1. Revise 18.4.5.2 and add a new 18.4.5.2.3 to read as follows:

**18.4.5.2 Buildings Other Than One- and Two-Family Dwellings.** The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table 18.4.5.1.2 and as modified by 18.4.5.2.1 through 18.4.5.2.3.

18.4.5.2.1 Required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system. The resulting fire flow shall not be less than 1000 gpm (3785 L/min).

18.4.5.2.2 Required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system, which utilizes quick response sprinklers throughout. The resulting fire flow shall not be less than 600 gpm (2270 L/min).

18.4.5.2.3 Required fire flow for open parking structures that are not protected throughout by an approved automatic sprinkler system shall be reduced by 75 percent where all of the following conditions are met:


(2) The open parking structure shall be of Type I or Type II construction.

(3) The resulting fire flow shall not be less than 1000 gpm (3785 L/min).

**Submitter’s Substantiation:** Section 18.4.5’s fire flow requirements for buildings is based upon a correlation of the Insurance Service Organization (ISO) Guidelines and first appeared in NFPA 1 in the Annex of the 2003 edition. The requirements were then moved to Section 18.4.5 during the 2006 to 2009 revision. The ISO method focuses only on a building’s construction type and size, disregarding its use and anticipated fire load and fire hazards. The fire flow calculations obtained by Table 18.4.5.2 assume complete building fire involvement.

Applying NFPA 1 Table 18.4.5.2 to a typical open parking structure – e.g., 8-levels; 166,000 square feet; and sized to accommodate approximately 420 automobiles, which is quite common in urban and suburban communities – requires a fire flow of 5,750 GPM for a duration of 4 hours. To put this into perspective, Table 18.4.5.2 assumes if hose lines are used to extinguish the fire, then a total of 23 2½-inch diameter hose lines, each flowing 250 gpm, are required. This means more than 20 fire department pumper – assuming a manning level of four firefighters per pumper – would be necessary to extinguish a fire in an open parking structure using hose lines. This supposition is contrary to fire statistics, full-scale fire test results, and other NFPA standards.

Compliance with Table 18.4.5.2 for a non-sprinklered open parking structure is unreasonable and problematic because a fire flow quantity of this magnitude requires substantial underground water main distribution infrastructure that is often not readily available in many suburban and urban communities. NFPA standards applicable to open parking structures do not require the installation of automatic sprinklers, since it is known a relatively low fire hazard exists in open parking structures and a limited number of vehicles will ultimately be involved in fire should the fire spread beyond the vehicle of fire origin.

**Supporting Rationale:** NFPA 88A, *Standard for Parking Structures*, 2011 edition, does not require automatic sprinklers in open parking structures of Type I and Type II construction. Accordingly, NFPA 101, *Life Safety Code*, 2012 edition; and NFPA 5000, *Building Construction and Safety Code*, 2012 edition also do not require automatic sprinklers in open parking structures. This includes multi-level structures of Type II (000) construction up to 75 feet (25m) in height. NFPA 88A, NFPA 101, NFPA 5000, and ICC *International Building Code* and its legacy codes all recognize a fire in a non-sprinklered open parking structure will not consume/involve more vehicles than that which could be reasonably extinguished with a few hose lines by the fire department. This is supported by full-scale fire test data and decades of fire incident data that has shown an automobile fire in an open parking structure is typically limited to the area of origin and few adjacent vehicles. These fire tests and fire incident data demonstrate:
Smoke and heat from a vehicle fire in an open parking structure vents to the outdoors, preventing the accumulation of smoke and hot gases. The results are ceiling temperatures in the area of the vehicle fire that are significantly lower than that of a fire in an enclosed parking structure or space, and the fire is not expected to spread beyond the vehicle of origin and the two or more adjacent vehicles, if the fire spreads at all.\footnote{1} \footnote{2}

The fire spreads to a limited number of adjacent vehicles beyond the vehicle of fire origin. Denda’s study “Parking Garage Fires: A Statistical Analysis of Parking Garage Fires in the United States” analyzing fire data and supports the conclusion of the 1970s full-scale fire tests. This study analyzed the occurrence of fire spread in vehicle fires and revealed that of the 257 documented cases; only 8 percent had fire spread from one vehicle to another. The majority of cases where the fire spread were caused by arson and consisted of large fires in enclosed spaces not open parking garages.\footnote{3}

NFPA 1 – 2012, Section 18.4.5.2, does not recognize the relatively low fire hazard of open parking structures; fire statistics and full-scale fire test data that shows automobile fires in open parking structures remain localized to the vehicle of fire origin and few adjacent vehicles; that NFPA 88A, NFPA 101, NFPA 5000, and the ICC International Building Code consider the fire hazard of open parking structures as being low, therefore allowing multi-level, unlimited area open parking structures without automatic sprinklers.

The 75-percent reduction in calculated fire flow, but not less than 1,000 gpm proposed in Section 18.4.5.2.3 correlates to the requisite fire flow for a sprinklered open parking structure. A fire flow rate of 1,000 gpm is sufficient to support four 2½-inch diameter fire hose lines, flowing 250 gpm each. This is a reasonable correlation when considering that NFPA 88A, full-scale fire test results, and fire incident data that shows fires in open parking structures involves a limited number of vehicles that could be extinguished with two or less 2½-inch diameter hose lines.

\textbf{Emergency Nature:} This issue meets factor (f) defined by NFPA in Section 5.3 of the Regulations Governing Committee Projects since Section 18.4.5.2 presents an unnecessary hardship for open parking garages.

\footnote{1} Gage-Babcock & Associates, Inc, Automobile Burn-out Tests in an Open Parking Structure, Scranton, PA, 1972

\textit{Anyone may submit a comment by the closing date indicated above. To submit a comment, please identify the number of the TIA and forward to the Secretary, Standards Council, 1 Batterymarch Park, Quincy, MA 02169-7471.}