Groton Fire Department Call & Response Data

GFD Staffing

		Current Staffing		Proposed Staffing	
		Mon-Fri	Sat-Sun	Mon-Fri	Sat-Sun
0:00	1:00	0	0	0	0
1:00	2:00	0	0	0	0
2:00	3:00	0	0	0	0
3:00	4:00	0	0	0	0
4:00	5:00	0	0	0	0
5:00	6:00	0	0	0	0
6:00	7:00	2	2	2	2
7:00	8:00	2	2	2	2
8:00	9:00	4	2	5	3
9:00	10:00	4	2	5	3
10:00	11:00	4	2	5	3
11:00	12:00	4	2	5	3
12:00	13:00	4	2	5	3
13:00	14:00	4	2	5	3
14:00	15:00	4	2	5	3
15:00	16:00	4	2	5	3
16:00	17:00	2	2	3	3
17:00	18:00	2	2	3	3
18:00	19:00	0	0	1	1
19:00	20:00	0	0	1	1
20:00	21:00	0	0	0	0
21:00	22:00	0	0	0	0
22:00	23:00	0	0	0	0
23:00	0:00	0	0	0	0

| Weekly | Staffing | 248 | Manhours | 332 | Manhours |

Current: 5 career firefighters
   2 from 6AM-6PM, Mon-Fri, Sat, Sun
   2 additional from 8AM-4PM, Mon-Fri

Proposed*: 7 career firefighters
   2 from 6AM-6PM, Mon-Fri, Sat-Sun
   2 additional from 8AM-4PM, Mon-Fri
   1 additional from 8AM-8PM, Mon-Fri, Sat-Sun

*Proposed. Approved by selectboard. Subject to Town Meeting vote.

GFD Calls and Response Data Overview

The data is from the National Fire Incident Reporting System (NFIRS)
- Common database used by fire companies around the world.
- Source of data for studies performed by FEMA, US Dept of Homeland Security, US Fire Administration, National Fire Data Center, and independent organizations.

NFIRS breaks calls into 9 major categories, and numerous subcategories.
- Fires calls (subcategories are structures, outdoors, vehicles, etc), overpressure, EMS/Rescue, hazardous conditions, service, good intent, alarms, and other.
- For this analysis, I've focused on "all categories", "fire calls", and "EMS/Rescue".

The data was provided as ~150 pages of PDF and required scanning, parsing, formatting– an imprecise exercise. A validity check the data was performed
- Compared to a summary dataset provided to a Selectman in early 2018.
  - It was nearly identical at the summary level.
  - Approximately 12 out of 2176 EMS calls were lost in the exercise.
- Random lines from the PDF were cross-checked.
- Totals from the PDFs were cross-checked.

NFIRS data rounds alarm/on scene/response times to lowest minute. Therefore, all responses between 5:00 - 5:59 are all reported as 5 minutes.

There appear to be some errors/oddities in the database but they do not appear to be statistically significant.
- Events such as responses to mutual aid and staging for potential mutual aid appear as unusually long responses
- Some events appear as zeros when not likely

GFD Calls and Response Overview & Crosscheck

			2017				2016				2015				2014				2013		
			Unstaffed	Staffed	Total # of Calls		Unstaffed	Staffed	Total # of Calls		Unstaffed	Staffed	Total # of Calls		Unstaffed	Staffed	Total # of Calls		Unstaffed	Staffed	Total # of Calls
100	Fire Calls	# of calls	11	24	35		22	49	71		15	35	50								
100	Fire Calls	Resp Time	12:38	7:10	8:53		13:35	8:11	9:52		13:48	8:53	10:22								
100	Fire Calls	Previous Info	12:38	7:10	35		13:35	8:11	71		13:48	8:53	50		12:41	9:24	37		13:57	10:47	32
200	Overpressure	# of calls	2	6	8		0	13	13		2	4	6								
200	Overpressure	Resp Time	15:00	9:00	10:30		0:00	5:46	5:46		13:00	1:45	5:30								
200	Overpressure	Previous Info	15:00	9:00	8		0	5:46	13		13:00	1:45	6		10:20	3:00	17		13:30	2:00	11
300	EMS/Rescue	# of calls	229	495	724		215	505	720		250	470	720								
300	EMS/Rescue	Resp Time	11:19	5:36	7:24		10:55	5:55	7:25		12:02	5:34	7:49								
300	EMS/Rescue	Previous Info	13:01	5:37	730		10:57	5:55	721		11:59	5:36	725		10:50	5:21	816		8:45	5:27	731
400	Haz Condition	# of calls	25	38	63		17	47	64		18	63	81								
400	Haz Condition	Resp Time	11:12	5:57	8:02		11:49	7:34	8:42		10:47	6:48	7:41								
400	Haz Condition	Previous Info	11:12	5:57	63		11:49	7:34	64		11:07	6:46	81		10:14	6:44	71		10:52	7:06	87
500	Service	# of calls	12	35	47		14	44	58		14	37	51								
500	Service	Resp Time	9:45	7:09	7:49		19:34	6:15	9:28		13:09	8:49	10:00								
500	Service	Previous Info	9:45	7:05	48		19:34	6:30	58		13:09	8.49	51		9:43	4:50	72		10:55	5:06	71
600	Good Intent	# of calls	0	28	28		2	28	30		7	23	30								
600	Good Intent	Resp Time	0:00	6:54	6:54		5:30	5:54	5:44		11:34	5:23	6:50								
600	Good Intent	Previous Info	0	6:54	46		5:30	5:45	48		11:34	5:23	37		6:44	6:27	27		7:00	4:17	35
700	Alarms	# of calls	80	166	246		68	160	228		58	124	182								
700	Alarms	Resp Time	10:07	6:08	7:26		12:46	6:12	8:09		12:02	6:46	8:27								
700	Alarms	Previous Info	10:07	6:09	245		12:46	6:12	228		12:08	6:46	182		10:55	5:50	203		9:38	6:33	193
800	Act of Nature	# of calls	1	0	1		7	0	7		0	1	1								
800	Act of Nature	Resp Time	5:00	0:00	5:00		7:17	0:00	7:17		0:00	1:00	1:00								
800	Act of Nature	Previous Info	5:00	0	1		7:17	0	7		0	1:00	1			10:00	4			6:40	3
900	Other	# of calls	0	3	3		0	1	1		0	0	0								
900	Other	Resp Time	0:00	6:20	6:20		0:00	0:00	0:00		0:00	0:00	0:00								
900	Other	Previous Info	0	6:20	3		0	0	1		0	0	0								0
Total		# of calls	360	795	1155		340	832	1172		364	757	1121								
Total		Resp Time	11:02	5:55	7:31		11:39	6:11	7:46		12:05	6:09	8:04								
Total		Previous Info			1179				1211				1133				1247				1163

