Fire Suppression Rating Schedule

INSURANCE SERVICES OFFICE, INC.

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FIRE SUPPRESSION RATING SCHEDULE

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Filed - Not Effective

FIRE SUPPRESSION RATING SCHEDULE

INTRODUCTION

100 PURPOSE:

The purpose of this Schedule is to outline the criteria for evaluating the fire prevention and fire suppression capabilities of individual communities — or fire protection areas. The purpose of such an evaluation is to develop a Public Protection Classification (PPC) for property insurance rating.

101 SCOPE:

The Schedule measures the major elements of a fire protection area's fire prevention and fire suppression systems. The fire suppression component evaluates how those systems address reported structure fires. The Schedule gives procedures and formulas for developing the measurements into a Public Protection Classification number on a relative scale from 1 to 10, with 10 representing less than the minimum recognized protection.

The Schedule is a property insurance rating tool, and is not intended to analyze all aspects of a comprehensive public fire protection program.

102 PUBLIC PROTECTION CLASSIFICATION:

A Public Protection Classification developed by this Schedule is only one of several elements used to develop the property insurance loss cost and underwriting information for an individual property. Other features specifically relating to the individual property — such as construction, occupancy and hazards, exposures and private fire protection — are also important in the evaluation of property insurance loss costs and underwriting.

103 FIRE PROTECTION AREA:

The term "fire protection area," as used in this Schedule may include cities, towns, villages, districts, counties, or other civil jurisdictions responsible for providing fire prevention and fire suppression services.

For the purposes of the Schedule, a fire protection area must have legally defined boundaries for fire suppression services. For example, community limit boundaries, fire district boundaries, contractual agreements defining areas of responsibility, and the like may define the boundaries of a fire protection area. If a fire protection area has no legally defined boundaries, a governmental authority must affirm the boundaries in writing to ISO.

For purposes of making such an affirmation, the governmental authority should be the chief administrative official of the governing body responsible for the public safety and welfare of the residents within the fire protection area. The individual must be outside the direct chain of command of the fire protection authority. The governmental authority should preferably be an elected official, such as the mayor, the county executive, a judge, or some similar official.

104 FORMAT:
This Schedule consists of two major chapters:

I Public Fire Prevention and Suppression:

Chapter I (Sections 200 through 1312) gives procedures and formulas for developing Public Protection Classifications for properties with Needed Fire Flows of 3,500 gpm or less.

II Individual Property Fire Suppression:

Chapter II (Sections 2000 through 2311) gives procedures and formulas for developing Public Protection Classifications for specifically rated properties with Needed Fire Flow greater than 3,500 gpm.

105 CALCULATIONS:
To prorate credits or to make any calculation using a fraction of a whole number or point, round the final calculation or credit to two decimal places.

To receive full credit for any section within this Schedule, the authority having jurisdiction must produce complete records substantiating the item under review. When only partial documentation is available, prorate the credit up to a maximum of 75% of the available credit unless otherwise stated specifically in this Schedule.

When no records exist for an item under review, give no credit unless otherwise stated specifically in this Schedule.

106 REFERENCE STANDARDS:
This Schedule recognizes various voluntary consensus standards addressing fire prevention and fire suppression. The standards, approved by the American National Standards Institute (ANSI), include publications by the National Fire Protection Association (NFPA), the American Water Works Association (AWWA), and the Association of Public-Safety Communications Officials – International (APCO).

Whenever this Schedule refers to a consensus standard, the latest edition applies.

107 MINIMUM FACILITIES FOR APPLYING THIS SCHEDULE:
To receive a Public Protection Classification other than Class 10, a fire protection area must meet the following minimum requirements:

A. Organization:
The fire department must be organized under applicable state or local laws. The organization must include one person responsible for operation of the department, usually with the title of chief.

The fire department must serve an area with definite boundaries. (See Section 103.)

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If a fire protection area does not have a fire department operated solely by or for the governing body of that fire protection area, the fire department providing such service must do so under a legal contract or resolution or must demonstrate documented performance for a minimum of one year. When a fire department's service area includes two or more fire protection areas, the department should execute a contract with each area served.

Governmental authorities may use NFPA 1201, *Standard for Providing Fire and Emergency Services to the Public*, as a guide to the organization and development of a fire department.

B. **Firefighter Response to Alarms:**
The fire department must demonstrate that a minimum number of firefighters — as defined in Section 201 — respond on the initial alarm to all reported structure fires. The chief officer may be one of the responding firefighters.

C. **Training:**
The fire department must provide training related to suppression of structure fires for active members for at least 3 hours every 3 months.

D. **Emergency Communications:**
Communications facilities and arrangements must provide for receipt of alarms and dispatch of firefighters and apparatus with no delay.

E. **Apparatus:**
The fire department must have at least one apparatus meeting the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus*. All apparatus must be registered and insured as emergency vehicles according to applicable state laws.

F. **Housing:**
Apparatus must be housed to provide protection from the weather and the deteriorating effects of all climatic conditions. In areas subject to freezing conditions, the structure must have provisions for providing heat.

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Chapter I

PUBLIC FIRE PREVENTION AND SUPPRESSION

SCHEDULE APPLICATION

200 GENERAL:
Chapter I of this Schedule gives procedures and formulas for developing a Public Protection Classification that applies to properties with a Needed Fire Flow of 3,500 gpm or less as determined in Section 300.

201 APPLICATION:
The method of applying Chapter I of this Schedule depends upon the minimum facilities available for the fire department and the adequacy and duration of the water system as outlined below:

A. Sections 300 through 1101 (Class 1 - 8) shall be applied if the fire protection area has all of the following:

1. An apparatus that has a permanently mounted pump with a rated capacity of 750 gpm or more at 150 psi and a water tank in accordance with the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus*, "Pumper Fire Apparatus."

2. A minimum of 4 firefighters responding on the initial alarm to all reported structure fires. The chief officer may be 1 of the 4 responding firefighters.

3. One or both of the following:

   a. A water system capable of delivering 250 gpm or more for a period of 2 hours plus consumption at the maximum daily rate at a fire location.

   b. Fire department supply capable of delivering 250 gpm or more for a period of 2 hours at a fire location beginning within 5 minutes of arrival of the first-due engine.

B. Sections 1200 through 1202 (Class 8B) apply if the fire protection area does not have the features outlined in A but does have all of the following:

1. An apparatus that has a permanently mounted pump with a rated capacity of 750 gpm or more at 150 psi in accordance with the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus*, "Pumper Fire Apparatus."

2. There shall be a minimum of 6 firefighters responding on the initial alarm to all reported structure fires. Two of the 6 may be automatic-aid firefighters (see Sections 507 and 511C). The chief officer may be 1 of the 6 responding firefighters.

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3. The ability to deliver a minimum of 200 gpm for 20 minutes (4,000 gallons of water) on the initial alarm to all reported structure fires beginning within 5 minutes of arrival of the first-due engine.

C. Sections 1300 through 1312 (Class 9) apply If the fire protection area does not have the facilities outlined in either A or B but does have all of the following:

1. An apparatus that has a permanently mounted pump with a rated capacity of 250 gpm or more at 150 psi and a permanently mounted water tank of at least 200 gallons in accordance with the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus,* "Initial Attack Fire Apparatus."

2. A minimum of 4 firefighters responding to all reported first-alarm structure fires. (See NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations by Volunteer Fire Departments.*) The chief officer may be 1 of the 4 responding firefighters.

3. The ability to deliver a minimum of 500 gallons of water to all reported first-alarm structure fires.

D. If the fire protection area does not have the facilities outlined in A, B, or C, apply Public Protection Class 10 to the fire protection area.

E. If the fire protection area has a combination of A, B, C, and D, multiple Public Protection Classifications apply.

NEEDED FIRE FLOW

300 GENERAL:

This section provides procedures and formulas for developing Needed Fire Flows for selected locations throughout a fire protection area. The Schedule uses those Needed Fire Flows for other calculations. The calculation of a Needed Fire Flow (NFF) in gallons per minute (gpm) considers factors such as the type of building construction (C), occupancy (O), exposure (X), and communication (P) of each subject building or fire division.

For more information, including help with determining the factors, see *Guide for Determination of Needed Fire Flow*, available online at www.isomitigation.com/nff.

301 AUTOMATIC FIRE SPRINKLER SYSTEMS

In calculating the Needed Fire Flow for a commercial building protected by an automatic fire sprinkler system, consider the demand at the base of the automatic sprinkler riser plus additional allowances for inside and/or outside hose streams for a duration of 2 hours. This procedure applies to buildings rated and classified as sprinklered under ISO's Specific Commercial Property Evaluation Schedule (SCOPES).

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The procedure also applies to a building not rated and not classified as sprinklered under ISO's SCOPES if a party responsible for the building has provided evidence that the automatic fire sprinkler system has been installed in accordance with the general criteria of NFPA 13, *Standard for Installation of Sprinkler Systems*, and is maintained in accordance with the general criteria of NFPA 25, *Standard for the Inspections, Testing and Maintenance of Water-Based Fire Protection Systems*.

310 CONSTRUCTION FACTOR (C):

The construction factor (C) is the portion of the Needed Fire Flow attributed to the construction and area of the subject building. To calculate the construction factor (C), use this formula:

$$C = 18F\left(\sqrt{A}\right)$$

Where:
A = Effective Area
F = Coefficient related to the class of construction:
F = 1.5 for Construction Class 1 (Frame)*
= 1.0 for Construction Class 2 (Joisted Masonry)*
= 0.8 for Construction Class 3 (Non-Combustible)*
= 0.8 for Construction Class 4 (Masonry Non-Combustible)*
= 0.6 for Construction Class 5 (Modified Fire Resistive)*
= 0.6 for Construction Class 6 (Fire Resistive)*

* See the Specific Commercial Property Evaluation Schedule (SCOPES) for a detailed definition of the construction classes.

Effective Area

Effective area is a modification of the total building area measured in square feet. The modification considers construction class, building height, fire protection features, division walls, and other factors that contribute to the spread of fire in a building. (See the Specific Commercial Property Evaluation Schedule (SCOPES) for detailed information on calculating effective area).

Mixed Construction

For buildings with two or more construction classes, see SCOPES, "Classification of Mixed Construction", for instructions on determining a single construction class for use in the construction factor (C) formula.

Minimum and Maximum Values

The minimum value of the construction factor (C) is 500 gpm.
The maximum value of the construction factor (C) is:
8,000 gpm for Construction Classes 1 and 2
6,000 gpm for Construction Classes 3, 4, 5 and 6
6,000 gpm for a 1-story building of any class of construction.

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Rounding
Round the calculated value of the construction factor (C) to the nearest 250 gpm.

320 **OCCUPANCY FACTOR (O):**
The occupancy factor (O) reflects the influence of the occupancy on the Needed Fire Flow. Select the occupancy factor (O) from the following table.

OCCUPANCY COMBUSTIBILITY CLASS	OCCUPANCY FACTOR (O)
C-1 (Noncombustible)	0.75
C-2 (Limited Combustibility)	0.85
C-3 (Combustible)	1.00
C-4 (Free Burning)	1.15
C-5 (Rapid Burning or Flash Burning)	1.25

Multiple Occupancies
For buildings that contain multiple occupancies, see SCOPES, Item 440, "Combustibility Classification Applicable to Buildings," for instructions on determining a single-occupancy combustibility class for use in selecting the occupancy factor (O).

330 **EXPOSURE (X) AND COMMUNICATION (P) FACTORS:**
A building's exposure to and communication with adjacent buildings influence the subject building's Needed Fire Flow. Where applicable, select an exposure factor (X) from Table 330A. If applicable, also select a communication factor (P) selected from Table 330B. Select the factors for the same side of the building. Use the side of the building for which the sum of the factors has the largest value, represented as:

$(X_i + P_i)_{max}$

Limit the value of $(X_i + P_i)_{max}$ to a maximum of 0.60.

A. The exposure factor (X) of the subject building depends upon the construction and length-height value* (length of wall in feet, times height in stories) of the exposed building and the distance between facing walls of the subject building and the exposed building. Select the exposure factor (X) from Table 330A(1-3).

* See the Specific Commercial Property Evaluation Schedule (SCOPES) for more information on the length-height value.

