

# Mayne Island Fire Rescue

## Fire Department Apparatus Replacement Report



### Report Purpose

The purpose of this report is to identify typical roles of the fire apparatus, identify any deficiencies of the fire department apparatus currently employed in provision of emergency services, and then prioritize the selection of replacement fire apparatus, including a review of the vehicle reserve fund.

### **Typical roles of the Fire Apparatus.**

Mayne Island Fire Department operates a fleet of six apparatus to provide emergency services.

- 1 Primary Engine: - Responds to all fire calls, all MVI calls, Hazmat calls, backup for EMA-FR calls
- 3 Water Tenders - Water Supply operations, backup for second alarm fires (Tender 1 only)
- 1 Rescue/Light Attack - Responds to all EMA-FR, Rescues, MVI (Jaws), Forest Fire Calls
- 1 Utility pickup - Responds to all fire calls (Command Post), all non-emergency investigations  
(note: Utility 1 will be outfitted with a Jump Kit, Oxygen & AED and will be the backup for EMA-FR calls)

The Primary Engine responds to all fire incidents and carries the firefighting equipment and initial attack crew to begin tactical operations of firefighting. Secondary roles of the Engine are to MVI and EMA-FR calls both as a support unit for additional equipment and personnel and as a backup for second EMA-FR calls. To meet Fire Underwriters Survey (FUS) grading, a new Primary Engine (*Engine 2*) will take place of Engine 1 in 2017. It is intended that Engine 1 will remain in service as a second engine for many years to support the Primary Engine and to respond to second alarms in an initial fire attack capacity. As a secondary engine, Engine 1 may be assigned as an attack pumper or as a supply pumper whenever the water source is within 300 metres of a fire. Currently, Mayne Island does not have any backup vehicles in reserve to cover an apparatus downtime.

The Water Tender Shuttle apparatus are responsible for the water supply on all fire calls, whether structural or wildland fires. During water shuttle operations the three tenders must deliver water at a rate of 265 gallons per minute within a round trip time of 16 minutes or less. With foresight and planning when purchasing, the Water Tenders and crew are also equipped to respond as a backup to deal with small outdoor fires as directed.

A failure of one Tender during a water shuttle supply operation reduces the available water supply from 265 to 165 gallons per minute - insufficient to operate two 38mm hoses simultaneously making an ineffective fire attack.

The Rescue / Light Attack apparatus is equipped with EMA-FR supplies, rescue extrication tools, self contained breathing apparatus and firefighting equipment enabling responses to all types of rescue calls: Emergency Medical Aid (EMA-FR), MVI and Auto-Extrication (Jaws), Rescue including Rope Rescue (THARR), Rescue from general situations, including animal rescue and outdoor fires, including brush and forest fires. MVI calls have a huge potential to become vehicle fires and requires additional apparatus dispatched to provide additional personnel to expedite the extrication process and firefighting capacity to protect trapped patients from and extinguish any potential or developing fire. Multiple or simultaneous calls for fires or EMA-FR are not common but do occur on occasion.

A failure of the Rescue / Light Attack apparatus may increase human suffering due to significant delays in response times.

The Utility vehicle is utilized for non-emergency calls, training purposes, Duty Officer calls to investigate complaints, rescue calls and forestry responses.

Emergency Medical Aid calls account more than three quarters of all emergency call responses; whereas fires of all types account for less than 10 percent of emergency responses by Mayne Island Fire Department.

To maintain the accepted levels of service and effective response times, steps must be taken to identify and correct significant deficiencies with any fire department apparatus. In some cases the recommendation will be to replace the apparatus as soon as practicable.



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### Current Apparatus Details

Designation:	Description	Age:	Odometer at 09/2012:	Proposed replacement:	Projected Cost:
Rescue: Rapid Attack*	1994 Ford Super-Duty Crew	18 yrs	65,464	2013	\$150,000
Tender: Tender 2*	1986 Ford Cargo	26 yrs	305,917	2014	\$200,000
Engine: Engine 1	1996 Freightliner FL80	16 yrs	16,708	2017	\$375,000
Tender: Tender 1	2000 Freightliner FL80	12 yrs	6,117	2021	\$200,000
Tender: Tender 3	2010 Freightliner M2	2 yrs	1450	2030	\$200,000
Utility: Utility 1	2012 Ford Super-Duty Crew	0 yrs	322	2025	\$70,000

### Identified deficiencies

**Rapid Attack\*** The 2011 Capital Plan identifies Rapid Attack for replacement in the year 2025 at 31 years of age.

However, Rapid Attack has several deficiencies that make it a priority for replacement, particularly considering this apparatus responds to the highest percentage of emergency calls of all the fire department apparatus.