GFD Calls and Response Overview

Average Response Times over Time
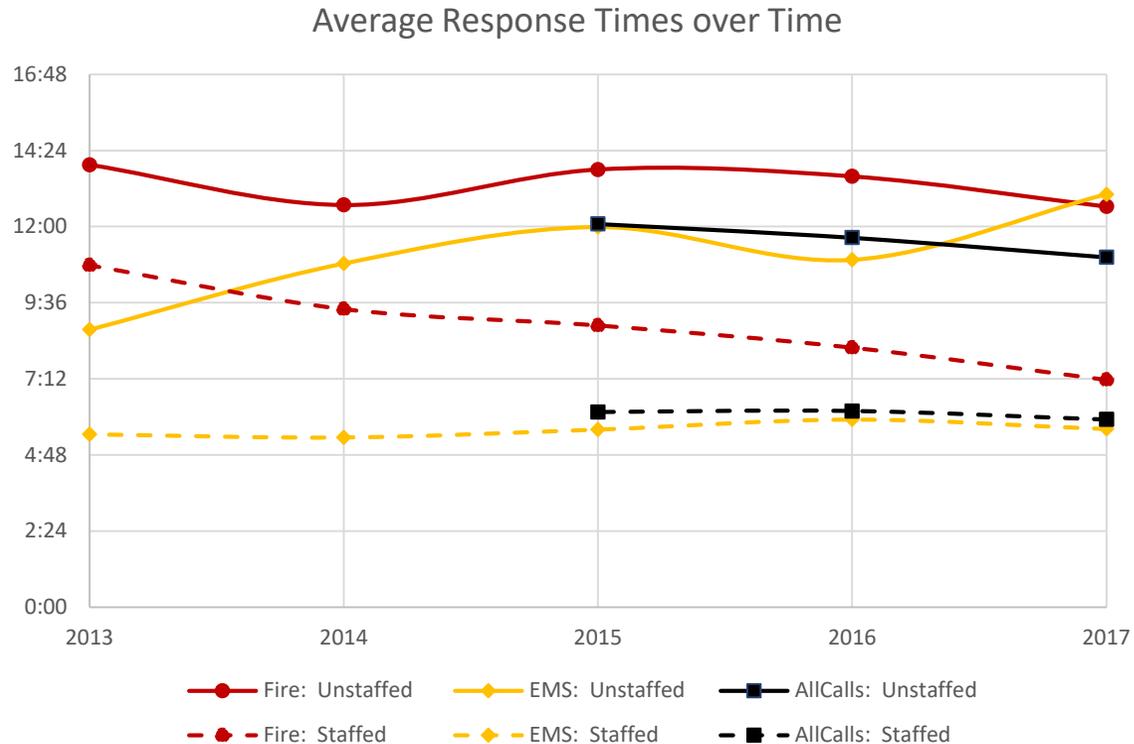
- Overall response times have been decreasing each year.

- Fire response times (staffed and unstaffed) have been decreasing each year, with one outlier low year in 2014.

- EMS response times have shown a slight increase for staffed over the years, and variation for unstaffed over the years.

Calls by Type

Calls By Type: Groton by Year

Calls By Type: National, Regional, Groton
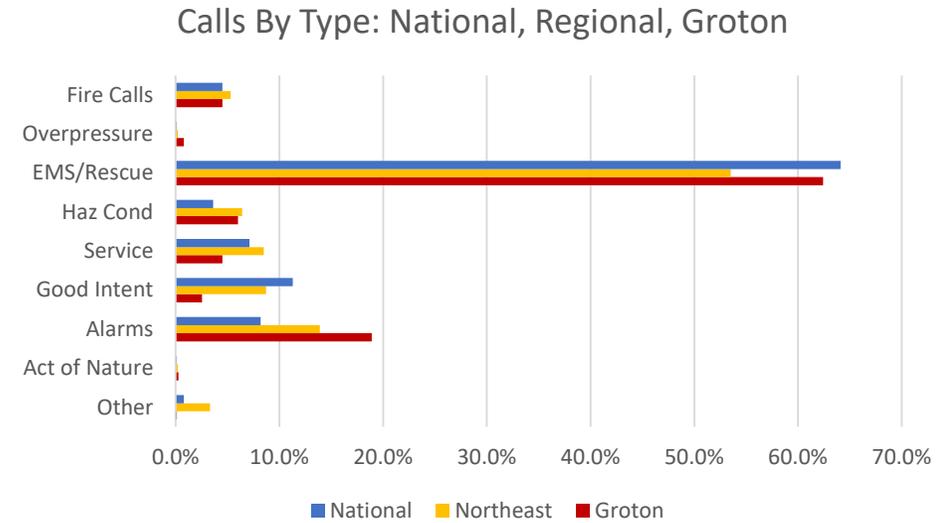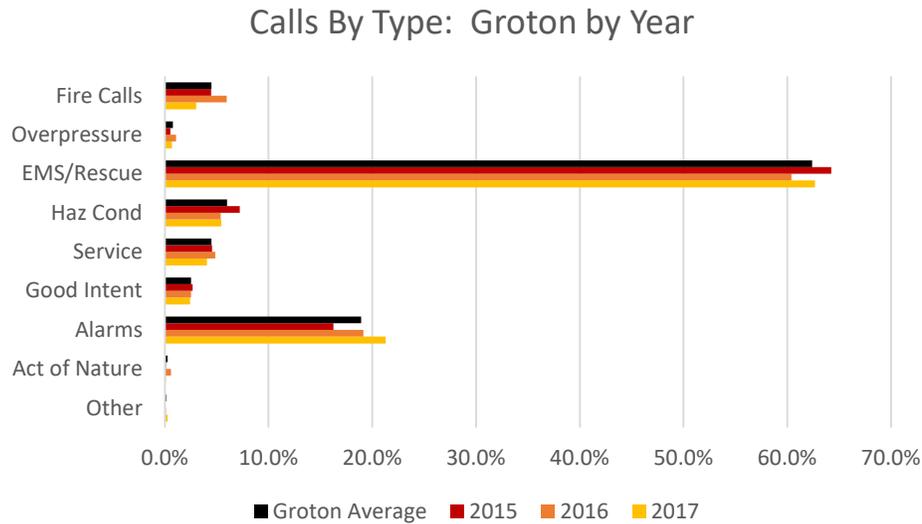
- Over the last three years, there has been little variation in the distribution of types of calls received/responded to by GFD. EMS accounts for 60-65%. Fire is 4-5%.

