Prescription for Better Buildings: Phius Prescriptive Path from Start to Plaque

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Prescription for Better Buildings, Faster
(Phius 2021 CORE Prescriptive path from start to plaque)

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High performance building consultant,
Kakoon Buildings
- Goals of the new protocol
- Prescriptive Criteria
- Getting started
- Case studies
GETTING TO ZERO

with a passive building baseline

Offsite RE

Onsite Renewable Energy

Active Conservation Strategies

Passive Conservation Strategies

Quality, Health, Durability

(prescriptive path)
Design: based on a decade of data
Goals:

- **Accessibility for more CPHCs**
  - Many CPHCs outsource Energy modeling
  - Every single CPHC can fill out a spreadsheet

- **Remove investment in Energy modeling**
  - Time, training, resources associated with WUFI Passive and THERM
  - Feedback loop increases design timeline

- **Reduce certification timeline**
  - Less to check = less rounds of review

- **Allows all Phius professionals to submit for pre-cert**

- **Support rapid development of single family homes**
  - Climate-specific standard has been successful in SF homes

- **Cost-effective solution for large-scale community development**
  - Time, training, resources associated with WUFI Passive and THERM
  - Feedback loop increases design timeline
To scale up the Phius standard we need the help of all our certified professionals.
Design: Expedite Certification

Sample Project Timeline - Performance path (Phius+ 2019)

Project Timeline: Case 01, GC Residence - Prescriptive path (2021 Phius CORE)
Prescriptive Criteria
Eliminates the need for WUFI
- Replaced with a prescriptive checklist based on project location
Criteria: Single Family

Applicable to:
- Single family detached
- Side-by-side duplexes
Criteria: Limitations

No fossil fuel combustion equipment

No jetted tubs / indoor pools

No natural draft fireplaces
Criteria: Airtightness

Increased airtightness
- .04 cfm/ft²
  (performance = .06 cfm/ft²)

Preliminary blower door
- Required
- Catch durability issues early

Mitigate risks
- Resiliency of assemblies
Building ‘compactness’ (Form factor) is limited
- Based on iCFA
iCFA/bedroom < 900 ft²
- Controls building occupant density

Criteria: Compactness

Envelope: 3,800 ft²  
iCFA: 1,200 ft²
(3.16)

Envelope: 4,500 ft²  
(3.75)

Envelope: 5,200 ft²  
(4.33)
Criteria: Solar protection

Zone 5 - 7
- Net Gain score (4.5)

Zone 4
- Max SHGC (4.1)
- Net Gain score (4.5)

Zones 0-3
- Max SHGC (4.1)
- Fixed overhangs required (4.4)
### 7 Mechanical Ventilation

**7.1 Balanced Ventilation**

- **7.1.1 Ventilation is balanced according to PHIUS Certification Guidebook Section 3.**

**7.2 Mechanical Ventilation Efficiency**

- **7.2.1 The sensible recovery efficiency \(^{39,32,34}\) in heating mode \(2\) calculated minimum required value.**
  - 80%

- **7.2.2 The total recovery efficiency \(^{39,32,34}\) in cooling mode is greater than or equal to the calculated minimum required value.**
  - NR

- **7.2.4 The ventilation ducts between the recovery device and the enclosure are insulated to at least R-8.**

- **7.2.5 The total length of the fresh air ventilation (supply and exhaust) ducts between the recovery device and the enclosure is less than or equal to the project-specific calculated maximum \(\text{ft}^{3}\).**
  - 25

### 8 Mechanical Systems

**8.1 The space heating system does not rely primarily \(^{49}\) on electric resistance.**

**8.2 Minimum required heating/cooling equipment efficiency is met based on climate zone and system type as calculated.**

- **8.2.1 Choose System:**
  - **Air Source Heat Pump**
  - **Minimum COP @ 5°F:** 1.0
  - **Minimum SEER:** 15.0

**8.3 Ventilation Fans meet ENERGY STAR Most Efficient 2020.**

**8.4 Dehumidifiers meet ENERGY STAR Most Efficient 2020.**
Process: Getting Started
# Phius CORE Prescriptive 2021 Snapshot

**State:** ALABAMA

**City:** ANNISTON METROPOLITAN AREA

<table>
<thead>
<tr>
<th>ASHRAE Climate Zone</th>
<th>3A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICFA (°F)</td>
<td>73</td>
</tr>
<tr>
<td>Number of Bedrooms</td>
<td>1500</td>
</tr>
<tr>
<td>Number of Stories</td>
<td>2</td>
</tr>
</tbody>
</table>

