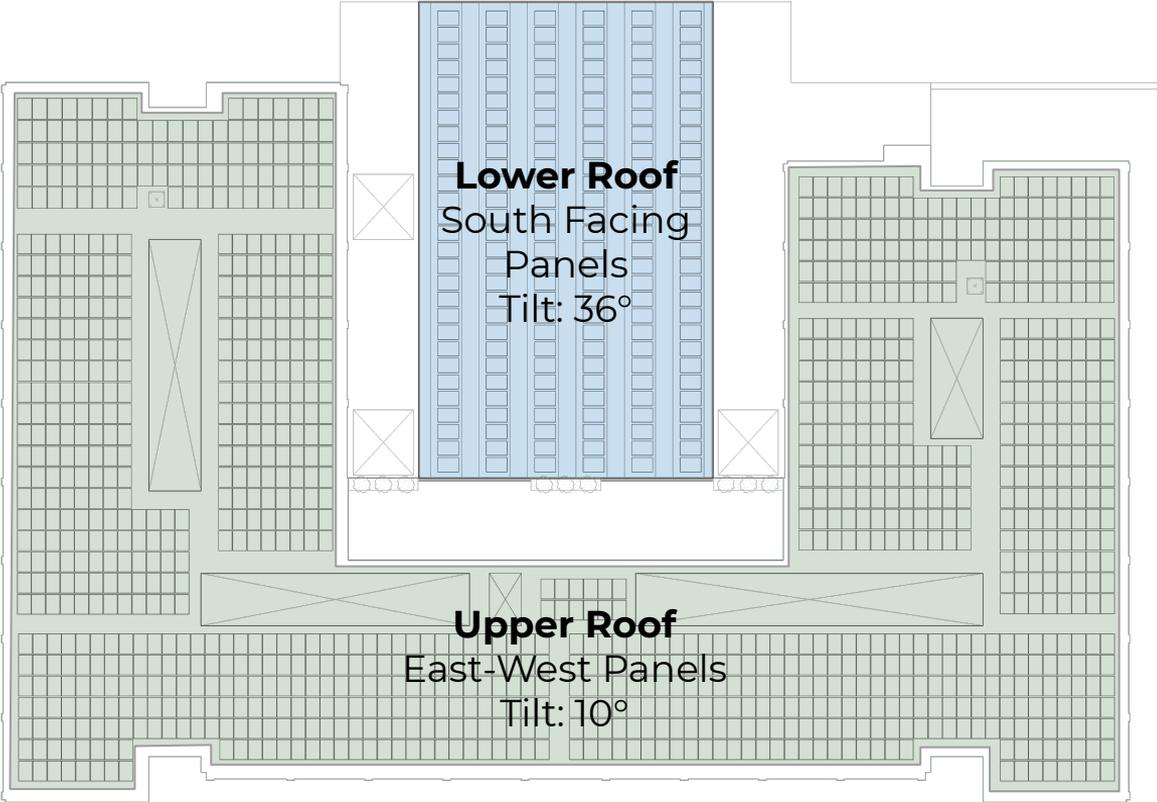
DESIGNING



ENERGY PRODUCTION



Roof PV Plan



MELODY



CONTEXT



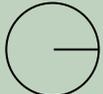
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DESIGNING

