CHAPTER FIVE
FIRE RESCUE APPARATUS

The selection and purchase of fire department apparatus and equipment are obviously an important part of any fire department’s business…it is usually second to salaries and benefits.

Foremost, the selection and purchase process must be based on community needs. Careful research and planning are crucial to meeting these needs. Fire vehicles and equipment are very specialized and technical in their nature.

Fire departments must be knowledgeable about all applicable standards and laws that impact the design, performance, use, and maintenance of the equipment. The selection and purchase of apparatus and equipment must take into account several factors. The foremost factor is the safety of the fire fighters and the public. One of the 16 Firefighter Life Safety initiatives of the National Fallen Firefighters Foundation states: “Safety must be a primary consideration in the design of apparatus and equipment.” Another factor is how the vehicle or equipment fits in with the previous purchases.

In addition, the fire department must provide training on the proper use of all its vehicles and equipment and must provide maintenance for the item purchased as described by the manufacturer.¹

COMMISSION ON FIRE ACCREDITATION INTERNATIONAL (CFAI)

The Commission on Fire Accreditation International (CFAI) emphasizes the role fire, EMS and support apparatus and vehicle acquisition and maintenance plays in an efficient, safe, and effective fire department. Progressive fire departments use this criterion, and others, as a benchmark for determining the best and safest service possible. The CFAI Apparatus and Vehicles and the Apparatus Maintenance Criterion Performance Indicators, as referenced by the Study Team, are provided below:

**Criterion 6B: Apparatus and Vehicles**

Apparatus resources designed and purchased to be adequate to meet the agency’s goals and objectives.

*Performance Indicators*

1. Apparatus is located to accomplish the stated standards of response coverage and service level objectives.
2. Apparatus types are appropriate for the functions served, i.e. operations, staffs support services, specialized services and administration.
3. There is a replacement schedule for apparatus and other tools and equipment.
4. There is a program in place for writing apparatus replacement specifications.

**Criterion 6C: Apparatus Maintenance**

The inspection, testing, preventive maintenance, replacement schedule and emergency repair of all apparatus are well established and meet the needs for service and reliability of emergency apparatus.

*Performance Indicators*

1. The apparatus maintenance program has been established. Apparatus is maintained in accordance with manufacturer’s recommendations, with activity conducted on a regular basis. Attention is given to the safety-health-security aspects of equipment operation and maintenance.
2. The maintenance and repair facility is provided with sufficient space and equipped with appropriate tools.
3. A system is in place to ensure the inspection, testing, fueling, preventive maintenance and emergency repair for all fire apparatus and equipment.
4. There are an adequate number of trained and certified maintenance personnel available to meet the objectives of the established program.
5. There is an adequate supervision to manage the program.
6. There is a management information system in place that supports the apparatus maintenance program and provides for analysis of the program.

These applicable Criteria and Performance Indicators will be addressed in the body of the chapter and specifically in the chapter summary.
APPARATUS AND EQUIPMENT ADMINISTRATION

New Rochelle Fire Department

The Fire Chief assigns the fire apparatus and equipment maintenance authority to the Support Services Deputy Chief. This maintenance is generally accomplished by the Department’s full-time Superintendent of Maintenance (Master Mechanic) at the shop located in the lower level of Station #1. The Master Mechanic reports to the Support Services Deputy Chief. The Department’s tenured Master Mechanic has recently retired and now is working part-time on a transition basis with the newly appointed Master Mechanic. Occasionally “light duty” firefighters are utilized for certain logistical and support needs.

The NRFD “Shop” is independent from the City of New Rochelle’s Department of Public Works’ central maintenance facility.

The Fire Department shop was designed prior to modern fire apparatus “flip up” cabs. Originally, access to fire apparatus drive trains, pumps and hydraulics, etc., was provided “under the hood” or through removable panels. Because there is only a one-foot clearance between the roof of pumpers, ladders and rescues, mechanics and maintenance personnel are unable to “flip the cabs up” to accomplish maintenance inside the shop. This restriction means that all maintenance must be done “outside” regardless of the time of day or season of the year. This has far-reaching consequences in the Department and Citywide ranging from reduced mechanic effectiveness, increased downtime, and increased response times.

Additionally, two significant, hazardous storage challenges currently exist in the shop: (1) the storage of oil, solvents and other flammable liquids without spill containment and (2) the storage of 18 truck and automobile tires in the boiler room. Both situations have been cited and are in violation of OSHA and EPA requirements.

CURRENT APPARATUS AND VEHICLE INVENTORY

Figure 5.1 lists the current fire apparatus and vehicle inventory for the New Rochelle Fire Department, along with their functions, capacities and assignments.

The New Rochelle Fire Department vehicle inventory is comprised of seven pumpers including two reserve, two rescue trucks, four ladder trucks including one reserve, six utility/support vehicles, 11 administrative vehicles and five trailers including a rubber boat and a “gator.”
### NEW ROCHELLE FIRE DEPARTMENT APPARATUS AND VEHICLE FLEET

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<th>MAKE/MODEL</th>
<th>FUNCTION</th>
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<td>Chev Van</td>
<td>Administrative</td>
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<td>Van</td>
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<td>CEnf/Fire Inv</td>
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<td>CEnf</td>
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<td>2007</td>
<td>Trailer</td>
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Source: New Rochelle Fire Department
APPARATUS REPLACEMENT SCHEDULE

To maximize firefighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities.

Significant progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus in recent years. Although limited in number in the NRFD fleet, apparatus manufactured prior to 1991 usually included only a few of the safety upgrades required by the recent editions of the NFPA 1901, *Standard for Automotive Fire Apparatus*.

Based on these safety upgrade improvements, fire departments should seriously consider the risk to firefighters of keeping fire apparatus older than 15 years in first-line service. The current edition of the NFPA Handbook, states however, “In general, a 10 to 15 year life expectancy is considered normal for first line pumping engines. In some types of service, including areas of high fire frequency, a limit of only 10 years may be reasonable for first line pumpers.”

There are a number of national fire apparatus organizations that have promulgated sample replacement schedules for fire and EMS apparatus, including the National Association of Emergency Vehicle Technicians (NAEVT), Fire Department Safety Officers Association (FDSOA), the National Fire Protection Association (NFPA), and the Fire Apparatus Manufacturer’s Association (FAMA).

FAMA developed the “Fire Apparatus Duty Cycle White Paper” in 2004. The paper is an in-depth analysis of many aspects of apparatus replacement, including the key factors to be considered in a typical apparatus replacement schedule including:

- Type of department;
- Fire department workload;
- Population served;
- Demographics served; and,
- Topography of region served

An additional factor that must be considered in the New Rochelle Fire Department’s apparatus replacement schedule and plan is the issue surrounding the bankruptcy of the American LaFrance apparatus manufacturer. Coupled with certain performance
challenges (e.g., engine cooling, failed pump tests), the bankruptcy has caused difficulty in obtaining parts and service.

Case in point, Engine 24 (American La France) has recently required a motor replacement at approximately $40,000. This phenomenon is an indicator of potential excessive maintenance and replacement costs for the NRFD American La France/ LTI vehicles.

Sample FAMA Apparatus/Vehicle Replacement Consideration Guidelines are as follows:

**Excellent Condition (E)**
- Less than five years old
- Fewer than 800 engine hours
- Fewer than 25,000 miles
- No known mechanical defects
- Very short downtime and very few operating expenses
- Excellent parts availability
- Very good resale value
- Meets all present NFPA 1901 and 1911 edition safety standards

**Very Good Condition (VG)**
- More than five but less than ten years old
- More than 800 but fewer than 1600 engine hours
- More than 25,000 but fewer than 50,000 miles
- No known mechanical or suspension defects present
- Low downtime and above average operating costs
- Good parts availability
- Good resale value
- Meets NFPA 1901 and 1911 safety standards

**Good Condition (G)**
- More than ten but less than 15 years old
- Some rust or damage to the body or cab
- More than 1,600 but less than 2,400 engine hours
- Some existing mechanical or suspension repairs necessary
- Downtime and operational costs are beginning to increase
- Parts are still available but getting difficult to find
- Resale value decreasing
- Meets all NFPA 1901 and 1911 safety standards

**Fair Condition (F)**
- More than 15 but less than 20 years old
- Rust, corrosion, or body damage apparent on body or cab
- More than 2,400 engine hours
- More than 75,000 but fewer than 100,000 miles
- Existing mechanical or suspension repairs necessary
- Downtime is increasing and operational costs are above historical average
- Parts become harder to find and/or obsolete
- Very little resale value
- Does not meet all NFPA 1901 and 1911 safety standards

**Poor Condition (P)**
- More than 20 years old
- Rust, corrosion, or damage to the body of cab impacting use of the apparatus
- More than 2,400 engine hours or 100,000 miles
- Existing mechanical or suspension problems affecting operation of the apparatus
- Downtime is exceeding in-service availability
- Operational cost are exceeding the resale value
- Parts are obsolete
- Does not meet all NFPA 1901 and 1911 safety standards

**Average Apparatus Service Life**

There are numerous resources available for reference to the average active and reserve life of emergency vehicles. The FAMA “Fire Apparatus Duty Cycle White Paper” (2004) reflects the following:

**Average Expected Years of Apparatus in Active Service**

<table>
<thead>
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<th>Suburban</th>
<th>Rural</th>
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<tbody>
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<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Aerial</td>
<td>18</td>
<td>19</td>
<td>21</td>
</tr>
</tbody>
</table>
Average Expected Years of Apparatus in Reserve Service

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<th>Rural</th>
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<tbody>
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<tr>
<td>Aerial</td>
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<td>10</td>
<td>13</td>
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Average Expected Years of Service Life (Active Reserve*)

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<tr>
<td>Aerial</td>
<td>27</td>
<td>29</td>
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The Fire Apparatus Manufacturers Association suggests that the active service life of an urban pumper is 15 years. Active pumpers in serviceable condition could move to reserve status, as needed, when reaching their urban (15 years) life span. For purposes of this Study, the New Rochelle Fire Department first-response district is considered an urban area.

Applying the Fire Apparatus Manufacturers Association’s formula to New Rochelle Fire Department’s urban aerial ladder trucks suggests the average expected years of active service to be 18*. Heavy rescue trucks typically align with the aerial ladder truck replacement schedule.

The Henrico (VA) Fire Department recently implemented a different rationale for the determination of the replacement of fire department vehicles.² The rationale involves the comparison of the life-to-date maintenance costs to the original vehicle acquisition costs. Their philosophy is one of not asking taxpayers to invest more money in the maintenance of a fire department vehicle than what they originally paid for it. They call it the ratio of maintenance to acquisition or M:A. They remove their front-line units from service when the M:A reaches 60 percent. This effectively means the vehicle has a 40 percent M:A equity remaining to serve as a reserve unit.

