



Design Strategies

For Podium & Wrapper Buildings

WHITE PAPER

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Introduction

Hord Coplan Macht recognizes and has responded to our client's desires to create high-density, multi-family projects that harmonizes into the urban context. Very often the project's viability requires the integration of mixed-uses all within a single building. Aside from residential, these uses often include retail, restaurant, office and structured parking. A cost effective means to achieve this is through podium and wrapper buildings. While designing these complex projects, we have identified an opportunity to answer our clients' questions on some of the design strategies that can be used for these mixed-use buildings. In an effort to further educate our clients on design strategies, this white paper identifies the opportunities and challenges that the building code provides for podium and wrapper buildings, while also identifying some additional design challenges of the buildings and construction types we have encountered through our experience.

Architectural and land planning design in dense urban environments provides opportunities to focus on core placemaking principles. This is accomplished by designing mixed-use buildings to reinforce the public street, strengthen existing pedestrian circulation, define public open space and create private courtyards for residents. Design solutions include creating retail,

restaurant and/or residential units at the street-level and residential units at the upper-levels, while mitigating the impact of parking for these mixed-use buildings on the urban scene by providing parking below grade or in a structure behind and/or within the mixed-use buildings. Depending on the challenges and opportunities of the project, these buildings can be designed as podium buildings (residential above mixed-use or parking), wrapper buildings (residential or mixed-use around parking) or a combination of both. Properly designed, these mixed-use developments maximize the density of the site and encourage the active, pedestrian environment for a successful urban project.

This paper identifies some successful design strategies, which can be used to develop these projects as podium and/or wrapper buildings. Our interpretations of the International Building Code 2012 (IBC) are based on our experience and discussions with a building code consultant; however, local building code officials have the final authority in determining the applicability and interpretation of building codes to specific projects.





Crosswinds at Annapolis Town Center, a Market-rate Apartment Podium Building in Annapolis, MD Client: The Bozzuto Group

Podium Buildings

Building Code (IBC)

An important factor in developing these buildings is understanding the limitations and opportunities that the building code provides. For these buildings, four types of construction materials are typically used for the structure. These include concrete, steel, metal studs and wood. The IBC designates construction using concrete, steel and metal studs (non-combustible) as Type I or Type II construction, wood construction (combustible) as Type V construction and construction using non-combustible or fire-retardant treated wood exterior walls and any construction type on the interior as Type III construction. Generally, the lower the construction type, the more building area and building height allowed (i.e., Type I construction allows more building area and height than Type V construction). Understanding these basic limitations is critical to understanding the constraints that the building code has on the construction type and building.

Construction Type	Applicable Materials	Building Height Range Building fully sprinklered	Stories Allowed Residential use / Building fully sprinklered
I and II	Concrete, Steel, Metal Studs	Unlimited	Unlimited
III	Exterior - Metal Studs or Fire-Retardant Treated (FRT) Wood Interior - Standard Wood	75'-85'	5
V	Standard Wood	60'-70'	4

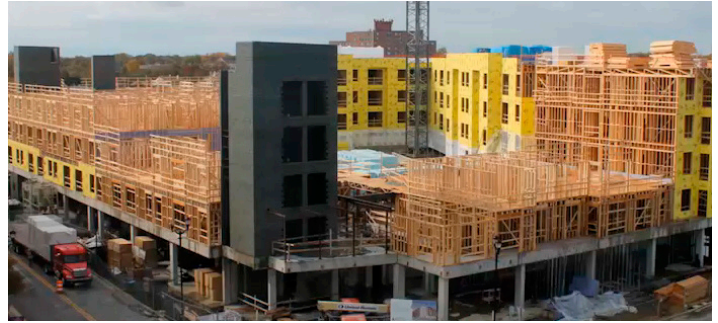
In today's market, the price of Type I and II construction and the affordability of the housing market are limiting a developer's ability to make a project work financially. Type V construction is the most economical option, but has the greatest limit on the number of stories and height per the IBC, limiting the density of the development. Type III construction provides a compromise between these other construction types by taking advantage of the affordability of wood framed construction on the interior and the additional density provided through the allowance of extra building height and stories with a non-combustible or fire-retardant treated (FRT) wood exterior walls. Type III construction presents some additional technical challenges because of the increased height and stories allowed in the construction type. If fire-retardant treated wood is used, five stories of load-bearing wood

framed construction pushes the limit of the structural abilities of the wood framing. This presents challenges including the spacing and size of the studs on the lower floors. Additionally, if the load-bearing walls are constructed with wood framing, wood shrinkage needs to be accounted for in the design. Typically, wood framing shrinks about 3/8" per floor, or almost 2" over 5 floors, which must be accommodated in design and construction. The shrinkage mostly occurs during the first year of occupancy due to the moisture absorbed by the wood during construction and the acclimatization of the wood to the conditioned indoor environment. This shrinkage can be most problematic when a masonry veneer is used on the exterior, creating differential movement between the veneer and the wood framed walls. If non-combustible walls are used on the exterior, the differential movement between the metal

exterior walls and the wood framed interior walls needs to be taken into account. A possible strategy that addresses these concerns is designing a composite structure in which the non-load bearing unit walls and floors are framed out of wood and a structural load bearing metal frame is used. Coordination amongst the building trades needs to be taken into account when considering this composite structure. In this ever changing market, structural design options need to be developed and estimated early in the design phase to determine the most cost effective system for each project.

