HUDDLE TOGETHER FOR WARMTH
HISTORY & DESIGN
BAYSIDE PROJECT INFO

PORTLAND, ME

45 UNITS: STUDIO, 1 BR & 2 BR

$145 / SF

4 STORIES

TAX CREDIT SUBSIDIZED RENTAL
<table>
<thead>
<tr>
<th>PORTLAND CLIMATE</th>
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<tbody>
<tr>
<td>HDD</td>
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<tr>
<td>DESIGN TEMP</td>
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<tr>
<td>JANUARY AV TEMP</td>
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<tr>
<td>JANUARY SOUTH RAD</td>
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<tr>
<td>JULY AV TEMP</td>
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</tbody>
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WINNING ENTRY: BAYSIDE ANCHOR

Team: Portland Housing Development Corporation
Avesta Housing
Wright-Ryan Construction
Kaplan Thompson Architects
Maine Affordable Housing Coalition

Location: Portland, Maine.
Total Built Area: 38,272 SQF.
The Deutsche Bank Americas Foundation and Enterprise Community Partners, Inc. (Enterprise) have announced the winning proposals of the Lowering the Cost of Housing Competition, an effort to support and highlight new approaches to achieving high-quality, lower-cost affordable housing for diverse populations. The Bayside Anchor development program, of Portland, Maine, captured the top prize while the ACDDC team of Austin, Texas, was awarded a prize to further research its proposal.

Bayside Anchor has been awarded $250,000 in program-related investment (PRI) for its prefab, 42-unit multifamily housing proposal. The judges were impressed by the design innovation and multitude of lowering cost approaches that will be deployed, as well as its potential replicability by other affordable housing developers. The Bayside Anchor has been designed to Passivhaus (ultra-low energy) standards and will include energy efficient measures such as solar photovoltaic panels on the roof and a courtyard for storm water management. These features, as well as ground floor community development space, will benefit low-income residents earning at or below 60 percent area median income (AMI).

Bayside Anchor sponsor, Portland Housing Development Corporation (PHDC), was also awarded a $25,000 prize to support work that will create a lifecycle underwriting tool that will enable developers, policy makers and financiers to better understand the implications of choices made during the development process. The Bayside team is comprised of Avesta Housing, Wright-Ryan Construction, Kaplan Thompson Architects, Maine Affordable Housing Coalition and PHDC, an affiliate of the Portland Housing Authority.
CAMPUS PARKING PLAN
TYPICAL UPPER PLAN
4 STORIES
TYPE VA
1 HOUR UNIT TO UNIT
2 HOUR STAIRS
DESIGN THEMES
DESIGN THEMES
BUILDING ELEVATIONS

1. **SW DETAIL ELEVATION**

2. **DECORATIVE METAL ACCENT PANELS**

3. **SMOOTH FIBER-CEMENT PANELS**

4. **FIBER-CEMENT BASE SIDING PATTERN**

- **FUTURE SOLAR PANEL ARRAY** with metal mesh screening for mechanical equipment below.
- **BRAKE METAL CORNICE, 3 PART**
- **MAIN SIDING MATERIAL**
  - 5/16" x 24" VERTICAL FIBER-CEMENT PANEL Siding W/ ALUMINUM HORIZ Z-FLASHING @ TOP EDGE, PAINTED
- **FIBERGLASS TRIPLE GLAZED WINDOW**
- **BRAKE METAL SHADING TRIM PANEL**
- **ENTRY CANOPY, BRAKE METAL FASCA & SOFFIT**
- **BASE CLADDING**
  - FIBER CEMENT TRIM BOARDS W/ HORIZ ALUM Z-FLASHING @ EACH COURSE
  - 3/4" REVEAL TYPICAL
  - (1) 3/4x1x12, (2) 3/4x4x4x4 PATTERN
- **GROUND LEVEL (OXFORD ST)**
  - 24'-0"
- **AVERAGE GRADE**
  - 20%-10 1/2%
BUILDING ELEVATIONS
PASSIVE HOUSE & PHIUS+
HEATING DEMAND

PASSIVE HOUSE
4.75 kBTU / SF / YEAR

PHIUS+ (PORTLAND, ME)
6.6 kBTU / SF / YEAR (+ 39%)
COOLING DEMAND

PASSIVE HOUSE
4.75 kBTU / SF / YEAR

PHIUS+ (PORTLAND, ME)
1.4 kBTU / SF / YEAR (- 71%)
PRIMARY ENERGY

PASSIVE HOUSE
38 kBTU / SF / YEAR
2.6 SOURCE ENERGY FACTOR

PHIUS+
OCCUPANCY x 6,200 kWh / YEAR
3.16 SOURCE ENERGY FACTOR
AIR TIGHTNESS

PASSIVE HOUSE
0.60 ACH50

PHIUS+
0.05 CFM50 / SF / ENCLOSURE
PEAK HEATING LOAD

PASSIVE HOUSE

3.17 BTU / SF / HOUR

PHIUS+  (PORTLAND, ME)

