Pender Island Fire Rescue

Training Facility Project Overview – December 2017

Executive Summary

Competencies in a wide range of tasks are essential for firefighters to quickly and safely deliver effective emergency response services. British Columbia provincial law obligates both career and volunteer firefighters to practice and demonstrate their abilities in those critical skills on a regular basis.

Creating, practicing and sustaining those competencies requires qualified instructors, effective training plans and appropriate facilities. As part of a long-term strategy to develop Excellence in Service Delivery, Pender Island Fire Rescue (PIFR) has been improving training facilities, developing instructors, and establishing agreements with educational institutions. PIFR also recognized that rigorous, challenging training was essential to recruit and retain the right volunteers. So, the training component of the strategy addresses three issues – service quality, responder safety, and personnel.

At the end of 2017, PIFR has reached a significant milestone in the success of this plan. On January 5th, 2018, we will officially open the Live Fire / Drill Tower Training Structure completing the third major phase of training facility development. Phase I included an auto extrication training area; Phase II was a water conservation system and propane-fueled exterior fire training props; Phase III is the structure. Completion of this work will enable responders on Pender to learn, practice and master a wide range of response skills, without leaving the island. Eliminating the costs of off-island travel and rental of other department's facilities will save our Pender community approximately $70,000 per year. As all phases of the project have been generously supported by private foundation donations, individual contributions, and provincial agency grants, our community is well positioned to benefit in many ways from this communal success.

The following pages provide a more detailed view of the training facilities, administrative and personnel development at Pender Island Fire Rescue.

Facilities overview

The Pender Island Fire Rescue training facilities at 4423 Bedwell Harbour Road on North Pender Island have been progressively completed over a number of years to address the requirements of training new and advanced emergency responders on the island. These industry-standard facilities supplement PIFR's long-term investment in the development of qualified trainers and accreditation relationships. Over $850,000 in support from private foundations, individual and organization contributions, and a major grant from the Province of BC has enabled PIFR to design, construct and complete the facilities without financially burdening our community. We are especially grateful to the Robert L. Conconi Foundation, Nu-To-You, the Royal Canadian Legion, Sea Star Estate, the Victoria Foundation, Farm Credit Canada, and CRD Director Howe for his work to secure a Community Works Grant to help fund the water conservation system. We are also extremely grateful for the unsung heroes among our neighbours who made the project possible through significant financial contributions and for all the firefighters, officers, and community professionals who donated hundreds of hours of their time, professional knowledge and skills to promote and manage the project.

Currently, the facilities include:

- Spill and water capture area
- Water recovery and storage system
- Automotive extrication and heavy rescue training area
- Live-fire training props and burn pads
- Propane and electrical utility system
- Confined space training chamber
- Live-fire and drill tower structure

Spill and water capture area

The facilities have been designed and built to mitigate the environmental impact of training exercises. Consideration has been given to reducing fuel consumption, limiting smoke, and minimizing liquid run-off. Smoke reduction and fuel use measures are described later in this document, and major investments have been made to minimize liquid contamination and maximize water recovery, storage and re-use. Prevention of contaminant and water runoff has been achieved at the PIFR facility by the construction of a 2100 square meter (22,540 square foot) capture basin and water recovery system. The capture basin area has been excavated down to solid, load-bearing level, then backfilled, compacted and finally paved with asphalt to create safe work areas for various evolutions, capturing any spilled or leaked materials, and the majority of water used in fire suppression. As well, the basin captures rainfall to be stored for use in training and community fire protection.

Water recovery and storage system

The water recovery and storage system consists of drains, filters, settlement tanks, pumps, tanks, hydrants and connecting lines, as shown in Figure 1, below. Drains at low points in the capture basin and training structure collect liquids and are connected to the settlement tank. Filters in the drains remove gross contaminants and hydrocarbons. Water from the drains flows into a settlement tank, where more suspended solids settle out. From the first chamber in the settlement tank, the water flows over a weir into a pump-out chamber. From this chamber, level-controlled pumps move the water up to the fiberglass storage tanks.

