

June 11, 2014

Express Fire Systems Inc.
1913 41st Street
Washougal, WA 98671

ATTN: Jerry Denney

RE: Janey II Automated-Type Parking Structure Requirements and Water Storage Tank Capacity Appeal

Division 21 FIRE SUPPRESSION, 1.06 QUALITY ASSURANCE of the project specifications requires compliance with the Oregon Structural Specialty Code (OSSC) and the Oregon Fire Code (OFC), (listed as State of Oregon "IBC" and "IFC"), and NFPA 13, 14, and 20. At the time of your bid for this project, the convention within the fire sprinkler industry was to provide fire sprinkler protection for parking structures in accordance with the Ordinary Hazard, Group 1 requirements of NFPA 13. The subject of this type of parking structure is also not provided for in any code or referenced standard.

NFPA 13 provides design criteria for various occupancies based on the expected fire load and severity. The annex material in NFPA standards is not a part of the standard, but is provided for further explanation or guidance only. Annex A of NFPA 13 includes some examples of occupancies that are considered as Light Hazard, Ordinary Hazard (Group 1 or 2), and Extra Hazard (Group 1 or 2). Occupancies for automobile parking and showrooms are included in the NFPA 13 examples for Ordinary Hazard, Group 1. That will normally be used as the industry standard convention.

However, the automated-type, multi-level car parking structure is not within the scope of the specification— and code-referenced standard, NFPA-13-2010, Installation of Sprinkler Systems. NFPA 88A, Standard for Parking Structures was not included in the list of specified standards. The design requirements for fire sprinkler protection of the multi-level parking are also not in the Oregon codes or in the Portland Fire Code. Since I was aware that NFPA considers these parking structures beyond the scope of NFPA 13 (See NFPA 88A comments below), a request for specific guidance was made to the fire department plans reviewer.

The Portland Fire Marshal has requirements that are not published or referenced on their web site. The existence of these requirements is not commonly known and is made available only when specifically requested. It appears from the size of the water tank for the fire pump that the A/E design team was also not aware of the fire marshal's requirements. The fire marshal's office provided a copy of their internal plans review memo, dated April 15, 2014, which is attached to this letter.

The Portland Fire Marshal has determined that automated-type, multi-level parking structures present a greater hazard than Ordinary-Group 1. Their requirements affect both the design of the fire sprinkler system and the capacity of the water storage tank. The sprinkler system will require more and larger pipe, added sprinklers and more closely-spaced sprinklers. It is also necessary for the owner or their representative to enter an appeal regarding the size of the water tank to the fire marshal.

The Oregon Fire Code provides for the Fire Marshal or Authority Having Jurisdiction (AHJ) to use compliance with other standards as evidence of compliance with the intent of the code, or to make a separate determination when matters are not provided for in the code.

OFC 102.8 Subjects not regulated by this code. Where no applicable standards or requirements are set forth in this code, or are contained within statutes or administrative rules adopted by the jurisdiction, compliance with applicable standards of the National Fire Protection Association or other nationally recognized fire safety standards, as *approved*, shall be deemed as prima facie evidence of compliance with the intent of this code. Nothing herein shall derogate from the authority of the *fire code official* to determine compliance with codes or standards for those activities or installations within the *fire code official's* jurisdiction or responsibility.

OFC 102.9 Matters not provided for. Requirements that are essential for the public safety of an existing or proposed activity, building or structure, or for the safety of the occupants thereof, which are not specifically provided for by this code shall be determined by the *fire code official*.

Excerpts from NFPA 13-2010 show the conventional protection for parking and the definitions for Ordinary and Extra Hazard Occupancies. Annex A comments are designated by the letter "A" in front of the applicable paragraph or section of the standard.

NFPA 13-2010, A.5.3.1 Ordinary hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Automobile parking and showrooms

NFPA 13-2010, 5.3.1.1 Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8 ft (2.4 m), and fires with moderate rates of heat release are expected.

NFPA 13-2010, 5.4.1* Extra Hazard (Group 1). Extra hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible or flammable liquids.