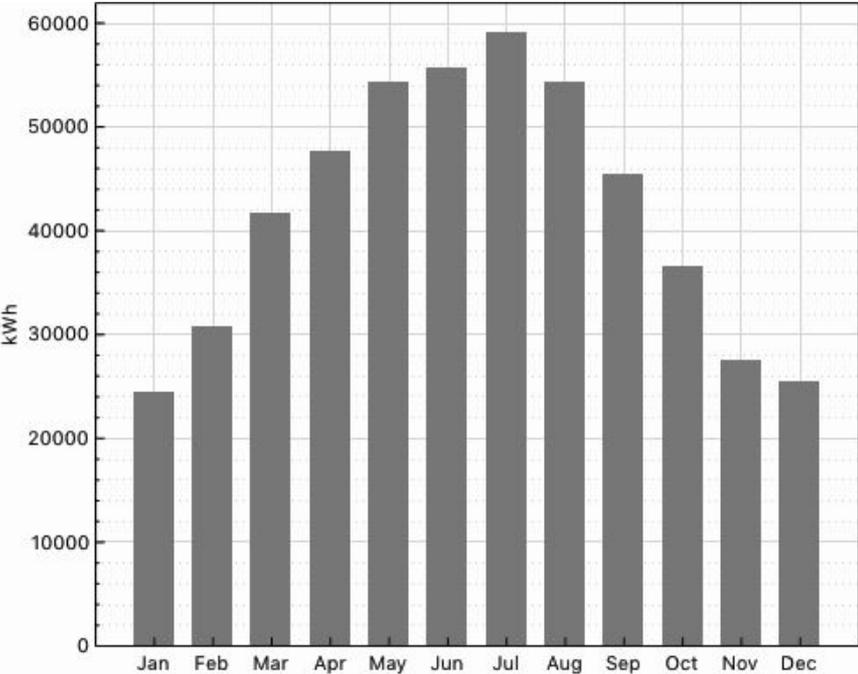


ENERGY
PRODUCTION



Energy Production

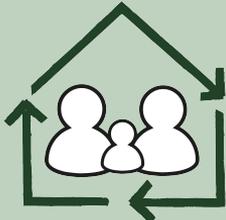
Monthly Energy Production



Annual Energy Production

Production: 491,630 kWh

EUI: 25.25 kBTU/sf/yr



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CONTEXT



CONCEPT



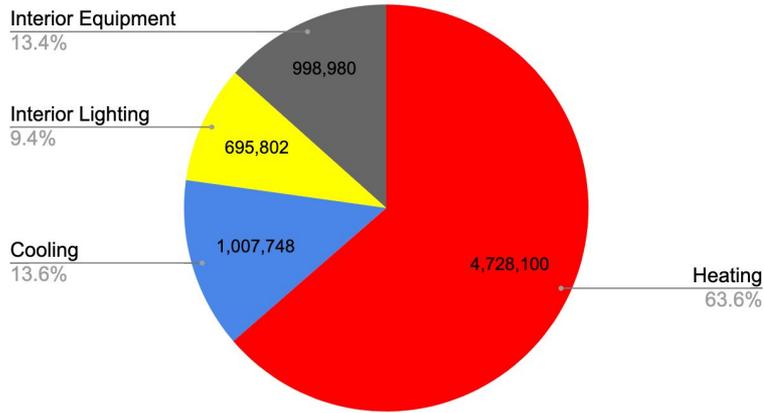
DESIGNING



ENERGY
PRODUCTION

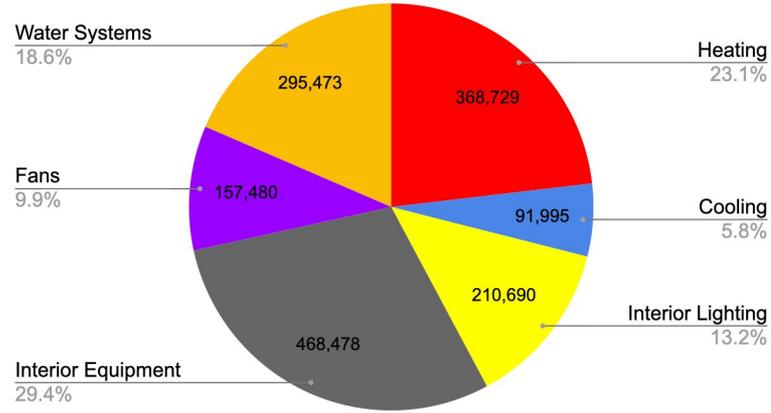
End Use Intensity Comparison

Existing Building General End Use



EUI: 112.97 kBTU/sf/yr

Design End Use



EUI Consumption: 23.97 kBTU/sf/yr



MELODY



CONTEXT



CONCEPT



DESIGNING



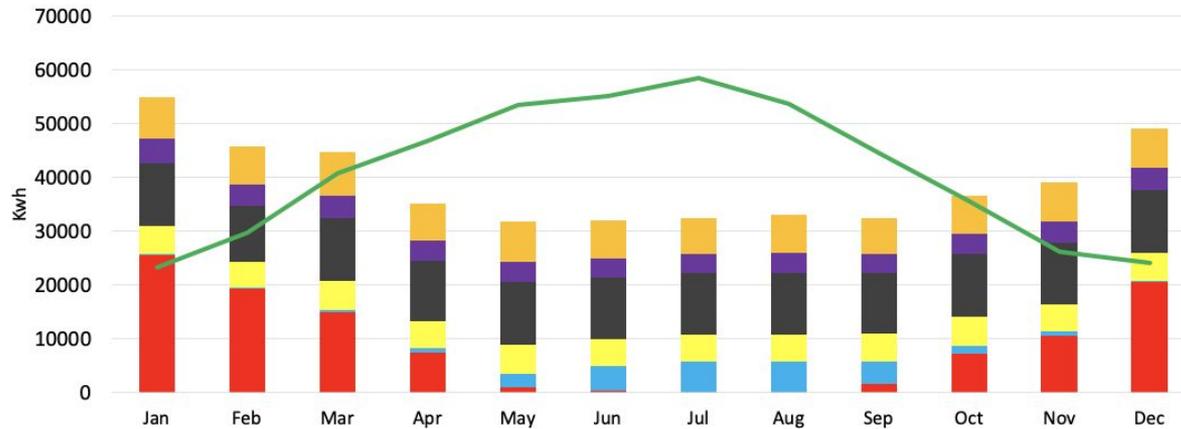
ENERGY
CONSUMPTION

Production vs Consumption

EUI Consumption: 23.97 kBTU/sf/yr

EUI Production: -25.25 kBTU/sf/yr

EUI Net: -1.28 kBTU/sf/yr



Heating

Cooling

Interior Lighting

Interior Equipment

Fans

Water Systems

Systems AC Energy



MELODY



CONTEXT



CONCEPT



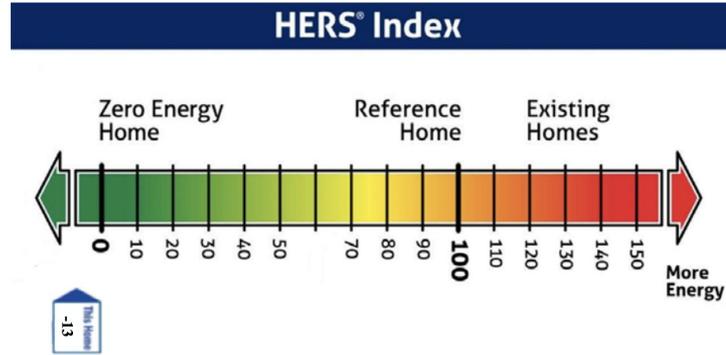
DESIGNING



ENERGY CONSUMPTION

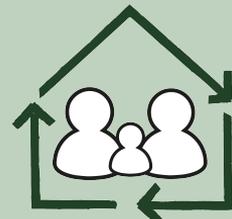
RESNET HERS Index

| Annual Consumption | Melody (MBTU) | 2018 IECC (MBTU) |
|---------------------|---------------|------------------|
| Heating | 625.3 | 430.9 |
| Cooling | 86.1 | 107.3 |
| Water System | 170.3 | 141.3 |
