DESIGN AIDD ARCHITECTURE, DPC
ARCHITECTURE FOR AFFORDABLE HOUSING

WAKEFIELD HOUSING AT EAST 231ST STREET

Winner of 2013 ICF "Best in Class" Multi-family Award

Winner of 2014 Award for Sustainable Building Project by the American Planning Association (APA)

DESIGN AIDD ARCHITECTURE, DPC

Category:	Architecture
Typology:	Affordable Housing
Project:	Wakefield Housing at East 231st Street, Bronx, New York
Description:	New construction of affordable 3-story building housing using sustainable measures through Insulated Concrete Form (ICF) construction and reduced HVAC system loads.
Amenities:	Laundry room, bicycle room, on-site parking garage, outdoor recreation space and landscaped front and rear yards.
Programs:	New York State Energy Research and Development Authority (NYSERDA) Multifamily Performance Program for new Construction; Community Preservation Corporation (CPC) Green Financing Initiative.
Structural Innovation:	One of the first Multi-Family projects in the Bronx that is built with Insulated Concrete Forms (ICF).
Size:	19,000 SF
Apartments:	15 rental units
Completion:	January 2012
Cost:	$3,500,000

CONCEPTUAL RENDERING
NORTHEAST FACADES

CONCEPTUAL RENDERING
SOUTHWEST FACADES

Project Description:

Located in the Wakefield section of the Bronx, the realization of this three-story, 15 unit affordable rental development, marked a turning point for this neighborhood compared to other existing multifamily buildings through its distinctive brick aesthetics. Implemented as part of a successful New York City Department of Housing Preservation and Development (HPD) Third Party Transfer (TPT) Program, the project features a bicycle room, common laundry room, on-site parking, outdoor recreation space and landscaped yards. The construction was completed under budget and

ahead of schedule. The cost savings which were substantial, allowed the interior finishes to be upgraded to maple hardwood floors, porcelain-tiled kitchens and bathrooms, cherry wood kitchen cabinets in the apartments and marble flooring in the lobby and entry vestibule.

PARTIAL VIEW OF EAST 231ST STREET
PRIOR TO CONSTRUCTION

VIEW OF BUILDING LOT
PRIOR TO CONSTRUCTION

Better Affordable Housing:

To improve the design quality of a typical multifamily apartment unit we made the differentiation between "houses" and "housing". While "houses" have multiple exposures with window openings to capture views and daylight on many sides, "housing" typically has only one exposure per room within an apartment. Apartments are generally arranged either on the street side or on the rear yard side of an artificially lit "double-loaded" corridor, with the exception of the more expensive penthouse units that incorporate multiple exposures.

NORTHEAST CORNER WINDOW
COMPLETED CONSTRUCTION

The design challenge for East 231st Street was to provide the qualities of a penthouse unit or house into the design of every apartment. Designing every living room and almost all bedrooms with corner windows resulted in these rooms having two exposures, greatly opening the space.

LIVING ROOM CORNER WINDOWS
COMPLETED CONSTRUCTION

Historic Sensitivity:

The tree lined residential streets of Wakefield are predominantly surrounded with one and two family homes; many of which have driveways. The housing types are a mix of wood-frame two and three-story, attached brick, and small apartment buildings. The project incorporates the scale of the surrounding housing types and their landscaped front, side and rear yards; using local construction materials and echoes the historic brick façade motifs.

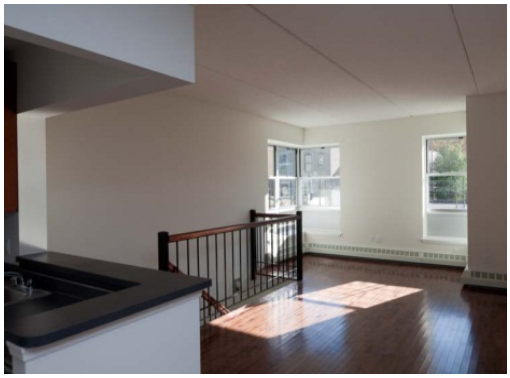
Aerial View of neighborghood
Prior to construction

Side view of Building Lot
prior to construction

Design Achievements:

