
Fire Code Consulting, Education & Mentoring Programs

6844 Nolan Road, Forestville, CA 95436
Tel: 707-887-0357 Cell: 707-849-6042
Email: hans@handsassociates.net Website: www.andssassociates.net

DATE: November 8, 2021
TO: Dave Despres, Replay Destinations Developer
FROM: Hans Henneberque, Fire Code Consultant
Jon Corbett, Fire Protection Engineer
SUBJECT: Fire Protection for underground parking garage and car stacker
QUERY: What are some practical and feasible methods of providing fire protection for a 3-level car stacker located in an underground parking structure.

PROJECT: Proposed new Hotel within the City of Healdsburg in the Mill District. The plan is for a 3-4 story hotel with an “amenities” building to be constructed, above ground, on top of an underground automobile parking structure. The project is exploring some practical and feasible options to allow for a “mechanical-access parking” structure within an underground parking garage. The vehicles would be brought into the parking garage via an elevator rather than a vehicle access ramp. The underground parking garage would be limited to staff only parking attendants and no public and be provided with at least two means of egress by way of stairways.

Our team was able to meet with yourself and members of your team to discuss the project and receive some additional information on the project. We understand that the project has not yet been submitted to the City of Healdsburg for planning purposes, but that the fire department has requested some information on how your company would go about providing fire protection for the underground parking structure.

Our understanding is that the planned underground parking area is planned somewhat in the shape of an “L” (see attached garage layout) and that the area for the car-stackers is located under the planned hotel. The cars would be placed in an elevator at a separate above ground building, across from the hotel main entrance, and be elevated down into the underground building. Valet staff would then drive the vehicle a short distance to the car stacker area and place the vehicle into the car stacker, 3-levels an no pit. Vehicles would be retrieved in a reverse order. The underground building would be approximately 15,000 square feet in area and be approximately 20 feet from floor to ceiling.

THINGS TO BE CONSIDERED:

1. Means of Egress for person working in the garage
2. Type of fire protection, such as automatic fire sprinkler system for standard underground parking garage and for car stacker.
3. Relief of hazardous exhaust fumes for normal operation
4. HVAC requirements under emergency conditions
5. Fire department access
6. Drainage of fire sprinkler water after emergency extinguishment

DISCUSSION:

We believe the most significant issue or concept, for this project, is that it will not be, what we normally consider, an underground parking garage with vehicle ramp. Underground parking garages with a vehicle ramp where people drive their car into the parking structure, park their vehicle and then take an elevator to the above ground building have been constructed for many years and are regulated by the building code. These facilities are classified as an S-2 enclosed parking garage and are regularly protected with a standard fire sprinkler system with an Ordinary Hazard Group 1 design density for the protection. H&S is not aware of any special requirements for capturing fire sprinkler water in case of an activation for these buildings. Underground buildings are also required to provide appropriate HVAC and CO removal for underground buildings in order to assure a safe atmosphere due to the exhaust fumes of vehicles driving in the garage.

The main difference between a standard underground parking garage and this project is that there is not a vehicle access ramp, thus vehicles will not drive into the garage but be brought into the garage via an elevator. We anticipate that the vehicle elevator will have to be provided with emergency power in order to retrieve vehicles that may become a problem.

The 2019 California Building and Fire Codes, as of 7/1/21, address the use of car stackers. These are identified as “mechanical-access garages.” CBC section 406.6.4 notes some very specific requirements for the mechanical access garages, These include, separation from other occupancies, the same as all other S-2 parking garages, smoke removal, the same as all underground buildings (the requirement for smoke removal under this section may be more stringent than other underground buildings), a fire control equipment room and fire department access doors similar to access to a high-piled storage building and a specially designed fire protection system.

The underground building can be constructed and protected as prescribed by the requirements of the CBC, thus no special options should be needed. The car stacker can be protected by a specially designed fire sprinkler system designed by a fire protection engineer. Although the regulations for mechanical-access garage are fairly new in the code, many jurisdictions have been dealing and regulations these car stackers for many years in various ways. We now have a standard and uniform method of handling these occupancies per the CBC and CFC. The protection of the car stacker can be handled simply as a different hazard within a larger building. The garage area will have one level of protection and the car stacker will have another level of protection.

OPTIONS: We envision two main options for this project:

1. The underground building can be protected with one automatic fire sprinkler system that is designed for a normal S-2 parking garage for the entire garage with the car stackers will be protected by a special designed sprinkler system. See description of the specially designed sprinkler system. The entire space would need to provide smoke removal at a rate approximately twice that of option #2.
2. Provide a fire separation door to split the underground building into two separate areas. With a fire separation-fire door (with a man door) (9,656 sq. ft. x 20') the make-up and exhaust air will require ~6,500 cfm of air flow. Make up air inlets/outlets located at 6' AFF and remote from exhaust air intakes/outlets. The CO removal system may be able to be used for the exhaust system if designed for the higher temperatures and FCC control.

REQUIREMENTS:

- A. Fire protection for specially designed fire protection for car stacker: 3 level stacker no pits: The fire sprinkler design requires ceiling coverage 1,500 sq. ft., 0.20 gpm/sq. ft. (OH 2) with 0.15 gpm (OH 1) under platforms for 6 cars per level (assume 2 sprinklers per car) for 24 flowing sprinklers. Estimated sprinkler water flow to be pumped out 800 gpm. A 3-foot draft stop is needed at 2-feet from the car stackers' open perimeter. A pit with space under cars requires sprinkler coverage and adds ~200 gpm to pump out. The sprinkler system demand is ~800 to 1,000 gpm plus 250 gpm hose. Most likely there will be a manual Class I standpipe.
- B. Separation: The underground garage would be completely separated from the building with a 3-hour fire barrier and constructed of Type 1-A construction per CBC 510.2.
- C. Smoke removal: The smoke removal will be provided to meet the requirements of CBC 910.4 for a mechanical smoke removal system. This will be a mechanical engineered system with make-up air brought in and exhaust air removed. As this is an underground building with another building on top of it, consideration will be given of where the equipment is located to not interfere with other operations or amenities.
- D. Fire Control Equipment Room: A fire control equipment room will be provided. The location of this room must be so located to be readily accessible to the fire department, based on their operations, and shall be approved by the fire marshal. The fire control equipment room shall be of sufficient size to accommodate the required equipment but shall not be less than 50 square feet. This room shall also include any emergency shut down functions and allow for manual activation of the smoke removal system.
- E. Fire department access doors. Fire department access doors are required on the exterior walls facing fire department access roads. This requirement is typically for above ground buildings and there are exceptions for this condition also. Fire department access doors are anticipated to be the two egress stairs into the underground garage however, the fire marshal may request additional access.
- F. Means of Egress: At least two exit access stairs will be provided. These stairs will be separated from any buildings constructed on top of the underground garage.

CONCLUSION: It is our opinion that the underground parking garage can be protected in a manner that is both code compliant and feasible. The initial review of the project would seem to indicate that this project is significantly different than most other projects. Admittedly, the project includes some elements that are somewhat unique, however, in the course of this review, we find that yes it presents some challenges for the engineering issues, but does not require any special considerations in order to meet both building and code requirements. We believe that the options and requirements identified are reasonable and feasible.