VERMONT RURAL FIRE PROTECTION TASK FORCE

Vermont Association of Conservation Districts (VACD)
Rural Fire Protection Program
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Needed Fire Flow
Does your site need more than one dry hydrant?

Properly designed, installed, and certified[1] dry hydrants are a great improvement to areas that have inadequate or undeveloped rural water supplies. There may be locations where more than one dry hydrant is required to meet the *needed fire flow* (NFF) for the service area.

In general, grant funded dry hydrants are designed to flow 1,000 gallons per minute or more. This flow rate may or may not be enough to satisfy the NFF for the largest possible fire load in the service area.

The Insurance Services Office (ISO) uses the following formula to estimate the NFF, or amount of water required to fight a fire in an individual, non-sprinkler building:

$$NFF = (C)(O)(1+(X+P))$$

NFF = the needed fire flow in gallons per minute (gpm)
C = a factor related to the type of construction
O = a factor related to the type of occupancy
X = a factor related to the exposure of the buildings
P = a factor related to the communication between buildings

The ISO has calculated the NFF for most target hazards in Vermont. This information is available to Fire Chiefs by faxing a request, on their letterhead, to ISO Mitigation at 856-988-7269. More information on the NFF formula and calculation is available at: www.isomitigation.com/downloads/ppc3001.pdf

Below are two simplified calculations that should be done BEFORE dry hydrant grants are applied for. If you find that you need two or more dry hydrants at the site to satisfy this NFF, you can meet the 25% local match, and two dry hydrants at one location are your TOP priority, you may apply for up to two grants at one location and plan access and maintenance of the developed rural water supply site accordingly.

1) For detached 1- and 2-family dwellings not exceeding 2 stories in height, ISO does not use the NFF formula and instead uses the following:

DISTANCE BETWEEN BUILDINGS	NEEDED FIRE FLOW
More than 100'	500 gpm
31-100'	750 gpm
11-30'	1,000 gpm
10' or less	1,500 gpm

2) Another simplified, but useful, method of estimating the NFF follows. It does not include the impact of exposures or communication between buildings.

[1] Has been certified by a Professional Engineer, or equivalent, to have an available 2% drought capacity that meets or exceeds the needed fire flow for 2 hours for flows up to 2,500 gpm and for 3 hours for flows of 3,000 gpm and 3,500 gpm.

Determine the building floor area and find the flow in gpm from the following table based on the building construction classification.

Construction Classification	Building Type
1	Wood Frame
2	Joisted masonry
3	Noncombustible
4	Masonry Noncombustible
5	Modified Fire-Restive
6	Fire Restive

Construction Class	1		2		3, 4		5, 6	
	Floor Area (SF)		Floor Area (SF)		Floor Area (SF)		Floor Area (SF)	
gpm	At Least	Not Over	At Least	Not Over	At Least	Not Over	At Least	Not Over
500	0	535	0	1,205	0	1,883	0	3,348
750	536	1,050	1,206	2,363	1,884	3,692	3,349	6,564
1,000	1,051	1,736	2,364	3,906	3,693	6,103	6,565	10,850
1,250	1,737	2,593	3,907	5,835	6,104	9,117	10,851	16,209
1,500	2,594	3,622	5,836	8,150	9,118	12,734	16,210	22,639
1,750	3,623	4,822	8,151	10,852	12,735	16,954	22,640	30,140
2,000	4,823	6,194	10,853	13,937	16,955	21,776	30,141	38,714
2,250	6,195	7,737	13,938	17,409	21,777	27,202	38,715	48,359
2,500	7,738	9,452	17,410	21,267	27,203	33,230	48,360	59,076
2,750	9,453	11,338	21,268	25,511	33,231	39,861	59,077	70,864
3,000	11,339	13,395	25,512	30,140	39,862	47,095	70,865	83,724

Multiply this flow rate in gpm by the Occupancy Adjustment.

Occupancy Combustibility Class	Occupancy Adjustment
Noncombustible	0.75
Limited-combustible	0.85
Combustible	1.00
Free-burning	1.15
Rapid-burning	1.25

The following is an example of this simplified calculation:

Occupancy: General Store

Building: Concrete block with brick walls, wood floors and roof = Construction Classification 2.

Size: 40’ x 60’, 2 stories with basement used for storage = 40’ x 60’x 3 floors = 7,200sf.

From Construction Class table, the unadjusted needed fire flow = 1,500 gpm.

Occupancy Adjustment for Combustibility Class is "Combustible" = 1.

NFF = 1,500 x 1 = **1,500 gpm for 2 hour duration**