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Table 330A(1)

Construction of Facing Wall of Exposure	Frame (Except Masonry and Fire Resistive)						
Construction of Facing Wall of Subject Building		Frame	Masonry Unprotected Openings	Masonry Semiprotected Openings (or Blank)	Noncombustible Walls and Noncombustible Roof	Masonry or Fire Resistive Unprotected Openings	Masonry or Fire Resistive Semiprotected Openings
Distance in Feet to the Exposure	Length-Height of Facing Wall of Exposure					Class 5 or 6	
0 - 10	80 - 100	0.126	0.0882	0.0000	0.1008	0.0252	0.0000
	101 - 200	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
	201 - 300	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
	301 - 400	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
	Over 400	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
11 - 20	80 - 100	0.098	0.0686	0.0000	0.0784	0.0196	0.0000
	101 - 200	0.126	0.0882	0.0000	0.1008	0.0252	0.0000
	201 - 300	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
	301 - 400	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
	Over 400	0.140	0.0980	0.0000	0.1120	0.0280	0.0000
21 - 30	80 - 100	0.056	0.0392	0.0000	0.0448	0.0112	0.0000
	101 - 200	0.098	0.0686	0.0000	0.0784	0.0196	0.0000
	201 - 300	0.126	0.0882	0.0000	0.1008	0.0252	0.0000
	301 - 400	0.126	0.0882	0.0000	0.1008	0.0252	0.0000
	Over 400	0.140	0.0882	0.0000	0.1120	0.0280	0.0000
31 - 40	80 - 100	0.028	0.0196	0.0000	0.0224	0.0056	0.0000
	101 - 200	0.070	0.0490	0.0000	0.0560	0.0140	0.0000
	201 - 300	0.098	0.0686	0.0000	0.0784	0.0196	0.0000
	301 - 400	0.112	0.0784	0.0000	0.0896	0.0224	0.0000
	Over 400	0.126	0.0882	0.0000	0.1008	0.0252	0.0000

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Table 330A(2)

Construction of Facing Wall of Exposure	Masonry & Fire Resistive (Unprotected Openings)						
Construction of Facing Wall of Subject Building		Frame	Masonry Unprotected Openings	Masonry Semiprotected Openings (or Blank)	Noncombustible Walls and Noncombustible Roof	Masonry or Fire Resistive Unprotected Openings	Masonry or Fire Resistive Semiprotected Openings
Distance in Feet to the Exposure	Length-Height of Facing Wall of Exposure					Class 5 or 6	
0 - 10	80 - 150	0.0441	0.0252	0.0000	0.0252	0.0000	0.0000
	151 - 200	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
	201 - 300	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
	301 - 400	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
	Over 400	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
11 - 20	80 - 150	0.0343	0.0196	0.0000	0.0196	0.0000	0.0000
	151 - 200	0.0441	0.0252	0.0000	0.0252	0.0000	0.0000
	201 - 300	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
	301 - 400	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
	Over 400	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
21 - 30	80 - 150	0.0196	0.0112	0.0000	0.0112	0.0000	0.0000
	151 - 200	0.0343	0.0196	0.0000	0.0196	0.0000	0.0000
	201 - 300	0.0392	0.0224	0.0000	0.0224	0.0000	0.0000
	301 - 400	0.0441	0.0252	0.0000	0.0252	0.0000	0.0000
	Over 400	0.0490	0.0280	0.0000	0.0280	0.0000	0.0000
31 - 40	80 - 150	0.0098	0.0056	0.0000	0.0056	0.0000	0.0000
	151 - 200	0.0245	0.0140	0.0000	0.0140	0.0000	0.0000
	201 - 300	0.0343	0.0196	0.0000	0.0196	0.0000	0.0000
	301 - 400	0.0392	0.0224	0.0000	0.0224	0.0000	0.0000
	Over 400	0.0441	0.0252	0.0000	0.0252	0.0000	0.0000

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Table 330A(3)

Construction of Facing Wall of Exposure	Masonry & Fire Resistive (Semiprotected Openings)						
Construction of Facing Wall of Subject Building		Frame	Masonry Unprotected Openings	Masonry Semiprotected Openings (or Blank)	Noncombustible Walls and Noncombustible Roof	Masonry or Fire Resistive Unprotected Openings	Masonry or Fire Resistive Semiprotected Openings
Distance in Feet to the Exposure	Length-Height of Facing Wall of Exposure					Class 5 or 6	
0 - 10	80 - 150	0.0189	0.0126	0.0000	0.0126	0.0000	0.0000
	151 - 200	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
	201 - 300	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
	301 - 400	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
	Over 400	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
11 - 20	80 - 150	0.0147	0.0098	0.0000	0.0098	0.0000	0.0000
	151 - 200	0.0189	0.0126	0.0000	0.0126	0.0000	0.0000
	201 - 300	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
	301 - 400	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
	Over 400	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
21 - 30	80 - 150	0.0084	0.0056	0.0000	0.0056	0.0000	0.0000
	151 - 200	0.0147	0.0098	0.0000	0.0098	0.0000	0.0000
	201 - 300	0.0168	0.0112	0.0000	0.0112	0.0000	0.0000
	301 - 400	0.0189	0.0126	0.0000	0.0126	0.0000	0.0000
	Over 400	0.0210	0.0140	0.0000	0.0140	0.0000	0.0000
31 - 40	80 - 150	0.0042	0.0028	0.0000	0.0028	0.0000	0.0000
	151 - 200	0.0125	0.0070	0.0000	0.0070	0.0000	0.0000
	201 - 300	0.0147	0.0098	0.0000	0.0098	0.0000	0.0000
	301 - 400	0.0168	0.0112	0.0000	0.0112	0.0000	0.0000
	Over 400	0.0189	0.0126	0.0000	0.0126	0.0000	0.0000

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330 EXPOSURE (X) AND COMMUNICATION (P) FACTORS: (Continued)

B. Factor for Communications (P):
The factor for Communication (P_i) depends upon the protection for communicating party wall* openings and the length and construction of communications between fire divisions* and shall be selected from Table 330B. When more than one communication type exists in any one side wall, apply only the largest factor for Communication (P).

Table 330B

Masonry Facing Wall (Exposure)
FACTORS FOR COMMUNICATIONS THROUGH PASSAGEWAYS

Description of Protection of Passageways Openings	Fire Resistive, Noncombustible, or Limited Combustible Passageways				Passageways with Combustible Construction					
	Open		Enclosed		Open			Enclosed		
	Any Length	10 ft or less	11 ft to 20 ft	21 ft to 50 ft	10 ft or less	11 ft to 20 ft	21 ft to 50 ft	10 ft or less	11 ft to 20 ft	21 ft to 50 ft
1. Unprotected										
Length-Height 20-150	0	0.0252	0.0189	0.0126	0.0189	0.0126	0.0063	0.0315	0.0252	0.0189
Length-Height >150	0	0.0280	0.0210	0.0140	0.0210	0.0140	0.0070	0.0350	0.0280	0.0210
2. Single Fire Door at One End of Passageway										
Length-Height 20-150	0	0.0126	0.0063	0.0000	0.0126	0.00945	0.0000	0.0189	0.0126	0.0063
Length-Height >150	0	0.0140	0.0070	0.0000	0.0140	0.01050	0.0000	0.0210	0.0140	0.0070
3. Single Fire Doors at Each End or Double Fire Doors at One End of Passageway										
Length-Height 20-150	0	0	0	0	0	0	0	0	0	0
Length-Height >150	0	0	0	0	0	0	0	0	0	0

FACTORS FOR COMMUNICATIONS THROUGH A PARTY WALL	
Single Fire Doors	
Length-Height 20-150	0.0189
Length-Height >150	0.0210

FACTORS FOR COMMUNICATIONS ACROSS PARTY WALLS	
All cases	0.0175

Table 330B (cont.)

Other Than Masonary Facing Wall (Exposure) FACTORS FOR COMMUNICATIONS THROUGH PASSAGEWAYS										
Description of Protection of Passageways Openings	Fire Resistive, Noncombustible, or Limited Combustible Passageways				Passageways with Combustible Construction					
	Open			Enclosed	Open			Enclosed		
	Any Length	10 ft or less	11 ft to 20 ft	21 ft to 50 ft	10 ft or less	11 ft to 20 ft	21 ft to 50 ft	10 ft or less	11 ft to 20 ft	21 ft to 50 ft
1. Unprotected										
Length-Height 20-100	0	0.0504	0.0378	0.0252	0.0378	0.0252	0.0126	0.063	0.0504	0.0378
Length-Height >100	0	0.0560	0.0420	0.0280	0.0420	0.0280	0.0140	0.0700	0.0560	0.0420
2. Single Fire Door at One End of Passageway										
Length-Height 20-100	0	0.0252	0.0126	0.0000	0.0252	0.0189	0.0000	0.0378	0.0252	0.0126
Length-Height >100	0	0.0280	0.0140	0.0000	0.0280	0.0210	0.0000	0.0420	0.0280	0.0140
3. Single Fire Doors at Each End or Double Fire Doors at One End of Passageway										
Length-Height 20-100	0	0	0	0	0	0	0	0	0	0
Length-Height >100	0	0	0	0	0	0	0	0	0	0

Note When a party wall has communicating openings protected by a single automatic or self-closing Class A fire door, it qualifies as a division wall* for reduction of area.

Note Where communications are protected by a recognized water curtain*, the value of P is zero (0).

*The term is defined in greater detail in the Specific Commercial Property Evaluation Schedule (SCOPES).

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340 CALCULATION OF NEEDED FIRE FLOW (NFF):
Use the following formula to determine the Needed Fire Flow (NFF):

$$NFF_i = (C_i)(O_i)[1.0 + (X + P)_i]$$

When a wood shingle roof covering on the subject building, or on exposed buildings, can contribute to spreading fires, add 500 gpm to the Needed Fire Flow.

The minimum Needed Fire Flow is 500 gpm, and the maximum is 12,000 gpm.

Round the calculated Needed Fire Flow to the nearest 250 gpm if less than 2,500 gpm and to the nearest 500 gpm if greater than 2,500 gpm.

For residential occupancies** protected with an automatic fire sprinkler system installed in accordance with the general criteria of NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and including Four Stories in Height*, the Needed Fire Flow is either the demand at the base of the automatic sprinkler riser or 1,000 gpm at 20 psi for a duration of 2 hours, whichever is greater.

For 1- and 2-family dwellings not exceeding 2 stories in height, the following Needed Fire Flows at a duration of 1 hour shall be used:

DISTANCE BETWEEN BUILDINGS	NEEDED FIRE FLOW
More than 30 feet	500 gpm
21-30 feet	750 gpm
11-20 feet	1,000 gpm
0 –10 feet	1,500 gpm

Exception 1: For a 1- or 2-family dwelling protected with an automatic fire sprinkler system installed in accordance with the general criteria of NFPA 13D, *Installation of Sprinkler Systems for One- and Two-Family Dwellings and Manufactured Homes*, the Needed Fire Flow is either demand at the base of the automatic sprinkler riser or 500 gpm at 20 psi for a duration of 1 hour, whichever is greater.

Exception 2: For a 1- or 2-family dwelling with an Effective Area greater than 4,800 square feet, calculate the Needed Fire Flow using the Needed Fire Flow formula in this Section. Use the duration as specified in Section 604.

** Residential occupancies specified in the scope of this standard include: apartment buildings; lodging and rooming houses; board and care facilities; and hotels, motels, and dormitories.

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Emergency Communications

400 GENERAL:
This section gives procedures and formulas for evaluating:

- communications facilities provided for the general public to report structure fires
- Enhanced 9-1-1 Telephone Service including wireless
- computer-aided dispatch (CAD) facilities
- alarm receipt and processing at the communication center
- training and certification of telecommunicators
- facilities used to dispatch fire department companies to reported structure fires

410 EMERGENCY REPORTING (ER):
For information about emergency reporting for fire alarms, see NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.*

Assign points for emergency reporting (ER) according to the following:

Apply either A or B below

		Maximum Value
	Emergency Reporting System (ERS_1)	
A.	**Basic 9-1-1 or no 9-1-1 (BSC)** Public Safety Answering Point (PSAP) does not have customer-premises equipment (CPE) to enable the receipt of Enhanced 9-1-1 calls. Basic 9-1-1 systems do not have provisions for selective routing and may have automatic number identification (ANI) and/or automatic location identification (ALI) ERS_1= Total, Maximum	10 10
	Emergency Reporting System (ERS_2)	
B.	**Enhanced 9-1-1 (ES)** Public Safety Answering Point (PSAP) has customer-premises equipment (CPE) to enable the receipt of Enhanced 9-1-1 calls with associated automatic number identification (ANI) and automatic location identification (ALI) from callers in the PSAP's jurisdiction, including selective routing	20 20

FIRE SUPPRESSION RATING SCHEDULE

1.	**E9-1-1 Wireless (EW)**		
	a. **Wireless Phase I using Static ALI Functionality (WP1)** The PSAP is Phase 1 wireless-capable for at least one wireless service provider (WSP) in the jurisdiction or has made a valid formal request for Phase 1 wireless service with the WSPs doing business in its jurisdiction	10	
	b. **Wireless Phase II using Dynamic ALI Functionality (WP2)** The PSAP is Phase 2 wireless-capable for at least one WSP in the jurisdiction or has made a valid formal request for Phase 2 wireless service with the WSPs doing business in its jurisdiction	15	
			25
2.	**E9-1-1 Voice over Internet Protocol (EI)**		
	a. **Static Voice over Internet Protocol using Static ALI Functionality (SVoIP)** The PSAP is capable of receiving and processing static VoIP calls with associated call back number and caller location information	10	
	b. **Nomadic Voice Over Internet Protocol using Dynamic ALI Functionality (NVoIP)** The PSAP is capable of receiving and processing VoIP calls utilizing dynamic ALI updates (callback number and caller location information)	15	
			25
3.	**Computer-Aided Dispatch (CAD)**		
	a. **Basic CAD (BC)** The PSAP provides its telecommunicators with software to assist in initiating calls for service, dispatching, and maintaining the status of responding resources in the field	5	
	b. **CAD with Management Information System (MIS)** The PSAP has the ability to automatically accept, display and plot caller location data on an electronic map display (GIS) and access historical incident information	5	
	c. **CAD with Interoperability (CAI)** The PSAP can transmit call information directly to responders, alternate PSAPs, and others. PSAP has the ability to provide data and interoperate electronically with other agencies and communications centers	5	
			15
4.	**Geographic Information System (GIS/AVL)** The PSAP uses a fully integrated CAD/GIS management system with automatic vehicle location (AVL) integrated with a CAD system providing dispatch assignments.	15	**15**
	ERS_2= Total, Maximum		**100**

