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architect

reIMAGINED ::

Office to Residential Conversions



relMAGINED ::
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Even before COVID-19 forced next-level teleworking, many office buildings stood outdated and in need of complete renovation. Companies were already embracing the concept of remote employees, virtual collaboration, and hybrid work weeks. Housing shortages existed – and still do – with increasing trends toward living in more urban and inner-ring suburban areas offering public transportation, walkability, and nearby amenities.

According to market data in Cushman and Wakefield's Q1 2024 Market Data reports and values computed by Switch on Business, Washington, D.C. has 24 million square feet of vacant office space with lost value of over $1.3 billion. Is office to residential conversion a major component of a viable solution to this declining value proposition? In 2020 and 2021, according to a report in RentCafe, more than 13,000 apartment units were created from former office space across the country, with Washington, DC, being one of the top locations for those conversions.

The number of office conversions will likely increase sharply this year, according to brokerage CBRE, as office vacancies continue increasing and developers realize conversions to other property types can be a lucrative option. Residential transformation is a popular solution given the housing shortage, especially affordable or market-rate housing, but these adaptations aren't without challenges. Zoning can be a significant hurdle, but also locations in areas with little to no evening/weekend activity, site limitations, and space to create recreational outdoor spaces. The building's existing architecture, systems, and core design can also require skilled intervention for adding plumbing and wiring to accommodate residential needs.

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Existing Park + Ford Site

Understanding Covnersions

Not all existing office buildings are good candidates for conversion projects. Many buildings are limited by their location, tight lot sizes, and lack of exposure to natural light. In addition, office building floorplans vary greatly from multifamily layouts—often with deeper spaces without corridors and with centralized stairs and elevators. Existing plumbing might not be adequate for the additional plumbing and mechanical systems needed for individual unit kitchens and baths in a multifamily building, and electrical distribution is sized for heavier and higher voltage loads than residential use demands.

Architects with experience in adaptive reuse design can support developers in determining which office buildings could be repurposed into multifamily or mixed-use communities; and even which jurisdictions have adopted building codes favorable to conversions or are eager to offer zoning variances for such projects. If familiar with working in the area, architects can also boost permitting success with their understanding of how the inclusion of community and public space can help project obtain zoning variances. Experienced architects understand what specific planning and review boards value, such as vitality on evenings and weekends, conversion of dead parking lots into vibrant amenity or green spaces, and an increase in density around transit centers.

Tapping into the architects' involvement early in the process benefits clients' bottom line by quickly understanding challenges and possibilities.



Park + Ford





Before (above) and after (next page) of Park + Ford, a multifamily residential conversion of two existing 1980's office buildings in Alexandria,VA.

Designing Value

The Bonstra Haresign ARCHITECTS design team has been adapting and repurposing buildings since the firm's founding in 2000. The complicated process of reimagining buildings involves closely working with city planners, often with historic preservation requirements and review, to obtain zoning variances and renovation approvals. Understanding and interpreting the existing building code, particularly related to requirements for a change of use and existing conditions that may be physically impossible to rectify, is often a key to financial viability to adaptive use projects.

The firm has experience designing more than 150 projects involving repurposing various building types – including numerous office buildings – into residential properties for clients. When engaged early in the evaluation of a project for adaptive use, the design team supports developers in assessing a building for conversions, looking at such potential building characteristics as:

- Location – Access to amenity including retail, cultural institutions and green space, walkability and public transportation.
- Existing building architecture – Structural framing systems, fenestration, building envelope, exterior finishes, core components and floor plate width, potential private and public outdoor spaces.
- Existing building systems – challenges of upgrading mechanical systems, capabilities to add plumbing for residential needs, and space for electric runs to accommodate individual units.

A study done by the Preservation Green Lab of the National Trust for Historic Preservation found it could take 10 to 80 years for a new energy efficient building to surmount the negative climate change impacts made during its construction, proving architect Carl Elefante, FAIA, LEED AP's, quote that the "greenest building is the one that already exists."

Encouraging Renovations

Jurisdictions are keenly aware of the impact of empty and/or underutilized office buildings on tax revenue through decreased valuations. City planningand economic development officials actively reward building conversionswith simplified and fast-tracked permitting and tax abatements. In Alexandria, VA, city planners will do everything they can to help support building conversations over demolishing and building new. Their primary goal is to convert some low-density buildings into more high-density housing that immediately. The city council fast-tracked re-zoning for Park + Ford, for example, in seven months.

Some office buildings present conversion opportunities requiring minimal interventions. The 1735 K St., NW, project, for example, will involve transforming a 1960s 12-story office building into a 106-unit apartment/ long stay hotel. At only 60-feet wide and with three elevations already exposed to natural light, this redesign was straightforward. Permitting took some negotiations by the architects, however. The project seeks to meet Washington, D.C.'s Green Building agenda by cladding the façade in energy-efficient window walls, adding an intensive green roof, and inserting a high-efficiency, low-emissions variable refrigerant flow (VRF) heating/ cooling for individual unit climate control.



Before (left) and after (right of 1735 K St NW, a planned conversion of a 12-story office building from the 1960s into energy-efficient residential just blocks from the White House.

Park + Ford's concrete office plaza has been transformed into appealing outdoor spaces for residents.



The Midtown Row development added four new mixed-use buildings and a parking garage, totaling approximately 350,000 square feet of residential and indoor/ outdoor amenity spaces to revitalize a forlorn strip shopping center in Williamsburg, VA.

Midtown Row near the historic William and Mary Campus in Williamsburg, VA, provides another example of how architects can improve returns on conversion projects. This former strip of underused commercial buildings sitting on vast surface parking lots added dense student housing above a vibrant retail base within walking distance of the campus. The project benefits the entire area, while exceeding the developer's profit expectations by being almost 100% leased before completion. Increasing residential density like this can also resolve several neighborhood issues—such as potentially eliminating food deserts by forcing a strong retail response, improving safety by putting more eyes on streets, and boosting surrounding businesses.

