

PROVIDENCE, RHODE ISLAND

FIRE DEPARTMENT STAFFING ANALYSIS

DRAFT

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I. EXECUTIVE SUMMARY

This *Fire Department Staffing Analysis* reviews the current fire and rescue system in Providence, the demand for services, and the implications of making the transition from a four-platoon system (42 hours a week) to a three-platoon system (56 hours a week).

- Currently, a minimum of 94 fire and rescue personnel is required to be on-duty 24/7 to staff 14 engine companies, eight ladder companies, one special rescue, and seven rescues (ambulances).
- The PFD has transitioned from a four-platoon system (average work week of 42 hours) to a three-platoon system (average work week of 56 hours).
- The four-platoon system (old system) schedules fire and rescue personnel to work approximately 2,184 hours per year. The three-platoon system (new system) schedules fire and rescue personnel to work approximately 2,928 hours per year. However, personnel work fewer hours than scheduled because of authorized leave (vacation, sick, injury, etc.).
- The analysis of authorized leave taken by personnel means that 1.29 persons are required to fill one position on each shift. This is called the staffing factor. It takes 5.16 persons (1.29×4 groups) to fill one position 24/7 under the four-platoon system. Under the three-platoon system, 3.86 persons are required to fill one position 24/7.

Exhibit 1 shows the total number of personnel required under the three and four platoon systems. Chief officers (Deputy Assistant Chief and Battalion Chief) are not included in the staffing factor. The staffing factor is designed to minimize the use of overtime. The two columns in blue show the difference between the three-platoon system and the four-platoon system. The three-platoon system requires 121 fewer personnel to fully staff fire companies.

EXHIBIT 1

FOUR-PLATOON SYSTEM AND THREE-PLATOON SYSTEM STAFFING*

UNIT TYPE	CURRENT MINIMUM SHIFT SCHEDULE	FOUR-PLATOON SYSTEM STAFFING	FOUR-PLATOON SYSTEM (1.29 STAFFING FACTOR)	THREE-PLATOON SYSTEM STAFFING	THREE-PLATOON SYSTEM (1.29 STAFFING FACTOR)
Firefighters/Company Officers	92	368	475	276	356
Deputy Assistant Chief	1	4	4	3	3
Battalion Chief	1	4	4	3	3
Total	94	376	483	282	362

*Staffing calculations are rounded to the closest whole number.

Exhibit 1 assumes there are no changes in the staffing per shift (currently 94 personnel). However, consideration should be given to reducing the number of ladders, from eight ladders to six ladders, and consolidating four fire stations into two fire stations. The PFD staffs two ladders with four personnel (one officer and three firefighters; and six ladders with three personnel (one officer and two firefighters). Assuming that the two ladders are deactivated and each is staffed with three personnel (one officer and two firefighters) there will be six fewer firefighters and company officers required on each shift (92 personnel minus six personnel equals 86 personnel per shift). Under the three-platoon system, there will be six fewer personnel per shift, for a total of 18 fewer personnel. However, applying the staffing factor of 1.29, there will be 23 fewer personnel, based on the deactivation of two ladders staffed with three personnel.

EXHIBIT 2

THREE-PLATOON SYSTEM WITH TWO FEWER LADDERS

STAFFING	CURRENT SHIFT STAFFING	TWO FEWER LADDERS PER SHIFT	TOTAL STAFFING PER SHIFT	TOTAL PERSONNEL	TOTAL PERSONNEL REQUIRED (STAFFING FACTOR)
Firefighters/Company Officers	92	- 6	86	258	333
Deputy Assistant Chief	1		1	3	3
Battalion Chief	1		1	3	3
Total	94		88	264	339

*Staffing calculations are rounded to the closest whole number.

The Fire Department operates 14 fire stations. The number of fire stations may be decreased by two by consolidating four stations into two stations, resulting in 12 stations. Exhibit 3 shows the staffing per shift with 12 fire stations. It is assumed that two fire

companies (each with one officer and two firefighters) would be eliminated with this station consolidation plan. As a result, there will be six fewer personnel on a platoon. Exhibit 3 also shows that a total of 316 personnel are required if there are 82 firefighters and officers on each shift.

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EXHIBIT 3

THREE-PLATOON SYSTEM WITH TWO FEWER FIRE STATIONS

STAFFING	CURRENT SHIFT STAFFING (MINUS 2 LADDERS)	NUMBER OF FIRE STATIONS	TWO FEWER FIRE COMPANIES PER SHIFT	TOTAL STAFFING ON SHIFT (MINUS 2 STATIONS)	TOTAL PERSONNEL	TOTAL PERSONNEL REQUIRED (STAFFING FACTOR)
Firefighters/Company Officers	86	14	- 6	80	240	310
Deputy Assistant Chief	1			1	3	3
Battalion Chief	1			1	3	3
Fire Station Reduction		- 2				
Total	88	12	- 6	82	246	316

**Staffing calculations are rounded to the closest whole number.*

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Exhibit 4 shows the number of personnel on each shift with a minimum staffing of 94, 88, and 82.

EXHIBIT 4

MINIMUM STAFFING

STAFFING	CURRENT SHIFT STAFFING	SHIFT STAFFING (MINUS 2 LADDERS)	SHIFT STAFFING (MINUS 2 STATIONS)
Firefighters/Company Officers	92	86	80
Deputy Assistant Chief	1	1	1
Battalion Chief	1	1	1
Total	94	88	82

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Exhibit 5 shows the total number of personnel required under a three-shift system. In addition, we propose that three additional Battalion Chief positions be established. One additional Battalion Chief should be assigned to each shift.

EXHIBIT 5
THREE-PLATOON SYSTEM
MINIMUM STAFFING ADJUSTMENTS (INCLUDES 1.29 STAFFING FACTOR)

STAFFING	94 MINIMUM STAFFING	88 MINIMUM STAFFING	82 MINIMUM STAFFING
Firefighters/Company Officers	356	333	310
Deputy Assistant Chief	3	3	3
Battalion Chief	3	3	3
Total	362	339	316

**Staffing calculations are rounded to the closest whole number. Three additional Battalion Chief positions should be created.*

This report presents a series of recommendations for local policy leaders to consider. The major recommendations are listed below.