414 CREDIT FOR EMERGENCY REPORTING (CER):
Calculate the credit for emergency reporting (CER) as follows:

$$CER = \frac{ER}{100} \times 3$$

Where:

$ER = ERS_1$ or ERS_2

ERS_1 = BSC
ERS_2 = (ES+EW+EI+CAD+GIS)

420 TELECOMMUNICATORS (TC):
Assign points for telecommunicators (TC) according to the following:

A. Telecommunicator Performance (TCP):
Handling of fire calls should be in accordance with the general criteria of NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.*

1. **Alarm Receipt (AR):**
   Receipt of alarms shall meet the requirements in accordance with the criteria of NFPA 1221.....20 points
2. **Alarm Processing (AP):**
   Processing of alarms shall meet the requirements in accordance with the criteria of NFPA 1221.....20 points

B. Emergency Dispatch Protocols for Fire Service (EDP):
Telecommunicators have emergency dispatch protocols (EDP) containing questions and a decision-support process to facilitate correct call categorization and prioritization. Telecommunicators use those protocols to provide prearrival instructions to emergency responders and callers.....20 points

C. Telecommunicator Training and Certification (TTC):
Telecommunicators meet the qualification requirements referenced in NFPA 1061, *Standard for Professional Qualifications for Public Safety Telecommunicator,* and/or the Association of Public-Safety Communications Officials - International (APCO) *Project 33.* Telecommunicators are certified in the knowledge, skills, and abilities corresponding to their job functions.....20 points

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D. **Telecommunicator Continuing Education/Quality Assurance (TQA):**
Telecommunicators participate in continuing education and/or in-service training and quality-assurance programs as appropriate for their positions.....20 points

422 CREDIT FOR TELECOMMUNICATORS (CTC):
Calculate the credit for telecommunicators (CTC) as follows:

$$CTC = \frac{TC}{100} \times 4$$

Where

$$TC = (AR + AP) + EDP + TCC + TQA$$

430 DISPATCH CIRCUITS (DC):
For information about the number and type of dispatch circuits needed to transmit alarms to fire department members, see NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*. If all responding firefighters are in the same building as the communication center and if the communications center personnel alert them, no dispatch circuit is needed. Do not give credit for facilities that are installed but not used or tested according to the general criteria of NFPA 1221.

431 REVIEW OF DISPATCH CIRCUITS (RDC):
Assign points for review of dispatch circuits (RDC) according to the following :

FIRE SUPPRESSION RATING SCHEDULE

Number of Needed Circuits	1	2		Max Value
		Primary	Secondary	
A. Dispatch Circuit(s) Provided: Apply only one of the following for each needed dispatch circuit. Maximum credit for this subsection is 40 points.				
1 Circuit to fire station where personnel are on duty:				
a. The circuit consists of voice radio (trunked or nontrunked), microwave carrier channel, polling or self-interrogating digital radio, dedicated telephone circuit, wired circuit (including Internet Protocol (IP)) dedicated to public safety or governmental use.	40	20	20	
b. The circuit indicates only the box number or street intersection. With this type of circuit, there must be a telephone circuit or other means of transmitting detailed information to the fire station.	20	10	10	
2 Radio Receivers Carried by Members: The circuit consists of a radio transmitter and receivers carried by members.				
a. Voice receivers under the direct control of the authority having jurisdiction (AHJ).	40	20	20	
b. Alphanumeric receivers with or without two-way paging capability under the direct control of the AHJ.	40	20	20	
3 Circuit to Outside Coded Sounding Device: The circuit activates a coded siren, air horn, or other outside sounding device that notifies members. With this type of circuit, there must also be a telephone circuit or other means of transmitting detailed information to the fire station.	20	10	10	
4 Circuit to Outside Noncoded Sounding Device: The circuit activates a noncoded siren, air horn, or other outside sounding device that notifies members. With this type of circuit, there must also be a telephone circuit or other means of transmitting detailed information to the fire station.	10	5	5	
5 No Circuit Provided:	0	0	0	
Maximum Value 431A				40

FIRE SUPPRESSION RATING SCHEDULE

Number of Needed Circuits		1	2		Max Value
			Primary	Secondary	
B.	**Monitoring for Integrity of Circuit:**	30	30		
	Maximum Value 431B				**30**
C.	**Emergency Power Supply System:**				
	When a dispatch circuit is dependent upon a power source at both transmitting and receiving facilities, credit the emergency power arrangement with the least points.				
	Credit for emergency power is dependent upon a testing program in accordance with the general criteria of NFPA 1221 and if applicable, remote annunciation based on NFPA 110, *Standard for Emergency and Stand-by Power Systems* and NFPA 111, *Standard on Stored Electrical Energy Emergency and Stand-by Power Systems* .				
	Apply only one of the following for each needed dispatch circuit.				
1	Automatically started generator:	20	10	10	
	When used in combination with an uninterruptible power supply (UPS) add:	10	5	5	
2	Manually started generator:	20	10	10	
	When used in combination with an uninterruptible power supply (UPS) add:	10	5	5	
3	Central battery system plus manually started generator:	30	15	15	
4	Central battery system only:	10	5	5	
	When strength and duration of the system meets the requirements in accordance with the general criteria of NFPA Standard 1221, add:	20	10	10	
5	No emergency power provided: Maximum credit for this subsection is 30 points.	0	0	0	
	Maximum Value 431C				**30**
D.	**When no circuit is needed:**	100			
	Maximum Total Credit		65	35	**100**

Note If some companies and members receive notification by one method and others by another method, prorate the points by the number members alerted by each method.

432 CREDIT FOR DISPATCH CIRCUITS (CDC):
Calculate the credit for dispatch circuits (CDC) as follows:

$$CDC = \frac{RDC}{100} \times 3$$

Where

$$RDC = (A + B + C + D)$$

440 CREDIT FOR EMERGENCY COMMUNICATIONS (CEC):
Calculate the credit for emergency communications (CEC) as follows:

$$CEC = (CER + CTC + CDC)$$

FIRE DEPARTMENT

500 GENERAL:
This section gives procedures and formulas for evaluating fire departments, including:

- engine, ladder, and/or service companies
- equipment carried
- response to reported structure fires
- deployment analysis of companies
- available firefighters
- training

501 BASIC FIRE FLOW (BFF):
The Basic Fire Flow for a fire protection area is the fifth highest of Needed Fire Flows determined in Section 340. The maximum Basic Fire Flow is 3,500 gpm.

507 AUTOMATIC AID (AA_i):
This section defines the credits available for automatic aid meeting the needs of the fire protection area under evaluation. Credit is available for engine companies and/or ladder/service companies from outside the fire protection area boundaries and within 5 road miles of the boundaries. The automatic-aid companies must respond under a legal contract or resolution or must demonstrate documented performance for a minimum of one year. The aiding fire departments must operate under a predetermined response plan for initial alarms.

AA_i is a factor used in other calculations in this Schedule.

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FIRE SUPPRESSION RATING SCHEDULE

Assign points for AA_i arrangements according to the following:

		Maximum Value
1. Communication Facilities Review the dispatch facilities of the automatic-aid fire department according to Section 431. Multiply the number of points developed by application of Section 431 by 0.002:	[redacted]	[redacted]
2. Communication Facilities (continued) The communications center receives and dispatches all alarms, or there is no delay between communications centers in receipt and dispatch of alarms:	[redacted]	[redacted]
3. Dispatch Plan The communications center uses computer-aided dispatch (CAD) to dispatch companies:	[redacted]	[redacted]
4. Interdepartment Training		
a. Quarterly 3-hour training exercises with automatic-aid companies:	0.35	
or		
b. Semiannual 3-hour training with automatic-aid companies:	0.20	
or		
c. Annual 3-hour training with automatic-aid companies:	0.10	0.35
5. Radio Communications Interoperability		
a. Common dispatch and tactical radio frequency capability:	0.10	
or		
b. Common dispatch or tactical radio frequency capability:	0.05	0.10
6. Standard Operating Procedures The fire departments have common standard operating procedures that outline the expectations and responsibilities for a first-alarm response:	0.10	0.10
AA_i = Total, maximum		**1.00**

Note: If the developed factor is less than 0.40, no credit applies.

510 ENGINE COMPANIES (NE):
The number of needed engine companies is the largest number determined by applying Section 510A, 510B, or 510C.

A. Engine Company Locations:
A fire protection area needs an engine company for each engine location credited under Section 560, Deployment Analysis.

As an alternative to determining the number of needed engine companies through the road-mile analysis used in Section 560, the authority having jurisdiction may provide the results of a systematic performance evaluation. This type of evaluation analyzes computer-aided dispatch (CAD) history to demonstrate that, with its current deployment of companies, each fire department meets the time constraints for initial arriving engine in accordance with the general criteria of in NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.*

B. Engine Companies by Basic Fire Flow (BFF):

Basic Fire Flow, gpm	Number of Needed Engine Companies
500 - 1,000	1
1,250 - 2,500	2
3,000 - 3,500	3

C. Number of Needed Engine Companies for Method of Operation:
The standard response on the initial alarm to fires in structures consists of a minimum of 2 engine companies. The responding fire departments must provide enough engine companies to ensure the response of at least 2 engine companies to all alarms for structure fires.

Exception: Minimum response for fire protection areas with a Basic Fire Flow of less than 1250 gpm is 1 engine company.

511 NUMBER OF EXISTING ENGINE COMPANIES (EE):

A. Engine Companies
Credit pumpers staffed on the initial alarm to all reported structure fires as existing engine companies. At least 1 apparatus must have a permanently mounted pump rated at 750 gpm or more at 150 psi. (See Section 201A1.)

Credit all other apparatus with a permanently mounted pump rated at 250 gpm or more at 150 psi in this section.

B. Engine-Ladder or Engine-Service Companies
Credit an apparatus that carries both pumper and ladder-service equipment that is staffed on the initial alarm to all reported structure fires as an existing engine company, if needed according to Section 510.

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C. **Automatic-Aid Engine Companies:**
Basic Fire Flow
Credit engine companies from outside the fire protection area and within 5 road miles of the fire protection area boundaries if needed to meet the requirements of Basic Fire Flow.

Deployment Analysis
Credit an automatic-aid engine company that serves 50% or more of an engine response district not within 1½ road miles of other engine companies. An engine response district is a built-upon area with a creditable water supply (as defined in Section 201A3) within a response distance of 1½ road miles.

Section 507 shows the credits available for automatic-aid engine companies.

512 EQUIPMENT ON EXISTING ENGINE COMPANIES (EC_i):

For each company meeting the criteria of Section 511, evaluate the following:

A. **Pump Capacity (PC_i):**

Evaluate the actual pump capacity for each existing pumper at a rated pump pressure of 150 psi. Calculate the credit for pump capacity (PC_i) as follows:

$$PC_i = \frac{\text{Pump Capacity, Up to 1000 gpm}}{1000 \text{ gpm}}$$

B. **Hose Carried (HC_i):**
Calculate the credit for hose carried (HC_i) as follows:

$$HC_i = \frac{SC_i + AC_i}{1200 \text{ feet}}$$

Where:

SC_i= length of supply line hose, comprising up to 1,000 feet in accordance with the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus*

AC_i= length of attack hose, comprising up to 200 feet of 2-inch,or 2½- inch hose

C. **Equipment (E_i):**
Evaluate pumper equipment and hose carried for fighting structure fires by referring to NFPA 1901, *Standard for Automotive Fire Apparatus,* "Pumper Fire Apparatus." Determine the points credited for each existing in-service pumper by referring to the current equipment lists in Table 512A, Pumper Equipment and Hose; Table 512B,

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Pumper Service Test Program; and Table 512C, Hose Service Test Program. Please see tables located in Appendix A of this document.

Calculate the credit for equipment (E_i) as follows:

E_i = Sum of applicable points from Table 512A, including points from Tables 512B, and 512C.

D. Value of Existing Engine Companies (EC_i):

Calculate the credit for the value of each existing engine company (EC_i) as follows:

$$EC_i = (PC_i)(HC_i)(E_i)$$

Note: When an automatic-aid company offsets the lack of a needed engine company, multiply the value of EC_i by the AA_i factor developed for each credited automatic-aid engine company. See Section 507 for development of the AA_i factor.

513 CREDIT FOR ENGINE COMPANIES (CEC):

Calculate the credit for engine companies (CEC) as follows:

$$CEC = \frac{(EC)}{600(NE)}[I + 0.5(I')] \times 6$$

Where:

$$EC = \sum_{i=1}^{n} EC_i$$

n = the number of existing engine companies (EE)

If NE < EE, then NE = EE

I = percent of built-upon area of the fire protection area with the initial response of at least 2 engine companies to reported fires in buildings

I' = percent of built-upon area of the fire protection area with the initial response of only 1 engine company to reported fires in buildings, except in fire protection areas where only 1 engine company is needed

Note: In fire protection areas where only 1 engine company is needed by Basic Fire Flow, I = 100%, and I' = 0.

520 NUMBER OF NEEDED RESERVE PUMPERS (NRP):

The number of needed reserve pumpers is 1 for each 8 needed engine companies or any fraction thereof.

