

Can Your Parking Garage Provide Hospital Surge Space During the COVID-19 Pandemic?

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Vanderbilt University Medical Center prepared an area in a parking garage to treat potential COVID-19 patients. (Photo provided by Vanderbilt University Medical Center.)

Hospitals are seeking surge space to accommodate a variety of hospital functions during the current novel coronavirus (COVID-19) pandemic. At the same time, it's possible that existing hospital parking garages are experiencing declines due to the cancellation of non-emergency treatments and the limitations of visiting inpatients. As a result, hospital parking structures may be suitable for certain non-parking uses during this time.

Parking structures proposed for alternative uses will need to be evaluated and checked for anticipated vehicle and environmental loads and access clearances to verify the suitability of the structure to accommodate that use.

It is important to note that certain characteristics in the design of parking structures may limit how they can be used.

Building Code Considerations

Building codes used for the design of parking structures in the US for the past 50+ years have resulted in most parking garages, whether above or below grade, being designed specifically for what is classified as “Light Vehicles” by the US Department of Transportation. Parking structures are designed for vehicles under 8,500 pounds gross vehicle weight rating, with standard headroom clearance stipulated by code to be 7’ minimum clear height with 8’2” clear height for van-accessible parking and 9’6” clear for passenger loading zones.

Headroom clearance limitations generally prevent passenger loading (pick-up/drop-off) zones in a typical parking structure. Current code requires passenger loading zones to have an accessible passenger loading space with 9’6” clear for the vehicle path of travel at every passenger loading zone. The 9’6” is intended to accommodate paratransit vehicles, which usually exceed the typical headroom clearance in open parking structures. Given the emergency nature of this situation, it would be reasonable to limit the use of the zone to private passenger vehicles only. The Americans with Disabilities Act (ADA) however, will still require that a passenger loading zone for the same purposes be provided at some equally convenient location at the site. That could also be the ambulance entrance to the ER where screening is also likely to occur.

Supported floors (with space underneath) typically were designed for loads associated with Light Vehicles and may not be adequate for alternative uses. Ambulances may be too heavy for staging or passenger unloading on an upper level that otherwise connects to appropriate space inside the hospital. Grade slabs conceivably can take heavier loads and/or could be easier to repair if damaged by the temporary use.

If the parking structure is in a seismic zone, there are added considerations in accommodating non-vehicular uses. Notably, there was a magnitude 5.8 earthquake near Salt Lake City, Utah on March 18, 2020 in the midst of the COVID-19 pandemic. Fundamentally, earthquake design for parking structures only expects that the structure not collapse under a set of loads appropriate to the location. Structures designed for clinical uses are required to be more resilient and require the facility to continue operations during and following a “design” earthquake event. It’s important to know if the garage has been designed and built to appropriate seismic code for alternative uses as mandated for clinical functions.

The following compares the design loads required by code for various potential alternative uses:

Use	Design Load Requirement (PSF)
Open Parking Structures - covered levels	40
Open Parking Structure - roof	40 +snow
In Patient Care Rooms	40
Nursing Homes (bedrooms)	40
Assisted Living and Multi-family Residential	40
Hotel Rooms	40
Medical Offices	50
Administrative Offices	50
Emergency Room and Outpatient Care Spaces	60

Anything that is similar in nature to inpatient care rooms or nursing home bedrooms, including isolation wards, can reasonably be considered in parking structures. However, waiting areas, ER, outpatient care spaces, and

presumably ICU units—where there is considerably more equipment—would require a specific structural evaluation to determine if the structure can accommodate it.

Corridors or assembly areas will have higher load, between 60 and 100 PSF, and therefore, alternate uses in existing parking structures should avoid any use that would be considered “assembly.”

Additional building code requirements for fire-protection, fire separation, emergency egress and ventilation need to be addressed for alternative uses. Ambulances, paratransit and other “bus” type vehicles require the area to be sprinklered and ventilated, even if the structure presently meets openness requirements for Light Vehicles. Ambulances are often a concern because of oxygen tanks. The local building officials could temporarily waive the requirement for sprinklers and ventilation for “other” vehicles, however, they may not waive a requirement for a fire separation between the vehicular area and any administrative office or hospital clinical spaces.

Passenger Unloading and Initial Screening of Patients

As discussed in our previous post on drive-through screening, hospitals have an urgent need to reduce the number of potentially infectious persons from Emergency Rooms (ER) and outpatient procedure check-in locations. On March 9, 2020, The Centers for Medicare and Medicaid Services directed that Medicare-certified hospitals with emergency departments are to provide a federally required medical screening examination to every patient that comes to the ER, including those suspected of having COVID-19. If the vehicles in the garage are limited to Light Vehicles and an alternate location is provided for over-height vehicles (up to 9’6”), this function could easily be moved to any level within the facility.

