

City of Courtenay Fire Insurance Grade Update Report

2014

FINAL

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1. SCOPE OF OUR ENGAGEMENT

The City of Courtenay contracted the services of Opta Information Intelligence (formerly IAO) to evaluate the Courtenay community's public fire protection programs. The purpose of the assessment is to determine whether the community's current fire insurance grading classifications are representative of the fire protection programs and fire protection resources that are currently in place within the community. A fire insurance grading review is a key part of the assessment process.

The significant findings of the Fire Underwriters Survey review were requested to be outlined within a report format. The report will provide an update on the City of Courtenay's fire insurance grading assignments and make recommendations aimed at improving the level of public fire protection and improving the fire insurance grading classifications.

1.1. Acknowledgement

Opta Information Intelligence and Fire Underwriters Survey wishes to thank the City of Courtenay, the Courtenay Fire Department, and the Comox Valley Regional District for their valuable assistance in conducting this survey and preparation of this report.

1.2. Distribution of Use

This report, along with the findings and conclusions, contained herein, is intended for the sole use of the City of Courtenay and the Courtenay Fire Department to assist in the public fire protection planning needs of the community.

Judgements about the conclusions drawn, and opinions presented in this report should be made only after considering the report in its entirety. This report is Private and Confidential and is intended for the exclusive use of the City of Courtenay and the Courtenay Fire Department.

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1.3. Reliance and Limitation

We have relied on the general accuracy of information provided by stakeholders including the City of Courtenay, the Courtenay Fire Department and the Comox Valley Regional District without independent verification. However, we have reviewed this information for consistency and reasonableness. The accuracy of our conclusions is dependent upon the accuracy and completeness of this underlying data. Therefore, any discrepancies discovered in this data by the reader should be reported to us and this report amended accordingly, as warranted.



2. EXECUTIVE SUMMARY

This report outlines the significant findings of the Fire Underwriters Survey carried out for the City of Courtenay. The City of Courtenay requested Fire Underwriters Survey to conduct a survey to evaluate the current public fire protection programs and fire protection resources within the municipality for the purpose of updating the fire insurance grades. In addition, the report provides recommendations for improvement of the overall level of public fire protection as well as fire insurance grading classifications.

Fire Underwriters Survey offices maintain data from surveys on fire protection programs throughout all municipalities across Canada. The results of these surveys are used to establish the Public Fire Protection Classification (PFPC) and Dwelling Protection Grade (DPG) for each community. The Public PFPC is a numerical grading system scaled from 1 to 10. Class 1 is the highest grading possible and Class 10 indicates that little or no fire protection is in place. The DPG is a numerical grading system scaled from 1 to 5. One (1) is the highest grading possible and five (5) indicates little or no fire protection is provided.

The Public Fire Protection Classification of the City of Courtenay has been improved to 4 and the Dwelling Protection Grade 3A has been maintained. The Courtenay Fire Department and the City of Courtenay are to be congratulated at improving its fire insurance grades. A number of conclusions and recommendations have been made as a result of our assessment to aid the City of Courtenay and the Courtenay Fire Department in improving its fire insurance grades further if so desired.

The following table shows each of the four fire insurance grading areas and the credit that the City of Courtenay received. The second table illustrates the credit range for each Public Fire Protection Classification.



Area of Grading	Weight within Grading	Credit Received 2014	Relative Classifications 2014
Fire Department	40	23.82	5
Water Supply	30	18.92	4
Fire Safety Control	20	14.80	3
Fire Service Communications	10	7.42	3
██████████		████	
██████████████████		████	
Total Credit Score		62.23	

Overall PFPC	Credit Range Per PFPC Grade
1	90.00 – 100.00
2	80.00 – 89.99
3	70.00 – 79.99
4	60.00 – 69.99
5	50.00 – 59.99
6	40.00 – 49.99
7	30.00 – 39.99
8	20.00 – 29.99
9	10.00 – 19.99
10	0.00 – 9.99

As part of the fire insurance grading review, the City of Courtenay requested a to review of the impact a second fire station in East Courtenay would have on the Public Fire Protection Classification and Dwelling Protection Grade of the City of Courtenay and its contract fire protection areas of the Comox Valley Regional District.

The addition of a second fire station within the City of Courtenay and with its current fire apparatus fleet would result in an improvement for first due engine response to properties in the eastern portion of the City.

Second due engine response remained consistent with the addition of a second fire station at either location. Total concentration credit decreased slightly with the addition of a second fire station within the City. However, the reduction in percent was due to the repositioning of fire apparatus which



resulted in some Required Fire Flow points being outside of the ideal distance of an engine apparatus for total concentration.

The Response Distance Standards of 2.5 km, 5 km, and 8 km were also reviewed. The addition of a second fire station would ensure all properties are within 8 km in the City of Courtenay. However, in the contract fire protection areas of the Comox Valley Regional District, the addition of the second station did not have a significant impact. Forty five percent of properties were outside of 8 km in road travel distance. With a considerable percentage of properties beyond 8 km and being predominantly single family residential (Personal Lines) the Courtenay Fire Department and Comox Valley Regional District may wish to discuss establishing a satellite fire station in either of the Tsolum Farnham or Merville fire protection areas to improve fire department response.

	City of Courtenay			Fire Protection Areas		
	Cumberland Road FS	Cumberland Rd & Ryan Rd	Cumberland Rd & Waters PI	Cumberland Road FS	Cumberland Rd & Ryan Rd	Cumberland Rd & Waters PI
First Due Engine	48.43%	77.58%	90.15%	5.27%	5.27%	5.87%
Second Due Engine	92.48%	92.48%	92.48%	14.63%	14.63%	14.63%
Total Concentration Engine (remaining apparatus needed)	72.41%	70.98%	71.31%	21.98%	21.60%	21.81%
First Due Ladder	53.72%	53.72%	53.72%	-	-	-
Total Concentration Ladder (remaining apparatus needed)	0.00%	0.00%	0.00%	-	-	-
Within 2.5km of Fire Hall	46.84%	72.01%	84.02%	3.30%	3.30%	3.61%
Within 5km of Fire Hall	88.19%	99.84%	99.83%	28.91%	30.89%	33.87%
Within 8km of Fire hall	99.97%	100.00%	100.00%	55.07%	55.24%	56.25%

Depending on the chosen location by the City of Courtenay and the Courtenay Fire Department additional credit would be achieved for fire insurance grading purposes within the fire insurance grading item reviewing the distribution of companies.

The City of Courtenay also requested to review the training facilities and props available within and outside of the City of Courtenay for the Courtenay Fire Department. The Courtenay Fire Department does not have adequate props and facilities for training within its municipality to provide realistic fire fighting training.



The Courtenay Fire Department utilizes Live Fire Training facilities in the Town of Comox and credit was achieved for use of the facility for fire insurance grading purposes. However, the following props and facilities were not available to the Courtenay Fire Department:

- Smoke facilities and alternative for protective B.A. Training
- Wet drill facilities
- Pumper test facilities
- Flammable liquid fire facilities

The City of Courtenay is encouraged to develop training facilities and props within its municipality that will allow the Courtenay Fire Department to train to realistic scenarios that would expected within their municipality.



2.1. Summary of Recommendations

Recommendation	Page	Fire Insurance Grading Weighting	Grading Item	Potential Credit Received Depending on Degree of Implementation
8.2-1 Provide Additional Engine Apparatus	48	Medium	PFPC - FD-1/FD-4	0 to 78 credit points
8.2-2 Provide a Reserve Engine Apparatus	48	Low	PFPC - FD-1/FD-4	
8.2-3 Provide a Reserve Ladder Apparatus	51	Low	PFPC - FD-2	0 to 18 credit points
8.2-4 Improve Distribution of Resources with Additional Fire Station in City of Courtenay	56	High	PFPC - FD-3	0 to 74 credit points
8.2-5 Consider Establishing a Satellite Fire Station in the Comox Valley Regional District	57	Medium	DPG	Additional properties eligible for improved insurance savings
8.2-6 Train and Qualify Additional Firefighters to Officer Positions	69	Medium	PFPC - FD-6	0 to 59 credit points
8.2-7 Improve Total Available Fire Force	73	High	PFPC - FD-7/FD-8	0 to 241 credit points
8.2-8 Ensure Officers are Certified to NFPA 1021 Level 1 and Level 2	84	Medium	PFPC - FD-13	0 to 50 credit points
8.2-9 Improve Training Facilities	84	Medium	PFPC - FD-13	0 to 53 credit points
9.2-1 Improve Reliability of Power Supply	100	Medium	PFPC - WS-3	Courtenay-CVRD 0 to 10 credit points Sandwick 0 to 49 credit points
9.2-2 Provide physical available fire flow testing in accordance with NFPA 291 or Hydraulic Model Results for Review	102	Medium	PFPC - WS-6	Courtenay-CVRD 0 to 240 credit points Royston 0 to 350 credit points Sandwick 0 to 490 credit points
9.2-3 Frequency of Available Fire Flow Testing	102	Low	PFPC - WS-6	
9.2-4 Improve Reliability of Principal Mains	104	Medium	PFPC - WS-7	Courtenay-CVRD 0 to 50 credit points Royston 0 to 75 credit points Sandwick 0 to 88 credit points
9.2-5 Upgrade Water mains in Weak Areas	107	Medium	PFPC - WS-8	Sandwick 0 to 73 credit points
9.2-6 Improve Hydrant Distribution	110	Medium	PFPC - WS-11	Courtenay-CVRD 0 to 111 credit points Royston 0 to 305 credit points Sandwick 0 to 285 credit points
10.1-1 Improve Inspection Frequency Policy	117	Medium	PFPC - FSC-2	0 to 134 credit points credit points



Recommendation 8.2-1 Provide Additional Engine Apparatus

The engine service requirements for fire insurance grading have not been fully met with the Courtenay Fire Department's existing apparatus fleet. The Courtenay Fire Department may wish to improve its fire fighting capabilities by acquiring additional apparatus. Fire apparatus should be ULC listed, be of an appropriate age, have an adequate pumping capacity, and be proven reliable. Doing so may help to provide an adequate level of fire protection and potentially improve the fire insurance grade for the community.

The Courtenay Fire Department received credit for 2.83 Engine Company. Credit up to the maximum amount of 1.17 can still be awarded for this grading item.

Acquiring additional fire apparatus is a serious matter that requires careful consideration. There are many factors to consider and fire insurance grading is only one such factor.

Recommendation 8.2-2 Provide a Reserve Engine Apparatus

To ensure an adequate response when a fire department has its engine apparatus out for repair, a fire department should have a reserve engine apparatus equipped, maintained and ready for replacement purposes if its primary engine is out of service. At a minimum one engine apparatus should be kept in reserve for each eight engine apparatus which would include a single engine apparatus having a replacement apparatus.

For the Courtenay Fire Department to receive maximum credit in this portion of the engine service grading item, a reserve engine of reasonable age would be required.

Recommendation 8.2-3 Provide a Reserve Ladder Apparatus

To ensure an adequate response when a fire department has its ladder apparatus out for repair, a fire department should have a reserve ladder apparatus equipped, maintained and ready for replacement purposes if its primary ladder is out of service. At a minimum one ladder apparatus should be kept in reserve for each five ladder apparatus which would include a single ladder apparatus having a replacement apparatus.

For Courtenay Fire Department to receive maximum credit in this portion of the ladder service grading item, a reserve ladder would be required.

Recommendation 8.2-4 Improve Distribution of Resources with Additional Fire Station in City of Courtenay

Personal Lines and Commercial Lines insured properties located in the eastern area of the City of Courtenay did not receive full credit due to the number of excessive responses that were not within the recommended responses distances for first due, second due, and total concentration for engine and ladder companies.

Additional credit can be received for fire insurance grading purposes if a second fire station was built in the City of Courtenay.



Recommendation 8.2-5 Consider Establishing a Satellite Fire Station in the Comox Valley Regional District

Credit that the Courtenay Fire Department could received was reduced slightly due to the number of Required Fire Flow points beyond first due engine response and total concentration engine response in the Merville and Tsolum Farnham fire protection areas. To improve credit within this grading item, the Courtenay Fire Department and the Comox Valley Regional District may wish to consider establishing a satellite fire station in the Merville Fire Protection Area or Tsolum Farnham Fire Protection Area to improve fire department response.

As the majority of properties within the Merville or Tsolum Farnham fire protection areas are beyond 8 km in road travel of a recognized fire station that provides response, a satellite fire station would extend the 8 km coverage within the Dwelling Protection Grade system and allow property owners in the Comox Valley Regional District to be eligible for reduced fire insurance premiums as it relates to Personal Lines and Commercial Lines property insurance.

Recommendation 8.2-6 Train and Qualify Additional Firefighters to Officer Positions

The Courtenay Fire Department received credit for 4 career officers when measured against the 20 career officers needed based on a shift factor of 4. The Courtenay Fire Department can receive additional credit up to the maximum if it increases the total number of Company Officers on the fire department. Credit can be received though a combination of career and auxiliary officers.

A fire department should have sufficient Company Officers available and assigned to provide one on duty response with each required engine or ladder company. The Company Officers should be adequately trained, preferably in accordance with NFPA 1021: *Standard for Fire Officer Professional Qualifications, 2009 Edition* or recent edition to receive full credit for fire insurance grading purposes.

Recommendation 8.2-7 Improve Total Available Fire Force

The Courtenay Fire Department is credited with 13.17 fire fighter equivalent units in its available fire force out of the maximum it can receive of 30. Courtenay Fire Department can receive additional credit up to the maximum if it improves its available fire force. Credit can be obtained through career and auxiliary members.

Note that the available fire forces can be improved through additional volunteers up to 50% of the required fire force. (In the case of the Courtenay Fire Department, the required force is 30, so the maximum available fire force that can be provided through volunteers and other FFEU sources is 15.)

Providing additional staffing either being career or auxiliary is a serious matter that requires careful consideration. There are many factors to consider and the fire insurance grading is only one such factor.



Recommendation 8.2-8 Ensure Officers are Certified to NFPA 1021 Level 1 and Level 2

Officers should be adequately trained, preferably in accordance with NFPA 1021: *Standard for Fire Officer Professional Qualifications, 2009 Edition* or recent edition to receive full credit for fire insurance grading purposes.

Recommendation 8.2-9 Improve Training Facilities

The Courtenay Fire Department does not have adequate props and facilities for training. The following props and facilities are recommended to be developed with the City of Courtenay:

- Smoke facilities and alternative for protective B.A. Training
- Wet drill facilities
- Pumper test facilities
- Flammable liquid fire facilities

Training facilities should be developed by the fire department in relation to the level of fire risk within the community so that realistic fire fighting training can be conducted.

It is recommended that facilities for drill and training be readily available for purposes that include necessary buildings or structures for ladder work, smoke and breathing apparatus training, use of pumper and hose lines, lecture space, etc. If the fire department were to develop its own training facilities it is recommended NFPA 1402 *Guide to Building Fire Service Centres, recent edition* be used for development.

Ideally for fire insurance grading purposes training props and facilities should be located within the municipality of the fire department. Credit can be received for the use of training facilities and props in neighbouring communities if the fire department has access to use them. To receive full or partial credit training facilities and props should be within 8 km of the municipal boundary. If training facilities and props are beyond 8 km, credit can still be achieved but sufficient fire department coverage must be maintained within the municipality when fire department resources are outside of the community for training purposes.

Recommendation 9.2-1 Improve Reliability of Power Supply

To receive additional credit up to the maximum is this grading item water purveyors may wish to consider improving reliability in power supply to ensure that adequate pressures and required fire flows in conjunction with the maximum day demand can be continually provided throughout the water distribution system (Courtenay-CVRD and Sandwick) during an electrical power outage.

Recommendation 9.2-2 Provide Physical Available Fire Flow Tests in Accordance with NFPA 291 or Hydraulic Modeled Results for Review

For FUS to determine if additional credit can be obtain for each of the water distribution systems, physical available fire flow test results or hydraulic model results of available fire flows should be submitted for review. If physical available fire flow tests are completed, they should be completed and documented in accordance with NFPA 291: *Recommended Practice for Fire Flow Testing and Marking of Hydrants*, recent edition to receive full credit for fire insurance grading purposes.



Recommendation 9.2-3 Frequency of Available Fire Flow Testing

Routine available fire flow testing should be completed on water supply systems that provide public fire protection. At a minimum available fire flow test should be conducted every 5 years in accordance with NFPA 25: *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, recent edition and NFPA 291: *Recommended Practice for Fire Flow Testing and Marking of Hydrants*, recent edition.

NFPA 25 Reference 7.3.1 Tests

7.3.1 Underground and Exposed Piping Flow Tests. Underground and exposed piping shall be flow tested to determine the internal condition of the piping at minimum 5-year intervals.*

7.3.1.1 Flow tests shall be made at flows representative of those expected during a fire, for the purpose of comparing the friction loss characteristics of the pipe with those expected for the particular type of pipe involved, with due consideration given to the age of the pipe and to the results of previous flow tests.

7.3.1.2 Any flow test results that indicate deterioration of available water flow and pressure shall be investigated to the complete satisfaction of the authority having jurisdiction to ensure that the required flow and pressure are available for fire protection.

NFPA 291 Reference 4.13 Public Hydrant Testing and Flushing

4.13.1 Public fire hydrants should be flow tested every 5 years to verify capacity and marking of the hydrant.*

4.13.2 Public fire hydrants should be flushed at least annually to verify operation, address repairs, and verify reliability.

Recommendation 9.2-4 Improve Reliability of Principal Mains

Redundancy of principal mains and water sources is important to ensure adequate pressures and flows can be continually provided throughout the community during foreseeable perils and system failures. Areas of the water distribution systems should be reviewed to determine mains that are most important and improve redundancy for those mains. Redundancy can be accomplished through redundant mains or by providing additional local storage that would be available to the distribution system in the event of water main or source failures.

A break in the water mains will affect the ability of the water system to provide required fire flows to those portions of the municipality. The water purveyors may wish to develop alternative measures to ensure reliability for public fire protection and fire insurance grading purposes. Additional credit can be received in this grading up to the maximum if principal water mains were twinned or storage on the distribution system was improved. Twinning of water mains or improving storage on the distribution system may also grant credit in other grading items.

Recommendation 9.2-5 Upgrade Water mains in Weak Areas

Water mains less than 150 mm in diameter do not have adequate fire flow capacities for firefighting purposes. To reduce the risk of fire flows being overly restricted through small portions of pipe, all new water lines and lateral



branches should be a minimum of 150 mm (6 inches). Pre-existing pipes that are smaller should be upgraded on a priority basis.

Recommendation 9.2-6 Improve Hydrant Distribution

Additional credit can be received for each of the water distribution systems if additional hydrants were added to the water systems to improve distribution. To receive maximum credit hydrant distribution for communities should be accordance with the Standard Hydrant Distribution table listed in Appendix B, FUS – 1999 Water Supply for Public Fire Protection.

Recommendation 10.1-1 Improve Inspection Frequency Policy

Additional credit up to the maximum can be received if the fire prevention inspection policy of high risk life safety and high risk

Fire Underwriters Survey recommends the following inspection frequency to receive maximum credit for fire insurance grading purposes:

National Building Code of Canada			Minimum Inspection Frequency
Group	Division	Description of Major Occupancies	
A	1	<i>Assembly occupancies</i> intended for the production and viewing of the performing arts	6 months
A	2	<i>Assembly occupancies</i> not elsewhere classified in Group A	6 months
A	3	<i>Assembly occupancies</i> of the arena type	6 months
A	4	<i>Assembly occupancies</i> in which occupants are gathered in the open air	6 months
B	1	<i>Care or detention occupancies</i> in which persons are under restraint or are incapable of self-preservation because of security measures not under their control	6 months
B	2	<i>Care or detention occupancies</i> in which persons having cognitive or physical limitations require special care or treatment	6 months
C	—	<i>Residential occupancies</i>	6 months
D	—	<i>Business and personal services occupancies</i>	12 months
E	—	<i>Mercantile occupancies</i>	12 months
F	1	<i>High-hazard industrial occupancies</i>	3 months
F	2	<i>Medium-hazard industrial occupancies</i>	6 months
F	3	<i>Low-hazard industrial occupancies</i>	6 months

Details are provided in Appendix H – Recommended Frequency of Fire Prevention Inspections



3. TERMS OF REFERENCE

Term	Definition
Aerial Fire Apparatus.	A vehicle equipped with an aerial ladder, elevating platform, aerial ladder platform, or water tower that is designed and equipped to support fire fighting and rescue operations by positioning personnel, handling materials, providing continuous egress, or discharging water at positions elevated from the ground.
Aid - Automatic Aid	A plan developed between two or more fire departments for immediate joint response on first alarms. This process is accomplished through simultaneous dispatch, documented in writing, and included as part of a communication center's dispatch protocols.
Aid - Mutual Aid	Reciprocal assistance by emergency services under a prearranged plan. This is part of the written deployment criteria for response to alarms, as dispatched by the communications center.
Basic Fire Flow	The benchmark required fire flow for a community, typically the fifth highest calculated required fire flow of all areas within the community. The Basic Fire Flow is the benchmark against which all protective facilities are measured.
Building	Any structure used or intended for supporting or sheltering any use or occupancy.
Building area	The greatest horizontal area of a building above grade within the outside surface of exterior walls or within the outside surface of exterior walls and the centre line of firewalls.
Building height	The number of storeys contained between the roof and the floor of the first storey.
Built Environment	Buildings and structures: human-made buildings and structures, as opposed to natural features.
Combustible	A material fails to meet the acceptance criteria of CAN4-S114, "Determination of Non-Combustibility in Building Materials."
Commercial Lines Insurance	A distinction marking property and liability coverage written for business or entrepreneurial interests (includes institutional, industrial, multi-family residential and all buildings other than detached dwellings that are designated single family residential or duplex) as opposed to Personal Lines.
Community - Major or Large	An incorporated or unincorporated community that has: <ul style="list-style-type: none"> • a populated area (or multiple areas) with a density of at least 400 people per square kilometre; AND • a total population of 100,000 or greater.
Community - Medium	An incorporated or unincorporated community that has: <ul style="list-style-type: none"> • a populated area (or multiple areas) with a density of at least 200 people per square kilometre; AND/OR • a total population of 1,000 or greater.
Community - Small	An incorporated or unincorporated community that has: <ul style="list-style-type: none"> • no populated areas with densities that exceed 200 people per square kilometre; AND • does not have a total population in excess of 1,000.
Company	A group of members that is <ol style="list-style-type: none"> (1) under the direct supervision of an officer or leader; (2) trained and equipped to perform assigned tasks;



	<p>(3) usually organized and identified as engine companies, ladder companies, rescue companies, or squad companies;</p> <p>(4) usually operates with one piece of fire apparatus (pumper, ladder truck, elevating platform, rescue, squad, ambulance); and</p> <p>(5) arrives at the incident scene on fire apparatus or assembles at the scene prior to assignment.</p> <p>The term company is synonymous with company unit, response team, and response group.</p>
Demand Zone Levels	<p>An area used to define or limit the management of a risk situation.</p> <p>A demand zone can be a single building or a group of buildings. It is usually defined in terms of geographical boundaries, called fire management areas or fire management zones.</p>
Detached Dwelling	<p>Buildings containing not more than two dwelling units in which each dwelling unit is occupied by members of a single family with not more than three outsiders, if any, accommodated in rented rooms. Aka. One- and Two-Family Dwelling</p>
Dwelling Protection Grade (DPG)	<p>The fire insurance grade or grades utilized by Personal Lines Insurers in Canada. The DPG is a number between 1 and 5 that is calculated by comparing the fire risk in terms of required fire flows to available resources. Unlike the PFPC system, within the DPG system, the benchmark required fire flow is a constant, and is typical for a Detached Dwelling. The DPG for communities across Canada is determined from a basic survey of the available resources related to fire risk reduction and fire protection capacity.</p>
Dwelling, Typical	<p>Refers to One- and Two-Family Detached Dwellings:</p> <ul style="list-style-type: none"> - with no structural exposures (buildings with an area exceeding 9.3 sq.m) within 3 m; - with no unusual fire risks (such as wood shake roofs); AND - with an effective area (all storeys excluding basements) not exceeding 334 sq.m (3,600 sq.ft).
Emergency Dispatch Protocol	<p>A standard sequence of questions used by telecommunicators that provides post-dispatch or pre-arrival instructions to callers.</p>
Emergency Incident	<p>Any situation to which the emergency services organization responds to deliver emergency services, including rescue, fire suppression, emergency medical care, special operations, law enforcement, and other forms of hazard control and mitigation.</p>
Emergency Response Facility (ERF)	<p>A structure or a portion of a structure that houses emergency response agency equipment or personnel for response to alarms.</p> <p>Examples of ERFs include a fire station, a police station, an ambulance station, a rescue station, a ranger station, and similar facilities.</p>
Emergency	<p>A condition that is endangering or is believed to be endangering life or property; an event that requires the urgent response of an emergency response agency.</p>
Engine	<p>A fire department pumper having a rated capacity of 2840 L/min (625 lpgm) or more.</p>
Exposing building face	<p>That part of the exterior wall of a building which faces one direction and is located between ground level and the ceiling of its top storey or, where a building is divided into fire compartments, the exterior wall of a fire compartment which faces one direction.</p>
Exposure	<p>The heat effect from an external fire that might cause ignition of, or damage to, an exposed building or its contents.</p>
Fire Apparatus	<p>A fire department emergency vehicle used for rescue, fire suppression, or other specialized functions.</p>



Fire Department Vehicle	Any vehicle, including fire apparatus, operated by a fire department.
Fire Department	A fire department is a group of persons formally organized as an authorized service of a municipal or other local government having a sustainable source of funding, which could include taxation, fees for services provided, contracts, permit fees or other reliable sources of revenue which will support the cost of services provided. A minimum number of trained persons able and equipped to respond with motorized fire fighting apparatus to extinguish fires or to respond to other classes of circumstances which may occur within a designated geographical area.
Fire Department. - Public Fire Department	A legally formed organization providing rescue, fire suppression, emergency medical services, and related activities to the public.
Fire Force, Available	A measure of the human resources that are available to participate in fire fighting operations on the fire ground or an equivalent measure.
Fire Force, Required	A measure of the human resources that are needed to participate in fire fighting operations on the fire ground (or an equivalent measure) for an ideal response based on the required fire flow, number of companies and average response time as specified in the Table of Effective Response.
Fire Flow	The flow rate of a water supply, measured at 20 psi (137.9 kPa) residual pressure that is available for fire fighting.
Fire Growth Potential	The potential size or intensity of a fire over a period of time based on the available fuel and the fire's configuration.
Fire Station/Hall	An "emergency response facility" where fire department apparatus and equipment are housed, protected against harm, and made readily accessible for use in emergencies. The fire station/hall is normally the location where fire fighters respond from. Other primary purposes include training and administration of the fire department.
Fire load	(as applying to an occupancy) The combustible contents of a room or floor area expressed in terms of the average weight of combustible materials per unit area, from which the potential heat liberation may be calculated based on the calorific value of the materials, and includes the furnishings, finished floor, wall and ceiling finishes, trim and temporary and movable partitions.
Fire Protection	Methods of providing fire detection, control, and extinguishment.
Fire Suppression	The activities involved in controlling and extinguishing fires. Fire suppression includes all activities performed at the scene of a fire or training exercise that expose fire department members to the dangers of heat, flame, smoke, and other products of combustion, explosion, or structural collapse.
First Responder (EMS)	Functional provision of initial assessment (airway, breathing, and circulatory systems) and basic first aid intervention, including CPR and automatic external defibrillator (AED) capability. A first responder assists higher level EMS providers.
First Storey	The uppermost storey having its floor level not more than 2 m above grade
Grade	(as applying to the determination of building height) The lowest of the average levels of finished ground adjoining each exterior wall of a building, except that localized depressions such as for vehicle or pedestrian entrances need not be considered in the determination of average levels of finished ground.
Hazard	The potential for harm or damage to people, property, or the environment. Hazards include the characteristics of facilities, equipment systems, property,



	hardware, or other objects, and the actions and inactions of people that create such hazards.
Hazardous Material	A substance (solid, liquid, or gas) that when released is capable of creating harm to people, the environment, and property.
Incident Commander.	The person who is responsible for all decisions relating to the management of the incident and is in charge of the incident site.
Incident Management System (IMS)	An organized system of roles, responsibilities, and standard operating procedures used to manage emergency operations. Such systems are also referred to as incident command systems (ICS).
Initial Attack	An aggressive suppression action consistent with fire fighter and public safety and values to be protected.
Initial Attack Apparatus	Fire apparatus with a permanently mounted fire pump of at least 250 USgpm (950 L/min) capacity, water tank, and hose body whose primary purpose is to initiate a fire suppression attack on structural, vehicular, or vegetation fires, and to support associated fire department operations.
Ladder Company	A fire department company that is provided with an aerial fire apparatus and is trained and equipped to support fire fighting and rescue operations by positioning personnel, handling materials, providing continuous egress, or discharging water at positions elevated from the ground.
Ladder Truck	An alternate name for Aerial Fire Apparatus.
Master Stream	A portable or fixed fire fighting appliance supplied by either hose lines or fixed piping and that has the capability of flowing in excess of 300 USgpm (1140 L/min) of water or water based extinguishing agent.
Member	A person involved in performing the duties and responsibilities of a fire department, under the auspices of the organization. A fire department member can be a full-time or part-time employee or a paid or unpaid volunteer, can occupy any position or rank within the fire department, and can engage in emergency operations.
Mobile Water Supply (Tanker)	A vehicle designed primarily for transporting (pickup, transporting, and delivery) water to fire emergency scenes to be applied by other vehicles or pumping equipment.
Non-combustible	A material that meets the acceptance criteria of CAN4-S114, "Determination of Non-Combustibility in Building Materials."
Non-combustible construction	The type of construction in which a degree of fire safety is attained by the use of non-combustible materials for structural members and other building assemblies.
Non-combustible Material	A material, as defined in NFPA 220, Standard on Types of Building Construction, that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapours when subjected to fire or heat. Materials reported as non-combustible, when tested in accordance with ASTM E 136, Standard Test Method for Behaviour of Materials in a Vertical Tube Furnace at 750°C, are considered non-combustible materials.
Officer	
Officer - Company Officer	A supervisor of a crew/company of personnel. This person could be someone appointed in an acting capacity. The rank structure could be either sergeant, lieutenant, or captain.
Officer - Incident Safety Officer	An individual appointed to respond or assigned at an incident scene by the incident commander to perform the duties and responsibilities of that position as part of the



	command staff.
Officer - Supervisory Chief Officer	A member whose responsibility is above that of a company officer, who responds automatically and/or is dispatched to an alarm beyond the initial alarm capabilities, or other special calls. In some jurisdictions, this is the rank of battalion chief, district chief, deputy chief, assistant chief, or senior divisional officer (UK fire service). The purpose of their response is to assume command, through a formalized transfer-of-command process, and to allow company officers to directly supervise personnel assigned to them.
One- and Two-Family Dwelling	Buildings containing not more than two dwelling units in which each dwelling unit is occupied by members of a single family with not more than three outsiders, if any, accommodated in rented rooms.
Optimum Level of Fire Protection	The combination of fire fighting staff and apparatus that delivers a suppression effort commensurate with the fire demand faced, yet representing the most efficient use of resources in a safe and effective manner.
Peak Fire Flow	All buildings and building groups within a District or Municipality, the highest calculated required fire flow.
Personal Lines Insurance	Insurance covering the liability and property damage exposures of private individuals and their households as opposed to Commercial Lines. Typically includes all detached dwellings that are designated single family residential or duplex.
Personal Protective Clothing	The full complement of garments fire fighters are normally required to wear while on emergency scene, including turnout coat, protective trousers, fire-fighting boots, fire-fighting gloves, a protective hood, and a helmet with eye protection.
Personal Protective Equipment	Consists of full personal protective clothing, plus a self-contained breathing apparatus (SCBA) and a personal alert safety system (PASS) device.
Public Fire Department	An organization providing rescue, fire suppression, emergency medical services, and related activities to the public.
Public Fire Protection Classification	The fire insurance grade or grades utilized by Commercial Lines Insurers in Canada. The PFPC is a number between 1 and 10 that is calculated by comparing the fire risk in terms of required fire flows to available resources. The PFPC for communities across Canada is determined from an extensive survey and analysis of the fire risk in the built environment and the available resources related to fire risk reduction and fire protection capacity.
Public Fire Service Communications Center	The building or portion of the building used to house the central operating part of the fire alarm system; usually the place where the necessary testing, switching, receiving, transmitting, and power supply devices are located.
Public Safety Answering Point	A facility in which 9-1-1 calls are answered.
Pumper	Fire apparatus with a permanently mounted fire pump of at least 750 USgpm (2850 L/min or 625 lpm) capacity, water tank, and hose body whose primary purpose is to combat structural and associated fires.
Quint	Fire apparatus with a permanently mounted fire pump, a water tank, a hose storage area, an aerial ladder or elevating platform with a permanently mounted waterway, and a complement of ground ladders. The primary purpose of this type of apparatus is to combat structural and associated fires and to support fire-fighting and rescue operations by positioning personnel-handling materials, providing continuous egress, or discharging water at positions elevated from the ground.



Required Fire Flow	The rate of water flow, at a residual pressure of 20 psi (138 kPa) and for a specified duration, that is necessary to confine and control a major fire in a specific building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.
Storey	That portion of a building which is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.
Wildland/Urban Interface	The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.



4. FIRE UNDERWRITERS SURVEY

Fire Underwriters Survey is a national organization that represents more than 85 percent of the private sector property and casualty insurers in Canada. Fire Underwriters Survey provides data to program subscribers regarding public fire protection for fire insurance statistical and underwriting evaluation. It also advises municipalities if they desire to review the current levels of fire defence in the community and provide direction with recommendations where improvements will enable them to better deal with fire protection problems.

Fire Underwriters Survey offices maintain data from surveys on fire protection programs throughout all municipalities across Canada. The results of these surveys are used to establish the Public Fire Protection Classification (PFPC) and Dwelling Protection Grade (DPG) for each community. The PFPC and DPG is also used by underwriters to determine the amount of risk they are willing to assume in a given community or section of a community.

The overall intent of the grading system is to provide a measure of the ability of the protective facilities within a community to prevent and control the major fires that may be expected to occur by evaluating in detail the adequacy, reliability, strength and efficiency of these protective facilities.

4.1. Fire Insurance Grading Classifications

Public Fire Protection Classification

The PFPC is a numerical grading system scaled from 1 to 10. Class 1 is the highest grading possible and Class 10 indicates that little or no fire protection is in place. The PFPC grading system evaluates the ability of a community's fire protection programs to prevent and control major fires that may occur in multifamily residential, commercial, industrial, and institutional buildings and course of construction developments.

Fire Underwriters Survey also assigns a second grade for community fire protection, referred to as the Dwelling Protection Grade (DPG), which assesses the protection available for small buildings such as single-family dwellings.



Dwelling Protection Grade

The DPG is a numerical grading system scaled from 1 to 5. One (1) is the highest grading possible and five (5) indicates little or no fire protection is provided. This grading reflects the ability of a community to handle fires in small buildings such as single family residences.

4.2. Public Fire Protection Classification System

The Public Fire Protection Classification grading system is a measure of a community's overall programs of fire protection. The ability of a community's fire defences are measured against recognized standards of fire protection relative to fire hazard and fire/life safety risk present within the community. The following areas of fire protection are reviewed in the survey and have the following weights within the PFPC grading system:

- Fire Department 40%
- Water Supply 30%
- Fire Prevention and Safety Control 20%
- Emergency Communications 10%

The above classifications are conveyed to subscribing companies of Fire Underwriters Survey. FUS subscribers represent approximately 85-90 percent of the fire insurance underwriters in Canada. Subscribers use this information as a basis in their fire insurance underwriting programs to set limits in the amount of risk they are willing to assume within a given portion of a community, and to set fire insurance rates for commercial properties. Improved fire protection grades may result in increased competition for insurance underwriting companies to place their business within a community. Our analysis indicates that an improved fire protection grade has a positive effect on fire insurance rates.

In addition, PFPC classifications are a measure of the fire protection within a community. Many progressive communities use the classification system to assess the performance of their fire protection programs, and to plan the direction of fire protective services for the future of the community.

Improvements that would have a cumulative positive effect in fire insurance grading classifications and fire protection ability are discussed within this report. The intent of identifying areas where improvements can be made is to provide the R direction in their community fire protection planning – if so desired and supported by the community.



4.3. Dwelling Protection Grading System

Dwelling Protection Grades are based on a 1 to 5 grading system; DPG 5 indicates little or no fire protection being available. Most small and midsize communities that have a gradable emergency water supply are assigned a DPG 3A rating, which the insurance industry has termed fully protected. DPG 3B refers to communities, or portions of communities, that have a recognized fire department but are not protected with a recognized water supply. The insurance industry has termed this 'semi-protected'. Within the Fire Underwriters Survey grading, a grade of 3B indicates that the fire department is equipped, trained, prepared and adequately staffed to provide "Standard Shuttle Service" to a fire event within a reasonable response time (i.e. utilize a pumper, tender and various related equipment to deliver water to a fire site and provide structural fire fighting at the fire event).

The protected assignment refers to DPG 1 to DPG 3A. An unprotected designation refers to DPG 5. DPG 3B and 4 are given the semi-protected designation. The lower the DPG assignment is, the larger the discount given in fire insurance rates. The discounts given for an identical property considered fully-protected over those considered unprotected can be approximately 60 percent. Where there is sufficient population and sufficient taxation base, the savings generated can more than offset the operating and capital costs of an effective fire service.

A summary of the requirements for the Dwelling Protection Grade system is provided in Appendix A.

Many insurers have simplified the Dwelling Protection Grading system to a simple three tier system. This is typical for setting insurance premium rates for detached single family residences only.

Different insurers utilize the Dwelling Protection Grades differently to set their own rates based on the marketplace and their own loss experiences. The three tier system that is typically used by many insurers is shown in Table 4.3-1 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades.



Table 4.3-1 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades

Fire Underwriters Survey Dwelling Protection Grades	System Used by Many Insurance Companies "3 tier" system	Insurance Companies typically refer to this grade as
1	Table I	Fully Protected, Career
2	Table I	Fully Protected, Composite
3A	Table I	Fully Protected, Volunteer
3B ¹	Table II	Semi-Protected, Career or Volunteer (Shuttle)
4	Table II or III	Limited-Protection, Career or Volunteer
5	Table III	Unprotected

The fire insurance industry has minimum requirements that communities must meet in order for their fire protection program to receive recognition. The insurance industry sets benchmarks for:

- Fire Department Organization
- Membership
- Training
- Apparatus Requirements
- Fire Suppression Capability, and
- Alarm Notification

4.4. Measuring Fire Risk in This Review

The strength of fire defence within a community depends largely on the will and financial ability of the community to support this emergency service. Fire Underwriters Survey and the National Fire Protection Association statistics indicate that the larger the population of a community, the higher the level of fire protection, when measured against the risk of fires within the community. The best scenario for the level of fire protection occurs when expectations of fire suppression and prevention match the community's willingness to pay for this expectation.

Community growth resulting from capital developments increases the level of fire risk; however, the development of fire protective services often falls behind the developments, particularly in communities where growth happens quickly. If the community expectation levels are constant and the fire protective service level is also constant, then as the fire risk level increases the fire protection level relative to the

¹ Note that communities qualifying for Dwelling Protection Grade of 3B may also be able to achieve an equivalency to 3A through Superior Tanker Shuttle Service Accreditation.



fire risk level decreases and community expectation (for a reasonable level of fire protection) may no longer be met.

Optimum Level of Fire Protection

The combination of fire fighting staff and apparatus that delivers a suppression effort commensurate with the fire demand faced, yet representing the most efficient use of resources in a safe and effective manner.

4.5. Overview of the Assessment Process

There is no one universal model of fire defence that can be applied to all situations or to a community requiring this emergency service. Ideally, the strength of a fire protection program is balanced between the risk of serious fire and the community's fire loss experience. Fire defences should be tailored with these issues in mind. To gauge the needs of the fire service based on experience alone would be to ignore perils that have not yet occurred. Ignoring experience and focusing on risk alone may tend to build-up a fire department force beyond the financial acceptability of the community paying for the service.

Fire Underwriters Survey measures the ability of a fire department against the risk of fire likely to occur within a community. This measurement is usually not determined by the most significant risk, nor is it based on the average fire risk. Our measurement tends to focus on those structures where there is a considerable risk to fire and life safety, and where total or temporary loss of a particular structure would have a significant impact on a community's tax base and economy. A fire department should be structured and supported to effectively deal with everyday emergencies while at the same time capable of controlling and extinguishing most fires that may occur.

In the case of the City of Courtenay, the fire protective service was measured in its ability to provide public fire protection to the typical risks found in the community. These risks included (but were not limited to): single family residential, multiple family residential and commercial buildings.

Fire Underwriters Survey examines the entire program of the community's fire defence in order to assess and grade the overall program. There are some areas within a FUS grading that carry substantial weight, (in bold) such as:

- **Type of, and number of apparatus**
- **The condition and age of fire apparatus and fire suppression equipment**



- The type of apparatus and ancillary equipment for the hazards present
- Pumping capacity
- **The type of Staffing (i.e. career firefighters vs. volunteers)**
- **The distribution of companies relative to fire risk**
- Response to alarm protocols
- Response times to critical risks
- Management of emergency services
- **The quality of training programs for the fire fighter including specialized training**
- **The availability, adequacy and reliability of emergency water supplies**
- **Fire prevention inspections**
- **Public education programs**
- Building controls (application of Building Codes and related standards; plan review process; effective construction inspection and permit process)
- Automatic fire protection systems
- Emergency communication systems



5. PROJECT SCOPE AND METHODOLOGY

5.1. Project Objectives

The scope of this assignment was to conduct an assessment of the Municipality of Courtenay's fire protection program, for two purposes being:

1. To evaluate the community's public fire protection needs, and
2. To evaluate whether the fire insurance grading classifications need updating based on the current level of public fire protection available to the community.
 - a. Review the addition of a second fire station within the City of Courtenay
 - b. Review the requirements for training facilities and fire training props/aids

A supplementary objective was to provide direction to the City of Courtenay as to where improvements to the community's public fire protection programs could be made should fire insurance grading classifications remain status quo.

