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Data Analysis



Albemarle County Fire Rescue Albemarle County, Virginia

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CONSULTANT REPORT

ALBEMARLE COUNTY FIRE RESCUE

DATA ANALYSIS

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METHODOLOGY

We utilized two CAD data files provided by Albemarle County Fire Rescue (ACFR) for analyses reflecting unique incidents and unit-level responses during the calendar year from January 1, 2017 to December 31, 2017. We reference two distinct measures in this report—call volume and workload. The number of requests for service are defined as “incidents” or “calls” (i.e., call volume). Call volume reflects the number of times a distinct incident was created involving one or more ACFR units, or calls received in ACFR’s jurisdiction. Calls were categorized as Agency Assist, EMS, Fire, Hazmat, Police-Related, Public Service, or Rescue using the “CADCallType” field in the CAD data file. “Responses” are the number of times that an individual unit (or units) responded to a call (i.e., workload).

Audits of the data files were first conducted to identify any anomalies for attention and reconciliation prior to data analysis (see Table 69 through Table 74 in the Appendix). Select exclusion criteria were applied prior to the identification of unique incidents to reflect call volume (Table 69). Exclusion criteria were also applied prior to the identification of unique responses to reflect unit-level workload (Table 71). All entries with one or more times outside of the logical temporal sequence of events (e.g., reported “AlarmDateTime” was earlier than reported “IncidentDateTime”) were excluded (Table 72; Table 73). Duplicate entries were also excluded. The application of exclusion criteria for workload and performance time data (Table 73; Table 74) resulted in slight reductions of call volume across analyses and related tables or figures; these adjusted sample sizes are noted in the report where applicable.

Responses were classified by ACFR based on call status and the role of the responding unit. Call status as emergency or non-emergency was assigned per call type by ACFR and was based on “CADCallType” from the CAD data file. Select units were identified by ACFR as primary front-line units. The majority of analyses related to performance (e.g., travel time) were restricted based on these classifications to include only primary front-line units responding to emergency (lights and sirens) calls and are identified in the report where applicable. Any reduced sample sizes due to missing data are noted in the report where applicable.

Classifications of responses into call categories and program areas appear in Table 75.

COMMUNITY RESPONSE HISTORY

During the 2017 reporting period (i.e., January 1, 2017 to December 31, 2017; hereinafter referred to as 2017), ACFR responded to a total of 13,038 requests for service, or incidents (Figure 1; Table 1).

EMS related requests totaled 8,777, accounting for 67.3% of the total call volume, and fire related requests totaled 2,426, accounting for 18.6% of the total call volume. Table 2 presents call volume by community type (i.e., development, rural, or other area). Classifications of call types from the CAD data file into program and call category are presented in Table 75 in the Appendix.

Figure 1: Percentage of Total Incidents by Program

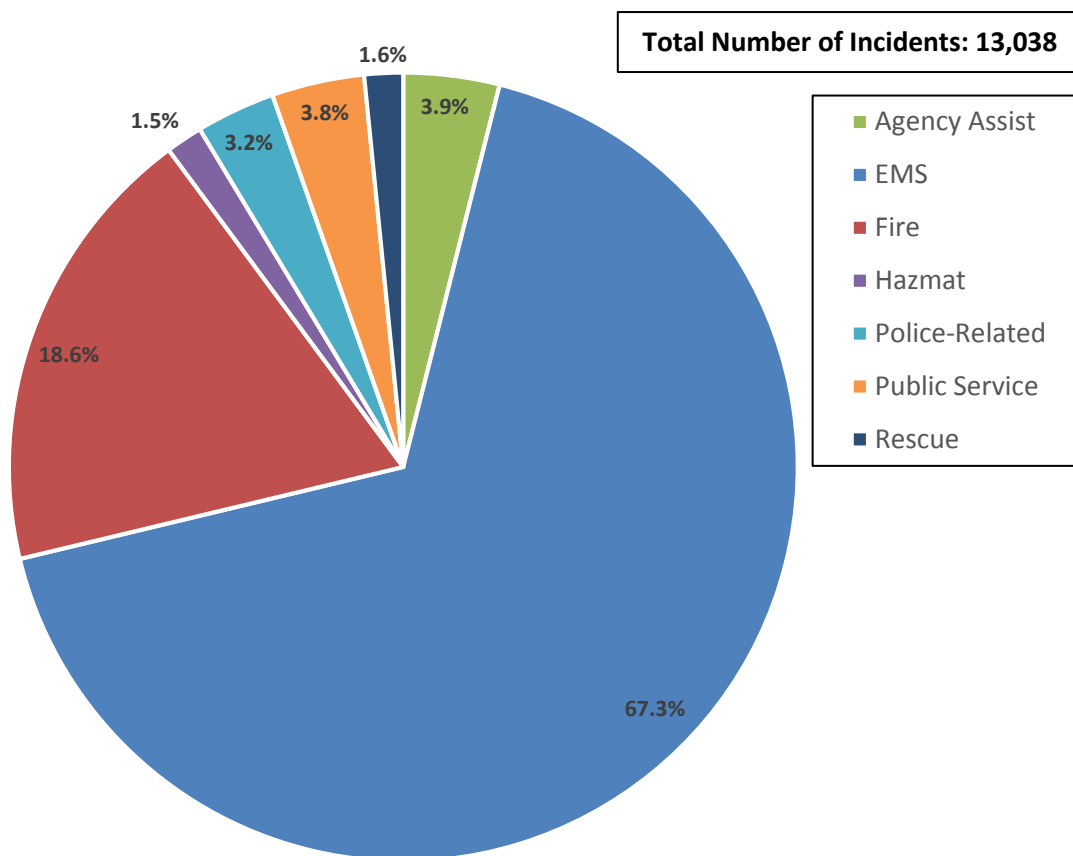


Table 1: Number of Incidents by Program and Call Category

Call Category	Number of Calls	Average Calls per Day	Call Percentage
Agency Assist	513	1.4	3.9
Aircraft Emergency	1	0.0	0.0
Alarm	212	0.6	1.6
Cardiac and Stroke	1,530	4.2	11.7
Difficulty Breathing	,1052	2.9	8.1
Fall and Injury	1,706	4.7	13.1
Illness and Other	2,481	6.8	19.0
MVC	878	2.4	6.7
Obvious Death	4	0.0	0.0
Overdose and Psychiatric	174	0.5	1.3
Seizure and Unconsciousness	702	1.9	5.4
Standby	37	0.1	0.3
EMS Total	8,777	24.0	67.3
Aircraft Emergency	3	0.0	0.0
Alarm	890	2.4	6.8
Elevator Emergency	11	0.0	0.1
Fire Other	404	1.1	3.1
Mutual Aid	40	0.1	0.3
MVC - Fluids Down	315	0.9	2.4
Outside Fire	389	1.1	3.0
Structure Fire	130	0.4	1.0
Structure Fire - Reduced Response	138	0.4	1.1
Vehicle Fire	106	0.3	0.8
Fire Total	2,426	6.6	18.6
Hazmat	197	0.5	1.5
Police-Related	423	1.2	3.2
Public Service	495	1.4	3.8
Mutual Aid	23	0.1	0.2
Rescue	175	0.5	1.3
Water Rescue	9	0.0	0.1
Rescue Total	207	0.6	1.6
Total	13,038	35.7	100.0

Table 2: Number of Incidents by Program, Call Category, and Community Type

Call Category	Number of Calls by Community Type ¹			
	Development	Rural	Other	Total
Agency Assist	296	197	20	513
Aircraft Emergency	1	0	0	1
Alarm	157	51	4	212
Cardiac and Stroke	1,006	494	30	1,530
Difficulty Breathing	708	328	16	1,052
Fall and Injury	1,189	488	29	1,706
Illness and Other	1,632	797	52	2,481
MVC	398	451	29	878
Obvious Death	3	1	0	4
Overdose and Psychiatric	115	54	5	174
Seizure and Unconsciousness	491	202	9	702
Standby	13	20	4	37
EMS Total	5,713	2,886	178	8,777
Aircraft Emergency	3	0	0	3
Alarm	513	369	8	890
Elevator Emergency	9	1	1	11
Fire Other	90	308	6	404
Mutual Aid	6	26	8	40
MVC - Fluids Down	144	154	17	315
Outside Fire	143	238	8	389
Structure Fire	75	42	13	130
Structure Fire - Reduced Response	95	38	5	138
Vehicle Fire	37	64	5	106
Fire Total	1,115	1,240	71	2,426
Hazmat	124	61	12	197
Police-Related	221	191	11	423
Public Service	362	125	8	495
Mutual Aid	9	7	7	23
Rescue	44	125	6	175
Water Rescue	1	7	1	9
Rescue Total	54	139	14	207
Total	7,885	4,839	314	13,038

¹“CompPlanArea” values in the CAD data file identified as “Development” areas include CROZ, HOLL, N-1, N-2, N-3, N-4, N-5, N-6, N-7, PINE, RIVA, and SVIL; “CompPlanArea” values in the CAD data file identified as “Rural” areas include RA-1, RA-2, RA-3, RA-4; and “CompPlanArea” values in the CAD data file identified as “Other” were noted to be different localities and include Augusta, Buckingham, Charlottesville, CITY, Fluvanna, Greene, Nelson, and Orange.

Combined, all ACFR units made 25,551 responses, and were busy on calls for a total of 15,635.2 hours in 2017 (Table 3). The number of individual unit responses will contribute to understanding total department workload, as 6,808 of 13,012 calls (52.3%) resulted in multiple ACFR units responding.

Table 3: Number of Calls, Number of Responses, and Total Busy Time by Program

Program	Number of Calls ¹	Number of Responses ²	Average Responses per Call	Responses with Time Data ³	Total Busy Hours	Average Busy Minutes per Response	Percentage of Total Busy Hours
Agency Assist	513	1,275	2.5	1,266	816.4	38.7	5.2
EMS	8,764	15,550	1.8	15,395	10,827.0	42.2	69.2
Fire	2,416	5,467	2.3	5,431	2,379.8	26.3	15.2
Hazmat	197	597	3.0	592	251.3	25.5	1.6
Police-Related	420	914	2.2	906	499.2	33.1	3.2
Public Service	495	698	1.4	693	225.2	19.5	1.4
Rescue	207	1,050	5.1	1,036	636.2	36.8	4.1
Total	13,012	25,551	2.0	25,319	15,635.2	37.1	100.0

¹“Number of Calls” reflects an adjusted number of unique incidents to correspond with number of responses following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

²“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

³“Responses with Time Data” reflects the number of responses in the CAD data file with available “AlarmDateTime” values and “InServiceDateTime” values.

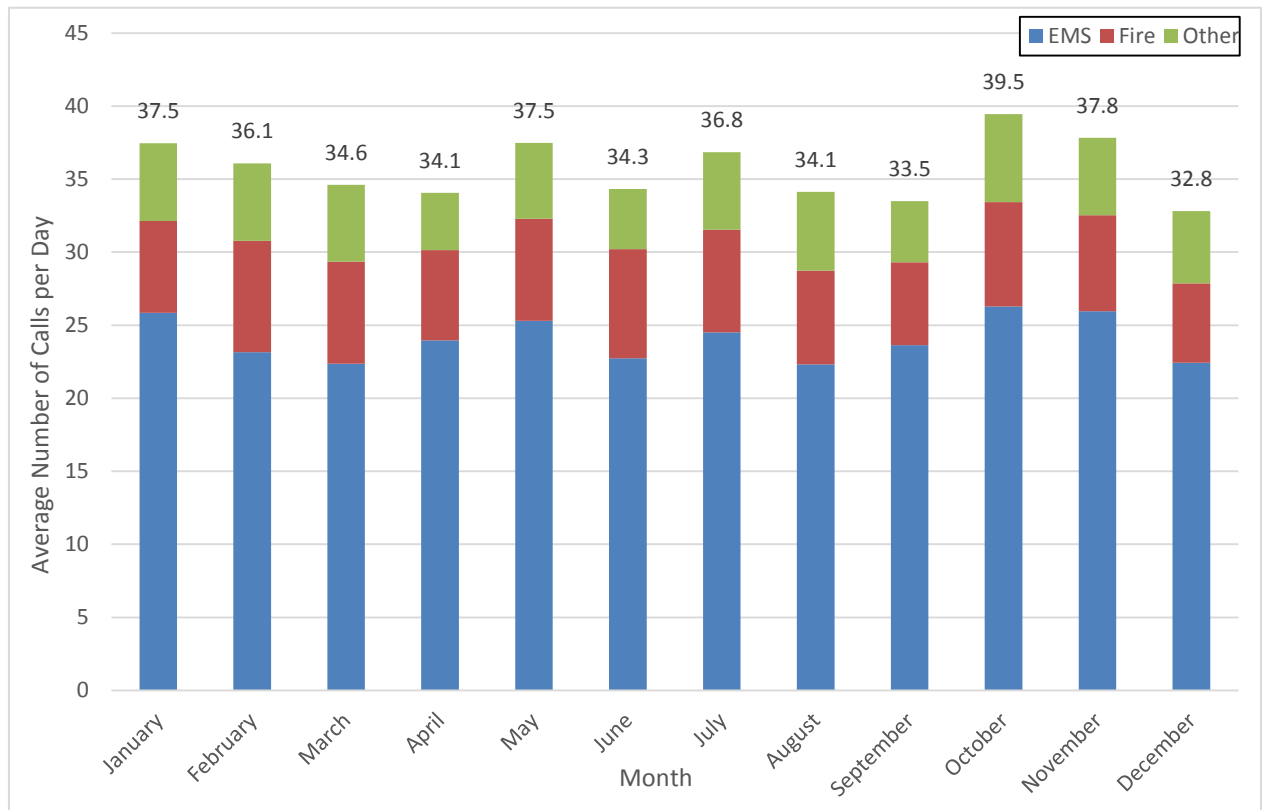
Temporal analyses were conducted to evaluate patterns in community demands. These analyses are based on the 13,038 incidents to which ACFR was dispatched, and they examine the frequency of requests for service by month, day of week, and hour of day. In the following analyses, Agency Assist, Hazmat, Police-Related, Public Service, and Rescue calls were grouped into an “Other” category for presentation purposes.

Overall, average requests per month ranged from a low of 32.8 calls per day in December to a high of 39.5 calls per day in October (Table 4; Figure 2). The top three months with the most demands in descending order were: October (39.5 per day), November (37.8 per day) and May (37.5 per day).

Table 4: Total Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	1,161	37.5	8.9
February	1,010	36.1	7.7
March	1,073	34.6	8.2
April	1,022	34.1	7.8
May	1,162	37.5	8.9
June	1,030	34.3	7.9
July	1,142	36.8	8.8
August	1,058	34.1	8.1
September	1,005	33.5	7.7
October	1,223	39.5	9.4
November	1,135	37.8	8.7
December	1,017	32.8	7.8
Total	13,038	35.7	100.0

Figure 2: Overall: Average Calls per Day by Month

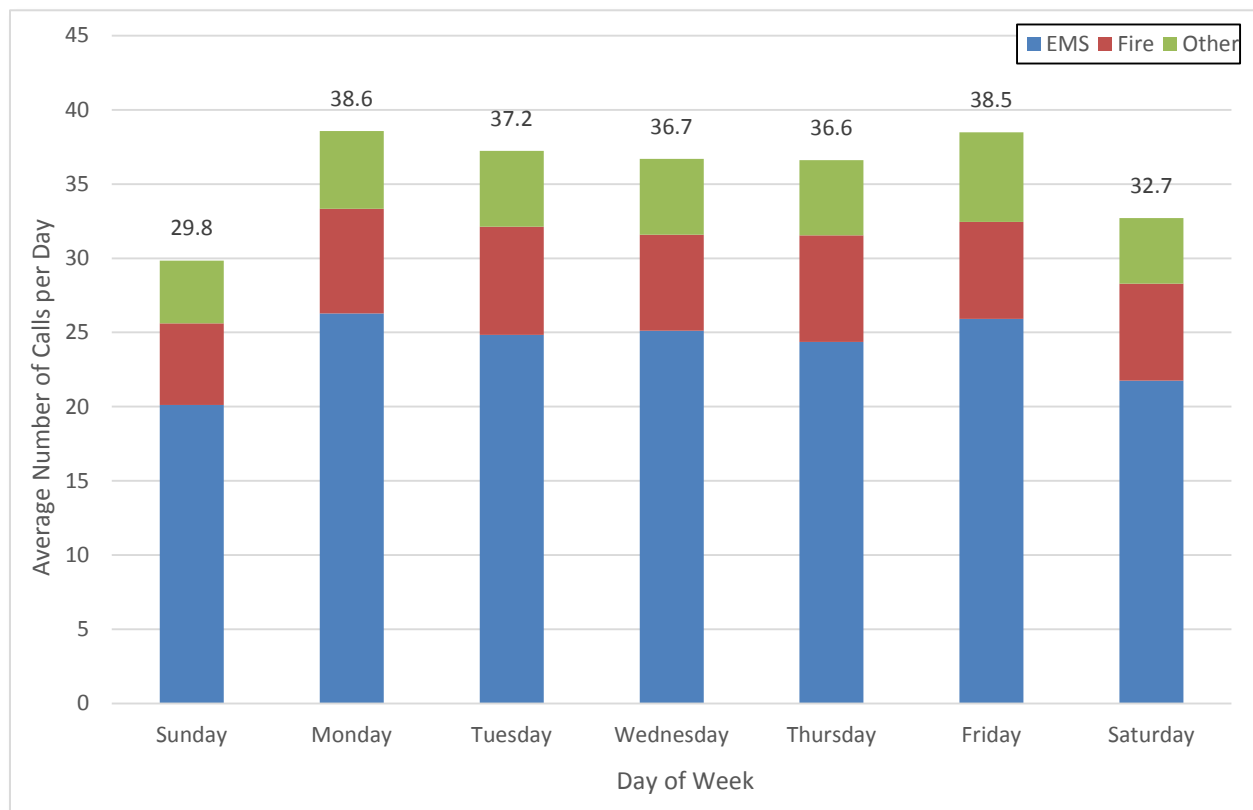


Similar analyses were conducted for requests by day of week (Table 5; Figure 3; 53 Sundays in 2017, 52 of all other days of the week). The highest average number of calls per day occurred on Monday (38.6 per day), and the lowest average number of calls per day occurred on Sunday (29.8 per day).

Table 5: Total Calls and Average Calls per Day by Day of Week

Day of Week	Number of Calls	Average Calls per Day	Call Percentage
Sunday	1,582	29.8	12.1
Monday	2,006	38.6	15.4
Tuesday	1,936	37.2	14.8
Wednesday	1,908	36.7	14.6
Thursday	1,904	36.6	14.6
Friday	2,001	38.5	15.3
Saturday	1,701	32.7	13.0
Total	13,038	35.7	100.0

Figure 3: Overall: Average Calls per Day by Day of Week



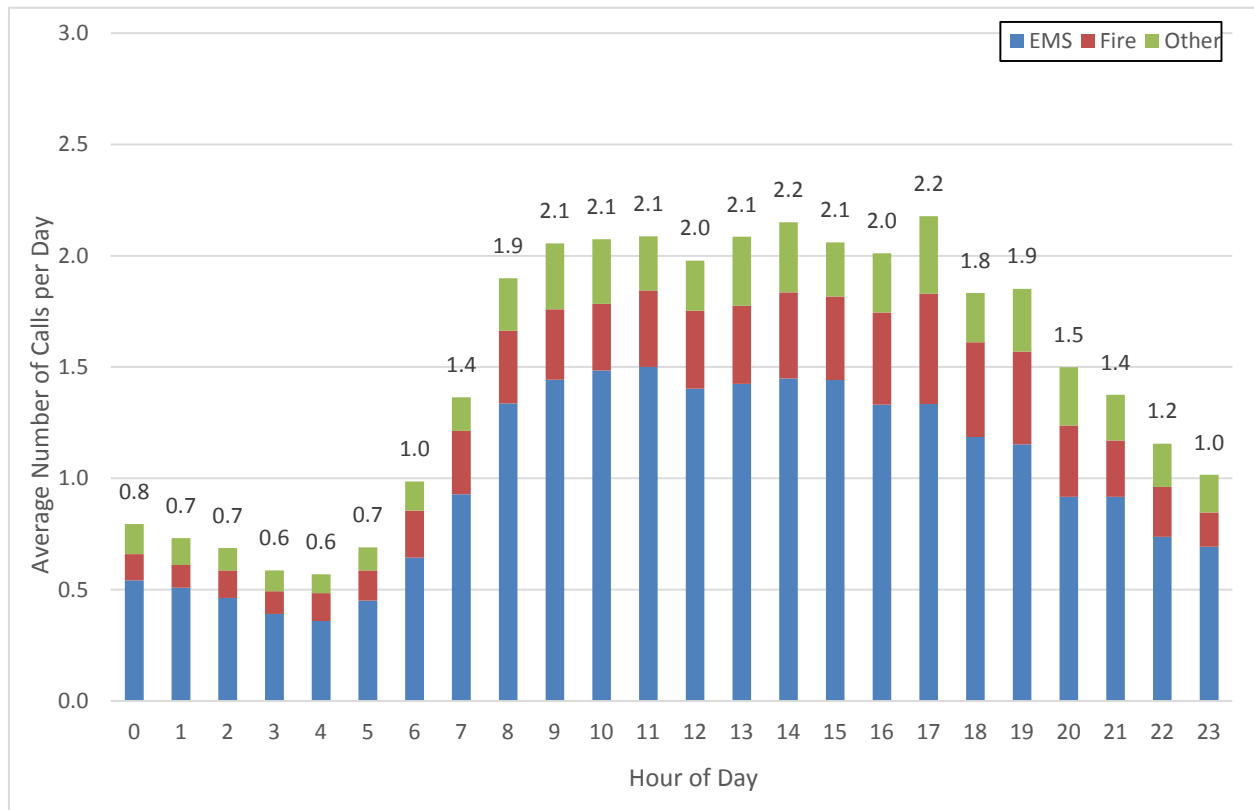
Overall demands were also evaluated by hour of day (Table 6; Figure 4). Some variability exists in the time of day that requests for services are received. The hours of the day with the highest average number of calls per day (ranging from 2.0 to 2.2 per day) are between 0900 and 1700. Peak demand occurs at 1700 (2.2 per day). The hours of the day with the lowest average number of calls per day (ranging from 0.6-0.8 per day) are between 0000 and 0500.