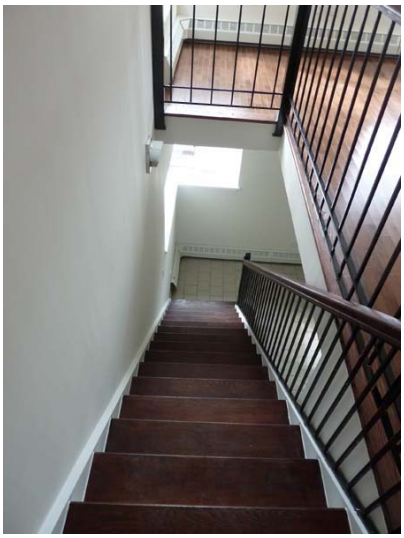
Since conception, the East 231st Street apartment building has proven to be a valuable opportunity to achieve an integral design for affordable housing. Designed on the east-west axis to optimize light and provide better solar access for day lighting and winter solar gain, the living room and bedroom positioning also reduces overheating and promotes passive cooling. The building and apartment layouts maximize cross-ventilation through multiple exposures, bolstered by corner windows at the perimeters of all the living rooms. Each of the one- and two-bedroom apartments features spacious well-lit rooms with open kitchens with Energy Star appliances.

Kitchen with Energy Star Appliances
Completed Construction



Apartment with recreation room
Completed Construction

Apartment with recreation room below
Completed Construction

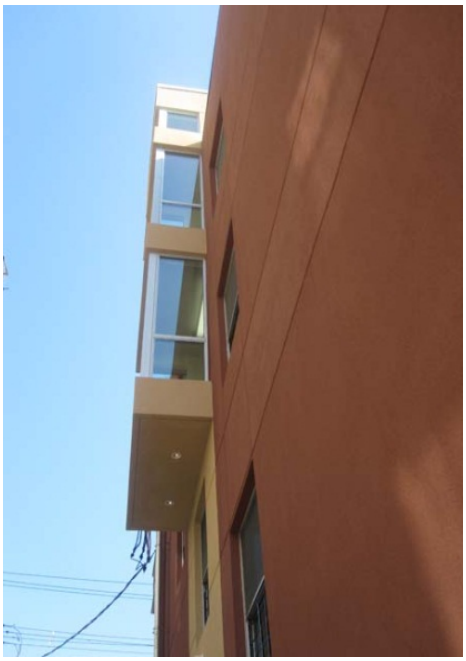


Apartment wood stair to
recreation room
Completed Construction

The two egress stairs, which are the largest vertical shafts, are located at the exterior walls so that the effect of rising air is reduced. The western stair is designed with an overhang landing and bay windows to bring in natural light and enhance its increased use for circulation.

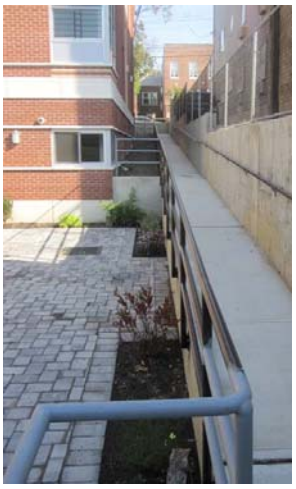
Partial North Facade
Completed Construction

The design of the entire first floor is handicap accessible through its direct street access and apartment features. All tenants also can take full advantage of the rear recreation space by using the ADA compliant ramp.



Northeast Facade
Completed Construction

Recreation area in rear yard
Conceptual Rendering



View of side yard
with access ramp
during construction

Brick Deatil

The active open recreation space located at the rear of the building and front yard have a variety of landscaping treatments, which fosters a sense of community for the tenants.

The provision of a bicycle room promotes a healthy active lifestyle for the tenants. The project is located within walking distance from major transit services thus reducing the residents' use of their car, lowering the costs of auto ownership and reducing the carbon footprint.

Sustainable Design Advancements:

The project incorporated the 2009 NYC approved Insulated Concrete Form (ICF) construction which provided a building with a higher insulation value, sound control, thermal mass and enabled the design of true corner windows. Using ICF in lieu of the traditional porous Concrete Block (CMU) wall system resulted in a significantly tighter envelope with reduced water infiltration, which promotes a temperature steady environment.

View of front facade
Construction completed

Northeast Facades
Completed Construction

The use of concrete as a construction material provided the unique opportunity to design corner windows resulting in apartments with substantially more daylight, increased natural ventilation, desirable views and spaciousness. A 30% window-to-wall ratio will reduce the heating and cooling

demand, lowering initial and long-term costs. The recessed windows help reduce solar heat gain during summer months.