The evaluation is intended to consider both current and future fire protection needs. The tasks and methodology used to conduct the assessment are listed below:

1. Community Risk and Hazard Assessment including

- Assessment of community profile
- Required Fire Flow Calculations
- Profile and quantify hazard and risk

2. Fire Department Assessment of

- Fire Department Profile
- Apparatus and equipment
- Distribution of resources
- Pumping capacity
- Maintenance programs
- Staffing and personnel
- Training programs and facilities
- Administration
- Pre-Incident Planning Program

3. Water Supplies for Public Fire Protection Assessment



- Compare available water supplies to combined domestic demand and calculated fire flow needs
 - Evaluate emergency water supplies capacity and storage
 - Analyze water system for weaknesses and lack of redundancy
 - Test water supplies at various representative points throughout system
- 4. Fire Safety Control Assessment**
 - 5. Fire Service Communications Assessment**
 - 6. Complete a Fire Insurance Grading Review of the City of Courtenay**
 - 7. Develop a Report that Includes Findings and Recommendations**



6. CITY OF COURTENAY

6.1. General Description

The City of Courtenay is located on the east coast of Vancouver Island within the Comox Valley Regional District of the Province of British Columbia. The City of Courtenay was incorporated in 1915 with a population of 700 and has grown to include an area of 3,270.97 hectares (8,082.71 acres) as of March 18, 2013 with a population of 24,099 (2011 Census Canada). It is the largest municipality in the Comox Valley.



7. COMMUNITY RISK AND HAZARD ASSESSMENT

7.1. Background

A fire hazard and risk assessment was conducted throughout the City of Courtenay community to aid in determining the community's fire protection needs and to assist in assessing the adequacy of the Water Supply and Fire Department. A risk and hazard assessment, along with a response distance review, community growth assessment and assessment of trends of emergency responses, lays the groundwork to determine fire protection needs within a community. This assessment is important in determining organizational structure, personnel requirements, training requirements, fire apparatus and fire equipment needs, response time requirements and adequacy of fire station location.

The "Risk and Hazard Assessment" is an evaluation of the life safety risks, fire loading and risk of fire that is present in a given area.

7.2. Measuring Fire Risk

Adequate response to a fire emergency is generally measured by the speed with which a responding fire fighting crew(s) can arrive at the fire emergency with the correct type and amount of resources, to have a reasonable degree of opportunity to control or extinguish a fire. Simply put, the response provided by a fire fighting crew should equal the potential severity of the fire or fire emergency. The required response from a fire fighting crew is greater if life safety is a factor in a fire event and the expected response time is shorter.

The potential severity of a fire event is generally associated with the fuel load present and exposures to the fire. Factors such as building construction materials; quality of construction; building renovation history; building size, height and age; occupancy and hazards associated with the occupancy, will all contribute to the potential severity of a fire. In addition, other buildings sufficiently exposed to a burning building can contribute to the magnitude of a fire and, the resources necessary to be in place to control or extinguish a given fire. Alternatively, building controls and automatic fire protection systems (both active and passive) that limit fire spread will reduce the potential severity of a fire. For building controls to be considered effective, their design, installation and maintenance must also be reviewed as any weak link may result in the system being ineffectual.



Much of the research into fire protection requirements for individual buildings and communities and the corresponding number of “*engine companies*” and response times has been conducted by Fire Underwriters Survey and the National Fire Protection Association. Fire Underwriters Survey evaluates adequacy of response by comparing the potential severity of fires that may occur with a rating of the ability of fire crews and their resources responding within a specified time period relative to the fire and life safety risk potential that may be needed.

In a fire and life safety risk analysis, the City of Courtenay is divided into zones of fire emergency risk and hazard profiles. For this review, the fire protection needs of the community were evaluated. A fire and life safety risk analysis provides much of the data that is necessary to comment on the community’s fire protection needs including fire apparatus requirements, fire equipment and other areas of a community’s fire protection programs.

Table 7.2-1 Fire Underwriters Survey - Table of Effective Response illustrates various sectors commonly found in most communities, and indicates a range of risk ratings that are commonly applied to these sectors. The Table of Effective Response also indicates a range of fire flows that are normally associated with each community sector profile. Additionally, Table 7.2-1 indicates the number of engine and ladder companies that are expected to be needed to control and suppress fires occurring within representative building zones throughout the community.

The number of fire companies that will be needed is correlated to fire loading within the community’s building stock and to life safety risks present. Fire flow requirements are determined by construction characteristics, occupancy, size and exposures to representative buildings throughout the community.



Table 7.2-1 Fire Underwriters Survey - Table of Effective Response

The following Table aids in the determination of Engine and Ladder Company distribution and total members needed. It is based on availability within specified response travel times in accordance with the fire potential as determined by calculation of required fire flows, but requiring increases in availability for severe life hazard.

RISK RATING	BUILDING DISTRICT EXAMPLES	FIRE FLOW		INITIAL RESPONSE TO ALARMS		1 st DUE	2 nd DUE	1 st DUE	TOTAL AVAILABILITY NEEDED			
		L/min X1000	Approx. l gpm Range	Engine Companies	Ladder Companies	Engine Company, Minutes	Engine Company, Minutes	Ladder Company, Minutes	Engine Companies, No.	Engine Companies, Min.	Ladder Companies, No.	Ladder Companies, Min.
1 (a)	Very small buildings, widely detached buildings.	2	400	1	0	7.5	-	*9	1	7.5	*1	9
(b)	Scattered development (except where wood roof coverings).	3	600	1	0	6	-	*7.5	1	6	*1	7.5
2	Typical modern, 1 - 2 storey residential subdivision 3 - 6 m 10 - 20 ft. detached).	4-5	800-1,000	2	0	4	6	*6	2	6	*1	6
3 (a)	Close 3 - 4 storey residential and row housing, small mercantile and industrial.	6-9 10-13	1,200-2,000 2,200-2,800	2 2	1 (if required by Hazards)	3.5 3.5	5 5	*4 *4	2 3	5 6	*1 *1	4 4
3 (b)	Seriously exposed tenements. Institutional. Shopping Centres Fairly large areas, fire loads, and exposures.	14-16 17-19	3,000-3,600 3,800-4,200	2 2	1 1	3.5 3.5	5 5	4 4	4 5	7 7	1 **1	4 4
4 (a)	Large combustible institutions, commercial buildings, multi- storey and with exposures.	20-23 24-27	4,400-5,000 5,200-60,00	2	1	2.5 2.5	4 4	3.5 3.5	6 7	7.5 7.5	2 2	5 5
4 (b)	High fire load warehouses and buildings like 4(a).	28-31 32-35	6200-6800 7000-7600	3	1	2.5 2.5	3.5 3.5	3.5 3.5	8 9	8 8	3 3	7 7
5	Severe hazards in large area buildings usually with major exposures. Large congested frame districts.	36-38 39-42 43-46	7,800-8,400 86,00-9,200 9,400-10,000	3	3	2 2 2	3.5 3.5 3.5	2.5 2.5 2.5	10 12 14	8 9 9	4 5 6	7.5 8 9



Notes to Table of Effective Response

* A ladder company is required here only when exceptional conditions apply, such as three storey heights, significant life hazards.

** For numerous or large single buildings over three stories use two ladder companies in five minutes.

When unsprinklered buildings over six stories have fire flow requirements less than Group 4, the number of Engine and Ladder Companies under “Total Availability Needed” should be increased at least to the next group to provide the additional manpower required except where this additional manpower regularly responds in the time allotted, as occurs in some volunteer or composite fire departments.

The Table of Effective Response gives travel times for apparatus AFTER dispatch and turn-out. Under very exceptional conditions affecting total response time, these nominal figures should be modified.

From the perspective of insurers, the level of fire risk is a function of several key factors (each of which are influenced by a number of sub-factors) that include:

1. **Likelihood** of fire event occurring
 - Influenced by many risk factors
 - Occupancy type (industrial, commercial, multi-family residential)
 - WUI - wild land urban interface exposures and Climatic conditions
 - Presence of combustibles, presence of ignition sources
 - Quantity of area protected, number of buildings/risks
 - Population demographic
2. **Consequence** of fire event occurring
 - Loss of life
 - Density of population
 - Number of persons expected to be affected
 - Loss of property and property values
 - Loss of business, employment, tax revenue, economic impacts
3. **Controls in place to prevent** fire event from occurring
 - Codes, Bylaws and enforcement measures
 - Fire Prevention Program



- Community and building design
4. **Controls in place to reduce impact** of fire event that occurs
- Quality and availability of fire department
 - Number of staff and quality of training program
 - Number of apparatus and quality/reliability of equipment
 - Availability and reliability of adequate water supplies for fire fighting

When there is an increase in the quantity of values that are being protected by a fire protective service organization, the level of fire protective service typically must increase to meet the increased risk levels. If the level of fire protective service remains a constant during the rise of protected property values, then the rated overall level of risk increases and the fire insurance grade typically reflects this.

7.3. Fire Risk Assessment in the City of Courtenay

The City of Courtenay building stock consists of:

- single family detached dwellings
- multi-family residences and townhomes
- Commercial and Mercantile space, such as
 - Hotels and motels
 - Restaurants
 - Tourist services
- Low to High hazard industrial

The City of Courtenay has been reviewed from the perspective of life safety, fire loading, fire risk and response characteristics. The community was assessed on three levels.

The first level Occupancy Risk is defined as the assessment of the relative risk to life and property resulting in a fire inherent in a specific occupancy or in generic occupancy class. For fire insurance grading purposes this is known as Required Fire Flows.

The second level Fire Flow Demand Zones, which are areas used to define or limit the management of a risk situation. A Fire Flow Demand Zone can be a single building or a group of buildings. It is usually defined with geographic boundaries and can also be called fire management areas or fire management zones.



The third level is known as Community Risk, which is defined as the overall profile of the community based on the unique mixture of individual occupancy risks and the level of service provided to mitigate those risk levels. For fire insurance grading purposes this is better known as the Basic Fire Flow.

7.3.1. Required Fire Flows

To develop the Required Fire Flows within the boundary of the City of Courtenay, the methodology described in the Fire Underwriters Survey Water Supply for Public Fire Protection, 1999 edition was used. Refer to Appendix B.

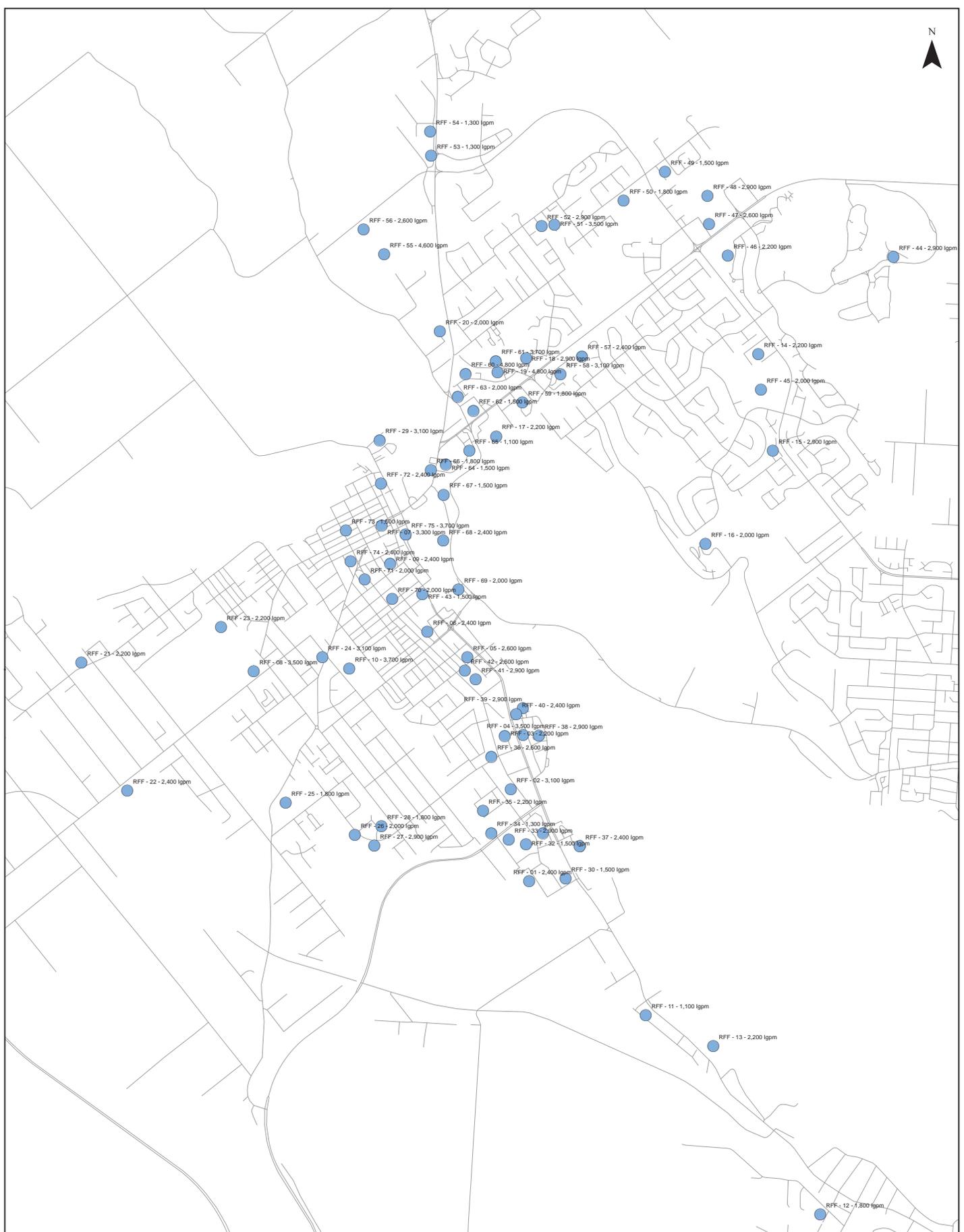
Required Fire Flows may be described as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposures.

It should also be noted that the Required Fire Flows determined by the Fire Underwriters Survey are then used to set the benchmark (Basic Fire Flow) that the community will be measured against. These fire flows are intended to be adequate to fight fires offensively, and to provide property protection (including exposure protection) in addition to life safety protection.

Required Fire Flows were calculated throughout the City of Courtenay to provide an accurate idea of the level of fire risk that is within the fire protection area. Required Fire Flows ranged from 800 Igpm to 4,800 Igpm in the City of Courtenay in 2013-2014.

Figure 7.3-1 shows where required flows were calculated for 75 risks throughout the City of Courtenay. Required fire flow calculations are provided in Appendix C – Required Fire Flow Summary.





Legend

- Required Fire Flow Locations
- Roads



Figure 7.3-1 Required Fire Flow Locations

Courtenay

Scale = 1:9,000



7.3.2. Fire Flow Demand Zones

The City of Courtenay's zoning data was received. The City of Courtenay was divided into geographically similar areas (from the perspective of fire fighting response characteristics) identified as "Fire Flow Demand Zones" as shown in Figure 7.3-2 Fire Flow Demand Zones. Each zone within the City of Courtenay was reviewed and a Risk Rating was determined. The Risk Rating was correlated to the Fire Underwriters Survey - Table of Effective Response. Fire Flow Demand Zones were assessed for primary zoning (residential, commercial, industrial, etc.) and for typical building construction.

The fire flows and the associated risk categories from the Table of Effective Response are utilized to determine appropriate levels of response from the emergency response facility (fire station), including items such as response times and apparatus requirements. These are used to determine staffing requirements and optimal fire apparatus and fire station locations based on achieving the level of response indicated in the Table of Effective Response 90 to 95 percent of the time.

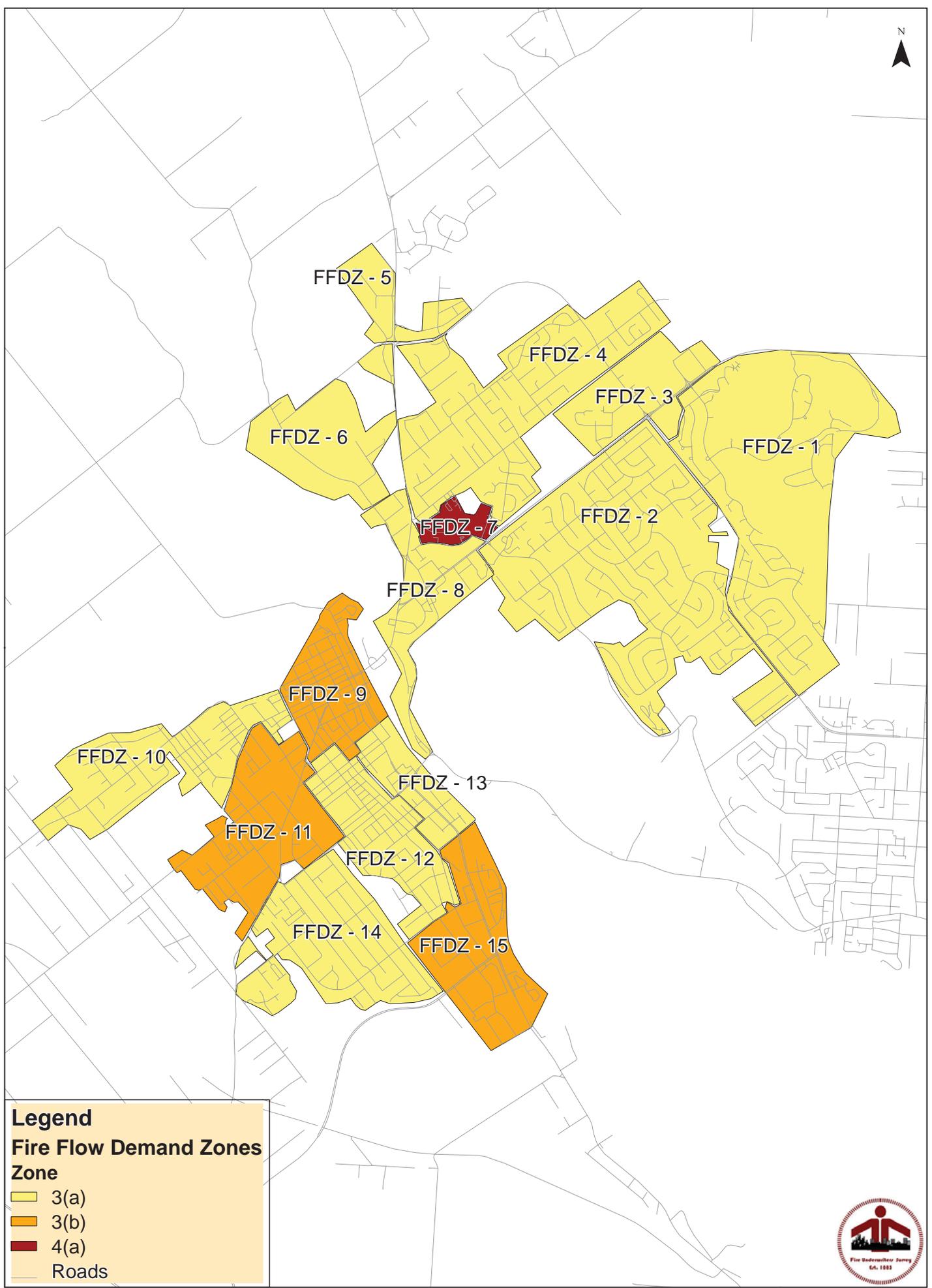
A secondary intent of the Fire Flow Demand Zones is to provide adequate water supplies for the majority (90 to 95 percent) of structure fires (not including Wildland Urban Interface). The Fire Flow Demand Zones are intended to be adequate for existing construction as well as new construction occurring in already built-up areas of the community. If however, substantial re-development occurs within a Fire Flow Demand Zone, adjustment of the risk rating and fire flow may have to be reviewed.



Table 7.3-1 Fire Flow Demand Zones

Fire Flow Demand Zone (FFDZ) #	Risk Rating	Fire Flow (lgpm)
		Approx. lgpm Range
1	3(a)	1,200-2,800
2	3(a)	1,200-2,800
3	3(a)	1,200-2,800
4	3(a)	1,200-2,800
5	3(a)	1,200-2,800
6	3(a)	1,200-2,800
7	4(a)	4,400-5,000
8	3(a)	1,200-2,800
9	3(b)	3,000-3,600
10	3(a)	1,200-2,800
11	3(b)	3,000-3,600
12	3(a)	1,200-2,800
13	3(a)	1,200-2,800
14	3(a)	1,200-2,800
15	3(b)	3,000-3,600





Legend
Fire Flow Demand Zones

	3(a)
	3(b)
	4(a)
	Roads



7.3.3. Basic Fire Flow

The Basic Fire Flow is determined from the analysis of the required fire flows. It is important to stress that the Basic Fire Flow assigned is not the peak required fire flow and is intended to be adequate for 90 to 95 percent of the typical structure fires that are expected to occur based on the Required Fire Flows calculated during the risk assessment.

The Basic Fire Flow(s) for the City of Courtenay have been set at 3,500 Igpm in 2014.

Required Fire Flows calculated that were higher than the Basic Fire Flow are not excluded from fire insurance grading. They are still utilized under specific grading items of the grading. Additional resources and planning may be required to adequately provide protection to peak Required Fire Flow risks.

7.4. Future Fire Risk in the City of Courtenay

The Basic Fire Flow of the City of Courtenay has been set at 3,500 Igpm in 2014. The Basic Fire Flows of the community are expected to be maintained as the level of development in the City is predominantly residential. As development increases in single family residential the Basic Fire Flow is not expected to change. However, if commercial and industrial development increases there is the possibility that the Basic Fire Flow may increase.

The Basic Fire Flow can be controlled and reduced through strict building construction practices and the City's bylaw for administration of the building code.

It is advisable that the Fire Department calculate Required Fire Flows for new developments to ensure they can be adequately protected by the fire department and water supply system.



8. PFPC - FIRE DEPARTMENT ASSESSMENT

8.1. Courtenay Fire Department

The Courtenay Fire Department provides various fire-related services from one fire hall located at 650 Cumberland Road. A total of 42 career and volunteer firefighters respond to both emergency and non emergency calls within the City of Courtenay and surrounding fire protection areas of the Comox Valley Regional District.

Of the 42 career and volunteer staff, six are career day time staff and 36 are paid on call volunteers. The six career day time staff positions include the Fire Chief, Deputy Fire Chief, Assistant Fire Chief/Training Officer, two Fire Prevention Officers and an Emergency Vehicle Technician/Fire Prevention Officer.

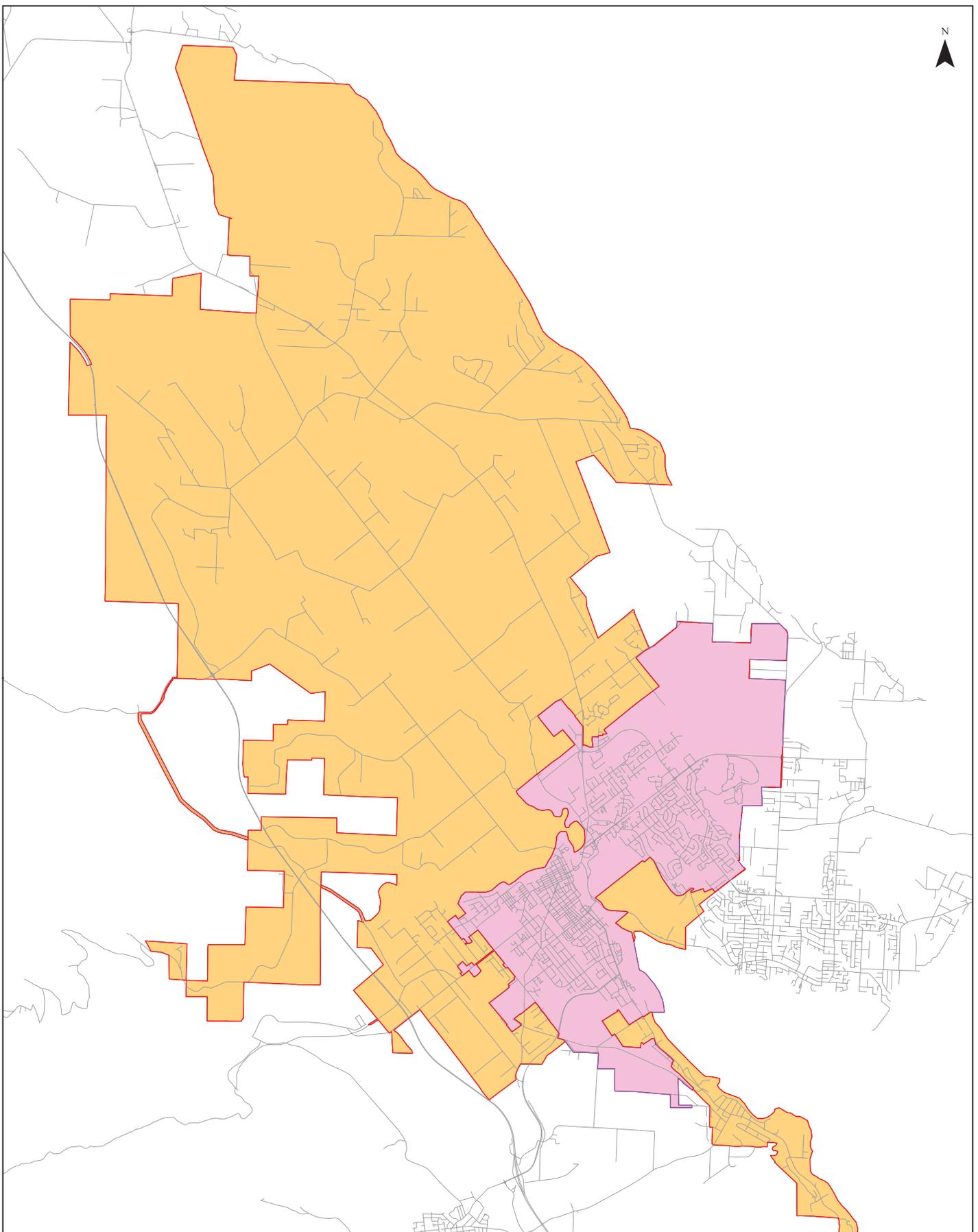
The fire protection areas of the Comox Valley Regional District are the Courtenay Fire Protection Area, Tsolum Farnham Fire Protection Area, and the Merville Fire Protection District.

The fire department currently operates six pieces of fire apparatus. The current in service fire apparatus of Courtenay Fire Department are as follows:

Unit #	Year	Vehicle Type	Pump (lgpm)	Tank Imp. Gallon	Manufacturer	Age in 2014
11	1995	Engine	1,050	500	Superior	19
12	2002	Ladder	1,700	500	Smeal	12
13	1988	Reserve Engine	1,050	500	Superior	26
14	2007	Mobile Water Supply	500	1,700	Commercial	7
15	2008	Engine	1,900	800	Fort Gary	6
71	1992	Rescue	0	0	Spartan	22

The City of Courtenay and the Courtenay Fire Department is part of the Comox Valley Fire and Rescue Services Agreement.





Legend

-  Courtenay Fire Protection Area
-  Comox Valley Regional District Fire Protection Area
-  Roads



8.2. Fire Department Grading Items

The sections below cover the 19 items of the Fire Department Grading. Forty percent of the Public Fire Protection Classification of the City of Courtenay comes from the grading of the Courtenay Fire Department. Information was provided and collected during a field survey in 2013.

8.2.1. Engine Service

Fire departments are evaluated for the number of engine companies in service relative to the overall fire potential and the area being protected. Engine apparatus are required to be adequately housed and staffed in order to receive full credit.

The engine service grading item refers to the amount of credit received for each of the department's engines. Recognition and credit for engines may be reduced or withheld based upon the measured reliability of the pumps and the apparatus upon which they are installed (ex. factors such as age, listing, testing, etc.).

Fire apparatus that serve dual purposes are evaluated based on the primary duty it serves on the fire ground. For example, a ladder apparatus with a fire pump may be credited in one of two ways.

- 100 percent credit as a ladder apparatus and 50 percent credit as an engine, or
- 100 percent credit as an engine apparatus and 50 percent credit as a ladder apparatus.

This depends upon the number of apparatus a department has available and where credit should be distributed properly in the grading depending on the primary use of the fire apparatus (this does not apply to Engine/Rescue combination apparatus. If an Engine/Rescue combination meets CAN/ULC-S515 for a triple combination engine, it receives 100 percent credit as an engine apparatus for fire insurance grading purposes).

The maximum acceptable age of apparatus specified in the fire insurance grading index is 20 years to receive maximum credit. Refer to Appendix D for Insurance Grading Recognition of Used and Rebuilt Fire Apparatus.

The benchmark number of Engine Companies that the Courtenay Fire Department can receive credit for based on the Basic Fire Flows of 3,500 Igpm is four engine companies. Values are cross referenced with the Table of Effective Response.



Additionally, credit can be received for one reserve Engine Company in this grading item. For fire insurance grading, a fire department should have one reserve engine for each eight engines in service. A fire department even with a single engine company should have a reserve engine.

The Total Credited Engine Companies calculated by summing the Primary Engine Company Credit and the Support Engine Company Credit. The calculation is as follows:

$$CEC_{Total} = ECC_{Primary} + ECC_{Support}$$

CEC_{Total}	=	Total Credited Engine Company
$ECC_{Primary}$	=	Primary Engine Company Credit (local to the Courtenay Fire Stations)
$ECC_{Support}$	=	Support Engine Company Credit (coming from other areas/halls)

Primary Engine Company Credit ($ECC_{Primary}$) is set by taking the sum of the number of in service engine apparatus in the hall and downgrading from 100 percent based on reliability factors (including but not limited to age, quality, listing and pump test results).

Support Engine Company Credit ($ECC_{Support}$) is set by taking the sum of the number of support engine apparatus and giving a specified percentage based on the aid being automatic or mutual. If aid is automatic a maximum of 90 percent of the engine company may be credited. If aid is mutual a maximum of 33 percent can be achieved from responding fire apparatus that are within 25 kilometres. To receive full credit a mutual aid contract must exist between fire departments providing mutual support.

Support Engine Company Credit was factored in to the grading of the Courtenay Fire Department. Fire apparatus from the Comox Fire Department, the Cumberland Fire Department, the Oyster River Fire Department, and the Union Bay Volunteer Fire Department were credited.



Table 8.2-1 Credited in Service Engine Summary

Unit #	Vehicle Type	Apparatus Credit	Engine Credit	Reserve Engine Credit
11	Engine	100% Engine Credit	1	0
12	Ladder	50% Engine Credit	0.5	0
13	Reserve Engine	40% Reserve Credit	0	0.4
14	Mobile Water Supply	0% Engine Credit	0	0
15	Engine	100% Engine Credit	1	0
Various	Engine(s)	33% Support Credit	0.33	0
Total Engine/Reserve Engine Credit Received:			2.83	0.4
Maximum Credit Receivable (BFF 3,500 Igpm):			4	1

The Courtenay Fire Department received credit for 2.83 Engines out of the maximum 4 engine companies that can be credited for the grading of the Courtenay Fire Department. Partial credit was received for the reserve engine apparatus. Credit was reduced due to the age of the reserve engine. Additional credit up to the maximum can be received if additional engine apparatus were acquired.

The Courtenay Fire Department received 180 points of credit out of the maximum possible for this grading item.

Recommendation 8.2-1 Provide Additional Engine Apparatus

The engine service requirements for fire insurance grading have not been fully met with the Courtenay Fire Department’s existing apparatus fleet. The Courtenay Fire Department may wish to improve its fire fighting capabilities by acquiring additional apparatus. Fire apparatus should be ULC listed, be of an appropriate age, have an adequate pumping capacity, and be proven reliable. Doing so may help to provide an adequate level of fire protection and potentially improve the fire insurance grade for the community.

The Courtenay Fire Department received credit for 2.83 Engine Company. Credit up to the maximum amount of 1.17 can still be awarded for this grading item.

Acquiring additional fire apparatus is a serious matter that requires careful consideration. There are many factors to consider and fire insurance grading is only one such factor.

Recommendation 8.2-2 Provide a Reserve Engine Apparatus

To ensure an adequate response when a fire department has its engine apparatus out for repair, a fire department should have a reserve engine apparatus equipped, maintained and ready for replacement purposes if its primary



engine is out of service. At a minimum one engine apparatus should be kept in reserve for each eight engine apparatus which would include a single engine apparatus having a replacement apparatus.

For the Courtenay Fire Department to receive maximum credit in this portion of the engine service grading item, a reserve engine of reasonable age would be required.

8.2.2. Ladder Service

Fire departments are evaluated for the number of ladder companies in service relative to the overall fire potential and the area being protected. Ladder apparatus are required to be adequately housed and staffed in order to receive full credit.

The ladder service grading item refers to the amount of credit received for each of the department's ladder apparatus. Recognition and credit for ladders may be reduced or withheld based upon the measured reliability of the apparatus upon which they are installed (ex. factors such as age, listing, testing, etc.).

Fire apparatus that may serve dual purposes are evaluated based on the primary duty it serves on the fire scene. As previously stated, a ladder apparatus with a fire pump may be credited in one of two ways.

- 100 percent ladder credit as a ladder apparatus and 50 percent credit as an engine, or
- 100 percent credit as an engine apparatus and 50 percent credit as a ladder apparatus.

This all depends upon the number of apparatus a department has available and where credit should be distributed properly in the grading depending on the primary use of the fire apparatus.

Response areas with five buildings that are 3 storeys or 10 m (35 ft) or more in height, or districts that have a Basic Fire Flow greater than 3,300 lpm, or any combination of these criteria, should have a ladder company. The height of all buildings in the community, including those protected by automatic sprinklers, is considered when determining the number of needed ladder companies for fire insurance grading to receive maximum credit. Refer to Appendix E for Requirements for Aerial Apparatus.

The City of Courtenay has multiple buildings that were reviewed during the risk assessment that fit into the three storeys and taller rule requiring an elevated ladder company response. Several Required Fire Flows were greater than 3,300 lpm. Structures within the City of Courtenay's limits that may require



additional ladder response (where an elevated master stream may be needed to effectively fight fires) include Required Fire Flows up to 4,800 Igpm.

The benchmark number of ladder companies that Courtenay Fire Department can receive credit for based on the Basic Fire Flow of 3,500 Igpm is one if there are five buildings that are 3 storeys or 10 m (35 ft) or more in height; five buildings which have a Required Fire Flow of 3,300 Igpm (15,000 LPM) or more; or a combination of these. Values are cross referenced with the Table of Effective Response.

The Total Credited Ladder Companies calculated by summing the Primary Ladder Company Credit and Support Ladder Company Credit. The calculation is as follows:

$$CLC_{Total} = LCC_{Primary} + LCC_{Support}$$

CLC_{Total}	=	Total Credited Ladder Company
$LCC_{Primary}$	=	Primary Ladder Company Credit (local to the Courtenay Fire Stations)
$LCC_{Support}$	=	Support Ladder Company Credit (coming from other areas/halls)

Primary Ladder Company Credit ($LCC_{Primary}$) is set by taking the sum of the number of in service ladder apparatus in the hall and downgrading from 100 percent based on reliability factors (including but not limited to age, quality, listing and ladder test results). Credit for ladder apparatus may be given depending on the use of the apparatus.

Support Ladder Company Credit ($LCC_{Support}$) is set by taking the sum of the number of support ladder apparatus and giving a specified percentage based on the aid being automatic or mutual. If aid is automatic a maximum of 90 percent of the ladder company may be credited. If aid is mutual a maximum of 33 percent can be achieved from responding fire apparatus that are within 25 kilometres. To receive full credit a mutual aid contract must exist between fire departments providing mutual support.

Support Ladder Company Credit was not factored in to the grading of the Courtenay Fire Department.



Table 8.2-2 Credited in Service Ladder Summary

Unit #	Vehicle Type	Apparatus Credit	Ladder Credit	Reserve Ladder Credit
12	Ladder	100% Ladder Credit	1	0
Total Ladder/Reserve Ladder Credit:			1	0
Maximum Credit Receivable (3,500 lpgm):			1	1

The Courtenay Fire Department received near maximum credit within this grading item for the number of ladder apparatus required for fire insurance grading purposes. Additional credit up to the maximum can be received in this grading item if a reserve ladder was present.

The Courtenay Fire Department received 152 points of credit out of the maximum possible [REDACTED] for this grading item.

Recommendation 8.2-3 Provide a Reserve Ladder Apparatus

To ensure an adequate response when a fire department has its ladder apparatus out for repair, a fire department should have a reserve ladder apparatus equipped, maintained and ready for replacement purposes if its primary ladder is out of service. At a minimum one ladder apparatus should be kept in reserve for each five ladder apparatus which would include a single ladder apparatus having a replacement apparatus.

For Courtenay Fire Department to receive maximum credit in this portion of the ladder service grading item, a reserve ladder would be required.

8.2.3. Distribution of Companies

There are two sets of response distances to be considered within the fire insurance grading; one set being the benchmark response distance which the fire department is graded against (Table 7.2-1) and the second set being response distances used by the insurance industry when applying the Dwelling Protection Grade and Public Fire Protection Classification as indicated in the following table.

Table 8.2-3 Response Distance Standards when Applying DPG and PFPC

	Personal Lines - DPG Response distance by road (km)	Commercial Lines - PFPC Response distance by road (km)
Recommended	5	2.5
Maximum	8	5



Fire departments are evaluated based on the response distances for engine and ladder companies from the fire station to a risk. Fire apparatus should be located such that response distances are not excessive.

Fire department companies are analyzed based on three levels of response, first due, second due and total concentration. The Table of Effective Response is used in the determination of engine and ladder company distribution. The recommended response distances for the first due, second due and total concentration for engine and ladder companies for fire insurance grading is based off the following formula:

$$D(km) = \frac{[T(\text{min}) - 0.65(\text{min})]}{1.065(\text{min}/ km)}$$

Where:

D = total distance in kilometres

T = time in minutes

Fire station effective response areas for engine and ladder companies were developed to illustrate first due, second due, and total concentration response within the municipal boundary of the City of Courtenay and in the contract fire protection areas of the Comox Valley Regional District.

As identified in section 7.3, Required Fire Flows were specifically calculated for 75 buildings in the City of Courtenay. In order to analyze fire station alignment within a City of Courtenay and the contract fire protection areas of the Comox Valley Regional District it is necessary to create a risk assessment model to represent building locations. Cadastral data provided by the City of Courtenay and the Comox Valley Regional District was used to create demand points, i.e. a point was used to represent property lots. Where the improvement value was equal to \$0, points were removed². Risk Categories and the associated Fire Flow from the Table of Effective Response were then used to assign a Required Fire Flow value to each point. The 75 Required Fire Flows originally calculated were included in the final risk assessment layer.

² Data irregularities existed between the City of Courtenay parcel data and BC Assessment information. 11,849 records existed in BC Assessment whereas there were 9,000 parcels. Data was matched as best possible and resulted in 6,860 RFF Points for analysis.



The following three figures illustrate how well the Courtenay Fire Department met the recommended response distances for the first due, second due and total concentration for engine and ladder companies for fire insurance grading purposes.