For the purposes of this paper, podium buildings are defined as buildings in which an extra story is allowed for the construction type by creating a horizontal fire separation between the first floor above grade and the floors above. The upper floors are built above a podium structure. The building code has historically provided special provisions for podium buildings to allow for mixed-use and/or parking below the building to address the needs of cities that are aggressively focused on urban renewal. These special provisions have been refined through code revisions over the years.

As of this publication (January 2014), there is a pending change to the 2015 IBC that would not limit the number of stories below the podium level to only one story. However, the height limit remains to be governed by the lesser construction type above the podium and is not a modification of the 2012 IBC. The potential new change is an interesting proposition that could allow a “5 over 3” podium building where the building is designed within the height limit of 85 feet using Type IIIA construction. Since the code modification is pending and state and local jurisdictions will still need time to adopt the new code, the risks of designing to this potential change must be understood by the designer and developer.



Crosswinds at Annapolis Town Centre, A Type V Podium Building Under Construction Client: The Bozzuto Group

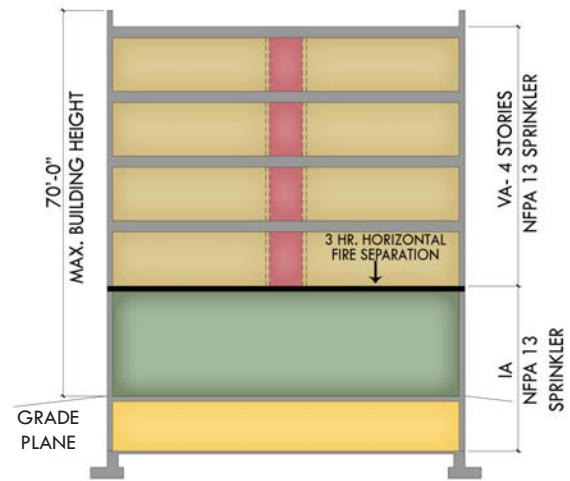
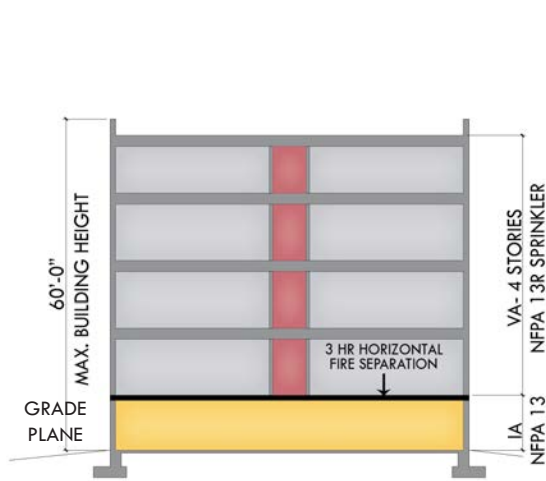


Leake Hall - A Type V Podium Building Under Construction Client: MICA



Tysons West located in Tysons, VA. Client: The JBG Companies

Podium Option 1



Diagrams Indicating Design Options of Construction Type VA, Podium Option 1 Building. Indicating Height, Story and Occupancy Limitations

Legend

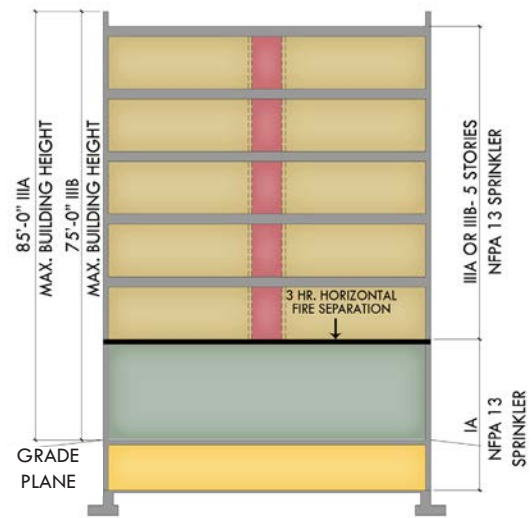
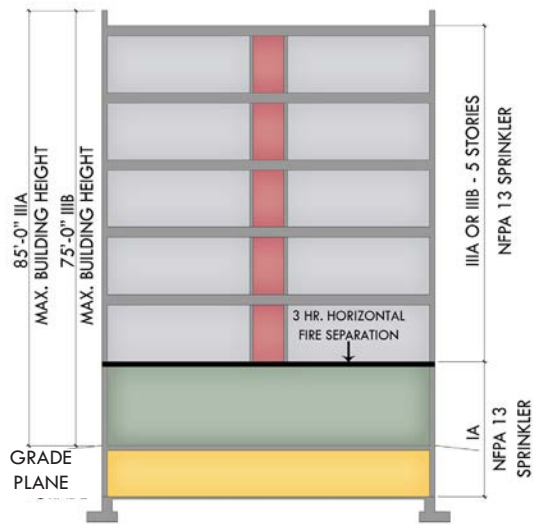
 CIRCULATION	 RESIDENTIAL/RETAIL/BUSINESS	 RESIDENTIAL
 PARKING	 RESIDENTIAL/RETAIL/BUSINESS/RESTAURANT/PARKING	

