

The Total Quint Transformation

Richmond Accomplishes Cost-Cutting, Service Goals

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The Richmond (Virginia) Department of Fire and Emergency Services has come up with innovative and radical changes in its firefighting operation that may help other localities as they look for less expensive, more efficient means of service delivery.

Richmond's Total Quint Transformation has allowed the city to take advantage of state-of-the-art firefighting equipment, to reduce its personnel strength by 50 positions, and to improve its responsiveness to all types of emergencies.

The concept was developed in early 1996, after the city council challenged the fire chief to devise a budget plan for the department that would trim personnel yet keep all 20 stations operating effectively. What resulted was a \$12.6 million plan to revamp the department's equipment completely with "quints," vehicles that combine five basic firefighting functions that till then had required a separate pumper truck and ladder truck. This concept may be the most radical overhaul for the Richmond Fire Department since its formation in 1782.

What Has Been Changed?

Richmond's transition to the Total Quint Transformation has been completed. The fire department now has 20 quints, three heavy-duty rescue

Overview of the City of Richmond, Virginia:

- Population: 203,056
- Area: 62.5 square miles
- Capital city of Virginia

units, and nine medium-duty rapid-response pumpers in service.

Richmond currently operates 20 fire stations that respond to more than 25,000 emergency incidents per year. The department also provides fire prevention and first-responder emergency services (EMS) to a diverse urban population, as well as to a large business, medical, and industrial communities. The former fleet of fire suppression vehicles included 20 engine pumpers, which pump water from fire hydrants, and seven aerial ladder trucks, which provide intense lifesaving and firefighting capabilities. Fighting fires traditionally requires at least one pumper and one ladder truck, each of which carries a four-person crew.

In addition to the fire suppression fleet, the department also had numerous specialized vehicles such as a hazmat (hazardous materials) unit, river rescue boats, foam pumpers, and a trench rescue truck. Before the planned transition, Richmond's 20 engine companies and seven ladder companies employed a total of 474 career firefighters. Through normal attrition and retirement, the department has reduced its ranks to 424 personnel.

Under the Total Quint Transformation, the five-function quints carry fire hoses, water in a booster tank, and ground ladders. They are able to pump water and are equipped with either a 75-foot or a 105-foot aerial ladder. Having the pumper and ladder both on one vehicle, of course, eliminates the need for a separate pumper and aerial ladder truck to perform these functions. Each quint also has its own power generator, positive-pressure ventilation fan for removing smoke, and hydraulic rescue tool for extrications.

The department traditionally has dispatched one of its engines or ladder companies on all life-threatening EMS calls, causing additional wear and tear on these large vehicles. With the new fleet, the company officer determines whether to respond with a quint, a medium-duty rapid-response pumper



Richmond, Virginia's firefighting equipment now includes quints measuring (top to bottom) 75 feet and 105 feet, as well as quint-platform trucks measuring 100 feet.

vehicle, or a pumper assigned to that station, depending on the situation. This choice reduces wear and tear on heavy-duty vehicles and saves on maintenance costs.

For overall improvements in response capabilities, see Figure 1.

The Savings Plan

Because quints are multifunctional, the department plans to reduce the number of companies from 26 to 23, a net decrease of 50 employees through normal attrition, without closing fire stations or

Figure 1. Response Capabilities

| | Traditional | Total Quint Transformation | Change |
|---|-------------|----------------------------|--------|
| Pumping (gallons per minute) | 25,000 | 40,000 | 60.00% |
| Aerial Ladders | 9 | 20 | 122.20 |
| First-Alarm Personnel | 17 | 23 | 35.30 |
| Aerial First-Alarm Personnel | 2 | 5 | 150.00 |
| Heavy Rescue on First Alarm (Personnel) | 0 | 1 | 100.00 |
| Companies Capable of Pumper Work | 20 | 20 | 0 |
| Companies Capable of Aerial Ladder Work | 9 | 20 | 122.22 |
| Companies Capable of Rescue Squad Work | 10 | 23 | 130.00 |
| Extrication Tools | 10 | 23 | 130.00 |
| Positive-Pressure Ventilation Fans | 9 | 23 | 155.60 |
| Rescue Saws | 9 | 23 | 155.60 |

hurting response times, which averaged 3 minutes, 58 seconds in 1997.

Here is a summary of Richmond's plan for upfront expenditures and the corresponding long-term savings:

1. Sell 13 pumpers and 10 aerial ladders for approximately \$1.2 million.
 - a. Replace them with 14 75-foot quints; four 105-foot quints; and one 100-foot platform. The department keeps 13 traditional

pumpers as response vehicles. These units respond with four-person crews.

- b. Add three new heavy-duty rescue vehicles that specialize in water rescue, hazmat, and search-and-rescue duties involving collapsed buildings, trenches, or high-angle extrications. The rescue units respond to all structural fires, extrications, and heavy-rescue incidents. These units

each carry a five-person crew.