These two tanks have a combined capacity of 227 cubic meters (50,000 Imperial Gallons), which is adequate for extended training use, as well as fire protection for the PIFR Fire Hall Number 1 on the same site. Outlets from the tanks connect to two standard fire hydrants, located to facilitate training as well as use in community fire protection.
This water supply is supplemented by the capture of rainwater from the roof of the fire hall, which is collected into a small holding chamber and pumped to the storage tanks.

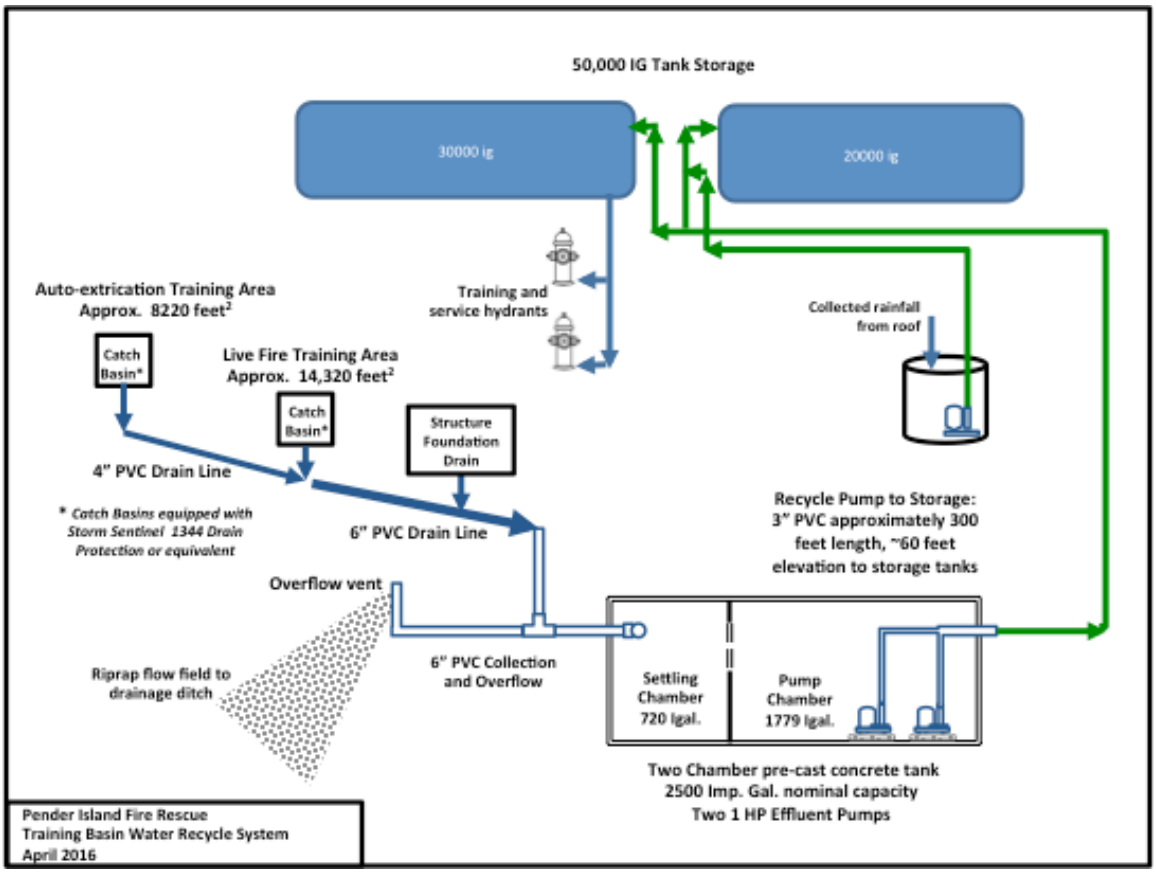

Figure 1. Water capture, recovery and storage system

Automotive extrication and heavy rescue training area

A portion of the paved catch basin area is allocated for training and practice of automotive extrication and heavy rescue skills. This area has a cedar fence for visual screening from the adjoining property, a more aggressive surface contour for liquids and debris capture, and a hydrocarbon absorbent filter in the drainage collection point.