| Lights & Appliances | 649.8 | 400 |
| PV | -1673.9 | 0 |



Calculated HERS Index: -13.19

REM/Rate validates the net zero objective



MELODY



Financial Analysis

| Type | Tab # | Division # | Description | \$ / SF | Budget Amount |
|----------------------|-------|------------|--|----------------|------------------|
| Direct Trade Costs | 1 | 00 | Procurement and Contracting Requirements | \$0.00 | 0 |
| | 2 | 01 | General Requirements | \$3.93 | 261,286 |
| | 3 | 02 | Site Construction | \$17.45 | 1,159,734 |
| | 4 | 03 | Concrete | \$0.91 | 60,680 |
| | 5 | 04 | Masonry | \$2.87 | 190,750 |
| | 6 | 05 | Metals | \$0.00 | 0 |
| | 7 | 06 | Wood, Plastics and Composites | \$0.85 | 56,250 |
| | 8 | 07 | Thermal and Moisture Protection | \$7.99 | 531,000 |
| | 9 | 08 | Doors and Windows | \$4.44 | 294,839 |
| | 10 | 09 | Finishes | \$0.79 | 52,650 |
| | 11 | 10 | Specialities | \$0.45 | 30,000 |
| | 12 | 11 | Equipment | \$2.10 | 139,247 |
| | 13 | 12 | Furnishings | \$2.51 | 166,930 |
| | 14 | 13 | Special Construction | \$16.43 | 1,092,101 |
| | 15 | 14 | Conveying Systems | \$0.42 | 28,000 |
| | 16 | 15 | Mechanical/Plumbing | \$5.19 | 345,183 |
| | 17 | 16 | Electrical | \$12.65 | 840,477 |
| | 18 | 17 | OTHER | \$0.00 | 0 |
| Cost Subtotal | | | | \$78.99 | 5,249,126 |