Rapid Attack was heavily modified by DND as a service truck prior to being converted into a Rescue / Light Attack for Mayne Island Fire Department. The deficiencies include

- mechanical component substitutions
- frame lengthened by approximately three feet
- steering performance is extremely poor during manoeuvres of typical intersections and driveways
- 210 Hp Diesel engine, automatic transmission

Breakdowns of mechanical and electrical components on this vehicle present significant repair problems and delays causing Rapid Attack to be out of service for lengthy periods:

- body and engine electrical systems do not necessarily match Ford technical specifications
- some mechanical components are not available
- certain components added by DND modifications are difficult to identify and are not replaceable

**Tender 2\*** The 2011 Capital Plan identified Tender Two for replacement in the year 2029 at 43 years of age and is not suitable as an emergency response apparatus due to performance, reliability and safety factors.

Tender 2 also has several deficiencies including:

- non-fire service rated brake components
- modified mechanical components
- intermittent electrical and starting problems
- 165 Hp turbo diesel with manual transmission is underpowered

Converted from a cargo van, Tender 2 was modified by shortening the frame and driveline components. Tender 2 does not carry any firefighting equipment because its capacity is full when loaded with its passengers, full tank of water, a portable tank and a few hoses. In addition to this capacity issue, the vehicle is quite difficult to drive and requires a skilled driver to operate safely and effectively. Deficiencies and safety concerns include:

- non-fire service rated service brake components
- undetermined "lean" to one side has not been identified nor repaired
- electrical problems that cause an intermittent no-start condition have not been repaired successfully
- no-start problems after an engine stall; drivers are not permitted to shut off the engine during calls.
- mechanical driveline components modified from stock parts
- difficult to obtain replacement parts for this model of Ford Cargo (informed none now available)
- Village Bay Repairs is holding an exhaust manifold in stock for this truck as we have been informed that another will not be obtainable



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### Conclusion:

Rapid Attack responds to the highest number of calls of all the apparatus and is regularly required to perform flawlessly during emergency medical aid calls. The community depends on the truck to transport crews quickly, reliably and safely in order to save lives, reduce human suffering and protect property and the environment.

Tender 2 is an integral component of effective firefighting tactics and is a key element in the water supply system for structural and wild land firefighting. Sufficient water supply determines the success of firefighter's efforts and limits extent of property loss.

These two vehicles were not built as fire apparatus. Both were purchased as used vehicles and modified for Mayne Island Fire Department. As such, many parts are custom fit and a direct replacement part is not available from a parts depot. These two apparatus exhibit poor performance and reliability when compared against similar factory built apparatus. Mechanical failures or accident caused by mechanical failure of either of these apparatus will not only place the department in reduced response capabilities but other consequences range from minor to severe, including liability, and firefighter as well as public safety. Replacement should not be based on economics, but on safety, reliability, longevity, and efficiency. The previous scheduled replacement dates are unrealistic expectations considering the demands of fire service and this fire departments requirement.

- Apparatus must be "safe and ready for immediate use" at all times; day and night, all year.
- Apparatus must be equipped to carry the number of personnel and all tools deemed to be necessary to carry out the emergency response tasks of the apparatus purpose and task designation.
- Apparatus must be reliable and readily repairable to be safe and ready for immediate use

Since these two vehicles do not serve their intended purposes effectively, safely, economically, nor efficiently they should be considered for timely replacement. Rapid Attack should be considered for immediate replacement as our first priority. Tender 2 must also be considered for early replacement as soon as is practicable.

The Fire Department suggests replacing Rapid Attack by July 2013 and replacing Tender 2 by July of 2014. In order to facilitate these purchases, a review of the funding model is included.

### Basis Criteria for Fire Department Apparatus Selection

For new or replacement apparatus, it can be considered best practice to purchase new apparatus only, except in extenuating circumstances such as when an immediate replacement apparatus may be required to replace an unserviceable apparatus due to total loss from an accident or other catastrophic event.

- Apparatus will have fire service rated components where desirable, including brake components
- Apparatus will be built with commonly available commercial vehicle chassis
- Apparatus will maintain compatibility with existing firefighting equipment and tools currently in service
- Apparatus will have automatic transmission and have a turbo diesel engine
- Apparatus will maintain single axle configuration
- Apparatus will be certified to NFPA, CAN ULC requirements when applicable

Apparatus design varies greatly.