Figure 8.2-1 Distribution of Response Benchmarking – City of Courtenay

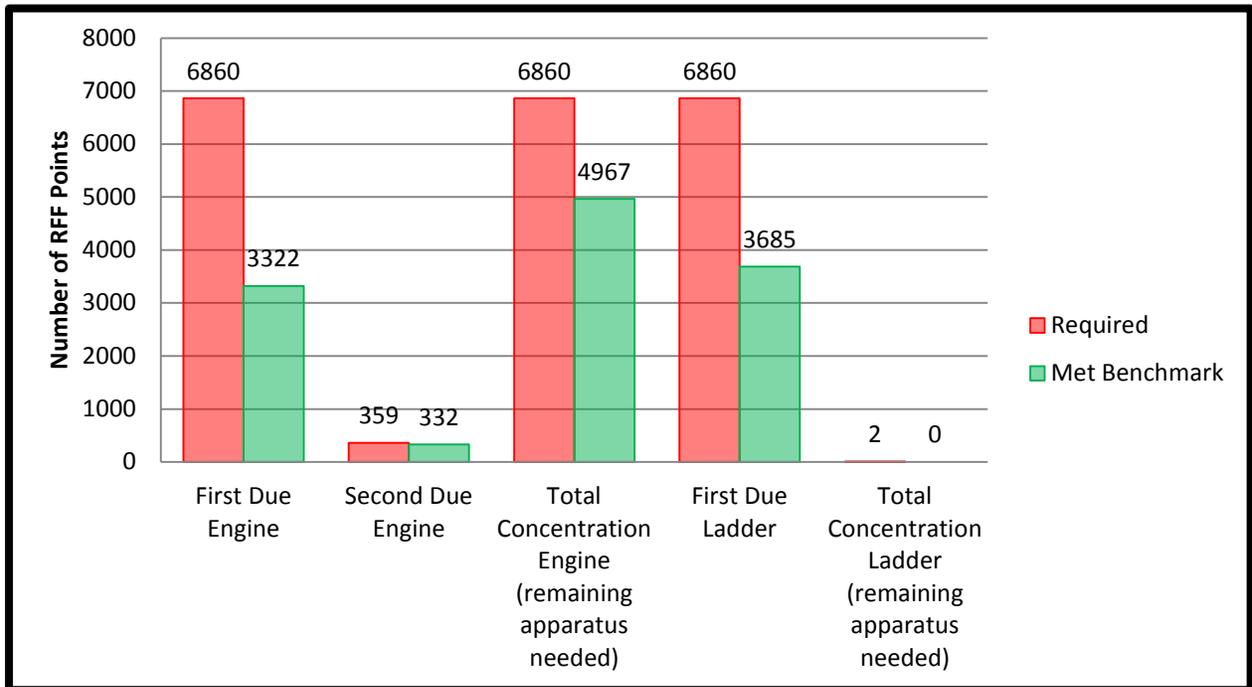


Figure 8.2-2 Distribution of Response Benchmarking – Courtenay Fire Protection Areas

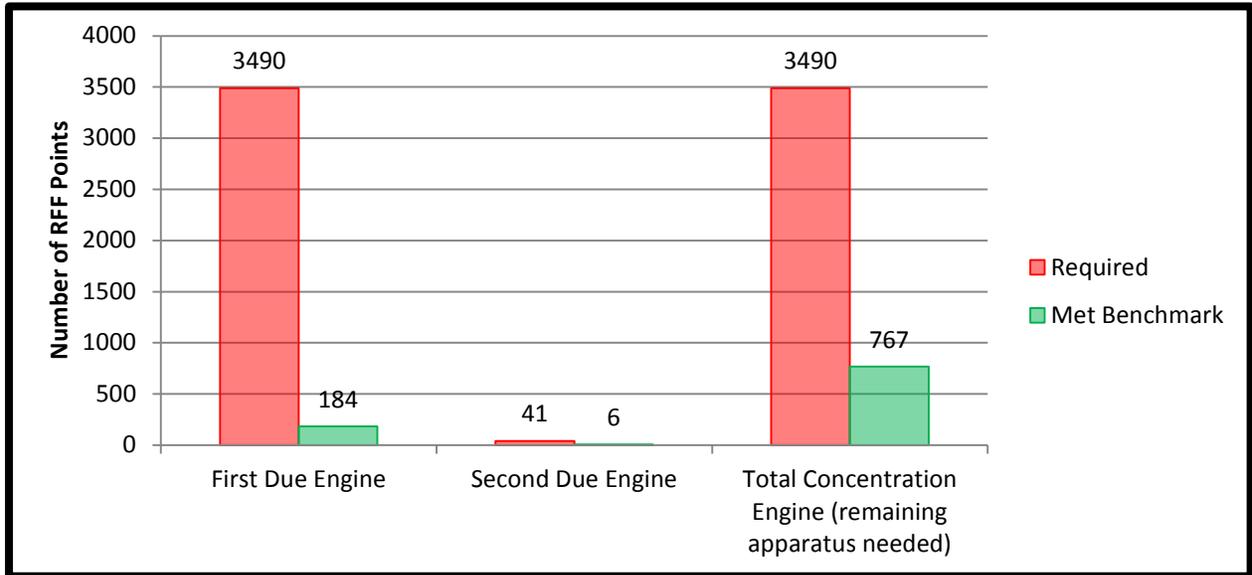
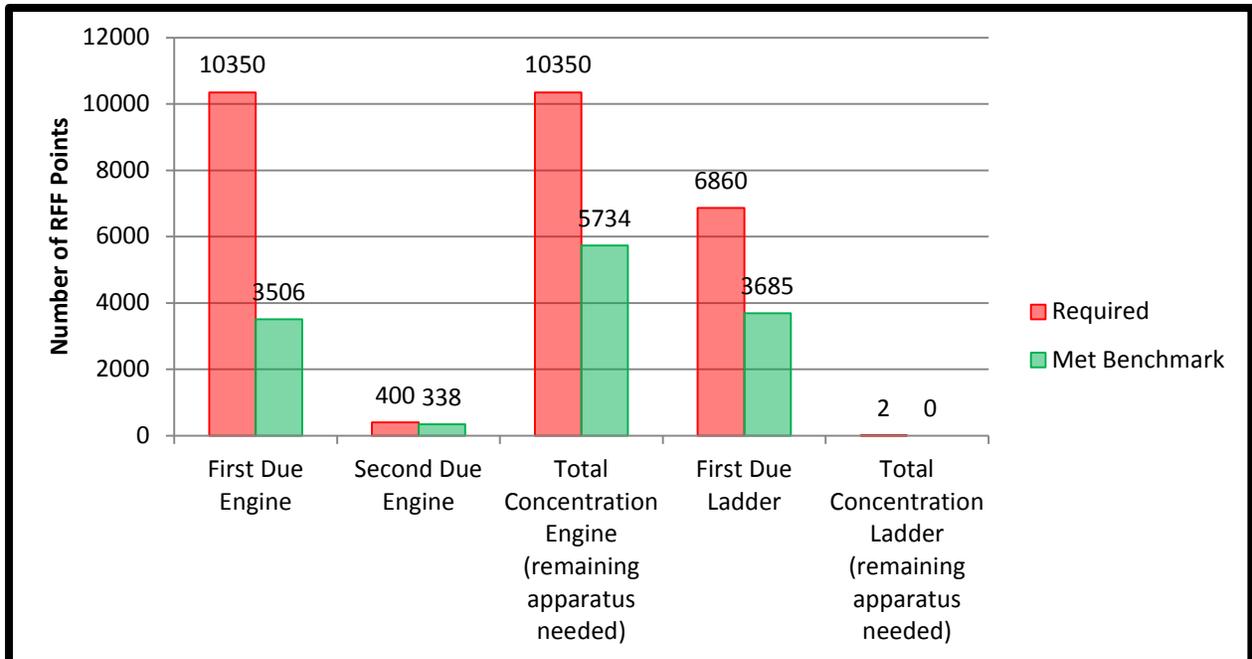


Figure 8.2-3 Distribution of Response Benchmarking – City and Fire Protection Areas



The current coverage of the City of Courtenay's fire station considering only Required Fire Flow points within municipal boundary indicated the following based on data from Figure 8.2-1:

- Of the 6,860 Required Fire Flows points that required first due response, the current fire station achieved 48.43 percent credit
- Of the 359 Required Fire Flows points that required second response, the current fire station achieved 92.48 percent credit
- Of the 6,860 Required Fire Flows points that required remaining engine apparatus needs, the current fire station achieved 72.41 percent credit
- Of the 6,860 Required Fire Flows points that required first due ladder response, the current fire station achieved 53.72 percent credit
- Of the 2 Required Fire Flows points that required remaining ladder apparatus needs, the current fire station achieved 0 percent credit (these Required Fire Flow points were Required Fire Flows greater than the Basic Fire Flow requiring additional ladder resources)

The current coverage of the City of Courtenay's fire station considering only Required Fire Flow points within the contract fire protection areas of the Comox Valley Regional District indicated the following based on data from Figure 8.2-2:

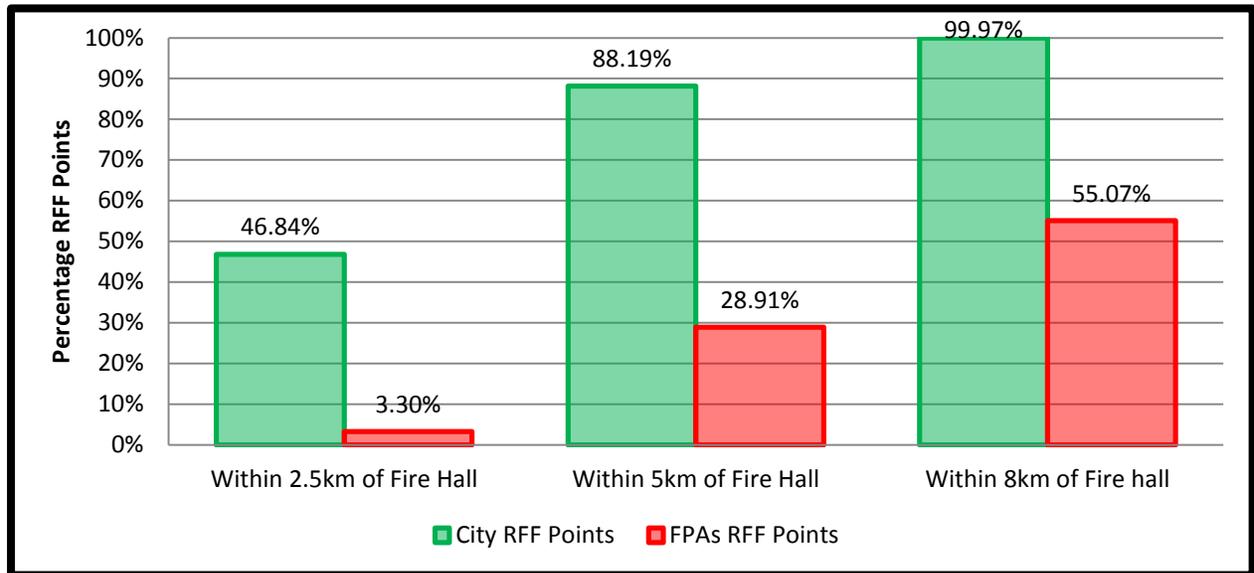
- Of the 3,490 Required Fire Flows points that required first due response, the current fire station achieved 5.27 percent credit
- Of the 41 Required Fire Flows points that required second response, the current fire station achieved 14.63 percent credit
- Of the 3,490 Required Fire Flows points that required remaining engine apparatus needs, the current fire station achieved 21.98 percent credit

Personal Lines – Dwelling Protection Grade Review

A review was conducted to evaluate how effective the location of the fire station is at providing response to Commercial Lines and Personal Lines insured properties considering the Response Distance Standards. The following figure illustrates the amount of Required Fire Flow points that are within 8 km in the City and in the contract fire protection areas of the Comox Valley Regional District.



Figure 8.2-4 Distribution of Response Benchmarking – Response Distance Standards



Within the City of Courtenay almost all Required Fire Flow points were within 8 km in road travel distance of the fire station. However, for the contract fire protection areas of the Comox Valley Regional District approximately 45 percent of Required Fire Flow points were beyond 8 km in road travel distance of the Courtenay Fire Station located at 650 Cumberland Road.

Overall, the Courtenay Fire Department graded fairly well in this grading item. Credit was reduced due to the number of excessive responses that were not within the recommended response distances for the first due, second due and total concentration for engine and ladder companies.

The Courtenay Fire Department received 126 points of credit out of the maximum possible 200 for this grading item.

Recommendation 8.2-4 Improve Distribution of Resources with Additional Fire Station in City of Courtenay

Personal Lines and Commercial Lines insured properties located in the eastern area of the City of Courtenay did not receive full credit due to the number of excessive responses that were not within the recommended response distances for first due, second due, and total concentration for engine and ladder companies.

Additional credit can be received for fire insurance grading purposes if a second fire station was built in the City of Courtenay.



Recommendation 8.2-5 Consider Establishing a Satellite Fire Station in the Comox Valley Regional District

Credit that the Courtenay Fire Department could receive was reduced slightly due to the number of Required Fire Flow points beyond first due engine response and total concentration engine response in the Merville and Tsolum Farnham fire protection areas. To improve credit within this grading item, the Courtenay Fire Department and the Comox Valley Regional District may wish to consider establishing a satellite fire station in the Merville Fire Protection Area or Tsolum Farnham Fire Protection Area to improve fire department response.

As the majority of properties within the Merville and Tsolum Farnham fire protection areas are beyond 8 km in road travel of a recognized fire station that provides response, a satellite fire station would extend the 8 km coverage within the Dwelling Protection Grade system and allow property owners in the Comox Valley Regional District to be eligible for reduced fire insurance premiums as it relates to Personal Lines property insurance.

8.2.3.1. Distribution of Companies – Fire Station Analysis

An analysis was requested to review the amount of credit that would be received for fire insurance grading purposes with the addition of a second fire station within eastern portion of the City of Courtenay. The City of Courtenay and the Courtenay Fire Department had two chosen locations for analysis. The locations were:

- Ryan Road (49.714949°, -124.957080°)
- Waters Place (49.713687°, -124.966865°)

8.2.3.2. Cumberland Road FS and Ryan Road FS

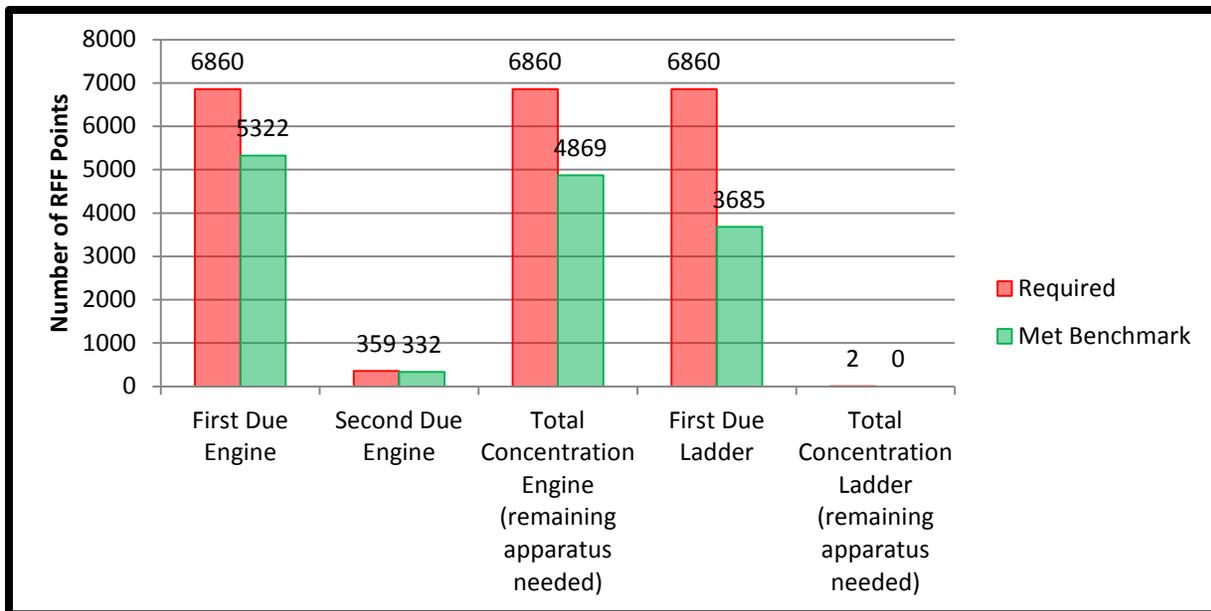
The coverage of the City of Courtenay's fire station and a fire station located on Ryan Road considering only Required Fire Flow points within the municipal boundary indicated the following based on data from Figure 8.2-5:

- Of the 6,860 Required Fire Flows points that required first due response, the current fire station and Ryan Road achieved 77.58 percent credit
- Of the 359 Required Fire Flows points that required second response, the current fire station and Ryan Road achieved 92.48 percent credit
- Of the 6,860 Required Fire Flows points that required remaining engine apparatus needs, the current fire station and Ryan Road achieved 70.98 percent credit
- Of the 6,860 Required Fire Flows points that required first due ladder response, the current fire station and Ryan Road achieved 53.72 percent credit



- Of the 2 Required Fire Flows points that required remaining ladder apparatus needs, the current fire station and Ryan Road achieved 0 percent credit (these Required Fire Flow points were Required Fire Flows greater than the Basic Fire Flow requiring additional ladder resources)

Figure 8.2-5 Distribution of Response Benchmarking – City (Cumberland Road FS and Ryan Road FS)

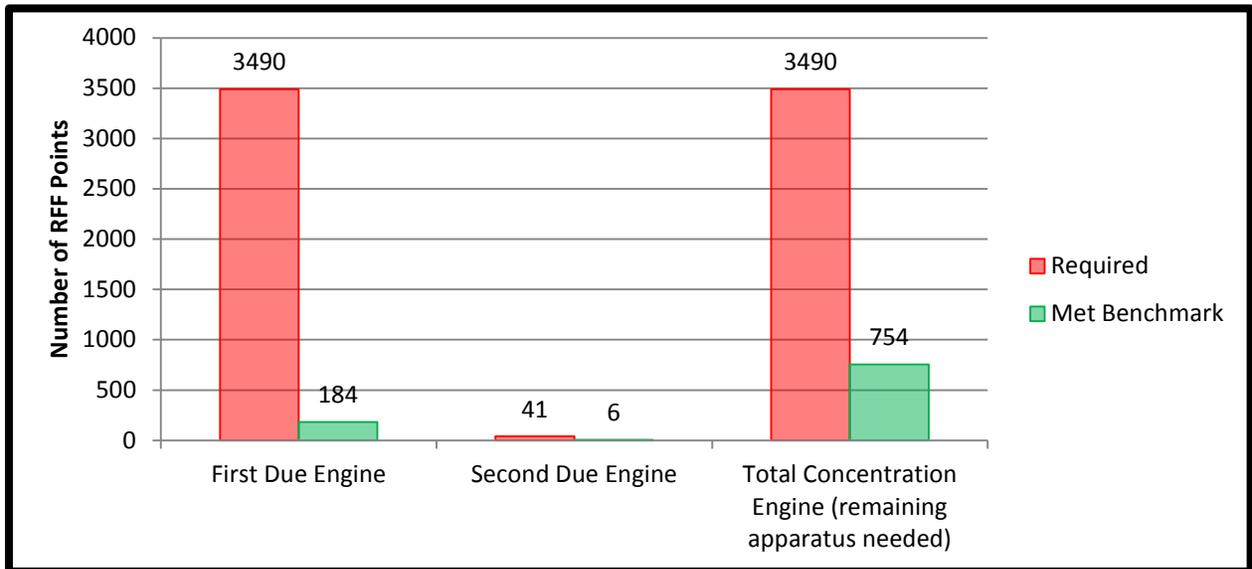


The coverage of the City of Courtenay’s fire station and a fire station located on Ryan Road considering only Required Fire Flow points within the contract fire protection areas of the Comox Valley Regional District indicated the following based on data from Figure 8.2-6:

- Of the 3,490 Required Fire Flows points that required first due response, the current fire station and Ryan Road achieved 5.27 percent credit
- Of the 41 Required Fire Flows points that required second response, the current fire station and Ryan Road achieved 14.63 percent credit
- Of the 3,490 Required Fire Flows points that required remaining engine apparatus needs, the current fire station and Ryan Road achieved 21.60 percent credit



Figure 8.2-6 Distribution of Response Benchmarking – FPAs (Cumberland Road FS and Ryan Road FS)

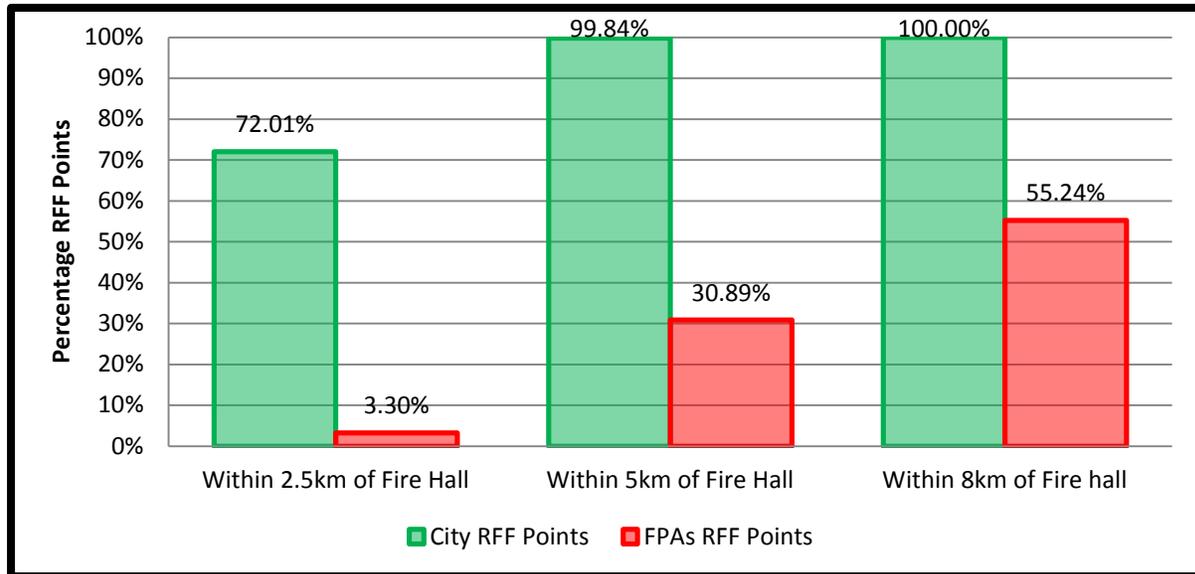


The coverage of the City of Courtenay’s fire station and a fire station located on Ryan Road considering only Required Fire Flow points within the contract fire protection areas of the Comox Valley Regional District indicated the following based on data from Figure 8.2-7:

- All Required Fire Flow points are within 8 km in road travel distance within the City of Courtenay with the addition of a second station at Ryan Road
- Only 55 percent of Required Fire Flow points are within 8 km in road travel distance with the addition of a second station at Ryan Road



Figure 8.2-7 Distribution of Response Benchmarking – Response Distance Standards (Cumberland Road FS and Ryan Road FS)



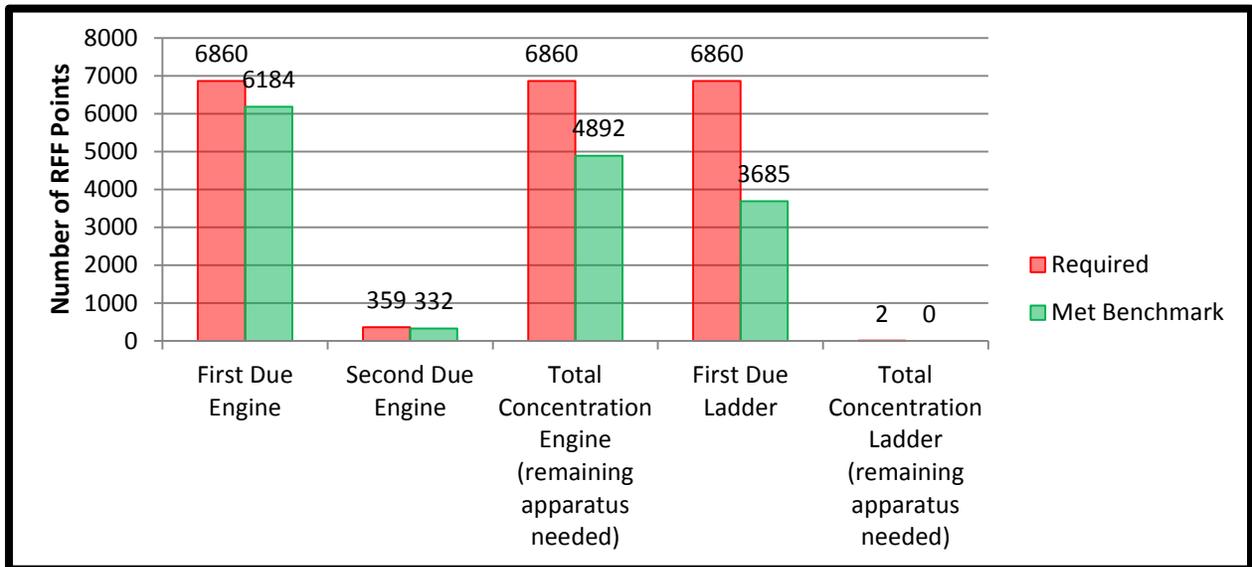
8.2.3.3. Cumberland Road FS and Waters Place FS

The coverage of the City of Courtenay’s fire station and a fire station located on Waters Place considering only Required Fire Flow points within the municipal boundary indicated the following based on data from Figure 8.2-8:

- Of the 6,860 Required Fire Flows points that required first due response, the current fire station and Waters Place achieved 90.15 percent credit
- Of the 359 Required Fire Flows points that required second response, the current fire station and Waters Place achieved 92.48 percent credit
- Of the 6,860 Required Fire Flows points that required remaining engine apparatus needs, the current fire station and Waters Place achieved 71.31 percent credit
- Of the 6,860 Required Fire Flows points that required first due ladder response, the current fire station and Waters Place achieved 53.72 percent credit
- Of the 2 Required Fire Flows points that required remaining ladder apparatus needs, the current fire station and Waters Place achieved 0 percent credit (these Required Fire Flow points were Required Fire Flows greater than the Basic Fire Flow requiring additional ladder resources)



Figure 8.2-8 Distribution of Response Benchmarking – City (Cumberland Road FS and Waters Place FS)

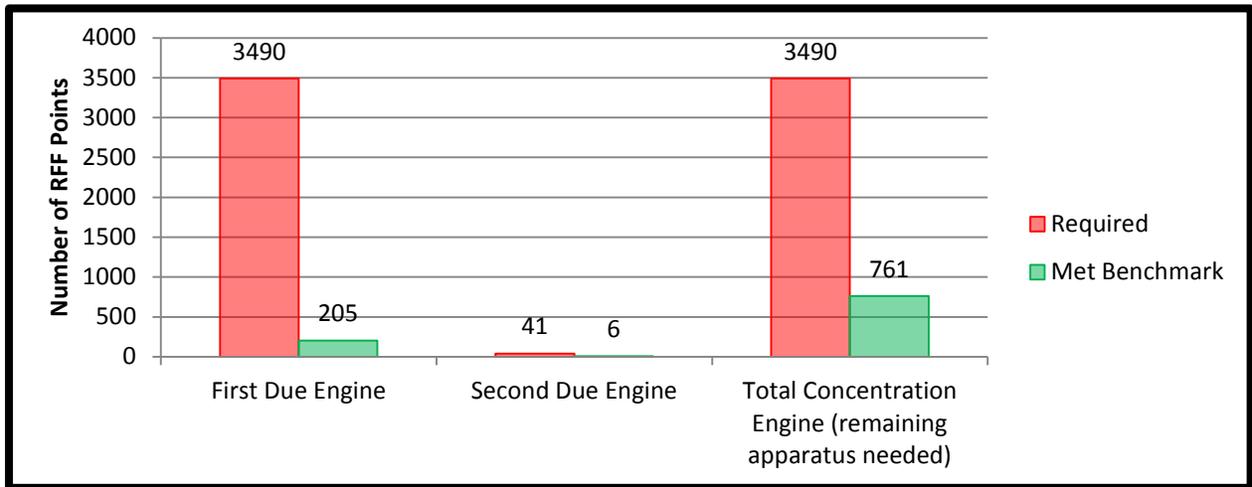


The coverage of the City of Courtenay’s fire station and a fire station located on Waters Place considering only Required Fire Flow points within the contract fire protection areas of the Comox Valley Regional District indicated the following based on data from Figure 8.2-9:

- Of the 3,490 Required Fire Flows points that required first due response, the current fire station and Waters Place achieved 5.87 percent credit
- Of the 41 Required Fire Flows points that required second response, the current fire station and Waters Place 14.63 percent credit
- Of the 3,490 Required Fire Flows points that required remaining engine apparatus needs, current fire station and Waters Place 21.81 percent credit



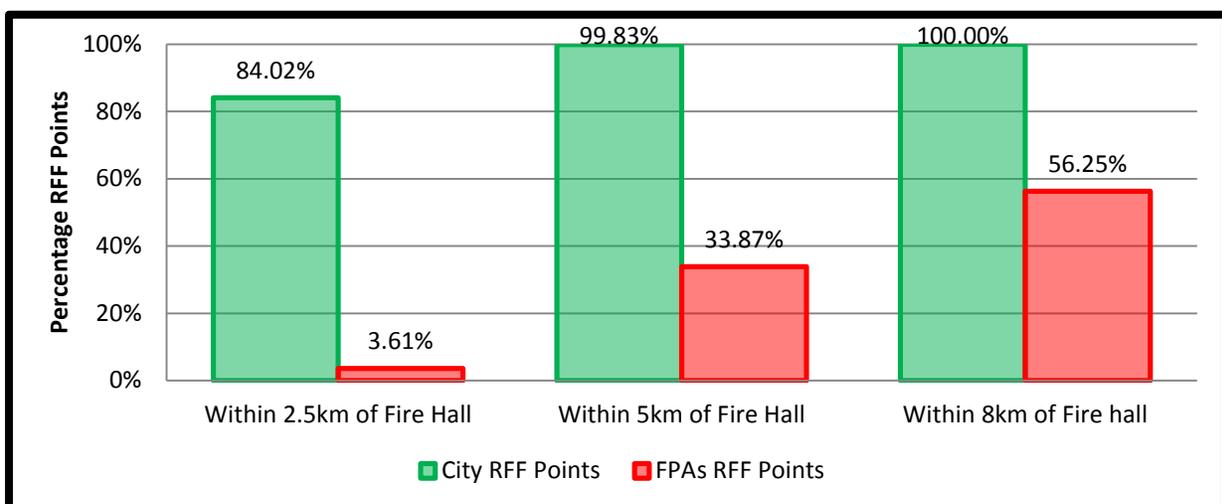
Figure 8.2-9 Distribution of Response Benchmarking – FPA's (Cumberland Road FS and Waters Place FS)



The coverage of the City of Courtenay's fire station and a fire station located at Waters Place considering only Required Fire Flow points within the contract fire protection areas of the Comox Valley Regional District indicated the following based on data from Figure 8.2-10:

- All Required Fire Flow points are within 8 km in road travel distance within the City of Courtenay with the addition of a second station at Ryan Road
- Only 56 percent of Required Fire Flow points are within 8 km in road travel distance with the addition of a second station at Ryan Road

Figure 8.2-10 Distribution of Response Benchmarking – Response Distance Standards (Cumberland Road FS and Waters Place FS)



8.2.3.4. Distribution Analysis Summary

The addition of a second fire station within the City of Courtenay and with its current fire apparatus fleet would result in an improvement for first due engine response to properties in the eastern portion of the City.

Second due engine response remained consistent with the addition of a second fire station at either location. Total concentration credit decreased slightly with the addition of a second fire station within the City. However, the reduction in percent was due to the repositioning of fire apparatus which resulted in some Required Fire Flow points being outside of the ideal distance of an engine apparatus for total concentration. If additional engine apparatus are acquired the total credit that can be received for remaining apparatus needed could be improved.

Table 8.2-4 Distribution Analysis Summary

	City of Courtenay			Fire Protection Areas		
	Cumberland Road FS	Cumberland Rd & Ryan Rd	Cumberland Rd & Waters PI	Cumberland Road FS	Cumberland Rd & Ryan Rd	Cumberland Rd & Waters PI
First Due Engine	48.43%	77.58%	90.15%	5.27%	5.27%	5.87%
Second Due Engine	92.48%	92.48%	92.48%	14.63%	14.63%	14.63%
Total Concentration Engine (remaining apparatus needed)	72.41%	70.98%	71.31%	21.98%	21.60%	21.81%
First Due Ladder	53.72%	53.72%	53.72%	-	-	-
Total Concentration Ladder (remaining apparatus needed)	0.00%	0.00%	0.00%	-	-	-
Within 2.5km of Fire Hall	46.84%	72.01%	84.02%	3.30%	3.30%	3.61%
Within 5km of Fire Hall	88.19%	99.84%	99.83%	28.91%	30.89%	33.87%
Within 8km of Fire hall	99.97%	100.00%	100.00%	55.07%	55.24%	56.25%

Depending on the chosen location by the City of Courtenay and the Courtenay Fire Department the following credit may be improved to one of the following for fire insurance grading purposes. If the number of engine or ladder companies increases additional credit may be achieved. If the number of engine or ladder companies decreases credit may be reduced.



The Courtenay Fire Department received 137 points of credit out of the maximum possible [redacted] for this grading item if a second station is placed at Ryan Road

The Courtenay Fire Department received 147 points of credit out of the maximum possible [redacted] for this grading item if a second station is placed at Waters Place

It was determined that a approximately 45 percent of Required Fire Flow Points in the contract fire protection areas of the Comox Valley Regional District are beyond 8 km in road travel distance of the current fire station located at Cumberland Road. The addition of a second fire station at Ryan Road or Waters Place did not have a significant impact on improving the number of Required Fire Flow points that would be within 8 km in road travel of a recognized responding fire station.

As the majority of properties within the Merville and Tsolum Farnham fire protection areas are beyond 8 km in road travel of a recognized fire station that provides response, a satellite fire station would extend the 8 km coverage within the Dwelling Protection Grade system and allow property owners in the Comox Valley Regional District to be eligible for reduced fire insurance premiums as it relates to Personal Lines and Commercial Lines property insurance. Refer to Recommendation 8.2-5.

8.2.4. Engine and Ladder Pump Capacity

The Engine and Ladder Pump Capacity grading item refers to the capacity of credited, recognized pumps located on fire apparatus. Recognition and credit for pumps on fire apparatus may be reduced or withheld based upon the measured reliability of the pumps and the apparatus upon which they are installed (ex. factors such as age, listing, testing, etc.).

Fire apparatus that may serve dual purposes are evaluated based on the primary duty it serves on the fire scene. As previously stated, a ladder apparatus with a fire pump may be credited in one of two ways.

- 100 percent credit as a ladder apparatus and 50 percent credit of the pump on the apparatus, or
- 100 percent for the pump on the ladder and 50 percent credit as a ladder apparatus.

This all depends upon the number of apparatus a department has available and where credit should be distributed properly in the grading depending on the primary use of the fire apparatus.



The benchmark pumping capacity that Courtenay Fire Department can receive credit for is based on the Basic Fire Flow of 3,500 Igpm.

The Total Credited Pump Capacity is calculated by summing the Primary Pump Capacity and Support Pump Capacity. The calculation used is:

$$PC_{Total} = PC_{Primary} + PC_{Support}$$

- PC_{Total} = Total Credited Pump Capacity
 $PC_{Primary}$ = Primary Pump Capacity (local to the Courtenay Fire Stations)
 $PC_{Support}$ = Support Pump Capacity (coming from other areas/halls)

Primary Pump Capacity ($PC_{Primary}$) is set by taking the sum of the rated capacities of the engines or ladders in the hall and downgrading from 100 percent of the rated capacities based on reliability factors (including but not limited to age, quality, listing and pump test results).

Support Pump Capacity ($PC_{Support}$) is set by taking the sum of the rated capacities of the support engines or ladders and giving a specified percentage of the rated capacity based on the aid being automatic or mutual. If aid is automatic a maximum of 90 percent of the pump capacity may be received. If aid is mutual a maximum of 33 percent of the pump capacity is received.

Support Pump Capacity Credit was factored in to this grading of Courtenay Fire Department from mutual aid providers.



Table 8.2-5 Pumping Capacity Credit Summary

Unit #	Vehicle Type	Pump (lgpm)	Tank Imp. Gal	Pump Capacity Credit %	Credited Pump Capacity (lgpm)
11	Engine	1,050	500	100% pump credit	1,050
12	Ladder	1,700	500	50% pump credit	850
13	Reserve Engine	1,050	500	100% pump reserve credit	1,050
14	Mobile Water Supply	500	1,700	0% pump credit	0
15	Engine	1,900	800	100% pump credit	1,900
Various	Mutual Aid Engine(s)	13,680	-	33% pump credit	4,514
Total Credited Pump Capacity:					9,364
Maximum Credit Receivable:					3,500

The Total Credited Pump Capacity of the Courtenay Fire Department is 9,364 lgpm. The Total Credited Pump Capacity should be at least equal to the Basic Fire Flow. Additional pump capacity is needed for Required Fire Flows greater than the Basic Fire Flow. Credit reduction may be applied if there is a large divergence between fire flows that are greater than the Basic Fire Flow.

A secondary analysis occurs in this grading item that analyzes the Total Credited Pump Capacity to meet the Basic Fire Flow benchmark of the Courtenay Fire Department with the most significant engine and its fire pump out of service.

Near maximum credit was received within this grading item for the Courtenay Fire Department.

The Courtenay Fire Department received 152 points of credit out of the maximum possible for this grading item.

8.2.5. Design, Maintenance and Condition of Fire Apparatus

Fire Department apparatus should be of suitable design and well maintained for the emergency service that is to be performed. A breakdown en route to, or on the fire ground could result in loss of life and greater damage to property. Maintenance facilities, quality of maintenance programs, qualifications of maintenance personnel, apparatus suitability and apparatus age are considered in this item.



Maintenance Facilities

The Courtenay Fire Department employs an emergency vehicle technician to conduct maintenance on its fire apparatus and firefighting equipment. Space is utilized within the fire station for maintenance and needed the fire department can utilize public work's space.

The fire department records all maintenance that is done to its fire apparatus on paper and digitally in their fire department records management software.

Engine and Ladder Testing

Engine and ladder service tests including but not limited to pump testing are valuable in assessing the effectiveness of the preventive maintenance program. Service tests of pumps and ladders on apparatus are generally conducted to show whether the equipment is working correctly.

The Courtenay Fire Department's fire apparatus receive annual Commercial Vehicle Inspections. Yearly service tests are completed to ensure pumps on the fire apparatus are still meeting the rated pump capacity listed on the pump. Tests are performed by a third party organization on a yearly basis. Records of testing and maintenance are kept on paper files and recorded digitally.

Ladder testing of the ladder apparatus is performed by a third party organization yearly and ground ladders are tested yearly by the emergency vehicle technician in accordance with the NFPA standards.

Age, Obsolescence and Condition of Apparatus

The age of fire apparatus is reviewed within the fire insurance grading system relative to age benchmarks of 15 and 20 years for first line and second line fire apparatus. The fire apparatus used by Courtenay Fire Department range from 3 years in age to 19 years in age. The fire apparatus were viewed to be in good condition and within the appropriate age benchmarks for fire insurance grading recognition of first line and second line apparatus.

An apparatus replacement schedule has been developed by the Courtenay Fire Department and follows the recommend replacement schedule for fire insurance grading recognition of first line and second line fire apparatus. Fire apparatus are replaced or put into reserve status at 20 years.

Overall, the Courtenay Fire Department's maintenance program and condition of fire apparatus graded well in this grading item.



The Courtenay Fire Department received 130 points of credit out of the maximum possible 150 for this grading item.

8.2.6. Number of Line Officers – Fire Suppression

The number of Chief Officers and Company Officer positions is reviewed and graded under this item. The number of Chief Officers and Company Officers required to receive maximum credit for this grading item is determined from the Basic Fire Flow and the resulting number of engine and ladder companies associated with the benchmark.

Chief Officers

For fire insurance grading the maximum credit Courtenay Fire Department can receive for Chief Officers is two. Full credit is received for each career Chief or career Deputy Chief on the fire department. An Auxiliary Chief or Auxiliary Deputy Chief is credited at 50 percent.

The Courtenay Fire Department has one career Fire Chief, one career Deputy Fire Chief and one career Assistant Fire Chief/Training Officer. The Courtenay Fire Department received three credits out the maximum two that can be received. The Courtenay Fire Department received 50 points of credit out of the maximum 100 in this portion of the grading item.

Company Officers

The number of Company Officers that the Courtenay Fire Department can receive maximum credit for fire insurance grading is determined by the total number of engine and ladder companies based on the Basic Fire Flow benchmark and an on duty shift factor. Credit can be received through a combination of career and auxiliary officers on the fire department. Full credit is received for each career officer on the department. Auxiliary officers are credited at 50 percent.

To determine the shift factor a typical 4 on/ 4 off system is used. If all shifts were operated continuously year round, then four career Company Officers would be required for each required company. However, in normal circumstances, shift coverage (holidays, leaves, etc.) requires that additional company officers be provided for continuous coverage. Typically the true value of required company officers will fluctuate between 4 and 6 company officers per company.



For fire insurance grading the maximum credit for Company Officers that Courtenay Fire Department can receive credit for is 20 officers. This was determined by the number of engine and ladder companies and an on duty shift factor. A shift factor of 4 was used.

The Courtenay Fire Department has eight paid-on-call officers. Fifty percent credit was achieved for auxiliary officers for fire insurance grading purposes.

Courtenay Fire Department Company Officers	
Career Officers	0
Auxiliary Officers	8
Total Available for grading:	4
Maximum Credit Receivable (BFF 3,500 lpgm):	20 total officers to cover 5 companies with a shift factor of 4

The Courtenay Fire Department received 11 points of credit out of the maximum ████ in this portion of the grading item.

Additional credit can be received up to the maximum if there were more fire fighters as trained officers on the fire department. Credit can be received though a combination of career and auxiliary officers.

The Courtenay Fire Department overall received 61 points of credit out of the maximum possible ████ for this grading item.

Recommendation 8.2-6 Train and Qualify Additional Firefighters to Officer Positions

The Courtenay Fire Department received credit for 4 career officers when measured against the 20 career officers needed based on a shift factor of 4. The Courtenay Fire Department can receive additional credit up to the maximum if it increases the total number of Company Officers on the fire department. Credit can be received through a combination of career and auxiliary officers.

A fire department should have sufficient Company Officers available and assigned to provide one on duty response with each required engine or ladder company. The Company Officers should be adequately trained, preferably in accordance with NFPA 1021: *Standard for Fire Officer Professional Qualifications, 2009 Edition* or recent edition to receive full credit for fire insurance grading purposes.



8.2.7. Total Fire Force Available

A fire department under this grading item is measured in its ability to meet the staffing requirements as determined by the Basic Fire Flow benchmark from the Table of Effective Response. For the grading of this item there should be at least six competent career fire fighters available and assigned to respond to fire for duty with each required engine and ladder company. The number of these fire fighters that should be on-duty with the apparatus of these companies at all times should be appropriate to the fire risk and fire incidence load.

The Basic Fire Flow for the City of Courtenay is set at 3,500 lpgm in 2014.

For the purposes of fire insurance grading, the maximum creditable number of career fire fighters per company is six (including officers). Therefore, the maximum credit that that Courtenay Fire Department can receive for this grading item is 30 career fire fighters based on four engine companies and one ladder company.

The total maximum creditable number of firefighters is based on the number of companies (total concentration) and the maximum creditable number of career fire fighters per company (six) per shift (including officers), available continuously year round (day and night) for fire insurance grading.

Credit for available fire force may be received according to the:

- minimum career fire fighters on duty,
- minimum regular vol. and off shift response of career fire fighters on 1st alarms,
- police officer/fire fighter and ambulance attendant/fire fighter,
- minimum automatic aid response,
- minimum mutual aid response, and
- minimum response of off-shift career fire fighters on multiple alarms.

Note that probationary fire fighters (incomplete training) and junior fire fighters (under age) are not credited due to lack of active fire ground duties.

Minimum Career Fire Fighters on Duty

The minimum number of career fire fighters on duty is determined by reviewing the fire departments records. Records are reviewed to determine the number of fire fighters on duty as during normal vacation periods less average details and sick leaves, but not the absolute minimum that may occur only



one or two days a year. This includes career company officers and fire fighters. For fire insurance grading, career fire fighters on duty are equal to one Fire Fighter Equivalent Unit (FFEU).

Courtenay Fire Department has at total of six career staff that on duty doing administration and fire prevention tasks within the fire hall, Monday to Friday 8:30 am to 5:00 pm. A detailed analysis of how the career members were credited is provided in Appendix F.

Minimum regular vol. and off shift response of career fire fighters on first alarms

Fire departments having off duty career members or auxiliary members responding on first alarms may receive credit. Typically three off duty or auxiliary members responding on first alarm are considered as one FFEU for grading purposes. Consideration for credit is based on records being available indicating response statistics. If no records are kept of response, credit for FFEU is limited to one FFEU for each six off duty or auxiliary members claimed to respond.

Courtenay Fire Department has 36 paid-on-call members on the roster. Records indicated the average turnout of auxiliary fire fighters to structural fires was 15 members. The Courtenay Fire Department received 4.95 credits for FFEU in this portion of the grading item of the fire department.

Police and Ambulance Personnel

Fire Departments may receive credit within the grading of this item for police and ambulance personnel responding and performing fire ground duties. The amount of credit depends upon the extent to which they are available and are used for response to fire alarms. Records of response and training are reviewed to determine that amount of credit that can be received. Each ambulance attendant/fire fighter or police officer/fire fighter on duty in a radio equipped vehicle and responding on first alarm equals 0.5 FFEU.

The Courtenay Fire Department has no records of response or training for police and ambulance personnel to receive credit towards its total available fire force.

Automatic Aid

Fire departments that have formal contracts for automatic aid response may receive credit for the personnel responding for this grading item. For personnel to be credited for automatic aid the responding fire department should be within 8 km in road travel distance to built-up areas of the community or municipality. Each career fire fighter from the responding fire department may be



credited as one FFEU and each volunteer fire fighter from the responding fire department may be credited as 0.33 FFEU.

The Courtenay Fire Department has no automatic aid agreements with neighbouring fire departments to receive credit.

Mutual Aid

Fire departments that have formal contracts for mutual aid response may receive some credit for the personnel responding for this grading item. For personnel to be credited for mutual aid the responding fire department should be within 25 km of travel distance to built-up areas of the community or municipality. Each career fire fighter from the responding fire department may be credited as one FFEU and each volunteer fire fighter from the responding fire department may be credited as 0.33 FFEU.