4.0 BTU / SF / HOUR
AREA MEASUREMENTS

GROSS AREA
37,815 SF

PASSIVE HOUSE: TFA
32,384 SF (- 15%)

PHIUS+: iCFA
34,925 SF (- 8%)
ENCLOSURE & VOLUME

THERMAL ENCLOSURE
35,659 SF

INTERIOR VOLUME
279,196 CU FT
MAX HEATING DEMAND

PASSIVE HOUSE
153,824 kBTU / YEAR

PHIUS+
230,505 kBTU / YEAR (+ 50%)
MAX COOLING DEMAND

PASSIVE HOUSE
153,824 kBTU / YEAR

PHIUS+
48,895 kBTU / YEAR (- 68%)
MAX PRIMARY DEMAND

PASSIVE HOUSE
1,230,592 kBTU / YEAR

PHIUS+  \( (6,200 \text{ kWH} / \text{PERSON}) \)
1,925,130 kBTU / YEAR (\(+ 56\%\))
MAX PRIMARY DEMAND

PASSIVE HOUSE
1,230,592 kBTU / YEAR

PHIUS+ (4,200 kWh / PERSON)
1,304,121 kBTU / YEAR (+ 6%)
PV TO BE NET ZERO

PASSIVE HOUSE
107 kW

PHIUS+
137 kW (+ 30%)
CFM50 AT BLOWER DOOR

PASSIVE HOUSE
2,792 CFM50

PHIUS+
1,783 CFM50 (- 36%)
EUI

PASSIVE HOUSE
12.5 EUI

PHIUS+
16.1 EUI (+ 30%)

ARCH 2030: 2015 TARGET
18.2 EUI
COST TO OPERATE

PASSIVE HOUSE
$20,806 / YEAR

PHIUS+
$26,781 / YEAR
### PHIUS+ METRICS

| PEAK LOAD | 130,156 BTU/HOUR |
| PRIMARY ENERGY | 53.94 kBtu/SF/YEAR |
| ANNUAL HEATING | 3.80 kBtu/SF/YEAR |
| ANNUAL COOLING | |

#### BAYSIDE ANCHOR

**VENTILATION**
- 76% \begin{comment}Efficient\end{comment}

**AIR TIGHTNESS**
- 0.05 CFM50 / SF / SHELL \begin{comment}ACHBD\end{comment}
- 0.35

#### R-VALUES

| Walls | 33 |
| Roof | 50 |
| Suspended Floors | 57 |
| Basement Walls | 16 |
| Slabs | |

#### WINDOWS & DOORS

| SHGC | 0.45 |
| Glazing U-Value | 0.13 |
| Frame U-Value | 0.25 |
| Total U-Value | 0.21 |