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



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CONTEXT



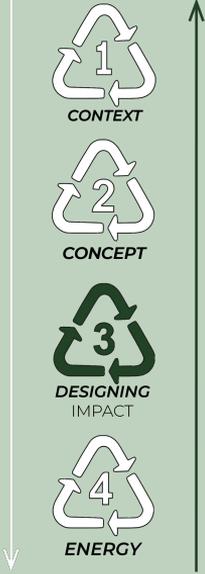
CONCEPT



DESIGNING
IMPACT



ENERGY



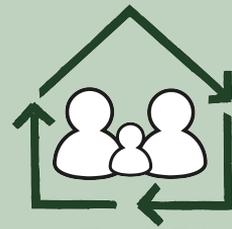
Points of Saving

Operations:

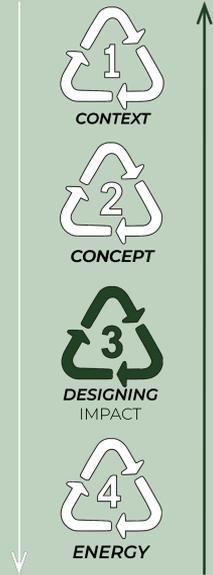
- Community education
- Resident incentives
- Low flow fixtures
- LED lighting
- Energy Star appliances

Second Hand Materials:

- 100% recycled metal cladding
- Reclaimed brick
- Reused furniture
- Reused cabinets