## 1. GENERAL

### 1.1.2 ICFA divided by Number of Bedrooms

1. Calculated Value Based on Inputs
2. Maximum Limit: 960 ft²
3. OK, Meets Limit: 375 ft²

## 3. COMPACTNESS

### 3.1 Maximum Envelope Area

1. Maximum Envelope to Floor Area Ratio
2. 4989 ft²
3. 3.33

## 4. SOLAR PROTECTION

### 4.1.1 Maximum Whole Window SHGC

1. 0.25

### 4.1.2 Projection Factor for Fixed Overhangs

1. 0.56

## 5. HEAT TRANSMISSION

### 5.1.1a Fenestration/Openings

1. Maximum Whole Component U-Value: 0.23 (BTU/h ft²°F)

### 5.1.1b Walls & Overhang Floors

1. Minimum Effective R-Value: 30 (r²°F/ BTU)

### 5.1.1c Roofs, Ceilings

1. Minimum Effective R-Value: 59 (r²°F/ BTU)

### 5.1.1d Whole Slab Foundations & Below-Grade Walls

1. Minimum Effective R-Value: 12 (r²°F/ BTU)

### 5.1.1e Ceilings of Unconditioned Basements or Crawls

1. Minimum Effective R-Value: 18 (r²°F/ BTU)

## 6. MOISTURE RISK LIMITATION

### 6.2.1 Minimum Fenestration Condensation Resistance

1. 0.61

## 7. MECHANICAL VENTILATION

### 7.2.1 Minimum Sensible Recovery Efficiency, Heating Mode

1. 66%

### 7.2.2 Minimum Total Recovery Efficiency, Cooling Mode

1. 60%

### 7.2.5 Maximum Total Length of Fresh Air Ducts to Exterior

1. 22 ft

## 8. MECHANICAL SYSTEMS

### 8.2 System Efficiency

#### Select System Type: Air Source Heat Pump

1. Minimum HSPF: 9.6
2. Minimum SEER: 18.0

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1. Prescriptive checklist
2. Construction drawings and takeoffs
3. Datasheets
Prescriptive checklist
- Organized in 9 sections
- Requirements automated based on general info
Case studies and principles
(Phius 2021 CORE Prescriptive path from start to plaque)
Northeast Case studies

First Phius Prescriptive path design certified project

R2 Pre-certification review

R2 Pre-certification review

03. Compactness

03. Compactness

Opted for performance path (Phius ZERO)

GC Residence
North River Design + Build
Stone Ridge, NY

RR Residence
North River Design + Build
Stone Ridge, NY

LT Residence
North River Design + Build
Kerhonkson, NY

Wellfleet
Wellfleet, MA

Riley Residence
Falmouth, MA

Pleasant Hill
Cornwall, NY

Wild Oak Passive House
R plus
Blacksburg, VA
Stone Ridge Passive House Tour
Phius Alliance Hudson Valley Youtube
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PHIUS 2022 Core
Prescriptive path –
Case Study
Bronzeville Estates
Milwaukee WI
Agenda

● Project background
● Project details
● Design decisions and opportunities
● Lessons learned
Full project
LIHTC development
15 retrofit units
15 new construction

Passive house portion
All new construction
3/3 Duplex
4/4 Duplex
Single family home

Developer: Maures Development

Architect: Engberg Anderson
Passive house Consultant: Kakoon Buildings
Bronzeville Scattered Sites- Passive House projects

2354 North 6th Street

2359 North 5th Street

2326 North 5th Street
Original Design – Good candidate for prescriptive path

- Multiple units with the same construction method and builder
- Modular construction with BuildSmart panel
- Townhouse style units, compact design are perfect candidates for prescriptive path certification
3/3 duplex
3 bed single family
● **Compactness**  
  ○ no change from original design

● **Efficient mechanics**  
  ○ original design was for natural gas furnace  
  ○ Replaced with ERV and multi-split heat pump system  
  ○ Increase in duct work

● **Air-Tightness**  
  ○ original design was standard 2x4 construction with spray foam  
  ○ Redesign included build smart panel system with 10” continuous EPS

● **Windows**  
  ○ Upgrade needed from standard U-value  
  ○ Easy to arrange with Build Smart integration of Alpen windows

● **Other items**  
  ○ EV chargers are required where parking is provided  
  ○ No combustion
Current state

- Construction had been scheduled to start in August of 2022
- Pricing came back higher than expected
- Currently waiting on the Developer to secure funding for gap in financing
Keys for success

- Have integrated project meetings
- Find experienced PHIUS architect and builder
- Have rater involvement from the beginning of the design
- Identify additional funding for passive house portion of the project
- Educate the developer and project team about the process early and often
- Make sure the developer is involved in the entire process
Questions

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