- c. Add nine medium-duty rapid-response pumper vehicles (with four-person crews) for first-responder/EMS calls, small fires, and auto accidents that do not require the full service of a quint. Total cost for vehicles: \$12.6 million.
2. Reduce department personnel by 50 positions through attrition (see Figure 2).
3. Achieve a total savings of approximately \$13 million over the next 15 years.

Using a total quint system also allows the department to dispatch the same number of companies with more personnel than the traditional pumper-and-ladder system. A traditional department would initially dispatch three to seven companies (12 to 28 firefighters), depending on the type of fire (see Figure 3). The ability to fight fires effectively with this system requires that pumpers and aerial ladders arrive on the scene at about the same time.

With the quint transformation, the department initially dispatches three to seven quint companies and one heavy-duty rescue response unit, with 17 to 33

Figure 2. Staffing Overview

| | Vehicle | Number of Vehicles | Number of Staff per Shift | Number of Shifts | Total Under Quint Transformation | Total Under Current System | Change |
|---|---------------------|--------------------|---------------------------|------------------|----------------------------------|----------------------------|---------------|
| Firefighters | Quint | 20 | 100 | 3 | 300 | | |
| | Heavy-Duty Rescue | | | | | | |
| | Tactical | 3 | 21 | 3 | 63 | | |
| | Light and Air Units | 3 | 3 | 3 | 9 | | |
| Battalion Chiefs | | | 3 | 3 | 9 | | |
| Subtotal for Suppression | | | | | 381 | 438 | -13.01% |
| Administration | | | 9 | 1 | 9 | 6 | 50.00 |
| Fire Marshal/Prevention | | | 16 | 1 | 16 | 14 | 14.29 |
| Training Academy | | | 8 | 1 | 8 | 5 | 60.00 |
| Civilians | | | 10 | 1 | 10 | 11 | -9.09 |
| Subtotal for Prevention, Administration, Training | | | | | 43 | 36 | 19.44 |
| Total Personnel | | | | | 424 | 474 | -10.55 |



Richmond, Virginia's firefighting equipment includes a first response truck and a heavy duty rescue truck.

firefighters, depending on the type of fire. This system ensures that enough personnel and equipment are on the scene, along with rescue and tactical response personnel who can handle special emergency situations.

The department believes that equipment and maintenance for the total quint concept will cost approximately \$18 million more over the next 15 years than would normal maintenance and replacement of the traditional fleet. At the same time, however, the program will reduce personnel costs by approximately \$31 million, for an overall savings of nearly \$13 million during that same time.

In all, the Total Quint Transformation will reduce the department to 424 employees, as shown in Figure 2. The department should realize an average savings of more than \$964,000 per year through the year 2011.

Of course, funding is at the heart of any plan. Richmond has adopted an \$11.4 million financial package that couples \$1.2 million from the sales of the old fleet with five-year serial equipment notes to fund this innovative program. This \$12.6 million has enabled the fire and emergency services department to order and receive 31 vehicles.

Fire and emergency services will repay Richmond's fleet management fund for 15 years to cover the principal and interest on the financial package. This also will build equity in the fund to purchase all new vehicles in 15 years. The department has based the 15-year repayment program on the expected life span of the vehicles.

Gains

This revolutionary plan dramatically improves emergency response capabili-

ties without increasing response times or closing fire stations. It replaces the department of fire and emergency services' aging fleet with state-of-the-art vehicles. And it ultimately reduces the size of the department.

Also, the plan improves the department's ability to respond to emergencies and ends a longstanding debate on the appropriate size of the crew on fire suppression vehicles. The anticipated savings of \$13 million over 15 years, including the reduction of 50 positions, achieves the Richmond City Council's goal of increasing effectiveness while cutting costs. **PM**

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| Figure 3. Responses to Different Fire Situations | | | |
|---|--|---|--|
| Type of Fire | Traditional Number of Vehicles and Firefighters | Total Quint Transformation Number of Vehicles and Firefighters | Increase in Firefighters Personnel |
| Residential..... | Two (2) pumper companies.....12 | Three (3) Quints.....17..... | 5 |
| | One (1) ladder company..... | One (1) heavy-duty rescue | |
| Business Area..... | Three (3) pumper companies.....20 | Five (5) Quints.....25..... | 5 |
| | Two (2) ladder companies..... | One (1) heavy-duty rescue | |
| High-Rise Building..... | Four (4) pumper companies.....24 | Six (6) Quints.....29..... | 5 |
| | Two (2) ladder companies..... | One (1) heavy-duty rescue | |
| High Life Hazard..... | Four (4) pumper companies.....24 | Six (6) Quints.....29..... | 5 |
| | Four (1) ladder companies..... | One (1) heavy-duty rescue | |
| Extreme Life Hazard..... | Five (5) pumper companies.....28 | Seven (7) Quints.....33..... | 5 |
| | Two (2) ladder companies..... | One (1) heavy-duty rescue | |