#### GLAZING % OF TFA

- North: 1258
- East: 837
- South: 1002
- West: 684

#### WINDOW ENERGY

-53,905 kBtu/Year

#### HEAT GAINS

- Solar Gains: 21%
- Mechanical Heating: 33%
- Internal Gains: 47%

#### HEAT LOSS

- Building Shell: 36%
- Ventilation & Air Leaks: 35%
- Windows: 34%

#### SHELL LOSSES

- Walls: 56%
- Floor Slab: 21%
- Roof: 23%
PASSIVE HOUSE METRICS

**PEAK LOAD**
131,810 BTU/HOUR

**PRIMARY ENERGY**
42.46 kBtu/ft²/year

**ANNUAL HEATING**
6.97 kBtu/ft²/year

**VENTILATION**
- Efficient: 76%
- Cfm/ft²/sf: 0.05
- Shell: 0.35

**R-VALUES**
- Walls: 33
- Roof: 50
- Suspended Floors: 57
- Basement Walls: NA
- Slabs: 16

**WINDOWS & DOORS**
- Shgc: 0.45
- Glazing U-Value: 0.13
- Frame U-Value: 0.25
- Total U-Value: 0.21

**GLAZING % OF TFA**

**HEAT GAINS**
- Solar Gains: 25%
- Mechanical Heating: 49%
- Internal Gains: 26%

**HEAT LOSS**
- Ventilation & Air Leaks: 29%
- Windows: 34%
- Building Shell: 37%

**SHELL LOSSES**
- Walls: 54%
- Floor Slab: 23%
- Roof: 0%

**WINDOW ENERGY**
-53,905 kBtu/year
### PHIUS+ CERTIFICATION

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANNUAL HEATING</strong></td>
<td>3.80</td>
<td>kBTU / SF / YEAR</td>
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<tr>
<td><strong>PHIUS+ HEATING LIMIT</strong></td>
<td>6.40</td>
<td>kBTU / SF / YEAR</td>
</tr>
<tr>
<td><strong>HEATING LOAD</strong></td>
<td>3.65</td>
<td>kBTU / SF / YEAR</td>
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<tr>
<td><strong>PHIUS+ LOAD LIMIT</strong></td>
<td>4.00</td>
<td>kBTU / SF / YEAR</td>
</tr>
<tr>
<td><strong>PRIMARY ENERGY</strong></td>
<td>53.9</td>
<td>BTU / HOUR</td>
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<tr>
<td><strong>PHIUS+ PRIMARY LIMIT</strong></td>
<td>54.01</td>
<td>kBTU / SF / YEAR</td>
</tr>
<tr>
<td><strong>COOLING DEMAND</strong></td>
<td></td>
<td>BTU / HOUR</td>
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<tr>
<td><strong>PHIUS+ COOLING LIMIT</strong></td>
<td>3.80</td>
<td>kBTU / SF / YEAR</td>
</tr>
</tbody>
</table>
INSULATION
CONCRETE SLAB W 3" EPS R - 13

INTERIOR FLOOR SLAB THERMALLY ISOLATED FROM FROST WALL

CONTINUOUS BEAD OF SEALANT
CORAVENT OR BUG SCREEN

CRUSHED STONE

RIGID INSULATION @ INTERIOR FOR FROST PROTECTION. TYP
10” DOUBLE STUD WALL

R - 32.7
CDX PLYWOOD

VAPOR RETARDER

MEMBRAIN™
Continuous Air Barrier & Smart Vapor Retarder

LOW HUMIDITY
Remains moisture tight in winter when humidity in the cavity is low.

HIGH HUMIDITY
Increases permeability in summer to let moisture escape when needed.
8” POLY-ISO OVER TRUSS

R - 50
U Frame  0.25
U COG    0.13
SHGC     45%

GUARDIAN Climaguard 8070
WALL

GWB. RETURNS

CLOSED CELL SPRAY FOAM INSULATION AT FLOOR PLATE (TYP)

CONT 2X RIBBON COORD W/TRUSS MANUF (TYP)
STRUCTURAL LOADING

WOOD MUD SILL
6,000 POUNDS PER STUD
250 PSI BEARING PRESSURE

STEEL COLUMN
50,000 POUNDS @ 11”x11”
425 PSI
INTERIOR BEARING WALL
PT MUDSILL
WRAP POLY VAPOR BARRIER UP THERMAL BREAK AND UNDER MUDSILL
EPDM GASKET
ENSURE INTERIOR CONCRETE SLAB IS THERMALLY ISOLATED FROM FOUNDATION STEM WALL
COLD FROST WALL
WARM CONC FLOOR SLAB
WARM CONC FLOOR SLAB
CONCRETE SLAB
HIGH LOAD FOAM
UNDERSLAB RIGID INSULATION
FOOTING
COLD FOOTING
CRUSHED STONE

FOUNDATION DETAIL - 3D
SCALE: 1” = 1'-0”
STYROFOAM™ BRAND LT SERIES COLUMN-BEARING BLOCKS

Supplied cut-to-size, STYROFOAM™ Brand LT Series Column-Bearing Blocks are made of high-density, rigid polyurethane foam designed to support heavy structural loads while providing a thermal break between the building interior and the supporting soils below, reducing thermal bridging through the column and increasing energy efficiency of the building. Blocks are resistant to moisture and will not rot, dissolve or absorb water.

Made of high-density, rigid polyurethane foam designed to support heavy structural loads while providing a thermal break between building interior and supporting soils below to increase the building's energy efficiency.

1,000 PSI

Used In
- Columns in commercial buildings

Product Advantages
- Contains an average of 20% pre-consumer recycled content certified by UL Environment Inc.
- Reduces thermal bridging through building column and increases energy efficiency;
- Resistant to moisture;
- Will not rot, dissolve or absorb water
PSI VALUE
0.015 BTU / HR • FT • °F
0.026 W / m K