Park + Ford

Saving Time with Strategic Design

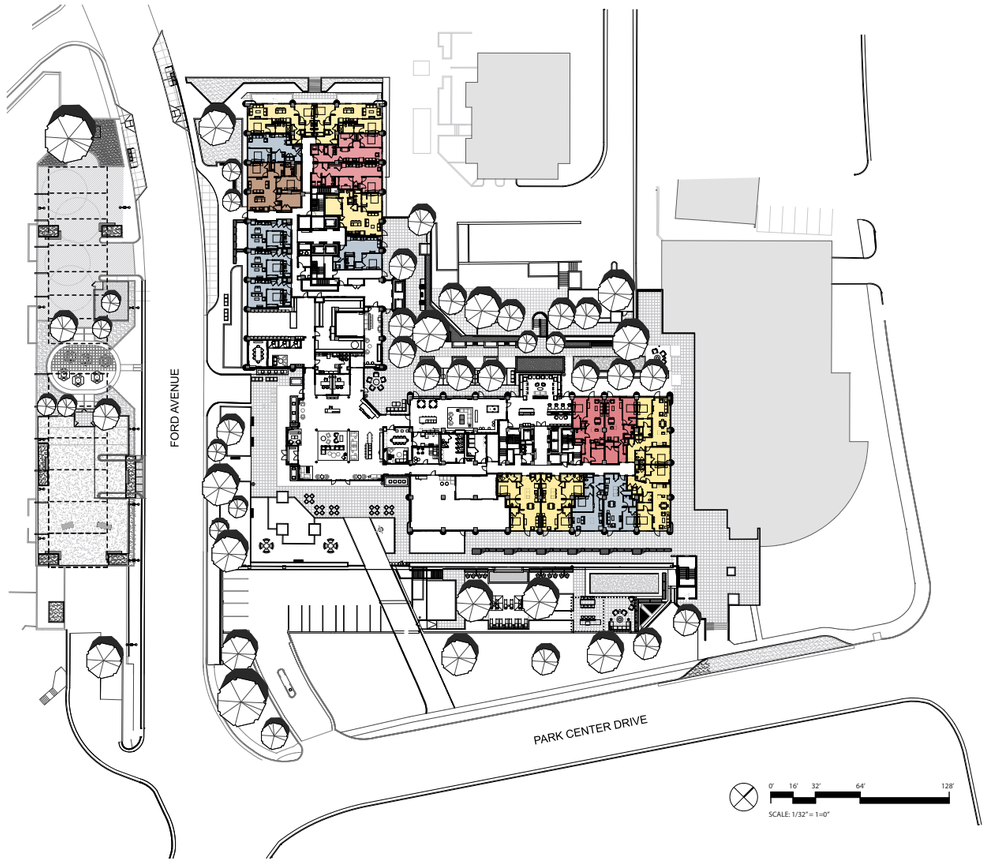
Converting and repurposing existing buildings saves embodied energy AND significant time. Preserving and reusing some of a building's most material-intense components—such as the foundation, structure, and skin—accelerates the design process. Many decisions are already made based on existing built conditions and can be considered an advantage not as a limitation. Instead, working with existing building pieces challenges architects to finish the design puzzle in innovative ways. For example, when converting Park + Ford in Alexandria, VA, refreshing the exterior of two unremarkable concrete office towers involved adding cantilevered balconies and slivers of bright color within the new aluminum-framed fenestration systems.

Developers can save 2 to 4 months of construction time by avoiding demolition, and minimally an additional 4 to 6 months for excavation and reconstruction of a new superstructure. Arguably the riskiest components of a new construction project – unforeseen challenges below grade with hazardous materials, unmapped utilities, unexpected groundwater and poor soil/foundation bearing conditions – are avoided by retaining the existing structure. Not having to tear something down also eliminates risks for both the human crew and possible damage to the surrounding built environment or infrastructure. Overall, a building conversion can be done 8 to 12 months faster than a new build, giving the client a year or more of income from leasing or sales.

In addition to saving time in both the design and construction phases of a project, converting buildings also saves a community's embedded memory. Even if a building isn't designated as historic, the surrounding community has collective memories of the building. Seeing a building repurposed brings new life into the community both physically and figuratively.



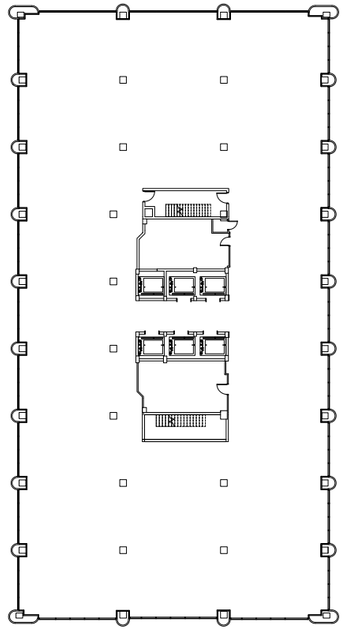
The Essen generates multifamily housing out of a four-story office building where residents will benefit from the nearly 7-acre verdant site adjacent to a nature preserve.