It appears New Rochelle Fire Department has the data capability to initiate the retention of all maintenance cost for the life of fire department vehicles to determine M:A ratios. Policymakers could determine the M:A percentage benchmarks for movement to reserve status or replacement.

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*Review NFPA Requirements*
These sample replacement schedules are illustrations of the apparatus capital planning considerations required of every fire department.

**New Rochelle Fire Department Apparatus Replacement Process**

Each budget year the Support Services Deputy Chief oversees an update of the Department’s “Fire Department Fleet Status and Long-Term Management Planning” document or “Fleet Management Plan.” This update is accomplished by a NRFD committee comprised of the Deputy Chief, the Master Mechanic and representatives of the different organizational entities of the Department. After internal approval by the Fire Chief, these documents, and others, are then provided to the City of New Rochelle Capital Budget Committee comprised of the City Manager, Finance Director and two to three other designated City officials.

While the City Council has not adopted a formal apparatus replacement schedule, the Department envisions a ten-year “front-line” service life for pumpers and ladder trucks with an additional five to six years in reserve for pumpers.

The apparatus and other vehicle needs are determined and specification drawn for internal review by the Fire Chief and other fire department representatives. Typically the Master Mechanic promulgates the “chassis/powertrain requirements” while the OEM Captain provides “compartmentation and body needs.”

NRFD should review and evaluate current purchase specifications development and selections practices and identify any opportunities for improvement. This evaluation should examine how the operation requirements of NRFD, especially practices and conditions unique to New Rochelle, and the maintenance and repair experience of the Department with specific makes and models of vehicles in the development of vehicle specifications. The findings of this evaluation should be used as the basis for developing and implementing formal vehicle specification and acquisition policies and procedures.

The New Rochelle Fire Department fleet data was compared to the Fire Apparatus Manufacturer’s Association data to produce the following illustrative chart addressing a sample replacement schedule for the Department’s primary response units (engines, ladders and rescue trucks).
Other factors, such as unit assignment, age, engine hours, mileage, and maintenance costs, etc., would have to be introduced for a more definitive, formal replacement schedule. The main purpose of the illustration is to identify the planning and funding considerations and requirements of the Department fleet.

**Figure 5.2**  
SAMPLE PRIMARY APPARATUS REPLACEMENT SCHEDULE BASED ON FIRE APPARATUS MANUFACTURER’S ASSOCIATION DATA  
[ILLUSTRATIVE/WITHOUT INFLATION]

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<td>F</td>
<td>2015</td>
<td>815,000</td>
<td>45,278</td>
<td>724,448</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Year</th>
<th>Mileage</th>
<th>Engine Hours</th>
<th>*Life Expect Years</th>
<th>Current Age Years</th>
<th>**Condition</th>
<th>Replace Year***</th>
<th>****Replace Cost</th>
<th>Annual Contrib</th>
<th>Current Cash Req</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladder Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$247,778</td>
<td>2,263,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue 54</td>
<td>1991</td>
<td>41938</td>
<td>6110</td>
<td>18</td>
<td>22</td>
<td>P</td>
<td>Overdue</td>
<td>500,000</td>
<td>27,778</td>
<td>500,000</td>
</tr>
<tr>
<td>Rescue 4</td>
<td>2009</td>
<td>6102</td>
<td>574</td>
<td>18</td>
<td>4</td>
<td>E</td>
<td>2027</td>
<td>650,000</td>
<td>43,333</td>
<td>173,332</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Year</th>
<th>Mileage</th>
<th>Engine Hours</th>
<th>*Life Expect Years</th>
<th>Current Age Years</th>
<th>**Condition</th>
<th>Replace Year***</th>
<th>****Replace Cost</th>
<th>Annual Contrib</th>
<th>Current Cash Req</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rescue Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$71,111</td>
<td>$673,332</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL** 622,220 5,753,882

Source: New Rochelle Fire Department

* Fire Apparatus Duty Cycle White Paper, 2004, FAMA- Urban (Years Listed Will Vary Based on Analysis Methodology)
**Fire Apparatus Duty Cycle White Paper, 2004, FAMA, E=Excellent, VG=Very Good, G=Good, F=Fair, P=Poor
*** Delivery Date
**** New Rochelle FD Budget Submittal Documents Without Inflation Considerations
It should be noted that planning and decision making leading to the replacement of apparatus should begin at least two years prior to the planned replacement year and based on either years of service or the condition of the unit. The intent is that the unit should, in fact, be physically replaced in the service life year. Experience has shown that it may take nearly two years to plan, obtain approval/funding, and take delivery of the new unit from the manufacturer.

Figure 5.3 is an Engine, Ladder, Rescue sample capital plan projection based on Fire Apparatus Manufacturers Association (FAMA). Additionally, the figure illustrates the need for a well thought out, approved replacement plan for effective acquisition planning.

<table>
<thead>
<tr>
<th>Delivery Year</th>
<th>Engines*</th>
<th>Ladders*</th>
<th>Rescues*</th>
<th>Annual Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>1/650,000</td>
<td></td>
<td>1/500,000</td>
<td>2/1,150,000</td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>2/1,300,000</td>
<td></td>
<td></td>
<td>2/1,300,000</td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td>1/815,000</td>
<td></td>
<td>1/815,000</td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td>1/1,200,000</td>
<td></td>
<td>1/1,200,000</td>
</tr>
<tr>
<td>2019</td>
<td>1/650,000</td>
<td></td>
<td></td>
<td>1/650,000</td>
</tr>
<tr>
<td>2020</td>
<td>1/650,000</td>
<td></td>
<td></td>
<td>1/650,000</td>
</tr>
<tr>
<td>2021</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2022</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2023</td>
<td>1/650,000</td>
<td></td>
<td></td>
<td>1/650,000</td>
</tr>
<tr>
<td>2024</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2025</td>
<td></td>
<td>1/815,000</td>
<td></td>
<td>1/815,000</td>
</tr>
<tr>
<td>2026</td>
<td>1/650,000</td>
<td></td>
<td></td>
<td>1/650,000</td>
</tr>
<tr>
<td>2027</td>
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<td>1/650,000</td>
<td></td>
<td>1/650,000</td>
</tr>
<tr>
<td>2028</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2029</td>
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</tr>
<tr>
<td>2030</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2031</td>
<td></td>
<td>1/815,000</td>
<td></td>
<td>1/815,000</td>
</tr>
</tbody>
</table>

Source: NRFD Fleet Data

* Quantity/Cost [$]
Typically Costs May Increase by Three Percent Annually
APPARATUS AND EQUIPMENT MAINTENANCE

A properly maintained and tested emergency response vehicle will provide the agency with a safe, ready-to-use vehicle with a minimum of unscheduled down time.” Compliance with the N.F.P.A., 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, will provide the department with a comprehensive emergency response vehicle maintenance, inspection, testing and replacement program.

The need to have fully inspected, tested, and maintained emergency response vehicles (and equipment) is unprecedented. Recent emergency response vehicle accidents and lawsuits have brought to the forefront the need for a professionally maintained fleet. A poor preventative maintenance (PM) program, no PM program at all, and/or unqualified technicians is a recipe for disaster. Any of these issues may lead to unsafe vehicles, increased maintenance costs and reduced apparatus life.

Along with these negatives, come the risk of accidents, lawsuits, lower morale and public distrust. Firefighter safety is of the utmost concern, and poorly maintained emergency response vehicles put everyone at risk. An accident caused by loss of brakes or broken components would be devastating as well as an invitation for lawsuits.

The heartache of a Line of Duty Death (LODD) is followed by board of inquiries, legal investigations and NIOSH investigation into the cause of the accidents. Every aspect of the vehicle and agency will be looked at including, but not limited to, records, documentation, and qualifications of technicians, fleet department operations, testing, operator training and department policies.

The publicity following an accident is negative for the department and personnel. No one wants to see a picture of a ladder truck driven into a building or have to answer in court why NFPA 1911 (a national accepted ANSI standard) was not used to ensure the apparatus was maintained properly, tested and safe to operate.3

The Department Master Mechanic completes a major maintenance process on all pumpers and ladder trucks at least twice per year. Pump tests and aerial tests are completed annually by “Fire One” Company. Once the summer aerial test is completed

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3 IAFC, White Paper, Apparatus Maintenance
the manufacturer’s representative is called in for an “oversight” inspection of the aerial and its components.

All needed repairs to apparatus and vehicles are completed by the Department’s Master Mechanic unless it involves warranty work or aerial hydraulics. If technical support is needed, Detroit Diesel is contacted for engine work, and Allison Transmission is contacted for transmission work.

**In-Station Maintenance**

On-duty firefighter crews provide the daily checks of the Department’s vehicles, tools, appliances and equipment at shift change under their respective company officers. Every Saturday a complete apparatus, tools and appliances check, inspection and routine maintenance is completed and documented on the Department’s “A3” form.

When these checks and inspections reveal a matter needing attention beyond the fire company level, a Department “A2” form “Emergency Report of Repair” is completed to apprise the Master Mechanic of the need. If the matter does not place the unit out of service the company typically drives the vehicle to the shop.

Diesel fuel is provided at Fire Station #1 and gasoline is available at Fire Department Headquarters. Response apparatus is refueled each Monday and Thursday.

From 1960 until 1980 Station #5 had a 1,000 gallon in the ground gasoline tank and dispensing pump system. This system was removed due to environmental concerns and because the size was conducive to the fuel going stale. During the weekly Monday and Thursday refueling process Engine 25 from Station #5 requests that another engine relocates to its district. The process averages 90 minutes during which each apparatus is out of position resulting in each engine being unavailable to perform fire inspection and other non-emergency duties (a loss of 300 inspection hours per year).

Engine 25 consumes approximately 1,600 gallons of fuel, 25-30 percent of this fuel is consumed while en-route to secure more fuel. Installing an approved, above ground diesel fuel tank and dispensing system at Station #5 could conserve more than 650 gallons of fuel and $2,000 annually. Response times, vehicle wear could be reduced and fire inspections could be increased.
The Master Mechanic is “called out” on all second alarm or greater incidents and responds with the Utility #92 vehicle having a 90 gallon diesel refueling tank.

Fire department fuel costs continue to increase. This is especially true with the service demands upon the large apparatus associated with firefighting. There are a number of options available to NRFD that may be implemented by policy to conserve fuel consumption.

Examples of these options are as follows:

- Do not allow vehicles to sit at idle when practical and appropriate.
- Do an analysis to confirm the NRFD “standard of cover” is commensurate with the Department’s mission and the City’s risk.
- Do an analysis to confirm the NRFD’s emergency medical resource response is commensurate with service needs.
- Reduce the number of needless and false fire protection system actuations.
- Review the need for “take home” vehicles.
- The use of hybrid and/or alternative fuel staff vehicles.
- The use of smaller staff vehicles.
- Make every effort to take the least number of staff vehicles to training, meetings and other official gatherings.