To provide a more granular understanding of the community's demand for services, this temporal analysis included the average number of calls per hour. In other words, when referring to Table 6 and Figure 4 below, the busiest hour is at 1700 with 795 calls occurring during that hour in 2017. The average number of calls per hour is a daily average for those 795 calls if they were distributed equally across the year (i.e., $795/365 = 2.2$). Therefore, the busiest hour per day would be at 1700 with an average hourly call volume at 2.2 calls per day. The second busiest hour occurs at 1400 with 785 calls during that hour in 2017, with an average hourly call volume of 2.2 calls per day. For ease of presentation, values displayed in Table 6 and Figure 4 have been rounded to one decimal place.

Table 6: Total Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	290	0.8	2.2
1	267	0.7	2.0
2	251	0.7	1.9
3	214	0.6	1.6
4	208	0.6	1.6
5	252	0.7	1.9
6	360	1.0	2.8
7	498	1.4	3.8
8	693	1.9	5.3
9	750	2.1	5.8
10	757	2.1	5.8
11	762	2.1	5.8
12	722	2.0	5.5
13	761	2.1	5.8
14	785	2.2	6.0
15	752	2.1	5.8
16	734	2.0	5.6
17	795	2.2	6.1
18	669	1.8	5.1
19	676	1.9	5.2
20	547	1.5	4.2
21	502	1.4	3.9
22	422	1.2	3.2
23	371	1.0	2.8
Total	13,038	35.7	100.0

Figure 4: Overall: Average Calls per Day by Hour of Day



Overall, ACFR made 25,551 responses, and the total busy hours were 15,635.2 hours during 2017 (Table 3; Table 7). The station-level demand is more reflective for deployment decisions (Table 7), and the unit-level workload will help evaluate the utilization of physical apparatus, and assist with apparatus procurement or maintenance decisions (Table 8).

Units assigned to Monticello responded to the greatest number of calls across the department, regardless of where the calls originated (2,563 calls; Table 7). Units assigned to Seminole made the greatest number of responses to calls across the department, regardless of where the calls originated (3,226 responses). WARS was the busiest station with a total of 2,166.9 busy hours during 2017. SVRS, Berkmar, and Pantops had the highest average busy minutes per response at 65.8, 52.8, and 51.1 minutes, respectively.

E111 was the top utilized engine based on number of responses (1,356 responses) and busy hours (541.4 hours; Table 8). E151 was the second most utilized engine based on busy hours (444.7 hours), and E82 was the second most utilized engine based on number of responses (1,318 responses). RS8 was the top utilized ambulance based on number of responses (2,445 responses) and busy hours (2,127.0 hours), and RS11 was the second most utilized ambulance based on number of responses (1,671 responses) and busy hours (1,469.9 hours).

Table 7: Overall Workload by Station

Station	Number of Calls Responded to By Units Assigned to Station ¹	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response	Percentage of Total Busy Hours
ACFR	1,164	1,560	1,547	850.8	33.0	5.4
Berkmar	2,445	2,445	2,417	2,127.0	52.8	13.6
Crozet	617	1,253	1,247	451.6	21.7	2.9
Earlsville	644	842	831	575.3	41.5	3.7
East Rivanna	1,153	1,456	1,443	665.0	27.7	4.3
Hollymead	1,774	2,226	2,199	1,535.7	41.9	9.8
Ivy	1,686	1,941	1,925	1,094.9	34.1	7.0
Monticello	2,563	3,140	3,106	2,072.7	40.0	13.3
North Garden	659	1,262	1,253	569.9	27.3	3.6
Pantops	868	868	858	731.0	51.1	4.7
Scottsville	469	873	864	390.2	27.1	2.5
Seminole	2,285	3,226	3,202	1,015.7	19.0	6.5
Stony Point	407	680	676	391.9	34.8	2.5
SVRS	868	918	909	996.5	65.8	6.4
WARS	1,607	2,861	2,842	2,166.9	45.7	13.9
Total	--	25,551	25,319	15,635.2	37.1	100.0

¹“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

²“Responses with Time Data” reflects the number of responses in the CAD data file with available “AlarmDateTime” values and “InServiceDateTime” values.

Table 8: Overall Workload by Unit

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
ACFR	BC10	Battalion Chief	22	22	11.3	30.9
	BC11	Battalion Chief	264	263	112.8	25.7
	BC12	Battalion Chief	198	197	73.0	22.2
	BC13	Battalion Chief	221	218	93.3	25.7
	BC14	Battalion Chief	184	179	74.5	25.0
	BC15	Battalion Chief	61	60	30.7	30.7
	CHF10	Chief	9	9	9.6	63.9
	CHF11	Chief	4	4	3.1	46.7
	CHF12	Chief	15	15	5.5	22.1
	CHF13	Chief	22	22	13.0	35.6
	E112	Engine	3	3	4.3	85.2
	FM10	Fire Marshal	75	75	26.7	21.4
	FM11	Fire Marshal	34	34	25.8	45.6
	FM12	Fire Marshal	79	79	91.3	69.3
	FM13	Fire Marshal	113	113	86.7	46.1
	FM14	Fire Marshal	100	100	67.4	40.4
	OMD6	Medical Director	22	22	18.5	50.3
	OMD8	Medical Director	6	6	7.5	74.7
	RS17	Ambulance	5	4	4.0	60.3
	RS18	Ambulance	67	66	54.8	49.8
	RS19	Ambulance	41	41	32.9	48.2
	TN10	Training	11	11	1.7	9.1
	TN12	Training	2	2	1.9	56.9
	TN13	Training	1	1	0.0	2.1
	TN14	Training	1	1	0.4	25.4
	ACFR Total		1,560	1,547	850.8	33.0
Berkmar	RS8	Ambulance	2,445	2,417	2,127.0	52.8
	Berkmar Total		2,445	2,417	2,127.0	52.8
Crozet	B53	Brush	58	58	18.8	19.4
	B55	Brush	102	101	55.1	32.7
	C50	Car	42	42	14.7	21.0
	C52	Car	2	2	0.7	21.6
	CHF50	Chief	56	56	24.2	25.9
	CHF51	Chief	55	55	27.1	29.6
	CHF52	Chief	21	21	9.3	26.4
	CHF53	Chief	35	35	11.0	18.9
	E52	Engine	331	327	121.1	22.2
	E56	Engine	83	83	25.0	18.1

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	E58	Engine	348	348	81.8	14.1
	T59	Tanker	98	97	51.0	31.6
	TO54	Tower	18	18	7.6	25.3
	U59	Utility	4	4	4.2	63.4
	Crozet Total		1,253	1,247	451.6	21.7
Earlsville	B43	Brush	29	28	26.0	55.8
	B46	Brush	60	60	43.3	43.3
	C40	Car	58	56	24.8	26.5
	C41	Car	2	2	1.0	30.6
	C42	Car	26	26	9.7	22.3
	CHF40	Chief	1	1	0.0	2.2
	CHF41	Chief	15	15	6.9	27.5
	CHF42	Chief	19	19	9.9	31.1
	E41	Engine	185	183	84.0	27.5
	E45	Engine	84	82	33.4	24.4
	HM47	Hazmat	21	21	23.4	67.0
	RS4	Ambulance	289	285	286.7	60.3
	T49	Tanker	53	53	26.3	29.8
	Earlsville Total		842	831	575.3	41.5
East Rivanna	B25	Brush	74	74	53.7	43.5
	C20	Car	78	77	29.7	23.1
	C21	Car	10	10	3.9	23.4
	C22	Car	30	30	13.0	26.0
	CHF20	Chief	9	9	9.9	66.3
	CHF21	Chief	80	78	43.6	33.5
	CHF22	Chief	4	4	5.3	79.3
	E21	Engine	979	971	421.3	26.0
	E24	Engine	70	68	23.6	20.8
	T26	Tanker	61	61	30.6	30.1
	T28	Tanker	23	23	17.3	45.2
	TO29	Tower	38	38	13.1	20.7
	East Rivanna Total		1,456	1,443	665.0	27.7
Hollymead	C121	Car	4	4	0.7	10.3
	E121	Engine	761	755	304.4	24.2
	RS12	Ambulance	,1304	1,283	1,163.7	54.4
	T121	Tanker	44	44	29.2	39.8
	TO121	Tower	113	113	37.8	20.1
	Hollymead Total		2,226	2,199	1,535.7	41.9
Ivy	C151	Car	3	3	1.9	37.4

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	CHF150	Chief	90	90	55.0	36.7
	E151	Engine	1,109	1,102	444.7	24.2
	RS15	Ambulance	739	730	593.4	48.8
	Ivy Total		1,941	1,925	1,094.9	34.1
Monticello	C111	Car	3	3	2.7	54.6
	E111	Engine	1,356	1,347	541.4	24.1
	RS11	Ambulance	1,671	1,646	1,469.9	53.6
	SQ11	Squad	56	56	24.5	26.2
	T111	Tanker	54	54	34.2	38.0
	Monticello Total		3,140	3,106	2,072.7	40.0
North Garden	B31	Brush	88	86	55.2	38.5
	B36	Brush	52	52	24.0	27.6
	C30	Car	118	116	55.1	28.5
	C31	Car	104	104	56.3	32.5
	CHF30	Chief	18	18	9.3	31.1
	CHF31	Chief	82	82	50.0	36.6
	CHF32	Chief	8	8	3.2	24.3
	CHF33	Chief	49	49	25.2	30.9
	E32	Engine	223	220	106.6	29.1
	E34	Engine	93	93	30.9	19.9
	T37	Tanker	77	76	31.8	25.1
	T39	Tanker	23	23	21.0	54.8
	U35	Utility	24	24	14.8	37.0
	U38	Utility	303	302	86.5	17.2
	North Garden Total		1,262	1,253	569.9	27.3
Pantops	RS16	Ambulance	868	858	731.0	51.1
	Pantops Total		868	858	731.0	51.1
Scottsville	B75	Brush	268	264	121.1	27.5
	C70	Car	74	74	55.0	44.6
	C71	Car	11	11	5.3	28.9
	C72	Car	6	6	6.2	61.8
	CHF70	Chief	21	21	11.9	34.0
	CHF71	Chief	1	1	0.6	37.3
	CHF72	Chief	29	29	16.6	34.4
	E72	Engine	161	159	47.2	17.8
	E73	Engine	193	191	56.9	17.9
	T77	Tanker	51	50	30.0	35.9
	T79	Tanker	23	23	14.1	36.9
	U76	Utility	35	35	25.3	43.3

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	Scottsville Total		873	864	390.2	27.1
Seminole	C80	Car	11	11	3.3	18.0
	C82	Car	7	7	2.7	23.5
	C89	Car	350	346	93.7	16.2
	CHF80	Chief	104	104	50.9	29.4
	CHF81	Chief	41	41	19.6	28.7
	CHF82	Chief	56	56	22.6	24.2
	CHF83	Chief	81	80	23.1	17.3
	CHF84	Chief	48	48	21.1	26.3
	CHF85	Chief	35	35	19.1	32.8
	E81	Engine	906	896	270.7	18.1
	E82	Engine	1,318	1,309	386.3	17.7
	E85	Engine	49	49	10.4	12.7
	TO88	Tower	209	209	85.9	24.7
	U86	Utility	11	11	6.3	34.5
	Seminole Total		3,226	3,202	1,015.7	19.0
Stony Point	B63	Brush	1	1	3.1	188.1
	B64	Brush	50	50	27.6	33.2
	C60	Car	11	11	7.9	43.0
	C61	Car	57	57	37.2	39.2
	C62	Car	7	7	3.0	26.1
	CHF60	Chief	86	86	47.1	32.9
	CHF61	Chief	13	13	5.3	24.3
	CHF62	Chief	31	31	16.9	32.7
	E61	Engine	179	179	92.7	31.1
	E62	Engine	193	190	119.2	37.6
	T69	Tanker	48	47	25.6	32.7
	U65	Utility	4	4	6.3	94.4
	Stony Point Total		680	676	391.9	34.8
SVRS	C700	Car	1	1	1.3	77.3
	C702	Car	1	1	1.1	64.5
	C708	Car	1	1	0.0	2.5
	RS7	Ambulance	403	399	462.2	69.5
	RS703	Ambulance	4	4	2.1	31.0
	RS705	Ambulance	188	186	212.4	68.5
	RS706	Ambulance	110	109	109.5	60.3
	RS707	Ambulance	210	208	207.9	60.0
	SVRS Total		918	909	996.5	65.8
WARS	C506	Car	114	114	64.9	34.1

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	C507	Car	11	11	53.3	290.8
	C508	Car	774	771	318.3	24.8
	DUTY5	Utility	23	23	9.3	24.1
	GAT5	Gator	14	14	42.9	183.9
	RS501	Ambulance	803	795	680.3	51.3
	RS502	Ambulance	814	806	734.6	54.7
	RS503	Ambulance	231	231	207.3	53.9
	SQ505	Squad	67	67	43.1	38.6
	WR509	Water Rescue	10	10	13.0	78.1
	WARS Total		2,861	2,842	2,166.9	45.7
	Total		25,551	25,319	15,635.2	37.1

¹“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

²“Responses with Time Data” reflects the number of responses in the CAD data file with available “AlarmDateTime” values and “InServiceDateTime” values.

The last analyses in this section focus on performance times related to dispatch, turnout, travel, and response times. “Dispatch Time” was calculated as “AlarmDateTime” – “IncidentDateTime”; “Turnout Time” was calculated as “EnrouteDateTime” – “AlarmDateTime”; “Travel Time” was calculated as “ArrivalDateTime” – “EnrouteDateTime”; and “Response Time” was calculated as “ArrivalDateTime” – “IncidentDateTime.” “Response Time” may also be calculated by summing dispatch, turnout, and travel times, and “Average Response Time” may be derived by summing average dispatch, turnout, and travel times when the sample data used during calculation of the outcomes are identical for all three outcomes.

Average performance times and performance times at the 90th percentile are reported in this section. The 90th percentile is presented as a more conservative and reliable measure of performance, as this measure is more robust, or less influenced by outliers, than measures of central tendency such as the average. Best practice is to measure at the 90th percentile. In other words, 90% of all performance is captured, expecting that 10% of the time the department may experience abnormal conditions that would typically be considered outliers. For example, if the department were to report an *average* response time of six minutes, then in a normally distributed set of data, half of the responses would be longer than six minutes and half of the responses would be shorter than six minutes. Utilizing six minutes as an example again, a *90th percentile value* of six minutes communicates that 9 out of 10 times, the department performance is six minutes or better (faster) and is therefore more predictable and more clearly articulated to policy makers and the community. Note, however, that the sum of the 90th percentile values for dispatch, turnout, and travel times is not equivalent to the 90th percentile response time.

Performance times were first calculated for all unit responses that reported any date and time stamp data for any relevant time field. All responses were included in this first analysis regardless of call type, status as emergency or non-emergency call, type of unit responding, order of response or arrival, or other response characteristic. Average performance times are presented by program in Table 9 and Figure 5; 90th percentile values are presented by program in Table 10. Sample sizes depicted in the tables represent the total number of responses made by ACFR units during 2017 per program noted. Sample sizes corresponding to individual table values may be slightly lower due to missing time data (e.g., time data not entered; unit did not go enroute; unit did not arrive on scene) such that the sum of average dispatch, turnout, and travel times may not equal average response time.

Across all ACFR responses, average dispatch time was 4.5 minutes (90th percentile = 8.9 minutes). When considering only the *first* unit dispatched to each call, average dispatch time was 2.7 minutes (90th percentile = 3.4 minutes; n=12,964; Table 11).

Average and 90th percentile turnout times across ACFR responses were 1.3 minutes and 2.4 minutes, respectively; average and 90th percentile travel times across ACFR responses were 7.5 minutes and 14.5 minutes, respectively; and average and 90th percentile response times across ACFR responses were 12.8 minutes and 22.0 minutes, respectively.

Table 9: Average Dispatch, Turnout, Travel, and Response Times by Program – All Units

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size ¹
Agency Assist	6.8	1.4	8.3	16.1	1,266
EMS	3.7	1.2	7.1	11.6	15,401
Fire	5.1	1.5	8.4	15.0	5,433
Hazmat	6.4	1.3	8.1	15.5	592
Police-Related	8.8	1.3	7.8	15.1	906
Public Service	3.4	1.1	7.3	11.2	693
Rescue	5.1	1.5	9.6	15.6	1,036
Total	4.5	1.3	7.5	12.8	25,327

¹Sample sizes depicted represent the total number of responses made by ACFR units during 2017 per program following all exclusions as noted in the Appendix; sample sizes corresponding to individual table values may be slightly lower due to missing time data (e.g., time data not entered; unit did not go enroute; unit did not arrive on scene) such that the sum of average dispatch, turnout, and travel times may not equal average response time.

Figure 5: Average Dispatch, Turnout, Travel, and Response Times by Program – All Units

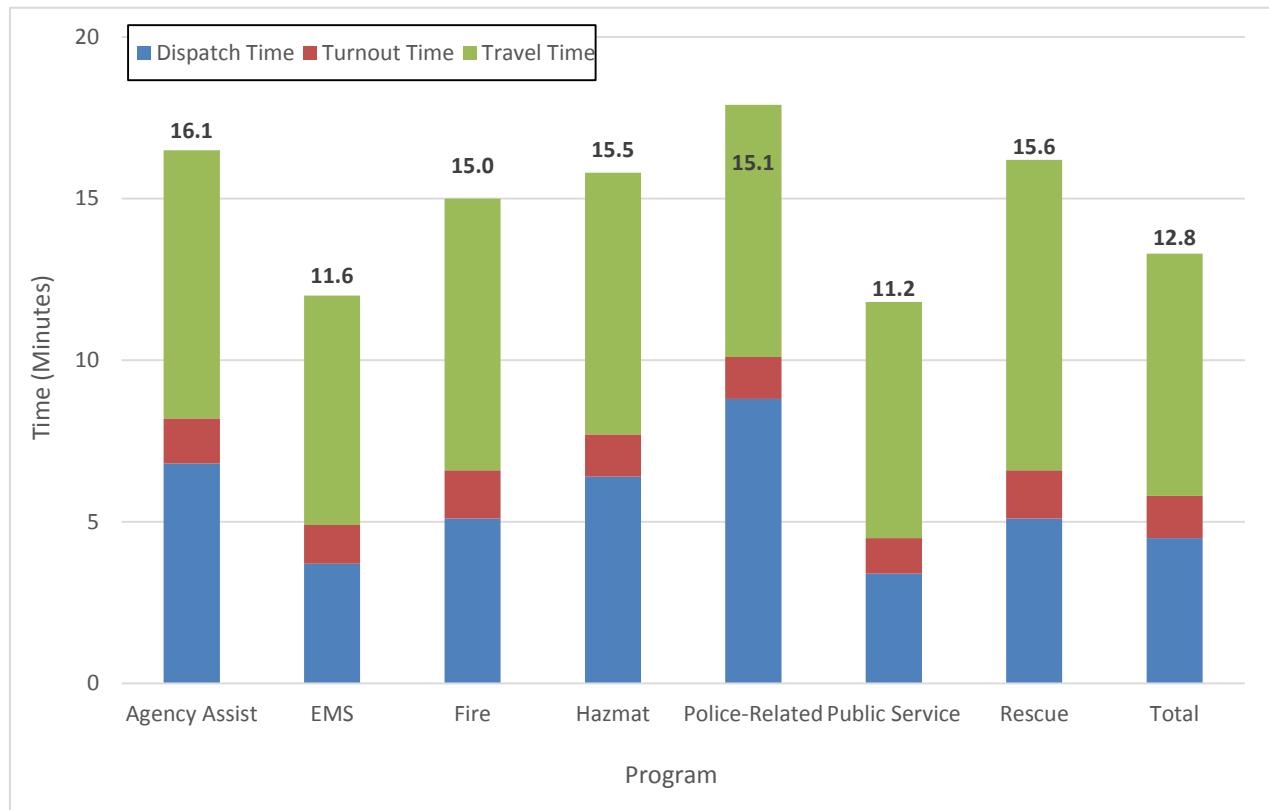


Table 10: 90th Percentile Dispatch, Turnout, Travel, and Response Times by Program and Unit Group – All Units

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size ¹
Agency Assist	14.1	2.5	16.9	27.3	1,266
EMS	6.3	2.2	13.9	20.3	15,401
Fire	11.5	3.3	15.9	25.7	5,433
Hazmat	10.9	3.1	15.2	24.6	592
Police-Related	13.3	2.3	14.0	24.3	906
Public Service	6.4	2.5	12.8	18.1	693
Rescue	10.4	3.0	17.7	26.2	1,036
Total	8.9	2.4	14.5	22.0	25,327

¹Sample sizes depicted represent the total number of responses made by ACFR units during 2017 per program following all exclusions as noted in the Appendix; sample sizes corresponding to individual table values may be slightly lower due to missing time data (e.g., time data not entered; unit did not go enroute; unit did not arrive on scene) such that the sum of average dispatch, turnout, and travel times may not equal average response time.