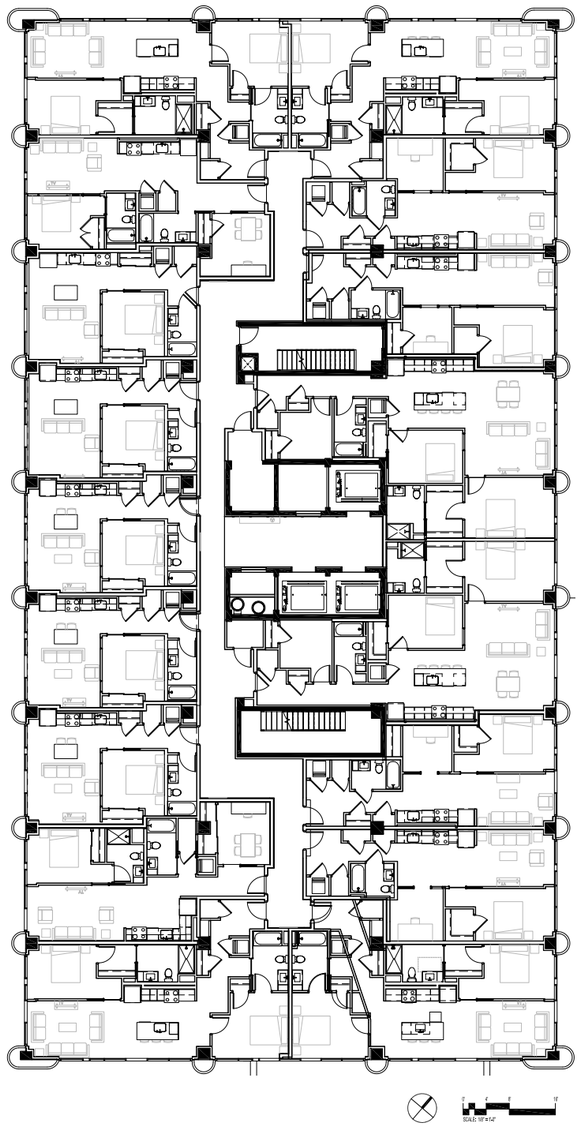
Park + Ford :: *First Floor Plan*

Finessing Floorplans

Floorplans for Park + Ford highlight the kind of complex layout possible by maximizing space within an office building structure. These two 14-story towers have concrete support columns spaced on an unusual 21-foot grid. An intricate floor plan layout allows all public spaces to flow uninterrupted without a single support column sitting in the middle of a kitchen or living room. Achieving this open living meant piecing together different sized units on each floor so the columns could all be hidden within interior walls without compromising circulation or room size.



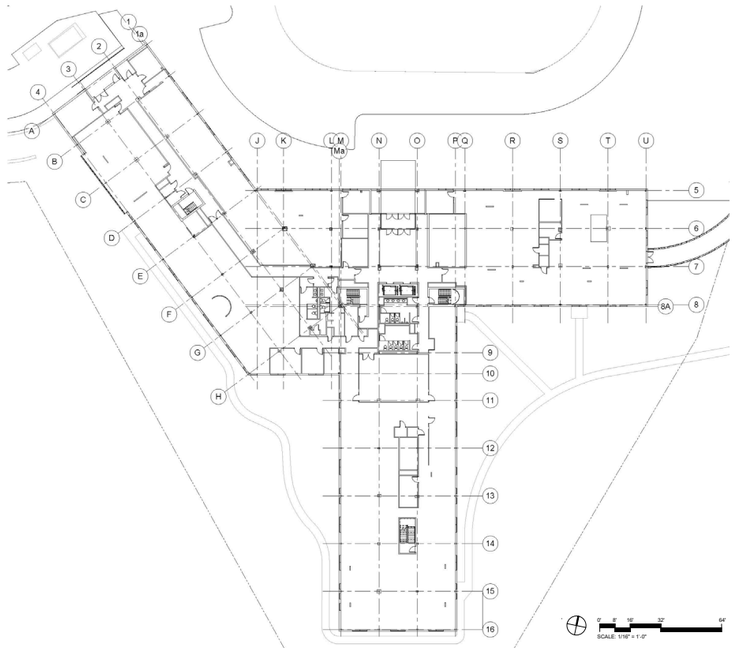
Park + Ford :: *Ford Typical Floor Plan*



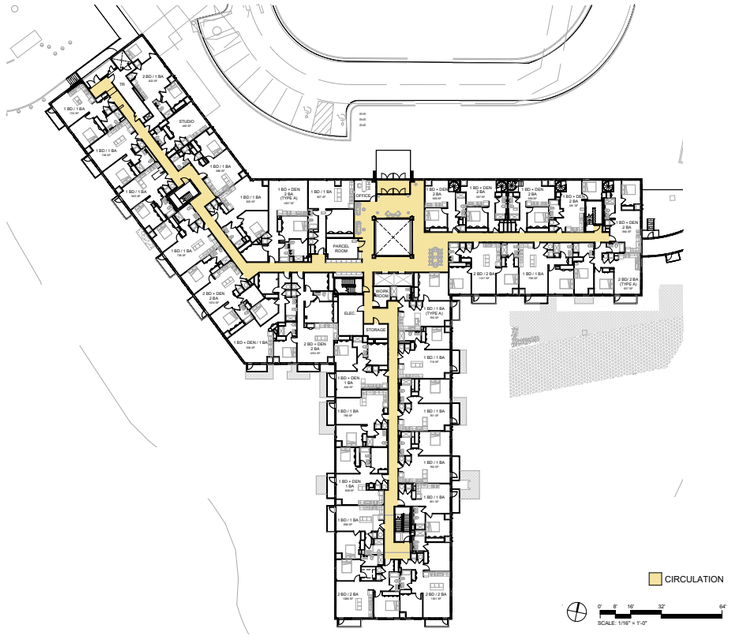


The George apartment sizes vary to foster a diverse community of residents.

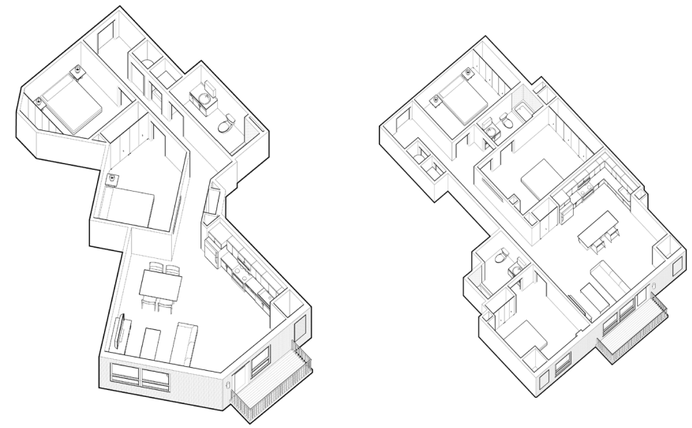
L-shaped units solved the mismatched structural grid issue in The George. Connecting L-shaped one-bedroom units with larger, more square units can also foster a diverse community of residents, from families to empty-nesters to young professionals, within these different sized apartments.



