Structured Parking

Structured or podium parking has typically been used on large-scale urban mixed use and residential developments. However, small-scale medium density infill developments are increasingly utilizing podiums as a viable alternative to individual garage parking or surface lots, and as a way of providing on-site parking for residents while providing more usable open space. This section provides insight into the types of developments which can benefit by using structured parking, explore many of the issues concerning podium parking, discuss the constructability and code related issues concerning structured podiums, and outlines the benefits of building podium parking for medium density residential projects.

Developers of medium density infill projects are looking at shared structured parking as a viable strategy to increase density while providing usable open space and meeting parking demand.

Developers, builders and designers of medium density infill housing developments need to balance the number of units, open space and parking requirements with the neighborhood and city’s desires for a project. On sites where the desired density, open space and need for parking impacts the overall site development to such an extent that traditional buildings are impractical, podium parking should be used or considered as a viable alternative to individual garage or surface clustered parking. Podiums can be used to improve the overall amount of parking provided when low parking ratios might not be accepted, improve the amount and quality of open space, and allow residents to maintain a strong connection to open space and the street.
Types of Buildings Which Can Utilize Podium Parking

Structured or podium parking is a valuable alternative to surface parking for medium density infill housing projects. The podium allows for increases in parking ratios while maintaining or increasing open space on the site. The shared parking podiums can support a variety of housing types, including row houses, flats, courtyard apartments, and other multifamily buildings. Structured parking garages also provide opportunities for additional storage and other shared facilities.

Structured parking is currently not commonly used in the Portland area by small builders and developers for a variety of reasons:

- Small builders are often not familiar with the building codes and construction methods necessary for building and designing concrete parking podiums.
- Small builder/developers often do a substantial portion of the construction work themselves and typically don’t “sub out” as large a task as a podium may require them to perform.
- They often do not use the professional services of an architect, or use architects and engineers who may not have experience with podium developments.
- The cost of podium parking is greater for the developer and needs to be evaluated and weighed relative to the associated benefits of higher densities, providing greater parking and open space.
- The shared nature of parking podiums has cost liability considerations, which need to be understood and addressed, particularly in condominium developments.

Sub-grade parking is seen in many new developments because it places parking underneath buildings, allowing the site to support more building area and open space.

Podiums are most successful when they are only 4–5’ above grade.
Construction Methods and Building Codes

Parking podiums generate flexibility in building. The International Building Code (IBC) with Oregon Amendments allows many options, depending on the height of the building. Conventional wood or light steel construction built above a concrete parking podium can often be built independently of the structural system of the garage, allowing for a large variety of building configurations. Through-slab utilities and any exceptional loads should be coordinated with the design of the parking structure and concrete slab. Structured parking can be built using any type of construction, but is most often built with Type I Construction. Common methods include heavy steel with fireproofing, conventional slab and post-tension slab construction methods. Post-tension slabs use less reinforcing and are often more cost effective, but require greater planning of through-slab utilities.

The ability to use conventional wood or light steel construction above the parking podium allows for structured parking to be incorporated into building projects in a cost effective way, utilizing construction methods that small builders tend to be more familiar with. These opportunities, together with efficiencies gained with not having to devote additional site area solely to vehicle parking and the resulting solutions this provides for small infill sites, make structured parking practical for a wide range of higher-density residential project, especially on the constrained sites typical of infill development.

Concrete slab podiums are a more common construction type used for structured parking. Coordination of penetrations is critical.

A combination of concrete block, steel, and wood framing can now be used as long as the parking is solely for the residents. Builders are often more familiar with steel and wood frame methods of construction.
Design and Engineering

Partially sub-grade parking is seen in many new developments because it places parking underneath buildings, typically extending 4–5 feet above grade, allowing the site to support more building area and open space. It is more cost effective than fully underground parking because of less excavation and it can often be naturally ventilated. It also elevates the first floor living area above the street level, which can increase privacy and allow for raised stoops or porches, which fits into many residential neighborhoods. Compared to above-grade parking, partially sub-grade parking reduces the bulk and the height of the building, helping to mitigate scale contrasts with smaller adjacent structures.