Table 11: Average and 90th Percentile Dispatch Times by Program and Call Status – First Dispatched Units

Program and Call Status	Average Dispatch Time (Minutes)	90 th Percentile Dispatch Time (Minutes)	Sample Size ¹
Agency Assist	3.9	5.0	513
Emergency	3.9	5.0	513
EMS	2.5	3.0	8,728
Emergency	2.4	3.0	8,693
Non-Emergency	16.6	35.5	35
Fire	2.8	3.9	2,407
Emergency	1.7	2.8	1,744
Non-Emergency	5.7	15.3	663
Hazmat	3.1	4.4	197
Emergency	3.1	4.4	197
Police-Related	6.8	7.1	420
Emergency	6.8	7.1	420
Public Service	2.3	3.3	493
Non-Emergency	2.3	3.3	493
Rescue	2.6	4.9	206
Emergency	2.6	4.9	206
Total	2.7	3.4	12,964
Emergency	2.5	3.2	11,773
Non-Emergency	4.6	8.3	1,191

¹Sample sizes depicted represent the total number of first dispatches made by ACFR units during 2017 per program and call status following all exclusions as noted in the Appendix.

Analyses of performance times next focused on emergency (lights and sirens) responses from the first arriving primary front-line units for all unique incidents. Call status as emergency or non-emergency was assigned per call type by ACFR and was based on “CADCallType” from the CAD data file. Units were identified as primary front-line units by ACFR.

Average performance times are presented by program in Table 12 and in Figure 6; 90th percentile values are presented by program in Table 13. Average performance times by program and community type are presented in Table 14, and 90th percentile values by program and community type are presented in Table 15. Due to the restriction of these analyses to select responses and units, maximum available sample size for these analyses is 10,589. Sample data were not identical across all performance time calculations (i.e., some missing data) such that the sum of average dispatch, turnout, and travel times may not equal average response times in Table 12 or Table 14. Some sample sizes were too small to allow for calculation of 90th percentile values; these cases appear as “-” entries in Table 15.

Across all ACFR responses made by first arriving primary front-line units to emergency calls, average dispatch time was 2.8 minutes (90th percentile = 4.4 minutes); average turnout time was 1.4 minutes (90th percentile = 2.4 minutes); average travel time was 6.8 minutes (90th percentile = 13.2 minutes); and average response time was 10.8 minutes (90th percentile = 18.6 minutes).

Typically, performance varies across call types or categories for a variety of reasons. For example, turnout time may be longer for fire related calls because the crews have to dress in their personal protective ensemble (bunker gear) prior to leaving the station, whereas on an EMS incident, they do not. Similarly, the larger fire apparatus may require longer response times due to its size and lack of maneuverability.

Table 12: Average Dispatch, Turnout, Travel, and Response Times by Program – First Arriving Units

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size ¹
Agency Assist	4.4	1.3	7.1	12.8	459
EMS	2.6	1.3	6.8	10.5	8,055
Fire	2.6	1.6	6.6	10.7	1,390
Hazmat	4.8	1.9	6.8	13.4	162
Police-Related	5.5	1.6	7.2	14.0	338
Rescue	3.1	1.6	8.1	12.8	185
Total	2.8	1.4	6.8	10.8	10,589

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per program following all exclusions as noted in the Appendix; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

Figure 6: Average Dispatch, Turnout, Travel, and Response Times by Program – First Arriving Units



Table 13: 90th Percentile Dispatch, Turnout, Travel, and Response Times by Program – First Arriving Units

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size ¹
Agency Assist	6.8	2.4	14.1	21.3	459
EMS	3.8	2.3	13.3	18.2	8,055
Fire	5.6	3.0	12.2	18.2	1,390
Hazmat	8.4	4.7	12.3	20.3	162
Police-Related	9.2	2.5	12.4	21.4	338
Rescue	7.2	3.2	14.8	21.3	185
Total	4.4	2.4	13.2	18.6	10,589

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per program following all exclusions as noted in the Appendix; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

Table 14: Average Dispatch, Turnout, Travel, and Response Times by Program and Community Type¹ – First Arriving Units

Program and Community Type	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size ²
Agency Assist	4.4	1.3	7.1	12.8	459
Development	4.6	1.3	5.1	11.0	268
Rural	4.2	1.3	10.4	15.8	174
Other	3.3	1.2	6.9	11.4	17
EMS	2.6	1.3	6.8	10.5	8,055
Development	2.5	1.2	5.0	8.7	5,295
Rural	2.6	1.4	10.2	14.0	2,640
Other	3.8	1.4	10.8	15.7	120
Fire	2.6	1.6	6.6	10.7	1,390
Development	2.3	1.4	4.9	8.5	763
Rural	2.7	1.9	8.7	13.3	597
Other	6.0	1.4	9.0	15.7	30
Hazmat	4.8	1.9	6.8	13.4	162
Development	4.1	1.6	5.6	11.2	104
Rural	6.5	2.1	8.9	17.6	52
Other	2.5	4.4	9.4	16.3	6
Police-Related	5.5	1.6	7.2	14.0	338
Development	5.8	1.2	6.3	12.9	175
Rural	5.3	2.1	8.3	15.2	159
Other	3.6	0.4	6.3	9.1	4
Rescue	3.1	1.6	8.1	12.8	185
Development	3.9	1.3	5.5	10.7	50
Rural	2.7	1.7	9.1	13.4	127
Other	5.6	1.0	9.2	15.8	8
Total	2.8	1.4	6.8	10.8	10,589
Development	2.7	1.3	5.0	8.9	6,655
Rural	2.9	1.5	9.8	14.1	3,749
Other	4.2	1.5	10.0	15.2	185

¹“CompPlanArea” values in the CAD data file identified as “Development” areas include CROZ, HOLL, N-1, N-2, N-3, N-4, N-5, N-6, N-7, PINE, RIVA, and SVIL; “CompPlanArea” values in the CAD data file identified as “Rural” areas include RA-1, RA-2, RA-3, RA-4; and “CompPlanArea” values in the CAD data file identified as “Other” were noted to be different localities and include Augusta, Buckingham, Charlottesville, CITY, Fluvanna, Greene, Nelson, and Orange.

²Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per program following all exclusions as noted in the Appendix; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

Table 15: 90th Percentile Dispatch, Turnout, Travel, and Response Times by Program and Community Type¹ – First Arriving Units

Program and Community Type	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size ²
Agency Assist	6.8	2.4	14.1	21.3	459
Development	6.3	2.4	9.1	15.0	268
Rural	7.4	2.3	18.8	25.8	174
Other	8.3	2.2	10.8	23.4	17
EMS	3.8	2.3	13.3	18.2	8,055
Development	3.5	2.2	8.6	12.7	5,295
Rural	4.3	2.4	17.8	22.1	2,640
Other	8.2	2.9	19.4	24.7	120
Fire	5.6	3.0	12.2	18.2	1,390
Development	4.4	2.3	8.6	12.7	763
Rural	6.4	5.1	14.5	20.4	597
Other	13.1	3.5	16.0	24.9	30
Hazmat	8.4	4.7	12.3	20.3	162
Development	8.3	3.0	9.0	15.2	104
Rural	10.3	5.8	17.0	24.4	52
Other	--	--	--	--	6
Police-Related	9.2	2.5	12.4	21.4	338
Development	9.0	2.2	9.2	17.7	175
Rural	12.3	5.0	15.7	24.2	159
Other	--	--	--	--	4
Rescue	7.2	3.2	14.8	21.3	185
Development	8.4	2.4	10.9	21.3	50
Rural	5.7	3.7	15.3	20.7	127
Other	--	--	--	--	8
Total	4.4	2.4	13.2	18.6	10,589
Development	3.9	2.2	8.7	13.0	6,655
Rural	4.9	2.7	17.1	22.0	3,749
Other	9.1	3.1	18.4	24.8	185

¹“CompPlanArea” values in the CAD data file identified as “Development” areas include CROZ, HOLL, N-1, N-2, N-3, N-4, N-5, N-6, N-7, PINE, RIVA, and SVIL; “CompPlanArea” values in the CAD data file identified as “Rural” areas include RA-1, RA-2, RA-3, RA-4; and “CompPlanArea” values in the CAD data file identified as “Other” were noted to be different localities and include Augusta, Buckingham, Charlottesville, CITY, Fluvanna, Greene, Nelson, and Orange.

²Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per program following all exclusions as noted in the Appendix; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

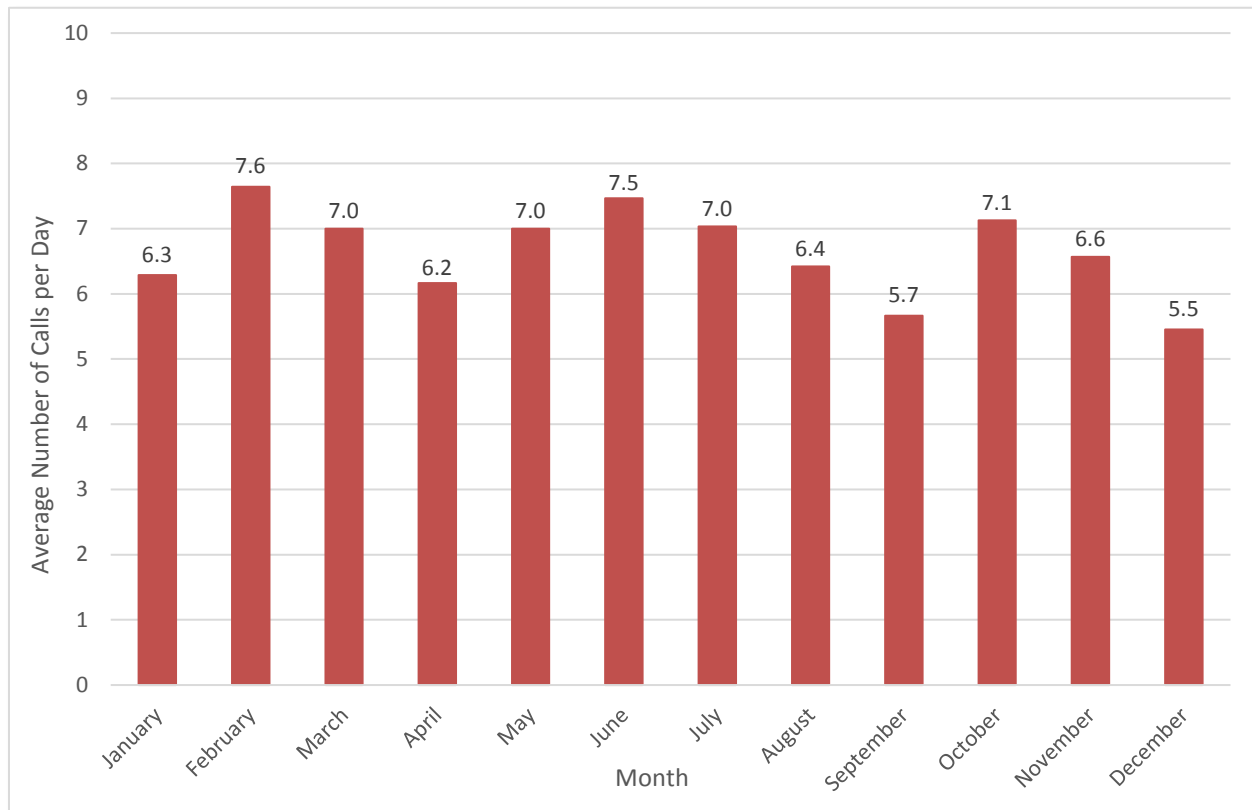
Fire Services

Temporal analyses were conducted to evaluate patterns in community demands for fire related services. These analyses examined the frequency of requests for service in 2017 by month, day of week, and hour of day. Results found that there was variability by month (Table 16; Figure 7). The three months with the most fire calls in descending order were: February (7.6 per day), June (7.5 per day), and October (7.1 per day). The three months with the fewest fire calls in ascending order were: December (5.5 per day), September (5.7 per day), and April (6.2 per day).

Table 16: Total Fire Related Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	195	6.3	8.0
February	214	7.6	8.8
March	217	7.0	8.9
April	185	6.2	7.6
May	217	7.0	8.9
June	224	7.5	9.2
July	218	7.0	9.0
August	199	6.4	8.2
September	170	5.7	7.0
October	221	7.1	9.1
November	197	6.6	8.1
December	169	5.5	7.0
Total	2,426	6.6	100.0

Figure 7: Average Fire Related Calls per Day by Month

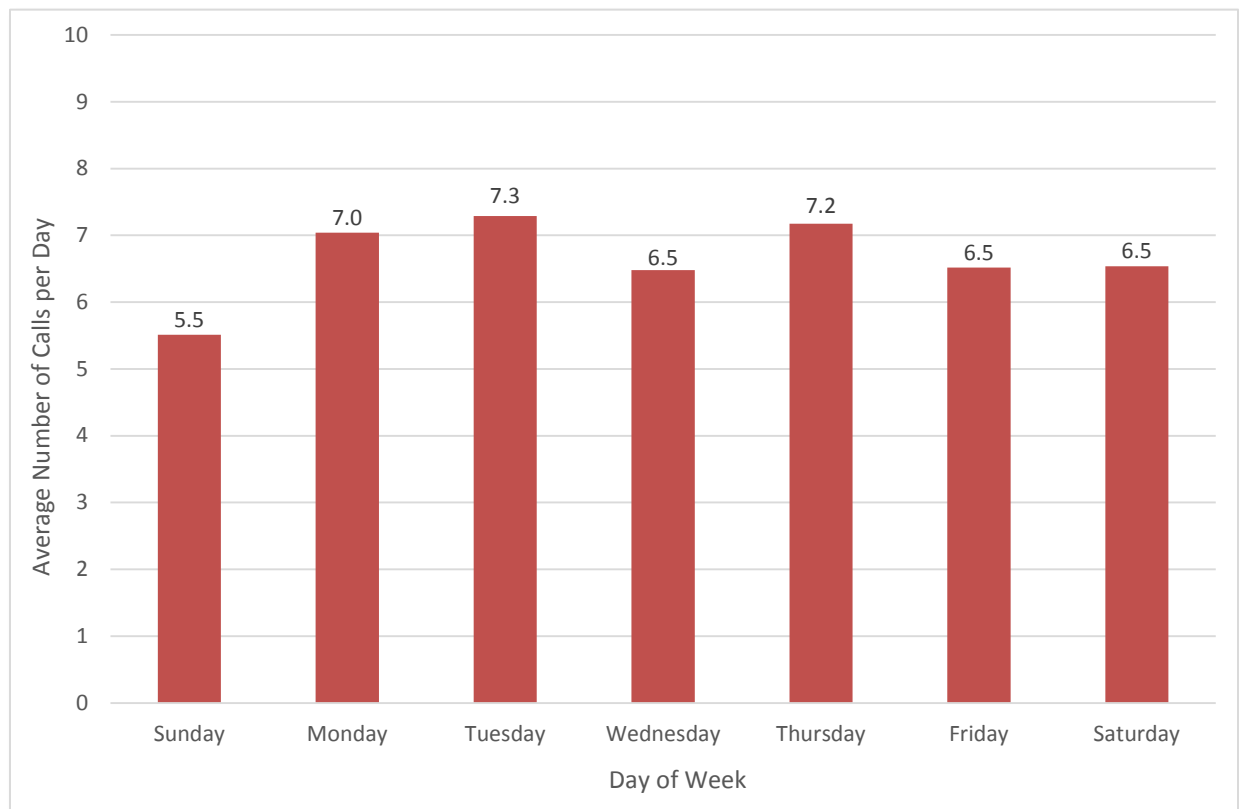


Similar analyses were conducted for fire related calls by day of week (Table 17; Figure 8). The data revealed that there is some variability in the demand for services by day of week. Tuesday had the highest frequency of requests for fire related services, averaging 7.3 calls per day and accounting for 15.6% of all fire related calls. Sunday had the lowest frequency of requests for fire related services, averaging 5.5 calls per day and accounting for 12.0% of all fire related calls.

Table 17: Total Fire Related Calls and Average Calls per Day by Day of Week

Day of Week	Number of Calls	Average Calls per Day	Call Percentage
Sunday	292	5.5	12.0
Monday	366	7.0	15.1
Tuesday	379	7.3	15.6
Wednesday	337	6.5	13.9
Thursday	373	7.2	15.4
Friday	339	6.5	14.0
Saturday	340	6.5	14.0
Total	2,426	6.6	100.0

Figure 8: Average Fire Related Calls per Day by Day of Week

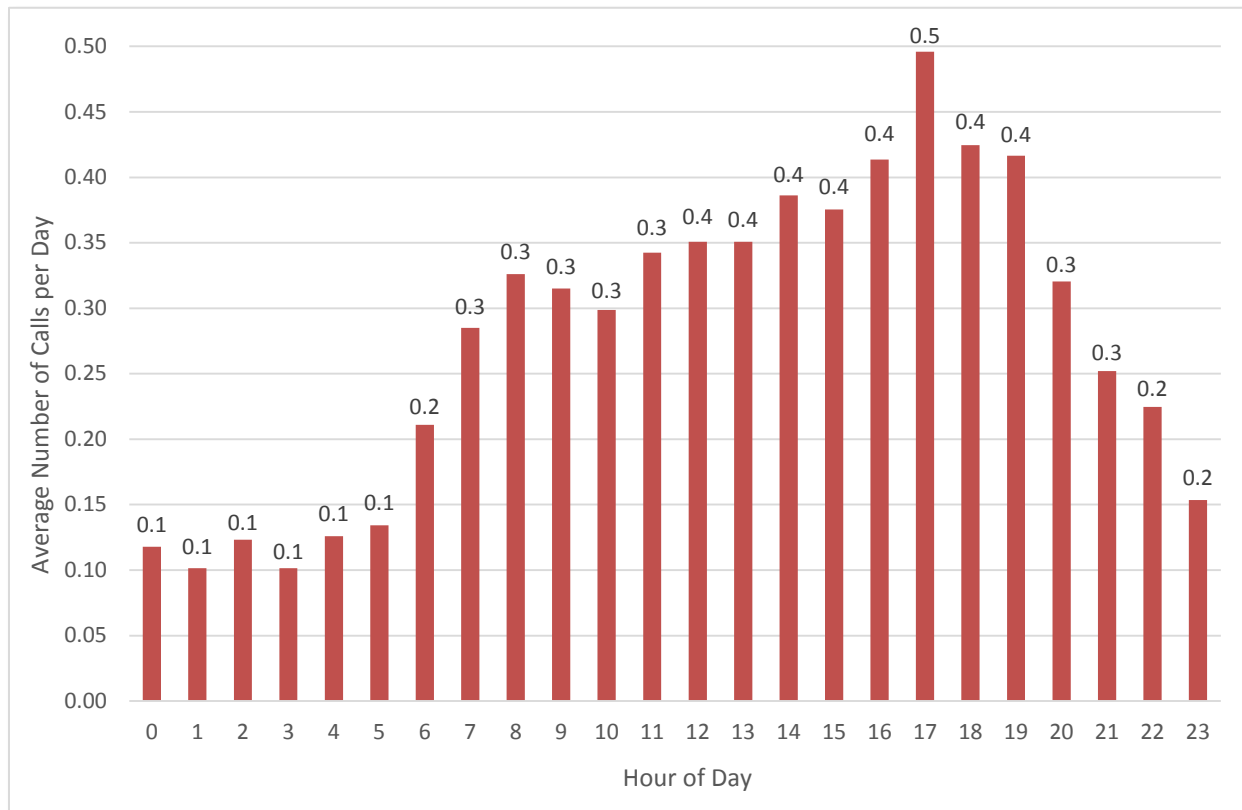


Fire related calls were also evaluated by hour of the day (Table 18; Figure 9). Some variability exists in the time of day that requests for fire related services were received. The highest demand for fire related services occurred between 1200 and 1900, where average number of calls per day during those hours ranged from 0.4 to 0.5 calls. Peak demand occurred at 1700. The hours from 0000 to 0500 had the lowest demands, where average number of calls per day for each of those hours was approximately 0.1.