The Essen :: *Existing First Floor Plan*



The Essen :: *Proposed First Floor Plan*



The Essen :: *Unit Axons*

The angled corner units in the Essen offer another conversion solution. Architects repurposed interior core space into flex rooms that might benefit from being windowless, such as media rooms, nurseries, guest bedrooms, or even home offices for someone like a graphic artist who prefers a dark workspace. For a mid-block office tower at 1735 K Street, maximizing the building's symmetrical footprint and relatively narrow width involved absorbing circulation space into the corner units and offsetting entryways, so residents aren't opening doors into each other.



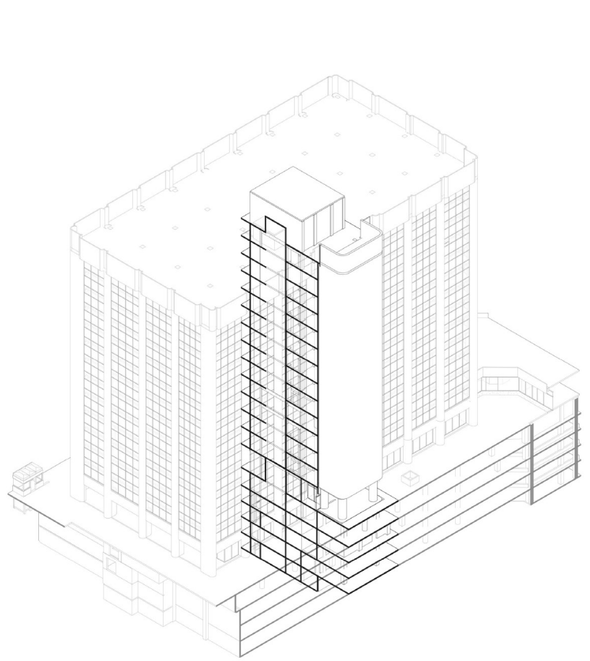
A typical unit kitchen in the Essen.



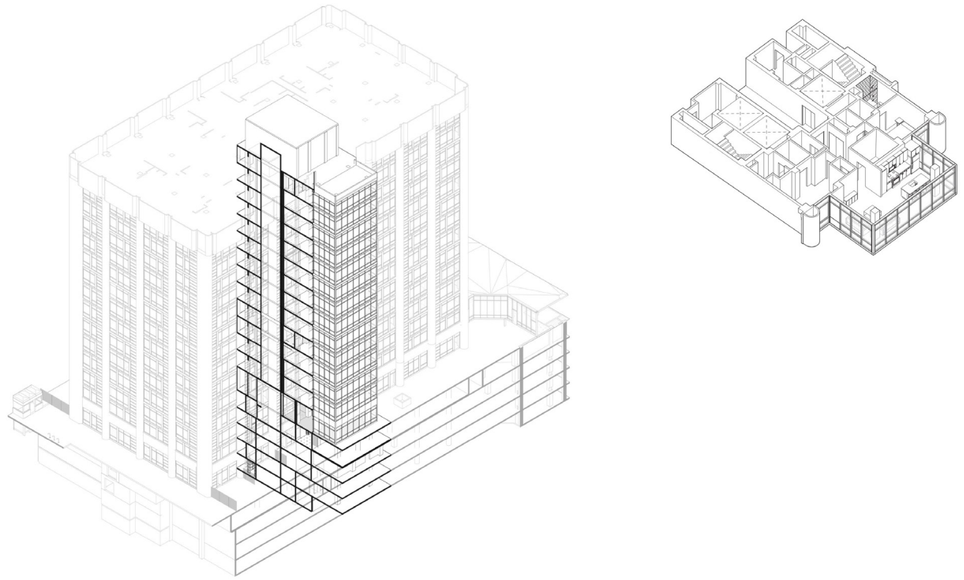
The original office bathroom core in Park + Ford *became a glassy projected column bringing natural light into living spaces.*

Domesticating the Core

Similar to the challenges of fitting appropriate residential spatial dimensions into a commercial structural framework, reorganizing an office core design for residential use requires inventive design skills. A typical multifamily building is around 58- to 62-feet wide with a double loaded corridor. A contemporary office building floorplate, in contrast, ranges from 105- to 130-feet across. In addition, an office building's core will contain more elevators than needed for residential occupants, plus large, centralized toilets and mechanical rooms on each floor.



Park + Ford :: *Existing Office Core*



Park + Ford :: *New Residential Core*

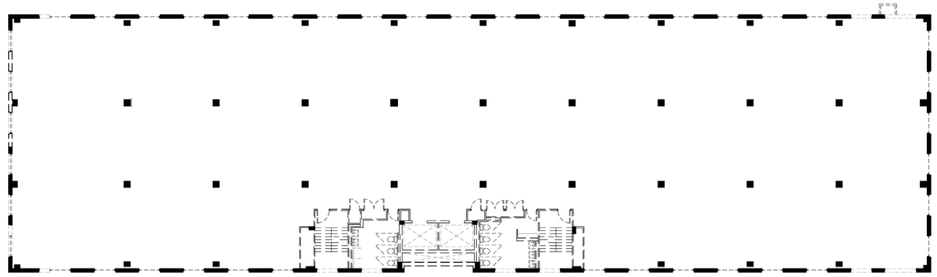


The George's rooftop indoor and outdoor amenity spaces.

So how can all this building depth — usually devoid of any natural light source — be repurposed for dwellings? For market rate apartments, bedrooms, home offices, or studies can occupy these interior spaces. A lot of people prefer the light and sound buffering provided by interior bedrooms and clever lighting design can go a long way toward making up for a window. Building codes for affordable housing, however, forbid any interior sleeping spaces, so creativity once again comes into play especially when organizing public circulation and individual unit layouts.

Fortunately, many historic commercial buildings convert more easily into domestic usage with widths closer to a typical apartment building. And Washington, D.C. has a lot of historical buildings. It wasn't until the 1970s when IBM set the scene for open workspaces and cubicles that floor plates in office towers began to expand.

