Amethyst Brook Apartments

Pelham, Massachusetts

PROJECT SNAPSHOT

Completion Date: May 2025
Development Type: New construction multifamily residential building
Developer: Home City Development
Architect/Designer: Architecture Environmental Life
Passive House Consultant: Building Evolution Corporation
Verifier: Airtight Energy
Contractor: Western Builders
Mechanical Systems Designer: BLW Engineers Inc
Code Pathway: Building 22 was permitted under the Stretch Energy Code (225 CMR 22.00), and pursued Phius CORE 2021 certification

Front building (Building 20), a 6-unit ENERGY STAR® certified building, and rear building (Building 22), a 28-unit building certified under Phius Core 2021.

PROJECT OVERVIEW

Amethyst Brook Apartments is a **34-unit, all-electric affordable housing** development located on a 2.6-acre site in Pelham, Massachusetts. Completed in 2025 and developed as a single project, the site includes two fully occupied buildings: a 28-unit multifamily building certified to **Phius CORE 2021 Passive House** standards and a 6-unit building certified to **ENERGY STAR**.

Although Pelham had not yet adopted the Specialized Stretch Energy Code at the time of permitting, the development team **pursued Passive House certification** for the larger building. The project was completed while the town was operating under the Massachusetts Stretch Energy Code; Pelham has since adopted the Specialized Stretch Energy Code, effective July 1, 2025.

Building 22, the 28-unit building, has a compact L-shaped form and is well suited for Passive House performance. The design of Building 20, the 6-unit building, reflects the form of a historic farmhouse and barn that previously occupied the site. Due to its more complex envelope geometry, the project team elected to pursue ENERGY STAR certification for this structure, which incorporated high levels of energy efficiency and all-electric operation across the site.

All apartments are **income-restricted and affordable** to households earning at or below 60 percent of Area Median Income (AMI). Five units are further restricted to households at or below 50 percent AMI, and eleven units are restricted to households at or below 30 percent AMI.

Design & Construction Approach

This multifamily project was developed using Low-Income Housing Tax Credits (LIHTC), which are administered through a state-level competitive allocation process. In Massachusetts, LIHTC-awarded developments must meet the Massachusetts Stretch Energy Code, regardless of whether the project is located in a Stretch Energy Code community. In addition, the state's Qualified Allocation Plan awards competitive points for enhanced energy performance, including compliance with the Specialized Energy Code and Passive House certification, making higher-efficiency design strategies a key factor in project competitiveness and selection.

As a nonprofit affordable housing owner-developer, Home City Development prioritized long-term operating cost stability, tenant comfort, and high energy performance. The team determined that designing Passive House standards was the most effective way to deliver durable, high-quality housing while minimizing energy costs and exposure to energy price volatility.

Envelope

The team paired continuous exterior mineral wool insulation with dense-packed cellulose in the wall assemblies to support a continuous thermal and air barrier. The building envelope was further supported by high-performance windows, insulated exterior doors, and an insulated slab-on-grade foundation.

Mechanical Systems, Appliances and Lighting

Variable refrigerant flow (VRF) cold-climate heat pump systems provide heating and cooling, with rooftop-mounted units designed for low-load performance. Heat pump water heaters supply domestic hot water, enabling energy-efficient hot water delivery. Energy recovery ventilators (ERVs) deliver continuous ventilation at 80 percent efficiency or higher, maintaining good indoor air quality and comfortable humidity levels year-round. **ENERGY STAR® appliances**, including refrigerators, dishwashers, washers, and dryers, serve each unit, with electric stovetops (non-induction) in every unit. **100 percent LED lighting** supports additional energy savings and efficient building operation.

Solar and EV Infrastructure

The project was built with a solar-ready roof, and rooftop photovoltaic (PV) systems were installed in late 2025 following completion of construction in May 2025. **Seven electric vehicle (EV) chargers** are installed (four at Building 22, three at Building 20). During the permitting process, town leaders expressed interest in making EV charging available to the public at Amethyst Brook Apartments, particularly because Pelham is a rural community of approximately 1,500 residents with no known public EV charging stations. Home City Development also received financial incentives from Eversource and the Massachusetts Department of Environmental Protection to help offset the cost of installing the chargers.