- The number of ladder companies should be reduced by at least two.
- The City should conduct a systematic review of the configuration of fire stations. The Fire Department should reduce the number of fire stations by two.
- The Fire Department should consider deactivating two ladders and reducing the number of stations by two, from 14 to 12. This minimum shift staffing would be 82 personnel. However, one additional Battalion Chief is required on each shift for a total of 83 (see below). Approximately 319 firefighters, company officers, and chief officers should be assigned to fire and rescue services (operations).
- The current shift schedule (10/14 schedule) should be abandoned under the three-platoon system; the 24-hour shift system should be adopted.
- The three-platoon system requires a reduction in the number of company officers.
- The Fire Department should create three additional Battalion Chief positions.

**EXHIBIT 6
RECOMMENDED CHIEF OFFICER POSITIONS***

POSITION TITLE	NUMBER OF POSITIONS
Chief	1
Assistant Chief (Operations Division)	1
Assistant Chief (Administrative Services Division)	1
Assistant Deputy Chief (Platoon Commander)	3
Assistant Deputy Chief (Emergency Medical Services Division Commander)	1
Battalion Chief	6 (increase of three)
Total	13

*Assumes a three-platoon system.

- The Department's rescue (ambulance) units should be assigned to a specific fire station, in accordance with current practices. However, the daily administration and supervision of the rescue units should be the responsibility of the station Captains.
- The role of the Emergency Medical Services Division should be restructured. The EMS Division should be concerned with medical control, quality assurance, training, and systematic analysis of data and information.
- The Emergency Medical Service Division should have a Field Unit composed of three officers to provide daily oversight and medical control of EMS units. One officer should be assigned to each shift.
- The Emergency Medical Services Division should have several staff officers, including a Field Unit Captain, a Training Captain, and a Quality Assurance Captain.

Exhibit 7 shows the recommended number of officers that should be assigned to the Emergency Medical Services Division.

EXHIBIT 7

EMERGENCY MEDICAL SERVICES DIVISION

RANK	NUMBER OF OFFICERS AND FUNCTION
Deputy Assistant Chief	1
Rescue Captain	1 - EMS Field Unit 1 - EMS Training Unit 1 - EMS Staff Officer for Quality Assurance
Rescue Lieutenant	1 - EMS Training Unit 2 - EMS Field Unit

- The personnel assigned to rescues (ambulances) should work a 24-hour schedule. However, personnel should only work eight to 12 hours on a rescue (ambulance) shift. Fire crew personnel from the same station, or company, should be assigned to work on a rescue (ambulance) unit for the balance of the 24-hour schedule. This practice is called crossed staffing.
- The PFD should staff each rescue (ambulance) with two EMT-Cs. The number of officers should be reduced.
- The PFD should deploy rescues (ambulances) based on activity levels and the peak period demand for services.
- The PFD should consider deploying one additional rescue (ambulance) unit.
- The City should implement an emergency medical dispatch (EMD) system.
- The PFD should convert eight firefighter positions that provide support functions to civilian positions.
- The PFD should be composed of 351 personnel:

Platoon Staffing	319
Administrative & Support Functions	25 (17 firefighters and 8 civilians)
Emergency Medical Service Administration and Oversight	7
Total Complement	351

The following recommendations are presented in the order that they appear in the report.

**EXHIBIT 8
LIST OF RECOMMENDATIONS**

1	The Providence Fire Department should adopt one of the optional staffing plans. Minimum Shift Staffing - 94 personnel (no change in number of units) Minimum Shift Staffing - 88 personnel (deactivation of two ladders) Minimum Shift Staffing - 82 personnel (deactivation of two ladders and station consolidation)
2	The Providence Fire Department should adopt a workforce model which minimizes the use of overtime.
3	The Providence Fire Department should deactivate two ladders.
4	The City should conduct a systematic review of the configuration of fire stations.
5	The City should review station consolidation options proposed in previous studies.
6	The PFD should abandon the current shift schedule and adopt a 24- hour schedule.
7	The PFD should reduce the number of company officers assigned to engine and ladder companies to meet the requirements of the three- platoon system.
8	The PFD should have a complement of 13 chief officers, including one Fire Chief, two Assistant Chiefs, four Deputy Assistant Chiefs, and six Battalion Chiefs.
9	The PFD should assign six Battalion Chiefs to fire and rescue operations.
10	The PFD should assign one Deputy Assistant Chief and two Battalion Chiefs to each platoon.
11	The Emergency Medical Services Division should be restructured.
12	The rescue and fire units (ladder companies) should be cross staffed. Personnel should be assigned to work on both a fire apparatus and a rescue unit.
13	The daily supervision and administration of rescue unit personnel should be the responsibility of the station Captain to which the units are assigned.
14	The recommended EMS Field Officer position should be responsible for providing medical oversight of the rescue units.
15	The PFD should implement a status system management strategy for EMS resources.
16	The City should implement an emergency medical dispatch system.
17	The PFD should consider deploying one additional rescue (ambulance) unit, after careful review of EMS management practices.
18	The PFD should employ civilians to fill the following positions: dispatch positions (six positions), carpentry shop position, and supply room position.

II. BACKGROUND AND DEMAND FOR SERVICES

PROVIDENCE FIRE DEPARTMENT

The Providence Fire Department provides services through a system of 14 fire stations. The PFD deploys 14 engines, eight aerial devices, seven rescue/ambulance units and one special hazards unit. The Department operates other support units.

The PFD currently has a daily minimum staffing requirement of 94 firefighters. Exhibit 9 identifies the units deployed and the number of firefighters and officers assigned to each unit on each shift. For example, six engines are staffed with three firefighters and one officer; eight engines are staffed with two firefighters and one officer.

EXHIBIT 9
CURRENT MINIMUM SHIFT STAFFING

UNIT TYPE	NUMBER OF UNITS	CHIEF OFFICER STAFFING	FIREFIGHTERS PER UNIT	OFFICERS PER UNIT	STAFFING PER UNIT	TOTAL DAILY STAFFING
Engine	6		3	1	4	24
Engine	8		2	1	3	24
Ladder	2		3	1	4	8
Ladder	6		2	1	3	18
Rescue/Ambulance	7		1	1	2	14
Special Rescue	1		3	1	4	4
<i>Subtotal</i>						92
Battalion Chief		1				1
Deputy Assistant Chief		1				1
Total	30					94

The Providence Fire Department requires firefighters to be trained as Emergency Medical Technicians (EMT-Cs). This provides the City with a skilled workforce and an opportunity for a variety of deployment options.