On the plus side, office floor plates and structural frames often already contain enough load-bearing capacity to carry additional floors and increase the number of units. The George was able to accommodate seven additional floors—six of residential units and one top floor amenity space adjacent to the expansive roof deck.



The George :: *Existing Typical Floor Plan*



The George :: *Proposed Typical Floor Plan*

DWELLING UNITS
VERTICAL CIRCULATION
CORRIDOR

Optimizing Structure for Spatial Gain

Repurposing the structural frame of an office building to work as residential units can present one of the trickiest parts of the design puzzle. Apartments are designed based on a cellular layout. Bedrooms, bathrooms, kitchens, living spaces, and utility spaces make up the cells to be assembled for various types of units. Wall placement for a cellular design is based on a building's structural framework, but the framing systems for office buildings frequently aren't in sync with a dwelling unit grid. A common office building design grid uses a series of 5-foot modules — so structural columns spaced 10 feet apart — sitting on top of a 35-foot base. New multifamily buildings, however, often use a 12-foot module with a 24-foot-wide base.

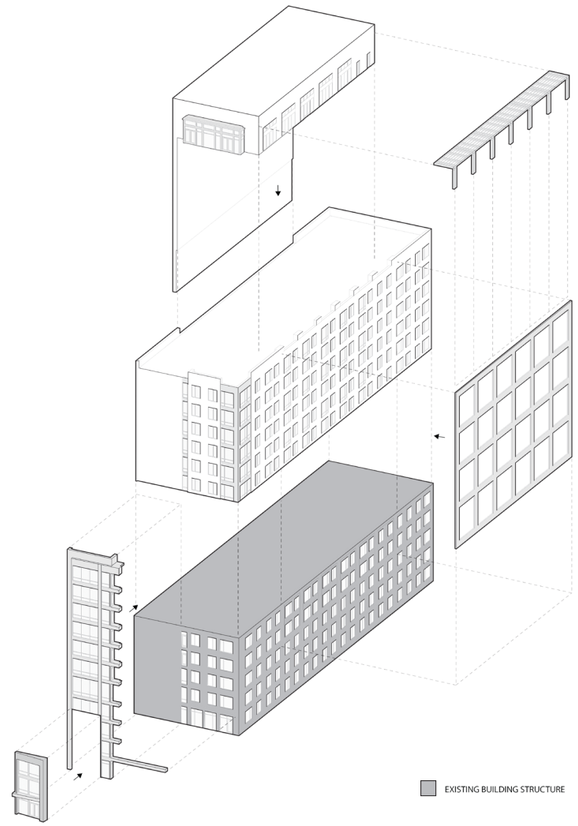
Fitting residential units into these wider office building structures can be done, and done well, with intense analysis of the existing structural system for coordination with proposed plans and residential utility needs. Architects can find ways to bury structural columns in walls while still creating the open spaces homeowners want.



Typical unit bedrooms' in The George offer residents access to a compact balcony..

Fitting developer/client unit targets into these complicated floor plan puzzles can present another challenge for architects. A building's structure ultimately informs the design team on how close they can get to those targets but designing 28 units with highly appealing and functional spaces outperforms 30 inefficient ones. Working within a set structural grid also generates the opportunity for variety. A 1,500-square-foot space can become a single luxury apartment, for example, or two generous 750-square-foot units, or four good-sized studios.

The George



The LEED-certified George conversion added 6 stories onto the original 1960s office building and now offers a mix of units close to public transportation and retail.

Embedded Structural Capacity

Per the prevailing International Building Code and prior versions, most office buildings are designed for a minimum 100 pound per square foot live load capacity. Residential structures have building code live load requirements for 40 pounds per square foot live load capacity. The excess load requirements can easily accommodate a vertical addition without changing the fundamental existing structure. Following a structural engineering load analysis, we added an additional six stories of residential units plus an amenity penthouse and occupied roof deck to the existing five story 1960' s office building at 11141 Georgia Avenue. Due to embedded inherent structural load capacity, we increased unit yield by 40% from original pro forma assumptions without modifying the existing building's structural frame or foundations.

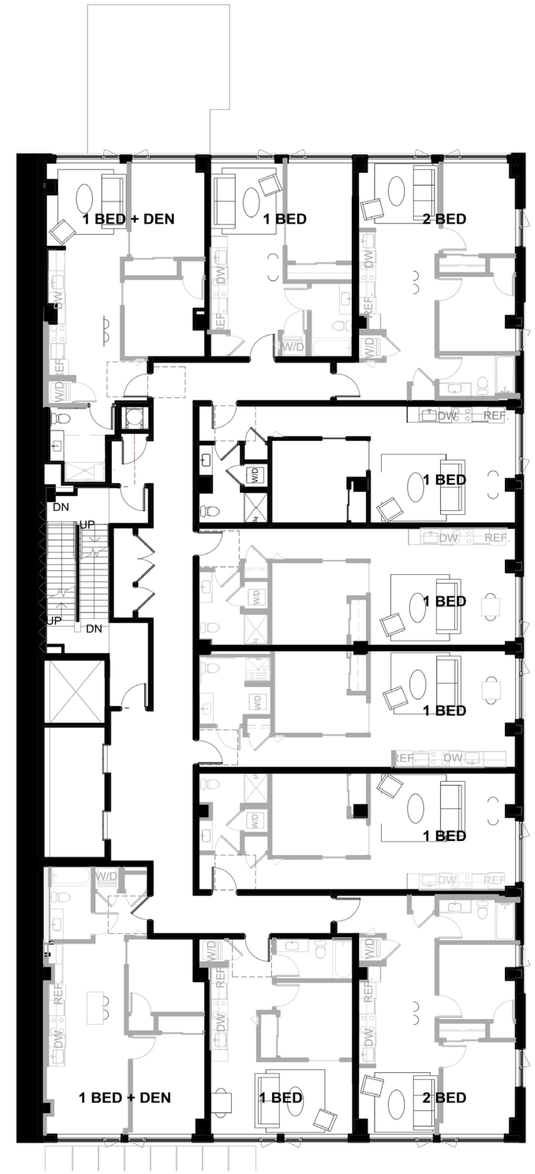
Replacing Systems

Although office building structure and skin often gets reused in a residential conversion, the mechanical, electrical, and plumbing systems will all need reconfiguring or more likely, replacing. The HVAC and electrical systems for offices exceed housing requirements — and electrical is probably the wrong voltage. Offices typically have 270-volt lighting systems, for example, and nothing over 208 volts is allowed in residential buildings for fire safety.