Option 1 utilizes special provision 510.2 in the 2012 IBC. This provision provides the greatest flexibility and creativity to the design team and is most appropriate for mixed-use buildings designed as podium structures. By separating the first floor above the average grade plane with a three-hour fire resistance rating from the building above, the building code essentially allows an additional story for the most restrictive construction type (in stories) because the number of stories allowed for the building is determined from the horizontal fire separation, not from the calculated grade plane. The

building above the fire separation can be of any construction type and can include residential, restaurant, retail or offices. Wood framed construction is the most affordable for this portion of the building. The story below the horizontal fire separation must be of Type IA construction and allows parking, residential, restaurants, retail or offices in any combination. The provision to allow residential use below the podium was adopted in 2009 IBC as previous versions of the code did not list 'residential' as a permitted use. The maximum height of the overall building is limited by the most restrictive (in building height) construction

type, which is the building over the fire separation. It is important to understand that the building height is determined from the calculated grade plane, which includes the building below the horizontal fire separation. In order to maximize the height, the number of stories and occupancies allowed, fully sprinklered buildings using NFPA 13 sprinkler systems are required. However, NFPA 13R sprinkler systems are permitted in the residential building above the fire separation when that portion is a maximum of four stories and no more than 60' above the calculated grade plane. If a fire wall is required in the

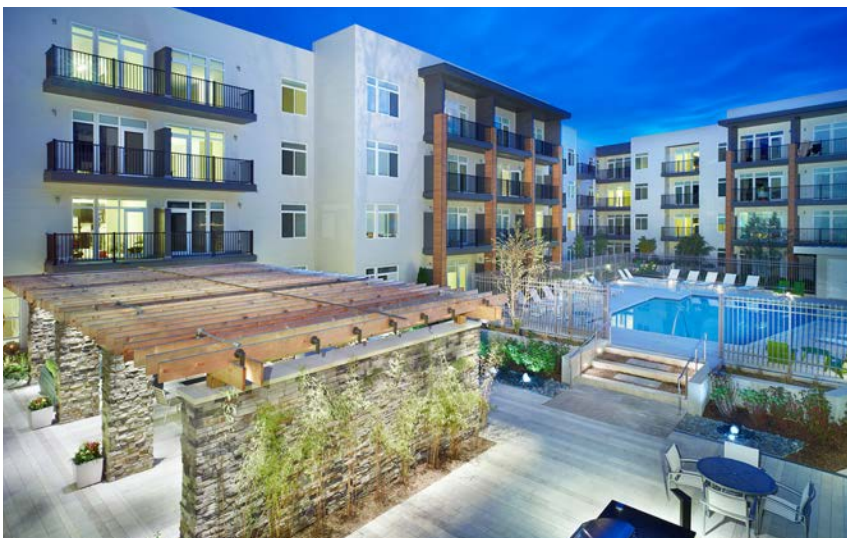
building above the horizontal fire separation due to building area, the fire wall is permitted to terminate at the horizontal fire separation, or podium level.



Diagrams Indicating Design Options of Construction Type III, Podium Option 1 Buildings. Indicating Height, Story and Occupancy Limitations



Crosswinds at Annapolis Town Centre - A Type V Podium Building Under Construction, described as Option 1 Client: The Bozzuto Group