The Fire Department's FY '16 budget provided for 486 personnel: 458 positions assigned to platoons and 28 personnel assigned to administrative and support functions. The Department currently has 353 positions filled; 325 personnel are assigned to platoons and 28 personnel are assigned to administrative and support functions. Exhibit 10 displays the number of personnel budgeted for in FY 2016.

**EXHIBIT 10
FIRE DEPARTMENT STAFFING (2016 BUDGET)**

POSITION TITLE	BUDGETED POSITIONS
Fire Chief	1
Assistant Chief	2
Deputy Assistant Fire Chief	4
Battalion Chief	4
Fire Marshal	1
Chief of Communications	1
Captain	34
Fire Lieutenant	95
Firefighter	344
Total	486

DEMAND FOR SERVICES

The Providence Fire Department maintains extensive data on fire and rescue operations. Slight variations in data were found among data sources, as a result of methods of reporting. Variations were not significant. In some instances, it was necessary to combine data from several sources.

The PFD responded to an average of 40,722 incidents (calls for service) annually for the last four years. Exhibit 11 shows the number of incidents to which the PFD responded in 2012, 2013, 2014, and 2015. Incidents frequently require the deployment of more than one unit, based on the type and severity of the incident. The number of actual runs made by rescues (ambulances), engines, ladders, and the special rescue are shown in Exhibit 12. Exhibit 12 shows the number of runs made by fire and rescue units for 2012 through 2015. The PFD averaged more than 86,000 runs each year.

**EXHIBIT 11
NUMBER OF INCIDENTS - 2012 THROUGH 2015**

YEAR	TOTAL CALLS
2012	43,643
2013	38,673
2014	38,989
2015	41,783
AVERAGE	40,772

**EXHIBIT 12
NUMBER OF RUNS BY UNIT AND STATION**

Station Name	Apparatus	2015		2014		2013		2012	
		Unit Total	Percent	Unit Total	Percent	Unit Total	Percent	Unit Total	Percent
Rescue (Ambulance)									
Allens Avenue	R1	4,731	14%	4,326	14%	4,550	15%	5,684	16%
Hartford Avenue	R2	4,585	14%	4,494	15%	4,861	16%	5,576	16%
Branch Avenue	R3	4,262	13%	4,341	14%	5,049	17%	5,908	17%
Washington Street	R4	5,899	18%	5,641	19%	5,660	19%	6,664	19%
North Main Street	R5	4,373	13%	4,396	14%	4,758	16%	5,647	16%
Atwells Avenue	R6	5,020	15%	5,011	16%	5,179	17%	6,040	17%
Broad Street	R7	4,285	13%	2,212	7%				
Total		33,155	100%	30,421	100%	30,057	100%	35,519	100%
Engine									
Branch Avenue	E2	2,865	7%	2,818	7%	2,718	7%	2,753	7%
Washington Street	E3	4,997	12%	4,770	12%	4,955	12%	5,014	13%
Rochambeau Avenue	E4	1,385	3%	1,373	3%	1,257	3%	1,387	3%
Humbolt Avenue	E5	1,275	3%	1,357	3%	1,199	3%	1,143	3%
Hartford Avenue	E6	2,415	6%	2,239	6%	2,379	6%	2,488	6%
North Main Street	E7	3,477	8%	3,283	8%	3,494	9%	3,238	8%
Messer Street	E8	4,200	10%	4,102	10%	3,991	10%	3,770	10%
Brook Street	E9	2,425	6%	2,343	6%	2,321	6%	2,444	6%
Broad Street	E10	3,153	8%	3,057	8%	3,221	8%	3,161	8%
Reservoir Avenue	E11	2,211	5%	2,031	5%	2,207	5%	2,010	5%
Admiral Street	E12	3,942	9%	3,896	10%	3,845	10%	3,838	10%
Allens Avenue	E13	2,384	6%	2,194	5%	2,175	5%	1,920	5%
Atwells Avenue	E14	3,346	8%	3,588	9%	3,334	8%	3,367	8%
Mount Pleasant	E15	3,549	8%	3,389	8%	3,247	8%	3,126	8%
Total		41,624	100%	40,440	100%	40,343	100%	39,659	100%
Special Rescue									
Washington Street	SH1	2,000		1,742		1,666		1,683	
Aerial Ladder									
Washington Street	TL1	2,264	17%	2,214	18%	2,058	18%	2,055	18%
Messer Street	TL2	1,728	13%	1,587	13%	1,541	13%	1,477	13%
Admiral Street	L3	1,350	10%	1,403	11%	1,325	11%	1,367	12%
North Main Street	L4	1,923	15%	1,913	15%	1,830	16%	1,772	15%
Broad Street	L5	1,446	11%	1,335	11%	1,227	11%	1,195	10%
Atwells Avenue	L6	1,711	13%	1,643	13%	1,428	12%	1,510	13%
Branch Avenue	L7	1,242	10%	1,155	9%	1,049	9%	1,043	9%
Brook Street	L8	1,294	10%	1,330	11%	1,215	10%	1,192	10%
Total		12,958	100%	12,580	100%	11,673	100%	11,611	100%
Grand Total		89,737		85,183		83,739		88,472	

Exhibits 11 and 12 show that the PFD responds to a large number of incidents annually. Calls for services and runs are measures of workload, which can also be measured by determining the ability of fire companies to respond when there is an emergency. This is called reliability, or the *in service ratio*. A mature fire and rescue system should have a reliability factor of 90 percent. This means fire units should be available 90 percent of the time. If a system is less reliable, there is difficulty achieving response objectives and responding to simultaneous events.

Reliability is established by determining how much time a fire unit is committed to emergency responses in relation to the number of hours a fire unit is in service. If all fire response units (engines or ladders) are heavily committed to incident response, the response system is not effective.

The following series of exhibits shows the number of responses by engine and ladder companies, and the time devoted to responding to incidents in 2014 and 2015. Reliability is determined by subtracting the number of hours in service from the hours available in a year, and dividing the number of hours in a year by the hours in service.

Exhibit 13 shows the reliability of fire units in 2014 and 2015. The exhibit also shows the average time per call. These data indicate that the response system is very reliable. Exhibit 14 organizes unit reliability by unit designation, from least reliable to most reliable.