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521 EQUIPMENT ON EXISTING RESERVE PUMPERS (RPC_i):
Evaluate reserve pumpers for pump capacity (PC_i), hose carried (HC_i) and equipment (E_i) in the same manner as described in Section 512. The number of reserve pumpers evaluated in this section shall not exceed the number of needed reserve pumpers.

For each reserve pumper, calculate the credit for equipment on existing reserve pumpers (RCP_i) as follows:

$$RPC_i = (PC_i)(HC_i)(E_i)$$

Where:

PC_i = pump capacity credit as developed in Section 512A ÷ 1,000 gpm
HC_i = hose credit as developed in Section 512B
E_i = equipment credit as developed in Section 512C

523 CREDIT FOR RESERVE PUMPERS (CRP):
Calculate the credit for reserve pumpers (CRP) as follows:

$$CRP = \frac{RCP}{600\ (NRP)} \times 0.5$$

Where:

$$RCP = \sum_{i=1}^{n} RCP_i$$

n = the number of needed reserve engine companies (NRP)

530 PUMP CAPACITY (PC):
The total available pump capacity should be sufficient for the Basic Fire Flow in the fire protection area. Credit the pump capacity obtained by test at the rated pump pressure, not to exceed rated capacity. Limit the credit to a maximum of 75% of the rated capacity if partial test data is available and to a maximum of 50% of the rated capacity if no test data is available.

531 REVIEW OF PUMP CAPACITY:

A. Existing Pump Capacity (EP_i):
In this section, credit the pump capacity of in-service pumpers, pumper-ladder trucks, and pumper-service trucks credited in Section 513.

B. Reserve Pump Capacity (RP_i):
In this section, credit the pump capacity of reserve pumpers credited in Section 523.

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C. **Other Pump Capacity (OP_i):**
In this section, credit 50% of the capacity of permanently mounted pumps on other responding apparatus not credited in Section 513 or Section 523. The pumps must be capable of delivering at least 250 gpm at 150 psi.

D. **Automatic-Aid Pumper Capacity (AAP_i):**
In this section, credit the capacity of pumpers credited as automatic aid in Section 513. Use the value of the AA_i developed in Section 507 multiplied by the creditable pump capacity for each credited automatic-aid pumper.

532 CREDIT FOR PUMP CAPACITY (CPC):
Calculate the credit for pump capacity (CPC) as follows:

$$CPC = \frac{(EP + RP + OP + AAP)\text{Up to BFF}}{BFF} \times 3$$

Where:

$$EP = \sum_{i=1}^{n} EP_i$$

Note: In this formula, n = number of in-service apparatus from Section 513.

$$RP = \sum_{i=1}^{n} RP_i$$

Note: In this formula, n = number of reserve apparatus from Section 523.

$$OP = \sum_{i=1}^{n} OP_i \times 0.5$$

n = number of other apparatus

$$AAP = \sum_{i=1}^{n} [(AAP_i)(AA_i)]$$

Note: In this formula, n = number of automatic-aid pumpers. The value AA_i is from Section 507.

540 LADDER/SERVICE COMPANIES (NL/NS):
The standard response on the initial alarm to fires in structures consists of a minimum of 1 ladder or service company. The responding fire departments must provide enough ladder and/or service companies to ensure the response of at least 1 ladder or service company to all alarms for structure fires.

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A fire protection area needs a ladder/service company for each ladder/service location credited under Section 560, Deployment Analysis.

Also, a fire protection area needs a ladder/service company in an existing fire station when that station serves 50% or more of a standard response district not within 2½ road miles of other ladder/service companies. A standard response district is a built-upon area with a creditable water supply (as defined in Section 201A3) within a response distance of 2½ road miles.

The additional needed ladder/service locations must be fire stations identified as needed in Section 510A.

As an alternative to determining the number of needed ladder/service companies through the road-mile analysis used in Section 560, the authority having jurisdiction may provide the results of a systematic performance evaluation. Such an evaluation analyzes computer-aided dispatch (CAD) history to demonstrate that, with its current deployment of companies, each fire department meets the time constraints for initial full-alarm assignment in accordance with the general criteria of NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.*

A. NUMBER OF NEEDED LADDER COMPANIES (NL):
Individual ladder/service response areas with at least 5 buildings of 3 stories or 32 feet or more in height (ground to eaves) or with at least 5 buildings that have a Needed Fire Flow greater than 3,500 gpm or with at least 5 buildings meeting any combination of those criteria must have a ladder company.

When no individual response area needs a ladder company, the fire protection area needs at least 1 ladder company if buildings in the fire protection area meet the criteria above.

B. NUMBER OF NEEDED SERVICE COMPANIES (NS):
Ladder/service response areas not needing a ladder company according to Section 540A must have a service company.

541 NUMBER OF EXISTING LADDER/SERVICE COMPANIES (EL/SC):

A. NUMBER OF EXISTING LADDER COMPANIES (EL):
For a company serving in the capacity of a ladder company, on the initial alarm to all reported structure fires, and equipped according to NFPA 1901, *Standard for Automotive Fire Apparatus,* give credit as an existing ladder company if a ladder company is needed according to Section 540A.

For an apparatus serving in the capacity of a ladder company, equipped according to NFPA 1901, and considered as an existing engine company in Section 511, give 50% credit as a ladder company (engine-ladder) in this section if a ladder company is needed according to Section 540A.

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B. **NUMBER OF EXISTING SERVICE COMPANIES (ES):**
For a company serving in the capacity of a service company, on the initial alarm to all reported structure fires, and equipped according to NFPA 1901, *Standard for Automotive Fire Apparatus*, give credit as an existing service company if a service company is needed according to Section 540B.

For an apparatus serving in the capacity of a service company, equipped according to NFPA 1901, and considered as an existing engine company in Section 511, give 50% credit as a service company (engine-service) in this section if a service company is needed according to Section 540B.

C. **AUTOMATIC AID LADDER/SERVICE (AAL):**
Credit ladder/service companies from outside the fire protection area and within 2½ road miles of the fire protection area boundaries if they cover areas beyond the standard 2½-mile response distance of existing ladder/service company locations. The automatic-aid credit will reflect the percentage of the area covered. Determine the type of company credited according to Sections 540A and 540B.

542 EQUIPMENT ON EXISTING LADDER, ENGINE-LADDER, SERVICE, ENGINE-SERVICE COMPANIES

A. **LADDER COMPANY EQUIPMENT (LCE_i):**
Evaluate ladder company equipment carried for fighting structure fires by referring to NFPA 1901, *Standard for Automotive Fire Apparatus, "Aerial Fire Apparatus."* Determine the points credited for each existing in-service ladder company by referring to the current equipment lists in Table 542A, Equipment for a Service Company; Table 542B, Additional Equipment for a Ladder Company; and Table 542C, Aerial Ladder/Elevating Platform Test Program. Please see tables located in Appendix B of this document.

B. **ENGINE-LADDER COMPANY EQUIPMENT ($ELCE_i$):**
For an existing engine-ladder truck considered in Sections 511 and 542A, equipped according to NFPA 1901, *Standard for Automotive Fire Apparatus,* serving in the capacity of an engine-ladder company, and considered as an existing engine company in Section 511, give 50% credit in this section if a ladder company is needed according to Section 540A.

Evaluate ladder company equipment carried for fighting structure fires by referring to NFPA 1901, *Standard for Automotive Fire Apparatus, "Aerial Fire Apparatus."* Determine the points credited for each existing in-service ladder company by referring to the current equipment lists in Table 542A, Equipment for a Service Company; Table 542B, Additional Equipment for a Ladder Company; and Table 542C, Aerial Ladder/Elevating Platform Test Program. Please see tables located in Appendix B of this document.

C. **SERVICE COMPANY EQUIPMENT (SCE_i):**
Determine the points credited for each existing in-service service company by referring to the current equipment list in Table 542A, Equipment for a Service Company. Please see tables located in Appendix B of this document.

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D. **ENGINE-SERVICE COMPANY EQUIPMENT ($ESCE_i$):**
For an existing engine-service truck considered in Sections 511 and 541B, equipped according to NFPA 1901, *Standard for Automotive Fire Apparatus*, serving in the capacity of an engine-service company, and considered as an existing engine company in Section 511, give 50% credit in this section if a service company is needed according to Section 540B.

Determine the points credited for each in-service engine-service company by referring to the current equipment list in Table 542A, Equipment for a Service Company. Please see tables located in Appendix B of this document.

548 **AUTOMATIC AID:**
In this section, credit the value of an automatic-aid ladder, service, engine-ladder, or engine-service company. Use the value of the company as determined by Sections 542A through 542D multiplied by AA_i factor developed in Section 507.

549 CREDIT FOR LADDER SERVICE (CLS): Calculate the credit for ladder service (CLS) as follows:

$$CLS = \left(\frac{LCE + SCE + 0.5(ELCE) + 0.5(ESCE)}{772(NL) + 356(NS)} \right)(A) \times 4$$

A = percentage of built-upon area of the fire protection area with initial response (first alarm) of a ladder, service, engine-ladder or engine-service company to reported fires in buildings.

Where:

$$LEC = \sum_{i=1}^{n} LEC_i$$

$$ELCE = \sum_{i=1}^{n} ELCE_i$$

$$SCE = \sum_{i=1}^{n} SCE_i$$

$$ESCE = \sum_{i=1}^{n} ESCE_i$$

n = number of apparatus

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550 NUMBER OF NEEDED RESERVE LADDER SERVICE TRUCKS (NRLS):
The number of needed reserve ladder (NRL) and needed reserve service (NRS) trucks is 1 for each 8 existing ladder and service companies (ELS) or any fraction thereof.

When a pumper-ladder truck has been credited in Sections 513 and 541A, consider it in this section as 1 existing ladder company.

When a pumper-service truck has been credited in Sections 513 and 541B, consider it in this section as 1 existing service company.

Calculate the number of needed reserve ladder service trucks (NRLS) as follows:

$$NRLS = \frac{EL + ES}{8}$$ (raise to the next highest integer)

Calculate the number of needed reserve ladder trucks (NRL) as follows:

$$NRL = \frac{EL}{8}$$ (raise to the next highest integer)

Calculate the number of needed reserve service trucks (NRS) as follows:

NRS = NRLS - NRL

551 EQUIPMENT ON RESERVE LADDER AND SERVICE TRUCKS ($RLSC_i$):
Evaluate the equipment carried on reserve ladder and service trucks in the same manner as described in Section 542.

The number of reserve ladder and service trucks credited in this section shall not exceed the number of needed reserve ladder and service trucks. A reserve pumper-ladder or reserve pumper-service truck may be credited in this section as a reserve ladder or service truck or in Section 523 as a reserve pumper, but not both.

553 CREDIT FOR RESERVE LADDER AND SERVICE TRUCKS (CRLS):
Calculate the credit for reserve ladder and service trucks (CRLS) as follows:

$$CRLS = \frac{RLSC}{NRL(772) + NRS(356)} \times 0.5$$

Where:

$$RLSC = \sum_{i=1}^{n} RLSC_i$$

n = the number of creditable reserve ladder and service trucks from Section 550

560 DEPLOYMENT ANALYSIS (DA):
The built-upon area of the fire protection area should have a first-due engine company within 1½ road miles and a ladder-service company within 2½ road miles.

As an alternative to determining the number of needed engine and ladder/service companies through the road-mile analysis, a fire protection area may use the results of a systematic performance evaluation. This type of evaluation analyzes computer-aided dispatch (CAD) history to demonstrate that, with its current deployment of companies, the fire department meets the time constraints for initial arriving engine and initial full-alarm assignment in accordance with the general criteria of in NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.*

561 CREDIT FOR DEPLOYMENT ANALYSIS (CDA):
Calculate the credit for deployment analysis (CDA) as follows:

$$CDA = \left[\left[\frac{EC}{600(EE)} \times 0.6(AE)\right] + \left[\frac{LCE + SCE + 0.5(ELCE) - 0.5(ESCE)}{772(EL) + 356(ES)} \times 0.4(AL)\right]\right] \times 10$$

Where:

AE = the percent of built-upon area within 1½ road miles of a first-due engine, engine-ladder, or engine-service company

AL = the percent of the built-upon area within 2½ road miles of a first-due ladder, service, engine-ladder, or engine-service company

570 EXISTING COMPANY PERSONNEL (ECP):
"Existing company personnel" means the average number of active firefighters and company officers available for existing companies. The number includes firefighters assigned to an initial rapid intervention crew (IRIC). Do not include the incident commander in existing company personnel.

Each person credited must, while on the fireground, have available a protective clothing ensemble in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*

Limit the credit for company personnel to the firefighters meeting the general criteria in Section 580. Evaluate company personnel as follows:

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FIRE SUPPRESSION RATING SCHEDULE

A. **On-Duty Firefighters at Fire Stations (ODF):**
To evaluate the total number of firefighters on duty with companies at the fire station, take an average over an entire year, considering vacations, holidays, sick leave, and other absences.

If a fire department has a funded hire-back program or equivalent program that will maintain minimum staffing levels, consider all staff as part of the annual average.

Include chiefs' aides in company strength if they participate in firefighting operations. Also include chief officers and fire department administrative personnel if they respond on the initial alarm to all reported structure fires and perform company duties.