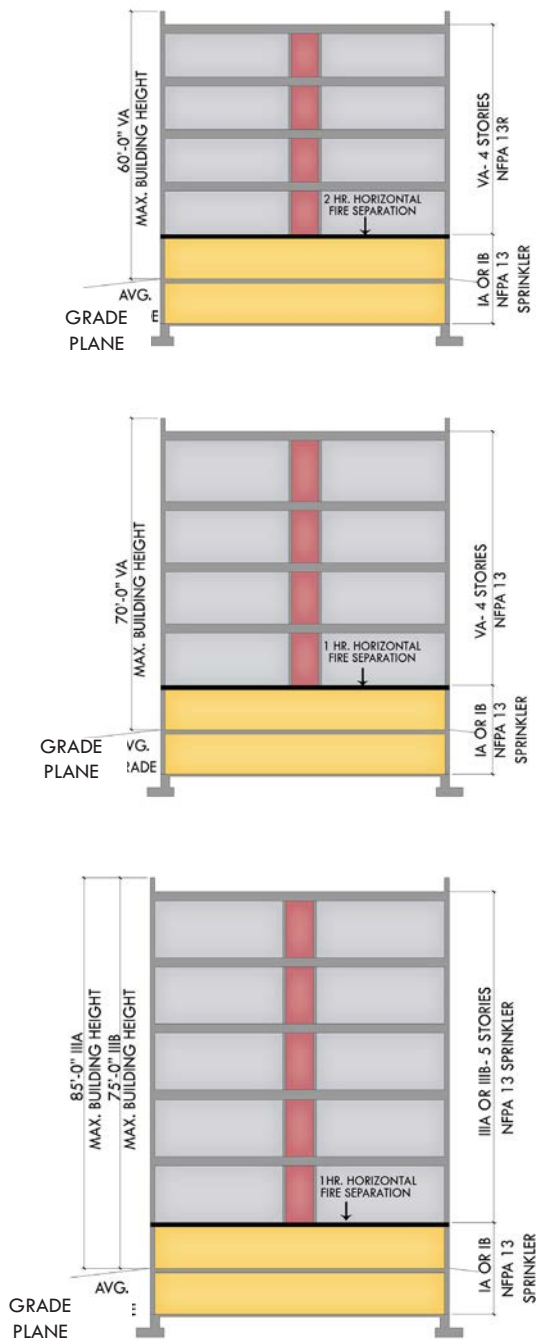


The design of outdoor terraces is typically a feature of podium buildings. Above is pool courtyard at Crosswinds at Annapolis Town Centre. Client: The Bozzuto Group

Option 1 Summary

- Provides greatest flexibility and creativity to the design team
- Allows an additional story of construction for Type III and Type V construction
- Allows residential, restaurant, retail, business or parking occupancies above the podium
- Allows parking, residential, restaurant, retail or business occupancies below the podium
- Any fire walls in the building above the podium can be terminated at the podium

Podium Option 2



Legend

- CIRCULATION
- PARKING
- RESIDENTIAL



Amenities are easily incorporated into podium buildings such as *The Galvan* in Rockville, MD. Client: *The JBG Companies*

Option 2 utilizes the special provisions found in 510.4 in the IBC where parking is the only use provided below the podium with residential use above. This provision also allows an additional story for the most restrictive construction type (in stories) because the number of stories allowed for the building is determined from the floor above the parking level that is located no more than one story above the calculated grade plane. The building above the parking garage can be of any construction type, though wood framed construction is the most affordable. The provision is more limiting than 510.2 because it **only** allows parking in the lowest story and **only** residential occupancies above the separation. The separation is only required to be one hour, if the building is fully sprinklered with an NFPA 13 sprinkler

system. However, If an NFPA 13R sprinkler system is used in the residential building above, (with Type V construction) a two-hour separation is required. The building height is determined from the calculated grade plane from the ground level adjoining the finished parking level below. Any fire walls that are required in the building above the separation because of floor or building area must be extended to the footings and may not be terminated at the horizontal podium separation.

Option 2 Summary

- Allows an additional story of construction
- Allows **only residential** above the podium
- Allows **only parking** below the podium
- Any fire walls in the building above the podium must be extended through the parking structure

CASE STUDY: Village Lofts

A Podium Building in Baltimore, MD

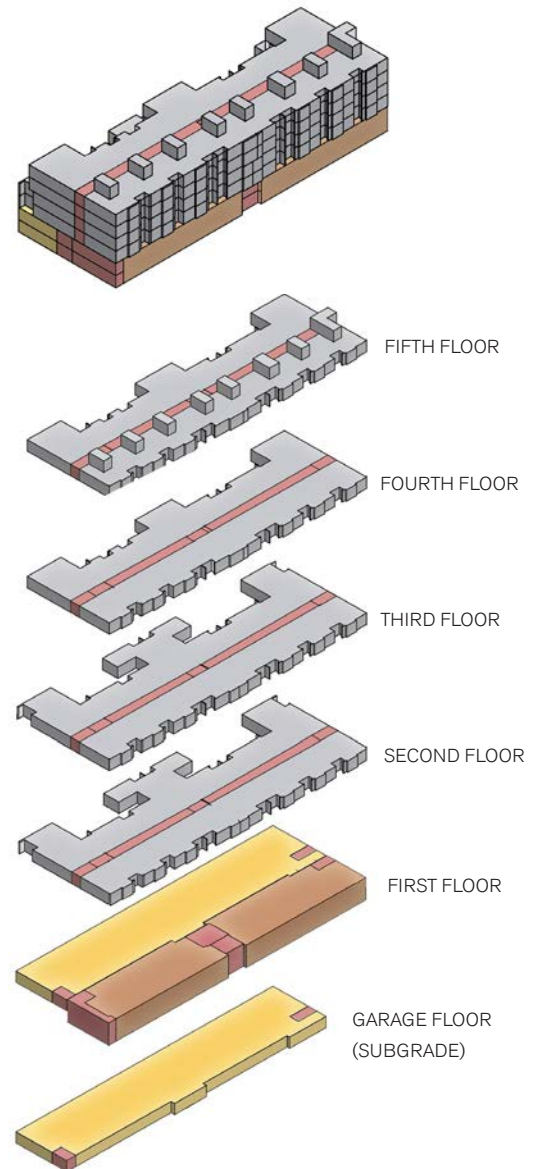


Village Lofts is a mixed-use development near the Johns Hopkins University Homewood campus in Baltimore, Maryland. The project is comprised of loft apartments, structured parking spaces and neighborhood retail space. The exterior was designed to invigorate the street level with retail, awnings and outside dining on a wide, carefully landscaped sidewalk. The building facades pick up detail from neighborhood buildings while expressing that this is an exciting, vibrant midtown community.