TOOLS, APPLIANCES AND EQUIPMENT ACQUISITION & MAINTENANCE

“Best practices,” as well as the Insurance Services Office (ISO), require that all automotive fire apparatus be equipped commensurate with N.F.P.A. Standard 1901, Standard for Automotive Fire Apparatus. This requirement pertains to reserve apparatus as well.

NRFD should confirm that all automotive fire apparatus meet the N.F.P.A 1901 equipment inventory requirement.

Within budget approvals, the acquisition and replacement of tools, appliances and small equipment is overseen by the Master Mechanic. The Master Mechanic accepts bids as required by City requirements for these items. Annual purchase orders are processed for those items appearing on New York State contracts. An inventory is maintained at the Department shop for those items requiring frequent replacement.
Maintenance of the Department’s tools, appliances and small equipment is initially accomplished by the on-duty firefighters as supervised by their company officers. Routine maintenance needs are usually determined during daily apparatus and equipment checks or when returning from incidents.

Maintenance of tools, appliances and small equipment that is beyond the company level is referred to the Master Mechanic whereby the unit “stops by” the shop for repair or replacement.

Figure 5.4 illustrates how required tests for apparatus, tools and hose are accomplished by NRFD.

### Figure 5.4
**REQUIRED APPARATUS, TOOLS AND HOSE TESTS**

<table>
<thead>
<tr>
<th>Test</th>
<th>Frequency</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumper Test</td>
<td>Annual</td>
<td>“Fire One” with Master Mechanic Oversight</td>
</tr>
<tr>
<td>Aerial Test</td>
<td>Annual</td>
<td>“Fire One” with Master Mechanic Oversight*</td>
</tr>
<tr>
<td>Ground Ladders</td>
<td>Annual</td>
<td>“Fire One” with Master Mechanic Oversight</td>
</tr>
<tr>
<td>SCBA Flow Test</td>
<td>Annual</td>
<td>“AAA Emergency Supply” with Safety Officer Oversight</td>
</tr>
<tr>
<td>SCBA Face piece Fit Test</td>
<td>Annual</td>
<td>Safety Officer</td>
</tr>
<tr>
<td>Hose Testing</td>
<td>Annual</td>
<td>Company Personnel with Safety Officer Oversight</td>
</tr>
</tbody>
</table>

Source: New Rochelle Fire Department
APPARATUS AND EQUIPMENT POLICIES AND PROCEDURES

The Study Team was provided with the current *New Rochelle Fire Department Standard Operating Procedure Manual* pertaining to apparatus and equipment. Figure 5.5 lists the guideline numbers and titles.

**Figure 5.5**

**CURRENT STANDARD OPERATING PROCEDURES PERTAINING TO APPARATUS AND EQUIPMENT**

<table>
<thead>
<tr>
<th>Article Number</th>
<th>Article Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.03</td>
<td>Equipment (EMS)</td>
</tr>
<tr>
<td>3.01a</td>
<td>Fire Hose (General)</td>
</tr>
<tr>
<td>3.01b</td>
<td>Fire Hose (Testing)</td>
</tr>
<tr>
<td>9.02</td>
<td>Inspection &amp; Maintenance (SCBA)</td>
</tr>
<tr>
<td>9.04</td>
<td>SCBA Air Refilling Procedures</td>
</tr>
</tbody>
</table>

Source: New Rochelle Fire Department

A number of important apparatus and equipment standard operating procedures are missing from the NRFD manual. The Study Team suggests that the NRFD, as soon as practical, conduct an analysis of their current standard operating guidelines as they relate to apparatus and equipment acquisition and maintenance and associated safety considerations. As a result of this analysis the Department should assign the appropriate staff to identify those standard operating procedures that have been omitted or are missing and initiate the process, in priority, to promulgate a complete and updated library of procedures.

An example of subjects (not all inclusive) for apparatus and equipment procedures to be considered for inclusion in the NRFD Policies and Procedures manual are as follows:

- Self-Contained Breathing Apparatus
- P.A.S.S. Devices
- Protective Equipment and Safety Equipment
- Service Requests and Work Orders
- Supplies Request
- Equipment Safety Inspections
- Lost/Destroyed/Damaged/Stolen Equipment
- Private Use of Fire Department Property
- Fueling of Apparatus
- Use and Operation of Washer/Extractor

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SUMMARY

The findings of the Study Team based on observations, data collection, interviews and best practices were compared to applicable apparatus and vehicle related CFAI Accreditation Criteria. Figure 5.6 summarizes the level of compliance of the NRFD with those Criteria.

Figure 5.6
SUMMARY OF NRFD INTERFACE WITH CFAI ACCREDITATION CRITERIA

<table>
<thead>
<tr>
<th>APPARATUS AND VEHICLES</th>
<th>Performance Indicators</th>
<th>*NRFD Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparatus is located to accomplish the stated standards of response coverage and service level objectives.</td>
<td>Please see Risk Analysis And Facilities Chapter</td>
<td></td>
</tr>
<tr>
<td>Apparatus types are appropriate for the functions served, i.e. operations, staffs support services, specialized services and administration.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>There is a replacement schedule for apparatus and other tools and equipment.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>There is a program in place for writing</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Fire apparatus replacement specifications.

## APPARATUS MAINTENANCE

The inspection, testing, preventive maintenance, replacement schedule and emergency repair of all apparatus are well established and meet the needs for service and reliability of emergency apparatus.

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>NRFD Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>The apparatus maintenance program has been established. Apparatus is maintained in accordance with manufacturer’s recommendations, with activity conducted on a regular basis. Attention is given to the safety-health-security aspects of equipment operation and maintenance.</td>
<td>Yes</td>
</tr>
<tr>
<td>The maintenance and repair facility is provided with sufficient space and equipped with appropriate tools.</td>
<td>No</td>
</tr>
<tr>
<td>A system is in place to ensure the inspection, testing, fueling, preventive maintenance and emergency repair for all fire apparatus and equipment.</td>
<td>Yes</td>
</tr>
<tr>
<td>There are an adequate number of trained and certified maintenance personnel available to meet the objectives of the established program.</td>
<td>Yes</td>
</tr>
<tr>
<td>There is an adequate supervision to manage the program.</td>
<td>Yes</td>
</tr>
<tr>
<td>There is a management information system in place that supports the apparatus maintenance program and provides for analysis of the program.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Study/CFAI

Fire apparatus is an emergency vehicle that must be relied on to transport firefighters safely to and from an incident and to operate reliably and properly to support the mission of the fire department. Tools, appliances and equipment must be ready to use when needed.

Apparatus and equipment that break down at any time during an emergency operation, not only compromises the success of the operation, but jeopardizes the safety of the firefighters relying on that resource to support their role in the operation. Old, worn-out,
or poorly maintained fire apparatus and equipment should have no role in providing emergency services to a community. The Commission on Fire Accreditation International (CFAI) provides criteria and a number of performance measures relating to apparatus and equipment and their maintenance. With the exceptions noted and as addressed in the Chapter recommendations below, the New Rochelle Fire Department meets or exceeds the apparatus and equipment criteria and performance indicators promulgated by the CFAI.

OPTIONS AND RECOMMENDATIONS

5-1 The City and Fire Chief should conduct an analysis of its current standard operating procedures as they relate to apparatus and equipment acquisition and maintenance and associated safety considerations, as soon as practical.

5-2 The City and Fire Chief should develop and implement formal, optimal replacement cycle policies for each of the key types of apparatus in the fleet using a recognized life cycle cost analysis technique.

5-3 The City and Fire Chief should develop and implement formal, optimal replacement cycle policies for required tools, appliances and equipment using a recognized life cycle cost analysis technique.

5-4 The City and Fire Chief should, as soon as practical, proceed with the approval and implementation of the “Department Shop Addition” as addressed in the most recent applicable “Capital Improvement Program-Project Request Form.”

5-5 The City and Fire Chief should conduct an activity based cost analysis of NRFD fleet maintenance and services as a basis to develop a process for distributing the cost of the vehicles and services consumed to each company and division that utilizes them.

5-6 The City and Fire Chief should conduct an activity based cost analysis of NRFD tools, appliances and equipment maintenance and services as a basis to develop a process for distributing the cost of the tools, appliances and equipment consumed to each company and division that utilizes them.

5-7 The Fire Chief should develop and implement a Department-wide policy for the conservation of vehicle fuel.
The Fire Chief should confirm that all automotive fire apparatus equipment inventory is in compliance with N.F.P.A. 1901, *Standard for Automotive Fire Apparatus*.

The Fire Chief should consider the installation of an above ground, 500 gallon diesel fuel tank and dispensing system at Fire Station #5.
CHAPTER SIX
OPERATIONS, COMMUNICATIONS & ISO

This chapter addresses the operational aspects of fire protection and rescue services delivery in the City of New Rochelle. The chapter is divided into several sections that examine incident response workload analysis, specialty response services, and Insurance Services Office (ISO). Emergency Medical Services (EMS) delivery is covered in Chapter Seven. The reader should note that the need for and implementation of incident command and control operations protocols and practices is addressed in Chapter Nine, Health and Safety, particularly as related to NFPA 1500, Standard on Fire Department Occupational Safety and Health.

INTRODUCTION

On the scene of a fire or rescue emergency there is no time to make decisions by committee. Although some quick consultation can take place, time for deliberation is limited. Decisions made at the emergency scene may be irreversible and consequences of error can be disastrous. Such errors can lead to further property loss, as well as injury or death to civilians and firefighters. In many cases, the fire officers must make decisions based on information they gathered hastily. The fact is that all structure fire situations are different. The differences include:

- The type of fire and its location in the building;
- The building type and its construction;
- The interior contents and furnishings of the building;
- The presence of hazardous materials;
- The resources available;
- The report of persons trapped, unaccounted for, missing or injured;
- The presence of built-in fire protection and life safety systems; and,
- The time of day and weather conditions.

Fire officers and firefighters must be well trained and prepared in order for there to be successful handling of emergency incidents. If training and preparation is left up to “on-the-job experience,” the cost has the potential to be significant.
Several key factors are necessary to ensure that emergency scene operations occur as efficiently, effectively, and safely as possible. First, fire and rescue stations must be both sufficient in number and geographic distribution in order to allow for the timely arrival of emergency equipment. Second, emergency response apparatus must be adequately staffed to allow for basic tasks to be completed in a timely and effective manner. Third, emergency responders must be properly trained and equipped to handle a wide variety of emergency incident scenarios. Finally, standardized operating procedures are needed to guide emergency scene decision making in the deployment of basic levels of service.

