PHB

passive house buildings

CLIMATE-CONSCIOUS BUILDING

FROM COAST TO COAST

Alberta Car Showroom

Chicago Brownstone Retrofit

Pittsburgh Library

Manhattan Mid-Rise

Fall 2018

Mixed-Use Building Rises in MIDTOWN MANHATTAN

Rendering (opposite page) by Stasis 3D
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This 24-story mixed-use building embodies the challenges and risks in developing an urban site with neighboring tall buildings, a tight zoning envelope, and a mid-block location with limited light, air, and access. The owner and developer, Bernstein Real Estate (BRE), wanted to bring the highest and best use to an empty lot that they owned, which had been being used just for parking, as well as expand their portfolio to include residential programming with a focus on energy efficiency.

The site was adjacent to a building also owned by BRE, which depended on windows installed right on the lot line as the only source of daylight for scores of offices. Therefore, the initial challenge that ZH Architects had to tackle was developing a floor plan and a building section that preserved the majority of the neighboring property's windows while creating apartment layouts that would meet current market demands.

The design they developed preserves this daylight at the upper floors of the existing building by creating an intentional gap between the facades of the new and existing buildings. To maintain the privacy between existing commercial and new residential tenants, the east façade of the new building was not punctured and the south- and north-facing façades of the new building were designed with ample glazing.

The restriction on the placement of the windows on the new building, as well as the added exterior wall surface area on the east façade, complicated the process of meeting Passive House performance targets and made it challenging to find room for 55 well-lit apartments. "It required some creative work in plan layouts," says Stas Zakrzewski, one of ZH's two principal architects, as it was important to reflect the changing needs of this neighborhood, which is a mix of students, creative professionals, and longtime garment and fur distributors. In the end, the building will provide a variety of apartment layouts ranging from studio to three-bedroom units with 20 percent of the units designated as affordable housing and the remaining market-rate.

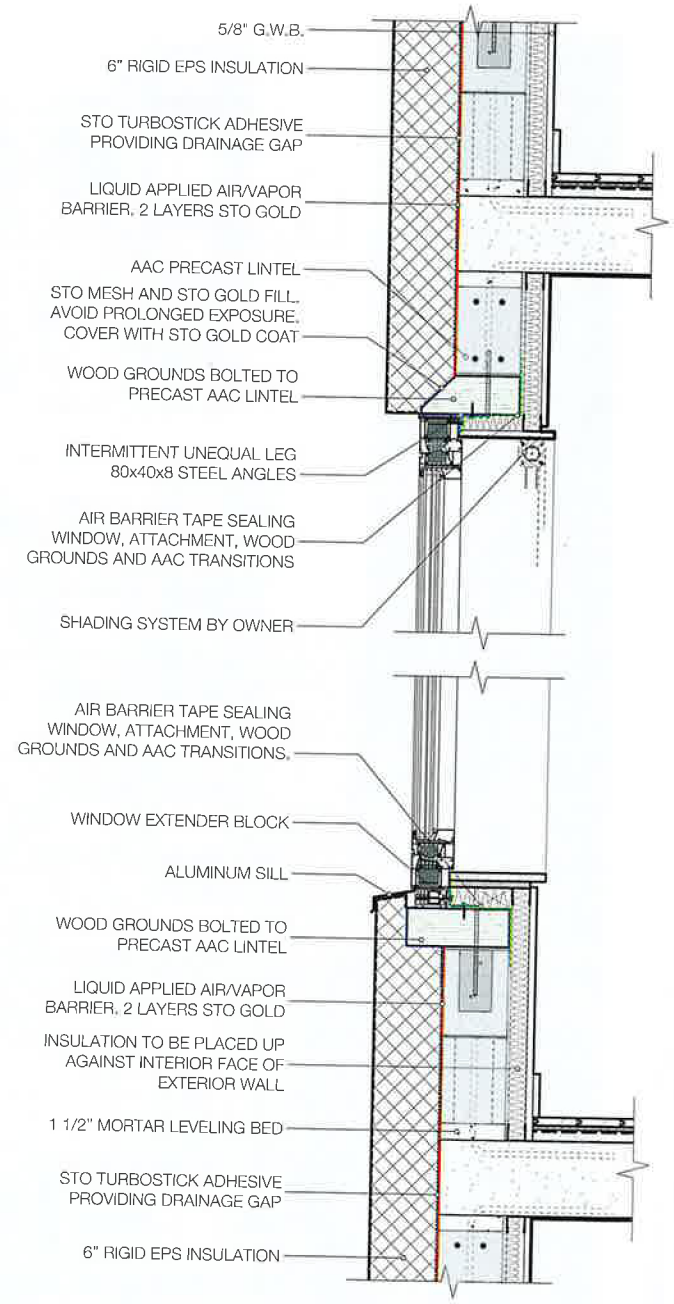
The foundation had its own peculiar trials, thanks to the site's subsoil conditions.. "These resembled a black diamond ski slope," recalls Zakrzewski. In places the bedrock lay just below the cellar, and leveling this area required extensive chopping away at the schist before construction. Elsewhere the building rests on grade