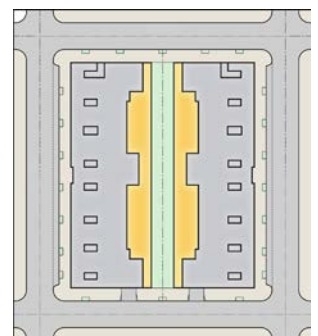
Prototypical Site Plan Density Analysis

Analysis based on 2 buildings in a typical block

Site Area:	73,334 SF [1.68 AC]
Residential Units:	136 in 2 buildings
Yield:	80.95 DU/AC
Parking:	174 private garage spaces in 2 buildings



Stacking Diagrams



Prototypical Site Plan

Wrapper Buildings



This perspective shows a mix of uses including a Wrapper Building in the upper right. The design calls for market rate apartments around a parking structure with ground-floor retail space. The image depicts the plaza between the buildings with a wrapper building beyond.



Wrapper buildings (also known as donut buildings) provide another design option to develop a successful urban project that incorporates core placemaking principles. By providing a pre-cast or cast-in-place parking structure in the center of the building and surrounding the parking structure with residential and/or mixed-use buildings, the sidewalk at the street-level is activated with traffic at the pedestrian scale. Because the height of the residential/retail building is independent of the

parking structure, wrapper buildings are a more viable solution than podium buildings when the local zoning ordinance limits the overall building height and there is ample site available to accommodate the separate parking structure.

Although the building code does not provide any special provisions specifically for wrapper buildings, it does provide opportunities for creative building code strategies that may minimize the fire resistance separation requirements and the mechanical ventilation and sprinkler requirements of the parking garage. These strategies include: designing the residential/retail building as a separate building from the parking structure in which a fire wall is shared between the two buildings or designing the residential/retail building as a separate building from the parking structure where the two buildings are separated by more than ten feet, potentially allowing the parking structure to be considered an open parking garage. Each of these options is dependent on the opportunities and challenges presented by each specific project and site.

Wrapper Option 1: Buildings Separated by More Than 10 Feet

This option classifies the parking structure as a separate building from the retail/residential building. By separating the parking garage by more than 10 feet, the parking garage may be considered open, eliminating the need for sprinklers and mechanical ventilation in the garage. This option works well for single-loaded corridor configurations because openings are not permitted in the residential building wall facing the parking garage. If the separation is increased to more

than 13 feet, the exterior wall of the residential building can have limited openings. Furthermore, consideration to create an open separation on only a single side of the garage can be incorporated into the design if the limitation of an 'open' garage is maintained.