- The Groton call distribution is comparable to the national and regional call distribution.
  - The "Good Intent + Alarms" accounts for ~20% of calls, although divided differently between the National, Regional, and Groton entities.

Call distribution and Response Times

Call Distribution by Hour

		Sunday	Monday	Tuesday	Wed.	Thursday	Friday	Saturday	Grand Total
0:00	1:00	0.23%	0.12%	0.29%	0.23%	0.26%	0.20%	0.32%	1.6%
1:00	2:00	0.20%	0.43%	0.20%	0.37%	0.29%	0.17%	0.12%	1.8%
2:00	3:00	0.43%	0.17%	0.29%	0.12%	0.14%	0.29%	0.23%	1.7%
3:00	4:00	0.29%	0.20%	0.32%	0.09%	0.14%	0.26%	0.29%	1.6%
4:00	5:00	0.35%	0.12%	0.29%	0.20%	0.17%	0.29%	0.03%	1.4%
5:00	6:00	0.14%	0.35%	0.14%	0.17%	0.23%	0.14%	0.20%	1.4%
6:00	7:00	0.23%	0.37%	0.43%	0.37%	0.29%	0.23%	0.17%	2.1%
7:00	8:00	0.49%	0.46%	0.61%	0.81%	0.52%	0.63%	0.49%	4.0%
8:00	9:00	0.78%	0.84%	0.95%	0.98%	0.87%	0.92%	0.61%	5.9%
9:00	10:00	0.69%	0.95%	0.95%	0.84%	1.04%	0.95%	0.75%	6.2%
10:00	11:00	0.61%	1.04%	1.10%	0.78%	1.18%	1.10%	0.89%	6.7%
11:00	12:00	0.81%	0.95%	1.24%	1.01%	0.78%	1.27%	0.66%	6.7%
12:00	13:00	0.92%	0.89%	1.01%	0.81%	0.89%	0.78%	0.78%	6.1%
13:00	14:00	1.01%	1.01%	0.92%	0.89%	0.75%	1.01%	0.69%	6.3%
14:00	15:00	0.81%	1.07%	0.92%	0.66%	1.36%	0.87%	0.75%	6.4%
15:00	16:00	0.78%	0.92%	1.04%	0.84%	1.24%	0.92%	0.52%	6.3%
16:00	17:00	0.84%	1.15%	0.92%	0.87%	0.98%	1.07%	0.87%	6.7%
17:00	18:00	0.75%	0.89%	0.84%	0.98%	0.89%	0.69%	0.72%	5.8%
18:00	19:00	0.78%	0.52%	0.58%	0.61%	0.75%	0.84%	0.58%	4.6%
19:00	20:00	0.87%	0.58%	0.49%	0.75%	1.30%	0.43%	0.66%	5.1%
20:00	21:00	0.81%	0.52%	0.49%	0.72%	0.37%	0.35%	0.55%	3.8%
21:00	22:00	0.43%	0.69%	0.49%	0.52%	0.43%	0.37%	0.32%	3.3%
22:00	23:00	0.46%	0.26%	0.35%	0.26%	0.49%	0.43%	0.43%	2.7%
23:00	0:00	0.32%	0.40%	0.26%	0.29%	0.17%	0.14%	0.26%	1.8%
(blank)									
Grand Total		14.0%	14.9%	15.1%	14.2%	15.5%	14.4%	11.9%	100.0%

Busiest: 8AM – 8PM

Response Time by Hour

Sunday	Monday	Tuesday	Wed.	Thursday	Friday	Saturday (blank)	Grand Total
12.4	10.8	12.4	12.1	12.2	13.0	14.7	12.7
14.6	13.5	12.3	12.3	13.2	14.7	13.3	13.3
16.3	12.2	12.9	14.5	12.4	14.6	16.4	14.5
8.7	13.6	14.3	8.3	11.0	14.3	13.7	12.5
13.1	9.8	10.5	13.1	13.2	12.2	24.0	12.4
7.4	12.8	15.2	14.0	13.4	12.4	12.0	12.6
10.3	6.6	6.5	5.9	7.8	5.0	6.8	6.9
6.2	6.6	6.0	6.8	6.9	5.1	6.9	6.3
6.1	5.5	5.8	6.5	6.1	6.9	5.9	6.1
8.4	5.8	5.8	5.7	5.1	5.2	5.5	5.8
7.2	5.4	5.5	3.9	6.9	4.6	6.0	5.6
7.9	5.9	5.8	6.0	5.6	5.9	7.3	6.2
6.1	5.8	5.3	7.3	5.1	6.0	6.4	6.0
6.8	6.8	6.0	6.1	6.2	5.9	7.2	6.4
5.7	6.7	6.7	5.0	5.3	6.4	5.8	6.0
6.2	6.2	5.1	6.3	6.1	5.4	6.7	5.9
6.5	5.9	7.1	5.2	5.4	6.0	6.9	6.1
6.0	5.7	5.9	6.5	6.0	6.6	7.0	6.2
9.7	11.4	9.6	10.1	8.0	9.1	11.4	9.8
10.4	10.1	10.1	11.4	10.4	10.2	12.1	10.7
11.1	9.3	11.2	9.0	9.2	11.3	9.8	10.1
11.4	10.4	11.1	9.7	12.0	12.6	13.6	11.3
15.2	11.4	11.2	11.8	12.2	14.0	14.4	13.1
12.7	10.7	11.1	14.8	14.7	17.0	15.0	13.2
8.6	7.5	7.4	7.6	7.5	7.5	8.6	7.8