The screening should occur immediately before the patient is either sent back to the car or allowed into the hospital, with appropriate precautions for contagion. One presumes it would need to be near a controlled entry and have rejection routes, plus routes to parking for the driver after a passenger has been accepted for further screening, testing or treatment. If potential patients are immediately screened for symptoms and directed on, it probably doesn’t trigger an assembly loading and would not require anything other than a small area for the staff to stage for screening. However, if patients are to be held in the area to be assessed and tested for viruses, there are additional considerations as discussed in the following sections.

Surge Assessment (Similar to ER Patient Assessment Areas) or Isolation Bed Space

Vanderbilt University Medical Center (VUMC) has prepared an area in one of their garages for surge patient screening. A video released by the medical center indicates it has stretcher-type beds that appear similar to those used in an Emergency Room patient assessment area. Patients who show up at the VUMC ER are already met by nurses in masks and protective gowns and screened outside the ER. Once the new facility is done, if COVID19 or flu is suspected they will be walked or wheeled to the outpost on the third floor of a parking garage. There they will be screened and possibly tested for COVID-19 and either sent home for isolation or, if their conditions require it, admitted for treatment in protected parts of the hospital.

According to a [press release](#):

“Like many other large academic medical centers, Vanderbilt University Medical Center has established an area that is away from the main emergency department to treat potential COVID-19 patients. Many of you may have seen photos shared on social media that this area is part of the “hospital overflow.” This is incorrect. The area, in an adjacent parking garage, is separated from the Adult Emergency Department to create appropriate distance from other patients and to protect from potential exposure to COVID-19. The area was created with walk-in and stretcher areas for the Adult Emergency Department and EMS use. We feel it’s better to be prepared than not.”

Space could be developed for non-acute care or isolation care if the requirements involves nothing more than basic equipment and beds. It might be argued these screening areas are no heavier than inpatient care and nursing home rooms, and thus likely could reasonably be placed in a parking garage without significant structural issues. Remember, however, that seismic risks might require further study of the structural capability.

Some considerations for this type of screening, short stays (perhaps while testing is completed) or nonacute multi-day care in a parking garage, include the following:

- Probably most important of all is to select an area that has easy connection to the hospital, whether at grade or via a pedestrian bridge or tunnel. As noted above, the hospital probably wants this space to be separate from an emergency room that serves other patients, and yet allows a patient undergoing screening or non-acute isolation care to be moved to into the hospital or to an ICU unit expeditiously. Many parking structures, especially older ones, don’t have stretcher-sized elevators, and even if they do, the cab is designed to barely accommodate one in an emergency evacuation of a patron, not be regularly used for stretcher transport.
- Because parking floors are designed to slope for drainage, and further often have an intentionally rough broom finish to help with vehicle and pedestrian traction, a false floor probably should be constructed to level the floor and provide a surface that is easy to clean to hospital patient care standards. Careful design will assist in distributing loads to the beams or tee stems, rather than point loads on thin parking floor slabs.
- While existing floor drains might be useful for washdown, it would be important to determine if the parking floor drainage is considered storm or sanitary, and if any further treatment of drainage is required for medical uses. Standard floor cleaning systems in hospitals would likely be more appropriate than trying to use the parking wash down drains.
- Considering the large amount of concrete in parking garages, they can be noisy and bouncy. Modular acoustical walls and ceilings will cut down on noise and provide privacy and quiet from any parking areas nearby.
- Multiple data/comm drops and emergency power receptacles are likely required for hospital beds at every column and along walls at 8’ on-center.
- Enhanced lighting – every light likely needs to be on emergency power. Parking garages typically are designed for an average illumination of less than 10-foot candles and are not designed to provide lighting controlled by a patient or staff member. Hospital rooms need to be designed for an ambient level of lighting with additional task lighting.
- In almost any climate, heating and air conditioning will need to be added. Fresh air supplies should be pulled from the exterior, not parking areas.
- There may need to be temporary electrical service added with a panel to distribute power to the patient areas.



- A critical issue will be restrooms for both staff and patients, which are difficult to retrofit in parking. Laundry and janitorial needs must also be considered. It is extremely important to involve a structural engineer, preferably the original designer, before cutting holes in **any** floor slabs.

The easiest area to convert is likely a tent over the roof level (where sloped only for drainage) and equipment and construction can be lifted by crane to the top level. The remainder of the structure can then continue to be used as normal for parking. This might be especially appropriate for isolation wards with only basic medical (non-acute) care similar to those rendered in nursing homes and rehabilitation centers.

Conclusion

There is a growing and urgent need for surge space at hospitals across the US due to the coronavirus pandemic, along with significantly increased needs for patient screening and isolation of flu-like illnesses. Existing parking structures might be considered for these services, freeing up hospital spaces for more acute care. To learn more, please contact [Mary Smith, PE](mailto:msmith@walkerconsultants.com) at msmith@walkerconsultants.com.