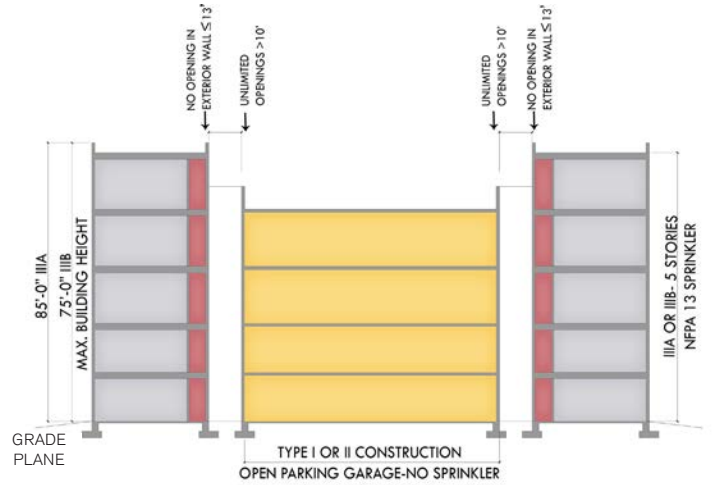


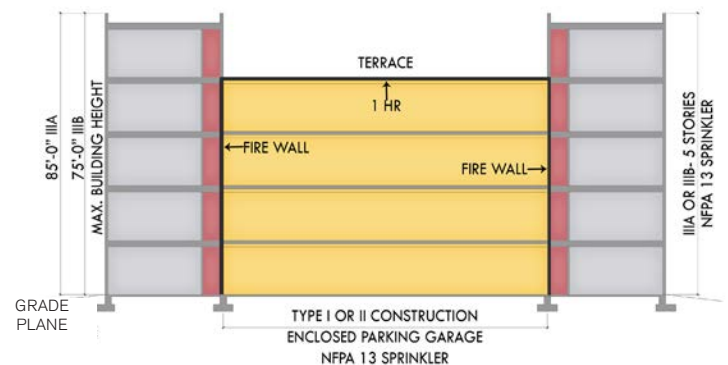
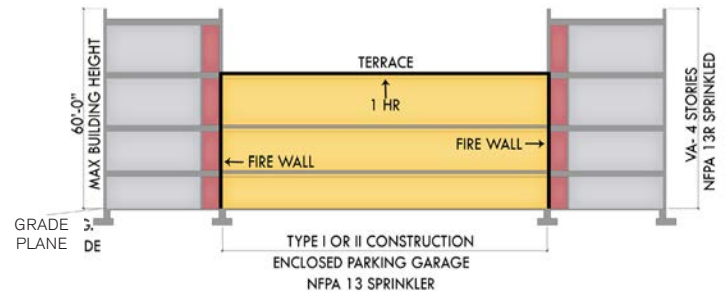
Diagram indicating design option for a wrapper building in which the parking garage is separated from the residential building

Wrapper Option 2: Separate Buildings Connected by a Fire Wall

This option classifies the parking structure as a separate building from the retail/residential building and requires a three-hour fire wall separating the buildings. If the parking structure is lower in height than the adjacent retail/residential building, the building code will allow the fire wall to be terminated at a one-hour roof assembly on the parking garage. This design option allows for a tighter footprint, however, this likely will classify the garage as "enclosed" in which a sprinkler system and mechanical ventilation will be required.

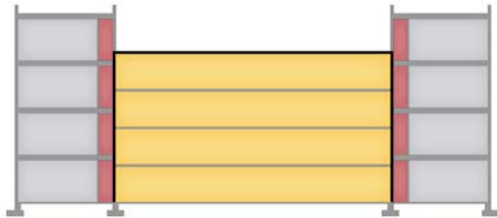
Legend

	CIRCULATION
	PARKING
	RESIDENTIAL



Diagrams indicating design options for a wrapper building in which the parking garage and residential buildings are separated by a fire wall

Design Challenges of Wrapper Buildings



Circulation Diagram 1
Parking and residential floors at different levels



Circulation Diagram 2
Parking and residential floors aligned

Circulation

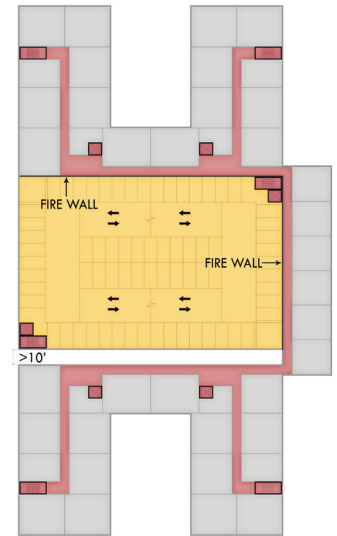
Because of the potentially different floor-to-floor heights between the parking structure and the residential/retail building, circulation between the two buildings is complicated [Circulation Diagram 1]. This can be addressed by providing a pedestrian ramp between the parking garage and the building, providing separate means of circulation in the parking garage and the residential/retail building, which are connected by a walkway at the first level or aligning the floor heights of the parking garage with the residential/retail building [Circulation Diagram 2]. This last solution will address the circulation concerns, but will increase the floor-to-floor height of the parking garage. Therefore, the cost of the garage will increase and the efficiency of the garage may decrease if the increased floor height of the garage eliminates a parking level.

Construction Phasing

The parking garage in a wrapper building is typically of pre-cast construction. Though these are less expensive than poured-in-place parking garages, they require a longer lead time for production. Additionally, the erection of the parking garage is more efficient and construction conflicts are avoided if the parking garage is erected prior to the start of construction of the residential/retail building. This can be avoided by building a cast-in-place concrete garage; however, the additional cost of the cast-in-place garage has to be weighed against the additional construction time cost inherent in the pre-cast garage.

Lot Size

Ramped parking garages require a minimum deck size to be efficient and to provide the ramping between parking levels. Providing a speed ramp in the parking garage can address this minimum size, but will increase the amount of gross square feet in the garage because parking cannot be provided on the slope required for a speed ramp.



