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PZ23-12000042

04/03/2024



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February 22, 2024

Via Email

Jim Galloway
Fire Plans Examiner
Pompano Beach Fire Rescue
120 SW 3rd Street
Pompano Beach, FL 33060

Pompano Hotel Garage – Pompano Beach, FL

Dear Mr. Galloway,

SLS has reviewed the Fire Department comments concerning the fire protection strategy for the parking garage at the Pompano Hotel project (File #: LN-531). SLS has also had a call with Mr. Galloway on November 2, 2023, to discuss these comments.

The protection scheme for the parking garage including areas with car stackers will be based on the recently introduced requirements of the 2022 Edition of NFPA 13, Standard for the Installation of Sprinkler Systems. These requirements coupled with design criteria from NFPA 88A, Standard for Parking Structures (2019 and 2023 Editions) provide a set of robust design provisions for the automatic sprinkler system. We have provided a two-part letter analysis of the protection measures that will be provided for the parking garage and have addressed the review comments.

PART I: SUMMARY OF RESPONSE TO COMMENTS

We have briefly addressed each of the comments in the table below. Part two of the letter elaborates on the specific protection scheme and design approach taken by the team to meet the requirements of the applicable codes and standards.

FIRE DEPARTMENT COMMENT	RESPONSE
1. Tandem stacked parking will not be allowed within the parking garage.	1. Requirements in recent and current Editions of both NFPA 13 and NFPA 88A provide explicit guidance on protection measures associated with car stackers. The

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FIRE DEPARTMENT COMMENT	RESPONSE
	proposed design approach noted in item 3 below and Part II of the report provides the code path and design requirements that permit car stackers.
2. Any parking area use with stacking must be protected as Extra Hazard Group 2.	Agreed. The parking areas using stackers will be designed in accordance with NFPA 13 and Extra Hazard Group 2. Sprinkler layout provisions include spacing, location, and hydraulic calculation (density/area combinations) have been accounted for. Additional information is found in item 3 below.
3. Appears that plan showed double row with stacking in the North end of the parking lot on multiple levels? How will this be protected and how will fire operations be able to combat, protect, defend a vehicle fire of this amount of fuel load?	The garage does include car stackers and the protection measures outlined in Part II of this letter provide the details and background on the protection scheme. It is based on the requirements from NFPA 88A as well as NFPA 13. These standards are mandatory referenced documents that are appropriate and applicable to the protection of the garage. The scope of the prevailing building and fire codes utilized for this project focuses on the built environment portions of the design. It is not within the scope of the developer or the design team to recommend fire operations, strategies, or tactics for any type of building fire event.
4. Proposed electric vehicle parking? Location cannot be stacked, must be protected as Extra Hazard Group 2 all should be located at ground level near the main entrance of building with direct access by the fire department.	The use of the parking garage is not restricted to any particular type of vehicle or fuel source, i.e. combustion engine, fuel cell, electric vehicle (EV). NFPA 88A as noted previously and shown in Part II of this report, portions of the garage utilizing stackers will be designed in accordance with Extra Hazard Group 2. There are no limitations or restrictions on designating EV parking spaces on ground levels, near garage entrances, nor prohibiting them to be parked on the car stackers.

PART II: PROTECTION SCHEME FOR THE GARAGE INCLUDING CAR STACKERS

The following information outlines the design approach for the automatic sprinkler system to protect the stacker areas within the garage. Car stackers are increasing in popularity and come in a variety of configurations ranging from two level stackers to as high as four level stackers. Sprinkler design provisions continue to expand and provide more detail and information regarding appropriate measures to protect these configurations.

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A. BACKGROUND

Fundamental protection measures for car stackers are currently found in NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 88A, Standard for Parking Garages. Recent revisions to these documents continue to expand and include specific information regarding protection options. A summary of the recent progression of these changes are provided below indicating the text from the standard:

NFPA 13:2016, 2019 Editions

§A.5.4.2/A.4.3.6 - Extra hazard (Group 2) occupancies include occupancies having uses and conditions similar to the following: (9) Car stackers and car lift systems with 2 cars stacked vertically.

2022 Edition

§A.4.3.5 - Extra hazard (Group 2) occupancies include occupancies having uses and conditions similar to the following: (9) Car stackers and car lift systems with 2 cars stacked vertically.

§10.3.2: Sidewall sprinklers shall only be installed as follows: (9)* Under cars in car stackers and car lift systems with cars stacked vertically placed under each level of cars.

§A10.3.2 (9): Where sprinkler protection is provided under each level of cars, the ceiling sprinklers should be designed based upon the occupancy classification of parking garages. Not all car stackers or car lift systems will be able to have a sidewall sprinkler installed due to car stacker design or operation. The sidewall sprinklers must be installed meeting the requirements in the body of the standard including 9.5.5.3.1.2. A performance-based design is allowed with proper documentation to show equivalent protection. If the car stacker or car lift system design and/or operation prohibits the coverage under the cars, then the overhead system would be required to be designed to Extra Hazard Group 2 occupancy classification [see A.4.3.5(9)].

§9.5.3.3.1.2: Sprinklers located below obstructions shall comply with one of the following, regardless of the geometry of the obstruction:

(1) Installed below the obstruction.

(2) Installed adjacent to the obstruction not more than 3 in. from the outside edge of the obstruction.