THE FIRE PROBLEM

The term “working fire” is a common term used throughout the United States by fire service personnel to describe a structure fire where fire department resources are expected to engage in some type of fire attack operation in order to mitigate the incident. Unfortunately, there is no agreed upon standard definition of a “working fire;” the term varies from region to region and, therefore, fire incident data.

For the purpose of this report, the Study Team defines a “working fire” as any fire incident where fire department personnel must don their protective clothing and equipment and use at least one hose line to control and extinguish a structure fire.

In 2012, a fire department’s incident response statistics include a wide variety of call types ranging from emergency medical runs, to public service calls, to automatic fire alarms, to trash fires. Of all the incidents to which fire departments respond, the working structure fire is generally one of the least frequent events, yet it carries with it perhaps the greatest threat to life and property.

The majority of incidents handled by today’s fire departments are handled with one or two pieces of apparatus and, with the exception of an emergency medical incident, these incidents are handled with a decreased level of urgency. A working structure fire on the other hand presents a series of urgent matters that must be quickly addressed by responding forces if lives and property are to be saved.

A structure fire requires the response of an adequate number of personnel and equipment, and it requires quick accurate decision-making and discipline. Without any of these key
elements, the structure fire may very well be extinguished without incident—but not without additional property loss and risk to emergency responders and civilians.

Therefore, the Study Team believes that a fire department must be sufficiently staffed, equipped, and prepared for the response to structure fires. Being ready for the structure fire response will also help ensure the department’s response readiness for other call types.

A “Snapshot” of National Fire Data

Fire continues to be a serious problem throughout the United States and has been for many years. In general, persons and communities of lower socioeconomic status generally tend to suffer greater occurrences of fire and its related losses. Thus, the workloads of fire departments are generally greater in the lower economic neighborhoods of the United States.

A review of national data indicates the magnitude of the fire problem on a national basis. The following fire data and statistics* present a view of fire’s impact on the United States in 2011 (the latest national data available from NFPA).

- 1,389,500 fires were responded to by public fire departments, an increase of 4.4% from 2000;
- 484,500 fires occurred in structures, a very slight increase of 0.5%;
- 370,000 fires or 76% of all structure fires occurred in home structures;
- 219,000 fires occurred in vehicles, a slight increase of 1.6% from the year before;
- 686,000 fires occurred in outside properties, an increase of 8.2%;
- 3,005 civilian fire deaths occurred in 2011, a decrease of 3.7%.
- 2,520 civilian fire deaths occurred in the home (84% of all fire deaths), a decrease of 4.5%;
- 300 civilians died in vehicle fires;
- A civilian fire death occurred every 175 minutes;
- A civilian death in home fires occurred every 208 minutes;
- 17,500 civilian fire injuries occurred in 2011, a decrease of 1.2%;
- 13,910 of all civilian injuries occurred in home fires;
- 1,190 civilians were injured in vehicle fires;
- A civilian fire injury occurred every 30 minutes;
- A civilian fire injury in home fires occurred every 38 minutes;
• An estimated $11.7 billion in property damage occurred as a result of fire, a very slight increase of 0.6% from last year;
• $9.7 billion of property damage occurred in structure fires;
• $6.9 billion of property loss occurred in home fires;
• $1.4 billion of property loss occurred in vehicle fires;
• An estimated 26,500 intentionally set (not including any allocation of fires with unknown cause), a decrease of 3.6%;
• Intentionally set fires in structures resulted in 190 civilian deaths, a 5.0% decrease;
• Intentionally set structure fires also resulted in $601,000,000 in property loss, an increase of 2.7%;
• 14,000 intentionally set vehicle fires occurred, no change from 2000, and caused $88,000,000 in property damage, a slight decrease of 1.1% from a year ago.

*Data was obtained from the National Fire Protection Association.

NEW YORK FIRE PROBLEM

According to the State Office of Fire Prevention and Control website, the following are relevant statistics that reflect the fire problem in the State of New York, based on NYS Fire Reporting System reported by New York Fire Departments outside New York City as of 04/24/2013. Reported data are as follows for 2011.

• 26,362 total building fire incidents;
• 9,129 total mutual aid building fires;
• 5,699 total vehicle fires;
• 45,183 total fire incidents;
• 2,303 total overpressure ruptures;
• 465,987 emergency medical incidents;
• 11,311 other rescue incidents;
• 67,869 hazardous conditions;
• 4,911 malicious false incident calls;
• 16,240 total other false calls;
• $163,902,422 total fire dollar loss;
• 512 fire related civilian injuries;
• 89 civilian fire related deaths;
• 749 fire service related injuries; and,
• 3 fire service related deaths.
NEW ROCHELLE FIRE DEPARTMENT WORKLOAD ANALYSIS

Records of incidents with the City of New Rochelle were acquired from the computer-assisted dispatch (CAD) records from the Westchester County Emergency Communications Center (60 Control).

It can be seen in Figure 6.1 that medical calls account for about 50% of service demand within the City of New Rochelle. Fire calls are approximately 4% to 5%, while other types of service calls account for just over 40%.

Figure 6.1
HISTORIC SERVICE DEMAND

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>380</td>
<td>314</td>
<td>367</td>
<td>347</td>
<td>327</td>
</tr>
<tr>
<td>EMS</td>
<td>4,062</td>
<td>4,146</td>
<td>4,188</td>
<td>4,194</td>
<td>4,241</td>
</tr>
<tr>
<td>Other</td>
<td>3,262</td>
<td>3,141</td>
<td>3,442</td>
<td>3,353</td>
<td>3,507</td>
</tr>
</tbody>
</table>
Examining last year of data\(^1\) more closely, changes in demand can be seen on a monthly basis. Figure 6.2 illustrates that service demand is higher in the summer months for all types of calls. Fire calls are especially higher in April, while EMS calls are higher in July, August, and September.

**Figure 6.2**

DEPARTMENT WORKLOAD BY MONTH OF YEAR

In Figure 6.2 it can be seen that service demand calls surged in October as the storm hit on the 30\(^{th}\) of the month and reduced as time passed. Fire and EMS calls were actually highest in November. Prior to that, a typical wavering of demand month-to-month is consistent with previous years.

\(^1\)CAD Records
Examining the department service demand by the day of the week (see Figure 6.3) reveals that Fridays and Saturdays are the busiest days of the week for medical calls for the New Rochelle Fire Department. Fire calls are higher on Sundays and Mondays with the volume of other call types increasing on Wednesdays.

**Figure 6.3**
DEPARTMENT WORKLOAD BY DAY OF WEEK

Figure 6.4 illustrates that the workload differences between night and day are significant. Firefighters typically work 24-hour shifts and the lesser workload at night allows for some respite from the busier daytime.
Demand for service from the fire department is not typically distributed evenly within an area. There are areas where incident calls occur frequently and in close proximity, as well as other places where demand is less intense and the occurrence is a greater distance from each other. Service demand is typically higher in areas of higher population, not just residential, but offices and shopping centers fill with people. Figure 6.5 illustrates the level of demand for services over the last year for the New Rochelle Fire Department. Figure 6.5 also shows that the greatest numbers of incidents occur in the downtown area, but this map is reflective of counts per square mile rather than a deviation from the normal amount of activity expected.

Figure 6.6 illustrates that call intensity is again highest in the downtown area, as expected, compared to a swath of less-intense activity in the northern side of town.

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2 Dispatched Calls from PSAP (60 Control)
Figure 6.5
SERVICE DEMAND
Figure 6.6
SERVICE DEMAND INTENSITY

New Rochelle, NY

- NRFD Stations
- Town Limits
- Railroad

Demand Intensity
- Cold Spot
- Cooler
- ‘Normal’
- Warmer
- Hot Spot

Legend:
- 0 0.5 1 Miles
- N

Map showing service demand intensity in New Rochelle, NY.
EMERGENCY MANAGEMENT

Emergency management (or disaster management) generally involves preparedness, response, and recovery in order to reduce the impact of disasters. All aspects of emergency management deal with the processes used to protect populations or organizations from the consequences of disasters, wars, and acts of terrorism.

Generally, every level of government is involved with emergency management, Federal, state, county and the various forms of local government. For New Rochelle, the hierarchy of emergency management agencies includes the following:

1. U. S. Federal Emergency Management Agency (FEMA);
2. New York State Emergency Management Office;
3. Westchester County Department of Emergency Services, Office of Emergency Management; and,

New Rochelle Emergency Management

As stated on the City’s website “The Office of Emergency Management (OEM), a function of the Fire Department, is responsible for developing plans for responding to, recovering from, and in some instances mitigating the results of natural, technical and man-made disaster events. OEM works closely with the City Manager’s Office, FEMA, SEMO (New York State), Westchester County OEM and the Red Cross.”

The study team reviewed the City of New Rochelle’s Emergency Management operations and its Emergency Operations Center, Communications operations, and unified Command structure. Since 2007, the City has experienced a variety of natural disasters including river and coastal flooding, high wind events, major snowfalls and Tropical Storm Irene and Superstorm Sandy.
The City activated its Emergency Operations Center in response of these events resulting in long workdays attempting to meet all the service requests being sent to the Emergency Operations Center. It became clear that the City’s small unified Command staff faced challenges dealing with the many service requests. The City has a large assisted living and nursing home population at the shoreline along with vulnerable populations spread out in other parts of the City. This makes evacuation planning and operations the top life-saving priority.

Incident stabilization for these major incidents becomes time and resource dependent. Other emergency challenges, including the interaction with power, communications and other utilities; debris removal; road openings; and business and housing issues add to demands on the Emergency Operations Center Staff in managing service requests.

Long-term recovery efforts along with damage assessments and disaster declaration information consume staff time as they transition back to normal operations. Public assistance projects, coupled with hazard mitigation projects requiring constant staff input and monitoring, can take years to complete.

**Emergency Management Operations Planning**

The Study Team reviewed local, county and State level planning documents and guidelines. These templates provide the City of New Rochelle with a pathway to update and enhance the Local Emergency Operations Plan risks to all who live and work within the City. Updated All Hazards planning will provide a powerful tool for both Emergency Operations Center personnel, first responders, senior management and elected officials in the decision-making process.

The Study Team envisions strong use of the National Incident Management System its Guidance, forms, and support data as spelled out in the National Response Framework. Many fire departments utilize pre-fire planning for purposes of preparing for fire operations at incidents. Besides the benefit to overall fire ground operations, the information gathered enhances emergency management planning. The ability to identify target hazards, at-risk populations, and special needs individuals is paramount to successful planning.
The Study Team views updated, ongoing emergency planning as a living document that requires input from all City and County agencies that interact with the City of New Rochelle.