Alternate design to address inherent inefficiency of wrapper building

Inefficiency

Depending on the site, wrapper buildings may be developed as single-loaded corridors, creating a less efficient building plan and less residential units per floor. There are creative options to design the residential building with a double-loaded corridor. This includes creating wings with double loaded corridors that do not overlook the parking garage. [See diagram]

Legend

- CIRCULATION
- PARKING
- RESIDENTIAL

Combined Podium and Wrapper Buildings

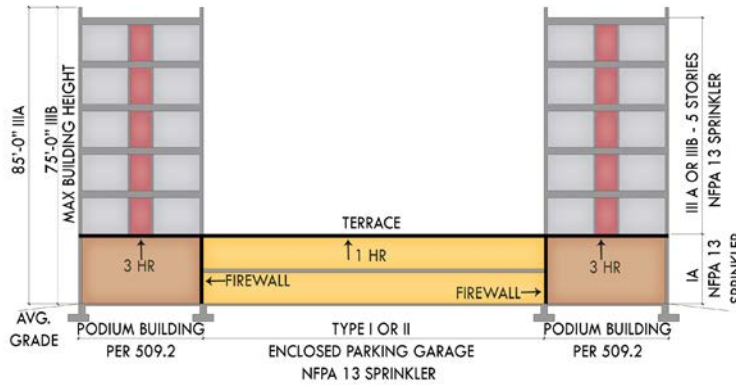
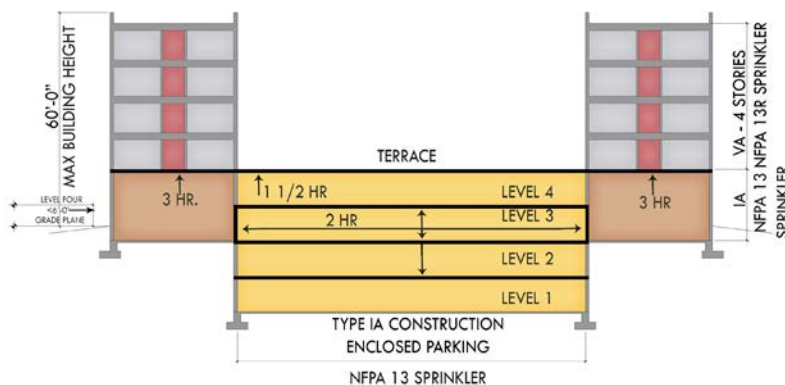
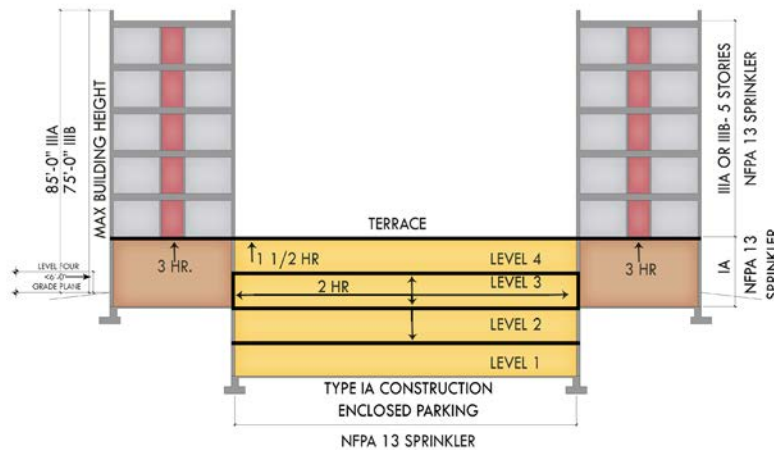


Diagram of design option combining a wrapper and podium building with a fire wall



Diagrams of design options using podium and wrapper buildings as non separated mixed use buildings