Another difference is that a multifamily building needs a fresh air return system in every space, including hallways and lobbies, with pressurized fresh air to remove odors in public spaces. Extra HVAC shafts in former offices can be used for these fresh air systems, while elevator shafts make great ready-to-use trash chutes.

The plumbing to bring in an adequate domestic water supply — offices might have only 25-30% of what multifamily needs — isn't complicated but the standard commercial 10-inch sewer pipes all have to be replaced with 12-inch. Determining where to place all the vertical risers for new plumbing and electrical presents another hurdle in these conversions. Post-and-tension slabs have bands of steel running through the concrete and not a single strand of rebar can be cut. To identify safe places for cutting the series of holes needed to run the new systems, several strategies can make it work. Using ground-penetrating radar, however, produces maximum efficiency and accuracy in avoiding post-tension cables.

In addition to calculating where not to put plumbing, architects must foresee how moving an electrical or plumbing core by inches might affect accessibility. For example, in one project with tricky plumbing rises, using a floating toilet solved the problem.



1735 K Street, NW :: *Proposed Typical Floor Plan*

0' 4' 8' 16'
SCALE: 3/32" = 1'-0"

Boosting Outdoor Connections

One of the major changes from office to residential involves replacing fenestration. Commercial buildings often use fixed single-paned curtain walls. D Age and weather deterioration requires replacing them with modern window walls featuring operable elements to allow for natural ventilation and insulated glass and thermally broken frames to improve efficiency. Attention to building orientation when designing new fenestration patterns can increase passive solar features and add sound-proofing — especially in urban areas — for many buildings. New window units also present an opportunity to create more lively exteriors. In the Essen new windows create a rhythmic exterior pattern including window wells for the lower-level units.



The Essen



Park + Ford features all new, high-efficiency window walls offering ample daylighting without heat gain.

Changing or adding exterior finishes and materials, including window bays, generates interest, breaks up massing, and reduces heat gain. With Park + Ford, existing, single-pane curtainwalls and storefront were replaced with unitized, insulated window walls. The thermally broken, low-E glass with slightly reflective glazing improved building envelope quality—boosting solar heat gain coefficients by 3 times and U factors by 4 times over the original condition—and providing operable windows.

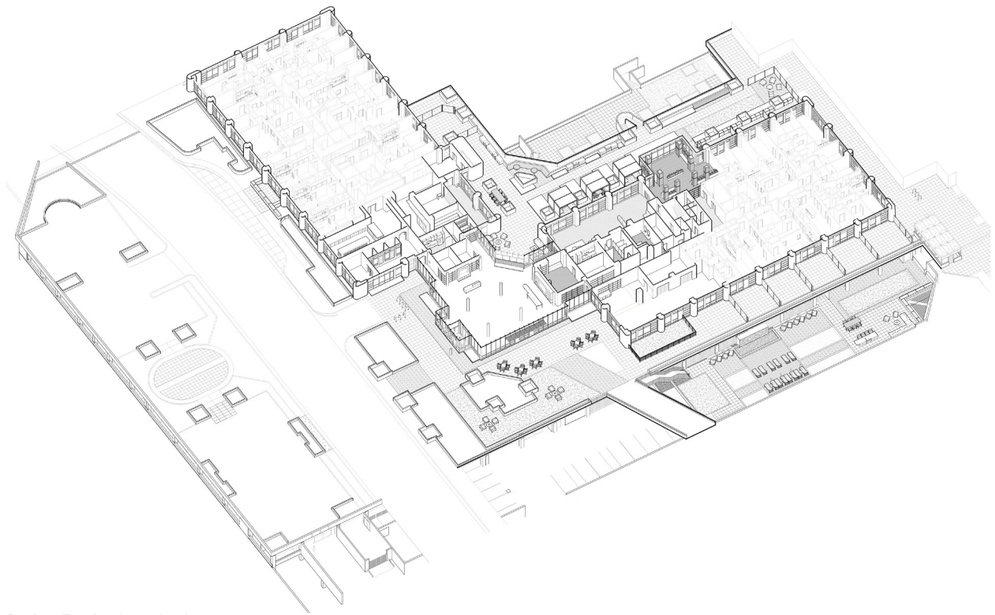
Transforming a building's exterior can also afford the option of integrating private outdoor spaces into some units. Clip on, cantilevered balconies were added to more than a third of the units in both Park + Ford towers and concrete panels finishing a projected bathroom core were replaced with glass becoming light-filled living spaces. Although it might seem like an unexpected solution, cantilevered balconies save time and money when adding outdoor access. Inset balconies are more complicated to build and therefore more costly. Strategies like this demonstrates yet another way developers can benefit from architectural expertise.

Park + Ford

Creating Amenities

Among the many benefits of converting office space into dwellings, there are several hurdles to overcome. Commercial buildings, and especially offices, frequently sit in dense urban or exurban areas with little nearby retail or leisure outdoor space. They also rarely have exterior exposures on all four sides, or even three sides, and the views they do offer might include other commercial or industrial buildings. Buildings sitting on larger lots often fill the added space with concrete expanses for surface parking or low-maintenance public spaces.

Parking allowances for office buildings can climb to three or four times the number of spaces required for residential needs. Thinking about how many people occupy cubicles and offices compared to the number of people living in one apartment, it's easy to see how much parking can be repurposed for other uses in a residential transformation. Especially if the building is close to transit, in a walkable neighborhood, or designated as affordable multifamily, then parking-to-people ratios can drop even more. putting parking below grade or transforming a fraction of the surface parking into a multilevel garage can further economize parking requirements.