Table 18: Total Fire Related Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	43	0.1	1.8
1	37	0.1	1.5
2	45	0.1	1.9
3	37	0.1	1.5
4	46	0.1	1.9
5	49	0.1	2.0
6	77	0.2	3.2
7	104	0.3	4.3
8	119	0.3	4.9
9	115	0.3	4.7
10	109	0.3	4.5
11	125	0.3	5.2
12	128	0.4	5.3
13	128	0.4	5.3
14	141	0.4	5.8
15	137	0.4	5.6
16	151	0.4	6.2
17	181	0.5	7.5
18	155	0.4	6.4
19	152	0.4	6.3
20	117	0.3	4.8
21	92	0.3	3.8
22	82	0.2	3.4
23	56	0.2	2.3
Total	2,426	6.6	100.0

Figure 9: Average Fire Related Calls per Day by Hour of Day



Temporal distributions related to hour of day were also created for station demand zones (or fire first due stations) to better understand each station demand zone's unique demand for services (Table 19 and Table 20; Figure 10 through Figure 18). For ease of presentation, numbers of calls are presented in the tables, and average numbers of calls per day are presented in the figures. Due to small sample sizes, only those station demand zones with total fire related calls > 100 for 2017 are presented in the figures.

Table 19: Total Fire Related Calls by Hour of Day and Station Demand Zone - I

Hour of Day	Number of Calls by Station Demand Zone								
	City	Crozet	Earlsville	East Rivanna	Fluvanna	Greene	Hollymead	Ivy	Monticello
0	3	10	1	5	0	0	2	6	5
1	1	1	3	5	0	0	3	2	9
2	4	6	4	9	0	0	5	0	7
3	2	2	3	6	0	0	2	6	2
4	2	10	2	6	0	0	2	5	5
5	0	6	2	11	0	0	3	3	1
6	0	7	5	8	0	0	8	11	5
7	1	7	2	15	0	1	7	12	17
8	3	12	4	8	0	0	10	19	20
9	1	13	8	8	0	0	9	12	17
10	4	14	7	14	0	0	6	12	15
11	3	10	8	8	0	0	7	17	15
12	2	6	6	18	0	0	10	19	10
13	5	12	4	15	0	0	11	14	18
14	5	19	10	12	1	0	8	11	14
15	1	11	9	18	0	0	7	13	13
16	6	24	7	20	0	0	6	11	22
17	11	24	7	23	0	1	10	18	24
18	4	19	13	26	1	1	7	15	21
19	6	23	7	24	0	0	6	16	13
20	2	17	12	12	0	0	6	7	15
21	3	10	6	9	0	0	9	6	8
22	2	12	4	9	0	0	3	6	11
23	5	3	3	9	0	0	4	6	7
Total	76	278	137	298	2	3	151	247	294

Table 20: Total Fire Related Calls by Hour of Day and Station Demand Zone - II

Hour of Day	Number of Calls by Station Demand Zone							Total
	Nelson	North Garden	Orange	Scottsville	Seminole	Stony Point	Not Identified	
0	0	3	0	3	5	0	0	43
1	0	2	0	1	9	1	0	37
2	0	4	0	4	1	0	1	45
3	0	3	0	1	8	2	0	37
4	0	2	0	2	7	3	0	46
5	1	4	0	6	11	1	0	49
6	0	6	0	5	20	2	0	77
7	0	5	1	9	23	4	0	104
8	0	4	0	9	26	4	0	119
9	0	9	0	7	25	6	0	115
10	1	10	0	5	20	1	0	109
11	1	8	0	6	39	3	0	125
12	0	9	0	10	33	4	1	128
13	1	11	0	7	23	6	1	128
14	1	13	0	9	36	2	0	141
15	0	9	0	9	41	3	3	137
16	0	4	0	13	31	5	2	151
17	0	11	0	13	32	4	3	181
18	0	10	0	13	20	4	1	155
19	0	9	0	8	31	8	1	152
20	0	8	0	7	26	5	0	117
21	0	6	0	12	22	1	0	92
22	0	6	0	9	17	3	0	82
23	0	2	0	5	11	1	0	56
Total	5	158	1	173	517	73	13	2,426

