

MIXED-USE PARKING STRUCTURE DESIGN

By John Purinton, PE, SE

A trend in the parking industry for the last decade, especially in downtown, urban, or educational settings, has been to include some type of mixed-use in new projects. Most of these mixed-use applications are retail and are located on the ground floor, where pedestrians will interact with the garage. The inclusion of this retail on the ground floor can significantly change the design from that required by a typical stand-alone garage. These changes will affect the cost and appearance of the garage, and definitely need to be considered starting at day one of the planning.

The biggest changes are:

- Floor-to-floor height of the second level.
- Structural framing of the second level.
- Mechanical, electrical, and plumbing services.
- Accommodating trash and delivery.



Floor-to-Floor Height

Typical parking structures have a floor-to-floor height from the ground to the second level of roughly 10.5 to 11.5 feet. The inclusion of mixed-use space will require this height to be anywhere from 16 to 19 feet, depending on the type of structural framing system and the mechanical ducting needs.

Most efficient stand-alone parking structures will use parked-on ramps, with a slope of 5 to 6 percent. When the floor-to-floor height increases by 5.5 to 7.5 feet, these efficient parked-on ramps are most likely not going to work simply because there is not enough length in the building to accommodate them. A typical garage ramp might be 180 feet in length, but with an increase of 6.5 feet in floor-to-floor height, this length would need increase approximately 110 feet, bringing the total ramp length to 290 feet. Most downtown blocks are not long enough to accommodate this. As a result, an express or speed ramp will need to be introduced. This will affect the parking efficiency (square foot per stall) and the framing system.



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Structural Framing at the Second Level

Most stand-alone garages are framed with long span beams that allow for unobstructed bays of parking. This type of framing will have a relatively high amount of deflection and vibration. While this is acceptable for parking, it may not be appropriate for retail space.

One approach to counter this vibration and noise is to incorporate short span framing with flat slabs. This has proven effective in minimizing the vibration above the retail space and helping improve its success. This approach can be used between the ground and second level only, with typical long-span framing used above the second floor for efficient parking.

Mechanical, Electrical, and Plumbing Services

Mechanical, electrical, and plumbing (MEP) design and construction costs will increase significantly for a mixed-use garage. The type and number of the retail spaces will need to be considered, along with how utilities will be monitored during use. One of the factors that causes the increased floor-to-floor height is the need to run ducting for the heating, air conditioning, and ventilation.

Trash and Delivery

Two everyday services that are common to retail spaces but most likely not to stand-alone parking are trash and supply deliveries. Where will the tenants walk to take the trash out? Where will the collection bins be stored—can they be accessed by the local service? Where will delivery trucks stage to unload supplies? All of these issues need to be addressed during the initial planning phases. Although not difficult to accommodate, these additional program elements will definitely take away valuable parking spaces at the ground floor and drive parking efficiency down.

Be prepared and informed before you start a challenging program with parking and retail, and your project will be successful. **P**