Fastest: 6AM – 6PM

Response Times

Average Response Times by Hour of Day

11:37 avg unstaffed
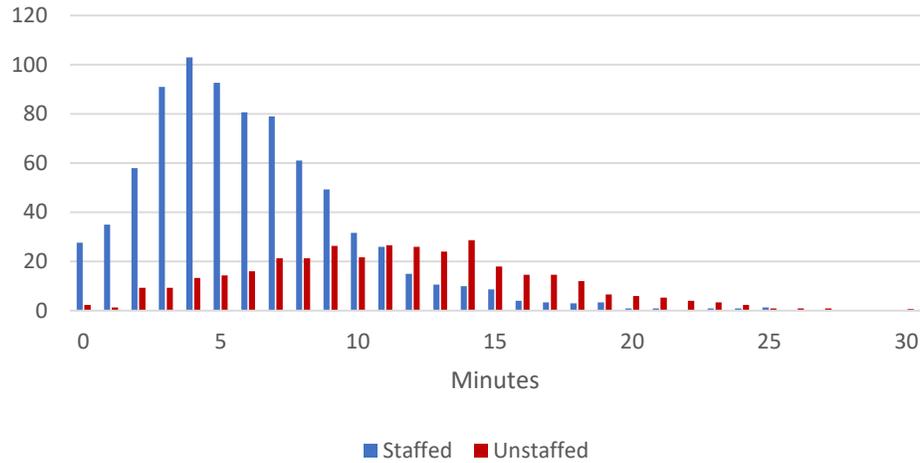
7:47 avg overall
6:05 avg staffed
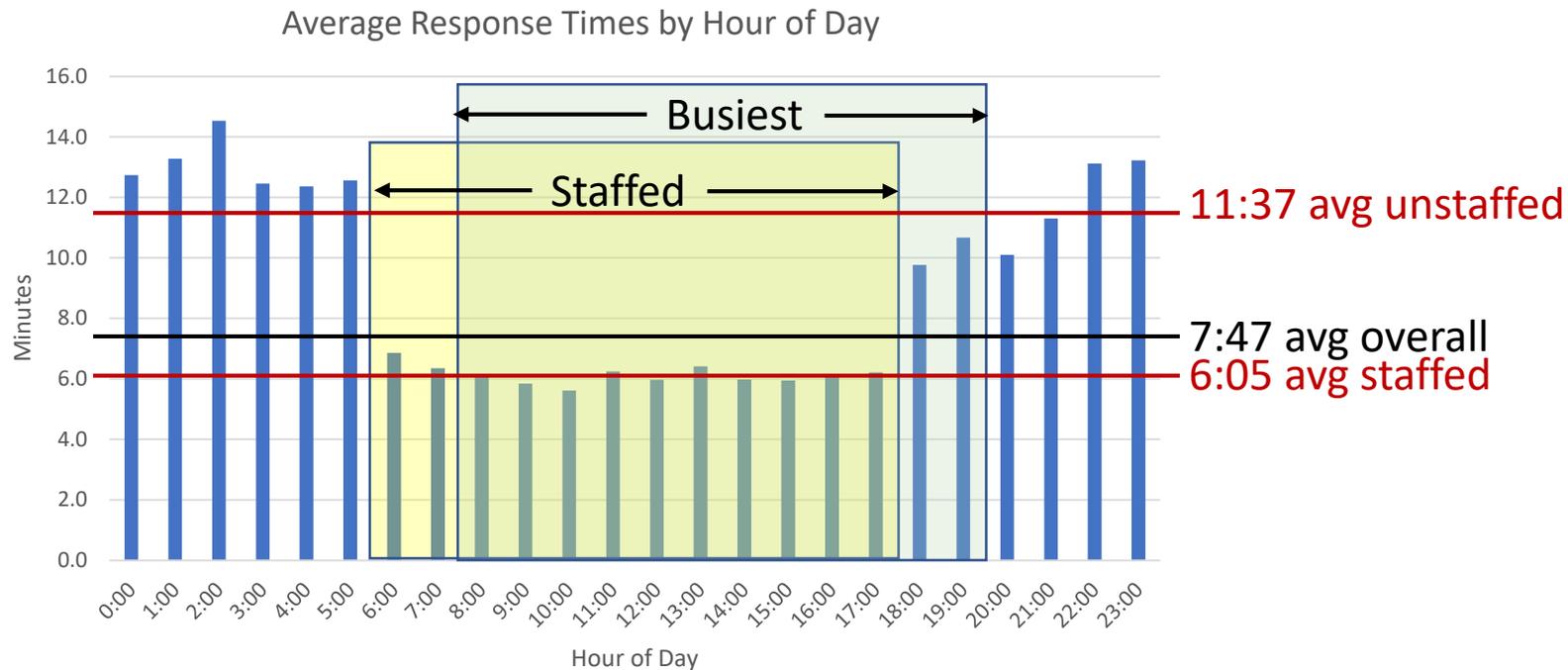
Response times are significantly slower when unstaffed.

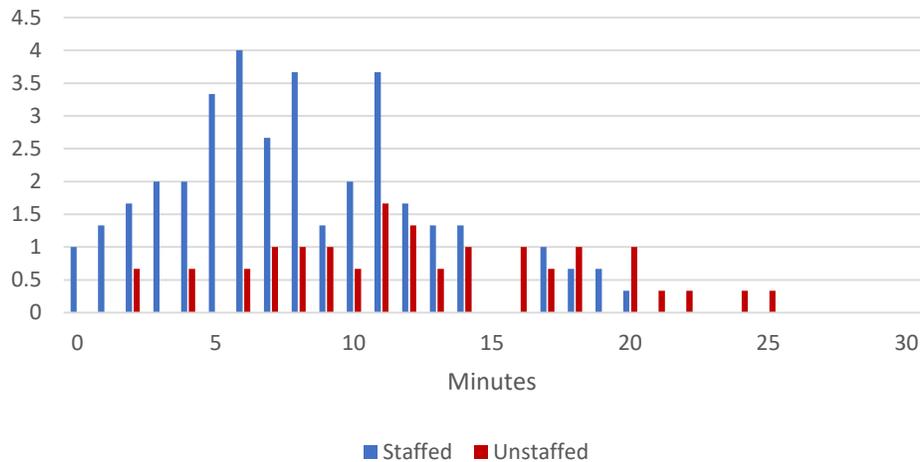Typically 5-6 minutes slower in all categories and overall.