Figure 10: Average Calls per Day by Hour of Day - Crozet

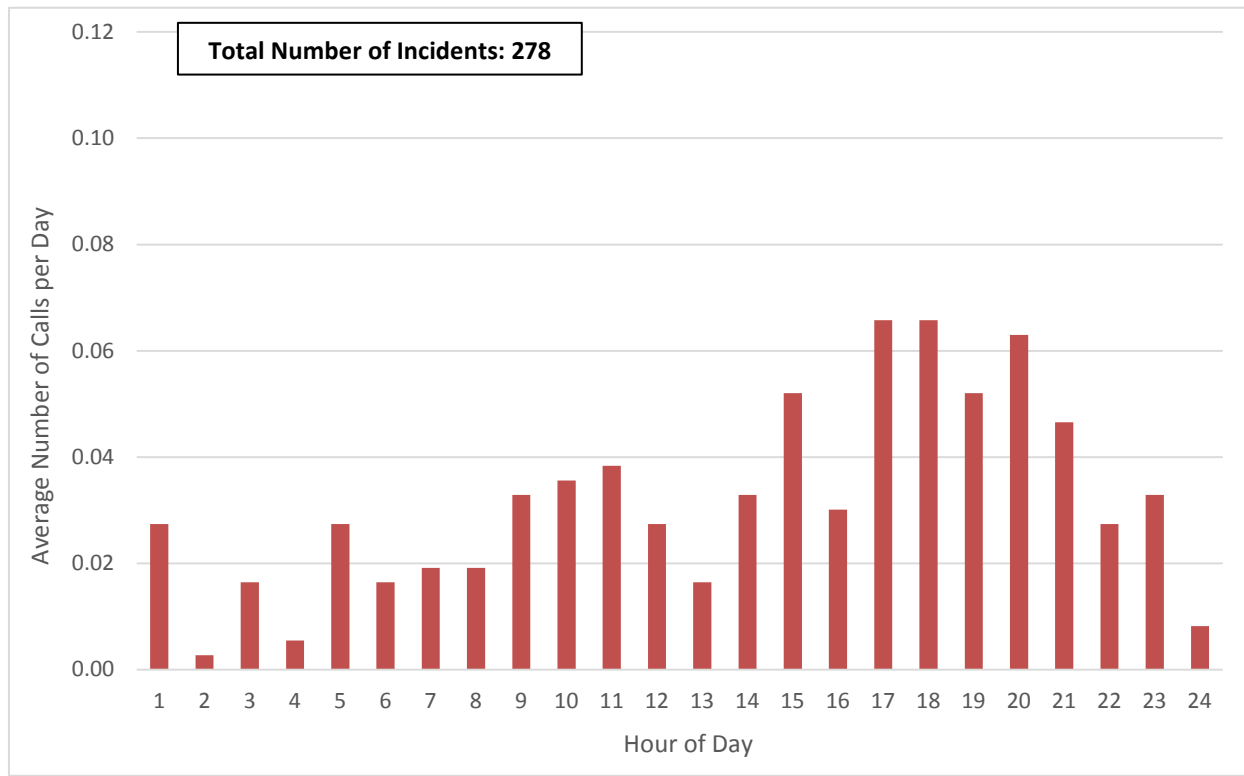


Figure 11: Average Calls per Day by Hour of Day - Earlysville

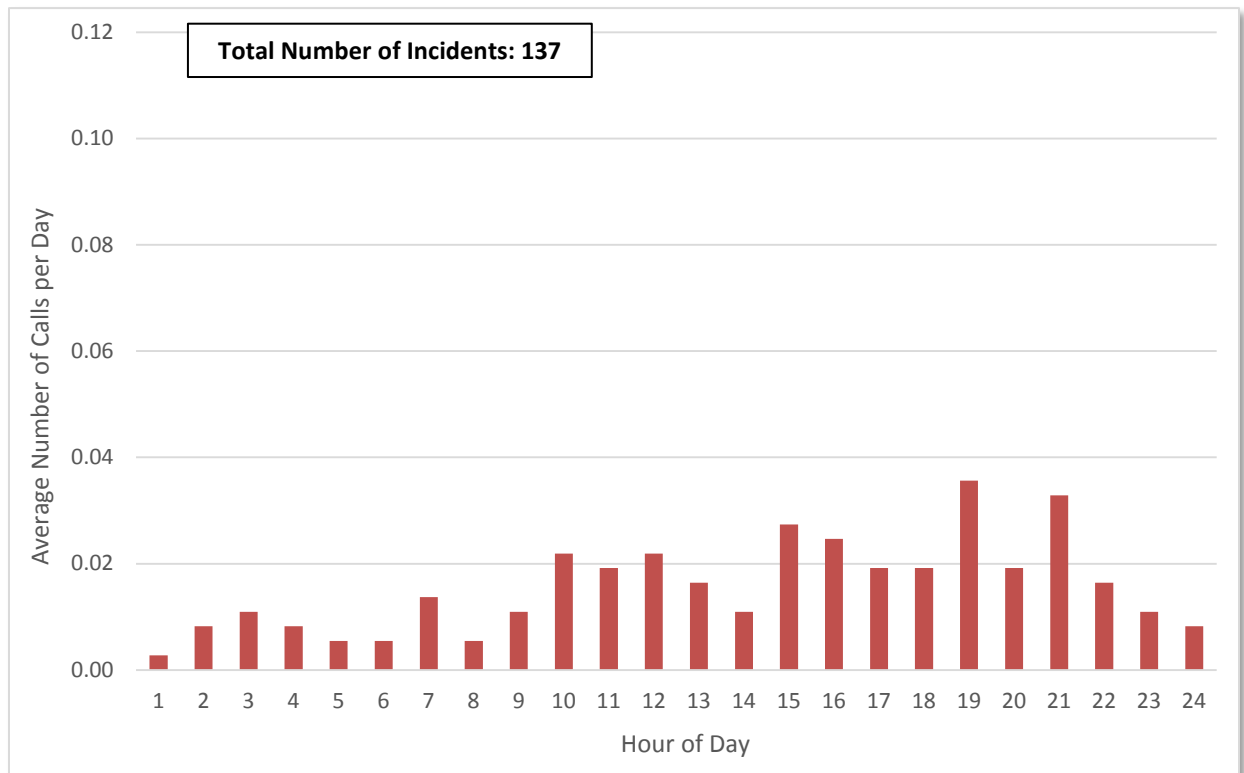


Figure 12: Average Calls per Day by Hour of Day - East Rivanna

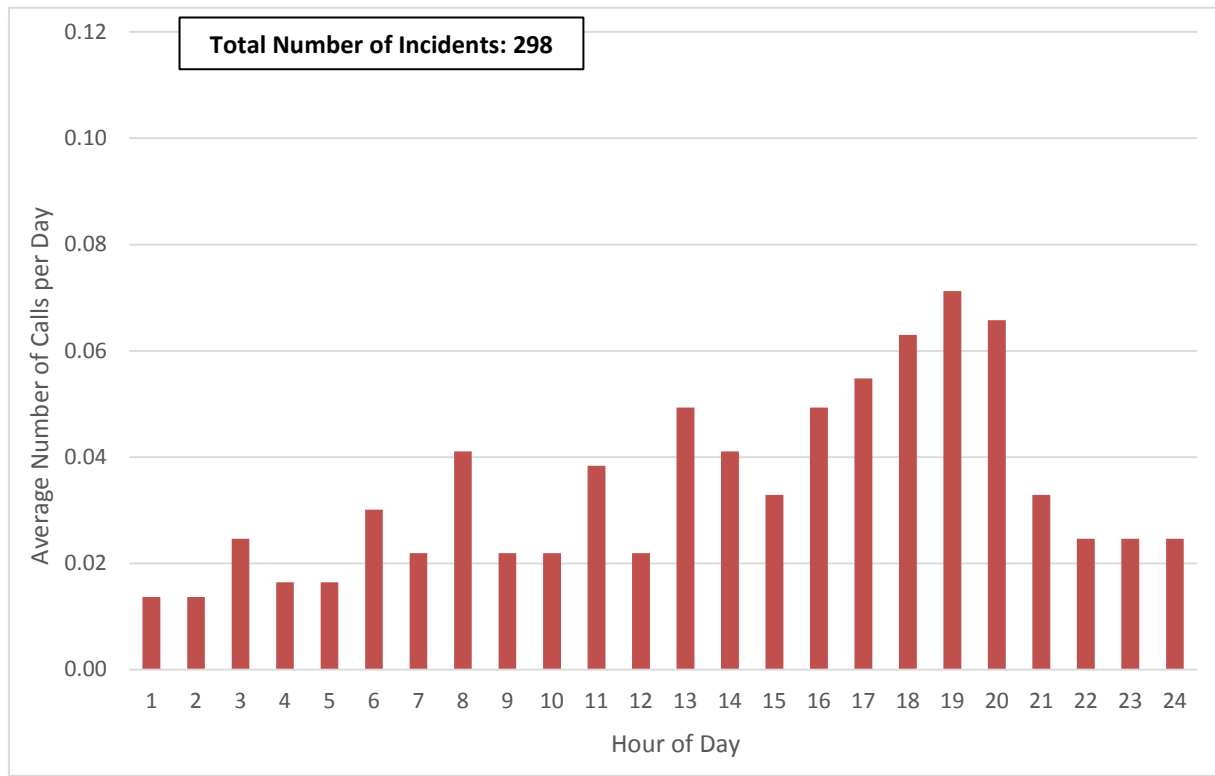


Figure 13: Average Calls per Day by Hour of Day - Hollymead

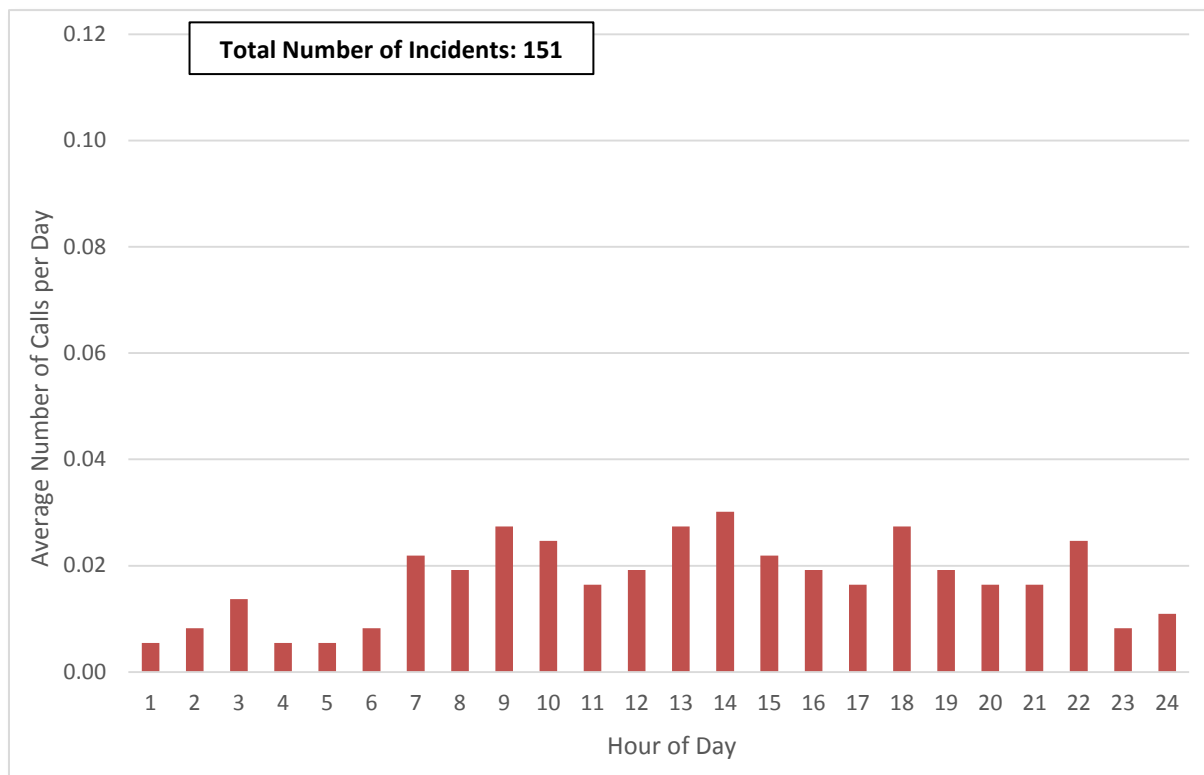


Figure 14: Average Calls per Day by Hour of Day - Ivy

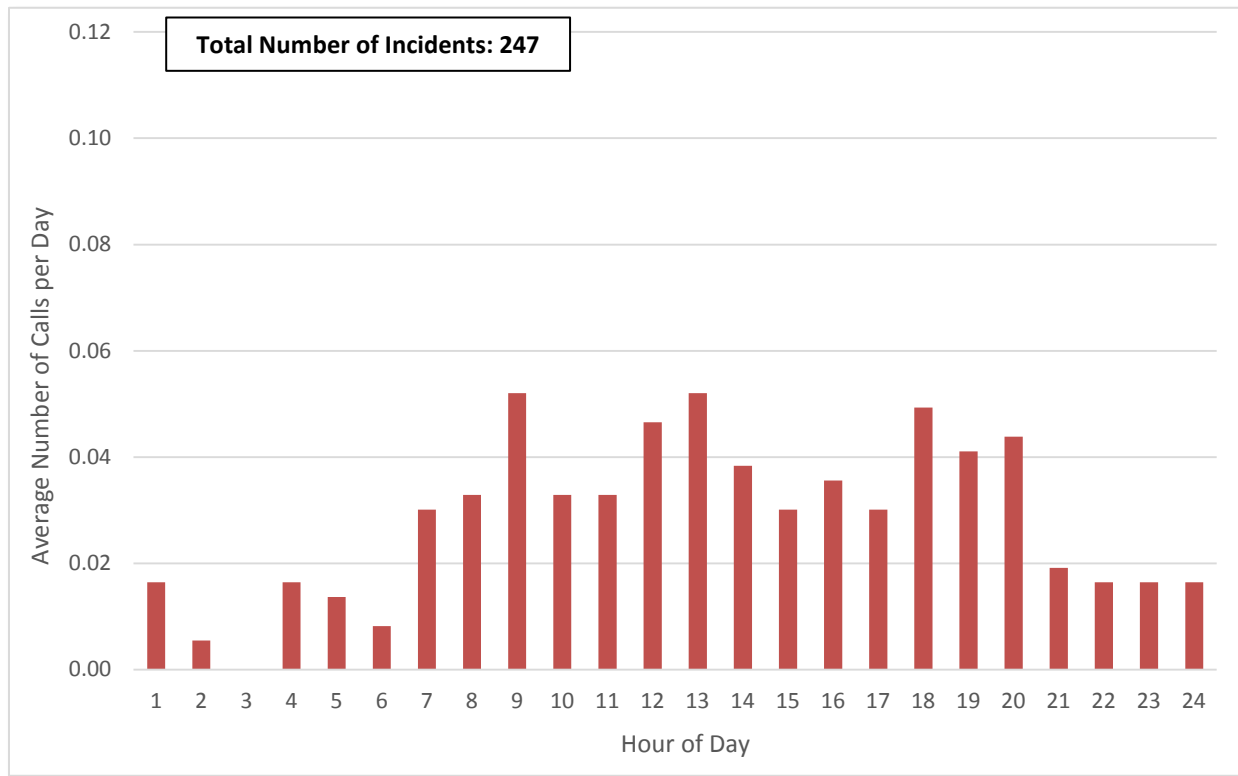


Figure 15: Average Calls per Day by Hour of Day - Monticello

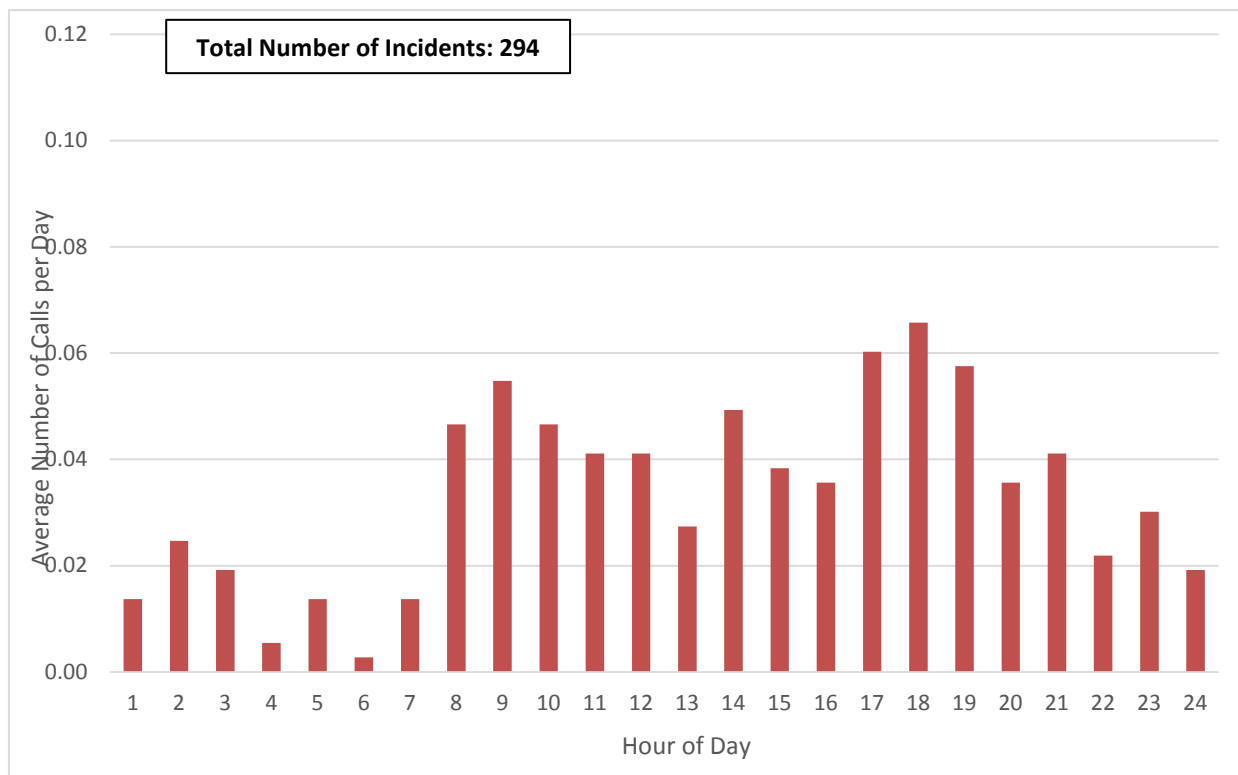


Figure 16: Average Calls per Day by Hour of Day - North Garden

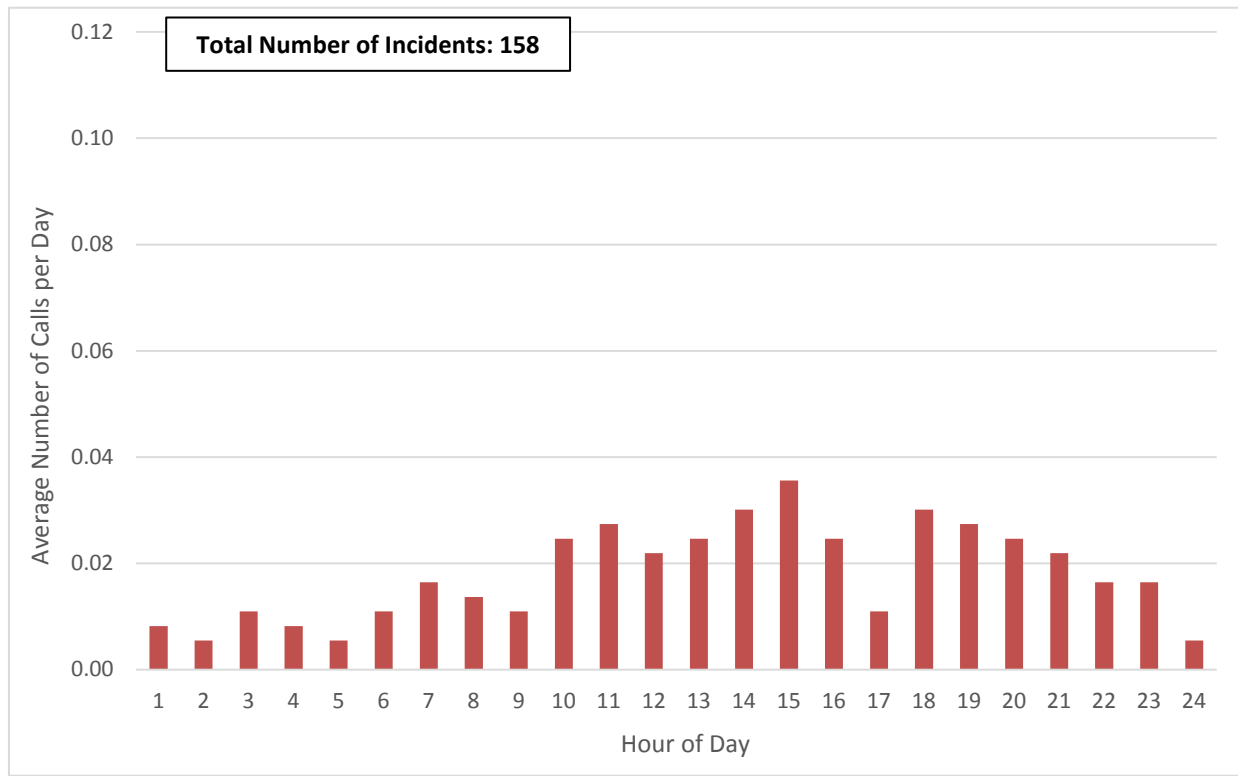


Figure 17: Average Calls per Day by Hour of Day - Scottsville

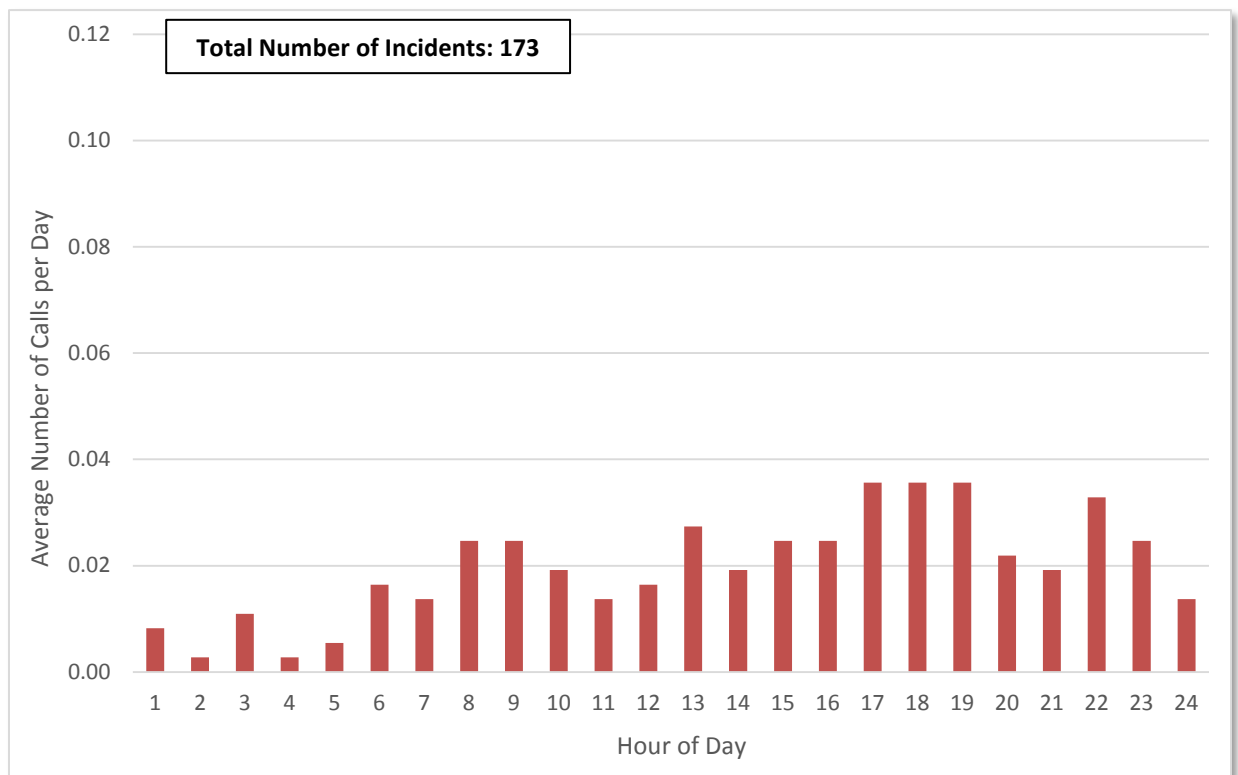
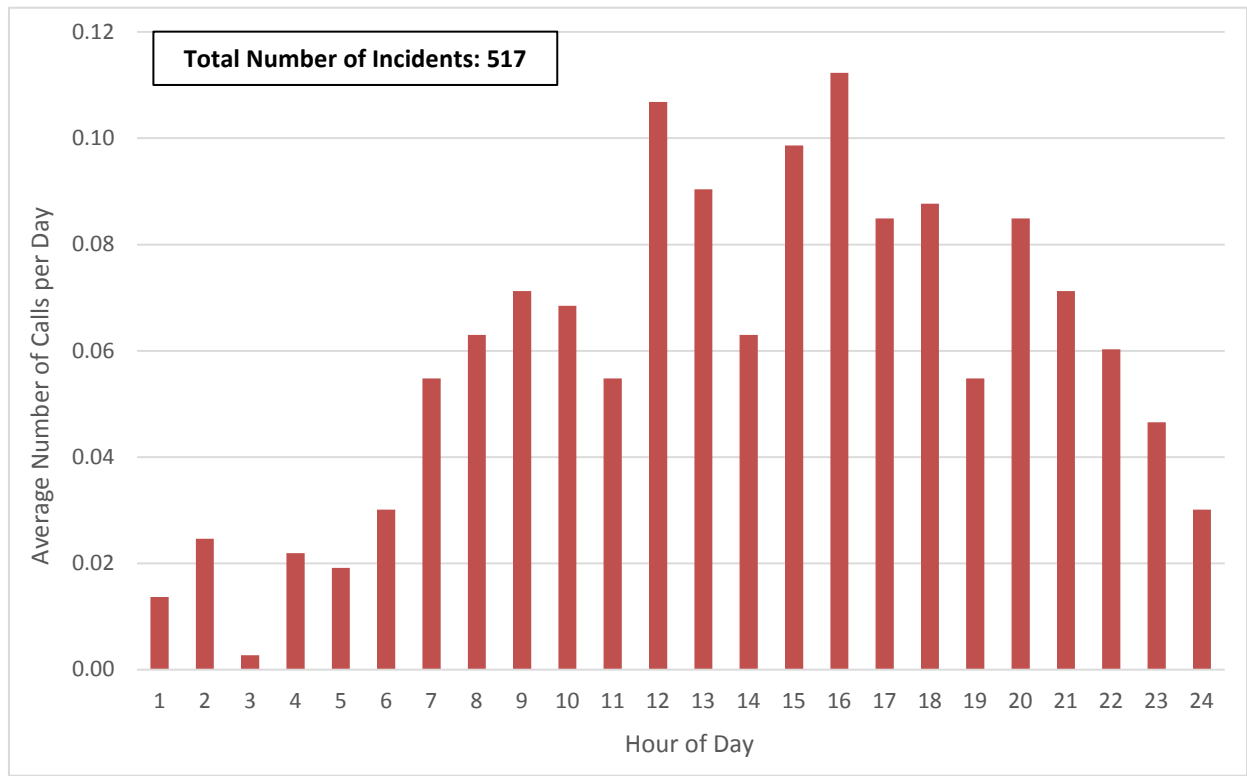
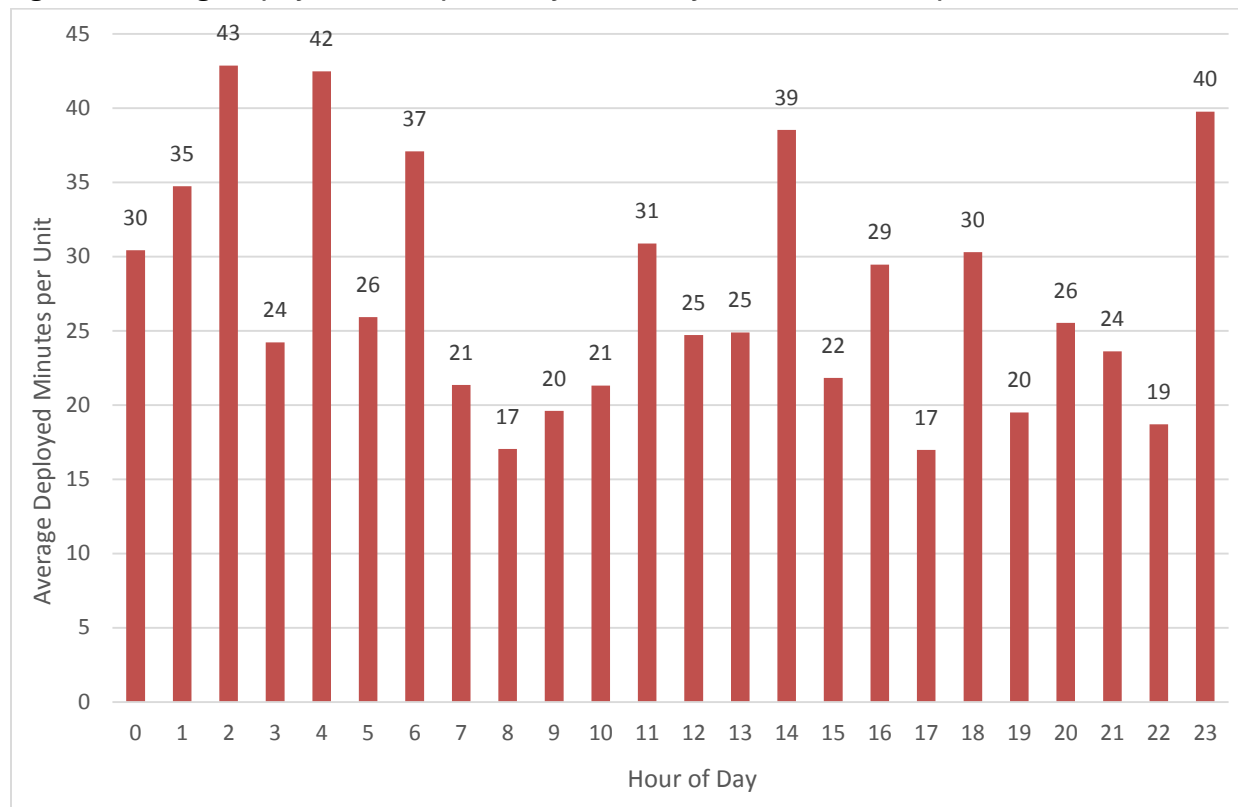


Figure 18: Average Calls per Day by Hour of Day - Seminole



In addition, the average time on task was evaluated to assess the demand for resources through the lens of time commitment per hour of day (Figure 19). Understanding that many fire related incidents require multi-unit responses, this analysis incorporates unit-level activity. Overall, ACFR was busy for an average of 26.3 minutes per unit-level response to fire related calls.

Figure 19: Average Deployed Minutes per Unit by Hour of Day for Fire Related Responses



Fire related incidents are an aggregated category of the various final incident types available in the CAD data file. Table 21 provides details of these fire related incidents by nature of the call. “Fire Alarm” was the most frequent community demand (890/2426 or 36.7% of calls), followed by “Fire Motor Vehicle Crash No Injuries Fluids Down” (315/2426 or 13.0% of calls).

Table 21: Total Fire Related Calls by Nature of Call

Nature of Call	Number of Calls	Percentage of Total Fire Service Demands
Fire Alarm	890	36.7
Fire Motor Vehicle Crash No Injuries Fluids Down	315	13.0
Tree Down	294	12.1
Brush Fire	229	9.4
Outdoor Smoke investigation - Non Brush Fire	106	4.4
Vehicle Fire	106	4.4
Smoke in Structure Commercial	50	2.1
Mutual Aid Request Fire	40	1.6
Structure Fire - Residential	40	1.6
Tree on Power Line	38	1.6
Transformer Fire	36	1.5
Structure Fire - Commercial	33	1.4
Smell of Smoke/Electrical Commercial	30	1.2
Water Hazard in Structure	30	1.2
Smell of Smoke/Electrical Residential	28	1.2
Smoke in Structure Residential	27	1.1
Chimney Fire - Residential	20	0.8
Lines Down	19	0.8
Unusual Odor	18	0.7
Appliance Fire Contained Residential	15	0.6
Elevator Emerg w/out Patient	11	0.5
Appliance Fire Contained Comm	10	0.4
Dumpster Fire	9	0.4
Trash Fire	9	0.4
Fire Threatening Residence	7	0.3
Bomb Threat	5	0.2
Fire Threatening Comm Building	4	0.2
Sparks from Outlet Commercial	3	0.1
Air Carrier Major Difficulty	1	0.0
Aircraft Crash	1	0.0
Single Engine Major Difficulty	1	0.0
Structure Fire - Commercial w/ Entrapment	1	0.0
Total	2,426	100.0

ACFR made a total of 5,467 responses to fire related calls (Table 3; Table 22). Total busy time was 2,379.8 hours, and the average busy minutes per response was 26.3 minutes. E151 (439 responses; 167.9 busy hours) and E111 (435 responses; 160.3 busy hours) were the most utilized engine units (Table 22).

Table 22: Workload by Unit for Fire Related Calls

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
ACFR	BC10	Battalion Chief	7	7	7.6	65.4
	BC11	Battalion Chief	82	82	39.8	29.1
	BC12	Battalion Chief	58	58	24.5	25.3
	BC13	Battalion Chief	71	70	27.6	23.7
	BC14	Battalion Chief	62	61	26.5	26.0
	BC15	Battalion Chief	21	21	10.0	28.6
	CHF10	Chief	5	5	7.9	94.6
	CHF11	Chief	1	1	2.0	117.3
	CHF12	Chief	8	8	3.7	27.8
	CHF13	Chief	13	13	8.7	40.1
	E112	Engine	1	1	0.2	9.2
	FM10	Fire Marshal	39	39	14.6	22.4
	FM11	Fire Marshal	15	15	9.3	37.1
	FM12	Fire Marshal	44	44	50.0	68.2
	FM13	Fire Marshal	51	51	45.0	52.9
	FM14	Fire Marshal	47	47	48.3	61.7
	OMD6	Medical Director	1	1	0.1	8.9
	RS18	Ambulance	3	3	1.1	21.2
	RS19	Ambulance	1	1	0.1	7.1
	TN10	Training	3	3	0.6	11.3
	TN13	Training	1	1	0.0	2.1
	ACFR Total		534	532	327.4	36.9
Berkmar	RS8	Ambulance	24	23	12.9	33.6
	Berkmar Total		24	23	12.9	33.6
Crozet	B53	Brush	51	51	15.3	17.9
	B55	Brush	87	86	40.0	27.9
	C50	Car	17	17	6.0	21.3
	CHF50	Chief	28	28	8.5	18.2
	CHF51	Chief	21	21	6.9	19.9
	CHF52	Chief	7	7	4.2	36.3
	CHF53	Chief	15	15	5.7	22.8
	E52	Engine	135	135	36.7	16.3
	E56	Engine	35	35	11.9	20.4
	E58	Engine	179	179	44.0	14.7

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	T59	Tanker	84	83	35.1	25.4
	TO54	Tower	11	11	2.6	14.4
	U59	Utility	2	2	3.7	110.1
	Crozet Total		672	670	220.6	19.8
Earlsville	B43	Brush	24	23	15.7	41.1
	B46	Brush	50	50	31.8	38.2
	C40	Car	5	3	2.2	44.7
	C42	Car	9	9	2.2	14.4
	CHF40	Chief	1	1	0.0	2.2
	CHF41	Chief	9	9	3.1	20.5
	CHF42	Chief	5	5	2.1	24.7
	E41	Engine	85	84	33.3	23.8
	E45	Engine	30	29	11.9	24.7
	HM47	Hazmat	4	4	8.2	122.6
	RS4	Ambulance	4	4	1.7	25.5
	T49	Tanker	43	43	20.7	28.9
	Earlsville Total		269	264	132.9	30.2
East Rivanna	B25	Brush	65	65	43.7	40.3
	C20	Car	22	22	8.4	22.9
	C21	Car	3	3	0.4	7.4
	C22	Car	8	8	3.3	24.5
	CHF20	Chief	6	6	3.9	38.8
	CHF21	Chief	35	35	22.5	38.6
	E21	Engine	292	289	121.0	25.1
	E24	Engine	22	21	7.7	22.1
	T26	Tanker	46	46	21.3	27.8
	T28	Tanker	18	18	12.5	41.6
	TO29	Tower	29	29	11.1	23.0
	East Rivanna Total		546	542	255.9	28.3
Hollymead	E121	Engine	213	213	88.1	24.8
	RS12	Ambulance	12	12	9.4	47.2
	T121	Tanker	38	38	24.6	38.8
	TO121	Tower	69	69	23.5	20.4
	Hollymead Total		332	332	145.6	26.3
Ivy	C151	Car	1	1	1.0	61.6
	CHF150	Chief	34	34	27.7	48.9
	E151	Engine	439	435	167.9	23.2
	RS15	Ambulance	17	17	11.1	39.3
	Ivy Total		491	487	207.7	25.6
Monticello	C111	Car	1	1	1.6	94.2
	E111	Engine	435	430	160.3	22.4