§10.2.8.1*: The clearance between the deflector and the top of storage shall be 18 in. (450 mm) or greater.

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A.10.2.8.1: The 18 in. (450 mm) clearance is not intended to apply to vehicles in parking structures.

Prior to the release of the 2022 Edition of NFPA 13, the only design criteria provided in the standard for car stackers was Extra Hazard Group 2 protection from the ceiling level system. In the 2022 Edition, the design standard added an optional design approach and criteria for providing sidewall spray sprinklers under each level of cars stored.

For two-level car stackers, this would mean a single sidewall spray sprinkler would be installed at the mid-section of the wall, underneath the top level of the stacked car. The annex material provided for NFPA 13 Section 10.3.2 (9) goes on to state that if a sidewall sprinkler is installed underneath each level of cars, the ceiling system can be designed using the standard Ordinary Hazard Group 2 (OH2) design criteria, as opposed to the Extra Hazard Group 2 design criteria that is required when sprinkler protection is only provided at the ceiling level.

Until the release of the newest edition of NFPA 13 (2022 Edition), limited design criteria had been published for the protection of car stackers. The July 2020 report, *Modern Vehicle Hazards in Parking Garages & Vehicle Carriers*, published by the Fire Protection Research Foundation provides a summary of the state of practice regarding protection measures, including those found in more recent editions of NFPA standards, and stresses the need for continuing research and study in this area.

To summarize the findings of the study, it was found through testing that sprinklers can extinguish the fire in the scenarios and configurations tested. In the case of fire within a vehicle stacker where the lower vehicle is burning, the sprinklers may only be able to control the fire and prevent further fire spread. Testing showed that the fire flared back up when the sprinklers were turned off. But with sufficient water supply, this should allow firefighting personnel to arrive and extinguish the fire. Note that this testing was only done on a two-level stacker system with sprinklers over both cars. It is unclear how the sprinklers would perform on larger systems (stackers 3 levels and higher), or a stacker with only ceiling level sprinklers.

Outside of the codes and standards, some cities such as San Francisco, CA, and Portland, OR have developed their own design criteria for sprinkler protection of car stackers in parking garages. In each of these cities Extra Hazard Group 2 (EH2) is the discharge criteria required at the ceiling level and a horizontal sidewall sprinkler listed for Ordinary Hazard Group 2 (OH2) is underneath each parking lift platform. These design approaches introduce additional conservatism and go beyond the current prescriptive requirements within NFPA 13.

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DESIGN APPROACH

Based on the design criteria provided in the 2022 Edition of NFPA 13 coupled with the supplemental design criteria we have identified for similar projects in other jurisdictions, we are proposing the following design approach for the automatic fire sprinkler system in those portions of the garage that contain the car stackers. As part of an alternative means and method approach that can be applied to enclosed parking garages utilizing car stackers with a single-lift platform,

SLS Consulting proposes the following design criteria be utilized:

- Parking garage areas containing Car Stackers / lift systems with a single lift platform shall be protected by an automatic wet-pipe sprinkler system designed as Extra Hazard Group 2 (EH2) for a maximum of two cars stacked vertically in the same location. In addition, standard-response horizontal sidewall sprinklers listed and designed for Ordinary Hazard Group 2 (OH2) shall be required for use under the parking lift platform. The sidewall sprinkler shall be permitted to be either standard coverage or extended coverage, depending on the width of the car stacker bays and what is required to provide protection underneath the platform.
- Discharge criteria for ceiling level sprinklers: 0.40 gpm/ft² over a minimum 2,500 ft² design area.
- Discharge criteria for sidewall sprinklers underneath stacker: 0.20 gpm/ft² over a minimum 1,500 ft² design area.
- The hydraulic calculation design criteria shall include all ceiling-level sprinklers within a minimum 2,500 ft² area of sprinkler operation, or the maximum area containing car stackers/lift systems extending 15 feet into adjacent areas that do not contain car stackers/lift systems. Sidewall sprinklers under the parking lift platforms are not required to be included in the area of sprinkler operation beyond their 1500 ft² design area and shall not be incorporated into the hydraulic calculation.
- The sprinkler design criteria for car stackers/lift systems must extend 15 feet into adjacent areas that do not contain car stackers/lift systems per 2016 NFPA 13 Section 11.1.2(1).
- Per the annex material for Section 10.2.8 of NFPA 13, 2022 Edition states that the 18-inch clearance requirement is not intended to apply to vehicles in parking structures.
- Per our discussion with the Pompano Fire Department, a 22-inch path between every other parking stacker will be required to access the lifts.

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The proposed design criteria establish a more conservative approach to protecting car stackers in accordance with the newest edition of the applicable codes and standards. By providing a sidewall sprinkler underneath the car stacker platform, a more effective means of protecting the lower-level vehicle is achieved.

PART III: CONCLUSION

It is the professional opinion of SLS Consulting, LLC. that the methods provided within this letter address the Fire Department comments regarding parking stackers in the Pompano Hotel. The method of fire protection approach from this code analysis regarding the parking stackers provides a level of life safety that meets or exceeds the level required in accordance with the 2022 Edition of NFPA 13 and NFPA 88A.

If you have any questions regarding the information included in this letter, please do not hesitate to contact us.

Sincerely,

SLS Consulting, LLC



Michael P. Sheehan, P.E.

Fire Protection Engineer/Principal