Staffed: 6:05 minute response
Unstaffed: 11:37 minute response
Overall: 7:47 minute response

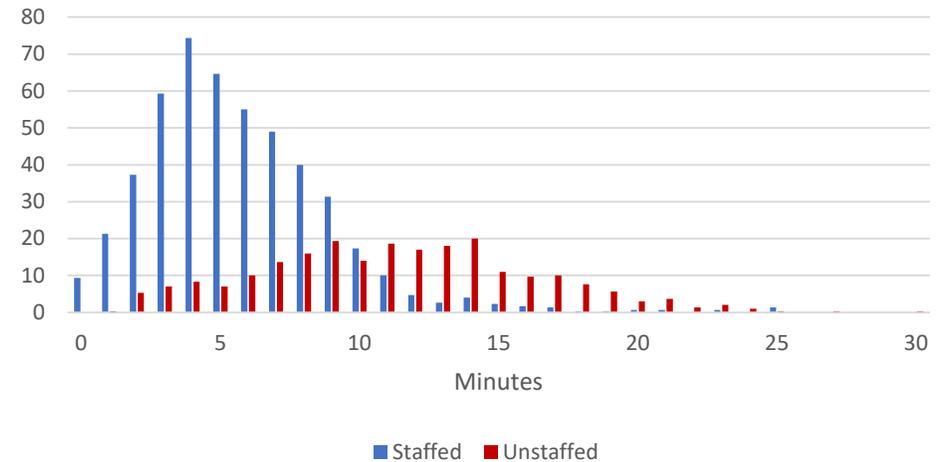# Response Time Histograms

All Response Times

	Fire			EMS			All		
	All	**Staffed**	**Unstaffed**	**All**	**Staffed**	**Unstaffed**	**All**	**Staffed**	**Unstaffed**
Median	9	8	12	7	5	11	7	5	11
Average	9:48	8:11	13:26	7:33	5:42	11:27	7:47	6:05	11:37
St Dev	6:18	5:07	7:11	4:59	3:36	5:15	5:21	4:03	5:53

- Note NFIRS response times rounded down to nearest whole minute, e.g., a response of 5:00-5:59 is logged as 5 minutes. Hence, whole number medians.
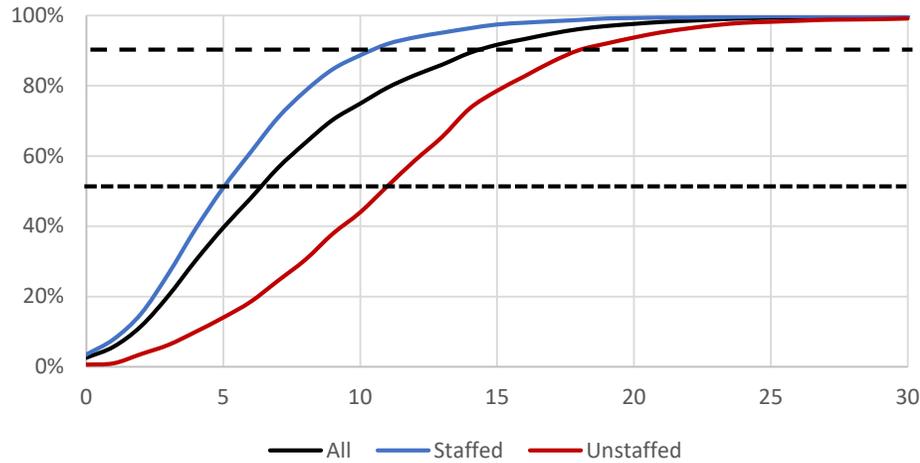
Fire Response Times

EMS Response Times

50% and 90% Response Times

All Response Times

90% of all calls are answered in 15 minutes or less.

	Fire			EMS			All		
	All	**Staffed**	**Unstaffed**	**All**	**Staffed**	**Unstaffed**	**All**	**Staffed**	**Unstaffed**
90%	18	14	21	14	9	17	15	11	18
50%	9	8	12	7	5	11	7	5	11
Average	9:48	8:11	13:26	7:33	5:42	11:27	7:47	6:05	11:37
St Dev	6:18	5:07	7:11	4:59	3:36	5:15	5:21	4:03	5:53