**Emergency Management — Operations**

The Study Team reviewed the City’s Emergency Operations Center facility functions along with dispatch communications, both at the City and County level. The ability for both dispatch and the Emergency Operations Center to send and receive information is a critical component to successful emergency management operations. The information flow regarding active incidents, as well as service requests in the current set up, is very labor intensive. The use of handwritten notes and the lack of a web-based informational platform likely hinder operations.

There should be a standard incident action plan format and command structure, as well as situational awareness for all City departments. The multi-tasking by staff members provides an environment where incidents and service calls may suffer delays or fall through the cracks in the system. The Study Team understands the hard work and long hours that a major event presents to the Emergency Operations staff. The dedication and ability of the City’s staff is not in question; rather it is the operational platform and tools to perform their mission that need to be upgraded.

The Study Team also noted that comprehensive continuity of operations planning (COOP) needs to be developed and integrated into City’s operations. The State of New York provides a template as a starting point for city Emergency Management Planners.

**Emergency Management — Training**

The Study Team also looked at levels of training for Emergency Operations Center staff. The training levels varied based on City department requirements. This allows for a lack of both operational and situational awareness in the Emergency Operations Center. The Study Team envisions that moving forward the City would install a comprehensive program from basic through command staff level training. The Study Team knows that both cost and personnel time and replacement costs are a factor. However, the proper levels of training to achieve nationally recognized standards will be a key in the City’s success or failure in managing an incident. The State of New York is an Emergency
Management Accreditation Program (EMAP). The EMAP sets standards for different levels of program certification.

The City should be actively engaged in insuring several key personnel become certified Emergency Managers. The City should be taking full advantage of training grants provided at the Federal and State level and free programs provided by FEMA, EMI, TEEXS, and others at the National and State level. This will provide cost savings and quality training for City personnel. While this will provide a starting point in developing a professional Emergency Management staff, the city should forecast training costs into future budgets that would include all city departments.

**Suggested Emergency Management Upgrades**

The following upgrades are suggested for the New Rochelle Emergency Management programs:

**Planning**
1. Update local emergency operation plans.
2. Provide an all hazards planning program.
3. Use Incident Command programs.
4. Use ESF format.
5. Work with the National Response Framework.
6. Develop extensive pre-fire planning.
7. View all emergency plans as living documents.
8. Reach out to other cities for existing best practices.
9. Train staff in plan development.

**Operations**
1. Use of Incident Action Plans.
2. Use of Unified Command.
3. Staff training basic thru Command level.
4. Purchase of a web-based operation program.
5. Continue use of emergency notification system.
6. Upgrade of IT equipment in Emergency Operations Center.
7. Develop COOP for all city operations.
Training

1. Develop multi-year training program.
2. Start key personnel in EMAP Certification.
3. Search out grant programs.
4. Forecast training budget costs.
5. Take advantage of federally funded training programs.
6. Take advantage of State and County funded training programs.

The Study Team believes that the implementation of these suggested upgrades will provide the City of New Rochelle a solid platform for Emergency Management Operations for the future.

Resource Documents

The following are a number of resource documents that may be useful to City staff:

- Continuity Guidance Circular 1 (CGC 1), Continuity Guidance for Non-Federal Governments, Federal Emergency Management Agency, July 2013; and,

These documents are available at each respective agency’s website.

SPECIAL OPERATIONS SERVICES

This section includes an overview of fire department special operations services, and the process by which these services are delivered in the City of New Rochelle.
Overview of Special Operations Services

In fire service jargon, the term “special operations” generally refers to those services that a fire department provides other than fire and EMS response. The traditional special operations services include hazardous materials (Hazmat) response, vehicle extrication service, and technical rescue service. The delivery models for special operations services can vary greatly from community to community across the United States. With the exception of vehicle extrication service, the other special operations services are seldom needed in most communities. Because special operations services are highly technical in nature and require specialized training and equipment, many communities opt not to deliver the services, or they elect to partner with neighboring communities to share resources in either a mutual aid or a regional team format.

When considering the need for special operations services, it is important to remember that when these types of services are needed, there cannot be a delay in response. The common dilemma faced by many communities is “at what cost” does the community wish to support the delivery of fire department special operations services, because the delivery of these services is often expensive, both in terms of training time and equipment.

The decision by a fire department or community to initiate any new service must be examined closely in terms of the expected demand for and the costs of delivering the service. The demand and costs must always be compared to the existing available resources in the department’s response region. This comparison is important in order to gather adequate information so that an informed decision on special operations services can be made. For example, it might be more practical for a fire department to train all of its responders to the “awareness” level of trench collapse emergencies and use a neighboring community’s trench rescue team as the primary response agency, rather than fund the purchase of expensive trench rescue equipment and train its own trench collapse rescue team.

The regional team approach to the delivery of special operations services continues to be a common approach in suburban communities across the nation.
Hazardous Materials Response

Over the past few years, international disasters, such as those in Yakima Nuclear Power Plant (Japan) and the Deepwater Horizon drilling rig (USA), have re-focused attention on the potential for catastrophic hazardous materials incidents throughout the world. In the 1980s, the concern for prevention of hazardous materials disasters served as an impetus for Federal legislation to prevent and control releases of hazardous materials and to protect workers involved in hazardous waste site clean-up and emergency response.

On October 17, 1986, President Ronald Reagan signed into law the Superfund Amendment and Re-authorization Act of 1986 (SARA). This legislation truly transformed the delivery of emergency response services and affected almost every jurisdiction throughout the nation. Although SARA is over 25-years-old, its impact still affects how emergency responders handle present-day hazardous materials incidents, both in terms of response operations and personnel training.

SARA provides for protection of the community under Title III and the protection of the worker under Title I. As a result of the legislation, the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Labor, through the Occupational Safety and Health Administration (OSHA), both adopted regulations that had major impacts on communities’ planning and response to hazardous materials incidents. The regulations impacted communities in a number of ways, but most significantly in the areas of planning; information gathering and retrieval; and emergency response capabilities.

In 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, OSHA provides the following definitions for the various levels of emergency response capabilities:

- **First Responder—Awareness (FRA).** Individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. Persons trained to the FRA level simply recognize the presence of an emergency involving hazardous materials and take action to notify emergency responders.

- **First Responder—Operations (FRO).** Individuals who respond to releases or potential releases of hazardous substances as part of the initial response for the purpose of protecting nearby persons, property, or the environment from the effects of the release. Persons trained to the FRO level meet the FRA requirements
and are trained to take defensive actions to control or minimize the effects of a hazardous materials release. FROs generally do not take any action that involves touching the hazardous material or its container and they are commonly trained in decontamination operations. The FRO is the “workhorse” of most every fire department in terms of basic response to hazardous materials incidents. More fire department personnel are trained to the FRO level than to any other hazardous materials training level.

- **Hazardous Materials—Technician (HMT).** Individuals who respond to releases or potential releases of hazardous substances for the purpose of stopping the release and mitigating the incident. Persons trained to the HMT level meet the FRO requirements and are trained to take offensive actions to control the release of a hazardous material from its container. HMTs are basically trained to manage leaks involving a wide variety of hazardous materials containers. The HMT is the workhorse of most every Hazmat response team. More Hazmat Team personnel are trained to the HMT level than to any other hazardous materials training level.

- **Hazardous Materials—Specialist (HMS).** Individuals who respond with and provide support to hazardous materials technicians at hazardous materials incidents. Typically, persons trained to the HMS level specialize in certain topic areas either through specialized knowledge or specialized skill. A local or regional Hazmat response team may have several “specialists” available to them through a callout or contact roster. For example, a local agricultural chemist might serve as a Hazmat team’s pesticide specialist, but he would not respond or operate at an acid tanker incident.

In the post 9/11 era, most Hazmat response teams have been tasked with accepting the new role of weapons of mass destruction (WMD) response in addition to their regular Hazmat response duties. When looking to identify who would fit the need for WMD response, the local Hazmat Team was the natural choice given their training in chemical protective clothing and their management of chemical releases. These additional WMD responsibilities were further reinforced by the anthrax events that followed September 11, 2001, when Hazmat Teams across the nation found themselves responding to potential biological agent emergencies.

Today, a local Hazmat Team is faced with a myriad of complex issues. The Hazmat response field has grown tremendously over the last three decades, from responding to oil
spills along the highways in the 1980s to being prepared for chemical, biological, and nuclear terrorist events in 2013.

**Vehicle Extrication Service**

Vehicle extrication is the most common type of rescue service provided by fire and EMS departments today. While the advancement in passenger vehicle safety features has certainly helped reduce the injury and death rates in motor vehicle collisions, the need still remains for specialized emergency response equipment and specially trained response personnel capable of “cutting” patients out of mangled cars after a violent collision.

The manner in which vehicle extrication service is delivered generally varies by the locale and the demand for service. Three common service delivery models incorporate the use of (1) a heavy rescue squad model (a specialized vehicle that carries large quantities of various rescue equipment); (2) a rescue engine model (an engine company equipped with some rescue equipment in addition to firefighting equipment); and (3) a ladder truck model (aerial device that carries extrication equipment). Each model has its own strengths and weaknesses, but the most important component is that trained rescue personnel (technicians) arrive with the tools needed to complete the extrication so that the traumatically injured patient can be taken to a definitive medical care facility for treatment in a timely manner.

Extrication services in the City of New Rochelle use a combination of the heavy rescue and ladder model. A ladder is equipped with a variety of vehicle extrication tools and equipment—enough so that the unit and the personnel responding to a motor vehicle collision should be able to complete most vehicle extrication operations without the need for an additional heavy rescue squad or other extrication-capable unit.

**Technical Rescue Services**

Technical rescue services normally include confined space rescue, trench collapse rescue, structural collapse rescue, high-angle rescue, and water rescue.
Confined-Space Rescue

In January 1993, OSHA issued a regulation entitled “Permit-Required Confined Spaces” (29 CFR 1910.146). Historically, confined-space work has proven deadly for many workers and “would-be” rescuers. Confined spaces are notorious for their poor atmospheric conditions and their internal configurations and entanglement hazards. The OSHA regulation was enacted in an attempt to reduce the number of injuries and deaths that occur in confined spaces by requiring only trained entrants and rescuers be allowed to work in confined-space environments.

While the OSHA confined-space regulation is focused mostly on industry and those who work in and around confined spaces, there are important implications for fire department and emergency service personnel. Facilities that have permit-required confined spaces must identify the rescue team before workers are allowed to enter a confined space. Large industrial facilities often have their own confined-space entry and rescue teams. However, smaller companies will often use the local fire department as the default rescue team—often unbeknownst to the fire department.