Park + Ford :: *Amenity Axon*



Existing Park + Ford Entry

The Park + Ford project repurposes large concrete plazas and multiple parking areas into usable outdoor amenities. An expansive plaza yielded multiple social spaces, including outdoor grilling shaded by greenery and natural wood pergolas. A sprawling drive now serves residents as a sunken courtyard divided into various activity zones with turf-covered areas for games and picnics; while a water feature, misting stations, cabanas with TVs and grills, plus a soft groundcover produce a relaxing vibe. Other parking areas were transformed into a dog wash station, daycare center, maker space, and bike storage.

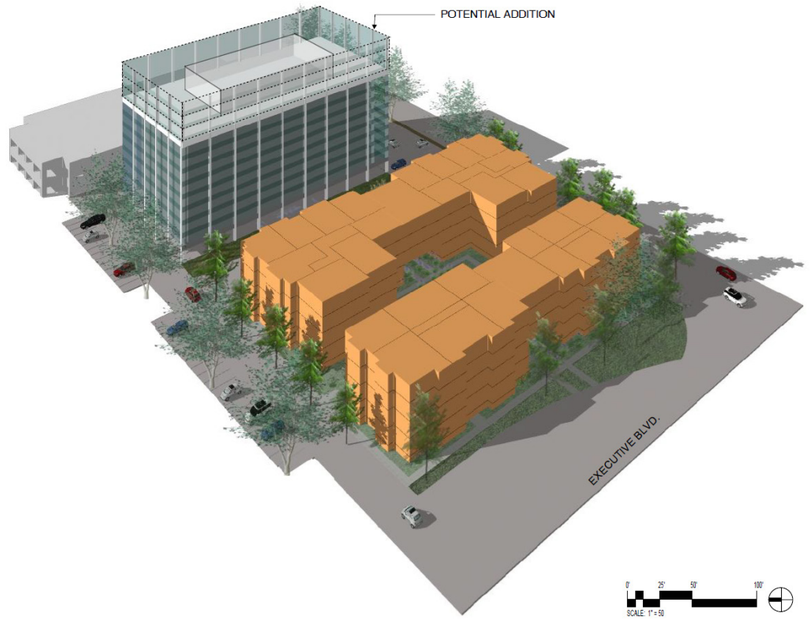
For buildings sitting on tighter spaces like The George, the firm often captures outdoor spaces and even green lawns with roof decks. This project's expansive rooftop terrace fans out around a large recreation room.

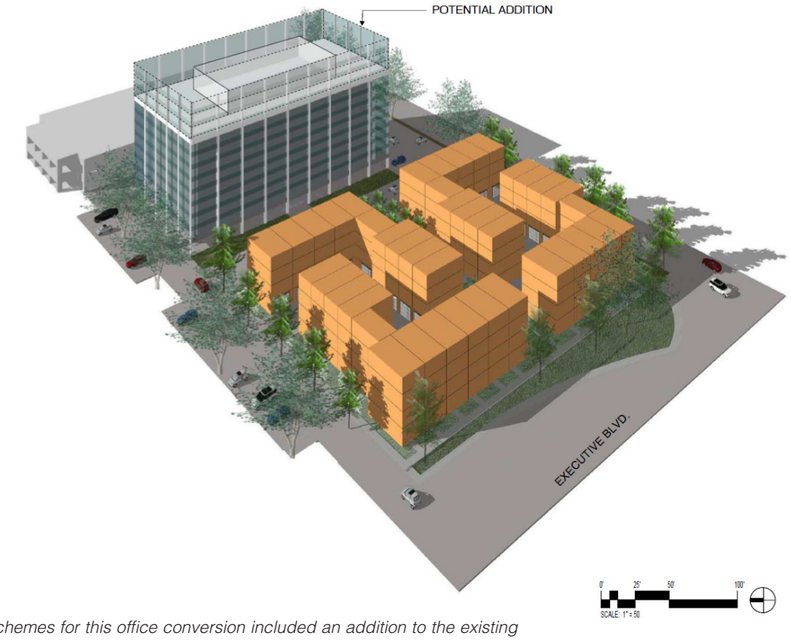
Park + Ford Entry

Increasing Site Density

Not all office conversions face site restrictions. Exurban and suburban buildings often enjoy expansive lots or adjacent green space. The design for the Essen—a low-rise former office complex in suburban Virginia—sets up its 119 units to embrace the 6.35-acre site. Full of old growth trees, the site is tucked into the side of a 44-acre botanical preserve giving future residents ample green space while also walkable distance to transit and retail.

One strategy for maximizing large sites involves looking for ways to increase the number of units. One feasibility study for a 10-story office building in Rockville, MD,— sitting on a 5-acre lot with both surface parking and a garage — includes several options for building rowhouses or 5-story apartment buildings on the surface lots. Proposed plans added more than 150 units to the 180 units included within the office tower conversion.





Schemes for this office conversion included an addition to the existing building along with new apartments or rowhouses on the surface lots.

Midtown Row

The 410,000 square feet of the mixed-use Midtown Row project maximized the sprawling site by adding new buildings totaling 240 residential units, expanding the heights of existing strip mall structures, and generating usable public spaces with extra wide sidewalks and a new “village green.”





Before (bottom) and after site photos of Midtown Row

Converting Other Typologies

Office buildings aren't the only building typologies available for repurposing into residential or mixed-use communities. Shopping malls, schools, and dorms, or even churches all provide opportunities to create high density housing in key urban and suburban locales. Similar to office conversions, each commercial or community building offers challenges and benefits for conversion into multifamily residential.

STRIP CENTERS. The advent of online shopping, also heightened by the pandemic like telecommuting, left numerous retail centers partially empty or completely abandoned. Midtown Row involved the adaptive reuse of a mostly unused strip mall center into a student housing/walkable retail/green space community. The master plan was developed in collaboration with civil engineers and landscape architects with the aim of increasing density, while minimizing existing surface parking to allow for more green spaces. Extra wide, planter lined wide sidewalks, a dog park and a central village green generates appealing walkability within the development, which also links to a community pedestrian/bike lane. Balconies and operable glazing for all units provide natural light and ventilation. Durable, nontoxic materials like brick and glass were used inside and out for healthy air quality.

