

Gateway Crossing – Lot 3 Sonic Drive-In Lake City, FL

Fire Flow Calculations

June 2022



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Attachments

Attachment A: NFPA Fire Flow Calculations

Attachment B: ISO Fire Flow Calculations

Attachments C: City of Lake City Fire Flow



Attachment A
NFPA Fire Flow Calculations

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FIRE FLOW CALCULATIONS PER NFPA 2009

BUILDING CONSTRUCTION:	Type V (000)
FIRE FLOW AREA (Total Floor Area):	1,227 SF (1 Floor)
FIRE FLOW REQUIRED:	1,500 GPM
BUILDING FULLY SPRINKLED?	No
FLOW DURATION:	2 Hours
AVAILABLE FIRE FLOW (@ 20 psi):	2,874 GPM @ 20 psig

Table 18.4.5.1.2 Minimum Required Fire Flow and Flow Duration for Buildings

Fire Flow Area ft ² (× 0.0929 for m ²)					Fire Flow gpm [†] (× 3.785 for L/min)	Flow Duration (hours)
I(443), I(332), II(222)*	II(111), III(211)*	IV(2HH), V(111)*	II(000), III(200)*	V(000)*		
0-22,700	0-12,700	0-8200	0-5900	0-3600	1500	2
22,701-30,200	12,701-17,000	8201-10,900	5901-7900	3601-4800	1750	
30,201-38,700	17,001-21,800	10,901-12,900	7901-9800	4801-6200	2000	
38,701-48,300	21,801-24,200	12,901-17,400	9801-12,600	6201-7700	2250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7701-9400	2500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9401-11,300	2750	3
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3000	
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5250	4
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5750	
Greater than 295,900	Greater than 166,500	106,501-115,800	77,001-83,700	47,401-51,500	6000	
		115,801-125,500	83,701-90,600	51,501-55,700	6250	
		125,501-135,500	90,601-97,900	55,701-60,200	6500	
		135,501-145,800	97,901-106,800	60,201-64,800	6750	
		145,801-156,700	106,801-113,200	64,801-69,600	7000	
		156,701-167,900	113,201-121,300	69,601-74,600	7250	
		167,901-179,400	121,301-129,600	74,601-79,800	7500	
179,401-191,400	129,601-138,300	79,801-85,100	7750			
		Greater than 191,400	Greater than 138,300	Greater than 85,100	8000	

*Types of construction are based on NFPA 220.

†Measured at 20 psi (139.9 kPa).

18.4 Fire Flow Requirements for Buildings.

18.4.1* Scope.

18.4.1.1* The procedure determining fire flow requirements for buildings hereafter constructed shall be in accordance with Section 18.4.

18.4.1.2 Section 18.4 does not apply to structures other than buildings.

18.4.2 Definitions. See definitions 3.3.13.6 (Fire Flow Area) and 3.3.108 (Fire Flow).

18.4.3 Modifications.

18.4.3.1 Decreases. Fire flow requirements shall be permitted to be modified downward by the AHJ for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire flow requirements is impractical.

18.4.3.2 Increases. Fire flow shall be permitted to be modified upward by the AHJ where conditions indicate an unusual susceptibility to group fires or conflagrations. An upward modification shall not be more than twice that required for the building under consideration.

18.4.4 Fire Flow Area.

18.4.4.1 General. The fire flow area shall be the total floor area of all floor levels of a building except as modified in 18.4.4.1.1.

18.4.4.1.1 Type I (443), Type I (332), and Type II (222) Construction. The fire flow area of a building constructed of Type I (443), Type I (332), and Type II (222) construction shall be the area of the three largest successive floors.

18.4.5 Fire Flow Requirements for Buildings.

18.4.5.1 One- and Two-Family Dwellings.

18.4.5.1.1 The minimum fire flow and flow duration requirements for one- and two-family dwellings having a fire flow area that does not exceed 5000 ft² (334.5 m²) shall be 1000 gpm (3785 L/min) for 1 hour.

18.4.5.1.1.1 A reduction in required fire flow of 50 percent shall be permitted when the building is provided with an approved automatic sprinkler system.

18.4.5.1.1.2 A reduction in the required fire flow of 25 percent shall be permitted when the building is separated from other buildings by a minimum of 30 ft (9.1 m).

18.4.5.1.1.3 The reduction in 18.4.5.1.1.1 and 18.4.5.1.1.2 shall not reduce the required fire flow to less than 500 gpm (1900 L/min).

18.4.5.1.2 Fire flow and flow duration for dwellings having a fire flow area in excess of 5000 ft² (334.5 m²) shall not be less than that specified in Table 18.4.5.1.2.