EXHIBIT 13

RELIABILITY OF FIRE UNITS

	RUNS		RELIABILITY		AVERAGE TIME PER CALL	
	2014	2015	2014	2015	2014	2015
Engine 2	2,646	2,749	90.2%	90.5%	19.49	18.11
Engine 3	4,481	4,719	86.8%	86.2%	15.45	15.33
Engine 4	1,281	1,289	95.5%	95.1%	18.49	19.99
Engine 5	1,308	1,232	95.0%	94.9%	20.19	21.68
Engine 6	2,126	2,319	91.7%	91.0%	20.53	20.29
Engine 7	3,111	3,353	88.8%	87.8%	18.84	19.13
Engine 8	4,038	4,032	87.7%	88.5%	16.02	15.02
Engine 9	2,232	2,229	92.4%	92.0%	18.00	18.75
Engine 10	2,824	2,967	91.9%	91.0%	15.16	15.99
Engine 11	1,920	2,097	93.2%	92.6%	18.73	18.50
Engine 12	3,584	3,850	88.3%	88.3%	17.21	15.97
Engine 13	2,084	2,279	92.8%	92.2%	18.12	17.90
Engine 14	3,323	3,114	88.6%	89.9%	18.01	16.98

Engine 15	3,309	3,448	88.7%	88.2%	17.98	17.93
SH1	1,670	1,933	93.9%	92.8%	19.29	19.55
Ladder 1	2,014	2,096	93.7%	93.3%	16.54	16.80
Ladder 2	1,424	1,621	95.7%	95.1%	15.70	15.88
Ladder 3	1,243	1,229	95.8%	95.7%	17.57	18.21
Ladder 4	1,813	1,859	93.2%	93.3%	19.80	19.01
Ladder 5	1,215	1,319	95.7%	94.8%	18.76	20.54
Ladder 6	1,453	1,563	94.8%	94.0%	18.78	20.04
Ladder 7	1,043	1,153	96.3%	95.7%	18.46	19.39
Ladder 8	1,245	1,228	95.5%	94.9%	19.04	21.78
			92.4%	92.1%	18.09	18.39

Exhibit 14 suggests that there is flexibility in the response system. Six fire response units are in service more than 90 percent of the time; other units are available more than 90 percent of the time. Some units, especially several ladders, are available more than 95 percent of the time. The data suggest that the number of ladders may be reduced. The items highlighted in blue indicate those fire units with reliability of less than 90 percent. The items highlighted in purple indicate those fire units with reliability of more than 95 percent.

EXHIBIT 14

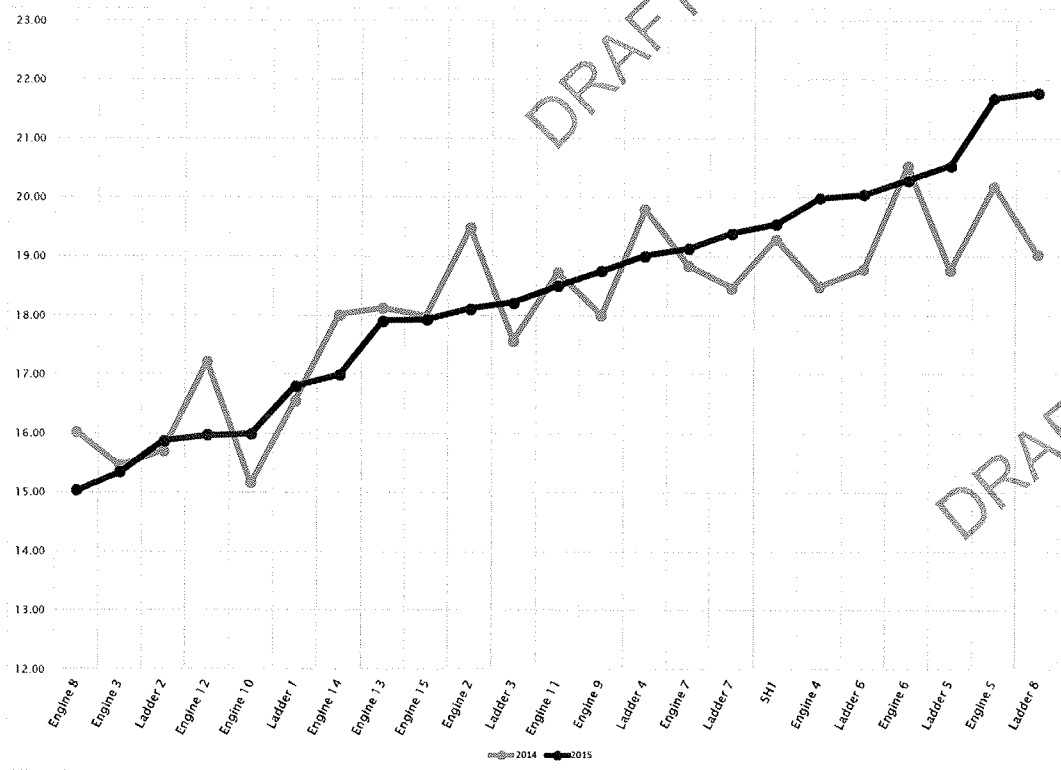
RELIABILITY OF FIRE UNITS

UNIT	2014	UNIT	2015
Engine 3	86.8%	Engine 3	86.2%
Engine 8	87.7%	Engine 7	87.8%
Engine 12	88.3%	Engine 15	88.2%
Engine 14	88.6%	Engine 12	88.3%
Engine 15	88.7%	Engine 8	88.5%
Engine 7	88.8%	Engine 14	89.9%
Engine 2	90.2%	Engine 2	90.5%
Engine 6	91.7%	Engine 10	91.0%
Engine 10	91.9%	Engine 6	91.0%
Engine 9	92.4%	Engine 9	92.0%
Engine 13	92.8%	Engine 13	92.2%
Engine 11	93.2%	Engine 11	92.6%
Ladder 4	93.2%	SH1	92.8%
Ladder 1	93.7%	Ladder 4	93.3%
SH1	93.9%	Ladder 1	93.3%
Ladder 6	94.8%	Ladder 6	94.0%
Engine 5	95.0%	Ladder 5	94.8%

Ladder 8	95.5%	Ladder 8	94.9%
Engine 4	95.5%	Engine 5	94.9%
Ladder 5	95.7%	Engine 4	95.1%
Ladder 2	95.7%	Ladder 2	95.1%
Ladder 3	95.8%	Ladder 3	95.7%
Ladder 7	96.3%	Ladder 7	95.7%
Average	92.4%		92.1%

Exhibit 15 graphically displays the average time each fire unit devotes to a run. The data is sorted from shortest to longest average time, using 2015 data.