In this section, include in company strength firefighters on apparatus not credited under Sections 513 and 549 if they regularly respond on the initial alarm to all reported structure fires to aid engine, ladder, and service companies.

Credit fire department personnel staffing ambulances or fire department apparatus responding on medical calls if those personnel participate in fighting structure fires. Prorate the credit to reflect the extent to which such personnel are available, respond on the initial alarm to all reported structure fires and perform company duties.

Each person credited in the section must, while on the fireground, have available a protective clothing ensemble in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*

B. **Public Safety Officers (PSO):**
Credit public safety officers employed to perform law enforcement or other municipal duties as well as firefighter duties on the basis of the average number of firefighters responding to structure fires on the initial alarm to all reported structure fires.

Each person credited must have a two-way portable radio on the fire frequency. Each person credited must receive notification of initial alarms for structure fires and must respond when the company to which he or she is assigned responds. While on duty, each person credited must remain within the company first-due assignment district, except that public safety officers may receive credit when the police patrol district and the first-due fire company response district overlap. Each person credited must have a vehicle equipped with emergency lights and a siren. Each person credited must, while on the fireground, have available a protective clothing ensemble in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*

Each position credited must have a written schedule including days of the month and times of day when the persons are available. The municipality must maintain records of the response of the persons to each initial report of a structure fire. Do not give credit for persons who experience unusual delays. To recognize that public safety officers may be unavailable because of assigned law enforcement and/or other responsibilities, credit each such officer as one-half of an on-duty firefighter.

C. **On-Call and Off-Duty Firefighters (OCF):**
Credit on-call, and off-duty firefighters based on the average number of firefighters who staff apparatus and respond on the initial alarm to all reported structure fires. In this section, include chief officers and fire department administrative personnel responding on the initial alarm to all reported structure fires and performing company duties. Credit off-duty firefighters responding on the initial alarm to all reported structure fires on the same basis as on-call firefighters. To account for the time needed for notification, travel, and assembly on the fireground, credit each on-call and off-duty firefighter as one-third of an on-duty firefighter.

Volunteer firefighters who are on duty at fire stations according to a predetermined assignment are credited as on-duty firefighters (ODF) for the time they are on duty; otherwise, volunteer firefighters are considered on-call.

D. **Automatic-Aid Response:**
In determining the credit for 570A, B, and C, consider the average number of firefighters responding with companies credited as automatic aid under Sections 513 and 549. To ODF, PSO, and OCF, add the average number of such firefighters responding multiplied by the AA_i factor developed in Section 507.

In determining the credit for 570A, B, and C, consider firefighters responding with companies located within 5 road miles of the fire protection area boundary and qualifying within Section 507 but not needed according to Section 513 and/or Section 549. Credit such firefighters only if they respond on the initial alarm to all reported structure fires to augment responding firefighters from the department under evaluation. To ODF, PSO, and OCF, add the average number of firefighters responding multiplied by the AA_i factor developed in Section 507.

E. **Special Apparatus:**
In determining the credit for 570A, B, C, and D, consider firefighters responding on the initial alarm to all reported structure fires on special fire department apparatus. Firefighters may be members of units such as rescue squads, personnel squads, or air units.

F. **Service, Engine-Service, and Engine-Ladder Trucks:**
If a service truck receives credit in Section 549, consider it as 1 existing service company in Section 571.

If an engine-service truck receives credit in Sections 513 and 549, consider it as 1 existing engine company and as 1 existing service company in Section 571.

If an engine-ladder truck receives credit in Sections 513 and 549, consider it as 1 existing engine company and as one existing ladder company in Section 571.

G. **Additional Personnel (AP):**
If the number of responding companies exceeds the number of needed companies for a response to structure fires as part of a standard initial response to all locations in the fire protection area, credit the personnel arriving with such companies in 570A, B, or C.

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H. **Personnel:**
The maximum credit for any response by on-duty, firefighters, public safety officers, on-call and off-duty firefighters, and automatic-aid firefighters is 12, including company officers, for each existing engine and existing ladder company and 6 for each existing service company.

I. **Alternative Water Supply Apparatus:**
In Section 570, do not credit firefighters responding on apparatus with the primary responsibility of establishing and maintaining the water supply.

571 CREDIT FOR COMPANY PERSONNEL (CCP):
Calculate the credit for company personnel (CCP) as follows:

$$CCP = \frac{ODF + (PSO/2) + (OCF/3)}{EE + EL + 0.5(ES) - AP} \times 2.5$$

Note 1: If necessary, adjust the number of existing companies to conform with Section 570G.

Note 2: If satisfactory records are not available, divide the credit for OCF by 6 instead of by 3.

580 TRAINING (T):
Fire departments must keep training records in accordance with the general criteria of NFPA 1401, *Recommended Practice for Fire Service Training Reports and Records*.

Construction of a fire service training center must be in accordance with the general criteria of NFPA 1402, *Guide to Building Fire Service Training Centers*.

All personnel engaged in fire suppression activities must receive training in subjects related to fighting structure fires. Evaluate training as follows:

A. **Training Facilities and Use (T_1):**
Training conducted at a live fire training facility.
Up to.....35 points

1. **Facilities (FA):**

	Maximum Points
Live fire training structure including smoke room	17
Drill tower at least 3 stories in height	10
Training area at least 2.0 acres in size	8

Maximum (FA) = 35

2. **Use of Facilities (U):**

For full credit under this item, each member of the department should attend 18 hours of training at the facilities credited in Section 580A1.

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Multiply the points credit for facilities (FA) by the factor (U) for use of the facilities by all company members:

Maximum 18 hours per member;
(U) = number of hours per member ÷ 18
Maximum for factor (U) =1.00

Training at the facilities credited in this section must be in accordance with the general criteria of NFPA 1403, *Standard on Live Fire Training Evolutions* and NFPA 1410, *Standard on Training for Initial Emergency Scene Operations.*

$T_1 = (FA)(U)$

B. Company Training Program (T_2):
Company training at fire stations including training using streets, buildings, and open areas, 16 hours per company member per month.
Up to.....25 points

Firefighter training should be in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*

Calculate the points for company training (T_2) as follows

$$T_2 = \frac{\Sigma(\text{Company Training Hours})}{16 \text{ Hours} \times (\text{Number of Members})} \times 25$$

Limit credit for company training hours to 16 hours per member per month.

C. Officer Training and Certification Program (T_3):

1. Officer Certification (OC):
Certification of each current officer with responsibilities in fire suppression in accordance with the general criteria of NFPA 1021, *Standard for Fire Officer Professional Qualifications.*
Up to:.....6 points

2. Officer Continuing Education (OE):
Continuing education for officer training on- or off-site, 12 hours per year for all officers.
Up to:.....6 points

Officer training should be in accordance with the general criteria of NFPA 1021, *Standard for Fire Officer Professional Qualifications*; NFPA 1521, *Standard for Fire Department Safety Officer*; NFPA 1561, *Standard on Emergency Services Incident Management System.*

Calculate the points for officer training and certification (T_3) as follows:

$T_3 = T_{3OC} + T_{3OE}$

Where:

$$T_{3OC} = \frac{\text{(Number of Certified Officers)}}{\text{Number of Officers}} \times 6$$

$$T_{3OE} = \frac{\Sigma\text{(Officer Continuing Education Hours)}}{\text{12 Hours} \times \text{(Number of Officers)}} \times 6$$

Limit credit for officer continuing education to 12 hours per officer per year.

D. **New Driver/Operator Training Program (T_4):**
60 hours (or certification) in accordance with the general criteria of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications.*
Up to.....5 points

The New Driver Operator Training Program should be in accordance with the general criteria of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications,* and NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program.*

Calculate the points for The New Driver/Operator Training Program (T_4) as follows:

$$T_4 = \frac{\Sigma\text{(New Driver Operator Training Hours)}}{\text{60 Hours} \times \text{(Number of New Driver Operators)}} \times 5$$

Limit credit for new driver/operator training hours to 60 hours per new driver/operator.

E. **Existing Driver/Operator Training Program (T_5):**
12 hours per year.
Up to.....5 points
Driver and operator training should be in accordance with the general criteria of NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications,* and NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program.*

Calculate the points for the Existing Driver/Operator Training Program (T_5) as follows:

$$T_5 = \frac{\Sigma\text{(Existing Driver Operator Training Hours)}}{\text{12 Hours} \times \text{(Number of Existing Driver Operators)}} \times 5$$

Limit credit for existing driver/operator training hours to 12 hours per existing driver/operator per year.

F. **Hazardous Materials Training Program (T_6):**
6 hours per member per year.....1 point

Hazardous materials training should be at a minimum awareness level in accordance with the general criteria of NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents.*

Calculate the points for the Hazardous Materials Training Program (T_6) as follows:

$$T_6 = \frac{\Sigma(\text{Hazardous Materials Training Hours})}{6 \text{ Hours} \times (\text{Number of Members})} \times 1$$

Limit credit for hazardous materials training hours to 6 hours per member per year.

G. Recruit Training Program (T_7):
240 hours per recruit within the first year of employment or tenure (or certification) in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*
Up to.....5 points

Firefighter training should be in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications*. Give credit for class hours spent towards the completion of Firefighter I and Firefighter II training (in accordance with the general criteria of NFPA 1001). Firefighters who obtain the Firefighter I and Firefighter II designation (in accordance with the general criteria of NFPA 1001) before employment or within the first year of employment or tenure meet the intent of Section 580G.

Calculate the points for the Recruit Training Program (T_7) as follows:

$$T_7 = \frac{\Sigma(\text{Recruit Training Hours})}{240 \text{ Hours} \times (\text{Number of Recruits})} \times 5$$

Limit credit for recruit training hours to 240 hours per recruit.

H. Building Familiarization for Pre-Incident Planning Program (T_8):
Annual pre-incident planning.
Up to.....12 points

The fire department should make building familiarization and pre-incident planning tours of each commercial, industrial, institutional, and other similar building at least annually. Records of the inspections (whether in electronic or other formats) should include complete and up-to-date notes and sketches, which must be available to the responding incident commander.

Building familiarization and pre-incident planning should be in accordance with the general criteria of NFPA 1620, *Standard for Pre-Incident Planning.*

Frequency of Inspections	Points
1 year	1.00
2 years	0.83
3 years	0.67
4 years	0.58
5 years	0.42
More than 5 years	0.00

Calculate the points for building familiarization for pre-incident planning (T_8) as follows:

$$T_8 = \text{Frequency} \times \left(\frac{\text{Number of Pre-Planned Buildings}}{\text{Number of Buildings}} \right) \times 12$$

I. **TRAINING RECORDS:**
Reduce the sum of points credited in Sections 580A through H as specified in Section 105.

581 CREDIT FOR TRAINING (CT):
Calculate the credit for training (CT) as follows:

$$CT = \frac{\Sigma(T)}{100} \times 9$$

590 CREDIT FOR FIRE DEPARTMENT (CFD):

Calculate the credit for fire department (CFD) as follows:

$$CFD = CEC + CRP + CPC + CLS + CRLS + CDA + CCP + CT$$

Appendix A

TABLE 512A PUMPER EQUIPMENT AND HOSE

Equipment and Hose	Needed	Points Credit/Unit	Total Points
Booster tank	300 gal. or larger	1/10 gal.	30
Hose:			
15' soft-suction or 20' hard-suction hose	1	12	12
1½" , 1¾", or 2" hose carried	400'	3/50	24
Master stream appliance (1,000 gpm)	1	100	100
Nozzles:			
2½" playpipe with shutoff and 1", 1⅛", and 1¼" tips	1	20	20
2½" combination spray with shutoff	1	30	30
1½" or 1¾" combination spray with shutoff	2	10	20
SCBA (30-minute minimum)	4	24	96
Extra cylinders (carried)	4	6	24
Salvage covers (minimum size of 12' x 14')	2	2	4
Electric handlights	2	2	4
Hose clamp	1	4	4
Hydrant hose gate (2½")	1	4	4
Gated wye (2½" x 1½" x 1½")	1	4	4
Radio:			
Mounted	1	32	32
Portable	1	16	16
Ladders:			
12' to 16' roof	1	10	10
24' extension or larger	1	16	16
Annual tests:			
Pumper (see Table 512B)	1	100	100
Hose (see Table 512C)	1	50	50
	Total		600

TABLE 512B PUMPER SERVICE TEST PROGRAM

Average Interval between 3 Most Recent Tests	Maximum Points Credit
1 year	100
2 years	75
3 years	50
4 years	25
5 years or more	0

The Pumper Service Test Program shall be in accordance with the general criteria of NFPA Standard 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus*.

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TABLE 512C HOSE SERVICE TEST PROGRAM

Average Interval between 3 Most Recent Tests	Maximum Points Credit
1 year	50
2 years	37
3 years	25
4 years	12
5 years or more	0

The Hose Service Test Program shall be in accordance with the general criteria of NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose.*

When the hose test frequency varies, proportion the credit based upon the percent of all hose tested for each frequency.

Note: If partial records of tests exist, reduce the credit for testing by 25% for Tables 512B and/or 512C; if no records of tests exist, reduce the credit by 100% for Tables 512B and/or 512C as applicable.