ANALYSIS BY SKYLAR SWINFORD
AIR BARRIER
WALL AIR BARRIER

FLUID APPLIED AIR BARRIER TO BE CONTINUOUS ON BUILDING SHEATHING BEHIND ALL CANOPIES AND OVERHANGS

FLUID APPLIED AIR BARRIER TO EXTEND TO BOTTOM OF SHEATHING. DO NOT SPRAY ONTO FROST WALL

CONTINUOUS BEAD OF SEALANT TO BE APPLIED BETWEEN SHEATHING & ALL BOTTOM PLATES

FLAT SIDE OF EPDM GASKET STAPLED TO UNDERSIDE OF BOTTOM PT PLATE

WRAP SHEET AIR BARRIER OVER FROST WALL TO ENSURE CONTACT WITH EPDM GASKET

CONTINUOUS SHEET POLY AIR BARRIER, ALL SEAMS & PENETRATIONS TAPE
AIR BARRIER

Dow Corning® DefendAir 200
WINDOW AIR BARRIER

CONTINUOUS LAYER OF FLUID APPLIED AIR BARRIER

FLUID APPLIED AIR BARRIER TO EXTEND FULL DEPTH OF WINDOW JAMB, HEAD AND SILL

SEALANT OR TAPE CONNECTION @ REAR OF WINDOW FRAME CONNECTING TO FLUID APPLIED MEMBRANE ON WINDOW BUCK

SEALANT OR TAPE CONNECTION @ REAR OF WINDOW FRAME CONNECTING TO FLUID APPLIED MEMBRANE ON WINDOW BUCK

FLUID APPLIED AIR BARRIER TO BE APPLIED OVER BEVELED SILL & BACK DAM
WINDOW HEAD

- Boral TrueXterior siding on lower level - shown dashed (see elevations for extent)
- Fiber-cement siding on upper levels (see elevations for extent)
- 1x strapping beyond
- Vapor-open fluid applied air barrier
- Counter flashing
- Cor-A-Vent or bug screen
- Metal head flashing with drip edge
- 1x4 head trim, PTD.
- Backer rod
- Caulk
- Fiberglass casement window sash
- 2x header
- Vapor retarder membrane
- Air seal 2x to buck
- Mounting clip
- GWB drywall returns, PTD
- Sealant (air barrier)
ROOF AIR BARRIER

- EPDM ROOF MEMBRANE (AIR SEAL LAYER) TO BE SEALED TO ALL PENETRATIONS
- WRAP EPDM ROOF MEMBRANE 6" MIN. DOWN FACE OF EXTERIOR WALL. CONNECT TO FLUID APPLIED AIR BARRIER
- CONTINUOUS LAYER OF FLUID APPLIED AIR BARRIER
- FLUID APPLIED AIR BARRIER TO EXTEND FULL DEPTH OF WINDOW JAMB, HEAD AND SILL
- SEALANT OR TAPE CONNECTION @ REAR OF WINDOW FRAME CONNECTING TO FLUID APPLIED MEMBRANE ON WINDOW BUCK
\[ \Psi = -0.039 \text{ BTU/h.ft}^\circ \text{F} \]
\[ U_{1d} = 0.020 \text{ BTU/h.ft}^2\text{F} \]
\[ U_{1d} = 0.035 \text{ BTU/h.ft}^2\text{F} \]

\[ l_A = 55.725 \text{ in / } l_B = 68.027 \text{ in} \]
\[ \Phi_{\text{total}} = -13.509 \text{ BTU/h.ft} \]
\[ L_{2D} = -0.076 \text{ BTU/h.ft}^2\text{F} \]
\[ \Delta T = -54.0 \text{ } ^\circ\text{F} \]

**PSI VALUE**

-0.039 BTU / HR • FT • °F

-0.067 W / m K
VENTILATION
(AND HEAT)
ELECTRIC BASEBOARD

$50
VENTILATION

RENEWAIRE EV450IN ECM

Indoor Unit with ECM Motor Option

.78 W/CFM

75%

*Sensible Winter Total Summer Total

*At AHRI 1050 standard conditions
(See certified data on page 73 for core components.)
HORIZONTAL DUCTED ERV

NO 2 HOUR SHAFTS

NO FIRE DAMPERS

45 MINUTE CORRIDOR RATING

1 ERV PER 6 UNITS

SIDEWALL INTAKE & EXHAUST
HVAC DESIGN: UPPER FLOORS
SERVICE DETAIL AT CORRIDOR CEILINGS

SCALE: 3/4" = 1'-0"
SERVICE DETAIL AT CORRIDOR CEILINGS

SCALE: 3/4” = 1’-0”
COMPARTMENTALIZATION
Pressurization

Duct Blaster B

Ring 1

Fan Speed

ACH50
Flow (cfm)

Fan Pressure (Pa)
DG700 - 38152 Ch B
-0.0

Bldg Pressure (Pa)
DG700 - 38152 Ch A
-0.0

Bldg Baseline (Pa)

Completed Tests
1

Seconds

# Samples

Edit Environmental Data

Start Test

Pause

Cruise

Sample

Clear

Previous

to Test Settings

Next
to Test Results

Status

Idle - Monitoring

Data Box Info
PLUMBING
ALMOST THERE