The New York State Department of Labor (DOL), Public Employee Safety and Health (PESH) is charged with enforcement of all OSHA regulations as they relate to municipal employees. In the mid 1990’s PESH sited New Rochelle Department of Public Works (DPW) with failing to protect its workers when entering manholes, catch basins, trenches and other confined spaces. The major violation was failure to establish and maintain a confined space rescue team. It was determined that it was much cheaper to have the fire department become an OSHA compliant rescue team than to have DPW do it. Annually the fire department already performs many of the requirements such as medical exams, mask fit testing and SCBA training. The NRFD and NR-DPW have worked together to provide this required service for approximately 20 years. Without a city confined space team, much of the work that DPW performs, particularly in the sewers and drain bureau would be illegal.

Trench Collapse Rescue

Some fire departments across the United States provide trench-collapse rescue service as part of their comprehensive rescue service plan. Many of these departments have experienced tremendous growth in their communities and have seen the need for the
service. In other areas of the country, trench collapse rescue is provided by a regional response team, possibly one that is search and rescue based. Regardless of the delivery model, the cost of trench collapse rescue service is very expensive and often cost prohibitive to many departments.

The Westchester Special Operations Task Force

To provide technical rescue service in a team approach as a basic regional and/or county-wide function the Westchester Special Operations Task Force was established a number of years ago to provide mutual benefits for nine Westchester County participating fire services delivery agencies working together with the support of a central County staff. Several of the special technical services provided are:

1. Hazmat team coverage;
2. Surface water rescue team coverage;
3. Building collapse/underground rescue team coverage;
4. Personnel/manpower squads; and,
5. Technical/heavy duty rescue.

It would be cost-prohibitive and impractical for every fire services delivery agency to be self-sufficient in all these types of specialty services areas. For the Westchester County area, the Westchester Special Operations Task Force fulfills this special services provision goal. The Task Force is available as needed to the nine participating municipalities and other non-participating municipalities.

The NRFD Heavy Rescue is an important part of this Task Force, particularly as related to collapse-rescue services. A NRFD deputy chief should be responsible for managing the NRFD Heavy Rescue functions along with a number of technical rescue training firefighters and officers.

The Heavy Rescue needs to be staffed at a minimum of three firefighters and officers. It is an integral part of the Westchester County Operations Task Force that responds and provides special technical rescue services to New Rochelle, the rest of Westchester County, the region, including the City of New York, and the State. For the cost of the NRFD heavy rescue, New Rochelle receives the services of this very progressive, state-of-the-art, fully staffed Special Operations Task Force. This is an invaluable resource.
available to New Rochelle with its many high hazard problematic risks, including the heavily travelled I-95 and other limited access highways, high-rise senior citizen occupancies and downtown commercial areas.

**Technical Rescue Training**

Due to the importance of training to the proper delivery of technical rescue services the Study Team spoke to a number of NRFD firefighters and officers. A number of points and needs were made clear to the Study Team during interviews and in assessing the various aspects of New Rochelle technical rescue services and related training. A number of needs should be considered with regard to these important services. These needs include:

- Rescue training should be upgraded;
- All Fire Station 1 firefighters and officers should be trained in appropriate heavy rescue;
- Fire Station 1 should be designated as the technical rescue station;
- The heavy rescue unit should not respond without the on-board staff being properly trained and certified in technical rescue; and,
- Every effort should be made to constant-staff the heavy rescue unit with a minimum of three.

**Summary of Special Operations**

In addition to the traditional fire and EMS services delivery, fire departments also provide a wide variety of other specialized services that are seldom needed, but really make a difference when used. The decision by a fire department to be in the special operations services business must be a decision that is well thought out and based upon a real need, not a perceived need presented by a few personnel who want to start a new program to satisfy their interests. When faced with limited resources and expanding calls for service from the community, a fire department should carefully select the services it provides. Often times a joint effort approach by several neighboring fire departments is a more efficient use of resources to accomplish the same task, as has been implemented with the Westchester Special Operations Task Force that New Rochelle and the other eight participating municipalities should be commended for initiating and operating.
COMMUNICATIONS AND DISPATCH

This section addresses a number of basic concepts and processes related to 9-1-1, public safety communications, and dispatch functions. Specific descriptions of the method of operations for the dispatch of the NRFD and other regional fire departments will be addressed. Relevant aspects, conclusions, and recommendations relating to the use of automation and technology; emergency communications center characteristics; state-of-the-art alarm process and dispatch procedures; and training, staffing and scheduling of emergency communications center personnel are also discussed.

Information relating to a number of relevant dispatch subjects, such as objectives, performance measurements, 9-1-1 operations and automated dispatch systems, are included in this section to familiarize the reader with the technology and processes.

Public Safety Answering Point Operations

A Public Safety Answering Point (PSAP), also commonly referred to as the 9-1-1 center, is a call center responsible for answering calls to an emergency telephone number for police, fire, and emergency medical services. In October 1999, the Federal Wireless Communications and Public Safety Act of 1999 (9-1-1 Act) took effect with the purpose of improving public safety by encouraging and facilitating the prompt deployment of a nationwide, seamless communications infrastructure for emergency services. One provision of the 9-1-1 Act directed the Federal Communications Commission (FCC) to make 9-1-1 the universal emergency number for all telephone services.

Trained telephone operators/dispatchers, known as telecommunicators, are responsible for obtaining pertinent information from callers and dispatching the appropriate emergency services to calls for help. Modern PSAPs and 9-1-1 systems automatically report the telephone number and location of 9-1-1 calls made from wireline or landline phones, a capability called Enhanced 9-1-1 or E9-1-1. The FCC also requires wireless telephone carriers to provide 9-1-1 and E9-1-1 capability, where a PSAP requests it. Once it is implemented fully, wireless E9-1-1 will provide an accurate location for 9-1-1 calls from wireless phones.

A commonly held belief of the public is that public safety providers are as close as a telephone. While this is generally true of public safety service provision, members of the
general public have a significant misunderstanding and lack of knowledge of the myriad functions that cause public safety officers to arrive where needed in a timely manner. Given the vast array of technological and human functions that must be carefully, accurately, and quickly executed to ensure a proper response to a demand for service, it is amazing to many, upon learning of the sequence of actions, that existing dispatching systems work as well as they do. Without the ability to receive calls, gather necessary preliminary information, transmit that information, and dispatch appropriate resources in such a manner to ensure a timely response, any system is doomed to failure. While there are a variety of methods in use across the country today, each must be considered individually for applicability to the needs, capabilities, and technologies of the jurisdiction being served.

**New Rochelle 911 Call Answering**

The following describes the process involved with handling New Rochelle 911 calls:

*What happens when a citizen calls 911 on a landline?*

All 911 calls in New Rochelle that come from a landline (noncellular phone) are automatically sent by the phone company to the New Rochelle Police Department’s Public Safety Answering Point (PSAP). The Police dispatchers first determine if the call is a police matter. If it is they handle it. If it is a fire or EMS call they transfer it to 60 Control (Westchester County Department of Emergency Services – NRFD’s dispatchers). If it is not clearly police, fire or EMS they will attempt to advise the caller of the correct agency (i.e., the courts, DPW, Parks & Rec. etc.). If they cannot, they turn the call over to 60 Control and they notify the Fire Department. The fire department is then sent to determine what the problem is and who should handle it.

*What happens when a citizen calls 911 on a cell phone?*

All 911 cell telephone calls in New York State are answered by either the New York State Police (NYSP) or NYC Police (if the cell tower accessed is in NYC). Most calls in New Rochelle will be picked up at the Transportation Management Center (NYSP) in Hawthorne. If they are busy, the call will roll over and any NYSP barracks (from Buffalo to Plattsburgh to Montauk) will get the call. If it is a police matter they will transfer the call to the proper police jurisdiction, if it is anything else they will transfer it to the proper county fire/EMS dispatch (60 Control), and they will dispatch the fire department.
As a point of information, a person who calls 911 considers his/her situation to be an emergency. It might not be an emergency to the fire department. As an example: an elderly female calls and all she says is her kitchen is flooded, please help. From the above dispatch, it could have been found:

- A broken water line, (in one case from a frozen pipe, that had thawed and been flowing overnight, putting 6 feet of water in the basement and electrifying the water).
- A tub overflowing from the apartment above (the owner had a stroke and was unconscious next to the tub).
- A roof leak, with a partial collapse, endangering the resident.
- A toilet backing up and either sewers and drains or a plumber was needed
- An open window, with the rain coming in and the resident could not close it.

So what is an emergency? If the fire department did not respond to this citizen’s call for help, who will?

As to actual 911 calls handled, 60 Control reported that in the past only about 25% of all 911 calls were properly transferred from NRPD dispatch to them. Currently it appears to be over 50% of the calls. 60 Control can only provide Emergency Medical Dispatch (EMD) services when the call is actually transferred. When they do not speak to the caller, they automatically send both an engine and an ambulance, even if the call appears to be extremely minor.

Further, it should be noted, that the Westchester Regional EMS Council (REMSCO) requires EMD, including the ability to give pre-arrival instructions, to be utilized by all advanced life support (ALS) organizations. **Failure to meet this standard may mean that the City would lose its paramedic service.** The point of this matter is that every effort should be made to actually transfer 911 calls for medical services to 60 Control.

### Communication Center Objectives

An emergency public safety communications center is the nerve center of primary emergency public safety services. It is the critical link—the lifeline—between the public and its protectors—the police officers, firefighters and rescue personnel. The general purpose and intent of the emergency communications center is best described by the following statement of objectives:
1. Establish and maintain a call center that the public client can contact for emergency assistance with the expectation that some corrective action or emergency service will result from that call.

2. Establish and maintain a system to which emergency calls for service result in prompt dispatch of proper agencies, personnel and equipment to effectively address the emergency.

3. Establish and maintain a system wherein properly trained and dedicated personnel closely monitor the progress of the agencies, personnel and equipment en route to the scene of the emergency and assist in prompt arrival of the services.

4. Establish and maintain a system wherein the resources remaining available to an emergency service agency are redistributed throughout the service area to minimize extended service response times because of “holes” in the coverage.

5. Provide, in a timely manner, and upon request from the field incident commander, additional resources that match the incident commander’s request as closely as possible.

6. Generate and maintain accurate and precise records as required by the emergency response system. The emergency response system includes the communications center.

7. Monitor the emergency to its conclusion, exchanging with field units any record-related or administrative information required by standing orders. Upon stabilizing or abating the emergency, properly close the records on the event or incident, file the record, and move on to the next incident.

8. Establish and maintain a properly designed radio communications system able to provide reliable dispatch of emergency units in stations or the field, and provide reliable information flow between the communications center and the field units, and the field units one with another at any time, including non-emergency periods.

9. Establish and maintain a properly designed radio, information and telecommunications system capable of providing reliable information flow between the agency that addresses an incident and other agencies or jurisdictions that may be called to assist.
10. Develop and maintain a database and records system that allows the communications center to identify the location of the call for service so the proper operational agency can respond.