18.4.5.1.2.1 A reduction in required fire flow of 50 percent shall be permitted when the building is provided with an approved automatic sprinkler system.

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.

18.4.5.2.1 A reduction in required fire flow of 75 percent shall be permitted 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 A reduction in required fire flow of 75 percent shall be permitted 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).



Attachment B
ISO Calculations

(Exhibit on Next Page)

ISO Needed Fire Flow (NFF) Worksheet

(Page references are to the appropriate sections in the ISO Guide for Determination of Needed Fire Flow)

Petition Number:		Date:	6/14/2022
Project:	Gateway Crossings Lot 3 - Sonic	Engineer:	GAL
		Checked By:	CAP
Location:	NW Centurion Blvd. Lake City, FL		

Subject Building

Construction Class (p. 4): Wood Frame Construction **construction coefficient (F) (p. 2):** 1.5

Area of largest floor in the building (if modifications are made for division walls (p. 8), the division walls must be shown on the site plan.): 1227 sq.ft.

Total area of all other floors (if modifications are made for division walls (p. 8), the division walls must be shown on the site plan.): sq. ft.

Effective Area (A_i) (p. 9) : 1,227 sq. ft. (Show calculations below)

Needed Fire Flow attributed to construction (C_i) (per formula (p. 2)): 945.771114

(Round to the nearest 250 gpm. See p. 10 for maximum and minimum values of C_i)

Type of Occupancy: Combustible (C-3) **Occupancy Factor (O_i) (p. 11):** 1

Exposures (p. 16)

Front: construction of facing wall of exposure building (p. 4):

Distance (ft.) to the exposure building:	Length of exposure wall:
Number of stories of exposure wall:	Length x number of stories: 0
Opening Protection in exposure wall:	
Factor for exposure (X _i) from Table 330.A (p. 17):	0

Back: construction of facing wall of exposure building (p. 4):

Distance (ft.) to the exposure building:	Length of exposure wall:
Number of stories of exposure wall:	Length x number of stories: 0
Opening Protection in exposure wall:	
Factor for exposure (X _i) from Table 330.A (p. 17):	0

Left: construction of facing wall of exposure building (p. 4):

Distance (ft.) to the exposure building:	Length of exposure wall:
Number of stories of exposure wall:	Length x number of stories: 0
Opening Protection in exposure wall:	
Factor for exposure (X _i) from Table 330.A (p. 17):	0

Right: construction of facing wall of exposure building (p. 4):

Distance (ft.) to the exposure building:	Length of exposure wall:
Number of stories of exposure wall:	Length x number of stories: 0
Opening Protection in exposure wall:	
Factor for exposure (X _i) from Table 330.A (p. 17):	0

Communications (p. 18)

Passageway Opening Protection: ▼
Construction class of communication (Table 330.B): ▼
Is communication open or enclosed? ▼
Length of communication (in feet): ▼
Factor for Communications (P_i) from Table 330.B on p.19):

Calculation of Needed Fire Flow (p. 1)

NFF=(C_i)(O_i)[1.0+(X+P)_i] (substitute values as determined above. For exposures and communications use the single side with the highest charge.)

$$NFF = 1000 \times 1 \times [1 + (0 + 0)]$$

$$NFF = 1000 \text{ gpm}$$

$$NFF = 1000 \text{ gpm (rounded to nearest 250 gpm per ISO requirements)}$$

Note: ISO evaluates hydrant distribution by examining the number and type of hydrants within 1,000 feet of each representative building. They also look at the distance from each such hydrant to the subject building, measured as apparatus can lay hose.

Hydrants with at least one large pumper outlet may receive credit for up to 1,000 gpm. Hydrants with at least two hose outlets, but no pumper outlet, may receive credit for up to 750 gpm. And hydrants with only one hose outlet may receive credit for up to 500 gpm.

Hydrants within 300 feet of the subject building may receive credit for up to 1,000 gpm (but not more than the credit that would apply based on the number and type of outlets). Hydrants from 301 feet to 600 feet from the subject building may receive credit for up to 670 gpm (but not more than the credit that would apply based on the number and type of outlets). And hydrants from 601 feet to 1,000 feet from the subject building receive credit for 250 gpm. Under certain circumstances, when all fire department pumpers carry sufficient large-diameter hose, ISO may allow maximum credit for hydrants up to 1,000 feet from the subject building.

More than one fire hydrant may be required for proper distribution of water per ISO requirements.