The Courtenay Fire Department is part of the Comox Valley Fire and Rescue Services Agreement. Volunteer fire fighters from the Comox Fire Department, the Cumberland Fire Department, the Oyster River Fire Department, and the Union Bay Volunteer Fire Department were credited. Four volunteers from each fire department were credited within this portion of the grading item. No credit was received for mutual aid partners exceed the travel distance of 25 km and one mutual aid partner has to be further reviewed before granting credit.

Off shift Response on Multiple Alarms

Fire departments that have formal agreements for career members to respond off shift on multiple alarms may receive credit for members responding within this grading item. Career members responding on multiple alarms are credited on the basis of four off duty career members being equal to one FFEU.

The Courtenay Fire Department has duty crew system and career members respond when they are off shift.

The following table indicates the amount of credit Courtenay Fire Department received towards its available fire force for this grading item.



Table 8.2-6 Fire Fighter Equivalent Units Credit Summary

	Courtenay Fire Department FFEU Credit
Minimum Career Firefighters on Duty	6 career staff on duty ³
Minimum Regular Vol. and OS on 1st Alarms	15*0.33 = 4.95
Police and Ambulance Crews Credited	0
Automatic Aid	0
Mutual Aid	16*0.33 = 5.28
Off shift Response on Multiple Alarms	6 career staff off duty
Total Credit Received:	13.17⁴
Maximum Credit Receivable:	30

The Courtenay Fire Department is credited with 13.17 fire fighter equivalent units in its available fire force out of the maximum 30. The Courtenay Fire Department can receive additional credit up to the maximum if it improves its available fire force. Credit can be obtained through career and auxiliary members. The available fire force grading item is weighted heavily within the fire insurance grading of the fire department.

Courtenay Fire Department overall received 198 points of credit out of the maximum possible for this grading item.

Recommendation 8.2-7 Improve Total Available Fire Force

The Courtenay Fire Department is credited with 13.17 fire fighter equivalent units in its available fire force out of the maximum it can receive of 30. Courtenay Fire Department can receive additional credit up to the maximum if it improves its available fire force. Credit can be obtained through career and auxiliary members.

Note that the available fire forces can be improved through additional volunteers up to 50% of the required fire force. (In the case of the Courtenay Fire Department, the required force is 30, so the maximum available fire force that can be provided through volunteers and other FFEU sources is 15.)

Providing additional staffing either being career or auxiliary is a serious matter that requires careful consideration. There are many factors to consider and the fire insurance grading is only one such factor.

³ A detailed analysis of how the career on duty members were credited is provided in Appendix F
⁴ The sum of all such equivalent fire fighter units (including those from automatic and outside aid) shall not exceed 50% of the lesser of the required strength of existing companies (at 6 fire fighters per company), or required companies (based on the Table of Effective Response at 6 fire fighters per company).



8.2.8. Engine and Ladder Company Unit Manning

This grading item measures the company unit strength of on-duty paid personnel responding on in-service apparatus. A maximum manning of six can be credited for each in service engine company and ladder company.

The number of members credited on-duty and on first alarm response determined from section 8.2.7 is used in the analysis of this grading item. The number of in-service engines and ladder apparatus is determined from sections 8.2.1 and 8.2.2.

The amount of credit received in this grading item is as follow:

Average Company Staffing	Credit
6 members	■
5 members	■
4 members	■
3 members	■
2 members	■
1 member	■
0 members	■

From section 8.2.7 Courtenay Fire Department received credit for 14 FFEU credited on-duty. The fire department has two engines and one ladder in-service. The following formula was used to determine the amount of credit for the average company staffing for the Courtenay Fire Department's in-service companies.

$$\begin{aligned}
 & \left[\frac{(2 \times 2.7) + (1 \times 2.7)}{2 + 1} \right] \\
 & \frac{5.4 + 2.7}{3} \\
 & \frac{8.1}{3} = 2.7
 \end{aligned}$$

The Courtenay Fire Department has an Average Company Staffing of 2.7 per engine and ladder company it has in service out of the maximum required when analysed against the engine and ladder companies



that are in service. Amount of credit received is interpolated between the values indicated in the table above.

Overall, the Courtenay Fire Department graded well within this grading item. To improve the amount of credit received within this grading item the average company staffing needs to be improved. This grading item is connected to the previous grading item of the fire department. Any improvement received section 8.2.7 will have a positive benefit on this grading item based on the current number of in service engine and ladder companies.

Courtenay Fire Department overall received 201 points of credit out of the maximum possible for this grading item.

8.2.9. Master and Special Stream Devices

This grading item considers the equipment fire fighters would use to be effective in combating large fires, flammable fire and fires in upper storey's or hard to reach locations. Equipment considered under this grading item are fixed and portable turrets, large spray nozzles, distributing nozzles, foam equipment, and elevated master stream devices.

Table 8.2-7 Master, Special Stream Devices, and Foam Equipment Summary

	Maximum Credit for Engines	Maximum Credit for Ladders	Maximum Credit Total	Have
Master and Special Stream Devices	█	-	█	2
Elevated stream device with necessary equipment	-	█	█	1
Turret with 35 mm (1 3/8 in.), 38 mm (1 1/2 in.) and 44 mm (1 3/4 in.) tips	-	-	█	3
Large spray nozzle	-	-	█	2
Distribution nozzle (aka spinner) (1/pumper)	█	-	█	3
Foam nozzle and 40 L (9gal.) foam liquid (per company)	█	-	█	4
Department foam supplies (Litres)	-	-	█	1638

The Courtenay Fire Department graded very well in regards to being equipped with the necessary equipment to provide effective structural fire protection to large fires, flammable fire and fires in upper storey's or hard to reach locations.



The Courtenay Fire Department overall received 50 points of credit out of the maximum possible for this grading item.

8.2.10. Equipment for Engines and Ladder Apparatus, General

This grading item considers the general equipment for engine and ladder apparatus. Equipment includes, but is not limited to, rope, cutters, fire extinguishers, nozzles, first aid equipment, wrenches, generators, salvage tarps, etc.

Courtenay Fire Department maintains detailed inventory sheets for each of its fire apparatus. Inventories have been developed by the fire department to keep track of equipment stored on its fire apparatus.

General Equipment for Engines and Ladder Apparatus

The inventories for each fire apparatus were reviewed for fire insurance grading purposes. Courtenay Fire Department is reasonably equipped to meet the NFPA standards.

Table 8.2-8 Equipment for Engines and Ladder Apparatus, General

	Maximum Credit Total	Have/Equipped
Nozzles for 25-38-65 mm Hose (min 3/app)	█	46
Breathing Apparatus (4/apparatus)	█	20
Resuscitators	█	1
Salvage-Covers	█	1
Clean-up Equipment	█	1
Lighting Plants	█	2
Smoke Ejectors	█	2
Heavy and Power Entry Tools	█	Yes



Portable Fire Extinguishers

Within this portion of this grading item, the number of Class A, B, and C fire extinguishers carried on engines and ladder apparatus is reviewed. At a minimum two Class A extinguishers and a 20 BC dry chemical extinguisher should be carried on engines and ladders.

The Courtenay Fire Department was reviewed for the amount and class of each extinguisher carried on engines and ladder apparatus. The Courtenay Fire Department carries an adequate amount of fire extinguishers on its fire apparatus.

Personal Protective Clothing and Equipment

The Courtenay Fire Department appears well equipped with Personal Protective Clothing (PPC) and Personal Protective Equipment (PPE). All of the fire department member have a set of PPC. PPC is checked in house and is well maintained. Repairs are completed as required and sent to a repair facility when needed. PPC is replaced every five years. Several reserve sets are maintained

A refill station is provided in the fire station for filling of SCBA bottles and has a portable refill station on its rescue apparatus. The Courtenay Fire Department conducts regular inspections on their SCBA equipment. Inspections include weekly checks and after each use. The Courtenay Fire Department are has two qualified SCBA technicians and a third in the process of being qualified to conduct maintenance on their SCBA's. SCBA testing is conducted annually by a third party organization to NFPA standards.

Ground Ladders

Courtenay Fire Department was reviewed for the number and length of ground ladders carried on fire apparatus. The Courtenay Fire Department had more than enough ground ladders for fire insurance grading purposes. The fire department has its ground ladders inspected and tested yearly by its emergency vehicle technician to the NFPA standards.

Overall, the Courtenay Fire Department received near maximum credit within this grading item.

Courtenay Fire Department overall received 98 points of credit out of the maximum possible for this grading item.



8.2.11. Fire Hose

Fire hose used by the fire department should be distributed so that each engine company carries a minimum of at least 360 m (1,200 ft) of 65 mm (2 ½ in) (or larger), 180 m (600 ft) of 38 mm (1 ½ in), and 60 m (200 ft) of 25 mm (1 in) booster hose (or equivalent hose). A fire department should maintain a complete reload or spare hose at the fire station. Maximum credit for this grading item is given if the fire department meets or exceeds the minimum hose totals. Larger hose may be credited in the place of smaller hose.

Table 8.2-9 Fire Hose for Engines and Ladder Apparatus, General

Unit #	Apparatus	Amount of Hose		
		Preconnect	32 mm or >	65 mm or >
15	Engine	259 m	152 m	366 m
11	Engine	107 m	259 m	427 m
13	Reserve Engine	259 m	168 m	442 m
12	Ladder	259 m	122 m	381 m
14	Tanker	0	107 m	530 m
Total:		884 m	808 m	2,146 m
Minimum Per Engine Company for Maximum Credit:		60 m	180 m	360 m
Spare Hose in Fire Hall:		0 m	732 m	792 m
Minimum Full Compliment Per Apparatus for Maximum Credit:		60 m	180 m	360 m

The Courtenay Fire Department was reviewed for the amount of fire hose carried on in-service fire apparatus and hose that is kept in reserve. Review indicated the fire department has an adequate amount of fire hose on its fire apparatus and stored at fire station. Maximum credit was received within this grading item.

The Courtenay Fire Department overall received 180 points of credit out of the maximum possible for this grading item.

8.2.12. Condition of Fire Hose

This grading item reviews the condition and maintenance of the fire department's fire hose. Fire hose should be properly cared for. Fire hose failure on the fire ground can lead to injury or death of building occupants or to fire fighters, and result in unnecessary property damage. Suitable facilities should be



provided for washing, drying, and storing of fire hose. Fire hose should be maintained in good condition and tested annually to at least 1,700 kPa (250 psi).

Testing Program and Age of Fire Hose

A portion of this grading item reviews the testing procedures and frequency of testing of the fire department fire hose. Fire hose should be maintained in accordance with NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*, recent edition.

The Courtenay Fire Department maintains a yearly fire hose maintenance program in accordance with NFPA 1962. Records of hose testing are maintained digitally.

Drying Facilities

Facilities and equipment for cleaning and drying of fire hose are reviewed in this portion of the grading item.

The Courtenay Fire Department has hose towers at its fire station for drying hose.

The Courtenay Fire Department graded well in this grading item for its fire hose testing and drying facilities. To receive full credit, the inspection program should be improved and hose testing occurs as required by NFPA 1962.

The Courtenay Fire Department overall received 48 points of credit out of the maximum possible for this grading item.

8.2.13. Training and Qualifications

Fire Department training is commensurate with fire potential in the community or municipality which facilitates the effective handling of fires through provision of a competent force of personnel. The objective of this grading item is to measure qualifications of the members of the department through the results of the training programs, not simply the programs and facilities themselves. The training and qualifications grading item is separated into five areas for review and grading.

Facilities should be provided, sufficient in size and number and suitably equipped, for the proper instruction of all members. There should be a complete, uniform training program under the close



supervision of a competent officer; the program should include the study and development of modern practices, including standard operational procedures. There should be a comprehensive schedule of regular classes and drills at the training facility and at fire stations. Special classes for new members, officers, operators, and drivers should be held.

Quality of Basic Recruit Training

This portion of the grading item reviews the basic recruit training program used by the fire department. The fire department's probation period is considered. Ideally a fire fighter should serve a probation period of up to one year in training status in which thorough training is provided in safe and efficient fire fighting and the probationer is assessed in actual fire service performance.

Training should produce, for most of the force, an all around fire fighter/fire prevention inspector. This allows the fire fighting force to complement the fire prevention staff in the total fire department objective. Recruit training should be separate from the routine drill program.

The Courtenay Fire Department has a fire force comprised of career fire administration, career fire prevention and paid-on-call members.

The Courtenay Fire Department recruits paid on call fire fighters on an annual basis. The following minimum requirements are followed by the fire department:

- Live in the City of Courtenay
- Are at least 19 years old
- Have a valid B.C. Driver's License
- Are in good health and physical condition
- Provide a current driver's abstract and criminal records check
- Pass a fitness evaluation, and
- Can attend the weekly Tuesday training sessions.

New recruits begin a 12 month training program and are enrolled in the JIBC Fire Fighter Level 1 and 2 programs and must be completed.

The Courtenay Fire Department graded well within this portion of the grading. Its recruiting and training program is adequate for the size of the fire department.



Quality of On-going Drills and Training

This portion of the grading reviews a fire departments on-going drill and training program. A fire department training program should include practise evolutions, classroom work, firefighting, prevention and other areas, all to be contained in a department manual; as well as inter-company and building familiarization exercises. This program should be under the supervision of an officer in charge with developing, coordinating and evaluating the results.

Regular training for fire department members occurs every Tuesday night for two hours. Fire department members not able to attend the regular scheduled training session can possibly catch up on the training on Wednesday in the morning. Additional training sessions may be held on weekends and members may also attend training courses outside of the municipality. Training is administered by the assistant fire chief/training officer. Paid on call members are enrolled in the JIBC Fire Fighter Level 1 and 2 programs and must be completed.

All aspects of training assistant fire chief/training officer and are recorded using the fire department's record management software. Fire department members are required to attend a minimum of 70 percent of training.

The Courtenay Fire Department has established minimum requirements that first year fire fighters, second year fire fighters, drivers, duty officers, lieutenants and captains have to meet for those positions.

The Courtenay Fire Department graded well within this portion of the grading item.

Qualifications of Line Officers

A portion of the grading item reviews the fire departments qualifications of line officers and promotion of its members. Within the fire insurance grading, promotions should be carried out under a documented system providing job related criteria for each rank for internal and lateral entry. Written and oral examinations, in-service training, programs directed toward particular job positions, and evaluation by superiors as well as training ground tests should be used for the selection of candidates for fire suppression officer positions. Career, on-call and auxiliary members of the same fire department should be trained to identical qualification levels. (NFPA Standards for Professional Qualifications, 1001, 1002, 1021, 1031 and 1041 are indicative of good practice.)



Fire Department members are required to have at minimum four years of service to be a Duty Officer and four years of service to be a Lieutenant. Officers are elected after they have met minimum time and training requirements as required by the Courtenay Fire Department position qualifications. Ongoing officer training occurs and follows NFPA but is not mandatory.

The Courtenay Fire Department graded fair in this portion of the grading item. Additional credit up to the maximum can be received if officers Duty Officers and Lieutenants are certified to Fire Officer Level 1 for and Captains are certified to Fire Officer Level 2 for.

Qualification of Specialists

A portion of the grading item reviews the specialized training and qualifications of members of the fire department. Training and education of members of the department on the job or by outside resources should provide personnel with the abilities to perform their manual rescue firefighting, fire fighting or specialist functions effectively in a manner commensurate with the size of the fire department and the fire potential of the community or municipality, including pump and ladder operators, mechanics, communications and any other fire suppression specialized personnel.

The Courtenay Fire Department has in house training programs for rope rescue and pump apparatus/driver operator. Additional courses and training sessions include but not limited to:

- Aerial operator
- Auto Extrication
- Incident Command System
- Forestry
- Emergency Scene Traffic
- Confined Space Awareness
- Live Fire 1 and 2
- Fire Service Instructor Level 1 and 2
- Safety Officer

The Courtenay Fire Department graded fair within this item.

Facilities for Training

Facilities for drill and training should be readily available for these purposes and include necessary buildings or structures for ladder work, smoke and breathing apparatus training, use of pumpers and hose lines, lecture space, are all in keeping with the size of the fire department. Larger fire departments



should have full training facilities capable of duplicating or simulating a variety of fire types and situations using real fires. Smaller departments may use provincial, regional or cooperative training facilities according to need, but in any case should provide for a broad range of realistic training exercises. Training facilities should always work towards meeting the needs of the potential fires. When a ladder company is required, the tower should be at least four storeys.

The Courtenay Fire Department was reviewed for training facilities in accordance's with NFPA 1402: Guide to Building Fire Service Training Centers, which considers the following:

Tower facilities

The Courtenay Fire Department has a three storey training tower adjacent to the fire station. Full credit was received for the training tower.

Fire facilities

The Courtenay Fire Department does not have its own burn building within the municipality. The Comox Fire Training Centre is utilized for Live Fire Training and Hazmat training. Credit was received for the use of the fire training facility.

Smoke facilities and alternative for protective B.A. Training

No smoke facilities exist within the City of Courtenay for the fire department to utilize to training its fire fighters.

Wet drill facilities

No wet drill facilities exist within the City of Courtenay for the Courtenay Fire Department to perform safe fire fighting scenarios utilizing the water distribution system. Minor credit is received for the use of locations throughout the City of Courtenay.

Pumper test facilities

No pumper test facilities exist within the City of Courtenay for the Courtenay Fire Department to utilize for testing its fire apparatus.

Flammable liquid fire facilities

No flammable liquid fire facilities exist within City of Courtenay for the Courtenay Fire Department for performing training scenarios.



Training Aids and Library

Adequate training materials were noted in the fire station, IFSTA manuals etc. The fire station has an adequate space on the second floor of the fire station for conducting seminars and class based training. The classroom training areas is equipped with a computer, a television, a projector, and visual aids for training.

Partial credit was received within this portion of grading item for the use of the Comox Fire Training Centre. However, further credit can be received for fire insurance grading purposes if additional training props were within the municipal boundary of the City of Courtenay for the Courtenay Fire Department to utilize in training its members.

Overall, the Courtenay Fire Department graded fairly well within this grading item. Adequate training facilities and props would allow the Courtenay Fire Department further improve its fire department training program by being able to provide more realistic fire fighting training.

The Courtenay Fire Department overall received 304 points of credit out of the maximum possible for this grading item.

Recommendation 8.2-8 Ensure Officers are Certified to NFPA 1021 Level 1 and Level 2

Officers should be adequately trained, preferably in accordance with NFPA 1021: *Standard for Fire Officer Professional Qualifications, 2009 Edition* or recent edition to receive full credit for fire insurance grading purposes.

Recommendation 8.2-9 Improve Training Facilities

The Courtenay Fire Department does not have adequate props and facilities for training. The following props and facilities are recommended to be developed with the City of Courtenay:

- Smoke facilities and alternative for protective B.A. Training
- Wet drill facilities
- Pumper test facilities
- Flammable liquid fire facilities

Training facilities should be developed by the fire department in relation to the level of fire risk within the community so that realistic fire fighting training can be conducted.

It is recommended that facilities for drill and training be readily available for purposes that include necessary buildings or structures for ladder work, smoke and breathing apparatus training, use of pumper and hose lines, lecture space, etc. If the fire department were to develop its own training facilities it is recommended NFPA 1402 *Guide to Building Fire Service Centres, recent edition* be used for development.



Ideally for fire insurance grading purposes training props and facilities should be located within the municipality of the fire department. Credit can be received for the use of training facilities and props in neighbouring communities if the fire department has access to use them. To receive full or partial credit training facilities and props should be within 8 km of the municipal boundary. If training facilities and props are beyond 8 km, credit can still be achieved but sufficient fire department coverage must be maintained within the municipality when fire department resources are outside of the community for training purposes.

8.2.14. Response to Alarms

An adequate initial response of apparatus and personnel upon receipt of an alarm of fire is essential to provide for prompt control of what is generally an escalating emergency. This is required to be pre-arranged in nature as far as possible to ensure reliability. Efficient advance plans should be made for developing a maximum concentration of forces including reserve apparatus and outside assistance for the largest fires. Response should be commensurate with the hazard of the location responded to, with due consideration for the likelihood of other, simultaneous fires. Minimum responses to fires in buildings considered reasonable are set out in the Table 8.2-10 Initial Response to Alarms of Fire, which is based off the Table of Effective Response.



Table 8.2-10 Initial Response to Alarms of Fire

Group	General Description Examples	Fire Flow		Response to First Alarm		Add for Severe Life Hazard: Engine, Ladder or Rescue Company, at Least
		L/min x 1000	Approx. Igpm range	Engine Companies	Ladder Companies	
1 (a)	Minor fires not in buildings, very small buildings, widely detached	1 2	200 400	1		
1 (b)	Scattered development (except wood covered roofs)	3	600	1		
2	Typical modern, 1-2 storey residential subdivision, 3-6 m (10-20 ft.) detached.	4-5	800 - 1,000	2		
3 (a)	Close 3-4 storey residential & row housing, small mercantile and industrial	6-13	1,200 - 2,800	2	1 (if required by hazards)	
3 (b)	Seriously exposed tenements. Institutional. Shopping Centres. Fairly large areas & fire loads, exposures.	14-19	3,000 - 4,200	2	1	1
4 (a)	Large combustible institutions, commercial buildings, multi-storey and with exposures.	20-27	4,400 - 6,000	2	1	1
4 (b)	High fire load warehouses and buildings like 4 (a).	28-35	6,200 - 7,600	3	1	1
5	Severe hazards in large area buildings usually with major exposures. Large congested frame districts.	36-46	7,800 - 10,000	3	2	1

First Alarm Response to Commercial Districts

The Basic Fire Flow Benchmark of 3,500 Igpm is used to determine the response on first alarm to commercial districts. Courtenay Fire Department was reviewed against a first response of two engine companies and one ladder company from Table 8.2-10.

The Courtenay Fire Department first response to commercial districts was reviewed. Courtenay Fire Department sends two engine companies and one ladder company on first alarm to commercial districts. The Courtenay Fire Department received 100 percent credit in this portion of the grading item.

First Alarms Response to Residential Districts

An average required fire flow for residential districts was determined and used for the first alarm response for residential districts. An average required fire flow of 1,500 Igpm was determined.



The maximum credit the Courtenay Fire Department can receive for first response to residential districts is two engine companies from Table 8.2-10. The Courtenay Fire Department sends two or more engine companies on first alarm to residential districts. The Courtenay Fire Department received 100 percent credit in this portion of the grading item.

Suitable Pre-arranged responses (Running Cards)

When a fire department requires the response of more than three engine companies determined by the Basic Fire Flow Benchmark, the means of which a fire department has developed pre-arranged responses (running cards) is reviewed.

Running cards should set fourth assignments of specific companies to respond to locations throughout the community or municipality on first and succeeding alarms, even though specific assistance is frequently specified by the officer requesting it. Running cards should call for relocation of companies on second alarms and succeeding alarms may be necessary for the purpose of equalizing depleted coverage of the community or municipality during large fires.

The Courtenay Fire Department has developed pre-arranged responses to risks within the municipality and is provided to emergency communications provider.

Suitable Covering-in and 2nd Alarm Responses

When a fire department requires the response of more than three engine companies determined by the Basic Fire Flow Benchmark, the means of which a fire department has capacity to provide cover-in and 2nd alarm response is reviewed.

The Courtenay Fire Department requires the response of more than three engines and capacity to provide suitable cover for 2nd alarm responses.

Overall, the Courtenay Fire department received near maximum within this grading item.

The Courtenay Fire Department received 96 points of credit out of the maximum possible for this grading item.



8.2.15. Fire Ground Operations

Within this portion of the grading item all phases of operations at fires are considered. The fire department is reviewed in its ability to operate effectively at fires both small and large in magnitude, including rescue work when necessary. Good results at the fire scene depend on the use of effective and efficient fire methods and standard operating procedures.

Good results at the fire scene depend on the use of effective and efficient fire methods and standard operating procedures, involving the laying of 65 mm (2 ½ inch) or larger hose lines, connecting pumpers to hydrants, connecting to and supplying sprinkler and standpipe systems in buildings so equipped and the efficient use of breathing equipment and tools and other devices as may be called for by the conditions encountered.

Fire ground operations will also be influenced (favourably or unfavourably) by the adequacy of department manpower, sufficiency of pumper and ladder companies, quality of training and other factors.

The Courtenay Fire Department follows a regular training schedule to maintain the adequacy of its career members and paid on call members to perform on the fire ground. The Courtenay Fire Department has established Standard Operating Guidelines that are reviewed and updated regularly.

Initial Available Fire Force Response to Commercial Districts

This portion of the grading item reviews fast response call members that includes individuals who are specifically designated to be available for first alarms for a given period and are able to respond immediately by motor vehicle, receiving the alarm call by vehicle radio, personal radio, or pager. These may include off shift career fire fighters, volunteers, ambulance attendants and police officers.

First alarm response to commercial districts is connected with grading item 8.2.7. Changes in that grading item may affect the amount of credit that is received within this portion of the grading item.

From Table 8.2-10, the number of engine companies and ladder companies based on the benchmark Basic Fire Flow of 3,500 Igpm is two engine companies and one ladder company. The maximum credit that Courtenay Fire Department can receive for initial available fire force response for two engine companies and one ladder company is 18 fire fighters. The Courtenay Fire Department received 7.95 FFEU within grading item 8.2.7 Total Fire Force Available.



The Courtenay Fire Department received 44 percent credit for first alarm response to commercial districts based on the minimum career fire fighters on duty, minimum regular vol. and off shift response of career fire fighters on first alarms, and police officer/fire fighter and ambulance attendant/fire fighter from 8.2.7 Total Fire Force Available.

Overall, the Courtenay Fire Department graded well within this item.

The Courtenay Fire Department received 219 points of credit out of the maximum possible [redacted] for this grading item.

8.2.16. Special Protection Required

Some municipalities have particular fire hazards within areas they protect requiring specialized apparatus or equipment which should be provided either by the fire department, individual property owners, or both together. These hazards, including waterfront port and marina facilities, large petrochemical installations or brush and grass fire potentials should be provided for.

The City of Courtenay has limited special hazards within the community that would require more specialized fire apparatus and training. However, It was determined that due to the wildland urban interface fire risk present within the City of Courtenay and the contract protection areas of the Comox Valley Regional District, equipment for brush fires is required within this grading item.

The Courtenay Fire Department is reasonably equipped by having its fire apparatus equipped with equipment to respond to brush and grass fires within the City of Courtenay and the contract protection areas of the Comox Valley Regional District.

The Courtenay Fire Department received near maximum credit for this grading item.

The Courtenay Fire Department received 191 points of credit out of the maximum possible [redacted] for this grading item.



8.2.17. Miscellaneous Factors and Conditions

Records (For Effective Operations, Planning)

Suitable records of fires, fire operations, personnel, training, fire hose and other essential matters should be kept. Records should be maintained as they are essential to effective and responsible management of a fire department. Daily, monthly, and annual reports are useful management tools for the Fire Chief.

Records of fires, training, tests, attendance and activities in the department should be developed to aid in planning future activity and policy as well as the assessment of performance. Good records of performance evaluations, work record and training should be maintained for each member.

The Courtenay Fire Department maintains records of its operation on paper and digitally using fire department record management software. Eight mobile data terminals in use by the fire department and are located within chief vehicles, duty chiefs vehicles, and all front line fire apparatus.

The Courtenay Fire Department received near maximum credit for their record management system that is in place under this grading item.

Fire Stations (Suitability)

All fire stations should be of substantial construction, suitable for the service, and located and arranged for ease and quickness of response. Proper safeguards against internal hazards should be provided. Construction of fire stations should be substantial, non-combustible, preferably fire resistive and protected from exposures, with internal and external hazards minimized. Stations should be equipped with adequate heating and lighting with consideration of the need to dry or thaw wet or frozen equipment and perform maintenance on apparatus.

Fire Station 1

The fire station building was originally built in 2000 to post disaster standards. The fire station is of non-combustible construction and has an automatic sprinkler system installed. The fire station has three drive through apparatus bays. Each bay can hold two fire apparatus depending upon the length of an apparatus. Space between fire apparatus within the bays was adequate for safely walking around the fire apparatus. A motor vehicle exhaust system is installed for the fire apparatus.



The fire station was deemed to have adequate space for administration, training, storage, and maintenance of equipment.

The fire station has a back-up power generator. The fire station and it can also be used as an emergency preparedness facility by the City and its emergency preparedness partners.

During the field survey the fire station was considered in good condition based on the visual inspection and walkthrough of the emergency response facility. Parking around the fire station was adequate and would not interfere with responses.

Apparatus Refuelling

Fuel should be available in sufficient quantities at convenient points within the community or municipality. Suitable arrangements should be made for delivery of fuel to apparatus at fires of long duration.

Normal refuelling operations are provided in the City of Courtenay to the fire department through fuel supplies at public works and secondly at public fuel vendors. The Courtenay Fire Department has access to fuel during emergency events if required.

Response Delays (Exceptional)

Every fire department may have delays in response for personnel or when on route to an emergency. The possibility of delays due to poor condition of roads, including inadequate snow removal and sanding, steep grades, vehicle parking, traffic, railroad crossing, and other similar features should be considered.

The only significant issue within the City of Courtenay that would cause exceptional fire department delays is if one or all three of the bridges to access the eastern area were out of service. Credit was reduced within this portion of the grading item due to the fact that three bridges (5th Street, 17th Street and Dove Creek Road), are the primary means to access the eastern portion of the City and fire protection areas. If all bridges were inaccessible the eastern area would have not be able to receive a reasonable level of response.

Overall, the Courtenay Fire Department received near maximum credit within this grading item.



The Courtenay Fire Department received 184 points of credit out of the maximum possible [redacted] for this grading item.

8.2.18. Pre-Incident Planning

Pre-incident planning is one of the most effective tools a fire department has in controlling or reducing the damage caused by fire. Planning for fires in industrial and commercial occupancies increases the confidence and ability of the fire department in handling the fires and reduces the risk to the life safety of the fire fighters involved.

This grading item reviews the fire departments pre-incident planning program. Review of this grading item looks at the pre-incident plan inspection program, preparation of plans, quality of data, and the use of pre-incident plans in training.

The Courtenay Fire Department has a pre-incident plan program in accordance with NFPA 1620: *Recommended Practice for Pre-Incident Planning*. Pre incident are created using Visio and are uploaded to the fire departments mobile data terminals. Binders are also maintained within the fire apparatus that Four mobile data terminals.

Fire Safety Plans are completed by property owners within the City of Courtenay. The fire safety plans are uploaded into Courtenay Fire Department mobile data terminals (laptops) on the fire apparatus. Information collected indicated that plans are not updated regularly and it is not known to what extent information collected during fire prevention inspections by fire crews is transferred to the fire safety plans.

Full credit was received for front line fire apparatus and chief vehicles being equipped with mobile data terminals to access pre incident plans.

Overall, the Courtenay Fire Department graded well within this grading item.

The Courtenay Fire Department received 169 points of credit out of the maximum possible [redacted] for this grading item.



8.2.19. Administration

Fire departments should be administrated and managed by qualified and progressive leadership with adequate authority to carry out its mandate. Adequate procedures should be established to govern the administration and operation of the organization. The fire department should be organized with appropriate staff for routine management and operational fire fighting and emergency command.

The Courtenay Fire Department is administrated by the City of Courtenay. Courtenay Fire Department is well established and employs qualified individuals in the Fire Chief, Deputy Fire Chief and Assistant Fire Chief positions. Adequate procedures are in place through standard operating guidelines.

The Courtenay Fire Department received near maximum credit within this grading item.

The Courtenay Fire Department received 192 points of credit out of the maximum possible [redacted] for this grading item.



9. PFPC - WATER SUPPLY ASSESSMENT

Water supplies for firefighting are a critical component of the community's fire defence systems. Water supplies for firefighting were evaluated for adequacy in several areas including but not limited to:

- Fire Flow Delivery – the ability of the water system to deliver the *Basic Fire Flow* (from Section 7.3).
- Storage Adequacy – quantity of stored water reasonable for expected demands and duration of appropriate flows during expected fire events.
- Distribution System Adequacy – layout and arrangement of piping and pump capabilities, looping/grid design of pipe networks for maximum versatility and minimum losses.
- Hydrant Distribution – appropriate spacing and distribution to minimize hose lays and other delays in setting up an initial attack during structure fires.
- System Design and Installation – the overall design of the system with regard to redundancy, and capability to continuously provide full service to all areas during all foreseeable events (including catastrophic events and/or perils).
- Maintenance of System and Components – system and component maintenance meets recognized standards and improved reliability of the system.

This section highlights some of the significant findings of the fire insurance grading of the water supply. Areas where additional credit can be received up to the maximum amount have been noted.

9.1. City of Courtenay and Comox Valley Regional District Water Systems

Within the City of Courtenay and the contract fire protection areas of the Comox Valley Regional District have three water distribution systems that provide public fire protection.

Comox Valley Regional District, City of Courtenay, and Town of Comox

The Comox Valley Regional District supplies bulk water to distribution systems operated by the City of Courtenay and Town of Comox. Water for potable use and for public fire protection is drawn from the Puntledge River, just downstream of its outlet from Comox Lake, through joint use of the BC Hydro penstock which feeds the generation station 11 km downstream. A 750 mm diameter steel main from the penstock supplies water to the chlorination building. A standby pump station alongside the generating station provides water to the system from the lower river when the penstock supply is unavailable for maintenance or other reasons.



The following infrastructure has been developed by the Comox Valley Regional District and municipalities which includes.

- Six reservoirs
 - West Courtenay – 9 million litres (1.98 Imperial million gallons)
 - Marsden – 2.5 million litres (0.55 Imperial million gallons)
 - East Courtenay 1 and 2 – 11.3 million litres (2.5 Imperial million gallons)
 - Crown Isle – 4 million litres (0.88 Imperial million gallons)
 - Comox – 4.5 million litres (0.55 Imperial million gallons)
- Four pump stations and one booster pump station
 - Puntledge standby pump station – 4 pumps – each at 158 Lps (661 Igpm)
 - Marsden – 4 duty pumps and 1 fire pump – 7.7 Lps (102 Igpm) each and 150 Lps (1,980 Igpm)
 - Dingwall – 4 duty pumps – 113.5 Lps (1,498 Igpm) each
 - Ryan – 4 duty pumps – 103 Lps (1,360 Igpm) each
 - Courtenay Booster Station – 3 duty pumps and 1 fire pump – 27.1 Lps (358 Igpm) each and 75 Lps (990 Igpm)
- Approximately 900 hydrants

Royston

Water supply for Royston is purchased from the Village of Cumberland. The Cumberland supply fills the Royston reservoir via gravity. Water is chlorinated by the Comox Valley Regional District before it enters into the distribution system.

The Royston water distribution system consists of:

- Two reservoirs
 - Royston – 2.8 million litres (0.65 Imperial million gallons)
 - Herrondale – 1.5 million litres (0.33 Imperial million gallons)
- Approximately 90 hydrants

Sandwich Waterworks District

The Sandwich water distribution is a private water system that services a small portion of the City of Courtenay and area within the Courtenay Fire Protection Area. Water sources include two deep wells, one river gallery intake and an emergency connection with the City of Courtenay.

The Sandwich Waterworks District consists of:

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- Three sources of supply and one emergency source
 - Well #1 – 96 lpgm
 - Well #3 – 95 lpgm
 - River gallery intake 400 lpgm
 - Emergency connection with City of Courtenay – 150 mm water main connect
- One Reservoir – 208,168 Imperial Gallons
- Approximately 80 hydrants

9.2. Water Supply Grading Items

The sections below cover the 15 grading items that pertain to the Water Supply. Thirty percent of the Public Fire Protection Classification of the City of Courtenay and contract fire protections areas of the Comox Valley Regional District comes from the grading of the Water Supply.

An adequate and reliable water supply is an essential part of the fire fighting facilities of a community or municipality. A water supply is considered to be adequate if it can deliver the required fire flow for the appropriate duration while simultaneously providing domestic water supply at the max day demand; if this delivery is possible under certain emergency or unusual conditions, the water supply is also considered to be reliable.

In most municipalities, due to structural conditions in some areas, the possibility exists that a combination of unfavourable factors, such as the delayed receipt of an alarm of fire, high winds, or an explosion, will result in a fire becoming large enough to tax the ability of the fire service to confine the fire using the normally available water supply.

If, at the same time, the water supply is lacking or is considerably curtailed due to the failure of essential equipment (reliability), any fire, even if relatively small upon the arrival of the fire department, could rapidly expand and extend to adjoining buildings, becoming a conflagration.

In order to provide reliability, duplication of some or all parts of a water supply system is important, the need for duplication being dependent upon the extent to which the various parts may reasonably be expected to be out of service as a result of maintenance and repair work, emergencies, or some unusual condition. The introduction of storage, either as part of the supply works or on the distribution system, may partially or completely offset the need for duplicating various parts of the system; the value of the storage depends upon its amount, location and availability.



Gravity Systems and Pumping Systems

Gravity systems delivering supply from the source directly to the community or municipality without the use of pumps is advantageous from a fire protection standpoint because of its reliability, but the reliability of a pumping system can be developed to such a high degree through redundancies and back-up power supplies that no distinction is made between the two types.

Storage

In general, storage reduces the requirements of those parts of the system through which supply has already passed. Since storage usually fluctuates, the total normal daily minimum maintained or 80 percent of capacity is the amount that is considered as available. Because of the decrease in pressure when water is drawn down in standpipes, only the portion of this normal daily minimum storage that can be delivered at the required residual pressure at the point of use is considered as available.

Pump Capacities

As part of the grading analysis of pumps for fire insurance grading the capacities of pumps are de-rated by 25 percent to factor in age and reliability.

9.2.1. Normal Adequacy of Supply Works

The first grading item of the water system considers the ability of the supply works to deliver water at a rate equal to the maximum day demand plus the Basic Fire Flow rate for the time duration specified in Appendix B Fire Underwriters Survey – 1999 Water Supply for Public Fire Protection under normal conditions. Credit may be given for the permissible overload rate of delivery from a filtration plant. If the supply works, alone or in conjunction with storage, can deliver the needed quantities to the distribution system, maximum credit will be received for this grading item.

This grading item reviews the supply works for possible limitations. Limitations may be in the intake main size(s), low-lift pumping capacity, raw water main size(s), settling capacity, settled water mains, filter capacity including allowable overload, filtered water main size, high-lift pumping capacity or the transmission main size to the community or municipality.

Courtenay and Comox Valley Regional District:

At a Basic Fire Flow of 3,500 l/gpm, the fire flow duration is 3.5 hours. The Maximum Day Demand for this area is taken as 8.17 MGD. When considering the supply to the system and storage on the system maximum credit within this grading item was received.



Royston:

At a Basic Fire Flow of 1,500 IGPM, the fire flow duration is 2 hours. The Maximum Day Demand for this area is taken as 1.1 MGD. When considering the supply to the system and storage on the system maximum credit within this grading item was received.

Sandwick:

At a Basic Fire Flow of 1,500 Igpm, the fire flow duration is 2 hours. The Maximum Day Demand for this area is taken as 0.566 MGD. When considering the supply to the system and storage on the system near maximum credit within this grading item was received.

The Courtenay and Comox Valley Regional District water system received 300 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 300 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwick water system received 293 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.2. Reliability of Sources of Supply

This grading item considers the effect on adequacy of the source of supply. Factors considered for adequacy may include the frequency, severity, and duration of droughts; physical condition of dams and intakes; danger from earthquakes, floods, forest fires, and ice dams or other ice formations; silting-up or shifting of channels; possibility of accidental contamination on the watershed; absence of watchmen where needed; and injury by physical means.

This item considers the miscellaneous factors in the source of supply, especially those due to natural causes that could result in partial or complete interruption of the delivery.

The sources of supply for each of the water systems were reviewed and were determined to be reliable sources of supply for fire insurance grading purposes. Credit was reduced due to probability of drought and contamination issues that may result in the sources of supply not be fully available, the duration and severity associated with the perils were also moderate.



The Courtenay and Comox Valley Regional District water system received 155 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 155 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 155 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.3. Reliability of pumping Capacity

The ability of the water supply system to maintain the maximum day demand concurrently with the Basic Fire Flow with one and two pumps out of service is considered under this grading item. The pumps considered out of service are those which would cause a maximum reduction in service delivery to the system. To receive maximum credit, the remaining system capacity in conjunction with available storage, should be able to provide the Basic Fire Flow for the specified duration of the design fire at any time during a period of five days concurrently with consumption at the maximum day demand.

For this grading item a single failure and dual point failure analysis is conducted for the pumps considered as having the greatest impact being out of service.

Each water systems were reviewed for a single failure and dual point failure analysis was conducted for the pumps considered as having the greatest impact being out of service in each of the water systems Near to maximum credit was received for each of the water systems.

The Courtenay and Comox Valley Regional District water system received 140 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 150 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 149 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.4. Reliability of Power Supply

The ability of the system to maintain the maximum day demand concurrently with the Basic Fire Flow for the specified duration at any time when considering power interruption that may affect internal or external lines or devices is considered under this grading item.



Electric power supply should be so arranged that a failure in any power line or the repair or replacement of a transformer, switch, control unit, or other device will not prevent the delivery, in conjunction with available storage, of the Basic Fire Flow for the specified duration of the design fire.

Two situations are considered for the reliability of power supply, one with an internal line or device affected, and the second a full grid outage.

Each water systems was reviewed for the two reliability scenarios. The Courtenay-CVRD and Sandwich water system did not receive full credit that the ability of the system to maintain the maximum day demand concurrently with the Basic Fire Flow for the specified duration at any time when considering power interruption that may affect internal or external lines or devices.

Additional credit up to the maximum could be received if back up power was provided to pumps to continue operation during a power interruption.

The Courtenay and Comox Valley Regional District water system received 150 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 182 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 133 points of credit out of the maximum possible [REDACTED] for this grading item.

Recommendation 9.2-1 Improve Reliability of Power Supply

To receive additional credit up to the maximum is this grading item water purveyors may wish to consider improving reliability in power supply to ensure that adequate pressures and required fire flows in conjunction with the maximum day demand can be continually provided throughout the water distribution system (Courtenay-CVRD and Sandwich) during an electrical power outage.

9.2.5. Reliability, Condition, Arrangement, Operation, and Maintenance of System Components

This grading item considers the condition of all necessary equipment that is not evaluated in other items which can also include pumps. This evaluation includes equipment such as pressure regulating valves or altitude valves that may be in the distribution system. The capability of personnel to operate the equipment credited under both normal operation and emergency conditions is also considered.



Overall, the water purveyors and water distribution systems graded well in this item.

The Courtenay and Comox Valley Regional District water system received 182 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 182 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 133 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.6. Fire Flow Delivery by Mains

This is one of the most significant grading items in the water supply section of the fire insurance grading. It is concerned with the actual rate of delivery of water from hydrants for use in combating fires. Credit is calculated by comparing the Required Fire Flows to Available Fire Flows as determined through actual flow tests conducted in accordance with the procedure specified in NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants, recent Edition*. Available fire flows are calculated through interpolation of data to determine the capacity of the water system when flows bring the residual pressure in the system to 20 psi, which is the minimum pressure that is required within the system for fire fighting.