These stated objectives of a public safety communications and dispatch center are general in nature; but these objectives provide the framework within which to understand the overall goals and purposes of a modern model emergency communications center. The objectives also provide an overview of how the support systems involved in a model public safety communications system assist in realizing the mission of the typical communications center.

**Cascade of Events and Performance Measures**

An essential element in the assessment of any emergency service delivery system is the ability to provide timely and adequate resources for anticipated emergency situations such as fires, rescue situations, medical emergencies, and other foreseen occurrences. Each emergency situation requires a variable amount of staffing, apparatus, equipment, and other resources to be effective. Appropriately trained and equipped fire companies must arrive, deploy, and control the emergency within specific timeframes for successful emergency event strategies and tactical objectives to be met. For example, most fire departments and emergency medical providers strive to extinguish small structure fires quickly before they reach flashover potential to minimize risk and damage and to intervene in medical emergencies quickly to reduce clinical and biological death from cardiac arrest or severe blood loss. In both of these instances, response times, appropriate staffing, and adequate resources are critical factors that affect the outcome of the event. The capability of a fire department to respond to these events within four minutes of the initiation of the event improves the chances of saving lives and property. The entire premise of a fire department’s successful response to a structure fire is based on its ability to effectively deploy properly trained personnel and adequate resources before the fire reaches flashover. Figure 6.7 from the Fire Sprinkler Association demonstrates fire growth to flashover and the critical timeline for fire department intervention.
The Commission on Fire Accreditation International (CFAI) has defined response time elements as a cascade of events. This cascade concerning the passage of time is the interval from when a fire or emergency medical event occurs and the fire service arrives on scene, and is a reflection of the time elements that make up the total response time in handling an event. Figure 6.8 illustrates that there are many components of time that must be kept as short as possible if a fire is to be controlled or a patient is to survive.
Below are definitions of each of the components of time for the cascade of events when responding to a fire or medical emergency that are illustrated in Figure 6.8.

• **Event Initiation Point**—The point at which factors occur that may ultimately result in activation of the emergency response system. Precipitating factors can occur seconds, minutes, hours, or even days before the point of awareness is reached. An example is the patient who ignores chest discomfort for days until it reaches a critical point at which time he/she makes the decision to seek assistance.

• **Emergency Event Awareness**—The point at which a human being or technologic sentinel (i.e., smoke alarm, infrared heat detector, etc.) becomes aware that conditions exist requiring activation of the emergency response system.

• **Alarm**—The point at which awareness triggers notification of the emergency response system. An example of this time point is the transmittal of a local or central alarm to a public safety answering point (PSAP). Again, it is difficult to determine the time interval during which this process occurs with any degree of reliability. The alarm transmission interval lies between the awareness point and the alarm point. This interval can be significant, as when the alarm is transmitted to a distant commercial alarm monitoring organization, which then retransmits the alarm to the local 9-1-1 dispatch center. When there is an automatic transmission of the signal, the fire department gains valuable time in controlling the event.
Another example of this situation occurs in many jurisdictions when 9-1-1 is called from a cell phone, which often goes to a central answering point and is then rerouted to the appropriate dispatch center.

- **Notification**—The point at which an alarm is received by the PSAP. This transmittal may take the form of electronic or mechanical notification received and answered by the PSAP.

- **Alarm Processing Time**—The time between the first ring of the 9-1-1 telephone at the dispatch center and the time the computer-aided dispatch (CAD) operator activates the station and/or company alerting devices.

- **Turnout Time**—The interval between the activation of station and/or company alerting devices and the time when the responding crew is aboard the apparatus and the apparatus is beginning to roll toward the call as noted by the mobile computer terminal or notifies dispatch by voice that the company is responding.

- **Travel Time**—The point at which the responding apparatus signals the dispatch center that they are responding to the alarm and ends when the responding unit notifies the dispatcher of its arrival on scene (via voice or mobile computer terminal notification).

- **On-Scene Time**—The point at which the responding unit arrives on the scene of the emergency.

- **Initiation of Action**—The point at which operations to mitigate the event begin. This may include size-up, resource deployment, and patient intervention.

- **Termination of Incident**—The point at which units have completed the assignment and are available to respond to another request for service.

Figure 6.8 contains at least three major critical components: alarm processing time, turnout time, and travel time. Collectively, they make up the total time from when a person activates the emergency response system and the system delivers a vehicle on site. It is imperative to keep in mind that certain intervals described, such as turnout and travel time, can be directly influenced by the fire service via station locations and design, staffing levels, as well as local rules and procedures for response. Others factors, such as notification and alarm processing, can be influenced indirectly through public education and engineering initiatives. The fire service can also influence the call-processing interval through its ability to define standards and compel performance by its dispatch centers.
National consensus standards developed by the National Fire Protection Association (NFPA) describe acceptable performance standards for alarm receipt, alarm processing, turnout, and response time. NFPA 1221, *The Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, defines acceptable alarm receipt performance as 95% of alarms received on emergency lines to be answered within 15 seconds and 99% to answered with 40 seconds; acceptable alarm processing performance as processing 95% of alarms processed with 60 seconds and 99% of alarms processed within 90 seconds; and where alarms are transferred from the primary PSAP to a secondary PSAP the transfer proceed should not exceed 30 seconds for 95% of the alarms processed.

**Organization and Management for Communication Centers**

This section discusses model management and coordination approaches for communications centers used by other municipalities. The Study Team has evaluated each of these models in the delivery of emergency communications services.

**Approaches to Model Dispatch Center Organization**

The Study Team has observed a number of approaches in managing and directing combined public safety communications centers. These include management by:

- Police departments;
- Separate municipal agencies;
- Fire departments; and,
- Regional facilities (e.g., multiple municipalities or county).

The management of communications centers by law enforcement departments is the most predominant approach in the United States. This practice seems related to the law enforcement workload, which typically has a higher call load than fire/rescue/EMS agencies. Third-party agencies include separate telecommunications agencies or emergency management agencies. There are very few combination public safety communications centers managed by fire departments.

When either the police or fire department manages the combination communications center, there is a potential for a perceived or actual “favoritism” whereby the dispatchers
indirectly or openly favor the field personnel, policies, and procedures of the agency for which they work. Regardless of whether the problem is perceived or real, public safety officials need to be proactive to avoid claims of “favoritism” in emergency communications service delivery.

The management of a number of combination public safety communications centers has dealt with this potential issue. Larger municipalities often budget for a police or fire liaison/supervisor position from the agency not responsible for the communications center. This position may be onsite either around the clock (in very large communications centers) or on the day shift to monitor, provide liaison and/or actually provide a certain level of dispatch operations supervision.

**Radio Systems**

A number of radio frequency bands have been made available for public safety agencies by the Federal Communications Commission (FCC). These bands are as follows:

- VHF low band
- VHF high band
- UHF 450 MHZ
- UHF 490 MHZ
- UHF 700 MHZ
- UHF 800 MHZ

Each frequency band has associated advantages and disadvantages. The selection of a particular frequency band by public safety agencies is dependent upon a number of factors, including frequency availability, area to be covered, type of geography, size of radio system designed, and frequency bands used by adjacent public safety agencies.

**Typical Radio System Configurations**

There are a number of radio system configurations available for public safety use. These system configurations vary primarily in the number and usage of radio frequencies that comprise each of the systems. The different system configurations are as follows:
• **Simplex** - Utilizes a single radio frequency for both transmitting and receiving all radios for each channel. Only one radio can transmit at any time while all other radios receive.

• **Two-frequency half duplex** - Utilizes separate frequencies for transmitting and receiving. Only one radio can transmit at any one time; all others receive.

• **Two-frequency full duplex** - Utilizes separate transmit and receive frequencies and permits simultaneous conversations in two directions.

• **Two-frequency repeater** - Utilizes a centrally located high-powered base station “repeater.” The repeater receives a transmission from any radio in the system on one radio frequency and instantly retransmits or “repeats” the message on a second frequency that is received by the other radios on the system. Repeater systems are two-frequency half duplex systems.

• **Trunking systems** - Utilizes a group of radio frequencies that are controlled by a computer at the base station or communications center. When a transmitter is keyed, it transmits a unique identity code to the computer. The computer instantly selects an available radio frequency and automatically directs the transmitting radio to use that frequency for transmission.

A radio system is generally comprised of the following primary components:

- Base station transmitter and receiver equipment;
- Antennae tower and equipment;
- Mobile radio equipment;
- Portable radio equipment;
- Applicable automation hardware and software; and,
- Communications center control equipment and consoles.

**800MHz Trunking System**

It is common knowledge that two-way radio communication is an essential tool for effective delivery of a wide range of public services. Fire, rescue, emergency medical services, law enforcement, public works, and transportation agencies cannot function well without access to reliable radio communications. Public safety radio communications is expected to grow by 55 percent over the next 10 years as a result of population and commercial growth. While the need is growing rapidly, the ability of users to upgrade their existing radio systems is limited, because most UHF/VHF
frequencies have been licensed to users and are not available to jurisdictions or regions needing to upgrade or expand radio systems.

In recognition of this frequency availability problem, the Federal Communications Commission (FCC) has taken action to allocate large blocks of 800MHz spectrum radio frequencies to help satisfy this growing communications requirement of government, business, industry, and land transportation. While releasing these frequency blocks, the FCC stipulated that certain communications systems operating in the 800MHz band must employ trunking techniques (computer controlled) to achieve increased channel utilization and loading.

On the conventional single-channel, two-way radio system, several users have access to only one channel. When that channel is in use, other users in the shared system should not access the channel. Therefore, like telephone users on a “party-line,” they must wait until the channel is free. Another channel may be clear in the area, but conventional system users have no means to access it.

On a trunking radio system, each user has access to a number of radio channels. When a user places a call (pushes the transmit button), the user is automatically assigned a clear channel for the duration of the message. While that channel is in use, other users can access other channels. At the conclusion of each message, the vacated channel is returned to the common pool where it becomes available to other users in the system.

Several key advantages of utilizing computer controlled trunking 700/800MHz radio systems are as follows:

1. Measurable improvement in frequency utilization;
2. Transmission of messages on identical frequencies at every site in the trunking system simultaneously;
3. Dynamic frequency allocation by tracking users and keying only sites and channels required to reach a particular user group;
4. Enhanced records capability regarding frequency use by units and groups in the system;
5. Improved frequency security;
6. Total ability to exclude unauthorized units from transmitting on the system;
7. Ability to allocate frequency groups “on-the-fly” in response to emergency requirements, such as disaster situations; and,
8. Ability to handle the increasing communications requirements with improved frequency allocation.

For a number of years, the FCC has been encouraging and facilitating communications users, such as fire, EMS and other local government agencies, to initiate regional planning efforts leading to the implementation of well-coordinated and planned 800MHz trunking radio systems. As a result, many such systems have been or are being planned and implemented across the United States.