Excerpt from NFPA 88A-2011 (New section in 2011 edition, unchanged in 2015 edition):

NFPA 88A-2011, A.9.2.4.1 As with the more conventional parking garages, NFPA 88A refers to other NFPA standards (NFPA 13, 14, 72, 101, and 5000) for certain fire protection features of automated-type parking structures. NFPA 13 at this time does not describe how to protect automated-type parking structures. The NFPA 13 approach to protection of multiple row racks [based on storage cubes of 1.22 m to 1.52 m (4 ft to 5 ft) on each side] does not adequately address the automated-type parking structure commodity [Group A plastics (vehicles with both plastics and fuel loads), of nominal dimensions 2.13 m × 5.79 m × 1.83 m (7 ft × 19 ft × 6 ft) high on solid shelves, dynamically controlled by the facility's "system"].

The Technical Committee on Garages and Parking Structures acknowledges that determining the minimum requirements for sprinkler protection is within the scope of the Sprinkler Project's Technical Committee on Sprinkler System Discharge Criteria. to identify the automatic sprinkler issues specific to the automated type parking structures and to support the work of the Sprinkler Project, a research topic description proposal has been submitted to the Sprinkler Research Council of NFPA's Fire Protection Research Foundation.

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The Portland fire marshal requirements change the fire sprinkler design from Ordinary Hazard, Group 1 to Extra Hazard, Group 1. This changes the design density from 0.20 gpm/sq. ft. to 0.30 gpm/sq. ft. and the design area for the dry sprinkler system in the Janey II parking area from 1,950 sq. ft. to 2,300 sq. ft. The existing water tank would be large enough for an estimated one hour demand for Ordinary Hazard, Group 1 of 25,740 gallons.

Since the fire marshal will allow the Extra Hazard density to be limited to the area over the multi-level car stack, with the Ordinary Hazard Group 1 density over the remainder of the design area, the water demand over the total design area can be minimized by installing a separate main on the same dry system to serve each car stack. The estimated secondary supply (tank) water demand for the sprinklers only will then be approximately 36,960 gallons (greater than the tank design). When the car stacker/lift system is no more than two levels high, the fire marshal also requires a 100 gpm hose stream allowance to be included in the secondary supply bringing the estimated total tank volume to 42,960 gallons. Without the separate mains behind the car stackers to aid in system hydraulic design balancing, this estimated total water supply for a two-level stacker would be approximately 51,540 gallons.

Since the car stacks are more than two levels high, the fire marshal requires that an appeal be entered to determine the required water tank size for the secondary supply. The appeal will be further complicated by the existing size of the already installed water tank. I can assist the owner or their representative with this appeal, if requested.

Please advise the general contractor of this unforeseen change in sprinkler requirements and the need for a fire code appeal.

Respectfully yours,



Kenneth D. Fuglee, PE
Fire Protection Engineer

ATTACHMENTS: (1) Portland Fire & Rescue Plan Review Memo

PORTLAND FIRE & RESCUE

Revised
April 15, 2014

GIDEON PLAN REVIEW
MEMO Sprinkler 18

Sprinkler Coverage for Car Stacking/Lift Systems

Contact Person: Hanson

ISSUE:

Establish requirements for sprinkler protection of car stackers/lift systems not specifically addressed in NFPA 13.

BACKGROUND:

It is becoming common for building owners in Portland to use car stackers/lift systems, with this comes the issue of how to best protect cars that are stacked two or more layers in height with automatic sprinkler systems.

FINDING:

In building parking garages or other areas containing car stackers/lift systems the car stackers/lift systems shall be protected by an automatic sprinkler system designed to Extra Hazard Group 1 at the ceiling. In addition, standard or extended coverage sidewall sprinklers listed for Ordinary Group Hazard 2 shall be provided under each parking level, including the bottom level if the stacker/lift system is provided with a pit.

Extra Hazard Group I area is 2,500 square feet, unless the square footage of the car stacker is less, at a .3 density. The design area may be reduced to 2000 square feet per NFPA 13 (2010) 11.2.3.2.6 when high temperature sprinklers are used. For dry pipe systems, the area shall be increased by 30 percent per NFPA 13 (2010) 11.2.3.2.5

The number of heads to calculate is to be the most demanding of either the ceiling or any of the lower car stacker levels.

The 15 foot requirement in the NFPA 13 (2010 ed. 11.2.1) to extend the more demanding design area into the lesser area is not required.

Note:

For a high-rise building, car stacker sprinkler systems may cause the secondary water supply capacity to increase. For car stackers/lift systems no more than 2 levels high, water supply and secondary water supply capacity for the system is to be considered as an Ordinary Hazard Group 2 System. The secondary water supply shall be designed for largest car stacking sprinkler system demand plus a hose allowance of 100 gpm for 60 minutes.