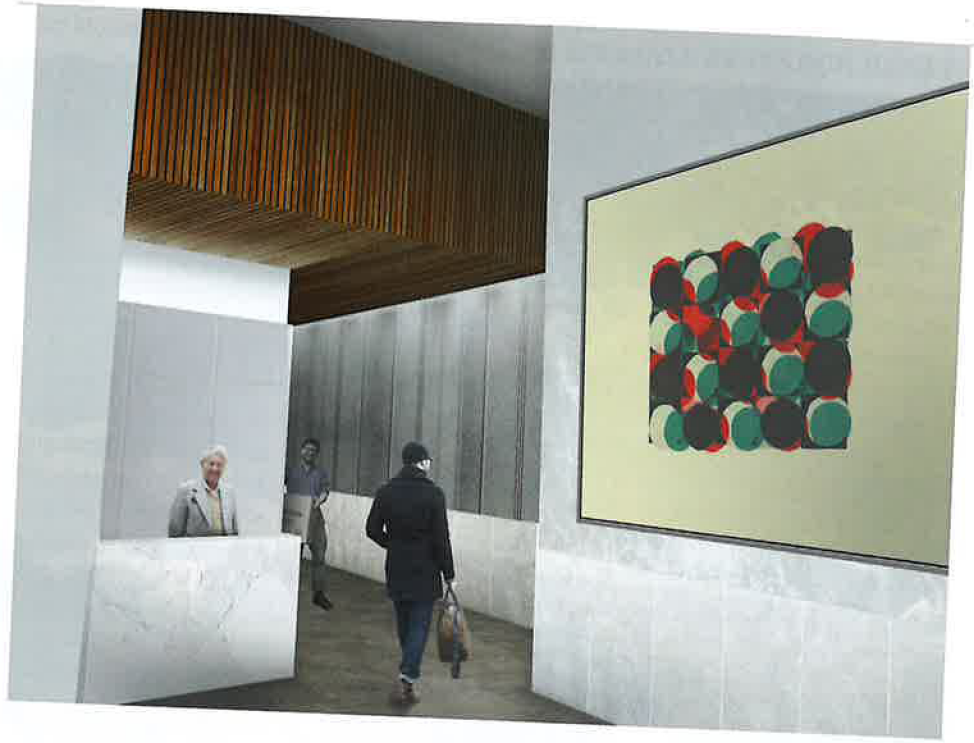
beams and piles that extend down to stable rock. Exterior insulation was added around the foundation's entire perimeter where possible but was only installed below the non-loadbearing foundations, as a building this size can lose heat in discrete places and still hit the performance targets.

The mix of apartment types, and varying building widths and height setbacks, required focused coordination between the mechanical, plumbing, electrical, and sprinkler trades in order to preserve the Passive House envelope. ZH was fortunate to have JBS Project Management and KSK Construction, with Steven Winter Associates as the Passive House consultant, working together to ensure this project's success.

To maximize space in the apartments, the wall assemblies were carefully evaluated for a balance between the preferred R-value and the corresponding depth of the proposed exterior wall assembly. After much consideration, autoclaved aerated concrete (AAC) block was chosen over CMU as it provided the highest R-value with the slimmest wall section and gained measurable square footage per floor—translating directly into usable space for the tenants. Other advantages of AAC block are its light weight, excellent fire resistance, and quick installation process. The front façade will be completed with a water and air barrier membrane adhered directly to the exterior of the AAC, 5 inches of mineral wool, and a ventilated rain screen façade. The remaining facades will rely on an EIFS system.

Building in an urban environment, where space comes at a high premium and each floor is tightly packed with apartments and building amenities, usually means that cooling is the dominant energy load on the building. Site conditions dictating that the prime elevation faces south also added to the cooling requirements. To mitigate for these factors, all the south-facing windows will feature accent brows





that double as shading devices to reduce summertime heat gain. Cooling, heating, and dehumidification will be supplied by a variable refrigerant flow air source heat pump with individual air handling units in each apartment, allowing each tenant to have control over its heat and air conditioning. A centralized ERV is being installed on the top bulkhead of the building. It will provide all the residential units with a continuous flow of filtered air, another advantage of Passive House construction.

The double-height lobby and retail spaces on the ground floor are both located within the thermal envelope. The lobby entry will feature two sets of high-quality airtight double doors to create a vestibule—a cost-effective solution compared to custom air-sealed revolving doors that were initially considered for ease of traffic flow. White box commercial spaces are often not included in a Passive House envelope as their future use is unknown, but for this owner/developer bringing energy efficiency to the commercial component of the project was a priority. Due to the different usage patterns of retail spaces, a second ERV was specified for that space, and occupancy sensors were added to reduce ventilation to the retail spaces when unoccupied.

—Mary James

Passive House Metrics

Heating energy	Cooling energy	Total renewable source energy	Air leakage
2.1 kBtu/ft²/yr	4.3	37.7	
0.6 kWh/ft²/yr	1.3	11.1	0.6 ACH_{50} (design)
6.6 kWh/m²a	13.6	119.0	

Products

Air/Moisture Control and Insulation
Sto — *stocorp.com*

Ventilation
Swegon
— *swegonnorthamerica.com*

Structural Thermal Breaks
Armatherm
— *armatherm.com*

Schöck
— *schock-na.com*