Live-fire training props and burn pads

There are six concrete burn pads incorporated into the water capture basin, all supplied with propane and electrical service through underground lines. Five of these pads serve as the bases for various live-fire training props, such as vehicles, dumpsters, and pressure tanks. The sixth is a dedicated burning-liquids pool. The concrete construction of the pads and pool protects the surrounding asphalt from the heat of the burning props, and directs suppression water onto the capture basin for re-use. A typical burn pad is shown below, in Figure 2.

Figure 2. Burn pad and utility risers

Figure 3. Propane control manifold

Propane and electrical utility system

As mentioned earlier, each of the burn pads is supplied with electrical service and propane through supply lines buried under the basin area. The use of propane fuel for training fires greatly reduces the amount of smoke and noxious emissions, replacing the solid organic fuels and hydrocarbon accelerants used previously. Each pad has three propane supply lines, which are individually controlled at a manifold located in the control station, shown in Figure 3.

The electrical supply to each pad is routed from the breaker panel located in the Live-fire structure. Intent of the power supply is to enable the future use of electrically operated and controlled propane-fueled props.

Confined space training chamber

During construction of the training basin, a 2500-gallon (11.4 cubic meter) concrete cistern was installed below the finish grade level for use as a confined-space rescue-training venue. The cistern is fitted with two vertical access hatches and a 15-foot long by 3-foot diameter (4.6 by 0.9 meter) horizontal access tunnel. This configuration, along with movable surface props, enables a wide variety of safe, realistic simulation of cistern, cave, and structural collapse rescue scenarios.

Figure 5. Training chamber

Live-fire and drill tower structure

Completed in December of 2017, the Live-Fire / Drill Tower Structure at the PIFR training facility meets and exceeds the requirements of NFPA 1402, Guide to Building Fire Service Training Centers. This fully engineered structure was designed and built to not only meet the standard requirements, but to realistically replicate many local residences. Live-fire burn rooms on three different levels of a 4-storey tower, variable interior wall geometry, a cold smoke generator distribution system, multi-level entrances, including a standard garage door, multiple ventilation and access props, and 360-degree vehicle access provide a wide range of training environments, from basic skill development to complex fire and rescue scenarios.

For safety, an automated temperature monitoring, alarm and exhaust system is active during all evolutions. Audible and visible alarms are sounded when the temperature at any point in the structure reaches a warning level; a second set of audible and visual alarms, as well as burn room ventilators are activated when temperature at any point exceeds safety limits. The alarm and safety shutdown temperature limits are set high enough to ensure realistic training experience, but low enough to protect participants and the structure. Manual alarm and ventilation activation switches are located on the exterior of the structure, and in the electrical control room.

A functional wood stove, chimney and attic space have been included to replicate the challenges of one of our most common structure fire situations.

As well, the structure is equipped with safety-rated anchor points and an engineered rappelling arch on the highest level for Technical High Angle Rope Rescue training and practice. Pick-off balconies and an exterior deck can be accessed from the arch, enabling a wide range of rescue evolutions.

Figure 5. Live-fire and drill tower structure

Primary function of facilities

The training facilities were designed and built to enable Pender Island Fire Rescue to meet and maintain compliance with National Fire Protection Association (NFPA) standards. These standards are broadly referenced in the now mandatory training requirements for firefighters in BC, as defined in the British Columbia Structure Firefighters Competency and Training Playbook. Although the Playbook was not yet provincial regulation during most of the design and construction period, the emerging requirement to meet the international standards was anticipated and well understood. Adequate, appropriate training and supervision are necessary to minimize firefighter deaths and injuries and therefore mandated under worker protection legislation.

The new facilities minimize the risk to our firefighters during initial training, testing and qualification. Perhaps more importantly, they provide a venue for qualified responders to maintain their skills, as required by NFPA Standard 1500, Fire Department Occupational Safety and Health Program (2013). Section 5 of that standard states: *"Members shall practice assigned skill sets on a regular basis but not less than annually."*

By having the full range of necessary facilities on the island, PIFR will save more than $70,000 each year in off-island costs, while still meeting the regulatory requirements for initial and ongoing skills practice. The facilities will also reduce community exposure to prosecution and penalties under much stricter worker protection Acts and regulations.

In addition to enabling PIFR to affordably meet the regulatory requirements, the new facilities play a key role in the safety, competency, recruitment and retention of fire department volunteers.