- 90% definition: time where 90% of responses are answered by.
- 50% definition: time where 50% of responses are answered by, aka, median.
- Note NFIRS response times rounded down to nearest whole minute, e.g., a response of 5:00-5:59 is logged as 5 minutes.
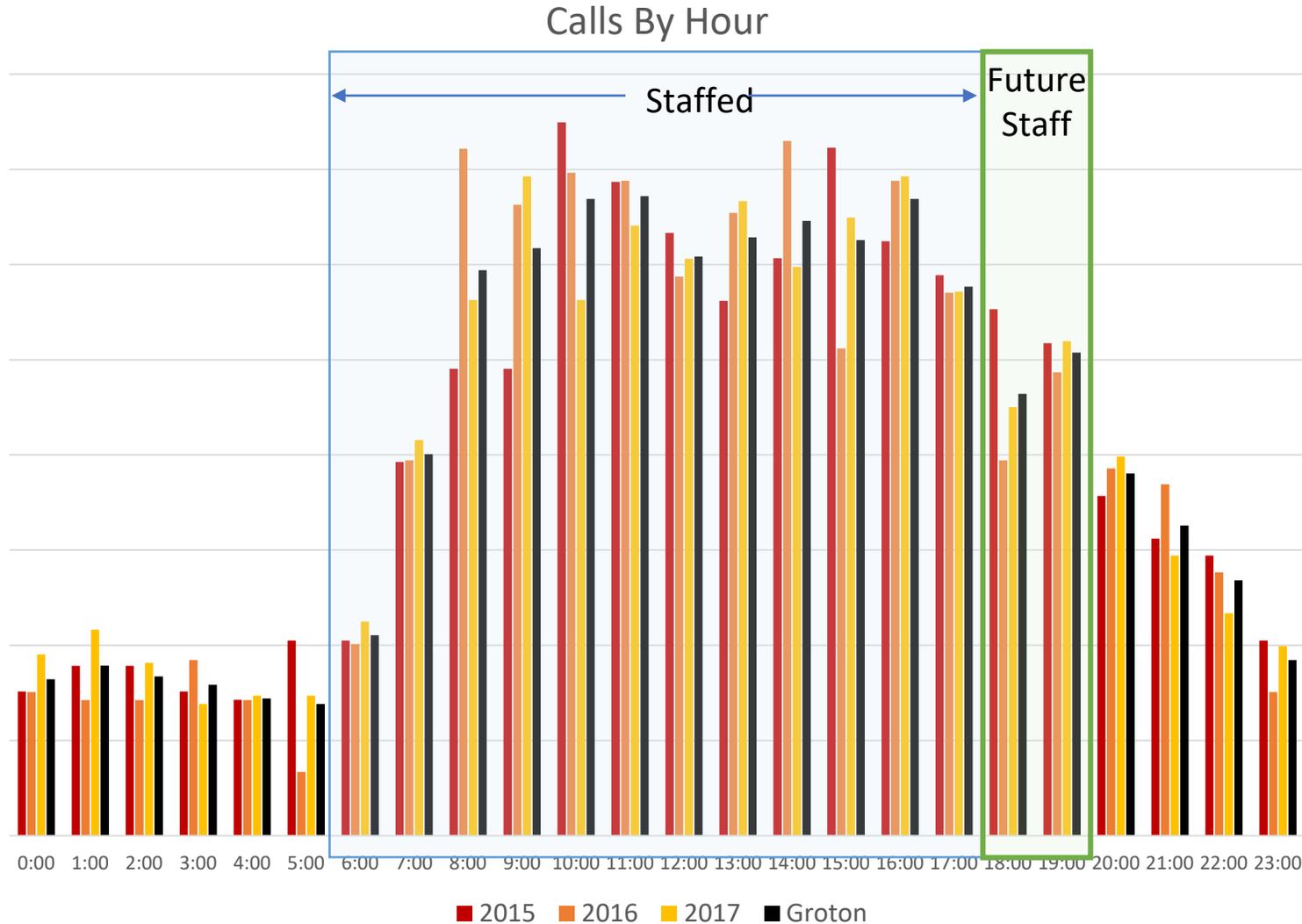
Fire Response Times
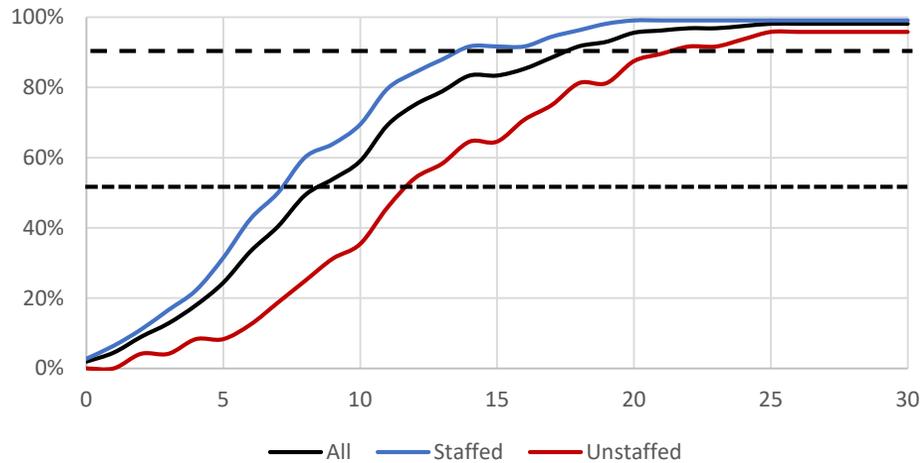
EMS Response Times
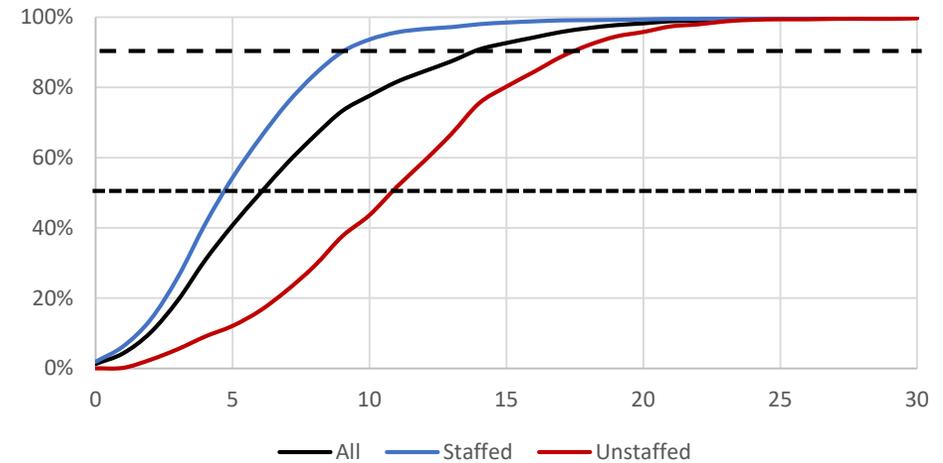
Call Distribution

|		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		Grand Total
0:00	1:00	0.23%	0.12%	0.29%	0.23%	0.26%	0.20%	0.32%		1.6%
1:00	2:00	0.20%	0.43%	0.20%	0.37%	0.29%	0.17%	0.12%		1.8%
2:00	3:00	0.43%	0.17%	0.29%	0.12%	0.14%	0.29%	0.23%		1.7%
3:00	4:00	0.29%	0.20%	0.32%	0.09%	0.14%	0.26%	0.29%		1.6%
4:00	5:00	0.35%	0.12%	0.29%	0.20%	0.17%	0.29%	0.03%		1.4%
5:00	6:00	0.14%	0.35%	0.14%	0.17%	0.23%	0.14%	0.20%		1.4%
6:00	7:00	0.23%	0.37%	0.43%	0.37%	0.29%	0.23%	0.17%		2.1%
7:00	8:00	0.49%	0.46%	0.61%	0.81%	0.52%	0.63%	0.49%		4.0%
8:00	9:00	0.78%	0.84%	0.95%	0.98%	0.87%	0.92%	0.61%		5.9%
9:00	10:00	0.69%	0.95%	0.95%	0.84%	1.04%	0.95%	0.75%		6.2%
10:00	11:00	0.61%	1.04%	1.10%	0.78%	1.18%	1.10%	0.89%		6.7%
11:00	12:00	0.81%	0.95%	1.24%	1.01%	0.78%	1.27%	0.66%		6.7%
12:00	13:00	0.92%	0.89%	1.01%	0.81%	0.89%	0.78%	0.78%		6.1%
13:00	14:00	1.01%	1.01%	0.92%	0.89%	0.75%	1.01%	0.69%		6.3%
14:00	15:00	0.81%	1.07%	0.92%	0.66%	1.36%	0.87%	0.75%		6.4%
15:00	16:00	0.78%	0.92%	1.04%	0.84%	1.24%	0.92%	0.52%		6.3%
16:00	17:00	0.84%	1.15%	0.92%	0.87%	0.98%	1.07%	0.87%		6.7%
17:00	18:00	0.75%	0.89%	0.84%	0.98%	0.89%	0.69%	0.72%		5.8%
18:00	19:00	0.78%	0.52%	0.58%	0.61%	0.75%	0.84%	0.58%		4.6%
19:00	20:00	0.87%	0.58%	0.49%	0.75%	1.30%	0.43%	0.66%		5.1%
20:00	21:00	0.81%	0.52%	0.49%	0.72%	0.37%	0.35%	0.55%		3.8%
21:00	22:00	0.43%	0.69%	0.49%	0.52%	0.43%	0.37%	0.32%		3.3%
22:00	23:00	0.46%	0.26%	0.35%	0.26%	0.49%	0.43%	0.43%		2.7%
23:00	0:00	0.32%	0.40%	0.26%	0.29%	0.17%	0.14%	0.26%		1.8%
(blank)										
Grand Total		14.0%	14.9%	15.1%	14.2%	15.5%	14.4%	11.9%		100.0%