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Appendix B

TABLE 542A EQUIPMENT FOR A SERVICE COMPANY

Equipment	Needed	Points Credit/Unit	Total Points
SCBA (30-minute minimum)	4	24	96
Extra cylinders (carried)	4	6	24
Salvage covers (minimum size of 12' x 14')	6	2	12
Electric generator (3,000 watt)	1	25	25
Portable floodlight (500 watt)	3	4	12
Smoke ejector (5,000 cfm)	1	20	20
Portable thermal cutting unit	1	20	20
Saw – power (chain or heavy-duty rotary type)	1	20	20
Electric handlights	4	2	8
Pike pole (plaster hook):			
3' or 4'	2	2	4
6' or longer	4	2	8
Radio:			
Mounted	1	32	32
Portable	1	16	16
Ladder:			
24' extension or longer	1	25	25
16' roof or longer	1	25	25
10' attic or longer	1	4	4
14' combination or longer	1	5	5
Total			356

TABLE 542B ADDITIONAL EQUIPMENT FOR A LADDER COMPANY

Equipment	Needed	Points Credit/Unit	Total Points
Ladder:			
16' or longer roof	1	25	25
35' or longer extension	1	25	25
Elevated stream device*	1	100	100
Large spray nozzle (1,000 gpm)	1	16	16
Aerial ladder/elevating platform*	1	200	200
Annual tests (aerial/platform, see Table 542C)	1	50	50
Total			416

*Of sufficient height to reach the roof of any building, or 100 feet, whichever is less. The credit shall be prorated if existing equipment has insufficient reach.

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TABLE 542C AERIAL LADDER/ELEVATING PLATFORM TEST PROGRAM

Average Interval between 3 Most Recent Tests	Maximum Points Credit
1 year	50
2 years	37
3 years	25
4 years	12
5 years or more	0

Aerial Ladder/Elevating Platform Test Program shall be in accordance with the general criteria of NFPA 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus*.

Note: If partial records of testing exist, reduce the credit for testing in Section 542C by 25%; and if no records of testing exist, reduce the credit in Section 542C by 100%.

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WATER SUPPLY

600 GENERAL:
This section gives procedures and formulas for evaluating the water supply system and/or fire department supply available for fire suppression in the fire protection area.

601 PART OF FIRE PROTECTION AREA WITHOUT A RECOGNIZED WATER SYSTEM:
If any portion of the fire protection area is not within 1,000 feet of a recognized water system, such area may receive a Class 8B (see Sections 1200–1202) or a Class 9 (see Sections 1300–1312). See Section 201A3 for the criteria for a recognized water system.

602 MAXIMUM DAILY CONSUMPTION RATE (MDC):
The maximum daily consumption rate is the rate of consumption on the maximum day. The maximum day is the 24-hour period during which the highest consumption total is recorded in the latest three-year period. High consumption that will not occur again because of changes in the system or that was caused by unusual operations will not be considered.

When a system has 2 or more service levels in series, the total maximum daily consumption rate that must pass through the service level being reviewed will be considered.

603 MINIMUM PRESSURE:
Evaluate the water system at a residual water pressure of 20 psi.

604 NEEDED FIRE FLOW (NFF) DURATION:
The fire-flow duration for commercial properties is 2 hours for Needed Fire Flows (NFF_i) up to 2,500 gpm and 3 hours for Needed Fire Flows of 3,000 and 3,500 gpm.

The fire-flow duration for 1- and 2-family dwellings with an Effective Area in excess of 4,800 square feet is 2 hours for Needed Fire Flows (NFF_i) up to 2,500 gpm and 3 hours for Needed Fire Flows of 3,000 and 3,500 gpm.

The fire-flow duration for 1- and 2-family dwellings with an Effective Area of 4,800 square feet or less is 1 hour.

The fire-flow duration for any 1- or 2-family dwelling protected with an automatic fire sprinkler system installed in accordance with the general criteria of NFPA 13D, *Installation of Sprinkler Systems for One- and Two-Family Dwellings and Manufactured Homes,* is 1 hour, in accordance with the general criteria of NFPA 1, *Fire Code.*

The fire-flow duration for a residential occupancy (in accordance with the general criteria of NFPA 101, *Life Safety Code*) up to and including 4 stories in height protected with an automatic fire sprinkler system installed in accordance with the general criteria of NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and including Four Stories in Height*, is 2 hours, in accordance with the general criteria of NFPA 1, *Fire Code.*

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605 SERVICE LEVEL:
A service level is a water distribution system or part of a system separated by closed valves, check valves, pressure-regulating equipment, or other means of separation. Evaluate each system or service level separately.

When a system or service level is supplied from 2 or more sources or supply works, the credit shall be based upon the combined water supply.

610 REVIEW OF SUPPLY SYSTEM:
Sections 611 through 616 give procedures and formulas for evaluating the ability of the water supply system to deliver the Needed Fire Flow (NFF_i) at representative locations throughout the fire protection area. For each representative location, separately evaluate the supply works, main capacity, and hydrant distribution.

611 SUPPLY WORKS:
Use the normal sustained flow as the normal capacity of the source. If conditions or operations regularly reduce the supply for a period exceeding 1 month per year, prorate the available supply accordingly. Do not take the absolute minimum supply available from water sources under extreme dry-weather conditions as the measure of the normal ability of the source of supply.

A. Minimum Storage (MS_i):
Credit no more than the average daily minimum water storage maintained.

For storage floating on the distribution system, credit only the portion of average daily minimum storage that the system can deliver at the required residual pressure and for the fire duration at the point of use. Minimum storage (MS) is the sum of all storages (MS_i) available at the test location for the fire duration, expressed in gpm.

For ground or below-ground storage where the average daily minimum storage must be repumped, limit credit for the storage to the capacity of the pumping facility for the fire duration.

When a fire protection area experiences large seasonal fluctuations of population and therefore wide variations in consumption, evaluate the average daily minimum storage at the time when consumption is average for the maximum population.

B. Delivery Rate (DR_i):
The total delivery rate for each service level is the effective capacity of all involved components. Components may include water treatment facilities, pumps, pipes, and other flow-restricting devices.

Consider each component of a water treatment facility (FL_i), including filters, storage, and pumps, for the limiting factor. Consider filters as capable of operating at a reasonable overload capacity based on records and/or the authority having jurisdiction. When treated water is pumped to a service level, the storage, filter, or pump capacity may limit the total delivery rate.

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Credit pumps (PU_i) at their effective capacities when delivering at normal pressures. Suction or discharge lines or the average minimum daily storage may limit pumps that supply a service level from storage. Water treatment components may limit the effective capacity.

When 2 or more pumps lift in series, the effective pump capacity is the capacity of the lift with the lowest total capacity. When the same pumps can operate in 2 or more lifts, evaluate them in each lift to determine the lift with the lowest total capacity.

Discharge lines, pressure-regulating devices, or other flow-control devices may limit the effective capacity of gravity supply from a water treatment facility to a service level or from one service level to a different service level. The total capacity available in the service level supplying water may limit the effective capacity of pumped supply from one service level to a different service level.

The total delivery rate (DR) for a service level is the sum of all supplies as limited by water treatment, pumps, and other devices, including flow-restricting devices in gravity supply systems.

C. **Emergency Supply (EM_i):**
Evaluate the system's ability to use emergency supplies through connections from other systems or from separate sources, storage, or equipment not normally used. Credit emergency supplies that come in automatically.

Also credit other emergency supplies adjusted for the time that would elapse before delivery is possible from the emergency supplies.

The total emergency supply capacity (EM) is the sum of all emergency supplies available at the test location, expressed in gpm.

Calculate the emergency supply (EM) as follows:

$$EM = \sum_{i=1}^{n} EM_i$$

Where:
n = number of emergency supplies available at the test location

D. **Suction Supply (SS_i):**
Where bays, rivers, canals, streams, ponds, wells, cisterns, or other similar sources are available as suction supply for fire department pumpers, evaluate the suction supply with respect to its ability to satisfy the Needed Fire Flow (NFF_i) at test locations. Consider accessibility and availability during freezing weather, floods, droughts, or other adverse conditions. The total suction supply (SS) credited is the sum of suction supplies (SS_i) at the test location for the fire duration or the capacity of the fire department pumping equipment, whichever is less, expressed in gpm.

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See NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting,* for criteria for establishment of a suction water supply.

Calculate the suction supply (SS) as follows:

$$SS = \sum_{i=1}^{n} SS_i$$

Where:
n = number of suction supplies available at the test location

See NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting,* for criteria for establishment of a suction water supply.

E. Fire Department Supply (FDS):
Credit supply delivered at a rate of 250 gpm or more by fire department apparatus either carrying and/or relaying water to the fire. The fire department must be able to achieve that application rate within 5 minutes of the initial arrival of the pumper apparatus at the fire site, and must continue for the fire-flow duration. If the fire department can increase the rate of flow within 15 minutes of arrival at the fire site and can continue the higher flow for the fire-flow duration, credit the higher rate.

Calculate the travel time of apparatus as follows:

$T = 0.65 + 1.7D$

Where:

T = minutes
D = miles

The formula assumes an average speed of 35 mph. Assume slower speeds in cases of adverse road conditions or apparatus laying hose lines.

The fire department supply (FDS) is the capacity of the supply for the fire duration, the capacity of the source pumping equipment, the capacity of the delivery equipment (mobile water supply apparatus and/or hose lines), or the capacity of the final delivery pumping equipment, whichever is least, at the test location, expressed in gpm.

See NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting,* for criteria for establishment of a fire department supply.

612 SUPPLY WORKS CAPACITY (SWC_i):
Calculate the supply works capacity in gpm, considering the fire-flow duration, for each representative test location.

For each supply at a test location, calculate the supply works capacity (SWC_i) as follows:

$$SWC_i = \sum_{a=1}^{n} SWC_{ak}$$

Where:

SWC_{ik} = [(MS + DR + EM) – MDC] + SS + FDS

k = represents the flow duration (Section 604)
n = the number of supplies available at a test location
a = the supply under consideration

613 MAIN CAPACITY (MC_i):
Evaluate the normal ability of the distribution system to deliver Needed Fire Flows (NFF_i) at the test locations considered in Section 612. The results of a standard flow test or the results of a properly balanced and tested hydraulic water system model at a representative test location will indicate the ability of mains to carry water to that location.

If the testing includes standard flow tests on 2 or more systems or service levels at the same location, give credit for the sum of the test results on each system or service level, up to the limit of supply, for the fire-flow duration at that location.

MC_i = tested or hydraulically modeled gpm at 20-psi residual pressure.

For information on standard flow testing of fire hydrants and sample forms for recording tests, see AWWA Manual 17, *Installation, Field Testing, and Maintenance of Fire Hydrants,* and NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants.*

614 HYDRANT DISTRIBUTION (HD_i):
Evaluate the distribution of hydrants and water suction points within 1,000 feet (as apparatus can lay hose) of the Needed Fire Flow test locations considered in Sections 612 and 613. Evaluate each hydrant. Also evaluate each water suction point (with or without a dry hydrant) that meets the criteria in Section 611D.

Credit up to 1,500 gpm for each hydrant or water suction point within 1,000 feet of the Needed Fire Flow location.

If 2 or more systems or service levels distribute water at the same location, give credit based on the hydrant protection provided by all systems and service levels available.

A. Consider substandard hydrants if they have at least 1 fire department outlet, and can deliver at least 250 gpm.

B. Consider cisterns or other suction points if they can supply at least 250 gpm for at least 2 hours.

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C. Limit the credit for a hydrant based on the number and size of outlets as follows:

Maximum Credit

At least one pumper outlet	1,500 gpm*
Two or more hose outlets, no pumper outlet	750 gpm*
One hose outlet only	500 gpm

*AWWA Standard C502 *Dry-Barrel Fire Hydrants* and AWWA Standard C503, *Wet-Barrel Fire Hydrants.*

HD_i is the creditable capacity, expressed in gpm, for each hydrant within 1,000 feet of the Needed Fire Flow test location.

$$HD_i = \sum_{a=1}^{n} HD_a$$

Where:
n = the number of hydrants within 1,000 feet of the test location
a = the hydrant under consideration

615 CAPABILITY OF WATER SYSTEM AT NEEDED FIRE FLOW TEST LOCATION (TLC_i):
The creditable rate of flow at each Needed Fire Flow test location is the lowest of Needed Fire Flow (NFF_i), supply works capacity (SWC_i), main capacity (MC_i), or hydrant distribution (HD_i).

616 CREDIT FOR SUPPLY SYSTEM (CSS):

$$CSS = \frac{TLC}{NFF} \times 30$$

Where:

$$TLC = \sum_{i=1}^{n} TLC_i$$

$$NFF = \sum_{i=1}^{n} NFF_i$$

n = number of test locations

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620 HYDRANTS - SIZE, TYPE AND INSTALLATION (PH):
Fire hydrants should be designed and installed in accordance with AWWA Standard C502, *Dry-Barrel Fire Hydrants,* or AWWA Standard C503, *Wet-Barrel Fire Hydrants.* Dry hydrants should be designed and installed in accordance with the general criteria of NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting.*

Assign points for hydrants, dry hydrants, cisterns, and/or suction points according to the following. Prorate the points according to the number of hydrants of each type compared with the total number.