Flow test results may be influenced by various factors that may positively or negatively influence the result such as seasonal fluctuations in demand and time of day demand. For this reason, it is important to regularly test water supplies to ensure adequate fire flows can be provided when compared to the Required Fire Flows.

It is important to note that although in some cases Available Fire Flows may be adequate; if hydrant distribution is inadequate it may not be possible to deliver the water at the fire flow rate that is available. Adequate distribution of hydrants is important, particularly when dealing with larger flows. Hydrant distribution is analyzed in section 9.2.11.

Conservative estimates have been used to grade this fire insurance grading item for each of the water distribution systems based on past fire insurance grading information, water main sizes, water main looping, adequacy of source of supply and storage on the distribution system.



Courtenay and Comox Valley Regional District - Commercial Lines Risks

For this portion of the grading, 300 points of credit were received out of the maximum [REDACTED].

Courtenay and Comox Valley Regional District - Personal Lines Risks

For this portion of the grading item 160 points of credit were received out of the maximum [REDACTED].

Royston:

For this portion of the grading item 350 points of credit were received out of the maximum [REDACTED].

Sandwick:

For this portion of the grading item 210 points of credit were received out of the maximum [REDACTED].

Additional credit can be received within this grading item if physical flow tests or an results from a hydraulic model are submitted to FUS for review.

The Courtenay and Comox Valley Regional District water system received 460 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 350 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwick water system received 210 points of credit out of the maximum possible [REDACTED] for this grading item.

Recommendation 9.2-2 Provide physical available fire flow testing in accordance with NFPA 291 or Hydraulic Model Results for Review

For FUS to determine if additional credit can be obtain for each of the water distribution systems, physical available fire flow test results or hydraulic model results of available fire flows should be submitted for review. If physical available fire flow tests are completed, they should be completed and documented in accordance with NFPA 291: *Recommended Practice for Fire Flow Testing and Marking of Hydrants*, recent edition to receive full credit for fire insurance grading purposes.

Recommendation 9.2-3 Frequency of Available Fire Flow Testing

Routine available fire flow testing should be completed on water supply systems that provide public fire protection. At a minimum available fire flow test should be conducted every 5 years in accordance with NFPA 25: *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, recent edition and NFPA 291: *Recommended Practice for Fire Flow Testing and Marking of Hydrants*, recent edition.



NFPA 25 Reference 7.3.1 Tests

7.3.1 Underground and Exposed Piping Flow Tests. Underground and exposed piping shall be flow tested to determine the internal condition of the piping at minimum 5-year intervals.*

7.3.1.1 Flow tests shall be made at flows representative of those expected during a fire, for the purpose of comparing the friction loss characteristics of the pipe with those expected for the particular type of pipe involved, with due consideration given to the age of the pipe and to the results of previous flow tests.

7.3.1.2 Any flow test results that indicate deterioration of available water flow and pressure shall be investigated to the complete satisfaction of the authority having jurisdiction to ensure that the required flow and pressure are available for fire protection.

NFPA 291 Reference 4.13 Public Hydrant Testing and Flushing

4.13.1 Public fire hydrants should be flow tested every 5 years to verify capacity and marking of the hydrant.*

4.13.2 Public fire hydrants should be flushed at least annually to verify operation, address repairs, and verify reliability.

9.2.7. Reliability of Principle Mains

This grading item reviews any and all pipe lines, aqueducts, tunnels, or conduits upon which service is dependent. This includes intakes, suction or gravity lines to pumping stations, flow lines from reservoirs, treatment plant piping, force mains, supply and arterial mains, etc.

In this grading item the ability of the supply works or main arteries in the distribution system to deliver the maximum day demand plus the Basic Fire Flow with the most critical length of main shut off due to a break in the pipe, was analysed. The time duration used in this item is three (3) days which should normally be sufficient to locate the break, isolate it, excavate to the main, make the necessary repairs, sterilize the main, verify the sanitary condition of the main and return the main to service.

Depending on the complexity of the supply works and distribution, the reliability of principal mains may be analyzed for a single main break or several main breaks across the water system. The mains that are analyzed are typically chosen on the basis of causing the most reduction in service.

Courtenay and Comox Valley Regional District:

The Courtenay and Comox Valley Regional District water distribution system was reviewed and received 50 percent credit within this grading item in regards to reliability of principal mains. Main failure analysis were conducted on the most important water mains and indicated the water distribution system was partially capable of providing the Basic Fire Flow in conjunction with the maximum day



demand. Pressure zones of the water distribution system that are fed by single water mains are most vulnerable and reduced the amount of credit that could be received within this grading item.

Royston:

The Royston water distribution system was reviewed and received a low amount of credit due to the degree of dependence on single water mains feeding the water distribution system and storage reservoirs. Main failure analysis were conducted on the most important water mains and indicated the water distribution system was not capable of providing Basic Fire Flow in conjunction with the maximum day demand for the fire duration during those scenarios.

Sandwick:

The Sandwick water distribution system was reviewed and received a low amount of credit due to the degree of dependence on single water mains feeding the water distribution system and storage reservoirs. Main failure analysis were conducted on the most important water mains and indicated the water distribution system was not capable of providing Basic Fire Flow in conjunction with the maximum day demand for the fire duration during those scenarios.

The Courtenay and Comox Valley Regional District water system received 50 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 25 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwick water system received 12 points of credit out of the maximum possible [REDACTED] for this grading item.

Recommendation 9.2-4 Improve Reliability of Principal Mains

Redundancy of principal mains and water sources is important to ensure adequate pressures and flows can be continually provided throughout the community during foreseeable perils and system failures. Areas of the water distribution systems should be reviewed to determine mains that are most important and improve redundancy for those mains. Redundancy can be accomplished through redundant mains or by providing additional local storage that would be available to the distribution system in the event of water main or source failures.

A break in the water mains will affect the ability of the water system to provide required fire flows to those portions of the municipality. The water purveyors may wish to develop alternative measures to ensure reliability for public fire protection and fire insurance grading purposes. Additional credit can be received in this grading up to the maximum if principal water mains were twinned or storage on the distribution system was improved.



Twining of water mains or improving storage on the distribution system may also grant credit in other grading items.

9.2.8. Installation of Pipes

The Installation of Pipes grading item reviews the installation of mains throughout the water distribution system. The type of water main used the provision of proper main appurtenances and the manner of installation is evaluated.

Mains should be in good condition and properly installed. Water mains should be suitable for the service intended. Asbestos-cement, Poly-vinyl chloride (PVC), cast and ductile iron, reinforced concrete and steel pipe manufactured in accordance with appropriate Canadian Standards Association or ANSI/AWWA standards, or any pipes listed by Underwriters' Laboratories of Canada for fire service are considered satisfactory. Normally, water mains rated for a maximum working pressure of 1,000 kPa is required. Service records, including the frequency and nature of leaks, breaks, joint separations, other failures and repairs, and general conditions should be considered as indicators of reliability.

A sufficient number of valves should be installed so that a break or other failure will not affect more than 400 metres of arterial mains, 150 metres of mains in commercial districts, or 250 metres of mains in residential districts. Valves should be maintained in good operating condition. The recommended inspection frequency is once a year, and more frequently for larger valves and valves for critical applications.

The age of water mains in the distribution varies with age and construction. As the water system continues to age water mains should be continually reviewed for reliability and replacement.

This item of the grading is linked to areas already considered in the previous item (reliability of principal mains). This item looks at a valve being out-of-service interrupting and the main supply line to the system and is a similar analysis to that previous.

The Courtenay-CVRD water distribution system graded fairly well considered important valves being out of service interrupting the ability of the water system to provide the Basic Fire Flow in conjunction with the maximum day demand.



The Royston and Sandwich water distribution systems did not grade well considering important valves being out of service interrupting the ability of the water system to provide the Basic Fire Flow in conjunction with the maximum day demand.

The Courtenay and Comox Valley Regional District water system received 68 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 28 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 27 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.9. Arrangement of Distribution System

The reliability of the arrangement of the mains in the distribution system is reviewed under this grading item. The supply mains, arteries, and secondary feeders should extend throughout the system, should be properly spaced, and looped for mutual support and reliability of service; dependence of relatively large areas upon single mains may constitute a reduction in credit.

This grading item is intended to review the amount of the community that is not serviced by arterial mains and arterial main looping. Also the overall distribution grid is reviewed for dead end mains and the amount of mains that are smaller than 150 mm (6 inch).

Courtenay and Comox Valley Regional District:

The Courtenay and Comox Valley Regional District water distribution system graded very well within this grading item.

Royston:

The Royston water distribution system graded very well within this grading item.

Sandwick:

The Sandwich water distribution system did not graded well within this grading item. Portions of the water distribution are serviced by four inch water mains which reduce the available fire flows for firefighting purposes.



The Courtenay and Comox Valley Regional District water system received 95 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 83 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 22 points of credit out of the maximum possible [REDACTED] for this grading item.

Recommendation 9.2-5 Upgrade Water mains in Weak Areas

Water mains less than 150 mm in diameter do not have adequate fire flow capacities for firefighting purposes. To reduce the risk of fire flows being overly restricted through small portions of pipe, all new water lines and lateral branches should be a minimum of 150 mm (6 inches). Pre-existing pipes that are smaller should be upgraded on a priority basis.

9.2.10. Additional Factors and Conditions Relating to Supply and Distribution

Water Supply grading items 1, 3, 4, 5, and 7 consider the adequacy and the reliability of the supply facility to deliver the maximum day demand concurrently with the Basic Fire Flow. This grading item evaluates, for the same items, the ability of the supply facilities to deliver the maximum day demand concurrently with the peak Required Fire Flow obtained from the risk assessment. It also covers any factors or conditions that will occasionally reduce the fire protection credited in the other items. Additional factors that are considered when analyzing the distribution system include built on areas that are not served, localized weakness, and service levels that are not considered.

Each of the water distributions systems were reviewed again for Water Supply Water Supply grading items 1, 3, 4, 5, and 7 consider the adequacy and the reliability of the supply facility to deliver the maximum day demand concurrently with the peak Required Fire Flow.

The Courtenay-CVRD water distribution and Royston water distribution system graded well against the peak Required Fire Flow on their water distribution systems. Near maximum credit was received within this grading item.

The Sandwich water distribution system did not graded well against the peak Required Fire Flow on its water distribution systems.



The Courtenay and Comox Valley Regional District water system received 154 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 187 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 86 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.11. Distribution of Hydrants

The ability of the distribution system to deliver adequate rates of flow for fire protection to various locations of a community or a municipality does not alone provide good fire protection. There should be sufficient hydrants to allow the required rate of flow to be delivered to fire department engines and these hydrants should be well spaced in order to keep the length of fire department hose lines short. This grading item compares the existing hydrant spacing with the hydrant spacing needed for the various districts within a community or municipality. Hydrant distribution was determined using the Standard Hydrant Distribution table listed in Appendix B, FUS – 1999 Water Supply for Public Fire Protection.

To determine the average area served by each hydrant, representative districts are selected based on being primarily commercial or primarily residential. As part of the analysis for hydrant distribution two items are used in determining the distribution of hydrants:

- Representative areas are determined by the total area in square metres. Green space, unused land, or undeveloped land (no infrastructure developed ex. water mains or road ways) is subtracted from the total area being considered.
- Fire hydrants within the representative area are counted.

The water distribution system of the City of Courtenay and Comox Valley Regional District was evaluated and results are provided in Appendix G, Hydrant Distribution Analysis Summary. Seven areas within the municipality were selected for reviews that were predominantly Commercial. Ten areas within the municipality and regional district were selected that were predominantly Residential for review.

The Royston and Sandwich water distribution systems did not have areas that were predominantly Commercial so only Residential analyses were completed. Two areas within the Royston were reviewed and three areas within Sandwich were reviewed.



Courtenay and Comox Valley Regional District - Commercial

The analysis of the seven areas for commercial hydrant distribution indicated a slight weakness in four of the areas. Three of the areas received 100 percent full credit. The other four areas received between 53 percent credit and 77 percent credit. The results indicated that the distribution of hydrants in each of the zones could receive more credit if additional hydrants were added to improve hydrant distribution.

Overall, for commercial hydrant distribution 249 points of credits were received out of the maximum [REDACTED] for a portion this grading item.

Courtenay and Comox Valley Regional District - Residential

The analysis of the ten areas included seven within the City Courtenay and four in the contract fire protection areas that the water system services. Areas reviewed in the City of Courtenay received as low as 22 percent credit and as high as 93 percent credit. The areas reviewed in the contract fire protection areas received between 35 percent credit and 52 percent credit. The results indicated that the distribution of hydrants in each of the zones could receive more credit if additional hydrants were added to improve hydrant distribution.

Overall, for residential hydrant distribution 240 points of credits were received out of the maximum [REDACTED] for this grading item.

Royston - Residential

The analysis of the two areas showed that one area received 43 percent credit and the other received 45 percent credit residential hydrant distribution. The results indicated that the distribution of hydrants in each of the zones could receive more credit if additional hydrants were added to improve hydrant distribution.

Overall, for residential hydrant distribution 295 points of credits were received out of the maximum [REDACTED] for this grading item.

Sandwich - Residential

The first area reviewed received 55 percent credit, the second area reviewed received 48 percent credit and the third area reviewed received 43 percent credit for residential hydrant distribution. The results indicated that the distribution of hydrants in each of the zones could receive more credit if additional hydrants were added to improve hydrant distribution.



Overall, for residential hydrant distribution 315 points of credits were received out of the maximum [REDACTED] for this grading item.

Unprotected Areas or Weak Coverage

The water distribution systems are well established for the current level of development within the City of Courtenay and Comox Valley Regional District.

Overall, for unprotected areas or weak coverage 50 points of credit were received out of the maximum [REDACTED] for a portion of this grading item for each of the water distribution systems.

The Courtenay and Comox Valley Regional District water system received 539 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 345 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 365 points of credit out of the maximum possible [REDACTED] for this grading item.

Recommendation 9.2-6 Improve Hydrant Distribution

Additional credit can be received for each of the water distribution systems if additional hydrants were added to the water systems to improve distribution. To receive maximum credit hydrant distribution for communities should be accordance with the Standard Hydrant Distribution table listed in Appendix B, FUS – 1999 Water Supply for Public Fire Protection.

9.2.12. Fire Hydrants – Size, Type, and Installation

Fire hydrants should conform to American Water Works Standard for Dry Barrel Fire Hydrants or Underwriters' Laboratories of Canada listing. Hydrants should have at least two 65 mm outlets. Where Required Fire Flows exceed 1,100 Igpm (5,000 LPM) or pressures are low there should also be a large pumper outlet. The lateral street connection should not be less than 150 mm in diameter. Hose threads, operating and cap nuts on outlets should conform to Provincial Standard dimensions. A valve should be provided on lateral connections between hydrants and street mains.

Fire hydrants that open in a direction opposite to that of the majority are considered unsatisfactory. Flush hydrants are considered undesirable because of delay in getting into operation; this delay is more



serious in areas subject to heavy snow storms. Cisterns are considered unsatisfactory as an alternative to pressure hydrants.

Overall, each of the water distributions systems graded well within this grading item in regards to fire hydrant size, type and installation.

The Courtenay and Comox Valley Regional District water system received 97 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 98 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 84 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.13. Fire Hydrants – Condition and Inspection

For fire hydrants to be useful in combating fires, hydrants must be in good operating condition. This grading item considers the condition and inspection of hydrants.

Hydrants should be inspected at least semi-annually and after use. The inspection should include operation at least once a year. Where freezing temperatures occur, the semi-annual inspections should be made in the spring and fall of each year. Hydrants should be kept in good condition and suitable records of inspections and repairs be maintained. Fire hydrants should be painted in highly visible colours so that they are conspicuous and be situated with outlets at least twelve inches above the grade. There should be no obstruction that could interfere with their operation. Snow should be cleared promptly after storms and ice and snow accumulations are removed as necessary.

Inspections are necessary to ensure that all hydrants in a community or municipality are in good condition. Full operation of the hydrant is necessary during inspections in order to check all features of the hydrant.

Overall, each of the water distributions systems graded well within this grading item in regards to fire hydrant condition and inspection. Credit was reduced for Sandwich as hydrant maintenance is not always annual.



The Courtenay and Comox Valley Regional District water system received 90 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 90 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 63 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.14. Other Conditions Affecting Adequacy and Reliability

This grading item covers pertinent factors or conditions not considered in other grading items. Specifically this grading item reviews:

- plans and records of the water system
- construction and hazards of buildings

Plans and Records

Complete, up-to-date plans and records essential for the proper operation and maintenance of the system should be available in a convenient form, suitably indexed and safely filed. These should include plans of the source as well as records of its yield and a reliable estimate of the safe yield; plans of the supply works including dams, intakes, wells, pipelines, treatment plants, pumping stations, storage reservoirs and tanks; and a map of the distribution system showing mains, valves, and hydrants.

Detailed distribution system plans, in a form suitable for field use, should be available for maintenance crews. Records of consumption, pressures, storage levels, pipes, valves, hydrants, and the operations of the supply works and distribution system, including valve and hydrant inspections and repairs should be maintained.

Plans and records of each of the water distribution systems are readily available and kept up to date and made available to the Courtenay Fire Department.

Construction and Hazards of Buildings

Pumping stations, treatment plants, control centres and other important structures should be located, constructed, arranged, and protected so that damage by fire, flooding, or other causes will be held to a minimum. Structures should be of non-combustible construction and contain no combustible materials.



Each of the water distributions house pumps and control centres in buildings that are of non-combustible construction. Adequate measures to protect the buildings by fire and vandalism are in place through restricted access and fences.

Overall, each of the water distribution system graded well within this grading item.

The Courtenay and Comox Valley Regional District water system received 180 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 180 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 167 points of credit out of the maximum possible [REDACTED] for this grading item.

9.2.15. Management

A water supply system should be well administered and have adequate plans for development to keep pace with the growth of a community or municipality. Supervisory personnel should be qualified to perform their duties efficiently and should have competent assistants. Credit may be reduced in this grading item if the capability of the water system to provide fire protection is hindered by management.

The water systems are well managed. Qualified individuals are responsible for overseeing the water system to ensure it is operating effectively in regards to meeting the fire protection needs of the water service areas. Near maximum credit was received for each of the water purveyors and their water distribution systems.

Overall, each of the water distributions systems graded well within this grading item in regards to fire management of the water system.

The Courtenay and Comox Valley Regional District water system received 95 points of credit out of the maximum possible [REDACTED] for this grading item.

The Royston water system received 95 points of credit out of the maximum possible [REDACTED] for this grading item.

The Sandwich water system received 82 points of credit out of the maximum possible [REDACTED] for this grading item.



10.PFPC - FIRE SAFETY CONTROL ASSESSMENT

10.1. Fire Safety Control Grading Items

The sections below cover the four grading items that pertain to Fire Safety Control. Twenty percent of the Public Fire Protection Classification of the City of Courtenay comes from the grading of Fire Safety Control. Fire Safety Control has become an increasingly heavily weighted portion of the fire insurance grading system. This is as a result of statistical data showing that communities employing effective programs in these areas have significantly reduced fire related losses.

A substantial degree of safety to life and protection of property from fire should be provided by provincial and municipal control of hazards. Control can be best accomplished by the adoption and enforcement of appropriate codes and standards for manufacture, storage, and use of hazardous materials and for building construction, as well as through training, advisory and education programs for the public.

The Courtenay Fire Department and the City of Courtenay have been reviewed in the effectiveness of their practices with regard to Fire Safety Control and Fire Prevention.

10.1.1. General Program

This grading item reviews the general fire prevention, inspection and investigation activities of the fire department. The official in charge of fire prevention activities, in cooperation with the chief of the fire department, should establish an inspection procedure for correction of: obstructions to exits which interfere with emergency egress or with fire department operations, inadequate or defective automatic or other fire alarm equipment or fire extinguishing equipment or conditions in buildings or other structures which create a severe life hazard potential. Provisions should be made for the investigation of fires.

The fire prevention program should include visiting and inspecting of dwellings on an occupant voluntary basis and the continuous education of the public. The fire department should maintain a highly visible profile in enforcement, education, training, and advisory services.

The Courtenay Fire Department offers public education and prevention programs related to:



- Fire Hall tours
- Smoke alarm program
- Juvenile Fire Setter program
- Fire Safety House Grade 3
- Fire Prevention Week
- Fire Safety Lectures
- Pre-incident planning
- Yearly fire prevention inspections for businesses
- Fire Safety Plan review

The Courtenay Fire Department has five individuals that administer the various fire prevention and education programs within the City of Courtenay and fire protection areas of the Comox Valley Regional District. Individuals providing these services include the Deputy Fire Chief, Assistant Fire Chief, two fire prevention officers, and one fire prevention officer/emergency vehicle technician.

The two fire preventions officers are certified to Fire Prevention Officer Level 2 and the fire prevention officer/emergency vehicle technician is certified to Fire Prevention Officer Level 1.

The Courtenay Fire Department graded well within this grading item since the previous assessment.

The Courtenay Fire Department received 410 points of credit out of the maximum possible [redacted] for this grading item.

10.1.2. Fire Safety Laws and Enforcement

This grading item reviews the fire safety laws in use and the enforcement of those laws within a community or municipality. Adequate laws or ordinances should be enacted to properly regulate the manufacture, storage, transportation and use of hazardous liquids, gases, and other combustible materials, including the handling of combustible waste, and to properly control building construction and electrical, heating, and ventilating installations. The National Fire and Building Codes of Canada and the Canadian Electrical Codes are accepted as the minimum standard regulation.

For enforcement purposes, inspections shall be made by personnel having specialized knowledge of special hazards by fire company members. Inspections should be made as frequently as may be



necessary for the proper enforcement of fire prevention regulations. Proper records of permits (licenses if required by local regulation), inspections, violations and their correction, and of all other important matters should be kept and analyzed.

The Courtenay Fire Department has an internal policy for the minimum frequency of fire prevention inspections and is one inspection per occupancy each year, except single family residential. The two fire prevention officers are assigned 45-60 inspections per month, the deputy chief is assigned 10 inspections per month and the fire prevention officer/emergency vehicle technician is assigned 10 inspections per month.

The City of Courtenay has approximately 1465 inspectable properties. The fire prevention division of the Courtenay Fire Department completes approximately 1,400 inspections a year within the City of Courtenay and within the Comox Valley Regional District response areas.

The Courtenay Fire Department can receive additional credit up to the maximum if it improved its inspection policy to review high hazard occupancies more than once per year.

The Courtenay Fire Department received 216 points of credit out of the maximum possible for this grading item.



Recommendation 10.1-1 Improve Inspection Frequency Policy

Additional credit up to the maximum can be received if the fire prevention inspection policy of high risk life safety and high risk

Fire Underwriters Survey recommends the following inspection frequency to receive maximum credit for fire insurance grading purposes:

National Building Code of Canada			Minimum Inspection Frequency
Group	Division	Description of Major Occupancies	
A	1	<i>Assembly occupancies</i> intended for the production and viewing of the performing arts	6 months
A	2	<i>Assembly occupancies</i> not elsewhere classified in Group A	6 months
A	3	<i>Assembly occupancies</i> of the arena type	6 months
A	4	<i>Assembly occupancies</i> in which occupants are gathered in the open air	6 months
B	1	<i>Care or detention occupancies</i> in which persons are under restraint or are incapable of self-preservation because of security measures not under their control	6 months
B	2	<i>Care or detention occupancies</i> in which persons having cognitive or physical limitations require special care or treatment	6 months
C	—	<i>Residential occupancies</i>	6 months
D	—	<i>Business and personal services occupancies</i>	12 months
E	—	<i>Mercantile occupancies</i>	12 months
F	1	<i>High-hazard industrial occupancies</i>	3 months
F	2	<i>Medium-hazard industrial occupancies</i>	6 months
F	3	<i>Low-hazard industrial occupancies</i>	6 months

Details are provided in Appendix H – Recommended Frequency of Fire Prevention Inspections

10.1.3. Building Construction Laws and Enforcement

This grading item reviews the building construction laws in use and the enforcement of those laws within a community or municipality. An adequate building construction code and enforcement program should be provided in the municipality, using a code equal to or better than the National Building Code of Canada.

The City of Courtenay employs qualified individuals within Building Division of the Development Services Department to ensure that the British Columbia Building Code and City of Courtenay bylaws are



effectively enforced. The City of Courtenay enforces the current British Columbia Building Code and has implemented a bylaw for the administration of the building code.

The City of Courtenay and Courtenay Fire Department graded well within this grading item.

The City of Courtenay and the Courtenay Fire Department received 74 points of credit out of the maximum possible [redacted] for this grading item.

10.1.4. Electrical Code and Inspections

This grading item reviews the extent of electrical code inspections and enforcement. An electrical code should be applicable and equivalent to the Canadian Electrical Code and be enforced by an inspection and permits program.

The City of Courtenay does not provide electrical code inspections. Electrical inspections and permits are required to be obtained from the BC Safety Authority.

The City of Courtenay received 40 points of credit out of the maximum possible [redacted] for this grading item.



11.PFPC - FIRE SERVICE COMMUNICATIONS ASSESSMENT

11.1. System Description Overview

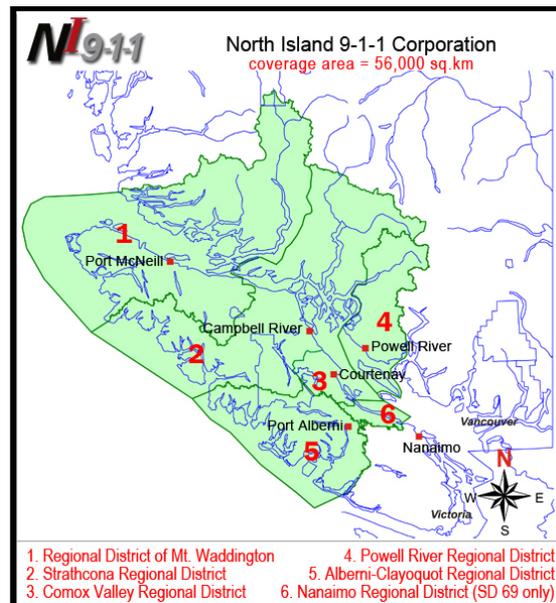
Emergency communications for the City of Courtenay is provided by North Island 9-1-1 and the Campbell River Fire Rescue Dispatch Centre.

Emergency Communications is provided by North Island 9-1-1 Corporation. North Island 9-1-1 provides and manages emergency 9-1-1 services to:

- Comox Valley Regional District
- Strathcona Regional District
- Regional District of Mt. Waddington
- Regional District of Alberni-Clayoquot
- Powell River Regional District (excluding Lasqueti Island), and
- a portion (School District No. 69) of the Nanaimo Regional District.

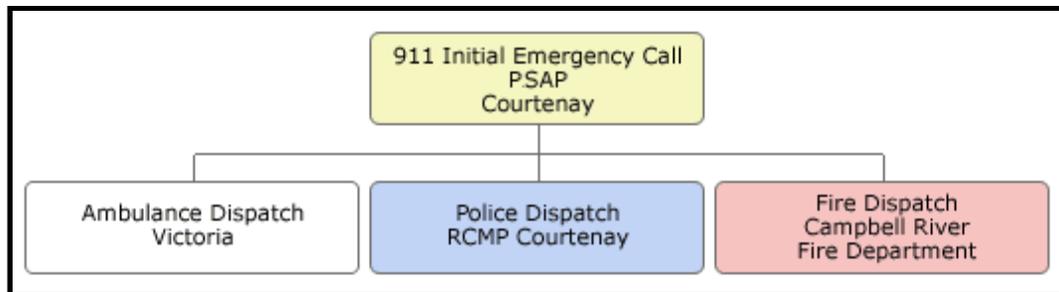
The North Island 9-1-1 Corporation coverage is shown in Figure 10.1-1 North Island 9-1-1 Corporation Coverage Area

Figure 11.1-1 North Island 9-1-1 Corporation Coverage Area



The initial answering point for public safety calls is the RCMP Operational Communications Centre (OCC) in Courtenay. The North Island 9-1-1 Corporation contracts the RCMP OCC to perform this function. Fire calls are relayed to the fire dispatch centre in Campbell River. All ambulance calls are relayed to the B.C. Ambulance Service in Victoria.

Figure 11.1-2 Emergency Communication Organizational Chart



The Campbell River Fire Dispatch Centre is partnered with approximately 49 fire departments. The dispatch area covered by the communications centre and member fire departments extends approximately 56,000 square kilometres over the northern portion of Vancouver Island and the mainland around Powell River.

11.2. Fire Service Communications Grading Items

The sections below cover the seven grading items that pertain to Fire Service Communications. Ten percent of the Public Fire Protection Classification of the City of Courtenay comes from the grading of Fire Service Communications.

11.2.1. Communication Center

This grading item reviews the facility used for emergency communications. Equipment for the receipt and transmission of alarms should be housed securely and be protected against fire or damage from other sources, including flooding, vandalism, and earthquakes. Emergency communication centres should be of non-combustible construction with one to three hour protection from exposures depending on complexity of the installation. Most importantly, there should be protection from ignition sources and rapid initial fire spread through control of such sources as flammable furnishings and building finish materials.



North Island 9-1-1 and Campbell River Fire Dispatch Centre facilities were reviewed for fire insurance grading purposes. The facilities graded well.

North Island 9-1-1 and Campbell River Fire Dispatch received 40 points of credit out of the maximum possible for this grading item.

11.2.2. Means for Transmitting Alarm by Public

This grading item reviews the means for transmitting alarm by the public. There should be reliable and convenient means for the public to communicate alarms of fire to the fire department, by public telephone or alternative means.

There are reliable and convenient means for the public to communicate alarms of fire to the fire department, by public telephone throughout the City of Courtenay. Cellular service and landlines are available in the City of Courtenay and Comox Valley Regional District.

North Island 9-1-1 and Campbell River Fire Dispatch received 70 points of credit out of the maximum possible for this grading item.

11.2.3. Fire Department Telephone Service (Incoming from Public)

This grading item reviews how the public contacts the emergency response agency. Sufficient circuits from the commercial telephone system shall be provided specifically for receiving fire calls and be specially listed in the telephone company directory. This is usually done through the use of a published fire emergency number or 9-1-1.

The primary means for the public to contact the Courtenay Fire Department is through the use of 9-1-1. The Department also has a non-emergency number for general inquiries. The number of fire lines available for receiving emergency calls was reviewed and North Island 9-1-1 and Campbell River Fire Dispatch have an adequate number of dedicated fire lines for fire insurance grading.

North Island 9-1-1 and Campbell River Fire Dispatch received 75 points of credit out of the maximum possible for this grading item.



11.2.4. Means of Alarm Dispatch

This grading item considers the point of receipt of fire alarms from the public. It is necessary to have reliable and prompt notification of fire fighters to respond. The use of both audible and visual means is considered essential in larger fire departments having more frequent fire calls.

Sufficiency of circuits or radio frequencies for the transmission of alarms to fire stations shall be provided as required by NFPA 1221. Alarm-receiving equipment in fire stations, and elsewhere as may be required, shall be provided and served as specified in NFPA 1221.

North Island 9-1-1 and Campbell River Fire Dispatch are equipped with the necessary equipment for receiving and handling alarms. The circuits and equipment are supervised with the necessary visual and audible trouble alarms. Uninterruptible power supplies are provided in the event of a power interruption as well as a back-up power in the form of a generator.

North Island 9-1-1 and Campbell River Fire Dispatch received 248 points of credit out of the maximum possible for this grading item.

11.2.5. Dispatching Service

This grading item considers the dispatching services in use. Telephone alarms should be received at a point where a competent operator or firefighter assigned to duty is available to promptly receive and process emergency calls at all times.

Operators should be familiar with the facilities provided and adequate in number for handling all alarms as required by the NFPA 1221 and NFPA 1061. The handling of all calls, including those related to fire and other emergencies shall be considered in determining the number of operators to be on duty.

North Island 9-1-1 and Campbell River Fire Dispatch employ an adequate number of telecommunicators to adequately staff the emergency communication centre and fire dispatcher centre.

North Island 9-1-1 and Campbell River Fire Dispatch received 79 points of credit out of the maximum possible for this grading item.



11.2.6. Operations Radio

This grading item considers the means of the emergency communication centre to stay in contact with fire stations, apparatus, and personnel during emergency events. Telecommunicators should be able to maintain radio communications, using established procedures, with fire companies and essential personnel away from their quarters, in order to permit more effective and efficient operations, including the recall or re-assignment of companies, passing reports from and between units on the fire ground and contact with units on in-service inspection activity and training.

Hand portable radios should be provided for all operational Chief and Company Officers on duty. The housing of base station equipment should be reliable and facilities preferably duplicated as to transmitter, wire circuits or radio relays. A duplicate transmitter and auxiliary power supply should be provided in fire departments having frequent fire calls.

The Courtenay Fire Department utilizes permanently mounted and portable radio equipment to receive emergency information and communicate between personnel on the fire ground during an emergency situation. The department possesses a sufficient amount of portable radios and pagers for its members.

The Courtenay Fire Department graded well within this grading item.

The Courtenay Fire Department received 69 points of credit out of the maximum possible for this grading item.

11.2.7. Miscellaneous Factors

This grading item considers any factors or conditions, not covered elsewhere, that may adversely affect the receipt and transmission of fire alarms or related emergency calls. These could include, but are not limited to: incompetent or insufficient supervisory and maintenance personnel; insufficient size or physical arrangement of the communication centre such that efficiency of fire alarm operators is decreased; unsuitable location of these operators; improper use of or inadequate testing of existing equipment; inadequate records; inadequate maintenance; possible delays to the handling of non-emergency calls; handling of alarms prior to receipt by the fire alarm operators and other undesirable operating procedures.



North Island 9-1-1, Campbell River Fire Dispatch were reviewed and graded well within this grading item.

North Island 9-1-1 and Campbell River Fire Dispatch received 20 points of credit out of the maximum possible for this grading item.



12. FIRE INSURANCE GRADING

Fire insurance grades are calculated as a single point in time measurement of fire risk and fire protection. The measurement is intended to be representative of the normal level of fire risk and fire protection resources in a community or a municipality at some given point in time and is considered from the perspective of property protection as opposed to life safety. In reality, fire protection capacity changes continuously as does fire risk and dynamic measurements of these are possible, but are not the method used for fire insurance grading.

The fire insurance grades have been calculated for the City of Courtenay in 2014 based on information acquired throughout the field survey in 2013 and described in this report.

12.1. PFPC - Fire Insurance Grading Areas

To determine the final Public Fire Protection Classification, the four separate fire insurance grading areas are reviewed and credit received is totaled. The four grading areas are each assigned a weighting for fire insurance grading purposes:

- Fire Department 40%
- Water Supplies 30%
- Fire Prevention and Safety Control 20%
- Emergency Communications 10%

Each of these fire insurance grading areas is further broken down and scored in a number of separate grading items with differing weights based on the importance of the item with respect to control of losses.

12.1.1. Fire Department Assessment within the Fire Insurance Grading

The Fire Department Assessment contributes 40 percent to the total Public Fire Protection Classification grade of the City of Courtenay. This is the most heavily weighted portion of the grading and as such is considered to be the most significant indicator of a community or municipality's overall preparedness for dealing with fire emergencies.



[Redacted text block]

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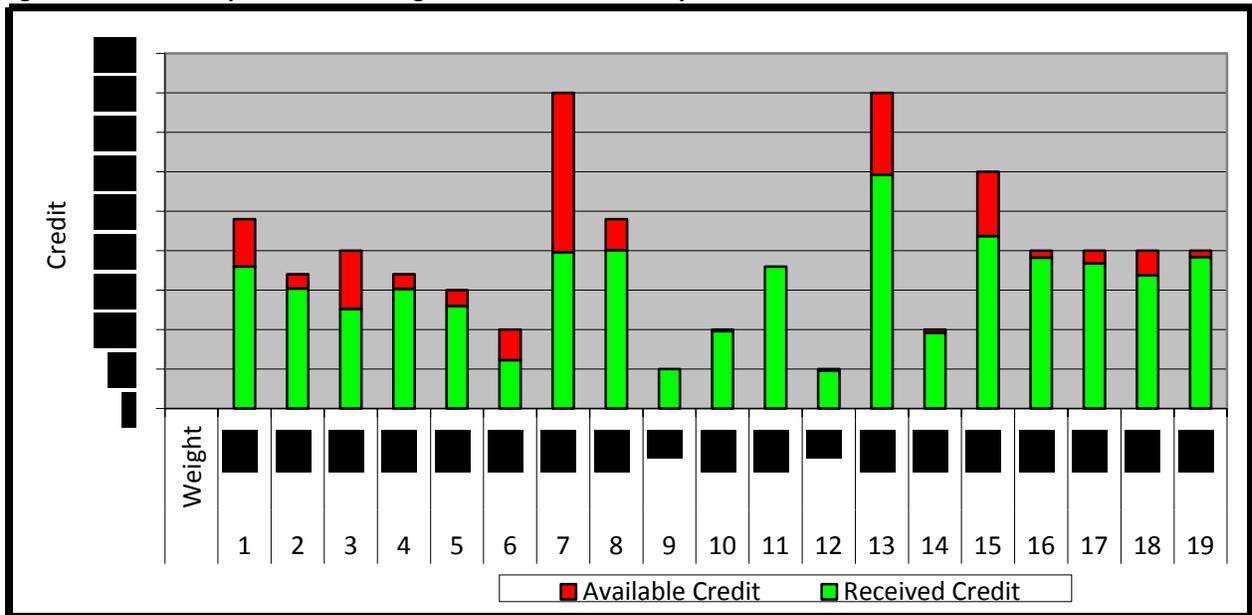


Table 12.1-1 Fire Department Grading Items Overall Summary

Grading Item	Category	Credit Received	Maximum Credit	% of FD	% of All
FD-1	Engine Service	180	█	█	█
FD-2	Ladder Truck Service	152	█	█	█
FD-3	Distribution of Companies and Type of Apparatus	126	█	█	█
FD-4	Engine and Ladder Pump Capacity	152	█	█	█
FD-5	Design, Maintenance and Condition of Apparatus	130	█	█	█
FD-6	Number of Line Officers – Fire Suppression	61	█	█	█
FD-7	Total Fire Force Available	198	█	█	█
FD-8	Engine and Ladder Company Unit Manning	201	█	█	█
FD-9	Master and Special Stream Devices	50	█	█	█
FD-10	Equipment for Engines and Ladder Trucks, General	98	█	█	█
FD-11	Fire Hose	180	█	█	█
FD-12	Condition of Fire Hose	48	█	█	█
FD-13	Training and Qualifications	296	█	█	█
FD-14	Response to Alarms	96	█	█	█
FD-15	Fire Ground Operations	219	█	█	█
FD-16	Special Protection Required	191	█	█	█
FD-17	Miscellaneous Factors and Conditions	184	█	█	█
FD-18	Pre-Incident Planning	169	█	█	█
FD-19	Administration	192	█	█	█
			█	█	40.00%
			█	█	
			█	█	
Weight in Grading	40			Credit Received	23.82
Relative Classification					
5					



Figure 12.1-1 Fire Department Grading Items Overall Summary



The relative classification of the Courtenay Fire Department is a 5. The figure above shows each grading item of the fire department and how much credit was received and how much credit is still available within each grading item.

Recommendations have been provided throughout the fire department assessment section of the report. Recommendations are provided for the Courtenay Fire Department if it wishes to work towards improving the relative classification. Credit up to the maximum can be received for each grading item.

The Courtenay Fire Department is encouraged to review the grading items that received the lowest amount of credit and decide if they wish to make specific plans to try and receive additional credit in those grading items.

Improving the relative classification of the fire department is an important step in improving the overall Public Fire Protection Classification of the City of Courtenay.



12.1.2. Water Supplies within the Fire Insurance Grading

The Water Supply Assessment contributes 30 percent to the total Public Fire Protection Classification grade of the City of Courtenay. As noted in the Fire Department section above, the Water Supply is graded similarly with two separate tiers of weight.