- Little variation day-to-day, with slightly lower load on Saturdays.

- Majority of calls between 8AM – 8PM.

- Peak load times are Thursdays, and late mornings.

Calls by Hour of the Day

Calls By Hour

Staffed

Future Staff

0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00

■ 2015 ■ 2016 ■ 2017 ■ Groton

- Consistent year-to-year.
- Light blue is currently staffed hours: 6AM-6PM.
- Light green is additional staffed hours if town approves Selectboard proposed hiring.
- Peak hours for calls is 8AM – 8PM.
- Staffed hours of 6AM – 6PM account for ~70% of calls.
- Staffed hours of 6AM – 8PM account for ~80% of calls.

# Calls by Hour of the Day

Calls By Hour
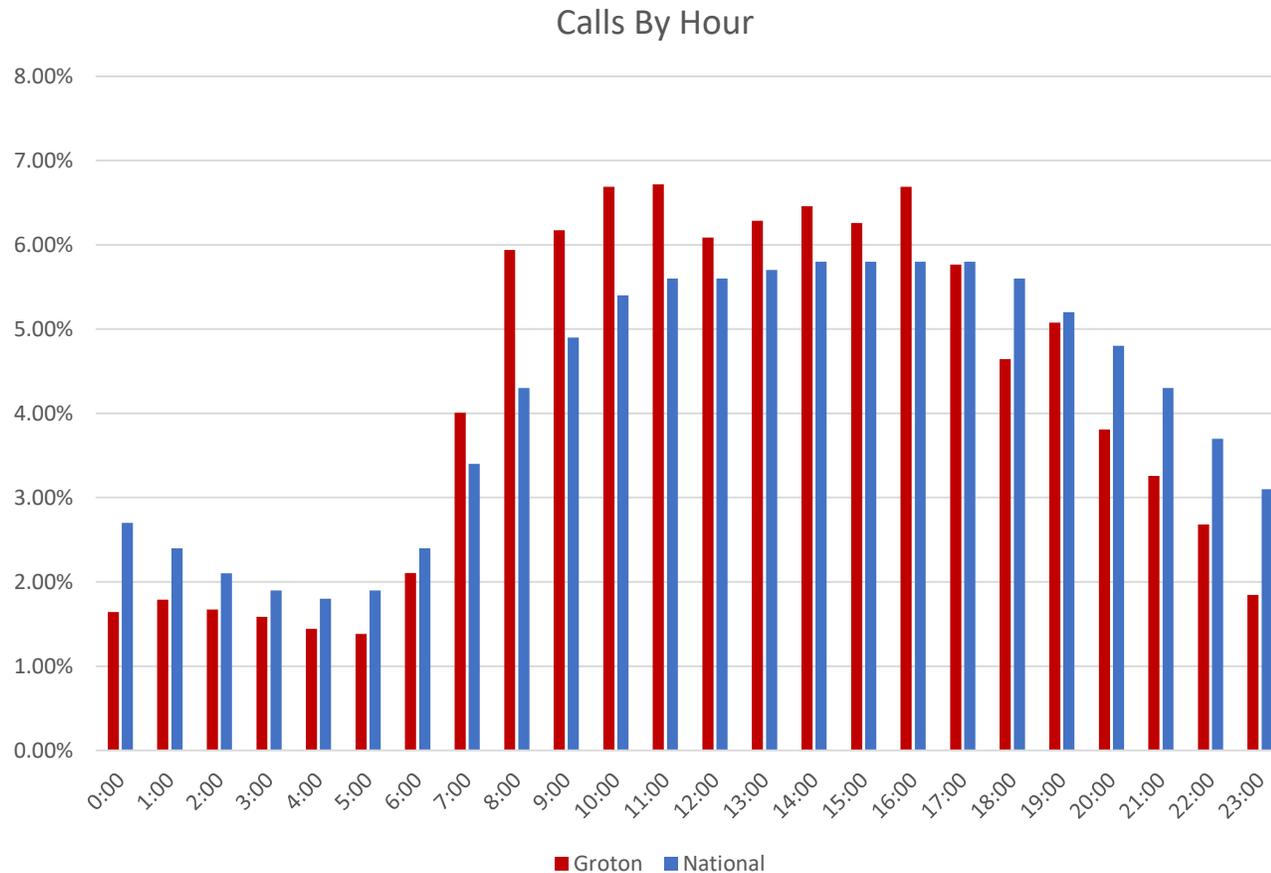
Groton National

- Distribution of calls by hours of the day for Groton is generally similar to the National distribution.

- Groton's calls are more heavily weighted to the currently staffed hours.
  - 6AM-6PM is ~70% of Groton's calls
  - 6AM-6PM is ~60% of National calls

- Groton is above average from 7AM-6PM, and below average from 6PM-7AM.