	Hydrants	Points
A.	With 6-inch or larger branch and a pumper outlet; with or without 2½ -inch outlets; or with 6-inch or larger dry hydrant installed in accordance with the general criteria of the applicable Standards	100
B.	With 6-inch or larger branch, no pumper outlet but 2 or more 2½ -inch outlets, or with small barrel less than 5 inches	75
C.	With only one 2½ -inch outlet	25
D.	With less than 6-inch branch	25
E.	Flush type (flush or ground level)	25
F.	Cistern or suction point	25

621 CREDIT FOR HYDRANTS (CH):
Calculate the credit for hydrants (CH) as follows:

$$CH = \frac{PH}{100} \times 3$$

630 INSPECTION AND FIRE FLOW TESTING OF HYDRANTS:

A. Inspection (HI):
Inspection of hydrants should be in accordance with AWWA manual M17, *Installation, Field Testing, and Maintenance of Fire Hydrants.* The frequency of inspection is the average time interval between the 3 most recent inspections.

Assign points for frequency of inspection (FI) according to the following:

Frequency of Inspection (FI)	Points
1 year	30
2 years	20
3 years	10
4 years	5
5 years or more	No credit

Adjust the points for frequency of inspection (FI) to reflect the following, if applicable:

1. Hydrant inspections include a flushing program: +10 points
2. Inspections include a pressure test: +10 points

3. Inspection of cisterns or suction points includes drafting with a pumper and back-flushing for dry hydrants: +20 points

After application of subsections 1–3, reduce the total points for frequency of inspection (FI) by 25% if partial records of inspections exist. If no records of inspections exist, no credit applies.

Calculate the credit for inspection (HI) as follows:

$$HI = \frac{FI}{50} \times 4$$

B. Fire-Flow Testing (FT):

Fire-flow testing of hydrants should be in accordance with the general criteria of AWWA manual M17, *Installation, Field Testing, and Maintenance of Fire Hydrants*, and NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*. For full credit in this section, fire-flow tests should be conducted on all parts of the distribution system every 5 years.

Assign points for frequency of fire-flow testing (FF) according to the following:

Frequency of Fire-Flow Testing (FF)	Points
5 years	40
6 years	30
7 years	20
8 years	10
9 years	5
10 years or more	No credit

If there is a hydrant marking program in accordance with the general criteria of NFPA 291 or AWWA manual M17, increase the points for frequency of fire-flow testing (FF) by 25%.

Reduce the total points for frequency of fire-flow testing (FF) by 25% if partial records of tests exist. If no records of tests exist, no credit applies.

Calculate the credit for fire-flow testing (FT) as follows:

$$FT = \frac{FF}{50} \times 3$$

In lieu of a comprehensive fire-flow testing program, credit the results of a current, properly installed and calibrated hydraulic water distribution system computer model that can produce static pressure and flow predictions at 20-psi residual pressure. For more information, see AWWA manual M32, *Computer Modeling of Water Distribution Systems*.

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631 CREDIT FOR INSPECTION AND FIRE-FLOW TESTING OF HYDRANTS (CIT):
Calculate the credit for inspection and fire-flow testing of hydrants (CIT) as follows:

CIT = HI + FT

640 CREDIT FOR WATER SUPPLY (CWS):
Calculate the credit for water supply (CWS) as follows:

CWS = CSS + CH + CIT

OPERATIONAL CONSIDERATIONS (OC)

700 GENERAL
This section gives procedures and formulas for evaluating fire department standard operating procedures (SOP) and incident management systems (IMS) for emergency operations involving structure fires.

710 CREDIT FOR STANDARD OPERATING PROCEDURES (SOP):
Evaluate established SOPs for fire department general emergency operations, including response of apparatus, operation of emergency vehicles, safety at emergency incidents, communications, apparatus inspection and maintenance, fire suppression, company operations, automatic-aid/mutual-aid operations, training, and personnel response. SOPs should be in accordance with NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* and/or NFPA 1201, *Standard for Providing Emergency Services to the Public.* .....50 points

720 CREDIT FOR INCIDENT MANAGEMENT SYSTEM (IMS):
Evaluate an established incident management system (IMS) in accordance with the general criteria of the National Incident Management System (NIMS) and NFPA 1561, *Standard on Emergency Services Incident Management System*.....50 points

730 CREDIT FOR OPERATIONAL CONSIDERATIONS (COC):
Calculate the credit for operational considerations (COC) as follows:

$$COC = \frac{SOP + IMS}{100} \times 2$$

800 RESERVED FOR FUTURE USE

900 RESERVED FOR FUTURE USE

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FIRE SUPPRESSION RATING SCHEDULE

COMMUNITY RISK REDUCTION

1000 GENERAL:
This section gives procedures and formulas for evaluating:

- adoption and enforcement of fire prevention codes
- public fire safety education
- fire investigation programs

1010 Reserved for future use

1020 FIRE PREVENTION CODE ADOPTION AND ENFORCEMENT (PCE)
Fire prevention code adoption and enforcement.
Up to.....40 points

1021 FIRE PREVENTION CODE REGULATIONS (PCR)
Evaluate the fire prevention code regulations in effect.
Up to.....10 points

Consider whether the jurisdiction adopts and enforces the latest edition of one of the following model codes:

- NFPA 1, *Fire Code*, promulgated by the National Fire Protection Association
- ICC International Fire Code, promulgated by the International Code Council

For full credit in this section, a jurisdiction must adopt and enforce the latest edition of one of the nationally recognized fire prevention codes.

If a jurisdiction adopts and enforces state or local amendments that modify or delete provisions for fire hazard mitigation within a nationally recognized fire prevention code, the points available in this section are subject to proration.

If a jurisdiction adopts and enforces a local code or regulations not developed by a nationally recognized code organization, the points available in this section are subject to proration.

1. If the published date of the adopted codes is within 5 years of the date of the grading, fire prevention code(s) addressing commercial and/or residential properties.....10.0 points

2. If the published date of the adopted codes is within 6 years of the date of the grading, fire prevention code (s) addressing commercial and/or residential construction.....8.6 points

3. If the published date of the adopted codes is within 10 years of the date of the grading, fire prevention code (s) addressing commercial and/or residential construction.....2.76 points

4. If an earlier edition of the adopted codes is enforced, fire prevention code(s) addressing commercial and/or residential construction.....1.06 points

1022 FIRE PREVENTION STAFFING (PS):
Evaluate staffing for fire prevention activities.
Up to.....8 points

A. Frequency of Fire Prevention Inspections:
The jurisdiction must provide adequate personnel to perform fire prevention inspections on all nonresidential structures at least once a year.

For the purposes of this section, pre-incident planning inspections — with no component for fire prevention code enforcement — are not fire prevention inspections.

B. Fire Prevention Inspectors:
The following types of personnel may conduct fire prevention inspections:

1. Certified fire inspectors — full-time and equivalent part-time fire inspectors certified in accordance with the general criteria of NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plans Examiner*, or equivalent ICC certification

2. State or county fire prevention inspectors or fire marshals with authority for fire prevention code enforcement

3. Fire suppression personnel who perform in-service fire prevention inspections

Reduce the credit for fire prevention staffing (PS) by 25% if partial records exist. If no records exist, no credit applies.

Calculate the credit for fire prevention staffing (PS) as follows:

$$PS = \frac{\text{Number of Non-Residential Structures Inspected Annually}}{\text{Number of Non-Residential Structures}} \times 8$$

1023 FIRE PREVENTION CERTIFICATION AND TRAINING (PCT):
Evaluate the certification and training of fire prevention code enforcement personnel.
Up to.....6 points

A. Fire Inspector Certification (PIC):
Up to.....3 points

All personnel assigned to perform fire prevention inspections shall be certified as fire inspector in accordance with the general criteria of NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*, or equivalent ICC certification.

Calculate the credit for fire prevention fire inspector certification (PIC) as follows:

$$PIC = \frac{\text{Total Number of Existing Certified Inspectors}}{\text{Total Number of Fire Inspectors}} \times 3$$

B. Fire Inspector Continuing Education (PIE),
Up to.....3 points

All fire prevention inspection personnel must receive at least 24 hours of additional fire prevention inspection continuing education every year.

Calculate the credit for fire inspector continuing education (PIE) as follows:

$$PIE = \frac{\text{The Required Number of Hours of Continuing Education per Year per Inspector}}{24} \times 3$$

C. Credit for Fire Prevention Certification and Training (PCT)
Calculate the credit for fire prevention certification and training (PCT) as follows:

$$PCT = PIC + PIE$$

1024 FIRE PREVENTION PROGRAMS (PCP):
Evaluate the fire prevention programs.
Up to.....16 points

Fire prevention programs include:

- plan review
- certificate of occupancy inspections
- quality control
- code compliance
- inspection of private fire protection equipment
- fire prevention ordinances
- coordination of fire department training and pre-incident planning

A. Plan Review (PPR):
Up to.....6 points

All construction plans for new nonresidential construction, additions, remodeling, and the like shall be reviewed for compliance with adopted fire prevention codes.

B. Inspections for Certificates of Occupancy (PCO):
Up to.....4 points

The jurisdiction must perform inspections for certificates of occupancy (or certificates of compliance) as specified by the code in effect.

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1. The jurisdiction must perform a fire prevention inspection of all new residential construction before issuing the certificate of occupancy.....2 points

2. The jurisdiction must perform a fire prevention inspection of all new nonresidential construction before issuing the certificate of occupancy .....2 points

C. Quality-Assurance Program for Enforcement and Inspection Programs (PQC):
Up to .....1 point

The jurisdiction must have a quality-assurance program that applies to all fire prevention code inspectors as appropriate for their position.

D. Code Compliance Follow-Up (PCF):
Up to.....1 point

The jurisdiction must perform follow-up inspections to verify correction of all violations.

E. Inspections of Private Fire Protection Equipment (PPP):
Up to.....1 point

The jurisdiction must perform routine inspections of all private fire protection equipment. The frequency of such inspections depends on the type of equipment. The schedule must comply with the adopted codes and/or be in accordance with the general criteria of NFPA standards.

F. Fire Prevention Ordinances (PPO):
Up to.....2 points

The jurisdiction must adopt ordinances governing fire lanes, fireworks, hazardous material routes, barbecue grills, and the wildland-urban interface (WUI) or weeds and trash.

G. Coordination with Fire Department Training and Pre-incident Planning (PTP):
Up to.....1 point

Personnel administering fire prevention activities must follow a defined procedure to share information and coordinate with training and pre-incident planning programs.

H. Credit for Fire Prevention Programs (PCP):
Calculate the credit for fire prevention programs (PCP) as follows:

$$PCP = PPR + PCO + PQC + PCF + PPP + PPO + PTP$$

1025 CREDIT FOR FIRE PREVENTION CODE AND ENFORCEMENT (CPCE):
Calculate the credit for fire prevention code and enforcement (CPCE) as follows:

$$CPCE = \frac{(PCR + PS + PCT + PCP)}{40} \times 2.2$$

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1030 PUBLIC FIRE SAFETY EDUCATION (FSE):
Evaluate public fire safety education.
Up to.....40 points

1031 PUBLIC FIRE SAFETY EDUCATORS QUALIFICATIONS AND TRAINING (FSQT):
Up to.....10 points

All public fire safety education personnel must be trained in methods of teaching as specified by the authority having jurisdiction.

A. Fire Safety Education Course (FSEC):
Up to.....5 points

All public fire safety education personnel must be trained in methods of teaching as specified by the authority having jurisdiction, in accordance with the general criteria of NFPA 1035, *Standard for Professional Qualifications for Fire and Life Safety Educator, Public Information Officer, and Juvenile Firesetter Intervention Specialist*.

B. Fire Safety Education Continuing Education (FSCE):
Up to.....5 points

All public fire safety education personnel must participate in continuing education in public fire safety education techniques and processes. They must receive at least 10 hours of additional work-related training each year.

Calculate the credit for fire safety continuing education (FSCE) as follows:

$$FSCE = \frac{\text{The Required Number of Hours of Continuing Education per Year per Educator}}{10} \times 5$$

C. Credit for Public Fire Safety Educators' Qualifications and Training (FSQT):
Calculate the credit for public fire safety educators' qualifications and training (FSQT) as follows:

$$FSQT = FSEC + FSCE$$

1032 PUBLIC FIRE SAFETY EDUCATION PROGRAMS (FSP):
Evaluate programs for public fire safety education.
Up to.....30 points

A. Residential Fire Safety Program (FSPR):
Evaluate the residential fire safety program.
Up to.....10 points

Base the evaluation of the effectiveness of the residential fire safety program on the percentage of the entire community population reached annually.

For more information, see NFPA 1452, *Guide for Training Fire Service Personnel to Conduct Dwelling Fire Safety Surveys*.

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B. **Fire Safety Education in Schools (Private and Public, Early Childhood Education through Grade 12) (FSPS):**
Evaluate fire safety education in the schools.
Up to.....10 points

1. Each school must conduct 1 fire exit drill, in accordance with the general criteria of NFPA 101, *Life Safety Code*, or the ICC International Fire Code each month that the campus is in session.
Up to.....5 points

2. Each school must present developmentally appropriate classroom instruction on fire safety to all students in early childhood education.
Up to.....5 points

C. **Juvenile Firesetter Intervention Program (FSPJ):**
Evaluate the juvenile firesetter intervention program.
Up to.....5 points

The program should refer all juveniles identified as involved in fire-play or firesetting behavior for educational intervention and/or other intervention services.

D. **Fire Safety Education Program for Occupancies Having Large Loss Potential or Hazardous Conditions (FSPL):**
Up to.....5 points

Evaluate the fire safety education in occupancies that have large loss potential or hazardous conditions as identified by the authority having jurisdiction.