EV Chargers: Building 22, 28-unit building certified under Phius Core 2021

Performance Results

Building 22, Phius Core 2021

Assembly/System	Material	Performance Metric	Value	Notes
Exterior Walls (Continuous/Armor Wall)	Polyiso ZIP R-sheathing	Nominal R-value	R-12	2” Thickness
Exterior Walls (Cavity)	Dense-packed cellulose	Nominal R-value	R-20	5.5” Thickness
Roof 1	Spray foam insulation	Assembly R-value	R-71	CCSF, 10” Thickness
Roof 2	Blown Cellulose		R-48	13” Thickness
Slab-on Grade (Under Slab)	Rigid insulation	R-value	R-15	3” Thickness
Slab-on Grade (Slab Edge)	Rigid insulation	R-value	R-10	2” Thickness
Exterior Doors	Insulated steel	R-value	R-5	
Windows	High-performance glazing	U-factor SHGC	0.18 0.26	Triple
Whole-Building Airtightness	Continuous air barrier	Air leakage	0.06 CFM/ft²	Meets Phius Core 2021 requirements
Individual Unit Airtightness (Compartmentalization)	Unit air barriers	Air leakage	0.3 CFM50/ft²	Meets ENERGY STAR® requirements
Heating	VRF cold-climate heat pumps	HSPF	≈ 11	Mitsubishi
Cooling	VRF cold-climate heat pumps	SEER	≈ 22	Mitsubishi
Domestic Hot Water	Heat pump water heater	Coefficient of Performance (COP)	≈ 4	Rheem

Building 20, ENERGY STAR®

Assembly/System	Material	Performance Metric	Value	Notes
ENERGY STAR® Units	Whole-unit performance	HERS Rating	38–47	Units 1–6; 1–3 bedrooms
ENERGY STAR® Units	Modeled energy use	Estimated annual energy cost	$977–$1,393	Units 1–6; 1–3 bedrooms

Cost Insights

The total development cost for Amethyst Brook Apartments was approximately $22 million, reflecting the construction of two high-performance buildings and significant site work, including retaining walls and roadwork. At roughly $650,000 per unit, the project reflects current affordable housing cost conditions in Massachusetts, where land, infrastructure, and material costs increasingly drive overall development budgets.

The project was financed through a layered structure combining **federal and state Low-Income Housing Tax Credits, state soft debt, municipal funding, energy efficiency incentives, and solar tax credits.**

"You don't need Passive House to get a building permit in a number of communities. But you pretty much need Passive House to get affordable housing incentives from the state. Or really, you need a non-fossil fuel high energy performing building." - Peter Serafino, Senior Project Manager for Home City Development

Primary funding sources included approximately **$9 million in federal Low-Income Housing Tax Credits** and just over **$5 million in Massachusetts state Low-Income Housing Tax Credits**, both administered through the Massachusetts Executive Office of Housing and Livable Communities. In addition, the Commonwealth provided **$6.2 million in state soft debt** raised through state-issued bonds. In total, **nine separate state funding sources** contributed to the project. The Town of Pelham contributed **$500,000 in Community Preservation Act (CPA) funds** to support the development. Amethyst Brook also received incentives through Mass Save, including approximately **$28,000 in pre-construction incentives,** and additional **post-construction performance-based incentives** tied to achieving **Passive House certification** and high-efficiency performance thresholds. The project also received approximately **$70,000 in federal solar tax credits.**

Utility Cost Insight

Early utility billing data for Building 22 shows winter operating costs ranging from approximately $7,100 to $9,000 per month from December through February. The highest charges occurred during the December–January billing cycle when heating demand peaked, with costs declining later in the season as temperatures moderated. The rooftop solar system became operational in mid-January, but early production was limited after the panels were covered by snow for approximately four to five weeks. As a result, this initial billing period does not yet reflect stabilized annual solar performance.

For Building 20, modeled resident energy costs for **ENERGY STAR®** certified one-to three-bedroom apartments were estimated at approximately $977 to $1,393 annually, indicating relatively low expected tenant utility expenses.

Outcomes & Lessons Learned

Amethyst Brook Apartments demonstrates that all-electric, Passive House multifamily housing is achievable within Massachusetts' affordable housing financing and funding support. The project delivers durable construction, high tenant comfort, and reduced long-term operating costs, supporting affordability for households earning 30–60% of area median income.

By designing the structures to Specialized Energy Code performance standards prior to local adoption, the project offers a strong example for future rural and suburban high-performance housing.

"Passive House is the future of affordable housing in Massachusetts and if not Passive House, then higher energy efficiency." Peter Serafino, Senior Project Manager for Home City Development

Special thanks to Matt Zarotny of Airtight Energy and Peter Serafino, Senior Project Manager for Home City Development, for sharing their insights for this case study.

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