Tender 3 is an example of a good functional tender design. Care should be exercised to ensure future tender apparatus are similar, if not identical. Shown are two examples of appropriate vehicles, including Tender 3.



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### Rescue / Light Attack Primary and secondary tasks:

- Emergency Medical Aid; Firefighter Rehab Station at fire incidents;
- Rescue - Technical High Angle Rope Rescue; Search & Rescue; animal rescue incidents;
- Motor Vehicle Incident - includes Emergency Medical Aid; entrapment rescue (Jaws); fire protection;
  - Outdoor Fires - grass; brush; wildland; dumpster; garbage fires;
  - Community Service; ie: EMA-FR Standby for Community event Terry Fox Run;
  - Firefighter & Personnel transportation

### 2013 - New Rescue / Light Attack

4 Wheel Drive Crew Cab Chassis  
Hub Custom Light Attack/Rescue  
Hub Fire Fighter 200 CAFS  
Turbo Diesel Engine 300 HP  
Allison 1000 EVS Transmission  
Rear SCBA Seats, Electric Ladder rack  
Hydraulic Generator, Light Tower

*LMC 5500  
CAB STYLE  
NO WORKSHE  
AVAILABLE*



A Rescue / Light Attack must carry the necessary equipment for:

For EMA-FR calls: Jump kit, Oxygen, AED, Blankets

For MVI calls: Extrication tools, Stabilization Equipment, Firefighting Equipment, Hazmat spill kit

For Rope Rescue calls: Life Safety Ropes, Rescue Harness, Rappelling equipment, Basket stretcher

Firefighting Equipment : Hoses, Water, Ladder, Axes, SCBA & spare bottles, saw, fire extinguishers

For Firefighter Rehab Station: Rehydration, nutrition, warming and cooling equipment

### Water Tender Primary and secondary tasks:

- Water supply shuttle
  - Relay pumping unit
  - Outdoor Fires - grass; brush; wildland fires
  - Firefighter transport to incidents

### 2014 - New Water Tender - same as Tender 3 with improvements

Freightliner M2 Chassis  
Hub Custom Enclosed Tanker  
Hale AP50 Pump 420 IGPM  
Co Poly Water Tank 1500 Imperial Gallons  
Cummins ISC Engine 300 HP  
Allison 3500 EVS Transmission  
Roll Up Doors, Porta Tank Storage, Extandalites  
Hard Suction Storage Electric Ladder rack, hose reel



A Water Tender must carry the necessary equipment for:

For Water Supply Fill Site: Supply Hose, Hydrant fittings & tools, hose bridges, safety cones

For Water Supply Dump Site: 2 Porta Tanks, Jet Siphon, Hard Suction Hose, Fittings & Adapters

As a Relay Pumper: On-Board high flow pump, 1200 feet of 4 inch Supply line, Fittings & Adapters

As a Standalone Firefighting vehicle: 38mm hand line, Hose line reel, Pulaski, axe, saw



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### Fire Department Apparatus Reserve Fund Review

To purchase future planned apparatus, reserve funds are collected each year from taxation, eliminating the need to finance the cost of fire department apparatus. Currently \$60,000 is transferred each year into the Vehicle Reserve fund. (fig. 1)

The 2011 Capital Plan does not provide consideration for any unplanned vehicle replacement and also presents a highly over-optimistic assessment of the service life and functionality for the two oldest apparatus: Rapid Attack and Tender 2. There are no reserves built up to purchase an immediate replacement after a loss.

(fig. 1) current plan - no change  
2011 Capital Plan - Vehicle Reserve Fund - 25 year apparatus replacement projection 2012-2036

Year:	2012	2016	2022	2025	2029	2030	2036	-	-	-	-
Balance - opening	115,550	305,550	315,550	245,550	335,550	195,550	305,550				
Contributions	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000				
Disbursements	-50,000	-350,000	-250,000	-150,000	-200,000	-250,000	-350,000				
Balance - closing	125,550	15,550	125,550	155,550	195,550	5,550	15,550				
Replaced Apparatus:	Command	Engine 1	Tender 1	R/A	Tender 2	Tender 3	Engine 2				

Continuing with the current plan for 2013 there will be approximately \$185,000 in the vehicle reserve fund to purchase a new Rescue / Light Attack vehicle at an estimated cost of \$150,000. (fig. 2)

This early replacement of Rapid Attack will cause this funding model to breakdown and creates serious challenges in meeting the funding requirements for future apparatus replacement.