Calls During Unstaffed Hours

Current 6AM – 6PM Staffing

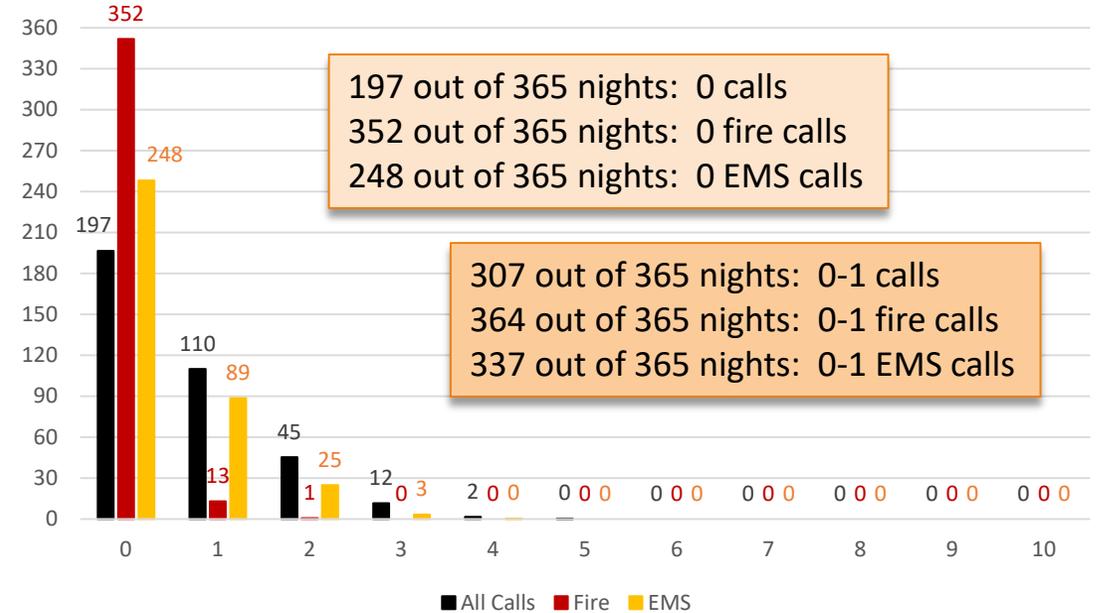Number of Nights per Year with #Calls: Unstaffed
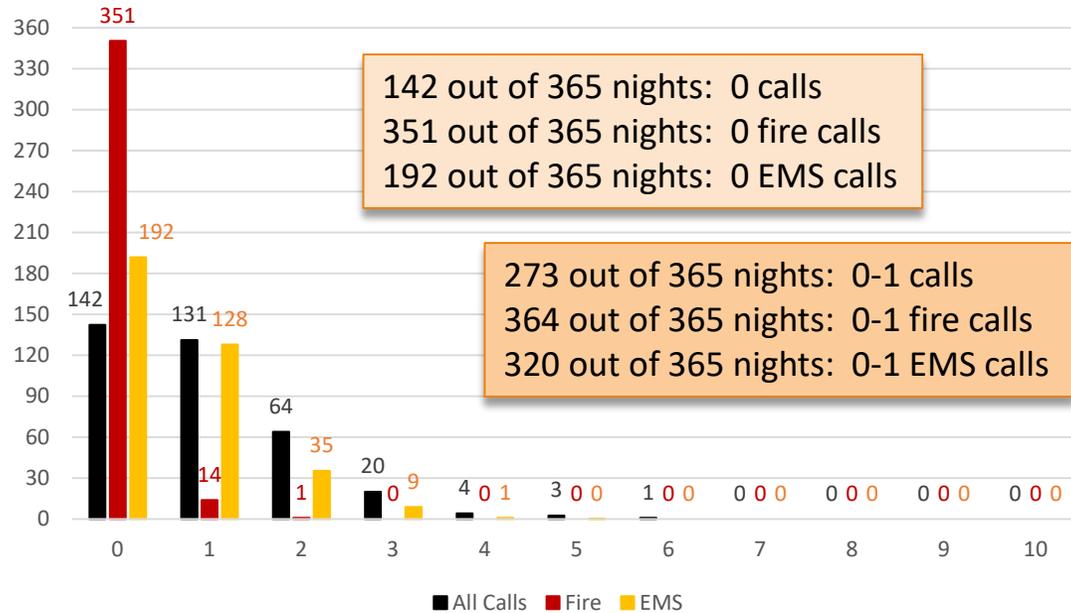
142 out of 365 nights: 0 calls
351 out of 365 nights: 0 fire calls
192 out of 365 nights: 0 EMS calls

273 out of 365 nights: 0-1 calls
364 out of 365 nights: 0-1 fire calls
320 out of 365 nights: 0-1 EMS calls

Proposed 6AM – 8PM Staffing

Number of Nights per Year with #Calls: Unstaffed

197 out of 365 nights: 0 calls
352 out of 365 nights: 0 fire calls
248 out of 365 nights: 0 EMS calls

307 out of 365 nights: 0-1 calls
364 out of 365 nights: 0-1 fire calls
337 out of 365 nights: 0-1 EMS calls

Current 6AM – 6PM Staffing

	Both	Staffed	Unstaffed
All Calls	1156	799	356
Fire Calls	52	36	16
EMS Calls	721	490	231

Extra two hours per day covers an additional 112 calls (~10%) per year.

Proposed 6AM – 8PM Staffing

	Both	Staffed	Unstaffed
All Calls	1156	912	244
Fire Calls	52	38	14
EMS Calls	721	571	150

Mutual Aid

	Received				Given			Summary		
	Cover Station	Fire	Ambulance	ALS	Cover Station	Fire	Ambulance	Total Received	(Total-ALS) Received	Total Given
Westford	1	2	1	48	1	1	4	52	4	6
Littleton										
Ayer										
Townsend										
Pepperell										
Shirley										
Dunstable										
Tyngsboro										
Total								52	4	6

Need this data

EMS/Rescue service levels
◦ ALS: Advanced Life Support – Paramedic – includes advanced cardiac monitoring, allows for IVs
◦ BLS: Basic Life Support – includes AED, but not advanced monitoring or IVs

Groton does NOT have ALS capabilities and relies on Westford, Littleton, Ayer, Townsend, Pepperell, and therefore will always **receive** ALS mutual aid and can not **give** ALS mutual aid
◦ Traditional studies and rules of thumb suggest 350 ALS calls a year is a threshold for starting a service. (cost for equipment, cost for increased training, cost for increased staffing, etc.)

ALS service call is typically triggered at the dispatch level based on information received from the caller.