[REDACTED]

[REDACTED]

[REDACTED]



Table 12.1-2 Water Supply Grading Items Summary – Courtenay and CVRD Water System

Grading Item	Category	Credit Received	Maximum Credit	% of WS	% of All
WS-1	Normal Adequacy of Supply Works	300	█	█	█
WS-2	Reliability of Sources of Supply	155	█	█	█
WS-3	Reliability of Pumping Capacity (Pumps and Drivers)	140	█	█	█
WS-4	Reliability of Power Supply	150	█	█	█
WS-5	Reliability, Condition, Arrangement, Operation, and Maintenance of System Components	182	█	█	█
WS-6	Fire Flow Delivery by Mains	460	█	█	█
WS-7	Reliability of Principal Mains	50	█	█	█
WS-8	Installation of Pipes	68	█	█	█
WS-9	Arrangement of Distribution System	95	█	█	█
WS-10	Additional Factors and Conditions Relating To Supply and Distribution	154	█	█	█
WS-11	Distribution of Hydrants	539	█	█	█
WS-12	Fire Hydrants – Size, Type, and Installation	97	█	█	█
WS-13	Fire Hydrants – Condition and Inspection	90	█	█	█
WS-14	Other Conditions affecting Adequacy and Reliability	180	█	█	█
WS-15	Management	95	█	█	█
		█	█	█	30%
		█	█	█	
		█	█	█	
Weight in Grading	30			Credit Received	18.92
Relative Classification					
4					



Table 12.1-3 Water Supply Grading Items Summary – Royston Water System

Grading Item	Category	Credit Received	Maximum Credit	% of WS	% of All
WS-1	Normal Adequacy of Supply Works	300	█	█	█
WS-2	Reliability of Sources of Supply	155	█	█	█
WS-3	Reliability of Pumping Capacity (Pumps and Drivers)	150	█	█	█
WS-4	Reliability of Power Supply	182	█	█	█
WS-5	Reliability, Condition, Arrangement, Operation, and Maintenance of System Components	182	█	█	█
WS-6	Fire Flow Delivery by Mains	350	█	█	█
WS-7	Reliability of Principal Mains	25	█	█	█
WS-8	Installation of Pipes	28	█	█	█
WS-9	Arrangement of Distribution System	83	█	█	█
WS-10	Additional Factors and Conditions Relating To Supply and Distribution	187	█	█	█
WS-11	Distribution of Hydrants	345	█	█	█
WS-12	Fire Hydrants – Size, Type, and Installation	98	█	█	█
WS-13	Fire Hydrants – Condition and Inspection	90	█	█	█
WS-14	Other Conditions affecting Adequacy and Reliability	180	█	█	█
WS-15	Management	95	█	█	█
		█	█	█	30%
		█	█	█	
		█	█	█	
Weight in Grading	30			Credit Received	13.53
Relative Classification					
6					



Table 12.1-4 Water Supply Grading Items Summary – Sandwich Water System

Grading Item	Category	Credit Received	Maximum Credit	% of WS	% of All
WS-1	Normal Adequacy of Supply Works	293	█	█	█
WS-2	Reliability of Sources of Supply	155	█	█	█
WS-3	Reliability of Pumping Capacity (Pumps and Drivers)	149	█	█	█
WS-4	Reliability of Power Supply	133	█	█	█
WS-5	Reliability, Condition, Arrangement, Operation, and Maintenance of System Components	133	█	█	█
WS-6	Fire Flow Delivery by Mains	210	█	█	█
WS-7	Reliability of Principal Mains	12	█	█	█
WS-8	Installation of Pipes	27	█	█	█
WS-9	Arrangement of Distribution System	22	█	█	█
WS-10	Additional Factors and Conditions Relating To Supply and Distribution	86	█	█	█
WS-11	Distribution of Hydrants	365	█	█	█
WS-12	Fire Hydrants – Size, Type, and Installation	84	█	█	█
WS-13	Fire Hydrants – Condition and Inspection	63	█	█	█
WS-14	Other Conditions affecting Adequacy and Reliability	167	█	█	█
WS-15	Management	82	█	█	█
			█	█	30%
			█	█	
			█	█	
Weight in Grading	30			Credit Received	5.25
Relative Classification					
9					



Figure 12.1-2 Water Supply Grading Items Summary – Courtenay and CVRD Water System

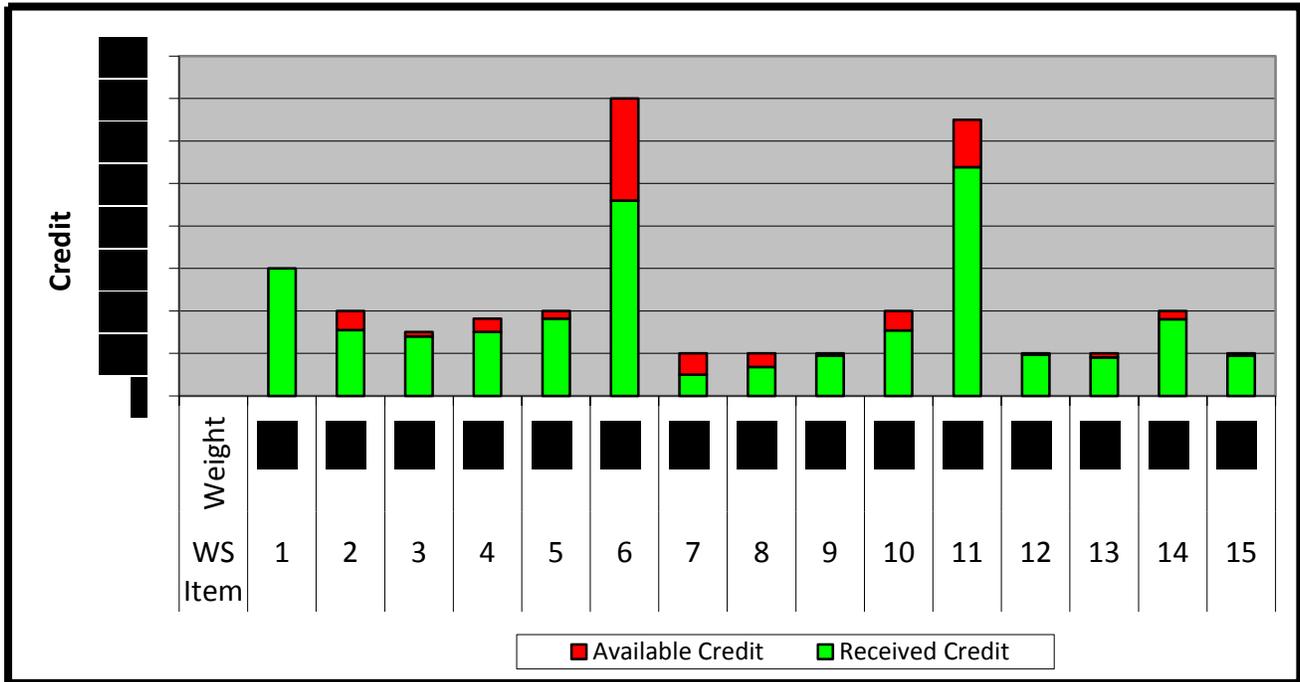


Figure 12.1-3 Water Supply Grading Items Summary – Royston Water System

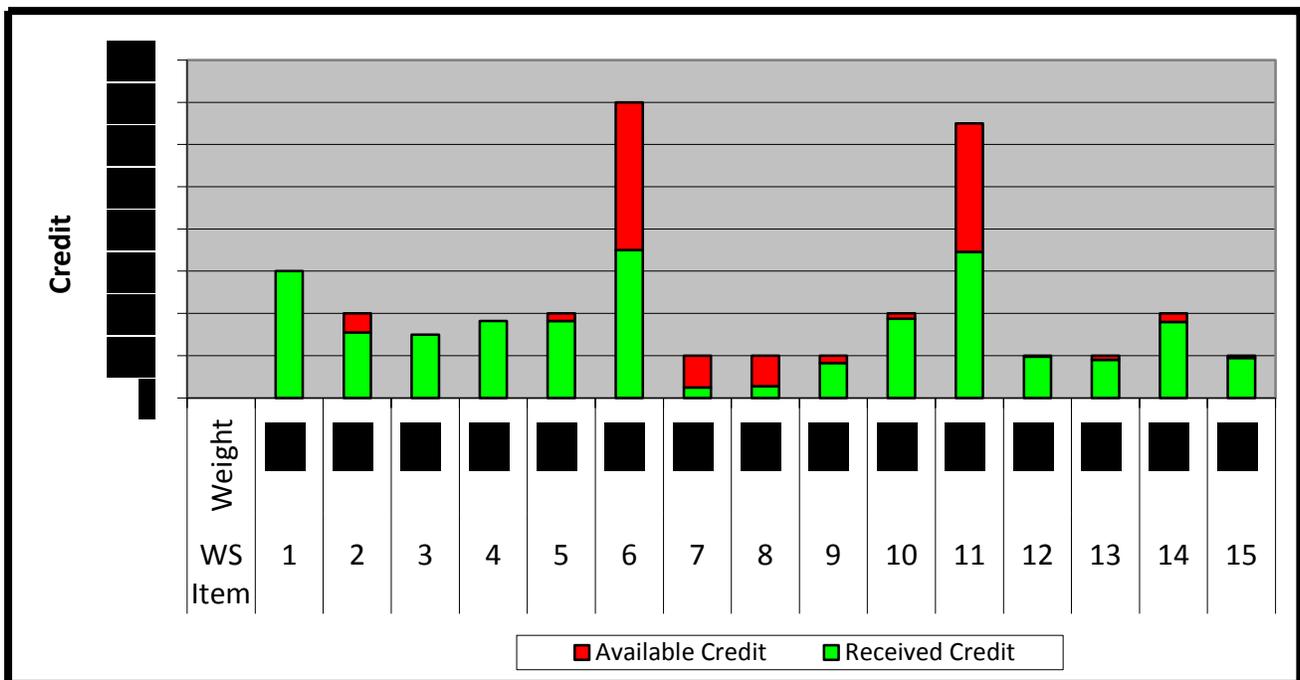
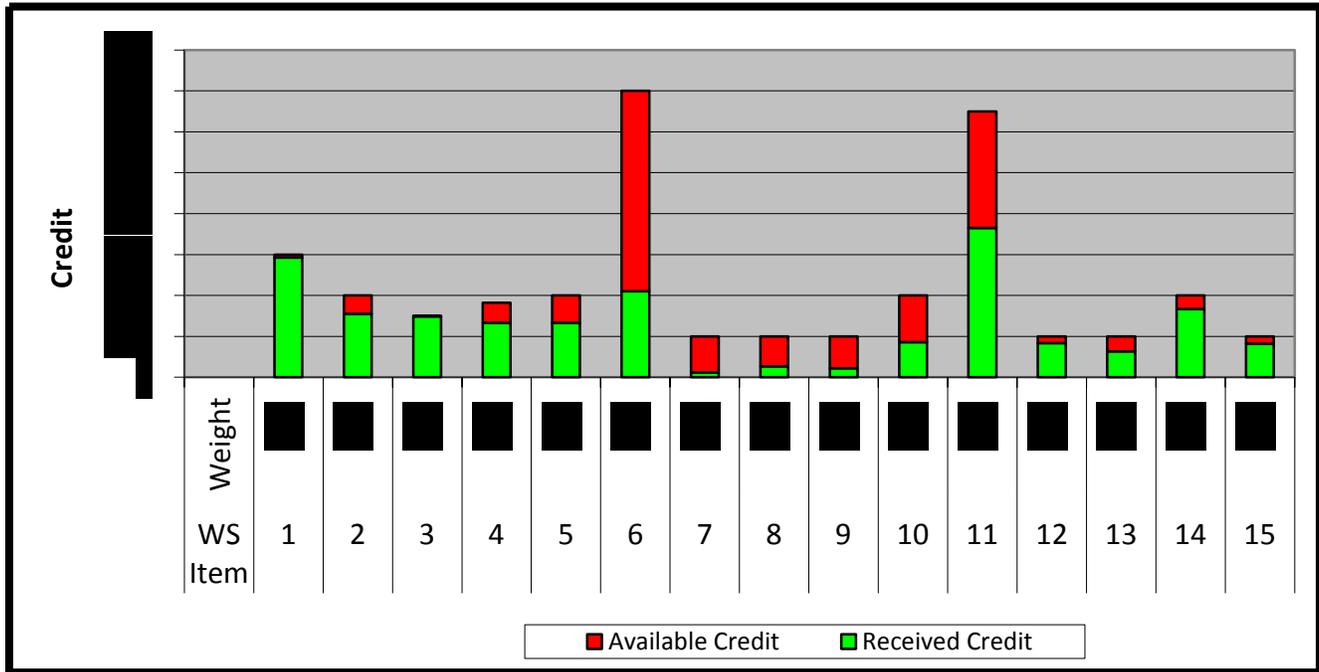


Figure 12.1-4 Water Supply Grading Items Summary – Sandwich Water System



The relative classification of the water supply for the City of Courtenay and Comox Valley Regional District water distribution system is a 4 which indicates the water supply system graded quite well.

The relative classification of the water supply for the Royston water distribution system is a 6 which indicates the water supply system graded quite well.

The relative classification of the water supply for the Royston water distribution system is a which indicates the water supply system graded poorly.



12.1.3. Fire Safety Control within the Fire Insurance Grading

The Fire Safety Control assessment contributes 20 percent to the total Public Fire Protection Classification grade of the City of Courtenay.

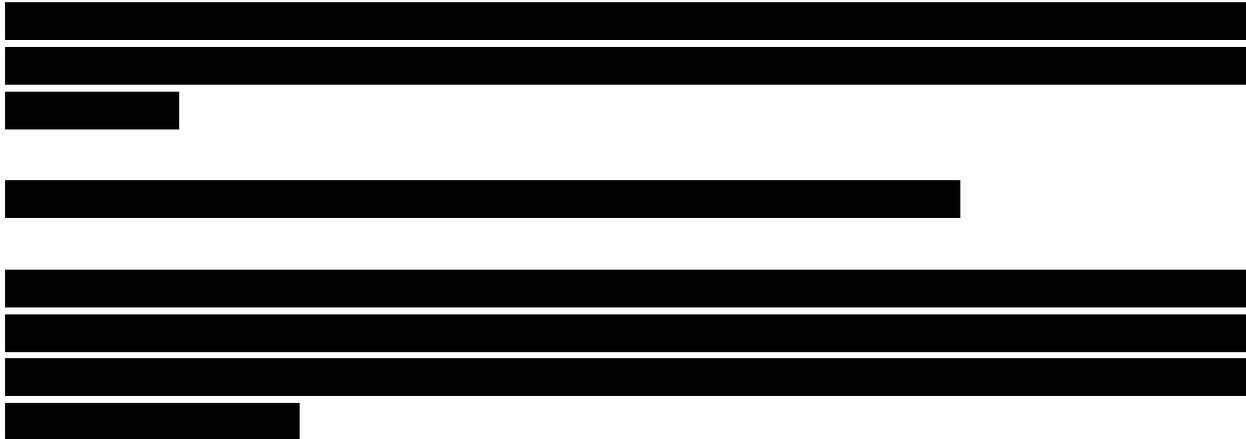
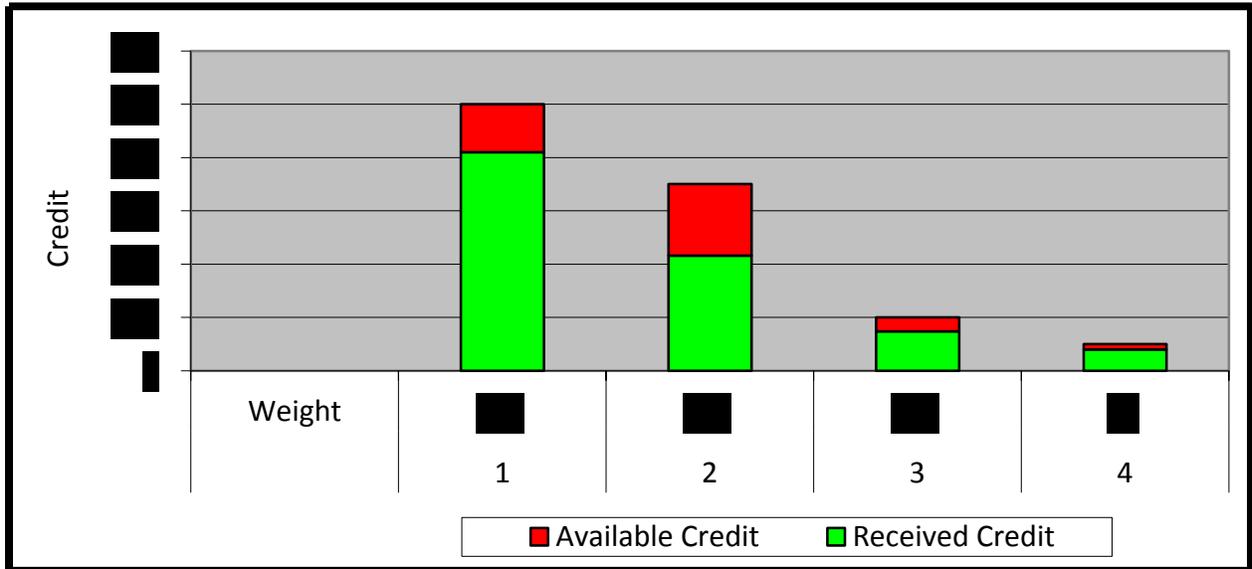


Table 12.1-5 Fire Safety Control Grading Items Summary

Grading Item	Category	Credit Received	Maximum Credit	% of FSC	% of All
FSC-1	General Program	410	█	█	█
FSC-2	Fire Safety Laws and Enforcement	216	█	█	█
FSC-3	Building Construction Laws and Enforcement	74	█	█	█
FSC-4	Electrical Code and Inspections	40	█	█	█
		█	█	█	20%
Weight in Grading	20			Credit Received	14.80
Relative Classification					
3					



Figure 12.1-5 Fire Safety Control Grading Items Summary



The relative classification of Fire Safety Control is a 3.

The Fire Safety Control programs utilized by the Courtenay Fire Department and City of Courtenay graded very well.

Recommendations have been provided throughout the Fire Safety Control assessment section of the report. Recommendations are provided for Courtenay Fire Department and the City of Courtenay if they want to work towards improving the relative classification further. Credit up to the maximum can be received for each grading item.

Improving the relative classification of fire safety control helps in improving the overall Public Fire Protection Classification of the City of Courtenay.



12.1.4. Fire Service Communications within the Fire Insurance Grading

Fire service communications contributes 10 percent of the overall grade in the calculation of Public Fire Protection Classification.

[Redacted]

[Redacted]

[Redacted]

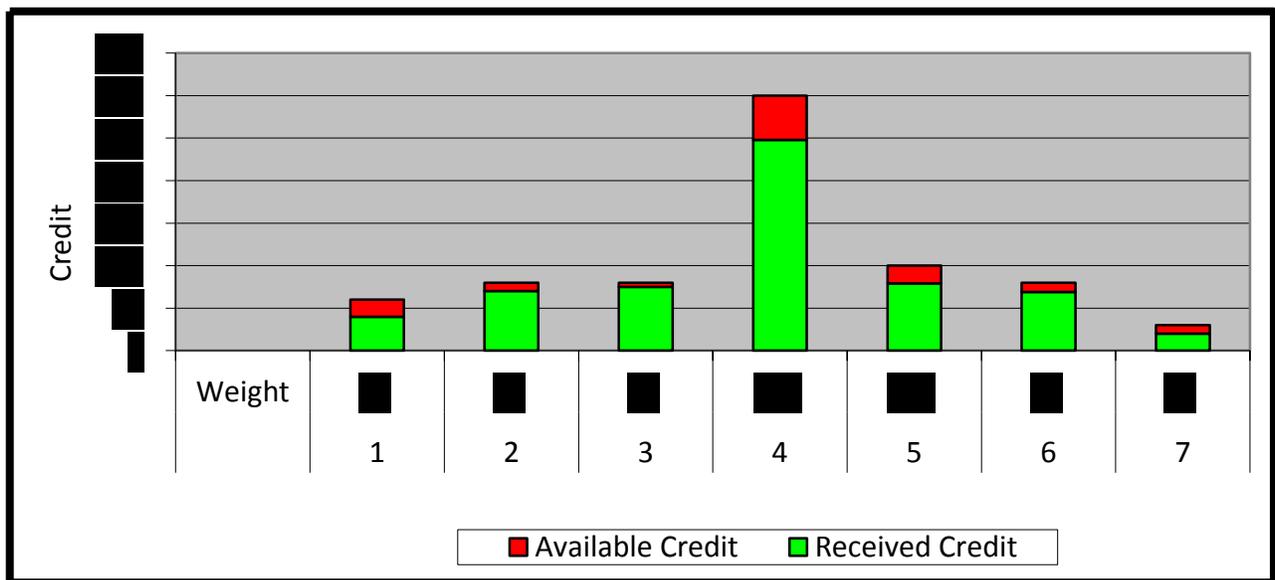
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Table 12.1-6 Fire Service Communications Grading Items Summary

Grading Item	Category	Credit Received	Maximum Credit	% of Comm	% of All
Comm-1	Communication Center	40	█	█	█
Comm-2	Means for Transmitting Alarm by Public	70	█	█	█
Comm-3	Fire Department Telephone Service (Incoming from Public)	75	█	█	█
Comm-4	Means of Alarm Dispatch	248	█	█	█
Comm-5	Dispatching Service	79	█	█	█
Comm-6	Operations Radio	69	█	█	█
Comm-7	Miscellaneous Factors	20	█	█	█
			█	█	10%
Weight in Grading	10			Credit Received	7.42
Relative Classification 3					

Figure 12.1-6 Fire Service Communications Grading Items Summary



The emergency communications available to the City of Courtenay and the Courtenay Fire Department through North Island 9-1-1 and Campbell River Fire Dispatch have a relative classification of 3. Overall, the emergency communication systems used by the Courtenay Fire Department graded well for fire insurance grading purposes.

12.1.5. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

12.1.6. Summary of PFPC Fire Insurance Grading

The overall Public Fire Protection Classification grade is determined by totalling the credit received per grading item. A summary of the relative classifications and results of each grading area is provided in Table 12.1-7.



Table 12.1-7 Summary of Public Fire Protection Classification Grading Areas – City

Area of Grading	Weight within Grading	Credit Received 2014	Relative Classifications 2014
Fire Department	40	23.82	5
Water Supply	30	City and CVRD 18.92	4
		Royston 13.53	6
		Sandwick 5.25	9
Fire Safety Control	20	14.80	3
Fire Service Communications	10	7.42	3
[REDACTED]		FD and City/CVRD [REDACTED]	
		FD and Royston [REDACTED]	
		FD and Sandwick [REDACTED]	
		-2.21	
Total Credit Score		City and CVRD 62.23	
		Royston 55.19	
		Sandwick 42.78	

The following table below indicates the credit range of each PFPC grade. The City of Courtenay’s overall credit score was 62.23. The City of Courtenay achieved a Public Fire Protection Classification 4 in 2014.

Overall PFPC	Credit Range Per PFPC Grade
1	90.00 – 100.00
2	80.00 – 89.99
3	70.00 – 79.99
4	60.00 – 69.99
5	50.00 – 59.99
6	40.00 – 49.99
7	30.00 – 39.99
8	20.00 – 29.99
9	10.00 – 19.99
10	0.00 – 9.99

In areas of the City and in the contract fire protection areas of the Comox Valley Regional District that are on different water systems have achieved a Public Fire Protection Classification 5 for Royston and 6 for Sandwick.



12.2. DPG - Fire Insurance Grading

To determine Dwelling Protection Grade many of the details were used to calculate the Public Fire Protection Classification. The minimum requirements to achieve a Dwelling Protection Grade 3A have been reviewed. The following table summarizes the review. The minimum requirement for the Dwelling Protection Grade system is provided in Appendix A.

Table 12.2-1 Dwelling Protection Grade Summary

Required for Dwelling Protection Grade System		Requirement Met?
Organization	Meet the requirements for organization under the authority of the Municipal Government Act. It should establish requirements for the establishment of boundaries, provision of funding and for the formal appointment of a fire chief by the involved local government body.	Yes - City of Courtenay has established a bylaw for fire protection services
Membership	Adequate roster levels for a recognized fire department. Fire department members should respond from within a reasonable travel distance to the fire station. An auxiliary fire fighter should live and work within 8 km of the fire station. DPG 1 – On duty: 3 career fire fighters, plus duty fire chief or other officer DPG 2 - On duty: 1 career fire fighter, plus 15 auxiliary fire fighters DPG 3A - 15 auxiliary fire fighters credit DPG 4 - 15 or 10 minimum auxiliary fire fighters credit	Yes
Training System	Meet minimum training levels including required frequency of training and maintenance of training records. NFPA 1001 - Fire Fighter Level 1.	Yes
Fire Fighting Apparatus	Meet minimum apparatus standards and requirements. NFPA 1901 or ULC S515 listed apparatus.	Yes
Fire apparatus equipment	Outline minimum equipment requirements pursuant to local needs and operating conditions.	Yes
Fire Station	Provide a well designed and located fire station to serve the department and the community, and house apparatus.	Yes
Alarm Notification System	Provide a reliable means of receipt of alarms and the immediate notification of fire fighters required to respond to these alarms, 24 hours/day, 365 days/year.	Yes
Water Supply	Require that a fire department has an adequate water supply for fire suppression purposes. Provide hydranted water supply designed in accordance with FUS Water Supply for Public Fire Protection.	Yes



The City of Courtenay has maintained its Dwelling Protection Grades since the previous assessment. A Dwelling Protection Grade 3A (volunteer fully protected) applies to Personal Lines insured properties in hydrant protected areas of the City of Courtenay and hydrant protected areas in the contract fire protected areas of the Comox Valley Regional District. A Dwelling Protection Grade 3B (volunteer semi-protected) applies to non-hydrant protected Personal Lines insured properties in the City of Courtenay and the contract fire protection areas of the Comox Valley Regional District.



13. FIRE INSURANCE GRADING CLASSIFICATION POTENTIAL REASSIGNMENT

13.1. Fire Insurance Grading Reassignment

The City of Courtenay has been reviewed for fire insurance grading purposes. A Public Fire Protection Classification of 4 and a Dwelling Protection Grade 3A were determined based on the fire insurance grading review. The following information indicated in Table 13.1-1 shows the fire insurance grades that were applied to the City of Courtenay prior to this survey and report and the updated grades in 2014.

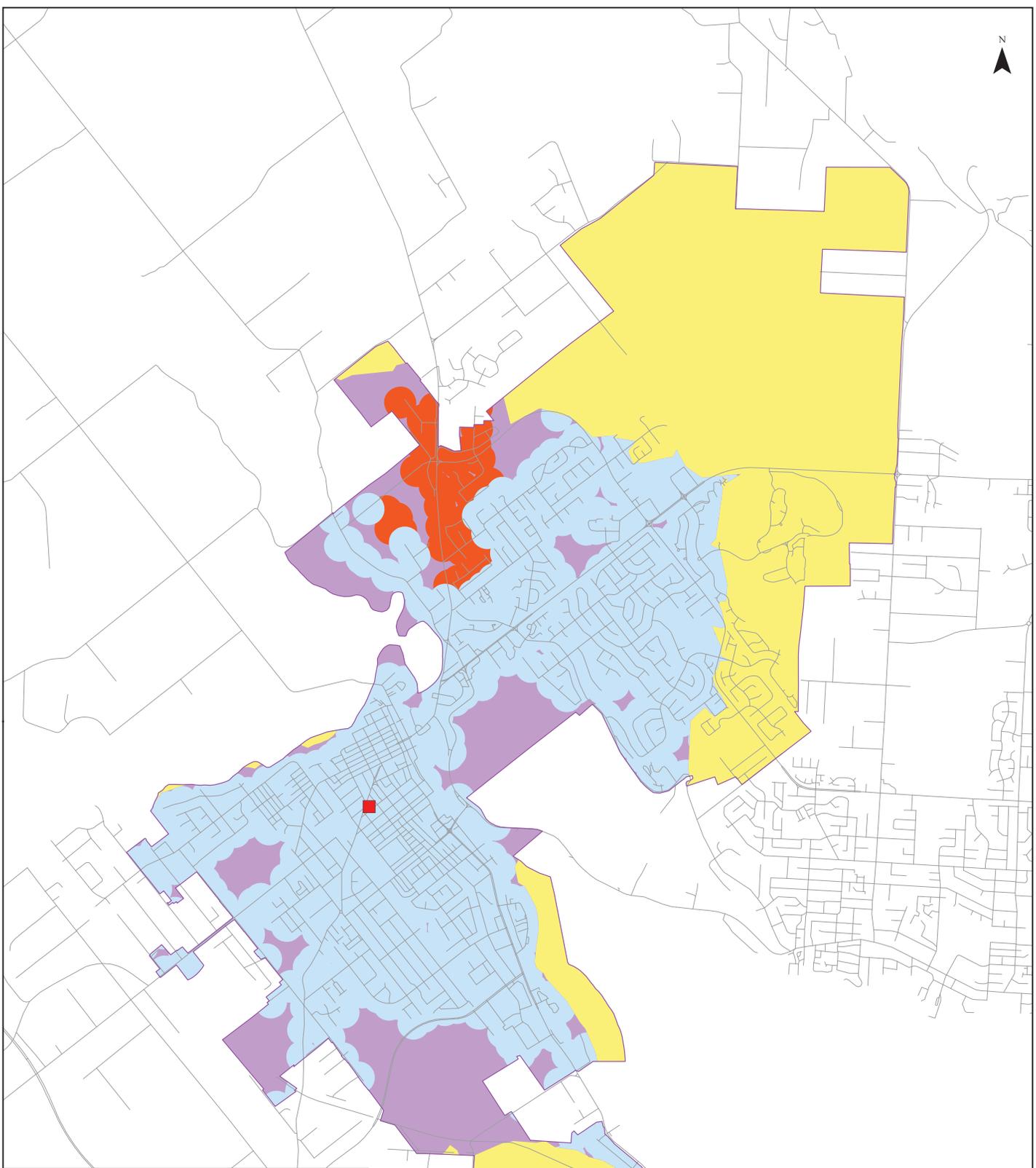
Table 13.1-1 City of Courtenay Fire Insurance Grading Classifications

SUB DISTRICT(S) and (contract protection areas)	PPFC previous	PFPC 2014	COMMENTS
City of Courtenay Water System CVRD Water System Royston Water System Sandwick Water System	6 8 8 8	4 4 5 6	Hydrant Protected – Commercial Lines insured properties within 150 m of a fire hydrant on a recognized water system and within 5 road km of a Courtenay Fire Station
City of Courtenay and Contract Fire Protection areas	9	9	Fire Station Protected – Commercial Lines insured properties not within 150 m of a fire hydrant on the Courtenay water system but within 5 road km of a Courtenay Fire Station
City of Courtenay	10	10	Unprotected – Commercial Lines insured properties not within 5 road km of a Courtenay Fire Station

SUB DISTRICT(S) and (contract protection areas)	DPG previous	DPG 2014	COMMENTS
City of Courtenay and Contract Fire Protection Areas	3A	3A	Hydrant Protected – Personal Lines insured properties within 300 m of a fire hydrant on a recognized water system and within 8 road km of a Courtenay Fire Station
City of Courtenay and Contract Fire Protection Areas	3B	3B	Fire Station Protected – Personal Lines insured properties not within 300 m of hose lay of a hydrant on the Courtenay water system but within 8 road km of a Courtenay Fire Station
City of Courtenay and Contract Fire Protection Areas	5	5	Unprotected – Personal Lines insured properties not within 8 road km of a Courtenay Fire Station

The following figures illustrate the general areas that the Public Fire Protection Classification and Dwelling Protection Grade apply within the City of Courtenay and its contract fire protection areas.

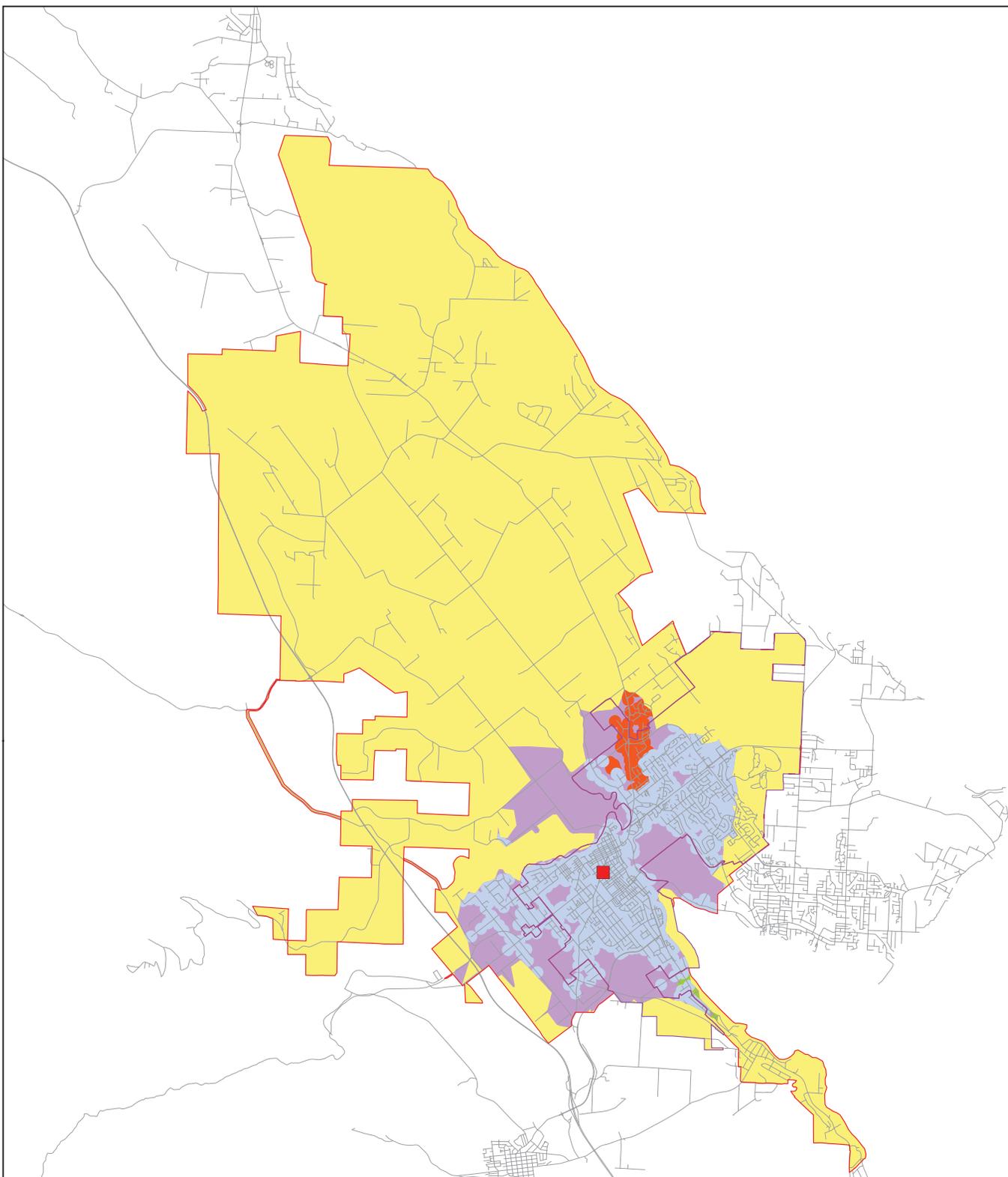




Legend

- Firehall
- PFPC 4
- PFPC 5
- PFPC 6
- PFPC 9
- PFPC 10
- Courtenay Fire Protection Area
- Roads

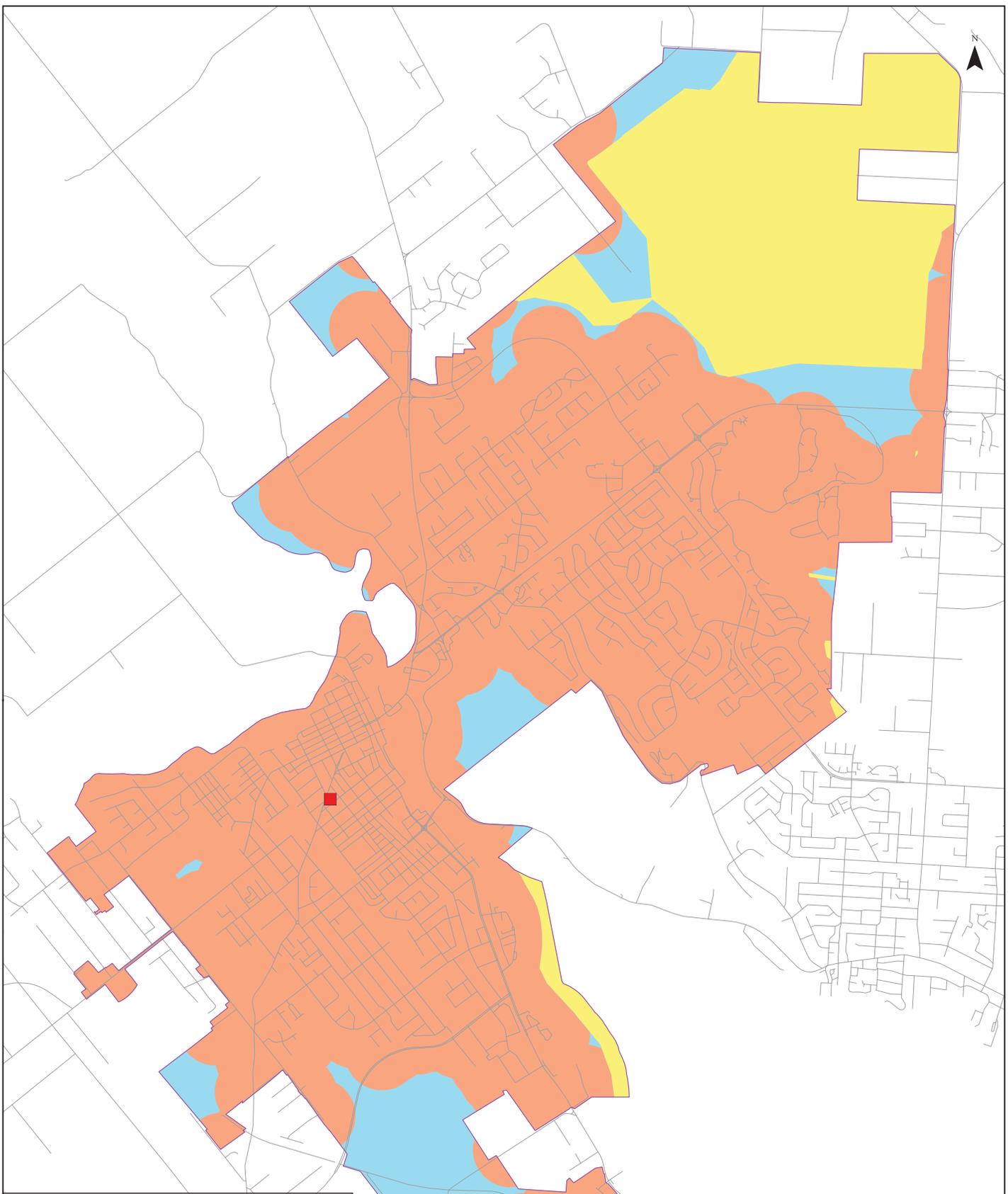




Legend

- Firehall
- PFPC 4
- PFPC 5
- PFPC 6
- PFPC 9
- PFPC 10
- Courtenay Fire Protection Area
- Comox Valley Regional District Fire Protection Area
- Roads

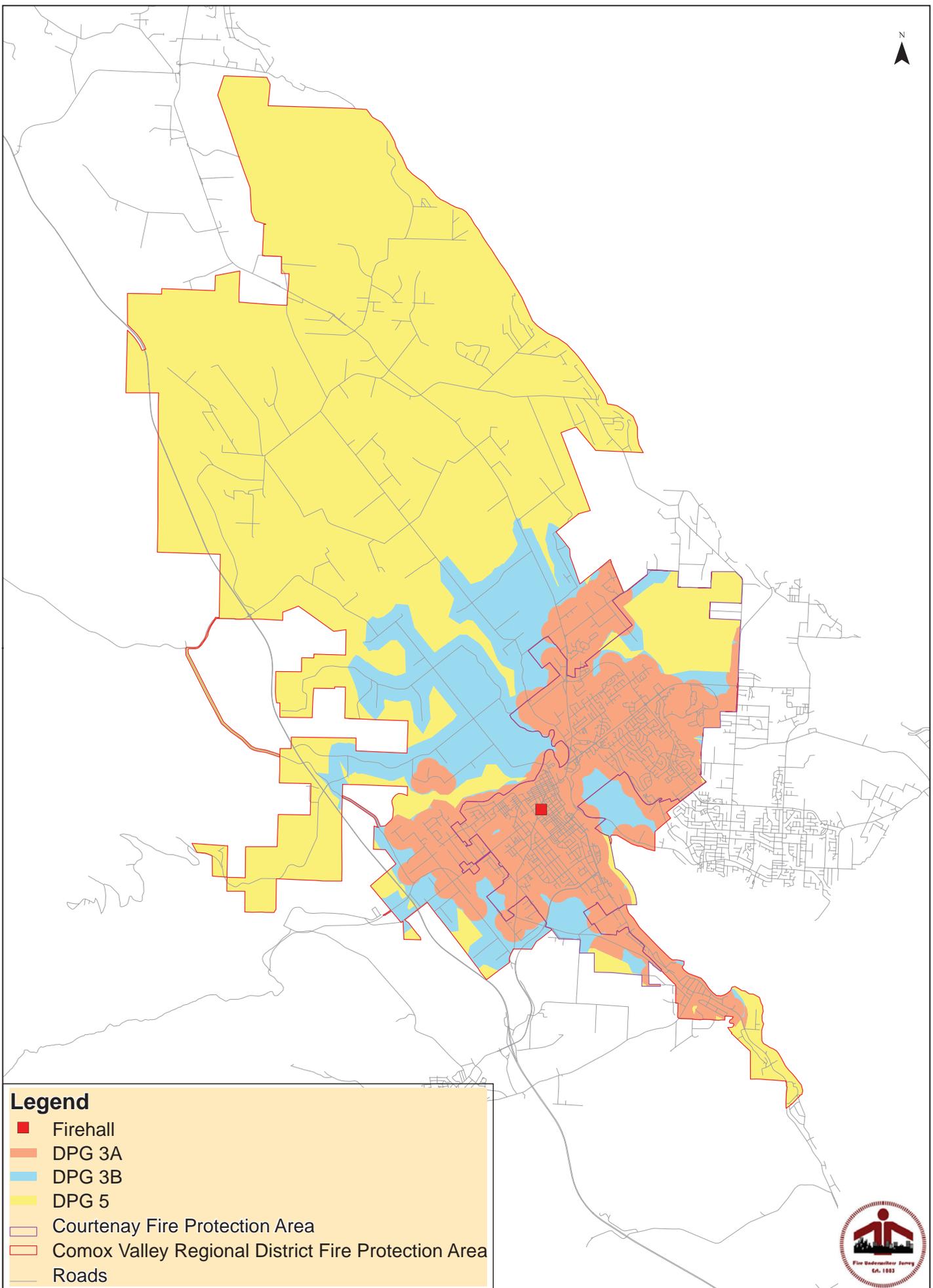




Legend

- Firehall
- DPG 3A
- DPG 3B
- DPG 5
- Courtenay Fire Protection Area
- Roads





Legend

- Firehall
- DPG 3A
- DPG 3B
- DPG 5
- Courtenay Fire Protection Area
- Comox Valley Regional District Fire Protection Area
- Roads



14. COST BENEFIT ANALYSIS

The current Dwelling Protection Grade and Public Fire Protection Classification applied to the City of Courtenay prior to this assessment are as shown in section 13. Based on these grades the following estimates are provided. It should be known that FUS is not involved in rate setting and each insurance company can have its own underwriting guidelines. Additionally, the insurance rates are dynamic and dependent on a large number of factors. Insurance savings can also be affected as a result in the community's previous loss experience. Furthermore, estimate on potential insurance savings are subject to errors of estimation due to the fact that future insurance rates are subject to the outcome of events yet to occur such as future losses and future insurance company behaviour. Previous experience and data sampling is used to generate the estimates provided here and results have shown them to be reasonably appropriate.

14.1. Dwelling Protection Grade for Personal Lines Insurance

As outlined in section 4.3, the first fire insurance classification published in the Fire Insurance Grading Index is the Dwelling Protection Grade (DPG). The DPG is a numerical system scaled from 1 to 5. DPG 1 represents the highest standard of service whereas DPG 5 indicates little or no recognized level of public fire protection. This grading reflects the ability of a community to effectively respond to fires in detached dwellings (single family residences and duplexes). An effective response requires adequate manpower (with appropriate training and equipment), apparatus, water supply and response time must be within the specified standard.

Table 14.1-1 Example Insurance Premiums for Single Family Dwellings by Fire Insurance Classification shows how the insurance premiums would vary for some typical single family residences under several insurance companies' current rating schedules. It is important to note that every insurance company sets its own rates. While these figures are reasonably representative of how much difference the fire insurance grading can make in an insurance buyer's premiums, the amounts and percentages of the premium credits for the various fire insurance classes varies among insurance companies.

Note that typically, detached dwellings are insured with packaged insurance referred to as Basic or Extended Coverage (EC). Packaged insurance includes insurance for more than one type of loss. For example depending on where a property is located, such packages may be available for perils such as windstorm, hail, explosion, civil commotion, riot, aircraft damage, vehicle damage, smoke damage, vandalism, malicious mischief, sprinkler leakage damage, sinkhole collapse, and volcanic action.