EXHIBIT 15
AVERAGE TIME COMMITMENT PER RUN



Emergency medical service responses make up a majority of the Department responses. The PFD reported that it responded to 33,155 EMS runs 2015. The average

number of EMS runs for the last four years was 32,288. In 2015, rescue units responded to an average of 4,736 runs.

EXHIBIT 16

EMERGENCY MEDICAL SERVICE RUNS

	2015	2014	2013	2012	AVERAGE
R1	4,731	4,326	4,550	5,684	4,823
R2	4,585	4,494	4,861	5,576	4,879
R3	4,262	4,341	5,049	5,908	4,890
R4	5,899	5,641	5,660	6,664	5,966
R5	4,373	4,396	4,758	5,647	4,794
R6	5,020	5,011	5,179	6,040	5,313
R7	4,285	2,212			
	33,155	30,421	30,057	35,519	32,288

Source: Providence Fire Department.

Exhibit 17 shows the number of EMS runs, the number of transports, and the percent of runs resulting in a hospital transport. The percent of patients transported ranged from 74 percent to 84 percent from 2009 through 2014. The percent of patients transported was significantly higher in 2015 (93%). The number of calls has remained relatively stable over the course of the seven years shown.

EXHIBIT 17

EMERGENCY MEDICAL SERVICE RUNS

FISCAL YEAR	2009	2010	2011	2012	2013	2014	2015
Number of Rescues	6	6	6	6	6	6	7
Total Runs	27,238	27,628	28,125	28,802	20,057	26,464	24,813
Transports	21,283	23,336	22,690	24,543	22,260	20,290	22,990
Patients Transported	78%	84%	81%	85%	74%	77%	93%
Total Unit Hours	52,560	52,560	52,560	52,560	52,560	52,560	61,320
UHU	0.40	0.44	0.43	0.47	0.42	0.39	0.37

Two terms used in Exhibit 17 should be explained. *Total Unit Hours* identifies the number of hours a rescue unit is operational each year. Each unit shown operates 24 hours a day, 365 days a year, or 8,760 hours per year. If six rescue units are staffed 24/7, there

are 52,560 unit hours. In 2015, seven rescue units were operational. Thus, there was a total of 61,320 unit hours available in 2015.

Unit Hour Utilization (UHU), as used by the Department, is a management measure which indicates the percent of time a rescue is responding to an incident and transporting a patient. Ideally, the UHU should be in the range of 0.33 to 0.35. Providence's UHU, as the data shows, has been improving. The data show the UHU for each year. The UHU may be calculated for each hour of every day. The UHU will vary from hour to hour, based on the number of calls for service. The UHU ratio is higher during peak period hours and lower in the early morning hours, when there are fewer calls.

Exhibit 18 graphically shows EMS responses by time of day. The exhibit illustrates the periods of time when the rescue units are more or less active. These data display a common pattern of EMS activity. Use of these data enables the Department to adjust unit staffing as required.

EXHIBIT 18
EMERGENCY MEDICAL SERVICE PEAK PERIOD ACTIVITY

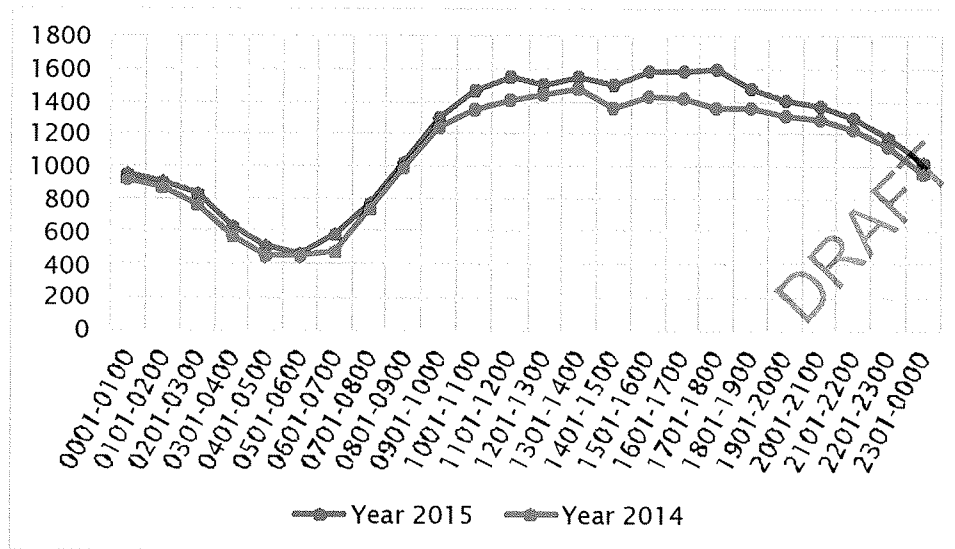


Exhibit 19 shows the percent of incidents reached within six, eight, ten, and 12 minutes. For example, from July 1, 2014 to June 30, 2015, 70.1 percent of incidents were responded to within six minutes and 85.5 percent of incidents were responded to within eight minutes. The data show responses from dispatch to arrival.

EXHIBIT 19
EMS RESPONSE TIME

TIME INCREMENT	7/1/2011- 6/30/2012	7/1/2012- 6/30/2013	7/1/2013- 6/30/2014	7/1/2014- 6/30/2015
Within 6 minutes	66.5%	65.8%	69.6%	70.1%
Within 8 minutes	82.3%	80.8%	85.1%	85.5%
Within 10 minutes	89.4%	85.1%	91.5%	91.9%
Within 12 minutes	92.9%	88.2%	94.3%	94.8%

The activity level of the PFD indicates that the Fire Department has some flexibility in the response system based on reliability data.

III. STAFFING FACTOR

The number of personnel required for rescue and fire suppression services is determined by an evaluation of risks and the development of response objectives. The staffing factor, often called the multiplier, is defined as the number of personnel it takes to keep one full-time person on-duty 24 hours a day, 365 days a year.