However, if not treated properly semi-depressed parking can result in the habitable portion of the building appearing to be overly separated from the street and the sidewalk pedestrian environment. A careful balance is needed between raising the building high enough to allow natural ventilation, but low enough to create a quality pedestrian environment. A common solution is to screen the exposed portion of the parking with architectural elements, such as stoops, bays and balconies, that restore a connection between the building and the ground and enhance the streetscape. Ventilation openings can be designed as integral elements of the facade.
Above-grade Parking

Above-grade parking can be more cost effective than parking that is below or semi-depressed from grade, but is more likely to create blank facades and result in a poor relationship between buildings at grade and buildings above the podium. Attaching habitable space at grade, as a liner, adjacent to the parking structure can mitigate the ground-level frontage of the podium. The upside to above ground parking is greater opportunities to provide adequate ventilation for the parking. This may be useful for small lots or attached infill housing. However in areas where height or relationships to adjacent properties is a major concern, partially sub-grade or totally sub-grade parking may assist in a project’s acceptance by the community.

Below-grade Parking

Below-grade parking can be used to increase the relationship between dwelling and grade, while reducing the bulk and height of a building. Below-grade parking structures need to be mechanically ventilated and further excavated, increasing the cost of the parking structure. Although the positives relate to mass and relationships to adjacent homes, the access to a sub-grade structure is typically a large ramp, which if located outside, may have tremendous negative impacts on the streetscape and the building design.

Structured parking can be concealed by placing habitable uses in front, as well as through variations in grading.

Portland plex, partially sub-grade shared parking

Building fronts should face other building fronts or open spaces whenever possible.
**Tuck-under Parking**

Tuck-under parking is a relatively inexpensive compromise between surface parking and fully-structured parking. A rowhouse with tuck-under parking will have parking located to the rear of the building, accessed by an alley. Tuck-under parking reduces the visual front facade impact of a full garage story by partially submerging the alley. The garage and alley should be at a lower level graded approximately half a story below the front yard and sidewalk and should include two parking spaces in a side by side or tandem orientation.

**Podiums as Open Space**

One of the benefits of podium parking is that the podium allows for more habitable open space. The slab can be landscaped as circulation, shared or private space depending on the development type. There are a wide variety of planting options for podiums requiring a varying amount of attention and planning. The podium can be landscaped with deep integrated planters for major landscape elements, such as trees and large shrubs, or landscaped with potted landscape, furniture, play structures and even turf or other ground cover. Downsides to using the podium as open space include waterproofing and drainage concerns, somewhat more limited landscape choices, smaller trees, and the overall cost of providing the planters, irrigation and landscape. Some of these problems can be solved by decreasing the lot area of the parking structure to provide on-grade landscaping and by proper planning before the design of the podium.
Potted plants are often used as a low cost alternative to integrated planters. Waterproofing and flashing protects the building and podium around integrated planters.

Potted plants limit the size and type of plants that can be used. If one chooses to design for larger trees and planters, special planning and coordination is needed to provide proper structural support. Large trees and planters can add extra hidden costs and increase reinforcement requirements for the structure. Large built-in planters require special attention to waterproofing, construction and detailing, particularly when they abut the buildings on the podium. Consultants, specializing in waterproofing, and architects familiar with these details can provide appropriate direction during construction.

Podium Garage Auto Entries
The garage entry has the greatest potential negative impact on the podium project's streetscape and requires special consideration of its location and design so as to be integrated into the building and minimally impact the streetscape. The ramped entry width should be minimized and the garage door should be integrated into the building façade. The podium access can often be best handled on developments on corner lots where drive access can be located on the side yard.

The garage entry has the greatest potential to negatively impact a projects relationship with the street. Parking garage entries should be integrated into the overall design of the project.
Structured Parking and Building Codes

The International Building Code (IBC) with Oregon amendments has several viable options for including parking garages in residential buildings.

A private parking garage for residents’ use only, and not more than 3,000 square feet in floor area, can be classified as a U Occupancy and be built using any Construction Type including conventional wood frame (Type V). Mechanical ventilation is not required. More than one 3,000-square-foot U-Occupancy parking garage is allowed in the same building if they are separated by fire walls.