As fire is only one part of typical insurance packages, changes to fire insurance grades do not affect all types of insurance. However, changes to fire insurance grades and associated fire insurance portions of insurance packages still have a significant impact on the overall cost of insurance.

The following table shows average insurance premiums as they relate to detached dwellings in the City of Courtenay. The values shown here are based on actual quotes as well as calculated values for Fire and Extended Coverage insurance.

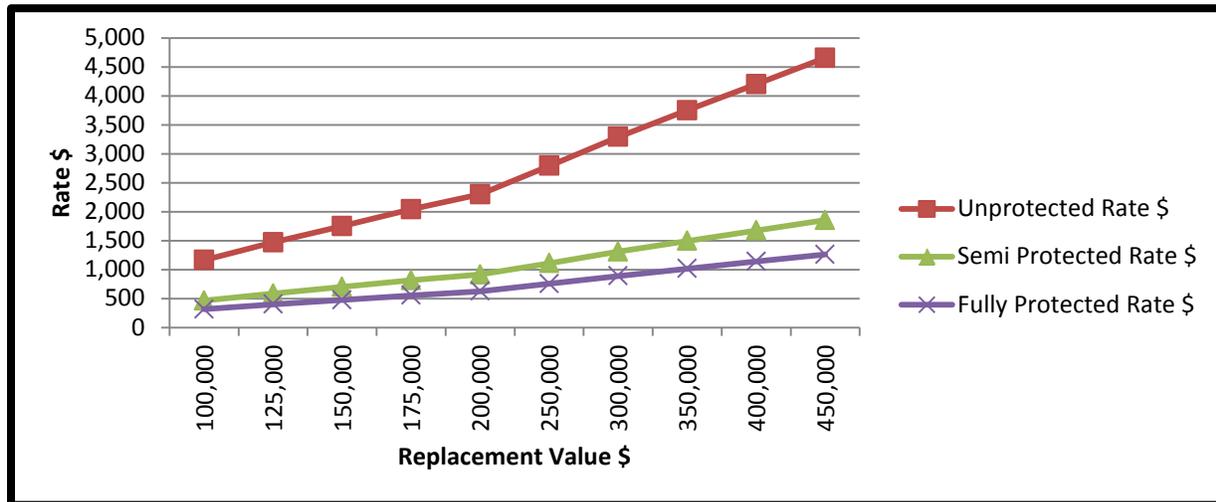
Table 14.1-1 Example Insurance Premiums for Single Family Dwellings by Fire Insurance Classification

Replacement Value \$	Unprotected Rate \$		Semi Protected Rate \$		Fully Protected Rate \$
100,000	1,165	60± % reduction	465	32± % reduction	315
125,000	1,470		585		400
150,000	1,750		700		475
175,000	2,040		815		555
200,000	2,710		1,215		739
250,000	3,290		1,475		893
300,000	3,880		1,741		1,053
350,000	4,422		1,987		1,201
400,000	4,953		2,226		1,349
450,000	5,489		2,465		1,491

The cost of insurance per dollar insured is shown to have an average difference of 32%± between Semi-Protected rates and Unprotected rates. The difference between Fully Protected rates and Unprotected rates is in the order of 60%±. Note, that individual cases may vary by as much as 10% from the figures shown here, however these figures are average values. The following figure shows the trend line for each of the tiers of insurance.



Figure 14.1-1 Dwelling Protection Grade Insurance Rate Estimates



The City of Courtenay was reviewed in 2013/14 and maintained its Dwelling Protection Grade 3A.

Insurance companies have different ways of interpreting fire insurance grades and using the information they acquire through the fire insurance grading index. Most insurers in Canada currently use a three tier system that groups communities into three “tiers” of fire protection; protected, semi-protected and unprotected. These three tiers are normally correlated to Dwelling Protection Grades as previously indicated in Table 4.3-1 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades. It should be noted that Fire Underwriters Survey is currently working with subscribers to have the top tier further delineated to address the differences between DPG 1, 2, and 3A.

The majority of properties, if not all, rate as DPG 3A “Fully-Protected” within the City of Courtenay. Total assessed values for properties insured under the Dwelling Protection Grade (DPG) system is approximately \$718,290,637. Based on this figure the total insurance costs related to DPG 3A for the City is \$3,598,220. Without public fire protection (recognized fire department and recognized water system) in place the rates are estimated at \$13,269,710. The difference in savings is approximately \$9,671,490 that the City maintains for its constituents by having an adequately trained and equipped fire department and a recognized water distribution system.



Figure 14.1-2 City of Courtenay Cost of Insurance for Personal Lines Properties

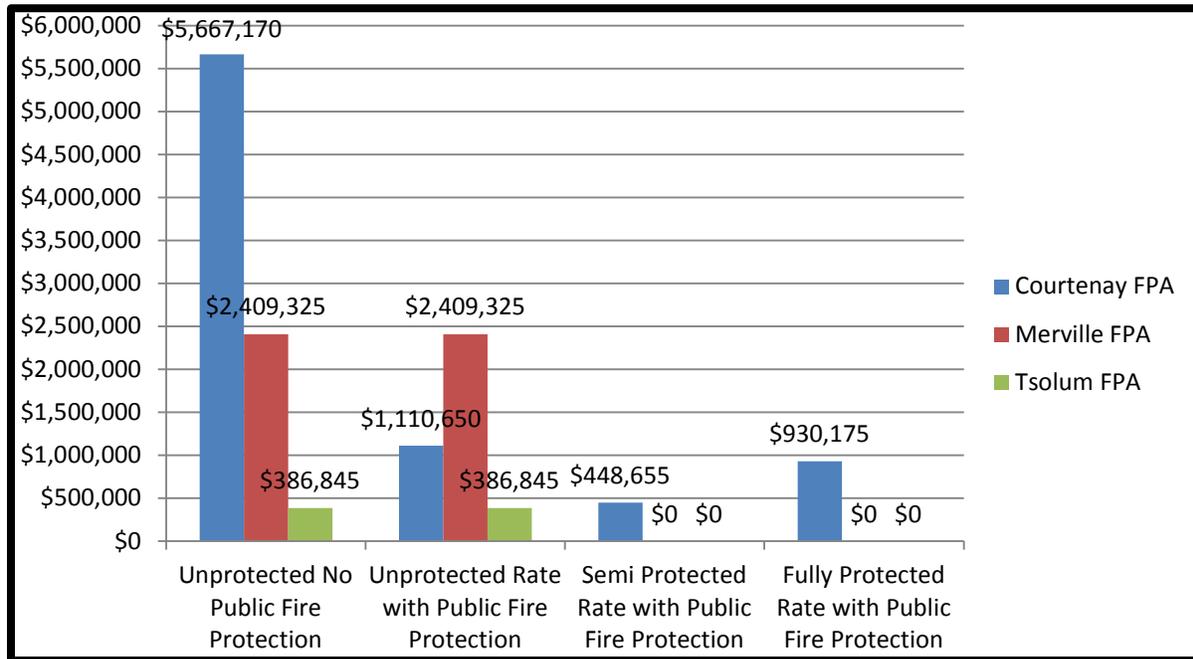


For Personal Lines insured properties within the fire protection areas of the Comox Valley Regional District properties qualify for one of the three rates. Total Assessed values for properties insured under the Dwelling Protection Grade (DPG) system is approximately \$640,635,300 within the Courtenay, Merville and Tsolum Farnham fire protection areas.

If there was no contract for public fire protection and a DPG 5 applied to all properties within the contract fire protection areas the total insurance cost is approximately \$8,463,340. With public fire protection being provided from the City of Courtenay to Personal Lines insured properties the total insurance costs savings related to Personal Lines insured properties that qualify for DPG 3B and DPG 3A was approximately \$4,288,340. Insurance costs savings was not achieved for Personal Lines insured properties in the fire protection areas that were beyond 8 km in road travel distance of the Courtenay fire station. There is potentially \$1,681,895 in savings for constituents of the Comox Valley Regional District if a DPG 3B was achieved. Further savings may be obtainable if a DPG 3A was achieved for Personal Lines insured properties.



Figure 14.1-3 Comox Valley Regional District FPAs Cost of Insurance for Personal Lines Properties



14.2. Public Fire Protection Classification for Commercial Lines Insurance

While the rate estimates for Dwelling Protection Grade system are relatively simple to estimate, those for the Public Fire Protection Classification system can vary quite noticeably as they are dependent on many more factors than those under the Dwelling Protection Grade system. FUS uses a U-Rate calculator to generate estimates and the results from past studies have shown typical reductions as shown in Table 14.2-1.

Table 14.2-1 U-Rate Typical Percentage Decreases

Public Fire Protection Classification	U-Rate Percentage Decreases
PFPC 10 to PFPC 9	99.2%
PFPC 9 to PFPC 8	96.6%
PFPC 8 to PFPC 7	82.4%
PFPC 7 to PFPC 6	74.4%
PFPC 6 to PFPC 5	63.1%
PFPC 5 to PFPC 4	53.8%
PFPC 4 to PFPC 3	48.0%
PFPC 3 to PFPC 2	47.3%
PFPC 2 to PFPC 1	45.8%

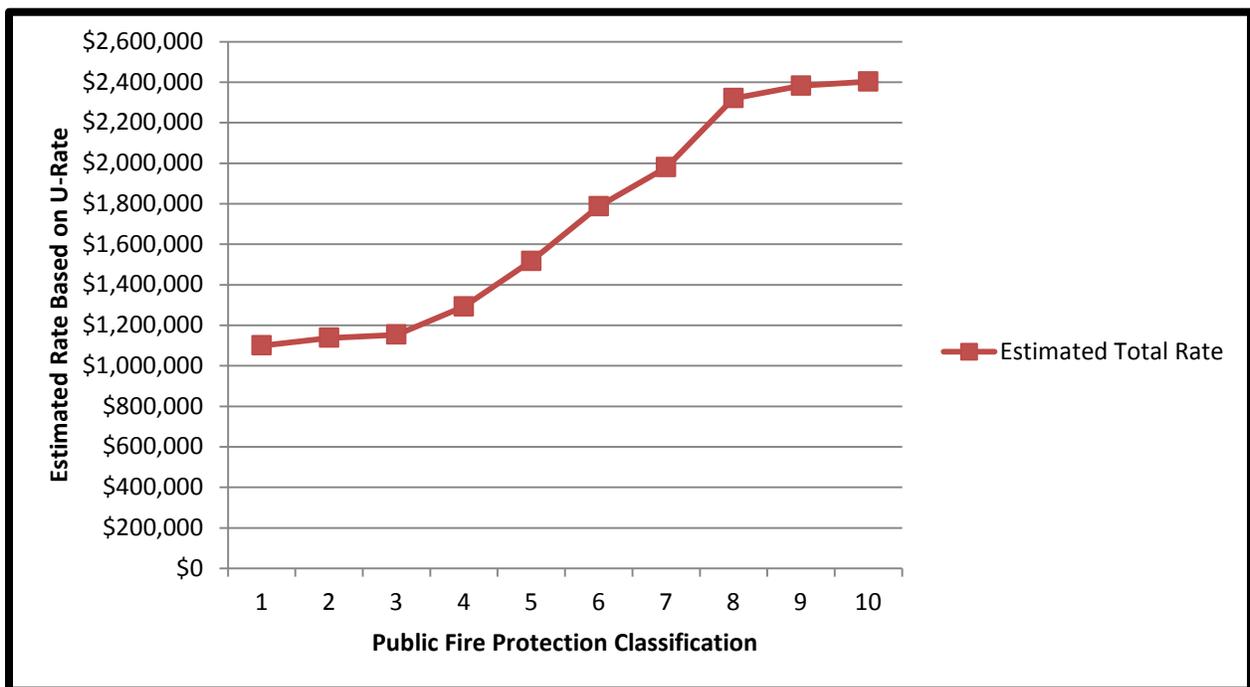


Typically an adjustment is made by the underwriter based on number of hydrants and distances to fire stations; however, estimates shown in Table 14.2-2 and Figure 14.2-1 only show the effect of the Public Fire Protection Classification prior to adjustment. It can be seen that moving from PFPC 6 to PFPC 4 shows a rate estimate decrease of approximately \$490,000 per year. A further point to consider is that as the PFPC decreases in value, i.e. going from PFPC 5 to PFPC 4 the capacity of an insurer to underwrite in the City can change and in turn can create competition which can lower rates. It is difficult to quantify the true effects and figures given here are estimates.

Table 14.2-2 Rate Estimates under the Public Fire Protection Classification System

Public Fire Protection Classification	No Fire Department	Total Rate Estimates Prior to FUS Study	Total Rate Estimates Post FUS Study
6		\$1,787,115	
4			\$1,292,365
10	\$2,402,818		
Total	\$2,402,818	\$1,787,115	\$1,292,365

Figure 14.2-1 Rate Estimates under Public Fire Protection Classification System



APPENDIX A - Dwelling Protection Grade Summary of Basic Requirements





Dwelling Protection Grade Summary of Basic Requirements per Fire Stationⁱ

DWELLING PROTECTION GRADE	WATER WORKS SYSTEM	FIRE DEPARTMENT		CORRELATION WITH PFPC ⁱⁱ Public Fire Protection Classification
		EQUIPMENT	FIREFIGHTERS ⁱⁱⁱ	
1	Water supply system designed in accordance with Fire Underwriters Survey standard "Water Supply for Public Fire Protection" with a relative classification of 5 or better	Response from within 8 km by road of a triple combination pumper	Minimum Response: - On-duty: 3 career fire fighters, plus - Off-duty: fire chief or other officer	Water Supply and Fire Department must grade PFPC Relative Class 5 or better
2	Water supply system designed in accordance with Fire Underwriters Survey standard "Water Supply for Public Fire Protection" with a relative classification of 6 or better	Response from within 8 km by road of a triple combination pumper	Minimum Response: - On-duty: 1 career fire fighters, plus - On-call: 15 auxiliary fire fighters	Water Supply and Fire Department must grade PFPC Relative Class 6 or better
3A	Water supply system designed in accordance with, and meeting the minimum requirements of, Fire Underwriters Survey standard "Water Supply for Public Fire Protection"	Response from within 8 km by road of a triple combination pumper	15 auxiliary fire fighters	No Public Fire Protection Classification required
3B	Not required – however fire department must have adequate equipment, training and access to approved water supplies to deliver standard shuttle service in accordance with NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting	2 units required. Triple combination pumper <u>plus</u> a mobile water supply with a combined water carrying capacity of not less than 6,820 L (1,500 IG)	15 auxiliary fire fighters	No Public Fire Protection Classification required
4 ³	Not required – however fire department must have adequate equipment, training and access to approved water supplies to deliver shuttle service in accordance with NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting	2 units required. Triple combination pumper <u>plus</u> a mobile water supply with a combined water carrying capacity of not less than 6,820 L (1,500 IG)	15 auxiliary fire fighters	No Public Fire Protection Classification required
5	Unprotected communities or communities not qualifying for Grades 1, 2, 3A, 3B, or 4 above	Unprotected communities or communities not qualifying for Grades 1, 2, 3A, 3B, or 4 above	Unprotected communities or communities not qualifying for Grades 1, 2, 3A, 3B, or 4 above	No Public Fire Protection Classification required



ⁱ Refer to additional notes and requirements for interpretation

ⁱⁱ The P.F.P.C. is a sophisticated municipal fire protection grading system utilized for Commercial Lines insurance. PFPC fire insurance grades are scaled from 1 to 10. One (1) represents a high level of fire protection and 10 indicates little or no recognized fire protection. This system evaluates the ability of a community's fire defences to prevent and control major fires that may occur in commercial, industrial and institutional buildings and/or districts.

ⁱⁱⁱ Requirements for Dwelling Protection Grade 4 are the same as for Dwelling Protection Grade 3B, however in some cases, an allowance may be considered for Dwelling Protection Grade 4 where all of the criteria for Dwelling Protection Grade 3B have been met with one exception. If more than one criteria has not been met (ex. less than 15 auxiliary fire fighters and a single pumper apparatus) Dwelling Protection Grade 5 is applied.

Where Dwelling Protection Grade 4 is applied, a signed letter of intent from the community is to be sent to Fire Underwriters Survey indicating that improvements will be made, within an agreed timeframe, to meet the criteria of Dwelling Protection Grade 3B.

It is important to note that the absolute minimum number of auxiliary fire fighters considered within the fire insurance grading is 10 and that maximum age of apparatus that can be considered is 30.

APPENDIX B - Fire Underwriters Survey - 1999 Water Supply for Public Fire Protection



**WATER SUPPLY
FOR
PUBLIC FIRE PROTECTION**

1999



FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

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FIRE UNDERWRITERS SURVEY is financed by the Canadian Insurance industry and utilizes technical staff of CGI Risk Management Services (formerly the Insurers' Advisory Organization Inc.) Its purpose is to survey fire protection conditions in Canadian communities and municipalities, providing data and advisory services to fire insurance underwriters and public officials concerned.

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WATER SUPPLY FOR PUBLIC FIRE PROTECTION

PREFACE

This guide summarizes the more significant recommendations of Fire Underwriters Survey with respect to fire protection requirements in municipal water works system design. It reflects the manner in which FUS assesses the water supply aspect of a municipality's fire risk potential during surveys on behalf of the Canadian property insurance industry and represents the accumulated experience of many years of study of actual fires. Water supply is one of a number of components evaluated by FUS in the municipal fire protection system. Recommendations applying to the fire departments and code enforcement are covered in other publications of Fire Underwriters Survey. FUS local offices are prepared to assist municipal officials or their consultants with advice on special problems, as time limits permit, in accordance with the intent of this guide. The minimum size water supply credited by FUS must be capable of delivering not less than 1000 L/min for two hours or 2000 L/min for one hour in addition to any domestic consumption at the maximum daily rate. Static suction supplies to fire department pumpers are recognized as a supplement to the piped system.

In the FUS assessment of a water supply system, the major emphasis is placed upon its ability to deliver **adequate** water to control major fires throughout the municipality on a **reliable** basis via sufficient and suitable **hydrants**. What is ultimately available to the fire department is the critical test in this fire protection evaluation.

Rates of flow for firefighting purposes are expressed in litres per minute as this is the adopted unit for the firefighting field.

In this edition all quantities are specified in S.I. units.

PART I

GENERAL

ADEQUACY AND RELIABILITY. An adequate and reliable water supply for firefighting is an essential part of the fire protection system of a municipality. This is normally a piped system in common with domestic potable water service for the community.

A water supply system is considered to be fully adequate if it can deliver the necessary fire flow at any point in the distribution gridiron for the applicable time period specified in the table "Required Duration of Fire Flow" with the consumption at the maximum daily rate (average rate on maximum say of a normal year). When this delivery is also possible under certain emergency or unusual conditions as herein specified, the system is considered to be reliable. In cities of population in excess of 250,000 (or smaller places with high fire incident and severe hazard conditions) it is usually necessary to consider the possibility of two simultaneous major fires in the area served by the system.

Fire flows are amounts of water necessary to control fires. These are determined as shown in Part II. System design should contemplate meeting the required fire flows existing or probable with the possible exception of gross anomalies where there is no fire threat to the remainder of the community. In these cases, the properties should preferably be modified in hazard to reduce the required flow as part of a coordinated community fire protection system.

The protection of buildings by automatic sprinkler systems is a significant contribution to the fire protection of the community and should be encouraged, not penalized by onerous service charges or metering requirements.

In order to provide reliability, duplication of some or all parts of the system will be necessary, the need for duplication being dependent upon the extent to which the various parts may reasonably be expected to be out of service as a result of maintenance and repair work, an emergency or some unusual condition. The introduction of storage, either as part of the supply works or on the distribution system, may partially or completely offset the need for duplicating various parts of the system, the value of the storage depending upon its amount, location and availability.

STORAGE. In general, storage reduces the requirements of those parts of the system through which supply has already passed. Since storage usually fluctuates, the normal daily minimum maintained is the amount that should be considered as available for fires. Because of the decrease in pressure when water is drawn down in standpipes, only the portion of this normal daily minimum storage that can be delivered at a residual pressure of 150kPa at the point of use is considered as available. As well as the quantity available, the rate of delivery of water to the system from storage for the fire flow period is critical to this consideration.

PRESSURE. The principal requirement to be considered is the ability to deliver water in sufficient quantity to permit fire department pumpers to obtain an adequate supply from hydrants. To overcome friction loss in the hydrant branch, hydrant and suction hose, a minimum residual water pressure of 150 kPa in the street main is required during flow. Under conditions of exceptionally low suction losses, a lower residual may be possible. This includes the use of 100 mm and larger outlets for fire department pumper use and hydrants with large waterways.

Higher sustained pressure is of importance in permitting direct continuous supply to automatic sprinkler systems, to building standpipe and hose systems, and in maintaining a water plan so that no portion of the protection area is without water, such as during a fire at another location. Residual pressures that exceed 500 kPa during large flows are of value as they permit short hose-lines to be operated directly from hydrants without supplementary pumping.

SUPPLY WORKS

NORMAL ADEQUACY OF SUPPLY WORKS. The source of supply, including impounding reservoirs, and each part of the supply works should normally be able to maintain the maximum daily consumption rate plus the maximum required fire flow. Each distribution service within the system should similarly support its own requirements. In large cities where fire frequency may result in simultaneous fires, additional flow must be considered in accordance with the potential. Filters may be considered as capable of operating at a reasonable overload capacity based upon records and experience. In general, overload capacity will not exceed 25 percent, but may be higher in well designed plans operating under favourable conditions.

The absolute minimum supply available under extreme dry weather conditions should not be taken as the measure of the normal ability of the source of supply such as supply from wells. The normal or average capacity of wells during the most favourable nine month period should be considered, or the normal sustained flow of surface supplies to the source.

RELIABILITY OF SOURCE OF SUPPLY. The effect on adequacy must be considered for such factors as frequency, severity and duration of droughts, physical condition of dams and intakes; danger from earthquakes, floods, forest fires, and ice dams or other ice formations; silting-up or shifting of channels; possibility of accidental contamination of watershed or source; absence of watchmen or electronic supervision where needed; and injury by physical means. Where there is a risk of disruption, special precautions or alternate supplies should be arranged.

Where the supply is from wells, some consideration should be given to the absolute minimum capacity of the wells under the most unfavourable conditions; also to the length of time that the supply from the wells would be below the maximum daily consumption rate, and the likelihood of this condition recurring every year or only at infrequent intervals. It should be recognized that some water is generally available from wells and that the most extreme conditions are not as serious as a total interruption of the supply, as would be the case in the breaking of a dam or shifting of a channel. The possibility of clogging, salinity, and the need for periodic cleaning and overhauling must be considered. Dependence upon a single well, even where records are favourable, may be considered a feature of unreliability.

Frequent cleaning of reservoirs and storage tanks may be considered as affecting reliability.

Continuity of, and delay in implementing water supplies obtained from systems or sources not under the control of the municipality or utility should be considered also from these aspects.

GRAVITY SYSTEMS. A gravity system delivering supply from the source to distribution directly without the use of pumps is advantageous from a fire protection point of view because of its inherent reliability, but a pumping system can also be developed to a high degree of reliability.

PUMPING

RELIABILITY OF PUMPING CAPACITY. Pumping capacity, where the system or service is supplied by pumps, should be sufficient, in conjunction with storage when the two most important pumps are out of service, to maintain the maximum daily consumption rate plus the maximum required fire flow at required pressure for the required duration. For smaller municipalities (usually up to about 25,000 population) the relative infrequency of fires is assumed as largely offsetting the probability of a serious fire occurring at times when two pumps are out of service. (The most important pump is normally, but not always, the one of largest capacity, depending upon how vital is its contribution to maintaining flow to the distribution system.)

To be adequate, remaining pumps in conjunction with storage, should be able to provide required fire flows for the specified durations at any time during a period of five days with consumption at the maximum daily rate. Effect of normal minimum capacity of elevated storage located on the distribution system and storage of treated water above low lift pumps should be considered. The rate of flow from such storage must be considered in terms of any limitation of water main capacity. The availability of spare pumps or prime movers that can quickly be installed may be credited, as may pumps of compatible characteristics which may be valved from another service.

POWER SUPPLY FOR PUMPS. Electric power supply to pumps should be so arranged that a failure in any power line or the repair or replacement of a transformer, switch, control unit or other device will not prevent the delivery, in conjunction with elevated storage, of required fire flows for the required durations at any time during a period of two days with consumption at the maximum daily rate.

Power lines should be underground from the station or substation of the power utility to water plants and pumping stations and have no other consumers enroute. The use of the same transmission lines by other consumers introduces unreliability because of the possibility of interruption of power or deterioration of power characteristics.

Overhead power lines are more susceptible to damage and interruption than underground lines and introduce a degree of un-reliability that depends upon their location and construction. In connections with overhead lines, consideration should be given to the number and duration of lightning, wind, sleet, and snow storms in the area; the type of poles or towers and wires; the nature of the country traversed; the effect of earthquakes, forest fires, and floods; the lightning and surge protection provided; the extent to which the system is dependent upon overhead lines; and the ease of, and facilities for, repairs.

The possibility of power systems or network failures affecting large areas should be considered. In-plant auxiliary power or internal combustion driver standby pumping are appropriate solutions to these problems in many cases, particularly in small plants where high pumping capacity is required for fire protection service. When using automatic starting, prime 'movers' for auxiliary power supply and pumping should have controllers listed by Underwriters' Laboratories of Canada to establish their reliability.

FUEL SUPPLY. At least a five day supply of fuel for internal combustion engines or boilers used for regular domestic supply should be provided. Where long hauls, condition of roads, climatic conditions, or other circumstances could cause interruptions of delivery longer than five days, a greater storage should be provided. Gas supply should be from two independent sources or from duplicate gas-producer plants with gas storage sufficient for 24 hours. Unreliability of regular fuel supply may be offset in whole or in part by suitable provisions for the use of an alternate fuel or power supply.

BUILDINGS AND PLANT

BUILDINGS AND STRUCTURES. Pumping stations, treatment plants, control centres and other important structures should be located, constructed, arranged, and protected so that damage by fire, flooding, or other causes will be held to a minimum. They should contain no combustible material in their construction, and, if hazards are created by equipment or materials located within the same structure, the hazardous section should be suitably separated by fire-resistive partitions or fire walls.

Buildings and structures should have no fire exposures. If exposures exist, suitable protection should be provided, Electrical wiring and equipment should be installed in accordance with the Canadian Electrical Code. All internal hazards should be properly safeguarded in accordance with good practice. Private in-plant fire protection should be provided as needed.

MISCELLANEOUS SYSTEM COMPONENTS, PIPING AND EQUIPMENT. Steam piping, boiler-feed lines, fuel-piping (gas or oil lines to boilers as well as gas, oil or gasoline lines to internal-combustion engines), and air lines to wells or control systems should be so arranged that a failure in any line or the repair or replacement of a valve, fuel pump, boiler-feed pump, injector, or other necessary device, will not prevent the delivery, in conjunction with storage, of the required fire flows for the specified duration at any time during a period of two days with consumption at the maximum daily rate.

Plants should be well arranged to provide for effective operation. Among the features to be considered are: ease of making repairs and facilities for this work, danger of flooding because of broken piping; susceptibility to damage by spray; reliability of priming and chlorination equipment; lack of semi-annual inspection of boilers or other pressure vessels; dependence upon common non-sectionalized electric bus bars; poor arrangement of piping; poor condition or lack of regular inspections of important valves; and factors affecting the operation of valves or other devices necessary for fire service such as design, operation, and maintenance of pressure regulating valves, altitude valves, air valves, and other special valves or control devices, provision of power drives, location of controls, and susceptibility to damage.

Reliability of treatment works is likely to be influenced by the removal from service of at least one filter or other treatment unit; the reduction of filter capacity by turbidity, freezing or other conditions of the water; the need for cleaning basins; and the dependability of power for operating valves, wash-water pumps, mixers and other appurtenances.

OPERATIONS. Reliability in operation of the supply system and adequate response to emergency or fire demands are essential. Instrumentation, controls and automatic features should be arranged with this in mind. Failure of an automatic system to maintain normal conditions or to meet unusual demands should result in the sounding of an alarm where remedial action will be taken.

The operating force should be competent, adequate, and continuously available as may be required to maintain both the domestic and fire services.

EMERGENCY SERVICES. Emergency crews, provided with suitable transportation, tools and equipment, should be continuously on duty in the larger systems and be readily available upon call in small systems. Spare pipe and fittings, and construction equipment should be readily available. Alarms for fires in buildings should be received by the utility at a suitable location where someone is always on duty who can take appropriate action as required, such as placing additional equipment in operation, operating emergency or special valves, or adjusting pressures. Receipt of alarms may be by fire alarm circuit, radio, outside alerting device, or telephone, but where special operations are required, the alarm service should be equivalent to that needed for a fire station.

Response of an emergency crew should be made to major fires to assist the fire department in making the most efficient use of the water system and to ensure the best possible service in the event of a water main break or other emergency. The increase of pressures by more than 25 percent for fires is considered to increase the possibility of breaks.

PIPING

RELIABILITY OF SUPPLY MAINS. Supply mains cut off for repair should not drastically reduce the flow available to any district. This includes all pipe lines or conduits on which supply to the distribution system is dependent, including intakes, suction or gravity lines to pumping stations, flow lines from reservoirs, treatment plant piping, force mains, supply and arterial mains, etc. Consideration should be given to the greatest effect that a break, joint separation or other failure could have on the delivery of the maximum daily consumption rate plus required fire flow at required pressure over a three day period. Aqueducts, tunnels or conduits of substantial construction may be considered as less susceptible to failure and equivalent to good mains with a long history of reliability.

INSTALLATION OF PIPE. Mains should be in good condition and properly installed. Pipe should be suitable for the service intended. Asbestos-cement, poly-vinyl chloride (PVC), cast and ductile iron, reinforced concrete and steel pipe manufactured in accordance with appropriate Canadian Standards Association or ANSI/AWWA standards, or any pipes listed by Underwriters' Laboratories of Canada for fire service are considered satisfactory. Normally, pipe rated for a maximum working pressure of 1000 kPa is required. Service records, including the frequency and nature of leaks, breaks, joint separations, other failures and repairs, and general conditions should be considered as indicators of reliability. When mains are cleaned they should be lined.

Mains should be so laid as not to endanger one another, and special construction should be provided to prevent their failure at stream crossings, railroad crossings, bridges, and other points where required by physical conditions; supply mains should be valved at one and one half kilometre intervals and should be equipped with air valves at high points and blow offs at low points. Mains should not be buried extremely deep or be unusually difficult to repair, though depths to ten feet may be required because of frost conditions.

The general arrangement of important valves, of standard or special fittings, and of connections at cross-overs, intersections, and reservoirs, as well as at discharge and suction headers, should be considered with respect to the time required to isolate breaks. The need for check valves on supply or force mains and for other arrangements to prevent flooding of stations or emptying of reservoirs at the time of a break in a main should also be considered, as well as the need for relief valves or surge chambers. Accessibility of suitable material and equipment and ease of making repairs should be considered.

Arterial feeder mains should provide looping throughout the system for mutual support and reliability, preferably not more than 1000 metres between mains. Dependence of a large area on a single main is a weakness. In general the gridiron of minor distributors supplying residential districts should consist of mains at least 150mm in size and arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 200 metres. Where longer lengths of 150mm pipe are necessary 200mm or larger intersecting mains should be used. Where initial pressures are unusually high, a satisfactory gridiron may be obtained with longer lengths of 150mm pipe between intersecting mains.

Where deadends and a poor gridiron are likely to exist for a considerable period or where the layout of the streets and the topography are not well adapted to the above arrangement, 200mm pipe should be used. Both the ability to meet the required fire flows and reliability of a reasonable supply by alternate routing must be taken into account in this consideration.

VALVES. A sufficient number of valves should be installed so that a break or other failure will not affect more than 400 metres of arterial mains, 150 metres of mains in commercial districts, or 250 metres of mains in residential districts. Valves should be maintained in good operating condition. The recommended inspection frequency is once a year, and more frequently for larger valves and valves for critical applications.

A valve repair that would result in reduction of supply is a liability, but because of the probable infrequency of occurrence, it might be considered as introducing only a moderate degree of unreliability even if it resulted in total interruption. The repair of a valve normally should be accomplished in two days. Valves opening opposite to the majority are undesirable and when they do occur they should be clearly identified.

HYDRANTS

SIZE, TYPE AND INSTALLATION. Hydrants should conform to American Water Works Standard for Dry Barrel Fire Hydrants or Underwriters' Laboratories of Canada listing. Hydrants should have at least two 65mm outlets. Where required fire flows exceed 5000 l/min or pressures are low there should also be a large pumper outlet. The lateral street connection should not be less than 150mm in diameter. Hose threads, operating and cap nuts on outlets should conform to Provincial Standard dimensions. A valve should be provided on lateral connections between hydrants and street mains.

Hydrants that open in a direction opposite to that of the majority are considered unsatisfactory. Flush hydrants are considered undesirable because of delay in getting into operation; this delay is more serious in areas subject to heavy snow storms. Cisterns are considered unsatisfactory as an alternative to pressure hydrants. The number and spacing of hydrants should be as indicated in the table titled "Standard Hydrant Distribution".

INSPECTION AND CONDITION. Hydrants should be inspected at least semi-annually and after use. The inspection should include operation at least once a year. Where freezing temperatures occur, the semi-annual inspections should be made in the spring and fall of each year. Because of the possibility of freezing they should be checked frequently during extended periods of severe cold. Hydrants should be kept in good condition and suitable records of inspections and repairs be maintained. Hydrants should be painted in highly visible colours so that they are conspicuous and be situated with outlets at least twelve inches above the grade. There should be no obstruction that could interfere with their operation. Snow should be cleared promptly after storms and ice and snow accumulations removed as necessary.

HYDRANT DISTRIBUTION. Hydrant locations and spacing should be convenient for fire department use. Hydrants should be located at intersections, in the middle of long blocks and at the end of long dead-end streets. To allow for convenient utilization of water supplies, distribution density of hydrants should be in accordance with the required fire flows indicated in the table titled "Standard Hydrant Distribution" (page 16). The maximum recommended spacing of hydrants in commercial, industrial, institutional and multi-family residential areas is 90 metres; in single family residential areas 180 metres is recommended. In areas where fire apparatus have access (e.g. large properties, private developments, etc.), hydrants should be required by bylaw. The planning of hydrant locations should be a cooperative effort between the water utility and fire department.

RECORDS

PLANS AND RECORDS. Complete, up-to-date plans and records essential for the proper operation and maintenance of the system should be available in a convenient form, suitably indexed and safely filed. These should include plans of the source as well as records of its yield and a reliable estimate of the safe yield; plans of the supply works including dams, intakes, wells, pipelines, treatment plants, pumping stations, storage reservoirs and tanks; and a map of the distribution system showing mains, valves, and hydrants. Plans and maps should be in duplicate and stored at different locations.

Detailed distribution system plans, in a form suitable for field use, should be available for maintenance crews. Records of consumption, pressures, storage levels, pipes, valves, hydrants, and of the operations of the supply works and distribution system, including valve and hydrant inspections and repairs should be maintained.

TABLES

STANDARD HYDRANT DISTRIBUTION	
Fire Flow Required (litres per minute)	Average Area per Hydrant (m ²)
2,000	16,000
4,000	15,000
6,000	14,000
8,000	13,000
10,000	12,000
12,000	11,000
14,000	10,000
16,000	9,500
18,000	9,000
20,000	8,500
22,000	8,000
24,000	7,500
26,000	7,000
28,000	6,500
30,000	6,000
32,000	5,500
34,000	5,250
36,000	5,000
38,000	4,750
40,000	4,500
42,000	4,250
44,000	4,000
46,000	3,750
48,000	3,500

REQUIRED DURATION OF FIRE FLOW	
Fire Flow Required (litres per minute)	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Interpolate for intermediate figures

Area refers to surface area of blocks and bounding streets. For a street without adjacent streets, a depth of one-half block is used.

A water supply system is considered to be adequate for fire protection when it can supply water as indicated above with consumption at the maximum daily rate. Certain types of emergency supplies may be included where reasonable conditions for their immediate use exist. Storage on the system is credited on the basis of the normal daily minimum maintained insofar as pressure permits its delivery at the rate considered.

PART II

GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW COPYRIGHT I.S.O.

N.B. It should be recognized that this is a "guide" in the true sense of the word, and requires a certain amount of knowledge and experience in fire protection engineering for its effective application. Its primary purpose is for the use of surveyors experienced in this field, but it is made available to municipal officials, consulting engineers and others interested as an aid in estimating fire flow requirements for municipal fire protection.

Required Fire Flow may be described as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.

1. An estimate of the fire flow required for a given area may be determined by the formula:

$$F = 220C\sqrt{A}$$

where

- F = the required fire flow in litres per minute.
C = coefficient related to the type of construction.
= 1.5 for wood frame construction (structure essentially all combustible).
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior).
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls).
= 0.6 for fire-resistive construction (fully protected frame, floors, roof).

Note: For types of construction that do not fall within the categories given, coefficients shall not be greater than 1.5 nor less than 0.6 and may be determined by interpolation between consecutive construction types as listed above. Construction types are defined in the Appendix.

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

For fire-resistive buildings, consider the two largest adjoining floors plus 50 percent of each of any floors immediately above them up to eight, when the vertical openings are inadequately protected. If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25 percent of each of the two immediately adjoining floors.

For one family and two family dwellings not exceeding two storeys in height, see **Note J**.

2. The value obtained in No. 1 may be reduced by as much as 25% for occupancies having a low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard. Those may be classified as to contents as follows:

Non-Combustible	-25%	Free Burning	+15%
Limited Combustible	-15%	Rapid Burning	+25%
Combustible	No Charge		

As guide for determining low or high fire hazard occupancies, see the list in the Appendix. The fire flow determined shall not be less than 2,000 L/min,

3. The value obtained in No.2 above may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. Additional credit of up to 10% may be granted if the water supply is standard for both the system and fire department hose lines required. The percentage reduction made for an automatic sprinkler system will depend upon the extent to which the system is judged to reduce the possibility of fires spreading within and beyond the fire area. Normally this reduction will not be the maximum allowed without proper system supervision including water flow and control valve alarm service. Additional credit may be given of up to 10% for a fully supervised system.
4. To the value obtained in No. 2 above a percentage should be added for structures exposed within 45 metres by the fire area under consideration. This percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s), and the effect of hillside locations on the possible spread of fire.

The charge for any one side generally should not exceed the following limits for the separation:

Separation	Charge	Separation	Charge
0 to 3m	25%	20.1 to 30 m	10%
3.1 to 10m	20%	30.1 to 45m	5%
10.1 to 20m	15%		

The total percentage shall be the sum of the percentage for all sides, but shall not exceed 75%.

The fire flow shall not exceed 45,000 L/min nor be less than 2,000 L/min.

Notes to Calculation

Note A: The guide is not expected to necessarily provide an adequate value for lumber yards, petroleum storage, refineries, grain elevators, and large chemical plants, but may indicate a minimum value for these hazards.

Note B: Judgment must be used for business, industrial, and other occupancies not specifically mentioned.

Note C: Consideration should be given to the configuration of the building(s) being considered and accessibility by the fire department.

Note D: Wood frame structures separated by less than 3 metres shall be considered as one fire area.

Note E: Fire Walls: - In determining floor areas, a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) may be deemed to subdivide the building into more than one area or may, as a party wall, separate the building from an adjoining building.

Normally any unpierced party wall considered to form a boundary when determining floor areas may warrant up to a 10% exposure charge.

Note F: High one storey buildings: When a building is stated as 1=2, or more storeys, the number of storeys to be used in the formula depends upon the use being made of the building. For example, consider a 1=3 storey building. If the building is being used for high piled stock, or for rack storage, the building would probably be considered as 3 storeys and, in addition, an occupancy percentage increase may be warranted.

However, if the building is being used for steel fabrication and the extra height is provided only to facilitate movement of objects by a crane, the building would probably be considered as a one storey building and an occupancy credit percentage may be warranted.

Note G: If a building is exposed within 45 metres, normally some surcharge for exposure will be made.

Note H: Where wood shingle or shake roofs could contribute to spreading fires, add 2,000 L/min to 4,000 L/min in accordance with extent and condition.

Note I: Any non-combustible building is considered to warrant a 0.8 coefficient.

Note J: Dwellings: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following short method may be used. (For other residential buildings, the regular method should be used.)

Exposure distances	Suggested required fire flow	
	Wood Frame	Masonry or Brick
Less than 3m	See Note "D"	6,000 L/min
3 to 10m	4,000 L/min	4,000 L/min
10.1 to 30m	3,000 L/min	3,000 L/min
Over 30m	2,000 L/min	2,000 L/min

If the buildings are contiguous, use a minimum of 8,000 L/min. Also consider Note H.

OUTLINE OF PROCEDURE

- A. Determine the type of construction.
- B. Determine the ground floor area.
- C. Determine the height in storeys.
- D. Using the fire flow formula, determine the required fire flow to the nearest 1,000 L/min.
- E. Determine the increase or decrease for occupancy and apply to the value obtained in D above. Do not round off the answer.
- F. Determine the decrease, if any, for automatic sprinkler protection. Do not round off the value.
- G. Determine the total increase for exposures, Do not round off the value.
- H. To the answer obtained in E, subtract the value obtained in F and add the value obtained in G.

The final figure is customarily rounded off to the nearest 1,000 L/min.

APPENDIX

TYPES OF CONSTRUCTION

For the specific purpose of using the Guide, the following definitions may be used:

Fire-Resistive Construction - Any structure that is considered fully protected, having at least 3-hour rated structural members and floors. For example, reinforced concrete or protected steel.

Non-combustible Construction - Any structures having all structural members including walls, columns, piers, beams, girders, trusses, floors, and roofs of non-combustible material and not qualifying as fire-resistive construction. For example, unprotected metal buildings.

Ordinary Construction - Any structure having exterior walls of masonry or such non-combustible material, in which the other structural members, including but not limited to columns, floors, roofs, beams, girders, and joists, are wholly or partly of wood or other combustible material.

Wood Frame Construction - Any structure in which the structural members are wholly or partly of wood or other combustible material and the construction does not qualify as ordinary construction.

OCCUPANCIES

Examples of Low Hazard Occupancies:

Apartments	Hotels	Prisons
Asylums	Institutions	Public Buildings
Churches	Libraries, except Large	Rooming Houses
Clubs	Stack Room Areas	Schools
Colleges & Universities	Museums	Tenements
Dormitories	Nursing, Convalescent	
Dwellings	and Care Homes	
Hospitals	Office Buildings	

Generally, occupancies falling in National Building Code Groups A, B, C and D are of this class.