Calculating the staffing factor in Providence is complicated by the change in the shift schedule from the four-platoon system (average work week of 42 hours) to the three-platoon system (average work week of 56 hours). Determining the staffing factor required a review of 56 and 42 hour work schedules. The consultants developed two 365 day work schedules, for 56 and 42 hour work weeks using the 10/14 schedule. This analysis provided the consultants with the number of hours each platoon would work under both schedules. The consultants also reviewed and recorded authorized time-off by personnel. Time-off data was examined for 2013, 2014, and 2015. Based on the time-off data, we determined that the average firefighter on the four-platoon system worked 1,693 hours. This calculation is determined by subtracting the average leave time used, 491 hours, from the hours scheduled to be worked ($2,184 - 491 = 1,693$). The staffing factor is established by dividing the hours scheduled to be worked (2,184) by the average hours worked (1,693). This results in a staffing factor of 1.29. The staffing factor of 1.29 means that it takes 1.29 persons to fill one position. Alternatively, 1.29×4 (number of platoons) equals 5.16, which means it takes 5.16 persons to fill one position (24/7) under the four-platoon system.

The consultants used the time-off data and the scheduling calculations to estimate the number of hours a firefighter would be scheduled to work on a three-platoon system (2,928 hours). In addition, the consultants estimated average authorized leave time to be 655 hours. Thus, 2,928 (hours scheduled) minus 655 (hours of leave) equals 2,273 (estimated hours to be worked). The estimated hours to be worked (2,273) is divided into the estimated hours scheduled (2,928) which results in a staffing factor of 1.29. This staffing factor means that it takes 1.29 persons to fill one position. Alternatively, 1.29×3 (number of platoons) equals 3.86, which means it takes 3.86 persons to fill one position 24/7 under the three platoon system.

It should be noted that there are alternative methods of determining staffing needs. For example, the total hours scheduled to be worked by all firefighters and company officers is divided by the number of hours the average firefighter works. The staffing factor calculates the number of firefighters and company officers required. The staffing factor is not applied to chief officer positions (Fire Chief, Assistant Fire Chief, Deputy Assistant Fire Chief and Battalion Chief).

Using the current staffing factor, approximately 483 positions are required under the four-platoon system, and 362 positions are required under the three-platoon system. These staffing estimates assume that the number of emergency units and minimum staffing requirements do not change. The number of positions will change if the number of emergency response units or the number of fire stations is altered.

In the following series of exhibits, we have applied the staffing factor to determine the number of personnel required to staff the Fire Department under a variety of scenarios. Below is a summary of each exhibit:

- ▶ Exhibit 20 shows the staffing required under the four-platoon system and the three-platoon system, assuming 94 personnel.
- ▶ Exhibit 21 compares the number of officers required in the three-platoon system and the four-platoon system.
- ▶ Exhibit 22 shows a summary of total staffing required under in the three-platoon system and the four-platoon system.
- ▶ Exhibit 23 shows the number of personnel required under the three-platoon system, with two ladders deactivated.
- ▶ Exhibit 24 shows the number of personnel required under the three-platoon system, with two ladders and two stations deactivated.
- ▶ Exhibit 25 shows the minimum number of personnel required on each shift.
- ▶ Exhibit 26 shows the total complement of personnel required with minimum shift staffing of 94, 88 and 82.

EXHIBIT 20

FOUR-PLATOON SYSTEM AND THREE-PLATOON SYSTEM TOTAL STAFFING*

UNIT TYPE	NUMBER OF UNITS	NUMBER OF UNITS x STAFF ASSIGNED	FOUR-PLATOON SYSTEM STAFFING	FOUR-PLATOON SYSTEM (1.29 STAFFING FACTOR)	THREE-PLATOON SYSTEM STAFFING	THREE-PLATOON SYSTEM (1.29 STAFFING FACTOR)
Engine	6	24	96	124	72	93
Engine	8	24	96	124	72	93
Ladder	2	8	32	41	24	31
Ladder	6	18	72	93	54	70
Rescue	7	14	56	72	42	54
Special Heavy Rescue	1	4	16	21	12	15
<i>Subtotal</i>	30	92	368	475	276	356
Deputy Assistant Chief	1	1		4		3
Battalion Chief	1	1		4		3
Total		94		483		362

*Staffing calculations are rounded to the closest whole number.

Note: Under the four-platoon system, it is recommend that four additional Battalion Chief positions be created. Under the three-platoon system, it is recommended that three additional Battalion Chief positions be created.

EXHIBIT 21

FOUR-PLATOON SYSTEM AND THREE-PLATOON SYSTEM OFFICERS REQUIRED

UNIT TYPE	NO. OF UNITS	OFFICERS REQUIRED PER SHIFT	FOUR-PLATOON SYSTEM	FOUR-PLATOON SYSTEM (1.29 STAFFING FACTOR)	THREE-PLATOON SYSTEM	THREE-PLATOON SYSTEM (1.29 STAFFING FACTOR)
Engine	6	6	24	31	18	23
Engine	8	8	32	41	24	31
Ladder	2	2	8	10	6	8
Ladder	6	6	24	31	18	23
Rescue	7	7	28	36	0	0
Special Rescue	1	1	4	5	3	4
Total			120	155	69	89

EXHIBIT 22

FOUR-PLATOON SYSTEM AND THREE-PLATOON SYSTEM TOTAL STAFFING*

	CURRENT MINIMUM STAFFING	FOUR- PLATOON SYSTEM STAFFING	FOUR-PLATOON SYSTEM (1.29 STAFFING FACTOR)	THREE-PLATOON SYSTEM STAFFING	THREE-PLATOON SYSTEM (1.29 STAFFING FACTOR)
Firefighters/Company Officers	92	368	475	276	356
Deputy Assistant Chief	1	4	4	3	3
Battalion Chief	1	4	4	3	3
Total	94	376	483	282	362

*Staffing calculations are rounded to the closest whole number.

Exhibit 22 assumes there are no changes in the staffing per shift (currently 94 personnel). Exhibit 23 assumes that the three-platoon system will continue to be operational. Moreover, consideration should be given to reducing the number of ladders, from eight ladders to six ladders, and consolidating four fire stations into two fire stations. The PFD staffs two ladders with four personnel (one officer and three firefighters) and six ladders with three personnel (one officer and two firefighters). Deactivating two ladders, each staffed with one officer and two firefighters, will result in six fewer firefighters and company officers required on each shift (92 personnel *minus* 6 personnel equals 86 personnel per shift). Under the three-platoon system, there will be six fewer firefighters on each shift. However, applying the staffing factor of 1.29, there will be 23 fewer personnel, based on the deactivation of two ladders staffed with three personnel.

