GREEN CLASS COMMUNITY

PERFORMANCE MEETS AFFORDABILITY
Group Leader
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Opportunity Assessments
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Systems
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Structure
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Hazem Shehada
Paul Skopek

Design
Michael Warnes
Bryon Krebs
GREEN CLASS COMMUNITY

• Continuation of iPro 323’s theoretical Zero Community

• Design an affordable and efficient housing community in Evanston
ZERO COMMUNITY

- iPro 323 created an almost self sustaining house
- Greatly reduced energy consumption
- Sacrificed affordability for sustainability
IPRO 358
SOLAR EXPOSURE

Optimum Orientation
Location: Chicago Ohare Intl, USA
Orientation based on average daily incident radiation on a vertical surface.

Best: 172.5°
Worst: 172.5°

* Weather Tool

Annual Average
Underheated Period: 0.97 kWh/m²
Overheated Period: 0.97 kWh/m²

Aug. Daily Radiation: 171.0°
Entire Year: 1.56 kWh/m²
Underheated: 1.87 kWh/m²
Overheated: 0.97 kWh/m²
## BUILDING ENVELOPE

- **Advanced Framing Techniques**
  - Less wood, more insulation
  - Enhances performance
- **Build-Up**
  - Thermal bridging
  - Brick façade
- **Best envelope for the money**

<table>
<thead>
<tr>
<th>Structure Type</th>
<th>R Value</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Stick Framing</td>
<td>R</td>
<td>$</td>
</tr>
<tr>
<td>Advanced Framing</td>
<td>RR</td>
<td>$</td>
</tr>
<tr>
<td>Structurally Insulated Panels</td>
<td>RRR</td>
<td>$$</td>
</tr>
<tr>
<td>Insulated Concrete Forms</td>
<td>RRR</td>
<td>$$$$</td>
</tr>
</tbody>
</table>

- No header in nonbearing wall
- Header hangers eliminate jack studs.
- Single top plate
- Place windows and doors on stud layout.
- Rigid-foam sheathing improves thermal performance.
- Single stud at rough openings
- For point loads, the rim joist acts as header.
- Stacked framing transfers load directly.
- Minimize stud nailing at intersecting walls.
- Properly sized header with foam on interior
- Two-stud corners won’t compress batt insulation.
- No cripples under ends of windowwall.
ENERGY MODELING

Autodesk®
Ecotect® Analysis

eQUEST
ENERGY MODELING: TRADITIONAL HOUSE COMPARISON

- **84% efficiency**

<table>
<thead>
<tr>
<th></th>
<th>iPro 358</th>
<th>Traditional</th>
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</thead>
<tbody>
<tr>
<td>Savings</td>
<td>22030</td>
<td>0</td>
</tr>
<tr>
<td>Space Heating</td>
<td>2270</td>
<td>22370</td>
</tr>
<tr>
<td>Space Cooling</td>
<td>1830</td>
<td>3760</td>
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</table>
ENERGY MODELING: TRADITIONAL HOUSE COMPARISON

<table>
<thead>
<tr>
<th>Energy Consumption</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional House</td>
<td>26130 kWh</td>
</tr>
<tr>
<td>Our Model</td>
<td>4000 kWh</td>
</tr>
</tbody>
</table>

You save $2620 annually
ENERGY MODELING: IPRO 323 COMPARISON

- Similar Systems
- 13% more efficient
- 80% of the cost
ACTIVE SYSTEMS

- Geothermal Furnace
- Energy Recovery Ventilator
- Instantaneous Water Heater
- Life Ware System
ACTIVE SYSTEMS: GEOTHERMAL FURNACE

- Uses the ground as a heat sink
- Forced air system
- Uses electricity only
- Energy consumption reduced by 21%
- Pay back in 7 years
ACTIVE SYSTEMS: ENERGY RECOVERY VENTILATOR

- Recovers energy from exhaust air
- Can recover up to 80%
- Helps balance thermal field
ACTIVE SYSTEMS: INSTANTANEOUS WATER HEATER

- On demand energy consumption
- Energy consumption reduced by 24%
- Pay back in 4 years
ENERGY CONSCIOUSNESS

- Complete home Automation
- Can save up to 20%
OPTIONAL SYSTEMS

- Photovoltaic Cells
- Solar Thermal Collectors
- Electrical Radiant Under Floor Heating
OPTIONAL SYSTEMS: PHOTOVOLTAIC CELLS

- Transforms solar radiation into DC power
- Requires inverter and connection to grid
OPTIONAL SYSTEMS: SOLAR THERMAL COLLECTORS

- Uses solar radiation to heat liquid medium
- Reduces fuel needed for domestic hot water
OPTIONAL SYSTEMS: ELECTRICAL RADIANT FLOOR HEATING

- Electrical resistance radiates up through the floor
- More efficient than forced air
- Exclusive use in bathrooms
PAYMENT MODEL

- Rent To Own
- Attract Investors – Consistent Return
- Attract Tenants – Try before you buy.
- Monthly Payment – 80% Rent, 20% Down Payment
- 3 Years – Option to buy
- Mutually Beneficial
FINANCIALS

- Sell Price = $300,000/Unit

- Projections (Total)
  - Expenses = $3,447,191
  - Revenue = $3,720,000
  - Profit = $272,809
  - Rate of Return = 26%
CONCLUSION

- Sustainable yet affordable
- Systems pay for themselves over time and considerable reduction in energy usage
- Sell Price lower than comparable market price
- Attractive sell even in the midst of a housing slump
- Attractive buy for Customers who want to go green
- Go Green and Save Green
Questions?

GREEN CLASS

COMMUNITY

PERFORMANCE
MEETS
AFFORDABILITY