It is said that "Good judgment comes from experience; experience comes from bad judgment". The right type of training facilities provide opportunities for participants to safely learn the consequences of incorrect decisions, reinforce the awareness, understanding and knowledge necessary to make good decisions, and reinforce the positive outcomes of those correct decisions. This experience will result in more correct decisions being made in stressful circumstances, translating directly into better service quality and safer responders. Experienced department members will also have more opportunities to develop advanced competencies, improving community response services and increasing trainer capabilities.

According to Rebecca Denlinger, former Fire and Emergency Management Commissioner of British Columbia, *"Quality training has been identified as a primary reason individuals choose to join and remain members of a fire department."* It has been clearly confirmed across North America that more rigorous, quality training increases retention of volunteer firefighters.

This is particularly important on Pender, and in many regional communities, where demographics and declining volunteerism are challenging the ability of fire departments to achieve and maintain adequate staff levels. The physical and mental challenges provided by an interesting and effective training program are primary elements in the solution to personnel challenges. Simply stated - Good training attracts, and retains, good people.

Operational requirements and current capabilities

Although the most visible and capital cost intensive, the physical facilities are only one part of the infrastructure necessary to deliver training. To make successful use of those facilities and props, the right administration and human resources are required.

Pender Island Fire Rescue has a majority of these administrative processes and human resources already in place.

Administration:
Effective educational administration includes:

- Training standards and procedures
- Training accreditation
- Training curriculum
- Training quality management
- Safety management
- Facilities maintenance, inspection and operation
- Scheduling and planning
- Training documentation and records management
- Management of operations and maintenance

Training standards and procedures:

Pender Island Fire Rescue operates and trains under the direction of a wide set of Operational Guidelines (OGs). These OGs have been developed and refined by PIFR over a number of years, and now effectively provide the framework for safe, effective emergency response service delivery, training and support. There are more than 110 current guidelines, ranging from Safety Guidelines to Emergency Traffic Control, to Ground Ladder Placement to Public Presentation Protocol. Whenever appropriate, these guidelines refer to higher-level standards and regulations, such as NFPA and WorkSafe BC. These guidelines provide a solid base for planning, preparing, delivering and managing training.

Training accreditation:

PIFR has formal agreements with three educational institutes; College of the Rockies (COTR), Justice Institute of British Columbia, (JIBC) and Vancouver Island Emergency Response Academy (VIERA). Each of these organizations are accredited by the National Board of Fire Service Professional Qualifications (ProBoard) or the International Fire Service Accreditation Congress (IFSAC). ProBoard and IFSAC are the primary bodies that accredit other organizations to certify training using the NFPA standards.

This means that training provided by PIFR in compliance with the defined agreement, curriculum, and evaluation criteria enables successful candidates to be certified by IFSAC or Pro Board, meeting the standards recognized throughout North America.

Training curriculum:

For most standard firefighter competencies, the skill and knowledge requirements are clearly defined by an associated standard, typically NFPA. PIFR delivers practical and classroom training to the associated NFPA standard utilizing a standard curriculum and

syllabus approved by our advanced education partners. Delivery can be customized to accommodate a variety of scheduling options to best meet the needs of the students. Approved invigilators and evaluators, in strict conformance with the policies and procedures mandated by ProBoard or IFSAC, deliver exams and practical evaluations. For more specialized training, local, regional or other expertise is used to develop, oversee and assist delivery.

Training quality management:

There is regular oversight and review of training events by senior department management, with ongoing coaching and development of instructors. An Operational Guideline is being drafted to implement a definition and framework for a structured instructor review and development process. Additionally, automated feedback processes, such as the Training Session Evaluation Mobile App, are being evaluated to enable and encourage participants to provide immediate, anonymous and first-hand input on the quality and effectiveness of training.

Safety management:

PIFR has earned a strong record of occupational safety excellence through a combination of leadership, communication and performance management.
The basis for this success in safety management is documented in Pender Island Fire Rescue Occupational Health and Safety Program, OSH-0-1 through OSH-0-13. Additional guidance is provided by Operational Policy #19, Training Safety (2015 Revision), Operational Guidelines 1-01 through 1-15, and Operations Guideline 2-01.