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	RS11	Ambulance	20	20	11.6	34.9
	SQ11	Squad	4	4	2.3	34.2
	T111	Tanker	47	47	27.7	35.3
	Monticello Total		507	502	203.5	24.3
North Garden	B31	Brush	77	77	45.8	35.7
	B36	Brush	39	39	16.5	25.4
	C30	Car	11	11	1.9	10.6
	C31	Car	21	21	11.0	31.5
	CHF30	Chief	11	11	6.1	33.4
	CHF31	Chief	21	21	12.1	34.7
	CHF32	Chief	2	2	0.9	28.5
	CHF33	Chief	18	18	7.8	25.9
	E32	Engine	100	100	38.8	23.3
	E34	Engine	42	42	9.2	13.2
	T37	Tanker	61	60	23.3	23.3
	T39	Tanker	20	20	13.6	40.7
	U35	Utility	13	13	11.4	52.7
	U38	Utility	2	2	0.3	9.6
	North Garden Total		438	437	198.8	27.3
Pantops	RS16	Ambulance	7	7	2.5	21.7
	Pantops Total		7	7	2.5	21.7
Scottsville	B75	Brush	103	101	43.4	25.8
	C70	Car	32	32	24.3	45.7
	C71	Car	3	3	3.4	68.3
	C72	Car	2	2	2.2	64.5
	CHF70	Chief	12	12	5.0	25.1
	CHF72	Chief	12	12	5.8	29.0
	E72	Engine	68	68	18.9	16.6
	E73	Engine	70	69	19.0	16.5
	T77	Tanker	47	46	27.7	36.1
	T79	Tanker	20	20	13.0	38.9
	U76	Utility	9	9	3.6	23.9
	Scottsville Total		378	374	166.2	26.7
Seminole	C80	Car	4	4	1.0	14.8
	C82	Car	3	3	2.3	45.9
	C89	Car	4	4	1.3	19.3
	CHF80	Chief	65	65	34.0	31.3
	CHF81	Chief	16	16	8.9	33.2
	CHF82	Chief	41	41	15.2	22.2
	CHF83	Chief	40	40	14.5	21.8
	CHF84	Chief	24	24	8.4	20.9

Station	Unit	Unit Type	Number of Responses¹	Responses with Time Data²	Total Busy Hours	Average Busy Minutes per Response
	CHF85	Chief	19	19	12.5	39.4
	E81	Engine	263	260	80.2	18.5
	E82	Engine	381	377	114.9	18.3
	E85	Engine	13	13	3.0	13.8
	TO88	Tower	120	120	51.4	25.7
	U86	Utility	9	9	3.6	23.7
	Seminole Total		1,002	995	351.0	21.2
Stony Point	B63	Brush	1	1	3.1	188.1
	B64	Brush	37	37	20.2	32.8
	C60	Car	4	4	4.2	62.7
	C61	Car	16	16	7.2	27.2
	C62	Car	1	1	0.1	7.3
	CHF60	Chief	27	27	16.6	36.8
	CHF61	Chief	3	3	1.5	30.6
	CHF62	Chief	12	12	9.1	45.6
	E61	Engine	61	61	30.9	30.4
	E62	Engine	36	36	24.0	40.0
	T69	Tanker	37	36	18.3	30.5
	Stony Point Total		235	234	135.3	34.7
SVRS	C702	Car	1	1	1.1	64.5
	RS7	Ambulance	9	9	7.8	52.3
	RS703	Ambulance	1	1	0.0	1.0
	RS705	Ambulance	2	2	0.2	5.3
	RS706	Ambulance	3	3	2.6	51.9
	RS707	Ambulance	5	5	5.0	59.4
	SVRS Total		21	21	16.7	47.6
WARS	C508	Car	3	3	0.1	2.4
	RS501	Ambulance	3	3	1.2	23.3
	RS502	Ambulance	4	4	1.4	20.3
	RS503	Ambulance	1	1	0.0	0.2
	WARS Total		11	11	2.6	14.4
Total			5,467	5,431	2,379.8	26.3

¹“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

²“Responses with Time Data” reflects the number of responses in the CAD data file with available “AlarmDateTime” values and “InServiceDateTime” values.

We also analyzed number of responding ACFR units by fire related call type (Table 23). Overall, 50.7% of fire related calls were responded to by one unit, and 24.8% were responded to by two units. However, for structure fire calls, 53.8% of calls (70/130) were responded to by seven or more units (Table 23; Figure 20). ACFR was busy on structure fire calls for 657.1 hours during 2017 (Table 24), making 1,038 responses to 130 structure fire calls and averaging 8.0 responses per call. The maximum number of units responding to a structure fire call was 20.

For structure fire call types with a reduced response, ACFR made 678 responses to 138 calls, averaging 4.9 responses per call. Seven or more ACFR units responded to 18.8% of these reduced response structure fire calls (Figure 21).

Table 23: Number of Responding Units by Fire Related Call Type

Call Category	Number of Responding Units ¹							Total
	1	2	3	4	5	6	7 or more	
Aircraft Emergency	0	0	0	0	0	0	3	3
Alarm	638	188	46	13	0	1	0	886
Elevator Emergency	6	5	0	0	0	0	0	11
Fire Other	244	125	25	4	2	1	0	401
Mutual Aid	17	12	6	2	1	0	0	38
MVC - Fluids Down	152	113	39	8	2	0	0	314
Outside Fire	123	111	72	48	11	6	18	389
Structure Fire	10	6	8	16	10	10	70	130
Structure Fire - Reduced Response	4	9	22	30	24	23	26	138
Vehicle Fire	31	30	21	14	7	2	1	106
Total	1,225	599	239	135	57	43	118	2,416
Percentage	50.7	24.8	9.9	5.6	2.4	1.8	4.9	100.0

¹Responses include the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix.

Figure 20: Percentage of Structure Fire Calls by Number of Responding Units

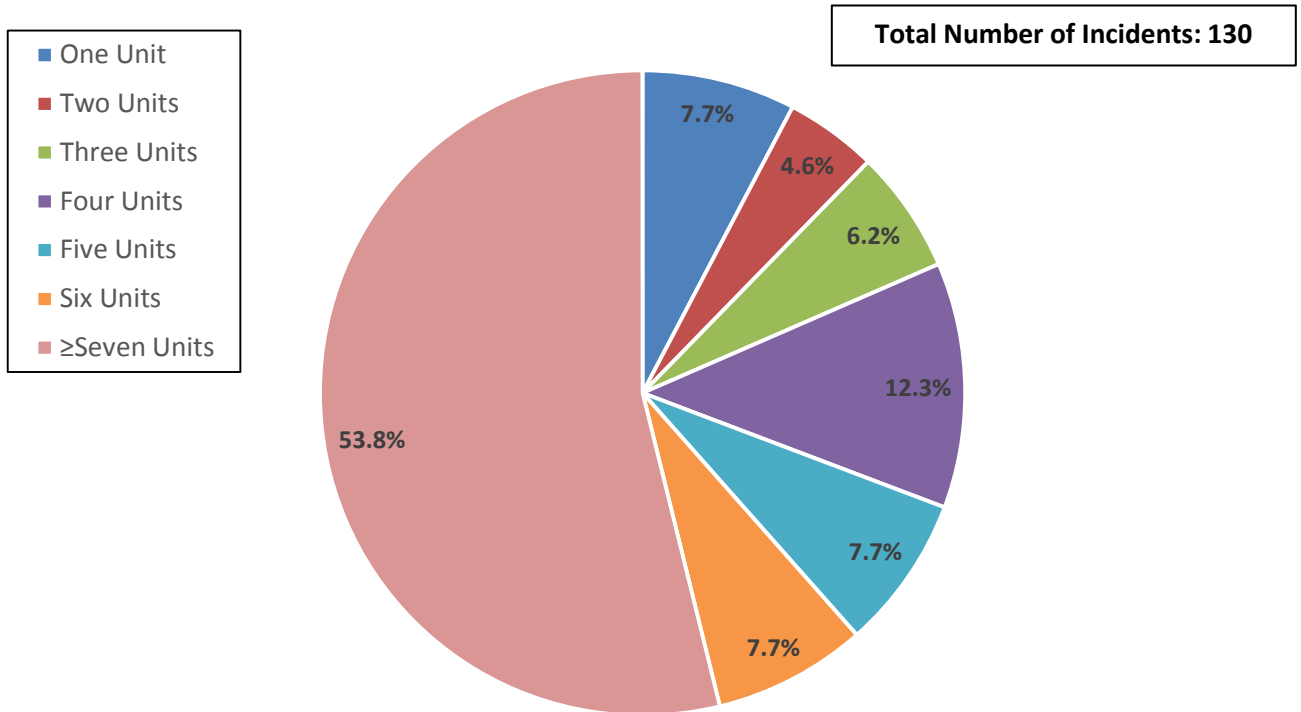


Figure 21: Percentage of Structure Fire Calls by Number of Responding Units – Reduced Response Calls

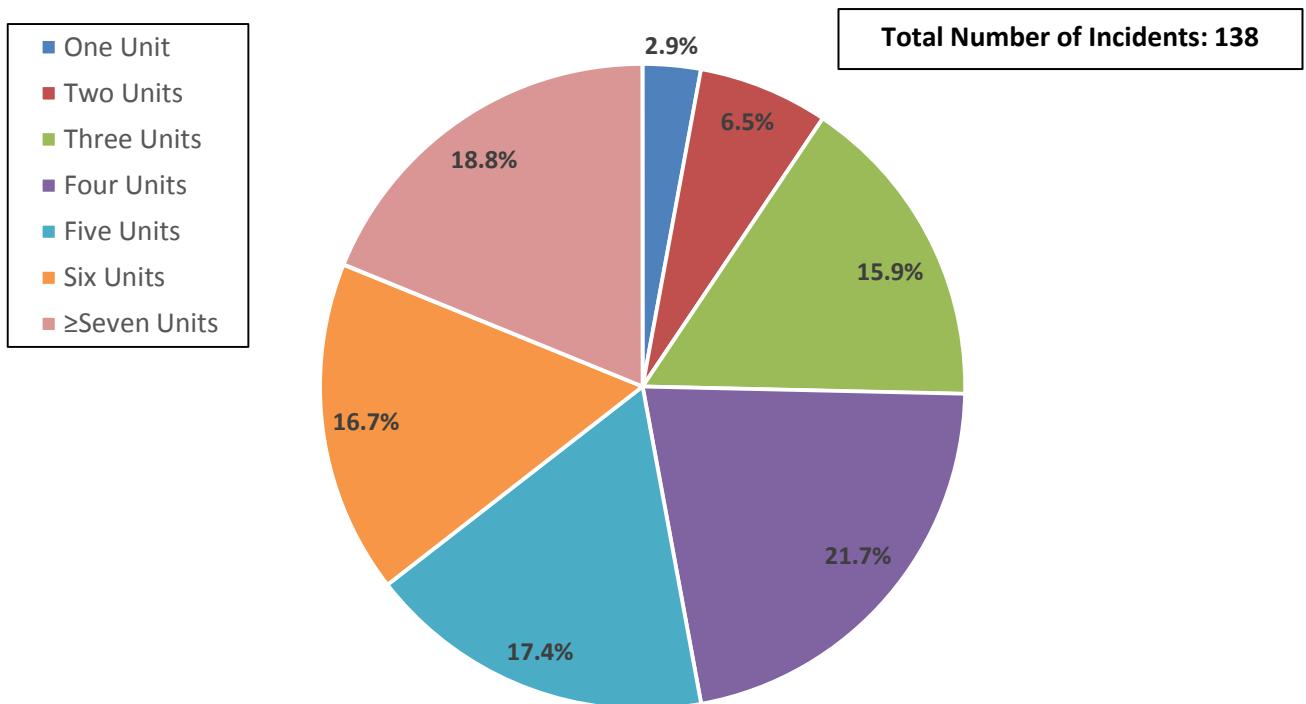


Table 24: Workload by Unit for Fire Related Calls – Structure Fires

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
ACFR	BC10	Battalion Chief	3	3	1.6	32.0
	BC11	Battalion Chief	35	35	20.7	35.5
	BC12	Battalion Chief	21	21	9.7	27.7
	BC13	Battalion Chief	35	34	14.1	24.8
	BC14	Battalion Chief	25	25	11.7	28.1
	BC15	Battalion Chief	6	6	3.0	30.3
	CHF10	Chief	2	2	2.2	66.8
	CHF11	Chief	1	1	2.0	117.3
	CHF12	Chief	3	3	2.8	55.4
	CHF13	Chief	7	7	1.9	16.0
	FM10	Fire Marshal	15	15	4.3	17.2
	FM11	Fire Marshal	8	8	3.9	29.2
	FM12	Fire Marshal	24	24	29.2	73.0
	FM13	Fire Marshal	21	21	16.5	47.2
	FM14	Fire Marshal	31	31	33.9	65.7
	RS18	Ambulance	1	1	0.6	36.2
	RS19	Ambulance	1	1	0.1	7.1
	TN10	Training	1	1	0.1	6.5
	ACFR Total		240	239	158.3	39.7
Berkmar	RS8	Ambulance	15	15	9.5	37.9
	Berkmar Total		15	15	9.5	37.9
Crozet	B53	Brush	2	2	0.3	9.1
	B55	Brush	1	1	1.2	72.2
	CHF50	Chief	1	1	0.2	9.2
	CHF51	Chief	2	2	1.0	29.9
	CHF52	Chief	1	1	0.7	42.2
	CHF53	Chief	3	3	0.6	12.2
	E52	Engine	11	11	2.5	13.6
	E56	Engine	4	4	2.2	33.4
	E58	Engine	16	16	7.6	28.4
	T59	Tanker	13	13	6.9	31.7
	TO54	Tower	6	6	1.6	15.9
	U59	Utility	1	1	1.3	77.4
	Crozet Total		61	61	26.0	25.6
Earlysville	B43	Brush	1	1	1.7	99.5
	B46	Brush	2	2	3.4	103.1
	C40	Car	1	1	1.7	99.7
	CHF41	Chief	1	1	1.4	83.5
	CHF42	Chief	1	1	0.9	53.5
	E41	Engine	7	7	5.2	44.5

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	E45	Engine	6	5	5.5	66.5
	RS4	Ambulance	2	2	1.7	49.8
	T49	Tanker	10	10	3.5	21.0
	Earlsville Total		31	30	24.9	49.9
East Rivanna	B25	Brush	2	2	3.5	105.6
	C20	Car	1	1	0.5	29.5
	C22	Car	2	2	1.0	30.4
	CHF20	Chief	2	2	2.9	86.8
	CHF21	Chief	8	8	7.0	52.1
	E21	Engine	28	28	16.6	35.5
	E24	Engine	2	2	0.7	21.8
	T26	Tanker	12	12	5.7	28.4
	T28	Tanker	4	4	2.3	34.4
	TO29	Tower	8	8	2.1	16.0
	East Rivanna Total		69	69	42.3	36.8
Hollymead	E121	Engine	35	35	20.7	35.5
	RS12	Ambulance	7	7	5.3	45.8
	T121	Tanker	14	14	12.4	53.1
	TO121	Tower	20	20	6.5	19.5
	Hollymead Total		76	76	44.9	35.5
Ivy	C151	Car	1	1	1.0	61.6
	CHF150	Chief	8	8	6.9	51.5
	E151	Engine	63	63	35.0	33.3
	RS15	Ambulance	10	10	5.1	30.4
	Ivy Total		82	82	47.9	35.1
Monticello	C111	Car	1	1	1.6	94.2
	E111	Engine	60	59	36.0	36.6
	RS11	Ambulance	10	10	6.5	38.7
	SQ11	Squad	1	1	1.6	98.4
	T111	Tanker	20	20	13.4	40.1
	Monticello Total		92	91	59.0	38.9
North Garden	B31	Brush	1	1	2.2	129.0
	C30	Car	3	3	0.7	13.1
	C31	Car	3	3	3.5	70.5
	CHF30	Chief	1	1	1.6	97.8
	CHF31	Chief	3	3	6.2	123.1
	E32	Engine	18	18	10.3	34.3
	E34	Engine	8	8	3.6	27.1
	T37	Tanker	20	19	8.2	25.8
	T39	Tanker	4	4	2.8	41.4
	U35	Utility	2	2	0.4	13.5

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	North Garden Total		63	62	39.4	38.1
Pantops	RS16	Ambulance	4	4	2.0	30.0
	Pantops Total		4	4	2.0	30.0
Scottsville	B75	Brush	1	1	2.2	133.3
	C70	Car	6	6	8.9	89.4
	C71	Car	1	1	0.1	7.5
	C72	Car	1	1	2.0	118.0
	CHF72	Chief	3	3	4.3	86.6
	E72	Engine	15	15	10.0	40.1
	E73	Engine	9	9	5.3	35.2
	T77	Tanker	11	11	11.0	60.0
	T79	Tanker	8	8	6.7	50.0
	Scottsville Total		55	55	50.6	55.2
Seminole	C80	Car	1	1	0.3	16.5
	C82	Car	1	1	1.2	74.9
	C89	Car	1	1	0.2	9.3
	CHF80	Chief	19	19	16.0	50.4
	CHF81	Chief	9	9	6.4	42.8
	CHF82	Chief	9	9	3.3	21.9
	CHF83	Chief	15	15	8.4	33.7
	CHF84	Chief	7	7	2.8	24.0
	CHF85	Chief	8	8	7.1	53.4
	E81	Engine	42	41	19.5	28.6
	E82	Engine	51	50	25.9	31.1
	E85	Engine	3	3	0.4	8.8
	TO88	Tower	28	28	18.3	39.2
	U86	Utility	1	1	0.3	17.4
	Seminole Total		195	193	110.1	34.2
Stony Point	C61	Car	1	1	0.8	50.7
	CHF60	Chief	4	4	4.8	72.6
	CHF61	Chief	1	1	1.0	61.6
	CHF62	Chief	2	2	0.3	10.1
	E61	Engine	12	12	8.0	39.9
	E62	Engine	4	4	4.8	71.7
	T69	Tanker	14	13	8.1	37.4
	Stony Point Total		38	37	27.9	45.3
SVRS	C702	Car	1	1	1.1	64.5
	RS7	Ambulance	6	6	6.7	67.4
	RS705	Ambulance	2	2	0.2	5.3
	RS706	Ambulance	1	1	1.3	79.9
	RS707	Ambulance	3	3	4.2	83.5

Station	Unit	Unit Type	Number of Responses¹	Responses with Time Data²	Total Busy Hours	Average Busy Minutes per Response
	SVRS Total		13	13	13.5	62.3
WARS	C508	Car	1	1	0.1	5.2
	RS501	Ambulance	2	2	0.3	8.0
	RS502	Ambulance	1	1	0.3	17.6
	WARS Total		4	4	0.6	9.7
Total			1,038	1,031	657.1	38.2

¹“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

²“Responses with Time Data” reflects the number of responses in the CAD data file with available “AlarmDateTime” values and “InServiceDateTime” values.