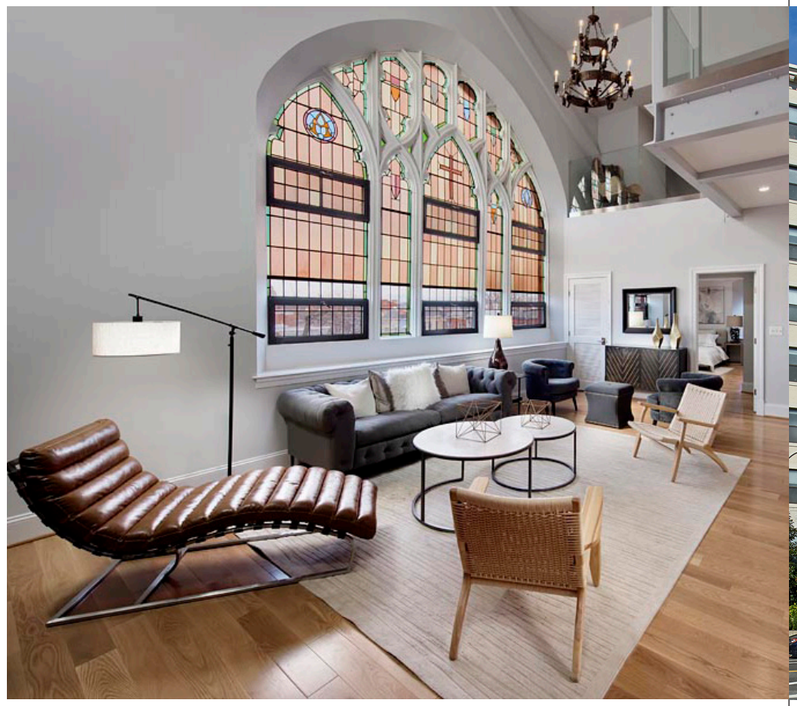
HISTORIC SCHOOL. Washington, D.C.'s Gage School was built in 1903 as a neo-Georgian foursquare brick building. Rehabilitating the nearly 30,000-square-foot building while adding two new buildings provided 92 affordable market rate condominiums—30 percent of them reserved for buyers associated with nearby Howard University — and initiated a revitalization of the historic neighborhood. Inserting dormers into the low-slope roofline converted unused attic space into an additional level of units. Transforming voluminous classroom interiors into 33 residences involved keeping some of the century-old charm like exposed brick and 14-foot ceilings, while adding all new HVAC, electrical, and plumbing systems. Maintaining those high ceilings along with the 12-foot window openings allows for natural light to penetrate throughout the deep floorplans.





Exteriors on the Gage School project's new buildings incorporate similar materials and proportions of the historic school without mimicking it (above). Interiors in the original school building enjoy high ceilings and tall, arched windows to preserve historic facades (below).





The Sanctuary's penthouse features restored stained glass windows preserved from the historic church.

HISTORIC CHURCH. The Sanctuary turned an historic church in the heart of Washington, DC, into luxury residences. Formerly an abandoned, century-old church, this project now infuses life into its surroundings thanks to the transformation of 35,000-square-feet of sacred space into 30 residences. The adaptive reuse infill project presented unique challenges and opportunities. Such as making the church, along with its annex and two adjacent rowhomes, work for residential life within the structure's original form — tower included. Preserving the exterior form safeguarded neighborhood context and offered owners inspired spaces.

Convincing the historic preservation board to approve restoration and alteration of the building's 132 stained glass windows allowed the insertion of clear and operable panels for access to views andfresh air. The two-story penthouse encompasses the former church's 85-foot-tall bell tower — although it never housed any bells — offering stunning views of the area. This unit's homeowner also enjoys vaulted ceilings, which frame an expansive, arched stained-glass window along with the impressive iron chandelier originally swinging above the choir loft.





The Concordia and a typical unit interior.

DORM/HOTEL. The Concordia was a neglected and crumbling 10-story, 1970-era building. Instead of demolishing it, however, saving and repurposing its solid concrete and steel frame saved embodied energy and allowed the client to not only retain but increase existing unit density for housing trainees during long term stays. In addition, 75% construction waste diversion and the use of locally sourced and sustainably certified materials as well as a modular, highly efficient variable refrigerant flow HVAC system earned the building a LEED Gold certification. Recycled-content steel frames balconies and window bays left over from the original concrete structure.

Interior layouts presented equal challenges, with the client wanting to increase the number of units — from 88 to 121 — as well as adding a gym, a second service elevator plus code-compliant egress stairs, business center, study areas, and catering kitchen. Full-width balconies or floor-to-ceiling window bays allow units to live beyond their square footage. Thanks to a tight building envelope, energy-efficient systems and low-flow water fixtures, the increased occupancy still results in an estimated $1.7 million less in operating costs over 25 years.



The George

Concluding Thoughts

The time, resources, embodied energy, and history saved by converting an office building into a multifamily residence generates numerous benefits for the developers and the community. However, the out-of-pocket cost of doing a conversion is about the same as new build and designing such a transformation can be complex. An experienced architect can identify and design these office-to-residential conversions to be profitable for developer clients. They know which districts are willing to support this type of adaptive reuse and have buildings being sold at low enough prices to make the investment worthwhile.

Architects can also point out design details developers might not see when considering conversions, such as how seemingly incompatible spaces can be reused — elevator shafts into rooms where residents won't miss windows like dens, theater rooms, or an office for a graphic artist who needs low light. Architects can also educate client developers on opportunities found in conversions.

And while the upfront cost might be similar to a new build, there's significant value in time saved, which typically results in a building producing income much sooner. One or more years of *not* carrying mortgage, while earning rental or sales income can generate significate financial gain for developers. Of course, the sustainability aspect of repurposing a building can boost fiscal benefits. Many states, counties, and cities offer tax credits for green buildings. Montgomery County, MD, for example, gave the developer of The George a significant bonus for saving and repurposing an existing building.