These documents clearly define the method and practices necessary to minimize the risks to volunteers and staff.

However, it does take much more than strong planning to achieve a safe work environment. It requires strong, consistent leadership and clear communication, leading to adoption of a safe-work mindset by all team members. PIFR has successfully developed and sustained this operational safety culture, as demonstrated by their safety performance record over the last ten years.

The same basis, plan and effective management of safety will be applied to all activities in the new facilities. This will provide a minimal-risk training environment.

Facilities maintenance, inspection and operation:

PIFR has ongoing experience with the development and effective use of planned maintenance programs, most successfully with the Truck Checker teams. PIFR will use the Live Fire Structure manufacturers maintenance and inspection plan as a base, and develop a maintenance plan for the complete training facility. This will include the specific inspections, acceptance criteria, preventative maintenance, checklists, documentation and schedule for the care and sustained operability of all training props, structures, systems, equipment and operations areas. The plan will define the required inspection and maintenance based on the intensity of facilities use.

PIFR will follow that plan to ensure that facilities are safe, ready for use, and will provide the best possible training experience. Additionally, defining the scope of work will assist in predicting and measuring the actual costs of operations.

Training documentation and records management:

PIFR has developed, and is utilizing a custom spreadsheet based training records management system. This is in addition to the records maintained for individuals by specific accrediting institutions such as College of the Rockies, Justice Institute of British Columbia, Vancouver Island Emergency Response Academy, National Board of Fire Service Professional Qualifications and the International Fire Service Accreditation Congress. The PIFR system allows simple recording and review of competency status, qualifications and endorsements either by individual, or by technical specialty. Having local, individual records, supplemented by the records of the accrediting agencies, allows for education tracking, planning and resource management.

Human Resources:

The Human Resources necessary to deliver the training that is defined by administration and enabled by the facilities include:

- Trainers, Evaluators
- Support Crew
- Clerical support
- Management

Trainers, Evaluators:

According to NFPA, any individual responsible for competency training and evaluation of firefighters must be qualified to a minimum of Fire Service Instructor Level 1 standards. These requirements are identified in NFPA Standard 1041, Fire Service Instructor Professional Qualifications.

As each level of qualification in each discipline is specifically defined in the relevant NFPA standard, the pathway for development and certification of instructors is very clear. PIFR has been following that pathway, investing and developing trainers for more than ten years. As a result, the current cadre of NFPA qualified trainers is as shown in Table 1, below.

Technical Skill	Standard	Fire Service Instructors	Fire Service Evaluators
Structural Firefighting	NFPA 1001	12	3
Automotive Extrication	NFPA 1006, 1670	12	3
Hazardous Materials Response	NFPA 472	2	2
Technical Rope Rescue	NFPA 1006, 1670	12	3
Medical First Response	B.C. Emergency Medical Attendant Licensing Board	12	3
Confined Space Rescue	NFPA 1006, 1670	7	7
Incident Safety Officer	NFPA 1521	12	3
Structural Collapse Rescue	NFPA 1006, 1670	12	3

Table 1, Summary of PIFR trainer Qualifications

Secondary opportunities

Although the primary focus will always be to serve the Pender community, there are significant opportunities PIFR to utilize their established capabilities, resources and expanded facilities, beyond the primary purpose of internal training. One of the most promising prospective areas is Regional Fire Services Training.

Regional Fire Services Training:

Based on PIFR's established resources and proven abilities, there is a clear opportunity for PIFR to meet the training needs of other local fire departments. These departments are all governed by the same provincial regulations, so they all have similar requirements for training and skills maintenance. Salt Spring, North and South Galiano, Mayne, Piers and Saturna Island fire rescue departments have already expressed strong interest in use of the Pender facilities. This use could be straight rental of the Pender facilities, where each department would provide their own instructors, or fully staffed training evolutions and standard courses, or a hybrid of these two approaches. In any case, the opportunity for Pender is clear, and well within current capabilities.

There are two major benefits to Pender from this logical expansion of training services; revenue from use of facilities and staff, and additional experience for PIFR members. Other departments will benefit from the immediate availability of advanced facilities, affordable training to professional standards, and customized skills maintenance practice, all within short travel distances.