EXHIBIT 23

THREE-PLATOON SYSTEM WITH TWO FEWER LADDERS

	CURRENT SHIFT STAFFING	NUMBER OF FIRE STATIONS	TWO FEWER LADDERS PER SHIFT	ADJUSTED SHIFT STAFFING	TOTAL PERSONNEL	TOTAL PERSONNEL (STAFFING FACTOR)
Firefighters/Company Officers	92		- 6	86	258	333
Deputy Assistant Chief	1			1	3	3
Battalion Chief	1			1	3	3
Total	94	14		88	264	339

*Staffing calculations are rounded to the closest whole number.

The number of fire stations should be decreased. The recommendation to reduce the number of stations has been made previously in Providence.

Exhibit 24 assumes that two stations will be closed and that each closed station has one officer and two firefighters assigned. Closing two fire stations results in six fewer firefighters on a shift. Exhibit 24 also shows the total complement of personnel. If there are 82 firefighters and officers on each shift, the total personnel complement will be 316 firefighters.

DRAFT

EXHIBIT 24

STAFFING WITH LADDER AND STATION DEACTIVATIONS

	CURRENT SHIFT STAFFING (MINUS 2 LADDERS)	NUMBER OF FIRE STATIONS	TWO FEWER FIRE COMPANIES PER SHIFT	TOTAL STAFFING PER SHIFT (MINUS 2 STATIONS)	TOTAL PERSONNEL	TOTAL PERSONNEL (STAFFING FACTOR)
Firefighters/Company Officers	86	14	- 6	80	240	310
Deputy Assistant Chief	1			1	3	3
Battalion Chief	1			1	3	3
Fire Station Reduction		- 2				
Total	88	12	- 6	82	246	316

DRAFT

**Staffing calculations are rounded to the closest whole number.*

EXHIBIT 25

THREE-PLATOON MINIMUM SHIFT STAFFING ADJUSTMENTS

	CURRENT SHIFT STAFFING	CURRENT SHIFT STAFFING (MINUS 2 LADDERS)	TOTAL STAFFING ON SHIFT (MINUS 2 STATIONS)
Firefighters/Company Officers	92	86	80
Deputy Assistant Chief	1	1	1
Battalion Chief	1	1	1
Total	94	88	82

DRAFT

Exhibit 26 shows the total number of personnel required with a minimum complement of 94, 88, and 82 firefighters. The exhibit does not account for several other staffing recommendations in this report. The consultants have proposed that three additional Battalion Chief positions be established to provide additional supervision on each shift. One Battalion Chief will be assigned to each shift.

EXHIBIT 26

THREE-PLATOON SYSTEM
 MINIMUM STAFFING ADJUSTMENTS (INCLUDES 1.29 STAFFING FACTOR)

	94 MINIMUM STAFFING	88 MINIMUM STAFFING	82 MINIMUM STAFFING
Firefighters/Company Officers	356	333	310
Deputy Assistant Chief	3	3	3
Battalion Chief	3	3	3
Total	362	339	316

**Staffing calculations are rounded to the closest whole number.*

RECOMMENDATION 1: *The Providence Fire Department should adopt one of the optional staffing plans.*

Minimum Shift Staffing - 94 personnel (no change in number of units)

Minimum Shift Staffing - 88 personnel (deactivation of two ladders)

Minimum Shift Staffing - 82 personnel (deactivation of two ladders and station consolidation)

RECOMMENDATION 2: *The Providence Fire Department should adopt a workforce model which minimizes the use of overtime.*

IV. RECOMMENDATIONS

The consultants have identified a series of management issues which are related to staffing concerns. The consultants found that:

- The current work schedule (10/14) is not effective under the three-platoon system.
- The Operations Division (fire suppression) and the EMS Division require closer organizational coordination.
- The command structure of the PFD requires reorganization.
- The EMS Division has too many company officers. A rescue/ambulance unit does not require the assignment of an officer on each response unit.
- The PFD has more aerial apparatus than typically found in similar organizations.
- The PFD requires all personnel to be Cardiac Care Technicians (EMT-Cs). However, the skills of all personnel are not fully unitized.
- The PFD does not operate an Emergency Medical Dispatch system (call screening and prioritization system).

This report presents a series of recommendations for local policy leaders to consider. However, it should be noted that many of the recommendations are intertwined.

The City operates eight ladder companies. Reliability data show that ladders are available to respond more than 95 percent of the time, suggesting that the City could operate with fewer ladders. In addition, normative data (comparative information) indicate that the Fire Department has more ladders than other comparable jurisdictions.

***RECOMMENDATION 3:** The Providence Fire Department should deactivate two ladders.*

The City should conduct a systematic review of the configuration of fire stations. The Fire Department should deactivate two stations, reducing the number from 14 to 12. The City should consider the four options presented below. These options were presented to the City in 2006.

EXHIBIT 27

FIRE STATION CONSOLIDATION OPTIONS

OPTION	STATION CONSOLIDATION	No. OF STATIONS
A	Consolidate Stations at Rochambeau Avenue and Humbolt Avenue	13
B	Consolidate Stations at Humbolt Avenue and Brook Street	13
C	Consolidate Stations at Mt. Pleasant Avenue and Atwells Avenue	13
D	Consolidate Stations at Rochambeau Avenue and Humbolt Avenue, and Mt. Pleasant Avenue and Atwells Avenue (The four fire stations should be consolidated into two new stations at the same time.)	12

RECOMMENDATION 4: The City should conduct a systematic review of the configuration of fire stations.

RECOMMENDATION 5: The City should review station consolidation options proposed in previous studies.

The 24-hour work schedule should be adopted. The current shift schedule (10/14 schedule) should be abandoned and should not be used in the three-platoon system. The adoption of the 24-hour schedule should be accompanied by several other management changes, including the proposed organizational changes in the EMS Division.

RECOMMENDATION 6: The PFD should abandon the current shift schedule and adopt a 24-hour schedule.