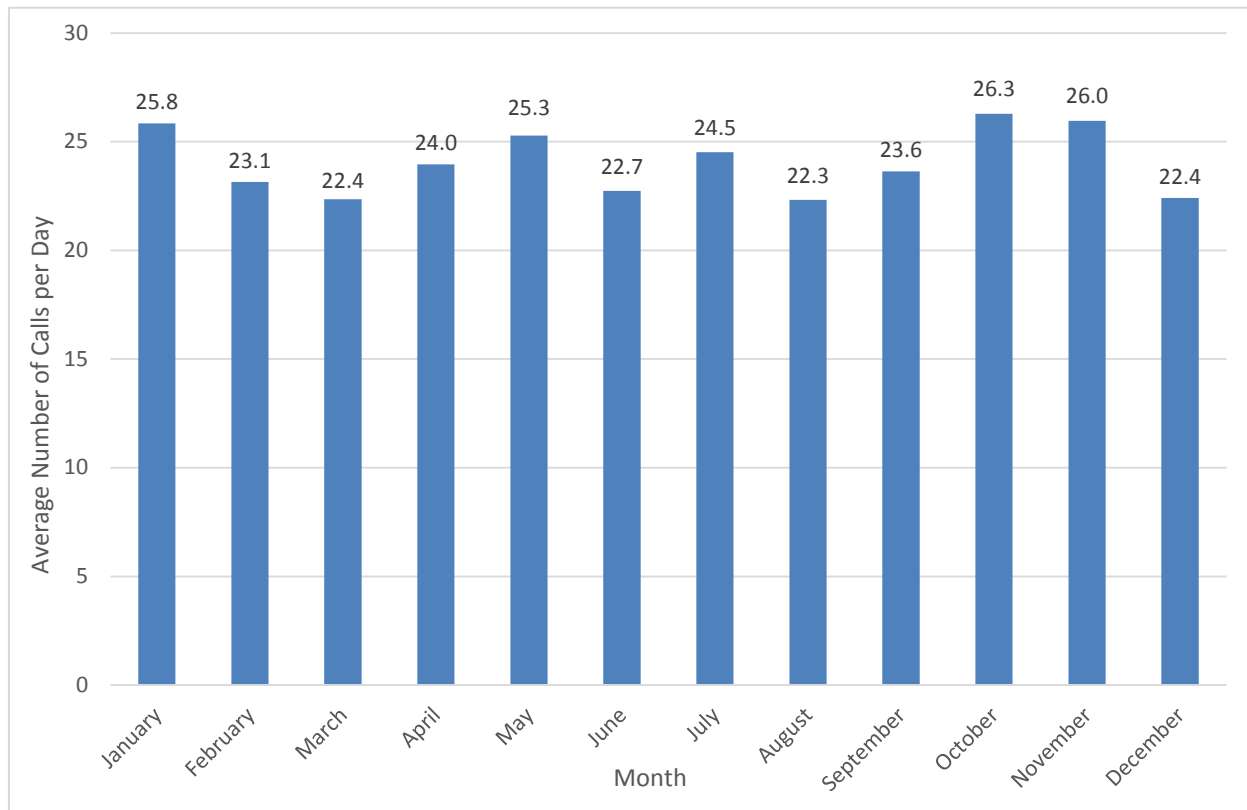
Emergency Medical Services

Temporal analyses were conducted to evaluate patterns in community demands for EMS related services. These analyses examined the frequency of requests for service in 2017 by month, day of week, and hour of day. Results found that there was variability by month (Table 25; Figure 22). The three months with the most EMS calls in descending order were: October (26.3 per day), November (26.0 per day), and January (25.8 per day). The three months with the least EMS calls in ascending order were: August (22.3 per day), March (22.4 per day), and December (22.4 per day).

Table 25: Total EMS Related Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	801	25.8	9.1
February	648	23.1	7.4
March	693	22.4	7.9
April	719	24.0	8.2
May	784	25.3	8.9
June	682	22.7	7.8
July	760	24.5	8.7
August	692	22.3	7.9
September	709	23.6	8.1
October	815	26.3	9.3
November	779	26.0	8.9
December	695	22.4	7.9
Total	8,777	24.0	100.0

Figure 22: Average EMS Related Calls per Day by Month

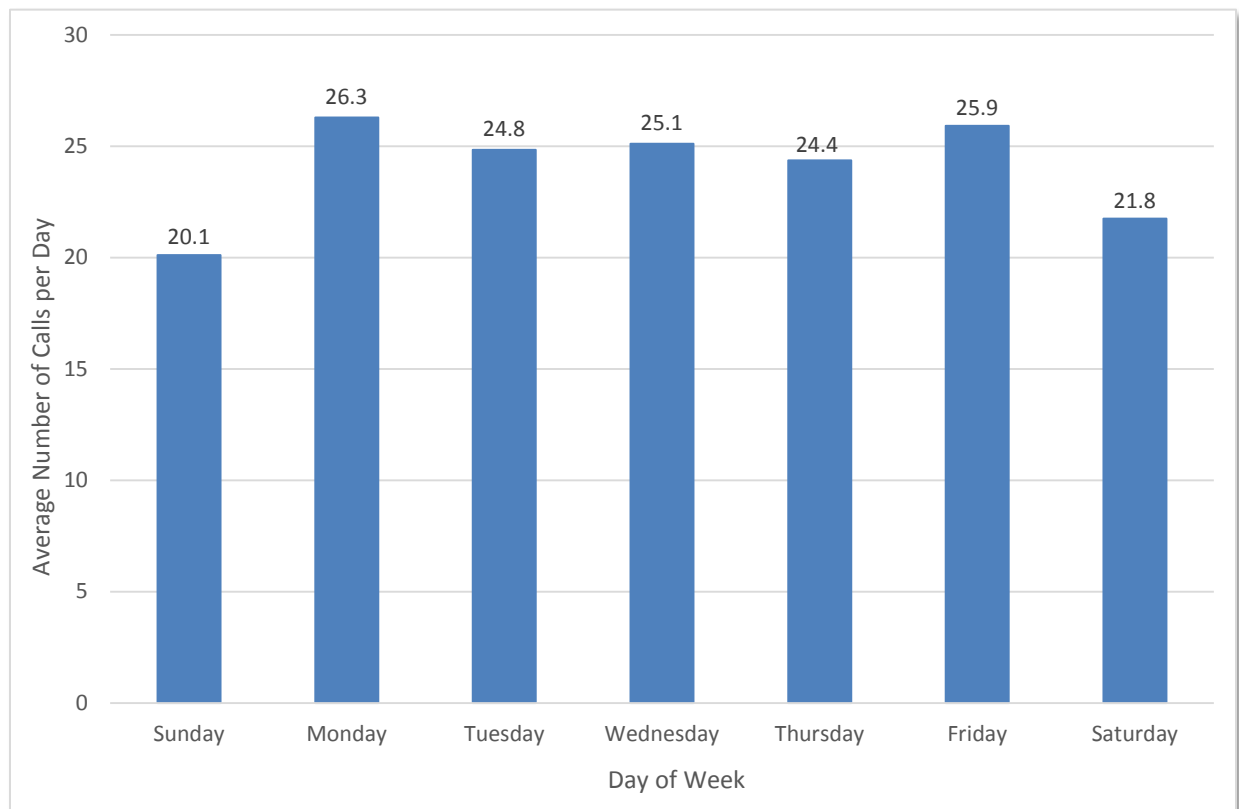


Similar analyses were conducted for EMS related calls by day of week (Table 26; Figure 23). The data revealed that there is some variability in the demand for services by day of week. Monday had the highest frequency of requests for EMS related services, averaging 26.3 calls per day and accounting for 15.6% of all EMS related calls. Sunday had the lowest frequency of requests for EMS related services, averaging 20.1 calls per day and accounting for 12.1% of all EMS related calls.

Table 26: Total EMS Related Calls and Average Calls per Day by Day of Week

Day of Week	Number of Calls	Average Calls per Day	Call Percentage
Sunday	1,066	20.1	12.1
Monday	1,367	26.3	15.6
Tuesday	1,292	24.8	14.7
Wednesday	1,306	25.1	14.9
Thursday	1,267	24.4	14.4
Friday	1,348	25.9	15.4
Saturday	1,131	21.8	12.9
Total	8,777	24.0	100.0

Figure 23: Average EMS Related Calls per Day by Day of Week

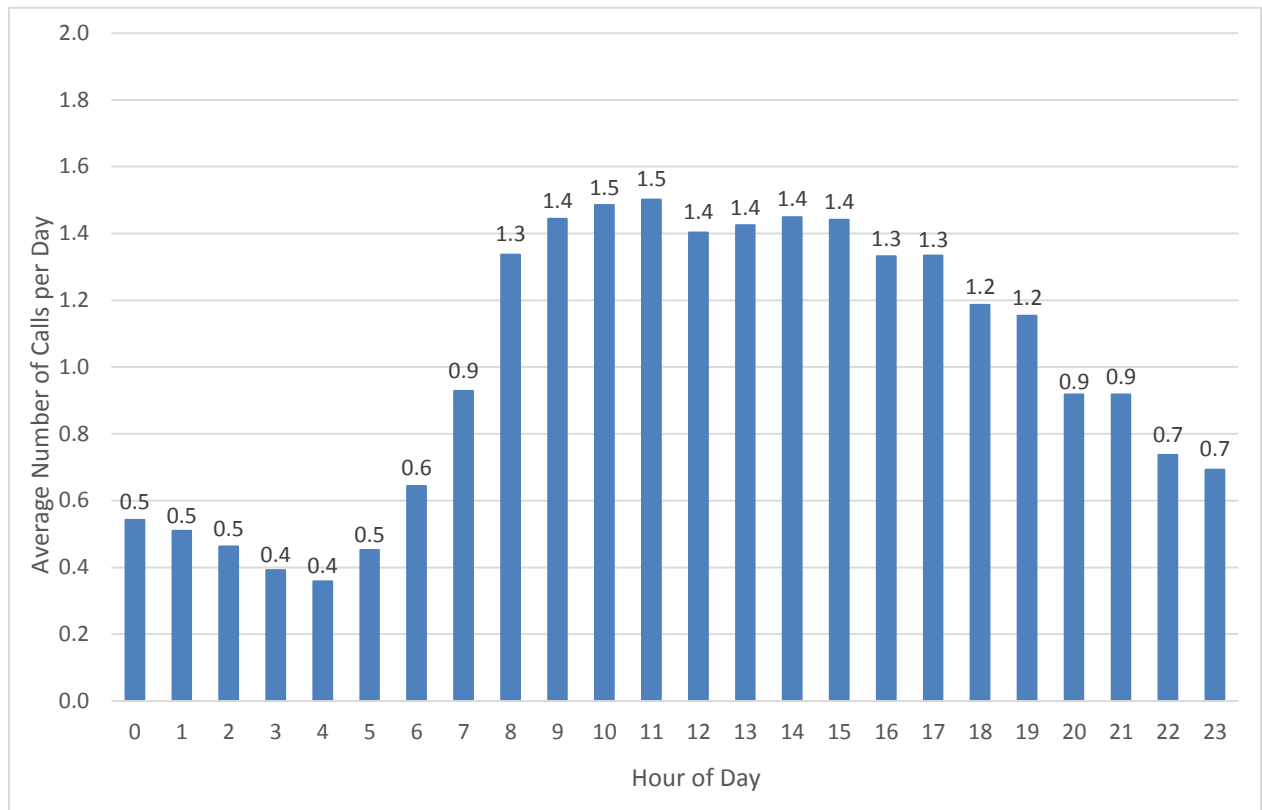


EMS related calls were also evaluated by hour of the day (Table 27; Figure 24). Variability exists in the time of day that requests for EMS related services were received. The highest demand for EMS related services occurred between 0900 and 1500, where average number of calls per day ranged from 1.4 to 1.5. Peak demand occurred at 1100 hours. The hours from 0000 to 0500 had the lowest demands, where average number of calls per day for each of those hours ranged from 0.4 to 0.5.

Table 27: Total EMS Related Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	198	0.5	2.3
1	186	0.5	2.1
2	169	0.5	1.9
3	143	0.4	1.6
4	131	0.4	1.5
5	165	0.5	1.9
6	235	0.6	2.7
7	339	0.9	3.9
8	488	1.3	5.6
9	527	1.4	6.0
10	542	1.5	6.2
11	548	1.5	6.2
12	512	1.4	5.8
13	520	1.4	5.9
14	529	1.4	6.0
15	526	1.4	6.0
16	486	1.3	5.5
17	487	1.3	5.5
18	433	1.2	4.9
19	421	1.2	4.8
20	335	0.9	3.8
21	335	0.9	3.8
22	269	0.7	3.1
23	253	0.7	2.9
Total	8,777	24.0	100.0

Figure 24: Average EMS Related Calls per Day by Hour of Day



Temporal distributions related to hour of day were also created for station demand zones (or rescue first due stations) to better understand each station demand zone's unique demand for services. Because first due station for EMS related calls varies based on the time of day the call was received—that is, Monday through Friday days from 0600 to 1700 (indicated as “MFDAYLIGHT” in the CAD data file), and Monday through Friday nights from 1800 to 0500 or weekends all day (indicated as “WEEKEND/EVENING” in the CAD data file), tables and figures were created separately for time of day categories. Of the 8,777 total EMS related calls during 2017, 4,441 originated during the MFDAYLIGHT period (Table 28 and Table 29; Figure 25 through Figure 32) and 4,336 originated during the WEEKEND/EVENING period (Table 30 and Table 31; Figure 33 through Figure 38).

For ease of presentation, numbers of calls are presented in the tables, and average numbers of calls per day are presented in the figures. Due to small sample sizes, only those station demand zones with total EMS related calls > 100 for 2017 are presented in the figures. Although there were only 260 weekdays during 2017, MFDAYLIGHT values were still divided by 365 to allow for comparable average number of calls per day values across sections. Additionally, the combination of all weekend hours with partial weekday hours for WEEKEND/EVENING calls requires that values be divided by 365 to accommodate all seven days of the week occurring in 2017.

Table 28: Total EMS Related Calls by Hour of Day and Station Demand Zone – MFDAYLIGHT I

Hour of Day	Number of Calls by Station Demand Zone						
	Buckingham	CARS	Earlsville	Fluvanna	Hollymead	Ivy	Monticello
6	0	0	9	0	13	13	22
7	0	1	8	0	27	21	24
8	0	1	5	0	36	32	50
9	0	0	16	1	35	40	31
10	1	1	7	1	29	43	36
11	2	2	13	0	40	30	51
12	1	4	10	0	30	41	37
13	1	5	11	0	38	29	35
14	2	4	11	0	33	28	45
15	0	1	11	0	39	24	42
16	0	2	13	0	31	28	39
17	1	8	14	0	33	36	41
Total	8	29	128	2	384	365	453

Table 29: Total EMS Related Calls by Hour of Day and Station Demand Zone – MFDAYLIGHT II

Hour of Day	Number of Calls by Station Demand Zone						Total
	Nelson	Pantops	Seminole	SVRS	WARS	Not Identified	
6	0	36	56	11	20	2	182
7	0	41	80	20	40	0	262
8	0	72	105	28	45	3	377
9	0	81	108	35	72	0	419
10	0	86	129	36	45	1	415
11	0	91	110	22	60	1	422
12	0	73	107	41	48	2	394
13	0	74	139	21	44	1	398
14	0	93	116	25	48	1	406
15	0	88	116	25	59	0	405
16	1	80	104	31	52	0	381
17	0	65	90	32	59	1	380
Total	1	880	1,260	327	592	12	4,441