Attachment C

City of Lake City Fire Flow Test Results

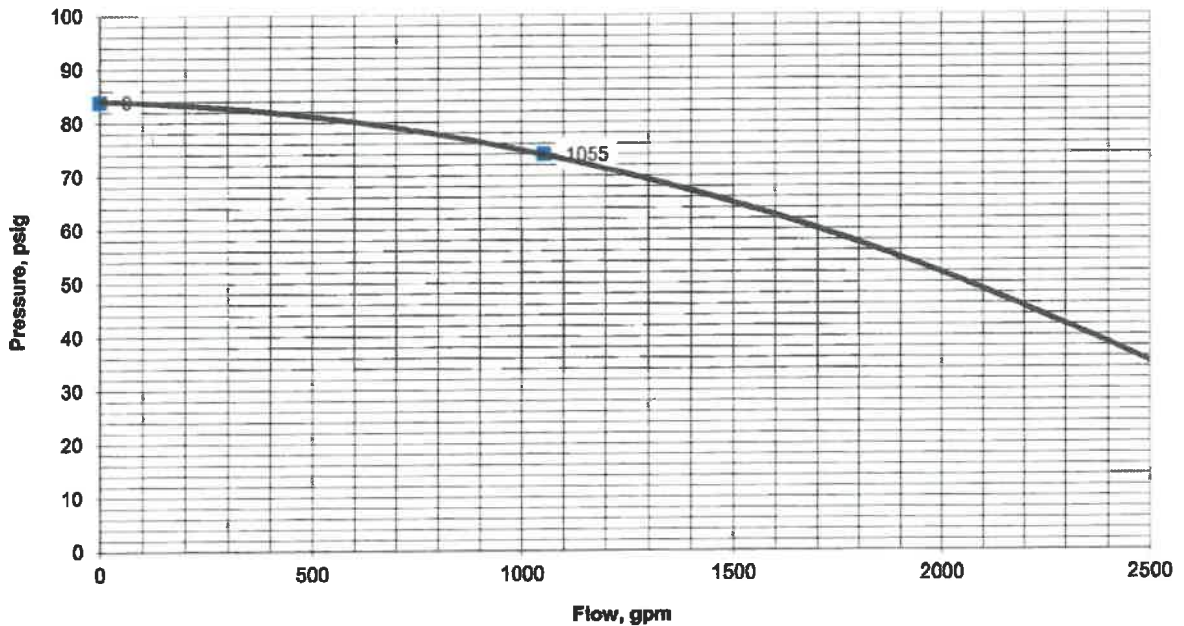
(Exhibit on Next Page)

City of Lake City Water flow report

HYDRANT # & LOCATION: 1st hydrant north of Denny's on NW Centurion Drive DATE: 6/14/2022
 TEST BY: Al/Lavonte Day: Tuesday Time: 9-10 Minutes: 2
 WATER SUPPLIED BY: Municipal
 PURPOSE OF TEST: request

DATA

FLOW HYDRANT(S)	A1	A2	A3
SIZE OPENING:	<u>2.5</u>	<u>2.5</u>	<u>2.5</u>
COEFFICIENT:	<u>0.8</u>	<u> </u>	<u> </u>
PITOT READING:	<u>50</u>	<u> </u>	<u> </u>
GPM:	<u>1055</u>	<u>0</u>	<u>0</u>
TOTAL FLOW DURING TEST:	<u>1055</u> GPM		
STATIC READING:	<u>84</u> PSI	RESIDUAL:	<u>74</u> PSI
RESULTS: AT 20 PSI RESIDUAL	<u>2874</u> GPM	AT 0 PSI	<u>3328</u> GPM
ESTIMATED CONSUMPTION:	<u>2109</u> GAL.		
REMARKS:			



City of Lake City Water flow report

HYDRANT # & LOCATION: **2nd hydrant north of Denny's on NW Centurion Driv** DATE: **6/14/2022**
 TEST BY: **AI/Lavonte** Day: **Tuesday** Time: **9:10** Minutes: **2**
 WATER SUPPLIED BY: **Municipal**
 PURPOSE OF TEST: **request**

DATA

FLOW HYDRANT(S)	A1	A2	A3
SIZE OPENING:	2.5	2.5	2.5
COEFFICIENT:	0.8		
PITOT READING:	45		
GPM:	1001	0	0
TOTAL FLOW DURING TEST:	1001 GPM		
STATIC READING:	82 PSI	RESIDUAL:	73 PSI
RESULTS: AT 20 PSI RESIDUAL	2837 GPM		AT 0 PSI 3299 GPM
ESTIMATED CONSUMPTION:	2001 GAL.		
REMARKS:			