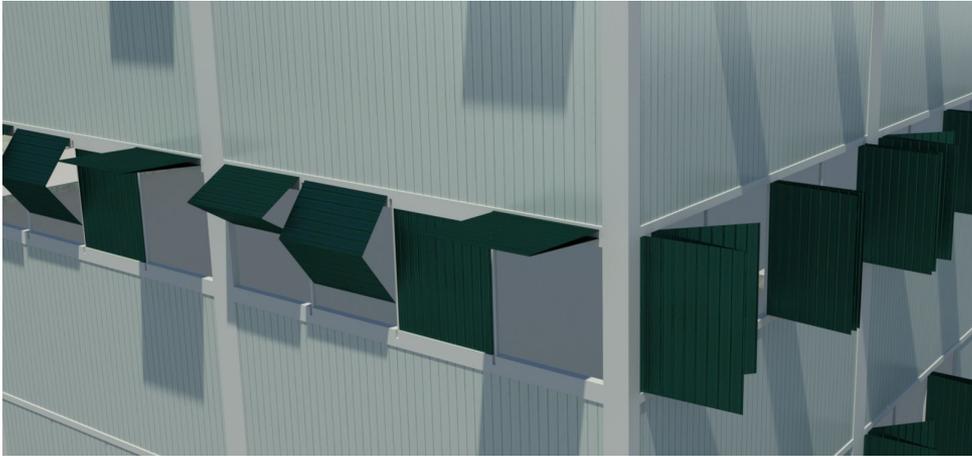


MELODY

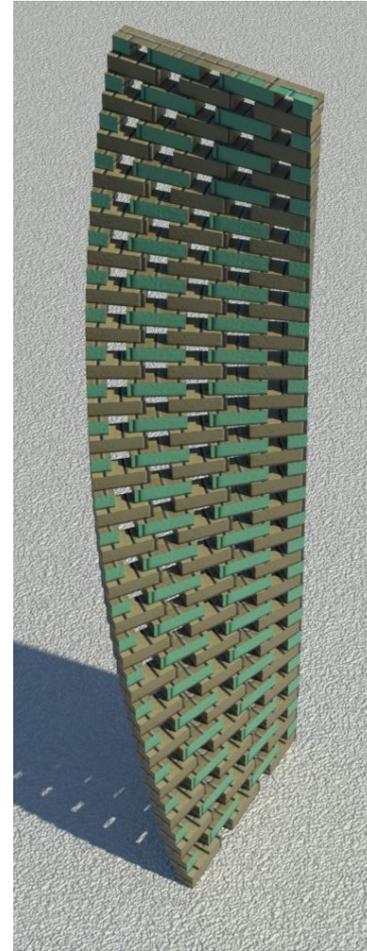


Points of Saving

Material Reuse & Recycling



Recycled Metal Rainscreen



Brise Soleil



MELODY



CONTEXT



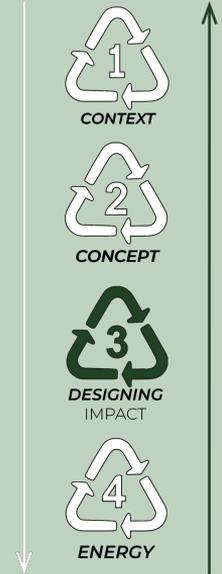
CONCEPT



DESIGNING
IMPACT



ENERGY

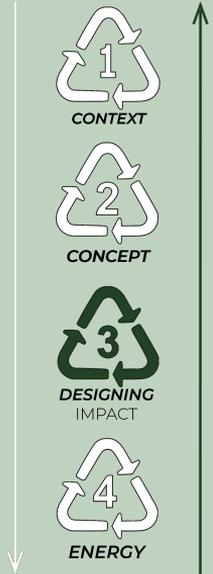


Life Cycle Analysis

| Cradle to grave (A1-A4, B4-B5, C1-C4) | kg CO ₂ e/m ² |
|---|-------------------------------------|
| <div style="background-color: #008080; color: white; padding: 5px; display: inline-block;">(< 200) A</div> | |
| <div style="background-color: #00b050; color: white; padding: 5px; display: inline-block;">(200-280) B</div> | |
| <div style="background-color: #90ee90; color: white; padding: 5px; display: inline-block;">(280-360) C</div> | 340 |
| <div style="background-color: #ffff00; color: black; padding: 5px; display: inline-block;">(360-440) D</div> | |
| <div style="background-color: #ffcc99; color: black; padding: 5px; display: inline-block;">(440-520) E</div> | |
| <div style="background-color: #ff9933; color: black; padding: 5px; display: inline-block;">(520-600) F</div> | |
| <div style="background-color: #ff0000; color: white; padding: 5px; display: inline-block;">(> 600) G</div> | |



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Long-Term Investments, Large Return

Openings
Skylights & Windows

- Improved indoor environmental quality

Envelope

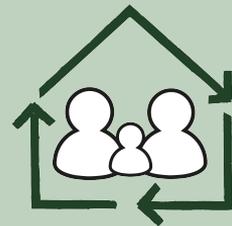
- Improved thermal comfort
- Aesthetics

Building Systems

- Targeted heat recovery
- High-efficiency lighting

Solar Panels

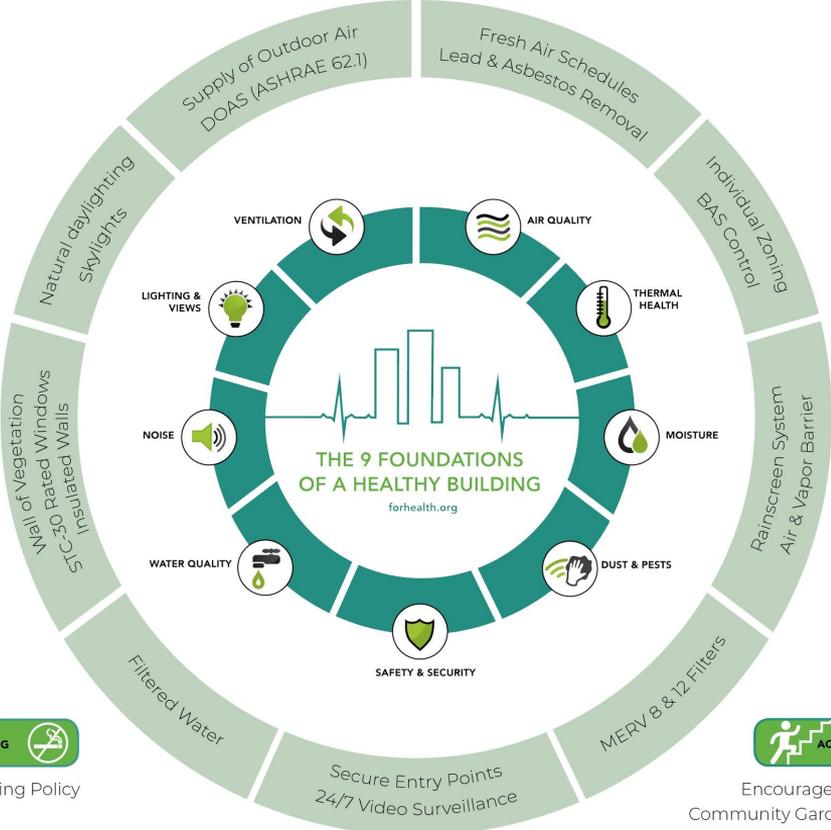
- Long term energy savings
- Reduced utilities