Examples of High Hazard Occupancies:

Aircraft Hangars	Linseed Oil Mills
Cereal, Feed, Flour and Grist Mills	Match Manufacturing
Chemical Works - High Hazard	Oil Refineries
Cotton Picker and Opening Operations	Paint Shops
Explosives & Pyrotechnics Manufacturing	Pyroxylin Plastic Manufacturing & Processing
Shade Cloth Manufacturing	Solvent Extracting
Foamed Plastics, Storage or use in Manufacturing	Varnish and Paint Works
High Piled Combustibles Storage in excess of 6.5 metres high	Woodworking with Flammable Finishing
	Linoleum and Oilcloth Manufacturing

Other occupancies involving processing, mixing storage and dispensing flammable and/or combustible liquids. Generally, occupancies falling in National Building Code Group F, Divisions 1 and 2 would be in this class.

For other occupancies, good judgment should be used, and the percentage increase will not necessarily be the same for all buildings that are in the same general category - for example "Colleges and Universities": this could range from a 25% decrease for buildings used only as dormitories to an increase for a chemical laboratory. Even when considering high schools, the decrease should be less if they have extensive shops.

It is expected that in commercial buildings no percentage increase or decrease for occupancy will be applied in most of the fire flow determinations. In general, percentage increase or decrease will not be at the limits of plus or minus 25%.

EXPOSURES

When determining exposures it is necessary to understand that the exposure percentage increase for a fire in a building (x) exposing another building (y) does not necessarily equal the percentage increase when the fire is in building (y) exposing building (x). The Guide gives the maximum possible percentage for exposure at specified distances. However, these maximum possible percentages should not be used for all exposures at those distances. In each case the percentage applied should reflect the actual conditions but should not exceed the percentage listed.

The maximum percentage for the separations listed generally should be used if the exposed building meets all of the following conditions:

- a. Same type or a poorer type of construction than the fire building.
- b. Same or greater height than the fire building.
- c. Contains unprotected exposed openings.
- d. Unsprinklered.

CONVERSION FACTORS

Multiply	By	To Obtain
Centimetre	0.3937	Inches
Cubic Foot	0.0283	Cubic Metres
Cubic Metre	35.3145	Cubic Feet
Cubic Metre	219.97	Imperial Gallons
Cubic Metre	1.000	Litres
Foot	0.3048	Metres
Horsepower	0.7457	Kilowatt
Imperial Gallon	4.546	Litres
Inch	2.54	Centimetres
Kilogram	2.2046	Pounds
Kilogram of Water	1	Litres
Kilopascal	0.1450	Pounds per sq. inch
Kilowatt	1.341	Horsepower
Litre	0.21997	Imperial Gallons
Litre of Water	1	Kilograms
Metre	3.281	Feet
Metre of Water	10	Kilopascals
Pound	0.4536	Kilograms
Pound per sq. inch	6.89476	Kilopascals
U.S. Gallons	0.8327	Imperial Gallons
Imperial Gallons	1.201	U.S.Gallons

APPENDIX C - Required Fire Flow Summary



City of Courtenay
Required Fire Flow Summary



RFF #	Address	Building Name	Footprint Area <i>m2</i>	Number of Storeys	Effective Total Area <i>m2</i>	Building Construction	Coeff	Occupancy Charge	Sprinkler Protection Reduction	Exposure Charge	Wood Shake Charge <i>LPM</i>	Required Fire Flow <i>LPM</i>	Required Fire Flow <i>IGPM</i>	Comments
1	3199 Cliffe Avenue	Walmart	10,085	1.0	10,085	Non-combustible	0.8	0%	-40%	0%	0	11,000	2,400	
2	Kilpatrick Avenue	Kilpatrick Ave Strip mall	22,184	1.0	22,184	Non-combustible	0.8	0%	-50%	5%	0	14,000	3,100	
3	2428 Cliffe Avenue	Lordco auto parts	3,335	1.0	3,335	Non-combustible	0.8	-5%	0%	9%	0	10,000	2,200	
4	2420 Cliffe Avenue	Tireland/Valley computers	1,843	2.0	3,686	Ordinary	1	-5%	0%	27%	0	16,000	3,500	
5	1885 Cliffe Avenue	Anco Motel	1,228	2.0	2,456	Ordinary	1	-10%	0%	18%	0	12,000	2,600	
6	Cliffe Avenue	Cliffe Ave Strip mall	3,286	1.0	3,286	Non-combustible	0.8	-10%	0%	18%	0	11,000	2,400	
7	268 5th Street	Stores on 5th street	3,134	1.0	3,134	Ordinary	1	-10%	0%	40%	0	15,000	3,300	
8	805 Willemar Avenue	Lake Trail middle school	5,653	2.0	11,306	Non-combustible	0.8	-15%	0%	0%	0	16,000	3,500	
9	230 8 Street	Shoppers Drug Mart	3,350	1.0	3,350	Non-combustible	0.8	-10%	0%	23%	0	11,000	2,400	
10	1540 Percy Avenue	Pacific Court	1,370	2.0	2,740	Wood-framed	1.5	-15%	0%	16%	0	17,000	3,700	
11	3610 Christie Parkway	All Secure mini-storage	663	1.0	663	Non-combustible	0.8	-10%	0%	20%	0	5,000	1,100	
12	3830 Warren Avenue	Royston Elementary School	2,781	1.0	2,781	Non-combustible	0.8	-15%	0%	0%	0	8,000	1,800	
13	3672 Island Hwy South	Residential	527	2.0	1,054	Wood-framed	1.5	-15%	0%	5%	0	10,000	2,200	
14	1551 Lerwick Road	Mark Isfeld Secondary	11,000	1.0	11,000	Non-combustible	0.8	-10%	-40%	0%	0	10,000	2,200	
15	2160 Hawk Drive	Trumpeter Greene	644	2.0	1,288	Wood-framed	1.5	-15%	0%	25%	0	13,000	2,900	
16	2450 Back Road	Glacier View Lodge	4,700	1.0	4,700	Ordinary	1	-15%	-40%	5%	1,000	9,000	2,000	
17	South Island Highway	Superstore	9,825	1.0	9,825	Non-combustible	0.8	-10%	-40%	6%	0	10,000	2,200	
18	175 Centennial Drive	Southview Manor	1,380	3.0	4,140	Ordinary	1	-15%	0%	10%	0	13,000	2,900	
19	1030 Braidwood Road	Braidwood Manor	1,280	4.0	5,120	Wood-framed	1.5	-15%	0%	9%	0	22,000	4,800	
20	4640 Headquarters Road	Casa Loma Retirement home	1,450	3.0	4,350	Ordinary	1	-15%	-40%	10%	0	9,000	2,000	
21	98 Mitchell Road	Arden Country Estates	628	1.0	628	Wood-framed	1.5	-15%	0%	49%	0	10,000	2,200	
22		School?	3,150	1.0	3,150	Ordinary	1	-15%	0%	4%	0	11,000	2,400	
23		Braidwood Centre	4,469	1.0	4,469	Ordinary	1	-15%	-40%	10%	1,000	10,000	2,200	
24	1015 Cumberland	Aran House Apartments	1,231	4.0	4,924	Wood-framed	1.5	-15%	-40%	11%	0	14,000	3,100	
25	470 Puntledge Road	Peircy Creek Estates	334	2.0	668	Wood-framed	1.5	-15%	-40%	48%	0	8,000	1,800	
26	2317 Cousins Avenue	Georgia Straight Collision	600	1.0	600	Wood-framed	1.5	0%	0%	17%	0	9,000	2,000	
27	2441 Cousins Ave	Multiple Mercantile	1,256	2.0	2,512	Ordinary	1	10%	0%	12%	0	13,000	2,900	
28	2440 Rosewall Crescent	Mixed Retail and Residential	382	2.0	764	Ordinary	1	0%	0%	33%	0	8,000	1,800	
29	20 Anderton Avenue	Convenience Store	946	1.0	946	Wood-framed	1.5	-15%	0%	65%	0	14,000	3,100	
30	3245 Cliffe Avenue	Futureshop/Sportcheck	3,684	1.0	3,684	Non-combustible	0.8	0%	-40%	3%	0	7,000	1,500	
31	2966 Kilpatrick Avenue	Salvation Army/Mercantile	2,608	1.0	2,608	Ordinary	1	0%	0%	14%	0	13,000	2,900	
32	2967 Kilpatrick Avenue	Multi Family Residential	1,825	1.0	1,825	Non-combustible	0.8	0%	-40%	21%	0	7,000	1,500	
33	2920 Moray Avenue	Comox Valley Flooring	1,848	2.0	2,772	Ordinary	1	0%	0%	9%	0	13,000	2,900	
34	801 29th Street	Tayco Paving/Eagle FM	1,156	1.0	1,156	Ordinary	1	-15%	0%	6%	0	6,000	1,300	
35	2775 Murray Avenue	Various Mercantile	1,357	1.0	1,357	Ordinary	1	5%	0%	23%	0	10,000	2,200	

City of Courtenay
Required Fire Flow Summary



RFF #	Address	Building Name	Footprint Area	Number of Storeys	Effective Total Area	Building Construction	Coeff	Occupancy Charge	Sprinkler Protection Reduction	Exposure Charge	Wood Shake Charge	Required Fire Flow	Required Fire Flow	Comments
			<i>m2</i>		<i>m2</i>						<i>LPM</i>	<i>LPM</i>	<i>IGPM</i>	
41	1970 Fitzgerald	Park Place	656	2.0	1,312	Wood-framed	1.5	-15%	0%	25%	0	13,000	2,900	
42	450 19th Street	Blue Jay Lofts	555	3.0	1,665	Wood-framed	1.5	-15%	0%	12%	0	12,000	2,600	
43	1365 14 Street	Multiple Mercantile	800	1.0	800	Ordinary	1	0%	0%	19%	0	7,000	1,500	
44	3666 Royal Vista Way	Corinthia Estates	923	4.0	4,793	Wood-framed	1.5	-15%	-40%	6%	0	13,000	2,900	
45	2300 Valley View Drive	Valley View Elementary	3,497	1.0	4,497	Ordinary	1	-15%	-40%	8%	0	9,000	2,000	
46	444 Lerwick Road	Crown Isle Shopping Centre	4,908	2.0	7,413	Non-combustible	0.8	0%	-40%	5%	0	10,000	2,200	
47	388 Lerwick Road	Home Depot	10,068	2.0	10,068	Non-combustible	0.8	10%	-40%	0%	0	12,000	2,600	
48	588 Crown Isle Road	Coscto	13,554	2.0	13,554	Non-combustible	0.8	5%	-40%	0%	0	13,000	2,900	
49	4644 Madrona Place	Various Industrial/Mercantile	600	1.5	900	Non-combustible	0.8	0%	0%	46%	0	7,000	1,500	
50	2345 Mission Road	Queeneesh Elementary	3,715	2.0	7,430	Non-combustible	0.8	-15%	-40%	0%	0	8,000	1,800	
51	4692 Alderwood Place	Joshua Estates	570	3.0	1,710	Wood-framed	1.5	-15%	0%	35%	0	16,000	3,500	
52	2767 Muir Road	Muir Ridge	422	2.0	844	Wood-framed	1.5	-15%	0%	55%	0	13,000	2,900	
53	4883 Frontage Road	Courtenay ATV	912	1.0	912	Non-combustible	0.8	0%	0%	15%	0	6,000	1,300	
54	4911 Frontage Road	Comox Fireplace and Patio	911	1.0	911	Non-combustible	0.8	0%	0%	17%	0	6,000	1,300	
55	4830 Headquarters Road	Georges P. Vanier Secondary	10,390	2.0	15,585	Non-combustible	0.8	-10%	0%	5%	0	21,000	4,600	
56	3001 Vanier Drive	Comox Valley Sports Centre	7,800	2.0	15,600	Non-combustible	0.8	-15%	-40%	3%	0	12,000	2,600	
57	1599 Tunner Drive	Christ King Church	1,763	3 and 4	4,408	Wood-framed	1.5	-15%	-40%	0%	0	11,000	2,400	
58	1450 Tunner Court	Ryan Court	730	2.0	1,460	Wood-framed	1.5	-15%	0%	26%	0	14,000	3,100	
59	333 Hunt Road	Canada Post	1,440	1.0	1,440	Non-combustible	0.8	0%	0%	15%	0	8,000	1,800	
60	840 Braidwood Road	The Oaks Villa	1,100	4.0	4,400	Wood-framed	1.5	-15%	0%	19%	0	22,000	4,800	
61	178 Braidwood Road	Maplewood Manor	1,060	3.0	3,180	Wood-framed	1.5	-15%	0%	8%	0	17,000	3,700	
62		Canadian Tire	4,835	2.0	4,835	Non-combustible	0.8	0%	-40%	0%	0	7,000	1,500	
63		Braidwood Centre	1,328	1.0	1,328	Ordinary	1	0%	0%	9%	0	9,000	2,000	
64	350 Island Hwy	Value Village	2,312	2.0	2,312	Non-combustible	0.8	-10%	-40%	21%	0	6,000	1,300	
65	470 Puntledge Road		783	1.0	783	Non-combustible	0.8	0%	0%	8%	0	5,000	1,100	
66		Lewis Centre	2,392	1.0	2,392	Non-combustible	0.8	-15%	0%	1%	0	8,000	1,800	
67		Multiple Mercantile	1,092	1.0	1,092	Ordinary	1	0%	0%	4%	0	7,000	1,500	
68		Honda	1,918	2.0	1,918	Ordinary	1	0%	0%	8%	0	11,000	2,400	
69		Convenience Store	500	2.0	750	Wood-framed	1.5	-10%	0%	8%	0	9,000	2,000	
70		Cedar Manor	300	2.0	600	Wood-framed	1.5	-15%	0%	34%	0	9,000	2,000	
71		Offices	550	2.0	782	Wood-framed	1.5	-15%	0%	23%	0	9,000	2,000	
72		Multi Family Residential	680	2.0	1,360	Wood-framed	1.5	-15%	0%	12%	0	11,000	2,400	
73		Electric Playground Fashion Etc	644	1.0	644	Ordinary	1	-10%	0%	35%	0	7,000	1,500	
74		2 storey offices	626	2.0	1,252	Wood-framed	1.5	-15%	0%	23%	0	12,000	2,600	
75		Home Hardware	3,190	2.0	7,632	Non-combustible	0.8	10%	0%	5%	0	17,000	3,700	

APPENDIX D - Insurance Grading of Used or Rebuilt Apparatus



TECHNICAL BULLETIN

FIRE UNDERWRITERS SURVEY™

A Service to Insurers and Municipalities

INSURANCE GRADING RECOGNITION OF USED OR REBUILT FIRE APPARATUS

The performance ability and overall acceptability of older apparatus has been debated between municipal administrations, the public fire service and many others for years. Fire Underwriters Survey (FUS) has reviewed experiences across Canada and in other countries and has developed a standard for acceptance of apparatus as the apparatus becomes less reliable with age and use.

The public fire service is unique compared to other emergency services in that fire apparatus vehicles are not continuously in use. However, when in use, the apparatus is subject to considerable mechanical stress due to the nature of its function. This stress does not normally manifest itself on the exterior of the equipment. It is effectively masked in most departments by a higher standard of aesthetic care and maintenance. Lack of replacement parts further complicates long term use of apparatus. Truck and pump manufacturers maintain a parts inventory for each model year for a finite time. After that period, obtaining necessary parts may be difficult. This parts shortage is particularly acute with fire apparatus due to the narrow market for these devices.

Fire Underwriters Survey lengthy experience in evaluating fire apparatus indicates that apparatus should be designed to an acceptable standard. The standard that is accepted throughout Canada by Fire Underwriters Survey is the Underwriters' Laboratories of Canada (ULC) Standard S515 (most updated version) titled, "Automobile Fire Fighting Apparatus," which was adopted as a National Standard of Canada in September 2004. Alternatively, NFPA 1901, the Standard for Automotive Fire Apparatus (most updated version) is also accepted by Fire Underwriters Survey with respect to apparatus design. Fire apparatus should be built by recognized manufacturers and tested by a suitably accredited third party.

Fire apparatus should respond to first alarms for the first fifteen years of service. During this period it has reasonably been shown that apparatus effectively responds and performs as designed without failure at least 95% of the time. For the next five years, it should be held in reserve status for use at major fires or used as a temporary replacement for out-of-service first line apparatus. Apparatus should be retired from service at twenty years of age. Present practice indicates the recommended service periods and protocols are usually followed by the first purchaser. However, at the end of that period, the apparatus is either traded in on new apparatus or sold to another fire department. At this juncture, the unit may have one or more faults which preclude effective use for emergency service. These deficiencies include:

- a. Inadequate braking system
- b. Slow pick-up and acceleration



- c. Structurally weakened chassis due to constant load bearing and/or overloading
- d. Pump wear

FUS has modified its application of the age requirement for used or rebuilt apparatus. Due to municipal budget constraints within small communities we have continued to recognize apparatus over twenty years of age, provided the truck successfully meets the recommended annual tests and has been deemed to be in excellent mechanical condition. The specified service tests are outlined below under the heading “Recommended Service Tests for Used or Modified Fire Apparatus”. Testing and apparatus maintenance should only be completed by a technician who is certified to an appropriate level in accordance with NFPA 1071, *Standard for Emergency Vehicle Technician Professional Qualifications*.

Insurance grading recognition may be extended for a limited period of time if we receive documentation verifying that the apparatus has successfully passed the specified tests. If the apparatus does not pass the required tests or experiences long periods of “downtime” we may request the municipal authority to replace the equipment with new or newer apparatus. If replacement does not occur, fire insurance grading recognition may be revoked for the specific apparatus which may adversely affect the fire insurance grades of the community. This can also affect the rates of insurance for property owners throughout the community.

Table 1 Service Schedule for Fire Apparatus For Fire Insurance Grading Purposes

Apparatus Age	Major Cities ³	Medium Sized Cities ⁴	Small Communities ⁵ and Rural Centres
0 – 15 Years	First Line Duty	First Line Duty	First Line Duty
16 – 20 Years	Reserve	2 nd Line Duty	First Line Duty
20 – 25 Years ¹	No Credit in Grading	No Credit in Grading <i>or</i> Reserve ²	No Credit in Grading <i>or</i> 2 nd Line Duty ²
26 – 29 Years ¹	No Credit in Grading	No Credit in Grading <i>or</i> Reserve ²	No Credit in Grading <i>or</i> Reserve ²
30 Years +	No Credit in Grading	No Credit in Grading	No Credit in Grading

¹ All listed fire apparatus 20 years of age and older are required to be service tested by recognized testing agency on an annual basis to be eligible for grading recognition. (NFPA 1071)

² Exceptions to age status may be considered in a small to medium sized communities and rural centres conditionally, when apparatus condition is acceptable and apparatus successfully passes required testing.

³ Major Cities are defined as an incorporated or unincorporated community that has:

- a populated area (or multiple areas) with a density of at least 400 people per square kilometre; AND
- a total population of 100,000 or greater.

⁴ Medium Communities are defined as an incorporated or unincorporated community that has:

- a populated area (or multiple areas) with a density of at least 200 people per square kilometre; AND/OR
- a total population of 1,000 or greater.

⁵ Small Communities are defined as an incorporated or unincorporated community that has:

- no populated areas with densities that exceed 200 people per square kilometre; AND
- does not have a total population in excess of 1,000.



Table 2 Frequency of Listed Fire Apparatus Acceptance and Service Tests

	Frequency of Test					
	@ Time of Purchase New or Used	Annual Basis	@ 15 Years	@ 20 Years <i>See Note 4</i>	20 to 25 Years (annually)	After Extensive Repairs <i>See Note 5</i>
Recommended For Fire Insurance Purposes	Acceptance Test if new; Service Test if used & < 20 Years	Service Test	Acceptance Test	Acceptance Test	Acceptance Test	Acceptance or Service Test depending on extent of repair
Required For Fire Insurance Purposes	Acceptance Test if new; Service Test if used & < 20 Years	No Test Required	No Test Required	Acceptance Test	Acceptance Test	Acceptance or Service Test depending on extent of repair
Factor in FUS Grading	Yes	Yes	Yes	Yes	Yes	Yes
Required By Listing Agency	Acceptance Test	No	No	No	N/A	Acceptance Test
Required By NFPA <i>See Note 6</i>	Acceptance Test	Annual Service Test	Annual Service Test	Annual Service Test	Annual Service Test	Service Test

Note 1: See: 'Service Tests for Used or Rebuilt Fire Apparatus' for description of applicable tests

Note 2: Acceptance Tests consist of 60 minute capacity and 30 minute pressure tests

Note 3: Service Tests consist of 20 minute capacity test and 10 minute pressure test in addition to other listed tests

Note 4: Apparatus exceeding 20 years of age may not be considered to be eligible for insurance grading purposes regardless of testing. Application must be made in writing to Fire Underwriters Survey for an extension of the grade-able life of the apparatus.

Note 5: Testing after extensive repairs should occur regardless of apparatus age within reason.

Note 6: Acceptance Tests: See NFPA 1901, Standard for Automotive Fire Apparatus

Service Tests: See NFPA 1911, Standard for Service Tests of Fire Pump Systems on Fire Apparatus, Article 5.1



SERVICE TESTS FOR USED OR MODIFIED FIRE APPARATUS

The intent of this document is to ensure that all used or modified fire apparatus, equipped with a pump or used for tanker service, essentially meet the requirements of Underwriters' Laboratories of Canada (ULC) "Standard for Automobile Fire Fighting Apparatus" S515-04 or subsequent (current) editions of the Standard. Full adherence with the following specified tests is recommended when purchasing used apparatus.

Weight Tests

Load Balance Test:

When fully laden (including a 460kg (1000 lbs) personnel weight, full fuel and water tanks, specified load of hose and miscellaneous equipment), the vehicle shall have a load balance of 22% to 50% of total vehicle mass on the front axle and 50% to 78% of this mass on the rear axle.

Distribution of mass of 33% and 67% respectively on the front and rear axles is preferable for a vehicle having dual rear tires or tandem rear axles.

For a vehicle having tandem rear axles and dual tires on each axle, a loading of between 18% and 25% on the front axle with the balance of mass on the rear axles is permissible.

Road Tests

Acceleration Tests:

2.1.1) From a standing start, the apparatus shall attain a true speed of 55 km/h (35 mph) within 25 seconds for Pumpers carrying up to 3,150 litres (700 gallons) of water.

For apparatus carrying in excess of 3,150 litres (700 gallons) or apparatus equipped with aerial ladders or elevating platforms, a true speed of 55 km/h (35 mph) in 30 seconds should be attained.

2.1.2) The vehicle should attain a top speed of at least 80 km/h (50mph).

Braking Test:

The service brakes shall be capable of bringing the fully laden apparatus to a complete stop from an initial speed of 30 km/h (20 mph) in a distance not exceeding 9 metres (30 feet) by actual measurement. The test should be conducted on a dry, hard surfaced road that is free of loose material, oil and grease.



Pump Performance Tests

Hydrostatic Test

Recent evidence of hydrostatic testing of the pump for 10 minutes at a minimum pressure of 3,400 kPa (500 psi). APPLICABLE TO NEW OR REBUILT PUMPS ONLY (see 3.3).

Priming and Suction Capability Tests

Vacuum Test:

The pump priming device, with a capped suction at least 6 metres (20 feet) long, shall develop -75 kPa (22 inches of mercury) at altitudes up to 300 metres (1000 feet) and hold the vacuum with a drop of not in excess of 34 kPa (10 inches of mercury) in 10 minutes.

For every 300 metres (1000 feet) of elevation, the required vacuum shall be reduced 3.4 kPa (1 inch mercury).

The primer shall not be used after the 10-minute test period has been started. The test shall be made with discharge outlets uncapped.

Suction Capability Test:

The pump (in parallel or series) when dry, shall be capable of taking suction and discharging water with a lift of not more than 3 metres (10 feet) through 6 metres (20 feet) of suction hose of appropriate size, in not more than 30 seconds and not over 45 seconds for 6000 L/min (1320 lgpm) or larger capacity pumps. Where front or rear suction is provided on midship pumps, an additional 10 seconds priming time will be allowed. The test shall be conducted with all discharge caps removed.

Pump Performance

Capacity Test:

Consists of drafting water (preferably with a 10 feet lift) and pumping the rated capacity at 1000 kPa (150 psi) net pump pressure for a continuous period of at least 1 hour.

Pressure Test:

Under the same conditions as in 3.3.1 above pumping 50% of the rated capacity at 1700 kPa (250 psi) net pump pressure for at least ½ hour



For additional information on the above noted tests and test procedures, the following documents provide useful data:

- Underwriters Laboratories of Canada (ULC) publication titled S515 Standard for Automobile Fire Fighting Apparatus, latest edition.
- Fire Underwriters Survey (FUS) publication titled Fire Stream Tables and Testing Data latest edition.
- International Fire Service Training Association (IFSTA) publication titled Fire Department Pumping Apparatus, latest edition.
- National Fire Protection Association (NFPA) 1901 Standard for Automotive Fire Apparatus, latest edition.
- National Fire Protection Association (NFPA) 1911 Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, latest edition.
- National Fire Protection Association (NFPA) 1912 Standard for Fire Apparatus Refurbishing, latest edition.

For further information regarding the acceptability of emergency apparatus for fire insurance grading purposes, please contact:

Western Canada	Quebec	Ontario	Atlantic Canada
Risk Management Services Fire Underwriters Survey 3999 Henning Drive Burnaby, BC V5C 6P9 1-800-665-5661	Risk Management Services Fire Underwriters Survey 1611 Crémazie Blvd. East Montreal, Quebec H2M 2P2 1-800-263-5361	Risk Management Services Fire Underwriters Survey 150 Commerce Valley Drive, West Markham, Ontario L3T 7Z3 1-800- 268-8080	Risk Management Services Fire Underwriters Survey 238 Brownlow Avenue, Suite 300 Dartmouth, Nova Scotia B3B 1Y2 1-800-639-4528



APPENDIX E - Requirements for Aerial Apparatus



TECHNICAL BULLETIN

FIRE UNDERWRITERS SURVEY™

A Service to Insurers and Municipalities

LADDERS AND AERIALS: WHEN ARE THEY REQUIRED OR NEEDED?

Numerous standards are used to determine the need for aerial apparatus and ladder equipment within communities. This type of apparatus is typically needed to provide a reasonable level of response within a community when buildings of an increased risk profile (fire) are permitted to be constructed within the community.

Please find the following information regarding the requirements for aerial apparatus/ladder companies from the Fire Underwriters Survey Classification Standard For Public Fire Protection.

Fire Underwriters Survey

Ladder/Service company operations are normally intended to provide primary property protection operations of

- 1.) Forcible entry;
- 2.) Utility shut-off;
- 3.) Ladder placement;
- 4.) Ventilation;
- 5.) Salvage and Overhaul;
- 6.) Lighting.

Response areas with 5 buildings that are 3 stories or 10.7 metres (35 feet) or more in height, or districts that have a Basic Fire Flow greater than 15,000 LPM (3,300 IGPM), or any combination of these criteria, should have a ladder company. The height of all buildings in the community, including those protected by automatic sprinklers, is considered when determining the number of needed ladder companies.

When no individual response area/district alone needs a ladder company, at least one ladder company is needed if the sum of buildings in the fire protection area meets the above criteria.”

The needed length of an aerial ladder, an elevating platform and an elevating stream device shall be determined by the height of the tallest building in the ladder/service district (fire protection area) used to determine the need for a ladder company. One storey normally equals at least 3 metres (10 feet). Building setback is not to be considered in the height determination. An allowance is built into the ladder design for normal access. The maximum height needed for grading purposes shall be 30.5 metres (100 feet).



Exception: When the height of the tallest building is 15.2 metres (50 feet) or less no credit shall be given for an aerial ladder, elevating platform or elevating stream device that has a length less than 15.2 metres (50 feet). This provision is necessary to ensure that the water stream from an elevating stream device has additional "reach" for large area, low height buildings, and the aerial ladder or elevating platform may be extended to compensate for possible topographical conditions that may exist. See Fire Underwriters Survey - Table of Effective Response (attached).

Furthermore, please find the following information regarding communities' need for aerial apparatus/ladder companies within the National Fire Protection Association.

NFPA

Response Capabilities: The fire department should be prepared to provide the necessary response of apparatus, equipment and staffing to control the anticipated routine fire load for its community.

NFPA Fire Protection Handbook, 20th Edition cites the following apparatus response for each designated condition:

HIGH-HAZARD OCCUPANCIES (schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high-risk or large fire potential occupancies):

*At least four pumpers, **two ladder trucks** (or combination apparatus with equivalent capabilities), two chief officers, and other specialized apparatus as may be needed to cope with the combustible involved; not fewer than 24 firefighters and two chief officers.*

MEDIUM-HAZARD OCCUPANCIES (apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or firefighting forces):

*At least three pumpers, **one ladder truck** (or combination apparatus with equivalent capabilities), one chief officer, and other specialized apparatus as may be needed or available; not fewer than 16 firefighters and one chief officer.*

LOW-HAZARD OCCUPANCIES (one-, two-, or three-family dwellings and scattered small businesses and industrial occupancies):

*At least two pumpers, **one ladder truck** (or combination apparatus with equivalent capabilities), one chief officer, and other specialized apparatus as may be needed or available; not fewer than 12 firefighters and one chief officer.*



In addition to the previous references, the following excerpt from the 2006 BC Building Code is also important to consider when selecting the appropriate level of fire department response capacity and building design requirements with regard to built-in protection levels (passive and active fire protection systems).

Excerpt: National Building Code 2006

A-3 Application of Part 3.

In applying the requirements of this Part, it is intended that they be applied with discretion to buildings of unusual configuration that do not clearly conform to the specific requirements, or to buildings in which processes are carried out which make compliance with particular requirements in this Part impracticable. The definition of “building” as it applies to this Code is general and encompasses most structures, including those which would not normally be considered as buildings in the layman's sense. This occurs more often in industrial uses, particularly those involving manufacturing facilities and equipment that require specialized design that may make it impracticable to follow the specific requirements of this Part. Steel mills, aluminum plants, refining, power generation and liquid storage facilities are examples. A water tank or an oil refinery, for example, has no floor area, so it is obvious that requirements for exits from floor areas would not apply. Requirements for structural fire protection in large steel mills and pulp and paper mills, particularly in certain portions, may not be practicable to achieve in terms of the construction normally used and the operations for which the space is to be used. In other portions of the same building, however, it may be quite reasonable to require that the provisions of this Part be applied (e.g., the office portions). Similarly, areas of industrial occupancy which may be occupied only periodically by service staff, such as equipment penthouses, normally would not need to have the same type of exit facility as floor areas occupied on a continuing basis. It is expected that judgment will be exercised in evaluating the application of a requirement in those cases when extenuating circumstances require special consideration, provided the occupants' safety is not endangered.

The provisions in this Part for fire protection features installed in buildings are intended to provide a minimum acceptable level of public safety. It is intended that all fire protection features of a building, whether required or not, will be designed in conformance with good fire protection engineering practice and will meet the appropriate installation requirements in relevant standards. Good design is necessary to ensure that the level of public safety established by the Code requirements will not be reduced by a voluntary installation.

Firefighting Assumptions

The requirements of this Part are based on the assumption that firefighting capabilities are available in the event of a fire emergency. These firefighting capabilities may take the form of a paid or volunteer public fire department or in some cases a private fire brigade. If these firefighting capabilities are not available, additional fire safety measures may be required.



Firefighting capability can vary from municipality to municipality. Generally, larger municipalities have greater firefighting capability than smaller ones. Similarly, older, well established municipalities may have better firefighting facilities than newly formed or rapidly growing ones. The level of municipal fire protection considered to be adequate will normally depend on both the size of the municipality (i.e., the number of buildings to be protected) and the size of buildings within that municipality. Since larger buildings tend to be located in larger municipalities, they are generally, but not always, favoured with a higher level of municipal protection.

Although it is reasonable to consider that some level of municipal firefighting capability was assumed in developing the fire safety provisions in Part 3, this was not done on a consistent or defined basis. The requirements in the Code, while developed in the light of commonly prevailing municipal fire protection levels, do not attempt to relate the size of building to the level of municipal protection. **The responsibility for controlling the maximum size of building to be permitted in a municipality in relation to local firefighting capability rests with the municipality. If a proposed building is too large, either in terms of floor area or building height, to receive reasonable protection from the municipal fire department, fire protection requirements in addition to those prescribed in this Code, may be necessary to compensate for this deficiency.** Automatic sprinkler protection may be one option to be considered.

Alternatively, the municipality may, in light of its firefighting capability, elect to introduce zoning restrictions to ensure that the maximum building size is related to available municipal fire protection facilities. This is, by necessity, a somewhat arbitrary decision and should be made in consultation with the local firefighting service, who should have an appreciation of their capability to fight fires.

The requirements of Subsection 3.2.3. are intended to prevent fire spread from thermal radiation assuming there is adequate firefighting available. It has been found that periods of from 10 to 30 minutes usually elapse between the outbreak of fire in a building that is not protected with an automatic sprinkler system and the attainment of high radiation levels. During this period, the specified spatial separations should prove adequate to inhibit ignition of an exposed building face or the interior of an adjacent building by radiation. Subsequently, however, reduction of the fire intensity by firefighting and the protective wetting of the exposed building face will often be necessary as supplementary measures to inhibit fire spread.

In the case of a building that is sprinklered throughout, the automatic sprinkler system should control the fire to an extent that radiation to neighbouring buildings should be minimal. Although there will be some radiation effect on a sprinklered building from a fire in a neighbouring building, the internal sprinkler system should control any fires that might be ignited in the building and thereby minimize the possibility of the fire spreading into the exposed building. NFPA 80A, "Protection of Buildings from Exterior Fire Exposures," provides additional information on the possibility of fire spread at building exteriors.

The water supply requirements for fire protection installations depend on the requirements of any automatic sprinkler installations and also on the number of fire streams that may be needed



at any fire, having regard to the length of time the streams will have to be used. Both these factors are largely influenced by the conditions at the building to be equipped, and the quantity and pressure of water needed for the protection of both the interior and exterior of the building must be ascertained before the water supply is decided upon. Acceptable water supplies may be a public waterworks system that has adequate pressure and discharge capacity, automatic fire pumps, pressure tanks, manually controlled fire pumps in combination with pressure tanks, gravity tanks, and manually controlled fire pumps operated by remote control devices at each hose station.

For further information regarding the acceptability of emergency apparatus for fire insurance grading purposes, please contact:

Western Canada	Quebec	Ontario	Atlantic Canada
Risk Management Services Fire Underwriters Survey 3999 Henning Drive Burnaby, BC V5C 6P9 1-800-665-5661	Risk Management Services Fire Underwriters Survey 1611 Crémazie Blvd. East Montreal, Quebec H2M 2P2 1-800-263-5361	Risk Management Services Fire Underwriters Survey 150 Commerce Valley Drive, West Markham, Ontario L3T 7Z3 1-800- 268-8080	Risk Management Services Fire Underwriters Survey 238 Brownlow Avenue, Suite 300 Dartmouth, Nova Scotia B3B 1Y2 1-800-639-4528



APPENDIX F - Courtenay Fire Department Fire Fighter Equivalent Unit Summary



APPENDIX G - Hydrant Distribution Analysis Summary





Courtenay and Comox Valley Regional District Water System Hydrant Distribution Analysis Summary

Commercial Area:	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	
Area considered name	FFDZ - 3	FFDZ - 7	FFDZ - 8	FFDZ - 9	FFDZ - 11	FFDZ - 13	FFDZ - 15	
Total Area Considered (sq.m)	435,426	135,520	599,284	580,579	951,574	325,668	824,539	sq.m
Number of equivalent hydrants in area	29	15	36	43	49	28	74	hydrants
Area weight	11%	4%	16%	15%	25%	8%	24%	
Average Area served per hydrant =	15,015	9,035	16,647	13,502	19,420	11,631	11,142	sq.m/hydrant
	162,000	97,000	179,000	145,000	209,000	125,000	120,000	sq.ft area served per hydrant
Average RFF for area considered for Area	2,425	3,617	1,925	3,033	3,033	2,350	2,525	IGPM
Required Average area per hydrant from Standard Hydrant Distribution Table:	11,500	9,375	12,750	10,250	10,250	11,750	11,250	sq.m area served per hydrant
	124,000	101,000	137,000	110,000	110,000	126,000	121,000	sq.ft area served per hydrant
Credit Percentage:	77%	100%	77%	76%	53%	100%	100%	
	249	Credit Points	Out of	■				



Residential Area:	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	
Area considered name	FFDZ - 1	FFDZ - 2	FFDZ - 4	FFDZ - 10	FFDZ - 12	FFDZ - 14	CVRD - 1	CVRD - 2	CVRD - 3	CVRD - 4	
Total Area Considered (sq.m)	1,527,220	2,497,444	1,129,929	915,936	694,873	1,112,608	1,534,205	1,891,930	426,176	1,217,846	sq.m
Number of equivalent hydrants in area	94	142	78	51	34	64	43	67	12	29	hydrants
Area weight	16%	27%	12%	10%	7%	12%	16%	19%	6%	16%	
Average Area served per hydrant =	16,247	17,588	14,486	17,960	20,437	17,385	35,679	28,238	35,515	41,995	sq.m/hydrant
	175,000	189,000	156,000	193,000	220,000	187,000	384,000	304,000	382,000	452,000	sq.ft area served per hydrant
Average RFF for area considered	1,500	1,500	1,500	1,500	1,500	1,500	1,000	1,000	1,000	1,000	IGPM
Required Average area per hydrant from											
Standard Hydrant Distribution Table:	13,500	13,500	13,500	13,500	13,500	13,500	14,750	14,750	14,750	14,750	sq.m area served per hydrant
	145,000	145,000	145,000	145,000	145,000	145,000	159,000	159,000	159,000	159,000	sq.ft area served per hydrant
Credit Percentage:	83%	77%	93%	75%	66%	78%	41%	52%	42%	35%	
	240	Credit Points	Out of	█							



Royston Hydrant Distribution Analysis Summary

Residential Areas	Area 1	Area 2	
Area considered name	1	2	
Total Area Considered (sq.m)	688,765	1,903,665	sq.m
Number of equivalent hydrants in area	21	60	hydrants
Area weight	27%	73%	
Average Area served per hydrant =	32,798	31,728	sq.m/hydrant
	353,000	342,000	sq.ft area served per hydrant
Average RFF for area considered	1.200	1,200	IGPM
Required Average area per hydrant from Standard Hydrant Distribution Table:	14,250	14,250	sq.m area served per hydrant
	14,250	14,250	sq.ft area served per hydrant
Credit Percentage:	43%	45%	
	295	Credit Points	Out of



Sandwick Hydrant Distribution Analysis Summary

Residential Areas	Area 1	Area 2	Area 3	
Area considered name	1	2	3	
Total Area Considered (sq.m)	337,270	797,326	955,159	sq.m
Number of equivalent hydrants in area	13	27	29	hydrants
Area weight	16%	38%	46%	
Average Area served per hydrant =	25,944	29,531	32,937	sq.m/hydrant
	279,000	318,000	355,000	sq.ft area served per hydrant
Average RFF for area considered	1.200	1,200	1,200	IGPM
Required Average area per hydrant from Standard Hydrant Distribution Table:	14,250	14,250	14,250	sq.m area served per hydrant
	153,000	153,000	153,000	sq.ft area served per hydrant
Credit Percentage:	55%	48%	43%	
	315	Credit Points	Out of	█

APPENDIX H - Recommended Frequency of Fire Prevention Inspections



TECHNICAL BULLETIN

FIRE UNDERWRITERS SURVEY™

A Service to Insurers and Municipalities

FIRE UNDERWRITERS SURVEY RECOMMENDED FREQUENCY OF FIRE PREVENTION INSPECTIONS

The frequency of fire prevention inspections for all occupancies should be specifically appropriate for the level of fire risk within the occupancy. The frequency of inspections will vary from one occupancy to another depending on:

1. Type of occupancy.
2. Occupant load.
3. Function.
4. Grade of hazard.

As the fire risk increases, the frequency of inspections should also be increased.

The following table is a minimum frequency guideline for major occupancy classifications from the National Building Code of Canada.

Group - Division (National Building Code) Occupancy	Minimum Inspection Frequency
A-1	6 months
A-2	6 months
A-3	6 months
A-4	6 months
B-1	6 months
B-2	6 months
C	6 months
D	12 months
E	12 months
F-1	3 months
F-2	6 months
F-3	6 months



Sample Customized Frequency Schedule

Sample Customized Frequency Schedule <i>Group - Division National Building Code</i> Occupancy		Inspection Frequency	Sample Customized Frequency Schedule <i>Group - Division National Building Code</i> Occupancy		Inspection Frequency
A-1	Movie Theaters Theaters	6 months 6 months	C	Apartments	6 months
A-2	Bowling Alleys	6 months		Boarding Houses	6 months
	Churches	6 months	Hotels (Unsprinklered)	2 months	
	Non-Residential Clubs	6 months	Hotels (Sprinklered)	4 months	
	Community Halls	6 months	Lodging Houses	6 months	
	Dance Halls	6 months	Motels	6 months	
	Exhibition Halls	6 months	Residential Schools	6 months	
	Gymnasiums	6 months	D	Banks	12 months
	Libraries	6 months		Barbers/Hairdressers	12 months
	Licensed Beverage Premises (Unsprinklered)	2 months		Beauty Parlours	12 months
	Licensed Beverage Premises (Sprinklered)	4 months		Dental Offices	12 months
	Museums	6 months		Self-Services Laundries	12 months
Restaurants	6 months	Medical Offices		12 months	
Schools	4 months	Offices		12 months	
Daycares	6 months	Radio Stations		12 months	
Undertaker Premises	6 months	Appliance Service/Rentals		12 months	
A-3	Arenas Rinks Indoor Pools	6 months 6 months 6 months		E	Department Stores
A-4	Stadiums	6 months	Shops		12 months
	B-1	Jails	6 months		Stores
Police Stations		6 months	Supermarkets	12 months	
B-2	Children's Custodial Homes	2 months	F-1	Feed Mills	3 months
	Hospitals	2 months		Spray Paint Booths	3 months
	Nursing Homes	4 months	F-2	Warehouses, Service Stations	12 months
		F-3		Storage Garages, Medical Labs	12 months

For further information regarding frequency of fire prevention inspections for fire insurance grading purposes, please contact a Fire Underwriters Survey office.

Western Canada	Quebec	Ontario	Atlantic Canada
Risk Management Services Fire Underwriters Survey 3999 Henning Drive Burnaby, BC V5C 6P9 1-800-665-5661	Risk Management Services Fire Underwriters Survey 1611 Crémazie Blvd. East Montreal, Quebec H2M 2P2 1-800-263-5361	Risk Management Services Fire Underwriters Survey 150 Commerce Valley Drive, West Markham, Ontario L3T 7Z3 1-800- 268-8080	Risk Management Services Fire Underwriters Survey 238 Brownlow Avenue, Suite 300 Dartmouth, Nova Scotia B3B 1Y2 1-800-639-4528



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