



**FIRE PREVENTION DIVISION**  
**PUBLIC FACILITIES MANUAL- APPENDIX 18-A**  
**FIRE PROTECTION WATER DEMAND WORK SHEET**

Chesapeake Fire Department  
 Fire Prevention Division  
 Office of the Fire Marshal  
 304 Albemarle Drive  
 Chesapeake, Virginia 23322  
 (757)382-6566 phone  
 (757)382-8313 fax

*The fire-flow method utilized for the City of Chesapeake shall be in accordance with the Virginia Statewide Fire Prevention Code and Appendix B as adopted by the City of Chesapeake. The procedure for determining fire-flow requirements for buildings or portions of buildings and facilities shall be in accordance with the Public Facilities Manual (PFM), Appendix 18A - Fire Protection Water Demand Worksheet which corresponds with Appendix B requirements and can be referenced at the following link: Appendix B*

Submittal Information	
Date:	City Project #:
Project Name:	Address:
Parcel #:	Certified Engineer (also affix stamp page 3):
Contact Phone #:	Email address:

### Fire Protection Water Demand Computations

**Fire-Flow Calculation Area** -The fire-flow calculation area shall be the total floor area of all floors within the exterior walls and under the horizontal projections of the roof of a building.

**Area separation:** Portions of buildings which are separated by *fire walls without openings* (even fire rated are considered openings), constructed in accordance with the Virginia Construction Code, are allowed to be considered as separate fire-flow calculation areas.

**Const. Type IA and type IB** - the area shall be the three largest successive floors. Exception: Open parking garages shall be determined by the area of the largest floor.

#### Section I – Fire-Flow Demand for One- & Two-Family Dwellings, Group R-3, R-4, and Townhouses Reference Table B105.1(1)

**Note:** Per VA Fire Code amendments (Section 507.5.1 exceptions), local fire hydrant requirements do not apply for in-fill development of fewer than 5 detached single-family dwellings constructed in existing developments & for the reconstruction or rehabilitation of detached single-family dwellings.

Fire-Flow Calculation Area (square feet)	Minimum Fire-Flow (gallons per minute)		Flow Duration (hours)	
	No sprinklers:	Sprinklers:	No sprinklers:	Sprinklers:
0 -3,600	1,000	500	1 hour	1/2 hour
3,601 and greater*	Value in Table B105.1 (2)		Duration in Table B105.1 (2)	
	1/2 value in Table B105.1(2)		1 hour	1 hour

Allowances for one- & two-family dwellings installed with an automatic fire sprinkler system per NFPA 13D or IRC P2904:

- <3,600 sf: minimum fire-flow & flow duration are permitted to be reduced by 50%.
- \*3,601 > sf: minimum fire-flow permitted to be 50% per the values in Table B105.1 (2) & flow duration is 1 hr.

#### Section II – Fire-Flow Demand for Bldgs. Other Than One- & Two-Family Dwellings, Group R-3, R-4, and Townhouses. Includes Commercial and Multi-Family Developments - Reference Table B105.1(2)

#### Structural Information from IBC & Table B105.1(2)

Occupancy class (IBC)		Const. type (IBC)		# of Stories	
Square Footage		Flow duration		<b>A. Fire-flow from table without use of sprinklers</b> ▶	gpm
<b>B. Reduction for sprinklers:</b> Enter 25% of the value in Table B105.1 (2) if an automatic fire sprinkler system is installed throughout. If NFPA 13 system min. cannot be less than 1,000 GPM, or if NFPA 13R min. cannot be less than 1,500 GPM. <b>Net GPM for use of sprinklers</b> ▶					gpm
<b>C.</b> Enter fire sprinkler system demand plus hose stream allowance, per NFPA 13. Enter GPM ▶					gpm
<b>Note:</b> Per VA amendments to Appendix B, Section B105.3, for buildings equipped with an automatic sprinkler system, the water supply shall be capable of providing the greater of either the needed fire-flow (NFF) or the fire sprinkler demand including hose stream allowance. Therefore, either value in Section B or C is the applicable fire protection water demand.					

<b>Section III – Comparison of Fire Protection Water Demand vs Available Supply Data</b>					
Enter the value from applicable Section I or Section II, either A (where no sprinklers are used), or the higher value of either B or C. <b>Site Fire Protection Water Demand</b> ▶					
<b>Justification of Available Water from City Main</b> (Flow extended to no less than 20 psi residual pressure – see note d) <b>Flow Must Be Within Past 6 Months to include Documentation of Flow Provided from Public Utilities</b>					↕ Difference ↕
Flow Date:	Static Pressure:	Residual Pressure:	GPM:	<b>Extension<sup>d</sup> to 20 psi residual Pressure:</b> ▶	
Enter Difference between Total Site Fire Protection Water Demand and Available Water Supply – If Supply is Greater than Demand then meets criteria for approval – see note e ▶					

**IFC APPENDIX B TABLE B105.1 (2)**  
**MINIMUM FIRE-FLOW AND FLOW DURATION**  
(Reference Table for Tables B105.1 (1) and B105.2)

*Click on the box next to the of Fire-Flow Calculation Area & Construction Type to be utilized*

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute) b	FLOW DURATION (hours)
Type IA & IB a	Type IIA & IIIA a	Type IV & V-A a	Type IIB & IIIB a	Type V-B a		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
-	-	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
-	-	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
-	-	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
-	-	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
-	-	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
-	-	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
-	-	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
-	-	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

- a. Types of construction are based on the Virginia Construction Code.
- b. Fire-Flow measured at 20 psi residual pressure.
- c. For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.
- d. Flow Data extension formula:  $Q_R = Q_F \times h_r^{0.54} / h_t^{0.54}$  Where: QR = flow predicted at desired residual pressure, QF = total flow measured during test,
- e. HR = pressure drop to desired residual pressure, hf = pressure drop measured during test. Note: a hydraulic model must be provided where a private
- f. Main will serve on-site fire protection demands (ex. sprinklers/hydrants) to show pressure/GPM can be met at hydraulically most demanding point.
- g. Fire-flow calculation area sf is a result of applying criteria & variables listed in Appendix B, Section 104. To see Appendix B click on the link: [Appendix B](#)

Fire Protection Water Demand Work Sheet completed on \_\_\_\_\_ (Date) and is hereby certified by the Professional Engineer whose stamp is affixed below.