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Comfort & Environmental Quality



No Smoking Policy



Encouraged Stair Use
Community Garden & Playground



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CONTEXT



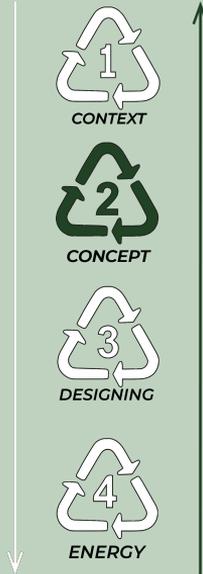
CONCEPT



DESIGNING



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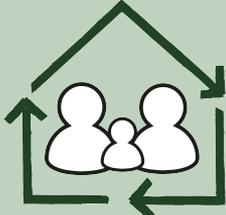


Beyond the Building

Community Revitalization



Chicago Housing Crisis



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CONTEXT



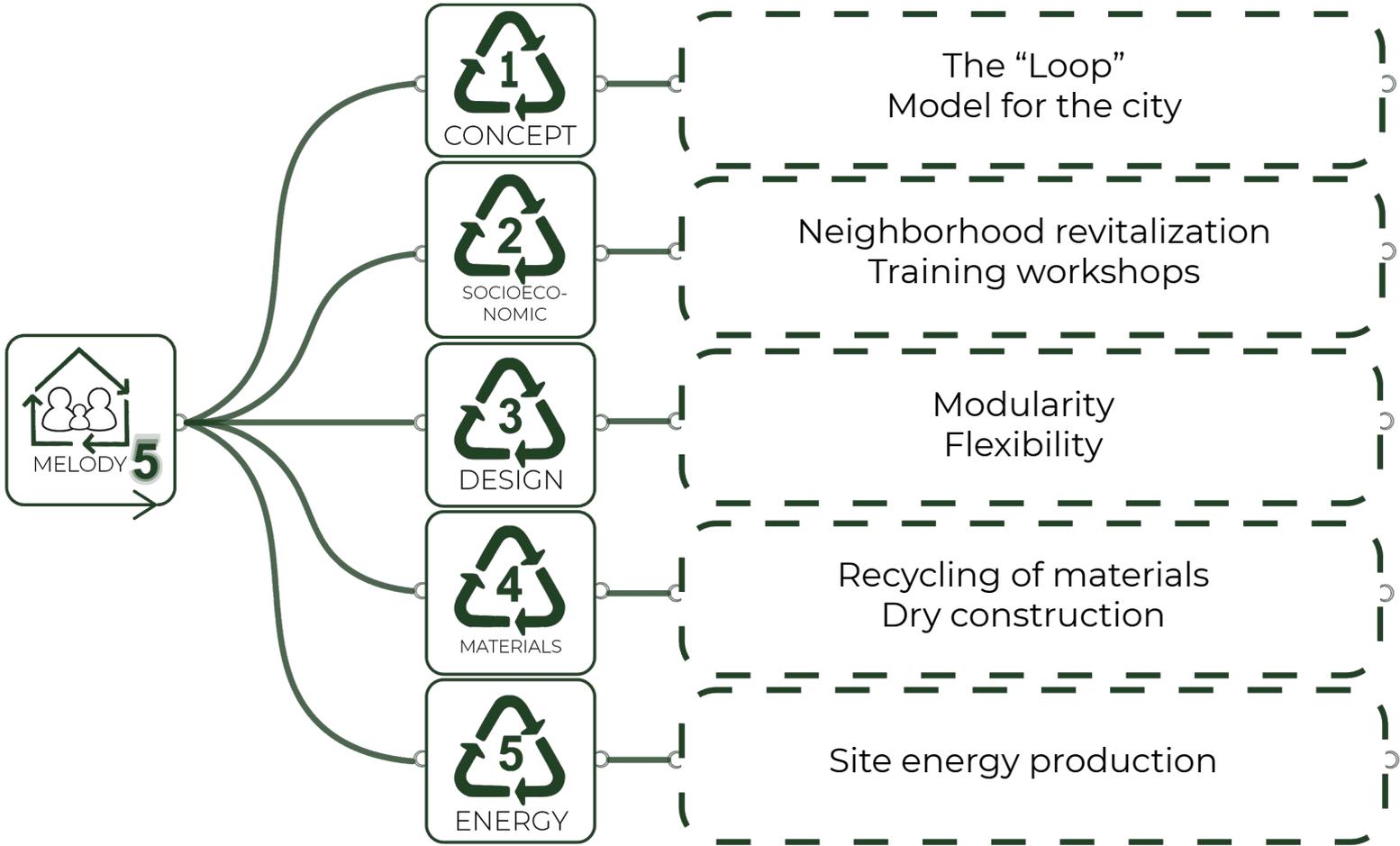
CONCEPT



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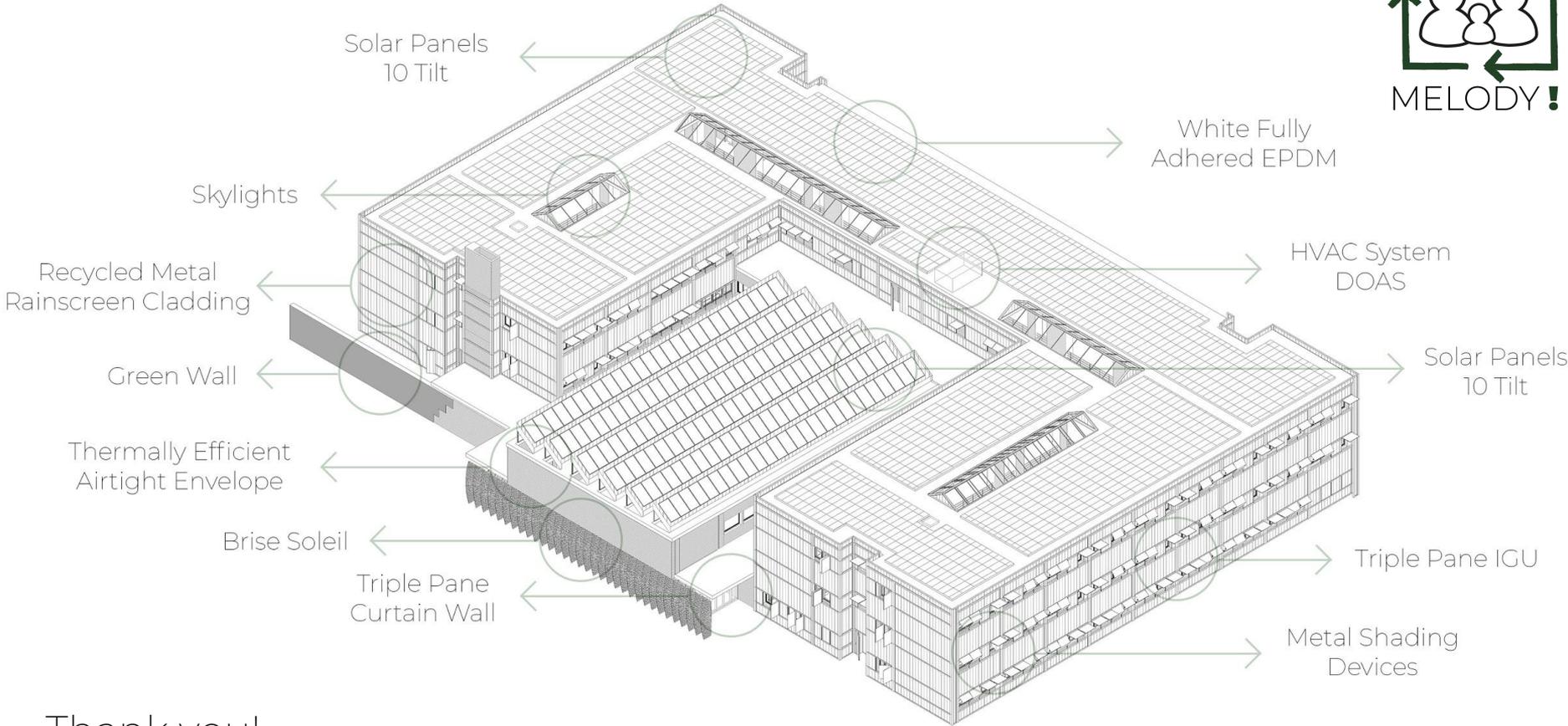


A special thanks to our professors and industry partners





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Thank you!