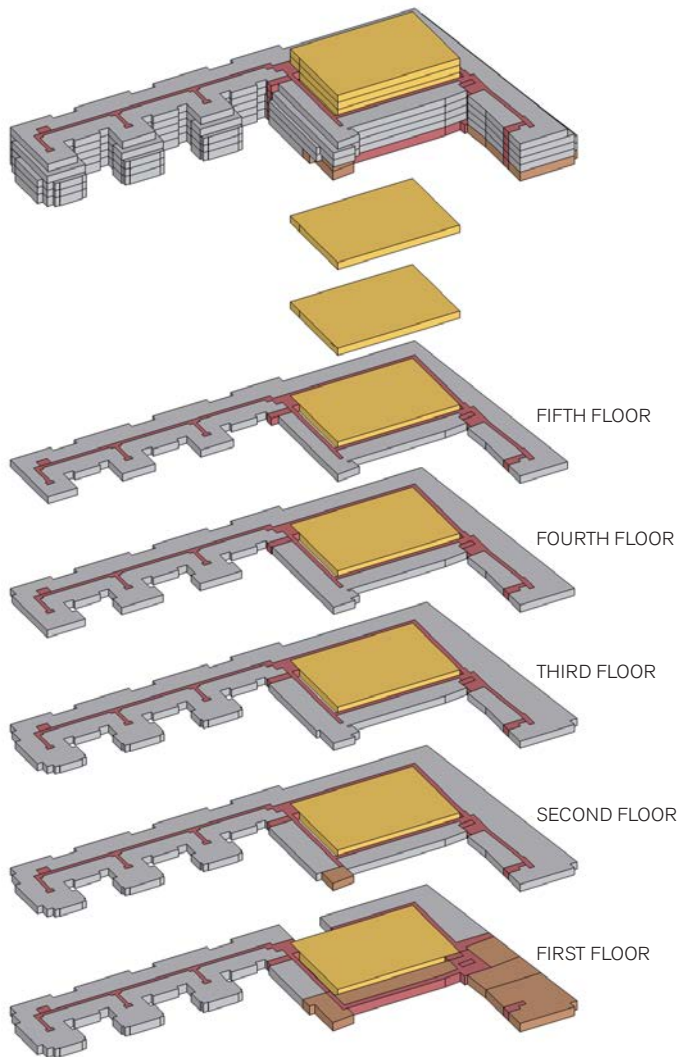
Legend

- CIRCULATION
- PARKING
- RESIDENTIAL
- RETAIL / BUSINESS / RESTAURANT

In order to provide mixed-use projects (including residential, retail and restaurant) within wrapper buildings, a podium building may also be provided around the perimeter of the parking garage. This is accomplished through a combination of the strategies indicated above using Option 1 for podium buildings with Option 1 or 2 for wrapper buildings. Another alternative solution would be to design the building utilizing Option 1 of the podium building as a non-separated mixed-use building between the mixed-use building below the podium and the parking garage.

CASE STUDY: Union Wharf

A Combined Podium & Wrapper Building in Baltimore, MD



LEGEND



Stacking Diagrams



Located on the waterfront in historic Fells Point, Union Wharf is a 281 unit mixed-use development that embodies the character of its unique setting. The project features open, loft-like residences overlooking the harbor and multiple courtyards. A series of community amenity spaces wrap the main court and features a dramatic pool and water element stretching from the building lobby to the water's edge. A combination of residential units and retail uses are designed below the podium level.

Prototypical Site Plan Density Analysis

Site Area:	148,000 SF/3.4AC
Residential Units:	281
Yield:	82.65 DU/AC
Parking:	472 Private
	Garage Spaces in 2 buildings



Union Wharf, Baltimore, MD Client: The Bozzuto Group

Summary

Design solutions for dense urban environments are dependent on the program, lot size, zoning requirements, parking requirements, building height, and topography, to name a few. Generally, podium buildings tend to be more appropriate when the lot size is limited and the zoning allows a higher building height. Wrapper buildings work well when there is more land area available and less building height allowed per zoning. Other factors, such as financing and the target market, also affect the best design solution for a specific project.

This paper has identified some creative design solutions that can be used to maximize the density of the development and limit the cost of the project while still maintaining the core place-making principles that we feel are critical for an urban environment.



Street-level retail is often integrated into the design below the podium level.

Project Experience

Podium Buildings

Crosswinds at Annapolis

Towne Centre

Annapolis, MD

The Galvan

Rockville, MD

Tysons West

Tysons Corner, VA

Seminary Hill

Alexandria, VA

Leake Hall, MICA

Baltimore, MD

Park Potomac

Potomac, MD

Hawthorne Place

Laurel, MD

Cameron Park

Alexandria, VA

6410 Arlington Blvd

Arlington, VA

Evergreen at Columbia

Town Center

Columbia, MD

Village Lofts

Baltimore, MD

The Marque at Heritage Hunt

Gainesville, VA

Waverly Gardens

Columbia, MD

Ellicott Gardens

Laurel, MD

Ashbury Courts

Laurel, MD

Patuxent Place

Laurel, MD

Remington Row

Baltimore, MD

Brompton House

Elkridge, MD

National Harbor

National Harbor, MD

530 First Street

Alexandria, VA

Station Square East

Pittsburgh, PA

Wrapper Buildings

Hunt Valley Mixed-Use

Development

Hunt Valley, MD

Oxford Square

Hanover, MD

Annapolis Junction

Annapolis, MD

Seminary Overlook

Alexandria, VA

Combined Podium & Wrapper Buildings

Union Wharf

Baltimore, MD

Mark Center

Alexandria, VA

South Alex

Alexandria, VA

Vienna Crossing

Vienna, VA

AVA Wheaton

Wheaton, MD

Scout on the Circle

City of Fairfax, VA



HORD COPLAN MACHT was founded in 1977 with the goal of providing the highest quality architectural, landscape architectural and planning services to our clients. Since our founding, we firmly believe in a collaborative, multi-disciplinary approach to problem solving. We strive for the highest quality design which will, through the clarity of ideas and sensitivity to the environment, produce a compelling project. We integrate our client's financial, functional and aesthetic goals into buildings, landscapes and land plans that will be enjoyed by the end user. HCM has a diverse studio environment with award-winning residential, healthcare, education, landscape architecture and planning studios to serve the diverse needs of our clients.

The architects, landscape architects and planners at HCM believe in the creation of meaningful places. The notion of "place" transcends throughout our studios in that we strive to create places to live, places to heal, places to learn or places to play. The planning of places collectively, form the basis for everyday civic life. We draw our inspiration from the fundamental understanding that humans connect with places they clearly and empathetically understand. We recognize that places we create have value and an obligation to coexist with the environment. We embrace sustainability through innovation and our commitment to a holistic design project.

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