VIEW TOWARD ENRTY FOYER
COMPLETED CONSTRUCTION

BATHROOM
COMPLETED CONSTRUCTION

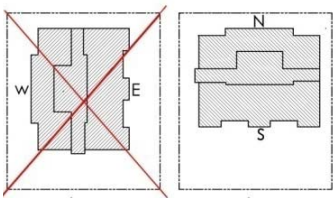
The removable AC units were designed as an integral part of the window framing, instead of utilizing less efficient through-wall AC or PTAC units. Windows designed with insulation panels that can be removed to install these AC units, combined with the use of the ICF system, helped exceed the blower-door test requirement to receive NY State Energy Research and Design Authority (NYSERDA) funding. NYSERDA requires a minimum air-tightness of 5 air changes per hour, while blower door test for East 231st Street showed the actual reading of 2.65, almost twice as low. Combined with the high thermal mass of the ICF system these values helped reduce the winter heating load, which in turn allowed for down-sized mechanical systems and smaller boilers.

The project exceeded the requirements of the NYSERDA pilot Multifamily Performance Program as well as the lender's Green Finance Loan program. The building is projected to save energy costs by more than 20% compared to traditional building construction. The use of the ICF system resulted in significant construction time and cost savings and reduction in trade labor that would be necessary in a standard CMU cavity wall system.

LIVING ROOM OPEN KITCHEN
COMPLETED CONSTRUCTION

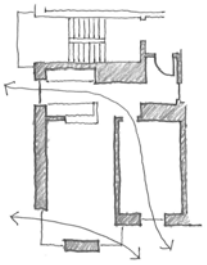
Conceptual Design Strategies:

Elongate Buildings Along The East-West Axis



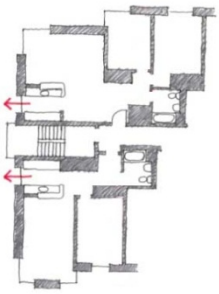
The site configuration allowed elongation along either the north-south or the east-west axis. By positioning the building along the east-west axis the apartments were provided with better solar access for day lighting and winter solar gain. This reduced the size and cost of the mechanical systems, since the building relies partially on passive heating.

Cross-Ventilation and Day Lighting



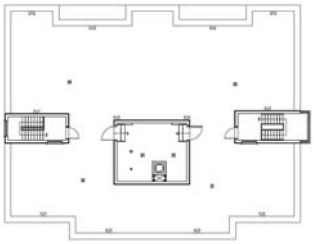
Cross-ventilation and day lighting is optimized by maximizing the number of units with multiple exposures, and by placing most of the living rooms at the corners. This allows for further reduction of the mechanical systems by promoting passive cooling. By means of bay windows at the facades, the number of corner windows was maximized, optimizing natural ventilation and lighting

Vertical Shafts



Vertical shafts were minimized in order to reduce the winter stack effect caused by heated air finding its way out of the apartments, pulling cold air in at the lower floors. The stack effect was reduced by designing almost all of the kitchens along the perimeter of the building, which provided windows instead of through floor exhaust ducts

Rooftop Boiler Room and Future Solar Panels



By distributing the floor area within three stories and limiting the height of the building to below the maximum height allowed by zoning, the boiler room was designed on the roof. The roof of the boiler room also allows for future solar panels. A rooftop boiler room functions more efficiently than one located in the cellar since the boiler flue does not penetrate the building floors and eliminates another potential source of air leakage.

Window Placement

Unlike standard CMU construction, where the structural and material properties limit corner openings, the ICF's allow the use of a cantilever to create corner windows. The thickness of the exterior ICF walls and the design of low window sills, resulted in the bonus feature of built-in window seats thus optimizing the active use of space.

Insulated Concrete Form (ICF) System:

To perform effectively, insulation needs to be uninterrupted and placed either within a cavity or using an exterior EIFS system. This helps capture the thermal mass of masonry walls, to moderate daytime temperature swings. An Insulated Concrete Form (ICF) system provides a sustainable alternative to the traditional wood frame and concrete block construction. It consists of two pre-manufactured interlocking stackable rigid insulation panels held together by fasteners and located on both sides of a poured-in-place concrete wall. These insulation panels are stackable to the desired floor or building height and act as the formwork for the system. This helps reduce labor costs and provides a faster erection of the exterior walls, creates a tighter envelope with greater insulation, improves waterproofing and energy efficiency.

ICF FORM WORK DURING CONSTRUCTION

ICF's are an economical sustainable option for construction and produces immediate energy savings for the building. Since ICF's create a more tightly sealed thermal envelope than materials like wood, steel frame or concrete block, it results in significant energy savings in comparison. The material is flame retardant, resistant to mold and mildew, has a high thermal resistance and is sound deadening.

ICF FOUNDATION AND STANDARD FORMS DURING CONSTRUCTION

ICF PLAN VIEW WITH RE-BARS DURING CONSTRUCTION