- This funding model cannot provide funds for the necessary replacement of Tender 2 in 2014.
- This funding model cannot provide funds for the necessary purchase of Engine 2 in 2016.
- Current plan cannot recover funds before the next apparatus is due for replacement.
- Financing is an option but this will create an additional \$70,000 annual loan repayment over five years.
- Financing is subject to approval by constituent approval - either by referendum or counter-petition.
- Extending the purchase date of apparatus is possible if it passes annual recertification each year.
- Delaying the purchase date of Engine 2 creates an imbalance in the apparatus life cycle funding plan.
- Further, there are no emergency funds built up to purchase a replacement after a loss.

(fig. 2) current plan - with early replacement of Rapid Attack // Tender 2  
2011 Capital Plan - Vehicle Reserve Fund - 25 year apparatus replacement projection 2012-2045

Current Year:	2012	2013	2014	2016	2022	2025	2030	2033	2036	2040	2045
Balance - opening	115,550	125,550	15,550	245,550	-34,450	-104,450	125,550	55,550	60,550	-124,450	-49,450
Contributions	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000	+60,000
Disbursements	-50,000	-150,000	-200,000	-350,000	-250,000	-70,000	-250,000	-175,000	-425,000	-225,000	-315,000
Balance - closing	125,550	35,550	-104,450	-334,450	-224,450	-114,450	-64,450	-59,450	-304,450	-289,450	-304,450
Replaced Apparatus:	Command	R/A	Tender 2	Engine 1	Tender 1	Utility 1	Tender 3	Rescue 1	Engine 2	Tender 4	T5 & U2



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The immediate solution to fund the required replacement of Rapid Attack and Tender 2 is to temporarily increase the Vehicle Reserve fund contributions over the next five years only, beginning with the 2013 budget. (fig. 3)

Increasing the Vehicle Reserve fund contributions from \$60,000 to \$120,000 from 2013 through 2017 will enable the purchase of Rescue 1 in 2013, Tender 4 in 2014 and Engine 2 in 2017. Once this is achieved, the annual Vehicle Reserve fund contribution is then reduced to \$65,000 and remains so through 2050.

In addition, by the year 2021 there will be sufficient accumulations in the Vehicle Reserve fund to enable the immediate purchase of an unplanned replacement apparatus due to total loss as well as allowing for unknown inflations in true costs that cannot be accurately predicted with today's information.

Financing is an option for Tender 2 replacement and the acquisition of Engine 2 but this would create an additional \$50 - 70,000 annual loan repayment over five years, which in fact increases the true cost by more than an increase in the vehicle reserve fund contribution due to interest paid, not interest earned. Financing should only be considered for an emergency replacement due to loss until sufficient reserves are built up in reserve.

It should be noted that increasing the annual vehicle reserve fund contribution to by \$60,000 is a net reduction of \$10,000 calculated at a loan repayment of \$70,000 per annum.

Following the proposed 25 year apparatus replacement projection plan outlined below, the required apparatus are acquired within a reasonable time frame, sufficient reserves are built up for emergency purchases by 2021, and the apparatus replacement cycle is stabilized to a typical five year spread between subsequent purchases to allow for good planning and selection of apparatus.

(fig. 3) proposed plan - with early replacement of Rapid Attack // Tender 2  
2012 Capital Plan - Vehicle Reserve Fund - 25 year apparatus replacement projection 2012-2050

Current Year:	2012	2013	2014	2017	2021	2025	2030	2035	2040	2045	2050
Balance - opening	115,550	125,550	95,550	255,550	195,550	255,550	-54,450	460,550	360,550	460,550	470,550
Contributions	+60,000	+120,000	+120,000	+120,000	+65,000	+65,000	+65,000	+65,000	+65,000	+65,000	+65,000
Disbursements	-50,000	-150,000	-200,000	-375,000	-200,000	-70,000	-375,000	-425,000	-225,000	-315,000	-225,000
Balance - closing	125,550	95,550	15,550	550	60,550	255,550	200,550	100,550	200,550	210,550	310,550
Replaced Apparatus:	Command	R/A	Tender 2	Engine 1	Tender 1	Utility 1	T3 & R1	E2	T4	T5 & U2	T6

A policy of purchasing only newly built apparatus provides additional confidence of a long and reliable service life of the apparatus, allowing for future apparatus planning based on needs, not on available funding.

Respectfully,

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Steven DeRousie, Deputy Fire Chief

Acting Fire Chief, Acting Heliport Manager

Sept 12 2012