Larger parking garages are classified as S-2 Occupancies, and are further classified as either open with natural ventilation, or enclosed with mechanical ventilation. Open parking garages must be of Construction Types I, II or IV (non-combustible or heavy-timber), but are usually built using concrete or steel. Open parking garages must have uniformly distributed openings on at least two sides with a cumulative area of at least 20% of the total perimeter wall area, and a cumulative length of at least 40% of the perimeter of the floor. Enclosed parking garages may be built of any Construction Type and must have mechanical ventilation as required by the Oregon Mechanical Code.

Parking garages in buildings governed by the Oregon Structural Specialty Code must be separated from other uses in the same building by one-hour fire-resistive walls and/or floor-ceilings. The location of the parking garage on the property depends on the placement and area of exterior wall openings. Walls less than 3 feet from a property line may not have any openings. Walls 3 – 5 feet from the property line may have up to 15% of their area open, walls 10 – 15 feet from the property line may have up to 25% of their area open, walls 10 – 15 feet from the property line may have up to 45% of their area open. These distances protect against fire traveling from building to building.

The International Residential Code (IRC) with Oregon amendments offers more flexibility for parking garages below residential structures including one and two-family dwellings, rowhouses (side-by-side dwellings on separate lots) and townhouses (multiple side-by-side dwellings on the same lot). Garages built using the Residential Code are not required to be ventilated and the separation between the garage and dwelling is less stringent.
Driveways: Transportation and Emergency Access Requirements

The size of driveways and other vehicle maneuvering areas are key elements that influence the design of higher-density infill projects. Besides Zoning Code development standards, other City requirements related to transportation and fire access play key roles in shaping these elements and the overall design of residential infill projects. To provide a clearer understanding of how driveways can be designed to meet the City’s various regulations, this section summarizes relevant Office of Transportation (“Transportation”) and Fire and Rescue (“Fire Bureau”) requirements. Note that these are generalized summaries only and do not take into account the many site-specific issues that typically have a bearing on requirements that would apply to a specific development proposal. Transportation and Fire Bureau staff should be consulted for greater detail and authoritative information.

Understanding requirements and allowances related to driveway width can make the difference between a project dominated by driveway surfaces (left) and one in which the driveway nearly disappears from view (above).
Transportation

Besides their responsibilities for public streets and other public rights-of-way, the Office of Transportation has authority regarding aspects of site design that have an impact on traffic safety and on-street parking. Regarding the site design of small infill projects, Transportation’s requirements are typically related to traffic safety when vehicles enter and exit public streets and to the preservation of on-street parking. Rules-of-thumb regarding Transportation’s requirements include:

**Driveway widths** (see Section 17.28.110 of the City Code)

- Driveways for houses, attached houses, and duplexes can be as narrow as 9’
- For multidwelling projects, driveways as narrow as 10’ are allowed for
  1. Sites with no more than 50’ of street frontage, and
  2. Wider sites, when the driveway provides access to no more than 10 parking spaces and access is on a local service street
- 20’-wide driveways are typically required for larger multidwelling projects, as well as for small projects when driveway access is on a busy street. This additional width is intended to ensure that two vehicles entering and exiting the driveway from a street can pass by each other, to avoid the traffic hazard posed by a vehicle having to stop in traffic while waiting to be able to enter the driveway.

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**Regulatory Tip**

Transportation’s primary concern regarding driveway width is where the driveway throat meets the street. When a 20’ width is required, it may be possible to have the driveway become narrower elsewhere on the site, particularly in the case of small multidwelling projects. The wider 20’ width is typically required for a length of 20’, measured from the street curb, after which point the driveway can be narrowed.
Maneuvering space to allow forward motion of vehicles

- Multidwelling vehicle areas are typically required to be designed to allow vehicles to enter and exit streets in a forward motion. To allow for this, a minimum **20’ back-out distance** is typically necessary behind parking spaces to provide enough room for vehicle maneuvering.

- This forward motion requirement does not typically apply to houses and rowhouses, except in the case of projects along busy streets, when a shared driveway or alley may be required instead of separate driveways for each unit. When rear, alley-accessed parking is included, however, the 20’ back-out distance is typically necessary.

Paired driveways

In order to preserve lengths of street curb for on street parking, front-accessed rowhouse driveways are typically required to be paired to limit the amount and frequency of curb cuts. For two-unit projects, however, Transportation staff may allow driveways to be separated if enough space for parking (approximately 18’) is provided between driveways.