Prorate the credit based on the percentage of the occupancies reached each year.

1033 CREDIT FOR PUBLIC FIRE SAFETY EDUCATION PROGRAMS (CFSE):
Calculate the credit for public fire safety education programs (CFSE) as follows:

$$CFSE = \frac{(FSP + FSQT)}{40} \times 2.2$$

Where:

$$FSP = FSPR + FSPS + FSPJ + FSPL$$

1040 FIRE INVESTIGATION (IF):
Evaluate the fire investigation programs.
Up to.....20 points

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1041 FIRE INVESTIGATION ORGANIZATION AND STAFFING (IOS):
Evaluate organization and staffing for fire investigations.
Up to.....8 points

A. Fire Investigation Organization (IO):
Up to.....4 points

There must be — within or outside the civil jurisdiction(s) under evaluation — an office with responsibility to conduct investigations of the causes and origins of fires.

B. Fire Investigation Staffing (IS):
Up to .....4 points

The jurisdiction must have enough fire investigators to investigate all structure fires.

Fire investigators may be paid or volunteer. Consider additional fire investigators with authority from the state fire marshal's office or the county or other civil jurisdiction.

Calculate the credit for fire investigation staffing (IS) as follows:

$$IS = \frac{\text{Structure Fire Receiving Cause and Origin Investigation}}{\text{Total Structural Fires}} \times 4$$

C. Credit for Fire Investigation Organization and Staffing (IOS):
Calculate the credit for fire investigation organization and staffing (IOS) as follows:

$$IOS = IO + IS$$

1042 FIRE INVESTIGATOR CERTIFICATION AND TRAINING (IQT):
Evaluate fire investigator certification and training.
Up to.....6 points

A. Fire Investigator Certification (IQTC):
Up to.....3 points

All personnel assigned to perform investigation of the causes and origins of fires must be certified, in accordance with the general criteria of NFPA 1033, *Standard for Professional Qualifications for Fire Investigator*.

Calculate the credit for fire investigator certification (IQTC) as follows:

$$IQTC = \frac{\text{Total Number of Existing Certified Fire Investigators}}{\text{Total Number of Existing Fire Investigators}} \times 3$$

B. Fire Investigator Continuing Education Training (IQTE):
Up to.....3 points

All personnel assigned to perform investigation of the causes and origins of fires must receive at least 40 hours of additional fire investigation training each year.

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Calculate the credit for fire investigator certification (IQTC) as follows:

$$IQTE = \frac{\text{The Required Number of Hours of Continuing Education per Year Per Investigator}}{40} \times 3$$

C. Credit for Fire Investigator Certification and Training (IQT):
Calculate the credit for fire investigator certification and training (IQT) as follows:

$$IQT = IQTC + IQTE$$

1043 USE OF THE NATIONAL FIRE INCIDENT REPORTING SYSTEM (IRS):
Give credit for satisfactory reporting using the National Fire Incident Reporting System (NFIRS) for the 3 years before the evaluation.
Up to.....6 points

1044 CREDIT FOR FIRE INVESTIGATION PROGRAMS (CIP):
Calculate the credit for fire investigation programs (CIP) as follows:

$$CIP = \frac{(IOS + IQT + IRS)}{20} \times 1.1$$

1050 CREDIT FOR COMMUNITY RISK REDUCTION (CCRR):
Calculate the credit for community risk reduction (CCRR) as follows:

$$CCRR = CPCE + CPSE + CIP$$

TOTAL CREDIT AND CLASSIFICATION

1100 GENERAL:
This section develops the Public Protection Classification number by summarizing the credits developed in sections 400 through 730. The calculation also includes an adjustment to reflect any difference between the evaluations developed for the fire department and the water supply.

1101 PUBLIC PROTECTION CLASSIFICATION (PPC):
Calculate the Public Protection Classification (PPC) as follows:

$$PPC = \frac{|100 - \{(CEC + CFD + CWS + COC + CCRR) - 0.5[|(CWS) - 0.8(CFD + COC)|]\}|}{10}$$

Note 1: Raise any decimal to the next higher whole number. For example, raise 5.2 to 6.

Note 2: The numerator shall not be less than 0.01.

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CLASS 8B PROTECTION

1200 GENERAL:

To be eligible for a Public Protection Classification of 8B, a fire protection area must meet the requirements listed in Section 107. In addition, the fire protection area must have at least one piece of apparatus with a permanently mounted pump with a rated capacity of 750 gpm or more at 150 psi. The fire protection area must also have fire suppression features meeting the criteria listed in Section 1201.

1201 CLASS 8B PROTECTION CRITERIA:

A. Emergency Communications

To be eligible for a Class 8B, a fire protection area must have an emergency communications system that receives a minimum credit of 4 points in Section 440, Credit for Emergency Communications (CEC).

B. Fire Department

To be eligible for a Class 8B, a fire protection area must have a fire department that meets the following requirements:

1. The engine(s) must be at least 40% adequate according to Section 512, Equipment on Existing Engine Companies (EC_i), which evaluates pumping capacity, hose quantity, and major equipment.

2. The fire department must respond with a minimum of 6 firefighters on the initial alarm to all reported structure fires. Each credited firefighter must, while on the fireground, have available a protective clothing ensemble in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*

3. For each active firefighter, the fire department must conduct a minimum of 24 hours per year of training in fighting structure fires.

C. Water Supply

To be eligible for a Class 8B, a fire protection area must have a fire department capable of delivering an uninterrupted fire flow of 200 gpm for 20 minutes beginning within 5 minutes of the first arriving engine.

1. The fire department must be able to deliver the minimum fire flow with only the primary responding fire department and automatic-aid fire department(s).

2. The fire department must be able to deliver the minimum fire flow to the buildable areas of the fire protection area within 5 road miles of the responding fire station.

1202 CLASS 8B CLASSIFICATION:

Assign Class 8B when a fire protection area meets the criteria of Sections 1200 and 1201.

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CLASS 9 PROTECTION

1300 GENERAL:
To be eligible for a Public Protection Classification of 9, a fire protection area must meet the requirements listed in Section 107 and Section 201C. The fire protection area must also have fire protection features meeting the criteria listed in Section 1310 but must not be eligible for Class 8B (Sections 1200–1202).

1310 CLASS 9 PROTECTION CRITERIA:
To be eligible for a Class 9, a fire protection area must also have a fire department that meets the following requirements:

A. Personal Protective Clothing:
Each credited firefighter must, while on the fireground, have available a protective clothing ensemble in accordance with the general criteria of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.*

B. Records Credit:
Records should indicate date, time, and location of structure fires; the number of responding members; meetings; training sessions; and maintenance of apparatus and equipment. A roster of fire department members should be kept up to date for active members.....10 points

C. Equipment:
Evaluate the fire service equipment in accordance with the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus*. Assign points for equipment carried according to the following:

1. 400 feet of 1½", 1¾" or 2" hose .....16 points
2. Two handline nozzles, 95 gpm minimum .....16 points
3. Two portable fire extinguishers suitable for use on Class A, B, and C fires. The minimum size should be 80 B:C rating dry chemical extinguisher, and a 2½-gallon water extinguisher .....4 points
4. One 24' or longer extension ground ladder.....14 points
5. One 12' straight ladder with roof hooks.....8 points
6. Four self-contained breathing appratus (SCBA) in accordance with the general criteria of NFPA 1981, *Standard on Open Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services* .....16 points
7. One spare SCBA cylinder for each SCBA carried (up to 4) .....4 points
8. One pick-head axe and 1 flat-head axe.....2 points
9. Two portable hand lights.....4 points

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10. One pike pole or plaster hook.....2 points

11. One forcible-entry tool .....2 points

12. One two-way radio assigned to the apparatus .....16 points

The criteria, specifications, and tools listed above are important in establishing Class 9 protection. However, the specific size and nomenclature of each individual subsection may be subject to local conditions in the fire protection area evaluated. Credit equipment having other names or different dimensions than indicated according to the ability of such equipment to perform similar fireground tasks.

1312 CLASS 9 CLASSIFICATION:

Assign Class 9 if the fire protection area meets the criteria of Sections 107, 201C, 1310 A, and a total of 100 or more points in Section 1310 B & C. Otherwise, assign Class 10.

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Chapter II

INDIVIDUAL PROPERTY FIRE SUPPRESSION

GENERAL

2000 GENERAL:
This chapter of the schedule develops a Public Protection Classification that applies to specifically rated properties that have a Needed Fire Flow (NFF_i) greater than 3,500 gpm.

FIRE DEPARTMENT COMPANIES

2100 FIRE DEPARTMENT COMPANIES (FC):
For each building with Needed Fire Flow (NFF_i) greater than 3,500 gpm, determine the number of needed engine companies (NE) and the number of needed ladder companies (NL) according to the following:

TABLE 2100

Needed Fire Flow (NFF_i) gpm	Number of Engine Companies Needed (NE)	Number of Ladder Companies Needed (NL)
4,000 - 4,500	4	1
5,000 - 5,500	5	2
6,000 - 6,500	6	2
7,000 - 7,500	7	3
8,000 - 8,500	8	3
9,000 - 9,500	9	4
10,000 - 10,500	10	4
11,000 - 11,500	11	4
12,000	12	5

2101 MINIMUM EQUIPMENT:
Each pumper credited shall be at least 40% adequate according to Section 512 Equipment on Existing Engine Companies (EC_i) which takes into consideration pumping capacity, hose, and major equipment.

Each ladder truck credited shall be at least 40% adequate in equipment and ladders, according to Section 542A, Ladder Company Equipment (LCE_i).

Each engine-ladder truck credited shall be at least 40% adequate according to Sections 512, Equipment on Existing Engine Companies (EC_i), and 542B, Engine-Ladder Company Equipment ($ELCE_i$) .

2102 EVALUATION OF FIRE DEPARTMENT COMPANIES (FDC):
Evaluate engine and ladder companies.

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A. For each creditable engine and ladder company in service in the fire protection area and responding on initial alarm or multiple alarms, assign 100 points. The maximum credit for an engine-ladder company is 150 points.

B. Credit is available for automatic-aid engine and ladder companies within 5 road miles of the fire protection area boundaries. The automatic-aid companies must respond to first or multiple alarms within the fire protection area and must operate under a predetermined response plan. Calculate the points for an automatic-aid engine or ladder company by multiplying the automatic-aid plan factor (AA_i) determined in Item 507 by 100. Calculate the points for an automatic-aid engine-ladder company by multiplying the automatic-aid plan factor (AA_i) determined in Section 507 by 150.

C. For each pumper and ladder truck in reserve in the fire protection area, if the truck is creditable under Section 2101 and if the truck has provision for staffing on multiple alarms, assign 50 points.

Note: A reserve pumper-ladder truck may be credited as a reserve pumper or as a reserve ladder truck, but not both.

D. Credit is available for outside-aid engine and ladder companies within 15 road miles of the fire protection area boundaries. The outside-aid companies must respond to the fire protection area when called. For each such company, assign 30 points. The maximum credit for an outside-aid engine-ladder company is 45 points.

FDC = A + B + C + D

Note: The number of pumpers credited shall not exceed the number specified in Table 2100 for the Needed Fire Flow at the property considered. The number of ladder trucks credited shall not exceed the number specified in Table 2100 for the Needed Fire Flow at the property considered.

2103 CREDIT FOR FIRE DEPARTMENT COMPANIES (CFC)

$$CFC = \frac{FDC}{NE + NL} \times 100$$

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WATER SUPPLY SYSTEM

2200 WATER SUPPLY SYSTEM (W):
This section gives procedures and formulas for evaluating the flow from the water supply system at or near a subject building that has a Needed Fire Flow (NFF_i) greater than 3,500 gpm. The fire flow duration for such buildings is 4 hours.

A. Supply works capacity (SWC_i) as developed in Section 612.

B. Main capacity (MC_i) as developed in Section 613.

C. Hydrant distribution (HD_i) as developed in Section 614.

The capability of the water supply system for each subject building in this section is the lowest of the NFF_i, SWC_i, MC_i, or HD_i.

2201 CREDIT FOR WATER SUPPLY SYSTEM (CW):

$$CW = \frac{TLC_i}{NFF_i} \times 100$$

TLC_i = capability of water system at test location, from Section 2200.

CREDIT AND CLASSIFICATION

2300 GENERAL:
The protection class of an individual property is the lower of two credits, the credit for fire department companies or the credit for water supply system.

2310 CREDIT FOR INDIVIDUAL PROPERTY (CIP):
If CFC ≤ CW, then CIP = CFC

If CFC > CW, then CIP = CW

2311 PUBLIC PROTECTION CLASSIFICATION (PPC) FOR AN INDIVIDUAL PROPERTY:
Calculate the Public Protection Classification (PPC) for an individual building as follows:

$$PPC^* = \frac{100 - CIP}{10}$$

If the PPC calculated in this section for an individual building is better than that calculated in Section 1101 for the fire protection area, use the PPC calculated in Section 1101.

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If the PPC calculated in this section for an individual building is worse than that calculated in Section 1101 for the fire protection area, use the PPC calculated in this section. However, do not use a PPC worse than Class 9.

If the PPC calculated in Section 1101 for the fire protection area is Class 8B, use Class 9 for the individual building.

*Raise any decimal to the next higher whole number.

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