**New Rochelle Radio System**

New Rochelle Fire Department has developed a state-of-the-art radio system. The system has built in redundancy and a back-up capability to ensure reliability. The majority of the system was grant funded. Primary NFRD dispatch is from 60 Control in Valhalla. 60 Control simulcasts all dispatches, that means that they alert us using both tones and voice that are sent simultaneously to the fire stations and the fire trucks. The stations alerts are sent on VHF-Lo Band via county radio transmitters located in Pelham, Town of Mamaroneck and Valhalla. They alert single or all stations and the ambulance quarters. Once received, the station has to confirm they received the call via radio. The simulcast gets sent via Verizon dedicated landlines to Fire Headquarters, where the signal is sent by microwave to the roof of Avalon East on Memorial Highway (there is also a backup tieline). Every fire truck, ambulance and staff vehicle can receive this radio signal.

The radio transmitter/receiver on Avalon East is the primary method used to communicate with 60 Control and the fleet, and for the fleet to communicate with other units. It operates on a dedicated UHF frequency. There is a back-up unit located on the roof of the original Avalon Building on Huguenot Street. It can be turned on and off remotely by 60 Control as needed. There is also a radio receiver located on the cell tower at Wilmot road and the Hutchinson River Parkway, this tower is connected to fire headquarters by a dedicated tieline and it ensures that portable radios can communicate as well as the more powerful vehicle radios.

The Fire Department has spare transmitter/receivers, in the event of a major hardware failure. All three sites have backup generators and can run continuously during an
extended power failure. The NRFD has planned to add a third back-up at city hall when/if the proposed cell tower is erected in the parking lot outside fire headquarters. All communication capabilities are available in fire headquarters in case 60 Control cannot dispatch NRFD. During major storms this has been an issue in the past. The NRFD also has maintained its original VHF low band transmitters along with county owned equipment located in Pelham. 60 Control also provided New Rochelle and all fire and EMS units in the county with a “Trunked” radio system to coordinate mutual aid and also to communicate with the hospitals.

The portable radio that every firefighter carries is capable of talking directly with 60 Control through the above systems. More commonly they are turned to a fire ground channel. This provides clearer direct radio-to-radio communication at an emergency scene. Each radio is capable of operating on all of the different fire ground channels used throughout Westchester and also a special mutual aid series of channels that we use with FDNY (New York City). All of the Westchester Fire and EMS departments have the ability to operate on New Rochelle’s fire ground channel if needed.

The New Rochelle Fire Department should be commended for planning and implementing this radio system that provides broad geographic coverage in a difficult urban environment.

**New Rochelle Fire and EMS Dispatch**

The New Rochelle Fire Department, TransCare Ambulance (which provides EMS transport services to New Rochelle), and other participating fire and EMS services delivery agencies in Westchester County are dispatched by Westchester County’s Emergency Communications Center, generally referred to as 60 Control. 60 Control is located in Valhalla, NY, and is part of the County’s Department of Emergency Services.

60 Control currently provides dispatch services to 48 of the 58 fire departments and 25 of the 45 EMS agencies in the County. According to County documents, 60 Control handled approximately 105,000 fire and EMS incident dispatches in 2012. The cost savings benefits to the participating municipalities and fire and EMS agencies are likely substantial. Further, the operations benefits are also likely substantial due to improved communications interoperability and incident unit command and control.
INSURANCE SERVICES OFFICE REVIEW

This section examines the Insurance Service Office’s “Fire Suppression Rating Schedule” (Schedule) as it relates to the operations of the NRFD. Information presented in the section includes an overview of the Schedule, an assessment of the NRFD’s deficiencies, and recommendations for improvement.

Insurance Services Office

The Insurance Services Office (ISO) is a private organization that provides a variety of services to the insurance industry in the United States. One of ISO’s services involves the assessment and rating of fire department performance—a service that is well-known among fire chiefs and municipal officials. Representatives from ISO use their agency’s Fire Suppression Rating Schedule to evaluate the performance of a fire department in an effort to help establish a basic guideline for insurance firms underwriting fire insurance policies in the community that the fire department protects.

ISO Fire Suppression Rating Schedule

The ISO Fire Protection Rating Schedule (Schedule) “rates” a community’s fire department based on three major fire protection factors: (1) how well the fire department receives alarms and dispatches its firefighting resources; (2) the number of engine and ladder companies and trained personnel the community needs to fight a fire; and (3) the community’s available water supply and distribution system.

Once an assessment is completed, the measurement results are converted into a Public Protection Classification (PPC) number on a relative scale from 1 to 10, with Class 10 representing less than the minimum recognized level of protection and Class 1 representing the highest level. Few fire departments achieve a Class 1 rating and a Class 10 rating is treated as if no fire department exists.

It is important to note that the Schedule is a fire insurance rating tool, and it is not intended to analyze all aspects of a comprehensive public fire protection program. ISO advises that the Schedule should not be used for anything else other than insurance rating. In addition, an ISO rating is not something that is done on a frequent basis. Once a fire department is evaluated and assigned a classification, that rating will remain in place until
the next evaluation. The NRFD completed its last ISO rating process in October, 2013, and is awaiting the results.

The Assessment

The Schedule is divided into numerous areas of assessment. While only ISO representatives can conduct an assessment and provide a rating, the Study Team reviewed the results of the 2000 survey and classification rating in order to identify possible areas of improvement.

Receiving and Handling Fire Alarms

The ISO Schedule reviews a fire department’s ability to receive notice of a fire emergency and alert its personnel so that a timely response can be made. Items surveyed include the telephone facilities provided for the general public to report fires, the operators on duty at the communications center, and the facilities used to dispatch fire department companies to the fire.

For the 2000 ISO grading assessment New Rochelle received 19.20 out of total possible 20.00 points credit. The primary loss of points was staffing levels at 60 Control that has not kept up with the growth of agencies added and call/population volume.

Fire Department Operations

The ISO Schedule evaluates a fire department’s operations in terms of engine and ladder companies, the equipment carried on those vehicles, and their response to fires. In addition, this section also assesses firefighter training and response to incidents. During the last ISO evaluation, the NRFD received 40.44 points out of a possible 50 points for fire department operations. Had the department received its rating based on this category alone, they would have received a Class 2 PPC rating.

The Study Team found the greatest areas of demerit in 2000 to be in training. In terms of training, the NRFD received only 51% of the possible points for training facilities and activities. The lack of a drill yard with a training tower clearly hurt the resulting ISO rating.
As noted in the Training Chapter of this Report, the Department’s training records and company drill training program both have substantially improved, so that an ISO rating today would likely be measurably better.

Finally, with staffing approaches suggested by this Report it is likely that increased credit could be attained for the next grading assessment.

**Water Supply**

The final section of the ISO Schedule reviews the water supply system that is available for fire suppression in the community. In 2000, the NRFD received 35.19 points out of a possible 40, which is a reasonably good score. Major changes made by United Water in the last 3-4 years may cause a significant drop in the City’s rating.

**Summary of ISO**

An ISO assessment can be a stressful time for a fire department; however, it is important to remember that the sole purpose of the assessment is for insurance underwriters, not for fire department critics. A Class 2 is a successful fire department that is involved in public fire safety education, and delivers EMS and paramedic services, and is very effective in keeping fire loss to a minimum. Insurance underwriters use the ISO information to determine their risk of loss and in part base their rates on that risk.

The Study Team urges the City of New Rochelle and the NRFD to use the results of ISO’s 2013 assessment in conjunction with the findings of the Study Team’s report as a basis from which to begin making additional operational improvements in the Department. It is possible that when the next ISO rating assessment is conducted, NRFD’s rating could improve to Class 1.

**SUMMARY**

Decisions made at the emergency scene may be irreversible, and the consequences of error can be disastrous. Errors can lead to further property loss, as well as injury or death to civilians and firefighters. Successful fire operations require thorough pre-incident
planning; knowledge of the nature and location of buildings; interior contents; and built-in systems.

In addition to the traditional fire and EMS services delivery, fire departments also provide a wide variety of other specialized services that are seldom needed, but make a difference when utilized. The decision by a fire department to be in the special operations service business must be one that is well thought out and made based upon a real need, not a perceived need presented by a few personnel who just want to start a new program to satisfy their interests. When faced with limited resources and expanding calls for service from the community, a fire department should carefully select the services it provides. Often times a joint effort approach by several neighboring regional departments is a more efficient use of resources, while still accomplishing the task.

In the case of the NRFD, the department needs to look closely at all of its special operations services to see what the demands for service are and how to best prepare the department to respond to those demands. Establishing program goals will be important for each type of special operation service provided. In some cases, perhaps the best way to meet the established goals will be to utilize outside mutual aid or regional resources instead of trying to be the sole-source provider of the service.

An emergency communications center is the nerve center of police, fire, and EMS service delivery agencies. It is the critical link—the lifeline—between the public and its protectors. Typically, emergency dispatch centers in a municipality are managed by a number of agencies, including fire, separate municipal agencies, regional agencies, or a police department. Predominantly, the public safety dispatch function is the responsibility of the police department or a regional communications center. In the City of New Rochelle, the emergency dispatch function is provided by the County’s Department of Emergency Services, generally known as 60 Control.

The radio system is the backbone of the emergency dispatch system as it is the means for communications between the dispatchers and the service delivery personnel, and among the service delivery personnel—police, firefighters, fire officers, EMTs, and paramedics. Radio systems have progressed technologically through the years to the point where many radio systems are computer-controlled, digital signal-based radio systems. The New Rochelle Regional Communications Center, 60 Control, serviced public safety agencies are supported by the state-of-the-art radio system New Rochelle radio system.
that is well designed and implemented to meet the NRFD and Transcare needs in a
difficult urban high-rise environment.

A number of options for improving emergency fire services in New Rochelle are outlined
for consideration.

OPTIONS AND RECOMMENDATIONS

6-1 The Fire Chief should retain one of the platoon commanders to oversee Special
Operations program as a collateral duty.

6-2 The Fire Chief should require all personnel assigned to perform technical rescue
operations be trained and certified to the applicable NFPA and/or the New York
State training standards.

6-3 The Fire Chief should assure that every effort is made to actually transfer 911 calls
for medical services to 60 Control.

6-4 The City and the Fire Chief should pursue implementation of the suggested emer-
gency management upgrades.

6-5 The Fire Chief should designate Fire Station 1 as the Department’s technical
rescue location and Fire Station 2 as the HazMat and WMD location.

6-6 The City and the Fire Chief should upgrade the staffing of the heavy rescue unit to
a minimum of three firefighters and officers.

6-7 The Fire Chief should consider using the results of the 2013 ISO grading with the
recommendations of this Report to improve the Fire Department.