Paired driveways are typically required for rowhouse projects (as in left image) to preserve on-street parking. An alternative to this for small, two unit projects is to provide enough space between driveways to allow an on-street parking space, which provides the design benefit of allowing landscaping to be the central feature (as in right image).
Fire Bureau

Requirements for fire access can play a key role in shaping the overall configuration of residential infill projects. While area required for fire access can sometimes occupy a significant portion of small sites, alternative strategies can be pursued that allow more space-efficient solutions for higher-density projects on small sites. Rules-of-thumb regarding fire access requirements include:

**A fire accessway is not needed if:**
(Note: distances from street curb are measured in terms of accessibility by fire hose)

1. All portions of buildings are within 150’ of a public street curb, or
2. Buildings have fire sprinklers, are within 250’ of a street curb, and are not taller than 30’,

**A fire accessway is required for:**

1. Unsprinklered buildings that extend more than 150’ from a street curb;
2. Any building that extends more than 250’ from a street curb; or
3. Any building more than 30’ tall that extends more than 150’ from a street curb or is not adjacent to a public street.

**Regulatory Tips**

- The 30’ measurement of building height is measured up to the mid-point of pitched roofs. However, the Fire Bureau will also consider allowing the lower building standards to apply to slightly taller buildings whose roof eaves (at gutter level) or exterior walls are no taller than 30’, as a primary concern is the ability to access windows within 30’ of ground level.
- On a deep site intended for higher-density development, it is possible to avoid having to include an emergency accessway if taller buildings are concentrated close to the street, with development on portions of the site that are more than 150’ from the street kept to lower-scale buildings less than 30’ high and sprinkled (see Prototype 5a).
Fire accessway width
(Applicable to driveways and private streets)
1. When required for buildings up to 30’ tall, fire accessways must typically be at least 20’ wide and set back at least 10’ from buildings being served by the accessway.

Exception: if structures with no more than 2 units extend beyond 150’ from a street curb, a 12’-wide emergency accessway is allowed (however, this narrower dimension is usually not granted if the accessway is lined by multiple units, due to concerns that larger numbers of units increase the likelihood that the accessway will be obstructed by illegally-parked vehicles).

2. For buildings more than 30’ tall that require a fire accessway, aerial apparatus access (for ladder trucks) must be provided that:
   a. Is at least 26’ wide in the immediate area of the building, and
   b. Is located at least 15’ and a maximum of 30’ from buildings being served by the accessway (this standard applies to at least one required access route).

Exception: Aerial apparatus access may not be required for taller buildings sprinkled to higher standards (NFPA13, which requires sprinklers in closets and attic space) and that include stairways with roof hatches providing roof access. A fire code appeal is necessary to determine if the added sprinkler coverage is an adequate substitute for an aerial access lane.

Other fire access requirements especially relevant to site design
- Two separate fire accessways are typically required for:
  a. Multifamily projects with more than 100 dwelling units when the project does not have adequate fire access from a public street. An exception is that multifamily projects with up to 200 units may have a single fire accessway when buildings are sprinklered.
  b. Developments with 30 or more one- or two-unit buildings, except when all units have sprinkler systems.
- Area for fire truck turnaround is required if the fire accessway extends more than 300’ from a street. (see the 2005 Portland Fire Code for details of approved turnarounds)
- Deeper building setbacks than those allowed by the Zoning Code may be required by the Fire Bureau for emergency access to third-story rescue windows.
A Note on Fire Sprinklers...

Installing fire sprinkler systems as an alternative to fire accessways allows for space-efficient configurations and can be particularly useful for higher-density projects on small sites. Sprinkler systems are typically required for residential buildings with three or more units. Sprinklers can also be a cost-effective option for houses and duplexes as alternatives to emergency accessways, as they:

- Decrease the amount of site area and materials that would otherwise be needed for an emergency accessway, providing cost savings that can defray much of the cost of sprinkler systems;
- Allow less impervious surface, decreasing the need for and costs of stormwater management systems;
- Are relatively inexpensive for houses and duplexes (about $1.50 per square foot of living space, utilizing the regular water system and meter).