The three-platoon system requires fewer company officers than the four-platoon system. Approximately 69 company officers (lieutenants and captains) are required under the three-platoon system.

RECOMMENDATION 7: The PFD should reduce the number of company officers assigned to engine and ladder companies to meet the requirements of the three-platoon system.

The organization of the Fire Department and the number of chief officers (Fire Chief, Assistant Chief, Assistant Deputy Chief, and Battalion Chief) requires adjustment. Six Battalion Chief positions are required. One additional Battalion Chief should be assigned to each shift. Exhibit 28 lists the Chief Officer positions required.

EXHIBIT 28 (EXHIBIT 6)

RECOMMENDED CHIEF OFFICER POSITIONS*

POSITION TITLE	NUMBER OF POSITIONS
Chief	1
Assistant Chief (Operations Division)	1
Assistant Chief (Administrative Services Division)	1
Assistant Deputy Chief (Platoon Commander)	3
Assistant Deputy Chief (Emergency Medical Services Division Commander)	1
Battalion Chief	6 (increase of three)
Total	13

*Assumes a three-platoon system.

RECOMMENDATION 8: The PFD should have a complement of 13 chief officers, including one Fire Chief, two Assistant Chiefs, four Deputy Assistant Chiefs, and six Battalion Chiefs.

RECOMMENDATION 9: The PFD should assign six Battalion Chiefs to fire and rescue operations.

RECOMMENDATION 10: The PFD should assign one Deputy Assistant Chief and two Battalion Chiefs to each platoon.

The role of the Emergency Medical Services Division should be restructured. The EMS Division should be concerned with medical control, quality assurance, training, and systematic analysis of data and information. The Emergency Medical Services Division should have a Field Unit composed of three officers to provide daily oversight and medical control of EMS units. One officer should be assigned to each shift. The Emergency Medical Services Division should have several staff officers, including a Field Unit Captain, a Training Captain, and a Quality Assurance Captain.

Exhibit 29 shows the number and rank of officers that should be assigned to the Emergency Medical Services Division. Two additional Captain and three Lieutenant positions should be created.

**EXHIBIT 29 (EXHIBIT 7)
EMERGENCY MEDICAL SERVICES DIVISION**

RANK	NUMBER OF OFFICERS AND FUNCTION
Deputy Assistant Chief	1
Rescue Captain	1 - EMS Field Unit 1 - EMS Training Unit 1 - EMS Staff Officer for Quality Assurance
Rescue Lieutenant	1 - EMS Training Unit 2 - EMS Field Unit

The Department's rescue (ambulance) units are assigned to stations. The daily administration and supervision of the rescue units should be the responsibility of station Captains.

The personnel assigned to rescues (ambulances) should work a 24-hour schedule. However, personnel should not be assigned to a rescue (ambulance) for the entire 24-hour shift. The rescue crew and a fire company (such as a ladder) should cross staff the ambulance. Fire crew personnel from the same station, or company, should be assigned to work on a rescue (ambulance) unit for a substantial part of each shift.

The rank structure of the rescue units should be revamped. There is no need to have an officer on each rescue unit. The PFD should staff each rescue (ambulance) with two EMT-Cs. The number of officers should be reduced.

RECOMMENDATION 11: *The Emergency Medical Services Division should be restructured.*

RECOMMENDATION 12: *The rescue and fire units (ladder companies) should be cross staffed. Personnel should be assigned to work on both a fire apparatus and a rescue unit.*

RECOMMENDATION 13: *The daily supervision and administration of rescue unit personnel should be the responsibility of the station Captain to which the units are assigned.*

RECOMMENDATION 14: *The recommended EMS Field Officer positions should be responsible for providing medical oversight of the rescue units.*

The EMS Division should implement several new operational practices. Rescue units should be deployed based on demand for service and peak period activity. The EMS Division should also use status system management. EMS Division personnel should monitor the amount of time rescue units are committed to responses.

The City should implement an emergency medical dispatch (EMD) system which triages calls for service and provides for pre-arrival instructions in certain circumstances. An EMD system provides a systematic approach to responding to incidents based on the severity of an incident.

***RECOMMENDATION 15:** The PFD should implement a status system management strategy for EMS resources.*

***RECOMMENDATION 16:** The City should implement an emergency medical dispatch system.*

There has been some discussion that the Fire Department should add an additional rescue unit because of the demand for service. It may not be necessary to deploy an additional rescue 24 hours a day; it may more appropriate to deploy an additional rescue at peak activity periods. While an additional rescue may be required, such factors as implementing an EMD system, status system management, and closer field monitoring of rescue units may alleviate the need for an additional unit.

***RECOMMENDATION 17:** The PFD should consider deploying one additional rescue (ambulance) unit, after careful review of EMS management practices.*

A Fire Department requires an efficient administrative and support structure. Several changes are proposed. Dispatch positions (six positions), the carpentry shop position, and the supply room position should be filled by civilians, not firefighters. The Chief of Communications position should be discontinued.

***RECOMMENDATION 18:** The PFD should employ civilians to fill the following positions: dispatch positions (six positions), the carpentry shop position, and the supply room position.*

The PFD should be composed of 351 personnel:

Platoon Staffing	319
Administrative & Support Functions	25 (17 firefighters and 8 civilians)
Emergency Medical Service Administration and Oversight	7
Total Complement	351

**EXHIBIT 30
SUMMARY OF FIRE DEPARTMENT POSITIONS**

ORGANIZATION UNIT/POSITION	NUMBER OF PERSONNEL	COMMENT
<i>Administration</i>		
Chief	1	
Assistant Chief	2	
<i>Fire and Rescue Operations</i>		
Officers and Firefighters	319	
<i>EMS Division</i>		
Deputy Assistant Chief	1	
Captain	3	
Lieutenant	3	
<i>Dispatch</i>		
Chief Dispatcher	1	Chief of Communications position discontinued
Dispatcher	5	Positions filled by civilians
<i>Fire Marshal (plan review)</i>		
Fire Marshal	1	
Firefighter	4	
<i>Training Division</i>		
Captain	1	
Fire Training Instructor	1	
<i>Support Services</i>		
Car 79 Firefighter	2	
Car 56 Firefighter	4	
Air Supply Technician - Firefighter	1	
Carpenter Shop - Person- in- Charge	1	Position filled by civilian
Supply Room - Person- in- Charge	1	Position filled by civilian
Total Personnel	351	