Figure 25: Average Calls per Day by Hour of Day MF DAYLIGHT - Earlysville

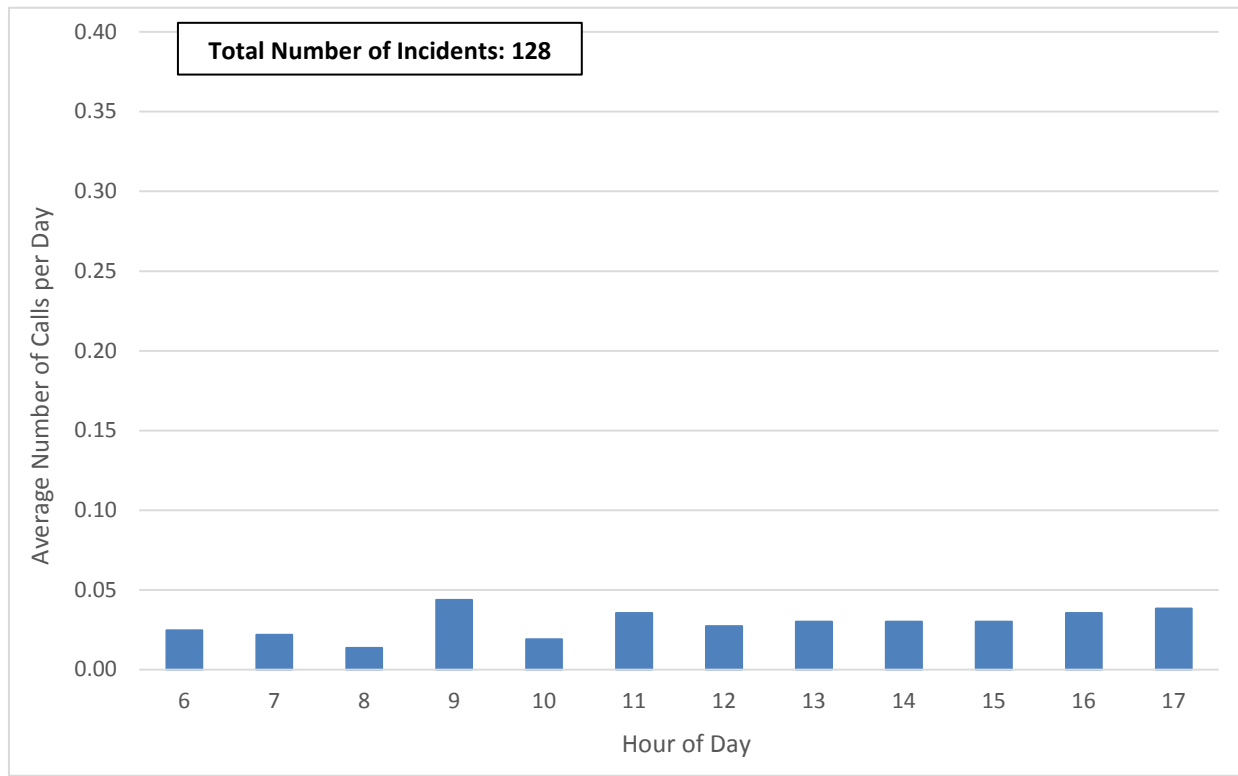


Figure 26: Average Calls per Day by Hour of Day MF DAYLIGHT - Hollymead

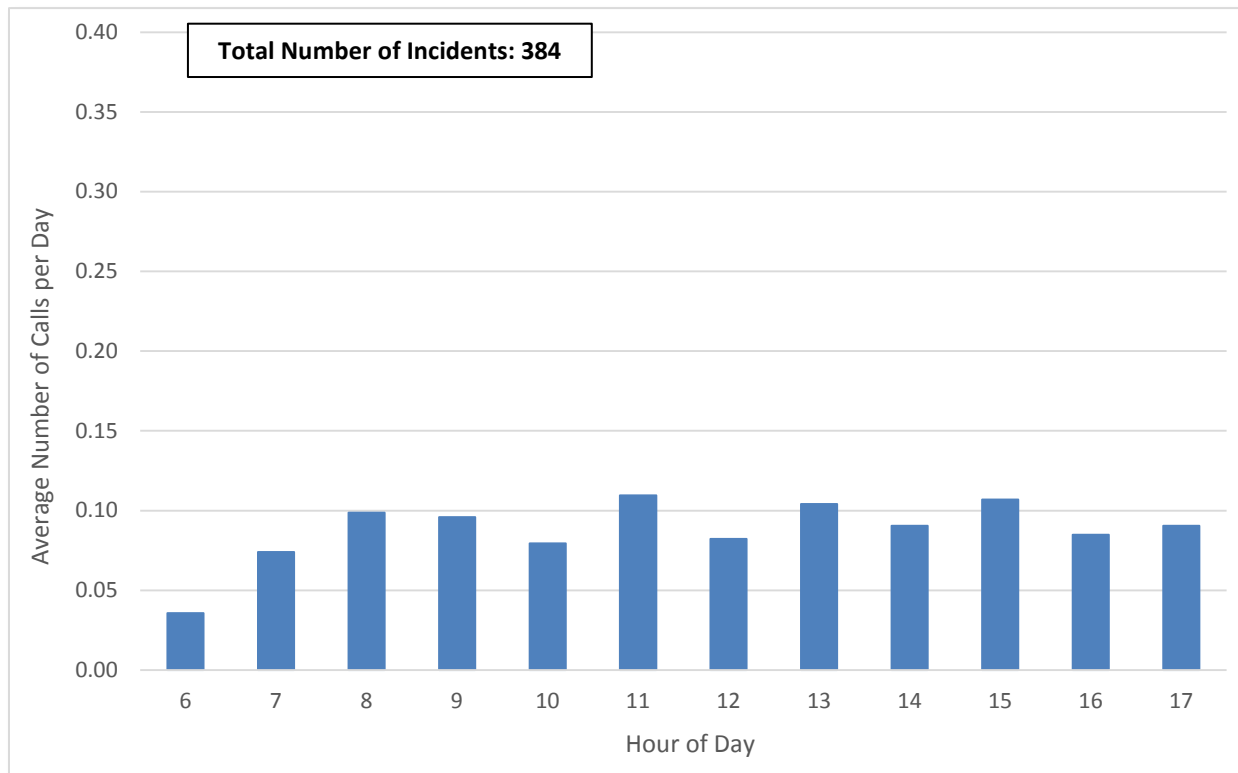


Figure 27: Average Calls per Day by Hour of Day MF DAYLIGHT - Ivy

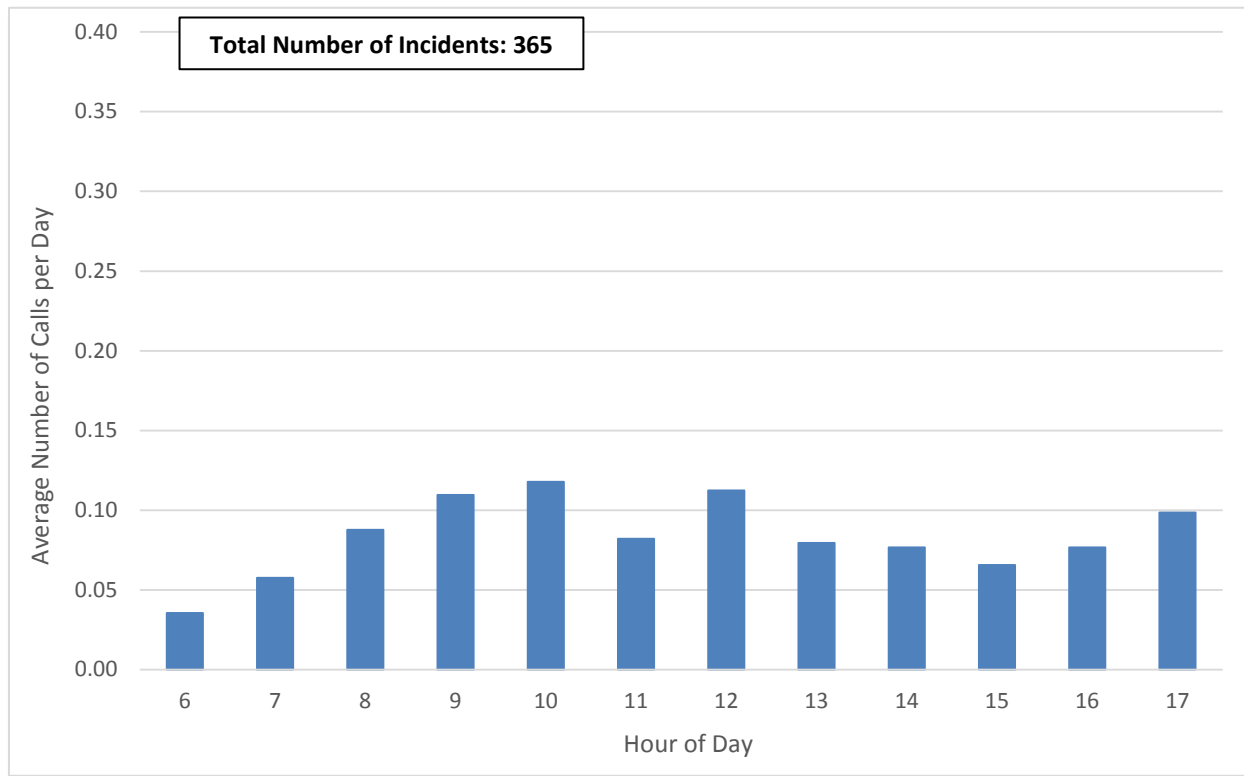


Figure 28: Average Calls per Day by Hour of Day MF DAYLIGHT - Monticello

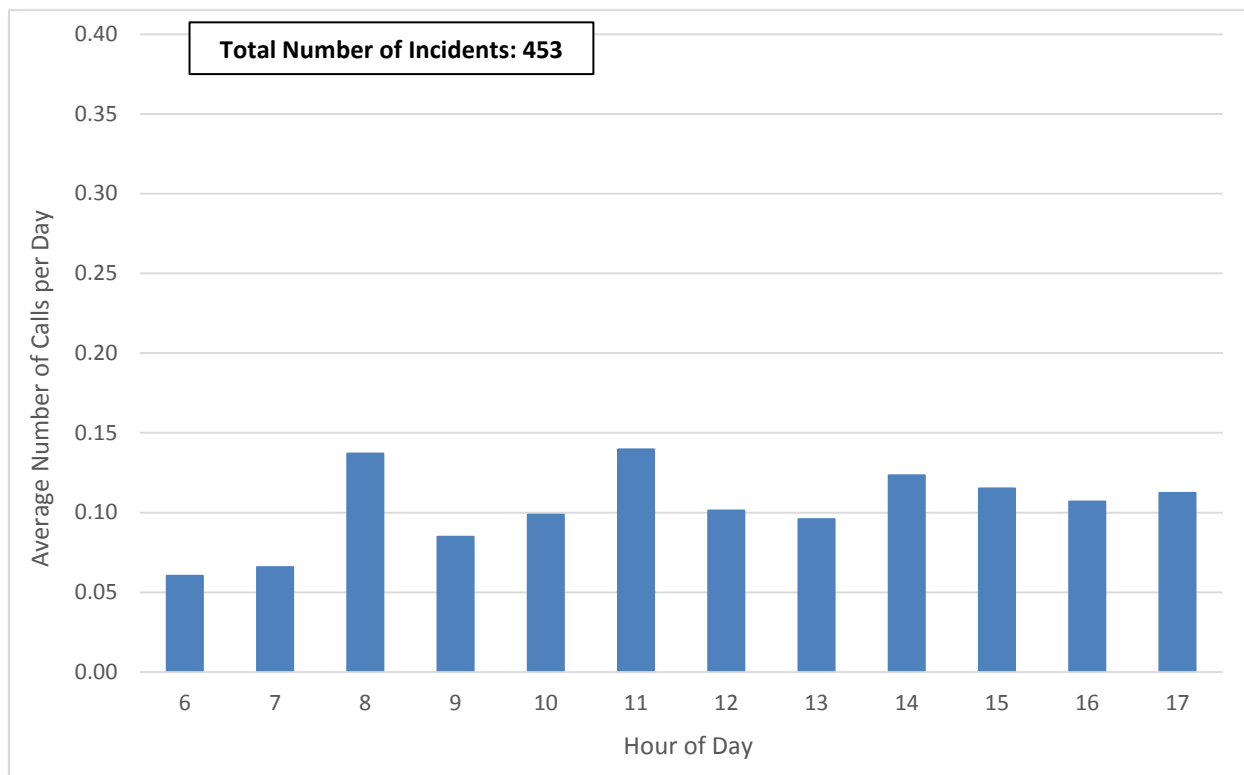


Figure 29: Average Calls per Day by Hour of Day MF DAYLIGHT - Pantops

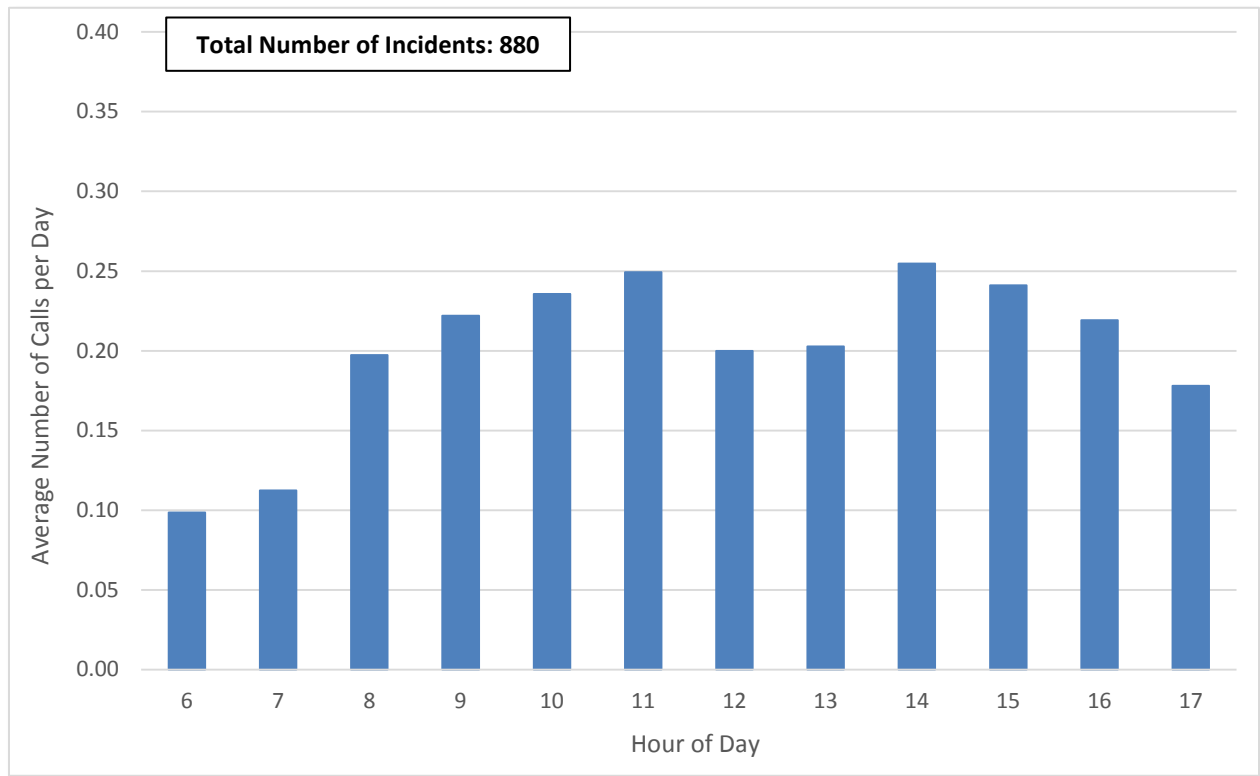


Figure 30: Average Calls per Day by Hour of Day MF DAYLIGHT - Seminole

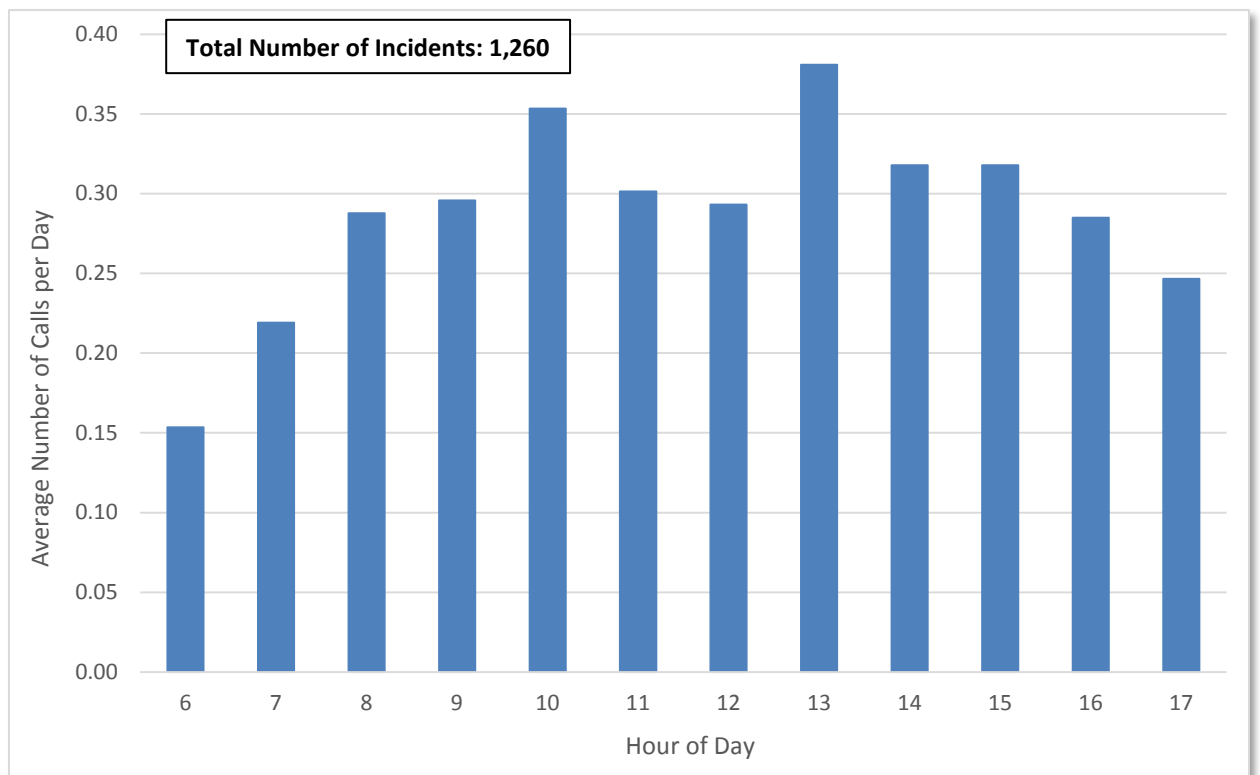


Figure 31: Average Calls per Day by Hour of Day MF DAYLIGHT - SVRS

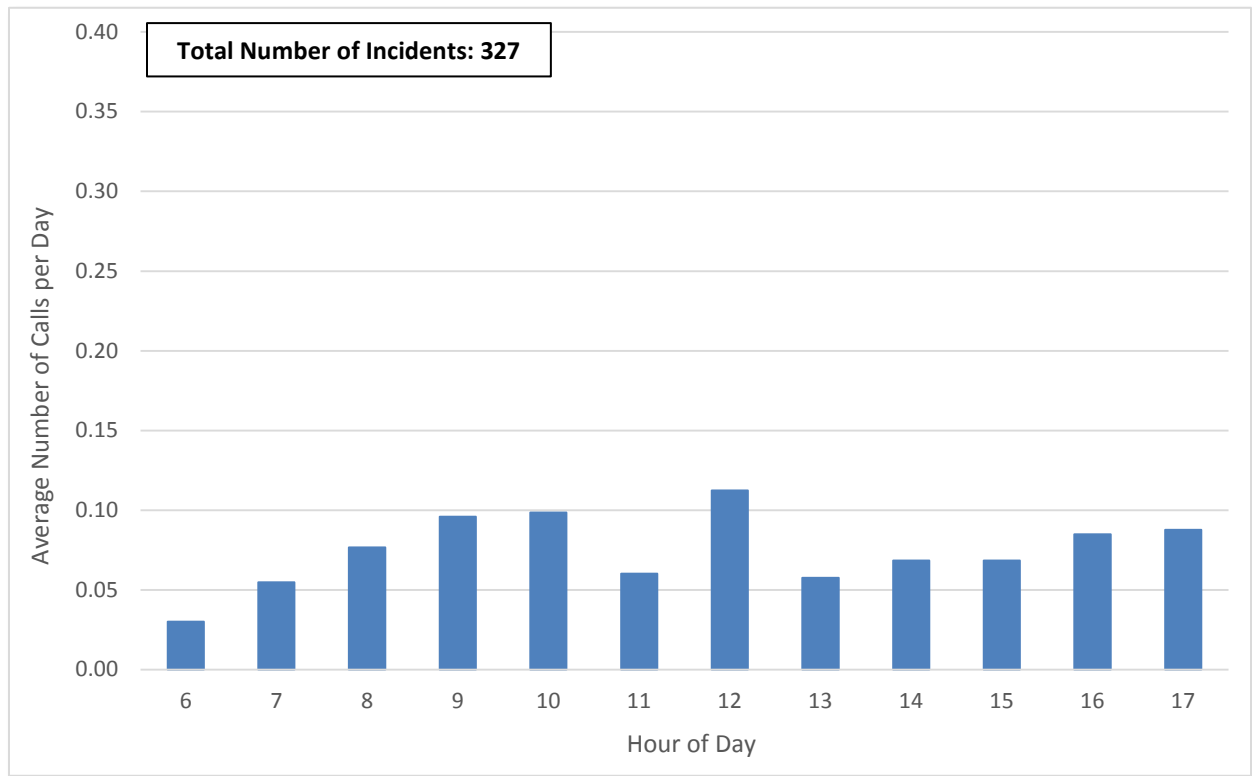


Figure 32: Average Calls per Day by Hour of Day MF DAYLIGHT - WARS

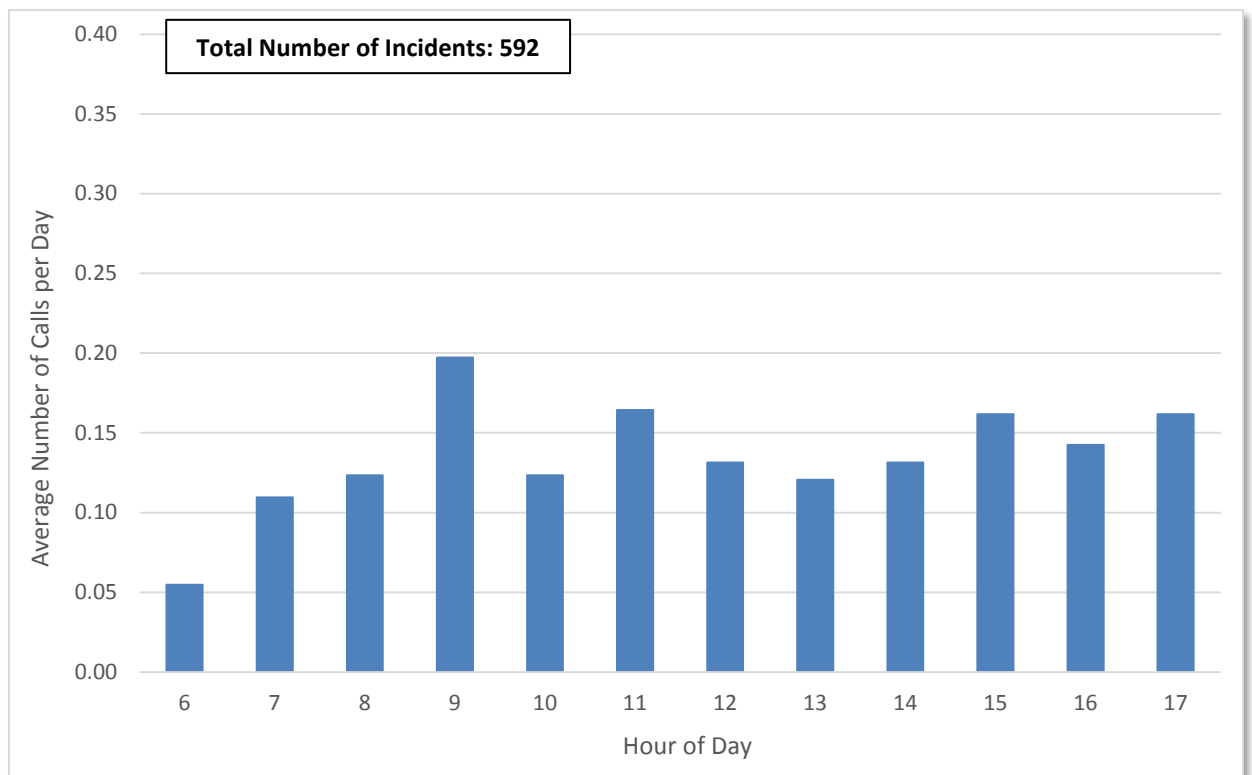


Table 30: Total EMS Related Calls by Hour of Day and Station Demand Zone – WEEKEND/EVENING I

Hour of Day	Number of Calls by Station Demand Zone					
	Buckingham	CARS	Greene	Hollymead	Monticello	Nelson
0	0	34	0	18	29	0
1	1	28	1	27	28	0
2	0	21	0	21	23	0
3	0	21	0	17	14	0
4	1	20	0	19	22	0
5	0	33	0	24	18	0
6	0	10	0	9	4	0
7	0	12	0	13	9	0
8	0	27	0	18	8	0
9	1	13	0	16	15	0
10	1	19	0	12	15	0
11	0	25	0	14	15	0
12	2	21	0	12	11	0
13	0	17	0	18	16	0
14	0	25	0	13	16	0
15	0	22	0	11	17	0
16	1	24	0	16	8	1
17	0	14	0	16	17	0
18	2	72	0	57	61	0
19	1	79	0	53	59	0
20	2	49	0	47	49	0
21	0	52	0	44	45	0
22	1	47	0	30	34	0
23	0	38	0	23	27	0
Total	13	723	1	548	560	1

Table 31: Total EMS Related Calls by Hour of Day and Station Demand Zone – WEEKEND/EVENING II

Hour of Day	Number of Calls by Station Demand Zone				
	Seminole	SVRS	WARS	Not Identified	Total
0	62	25	30	0	198
1	52	16	33	0	186
2	57	16	30	1	169
3	45	13	32	1	143
4	34	10	25	0	131
5	39	10	41	0	165
6	14	9	7	0	53
7	18	13	12	0	77
8	36	4	17	1	111
9	34	8	21	0	108
10	42	12	26	0	127
11	29	16	24	3	126
12	42	12	18	0	118
13	33	10	28	0	122
14	37	11	21	0	123
15	38	12	21	0	121
16	33	9	13	0	105
17	27	14	19	0	107
18	120	51	69	1	433
19	109	45	73	2	421
20	106	34	48	0	335
21	87	37	69	1	335
22	71	37	48	1	269
23	83	23	58	1	253
Total	1,248	447	783	12	4,336

Figure 33: Average Calls per Day by Hour of Day WEEKEND/EVENING - CARS

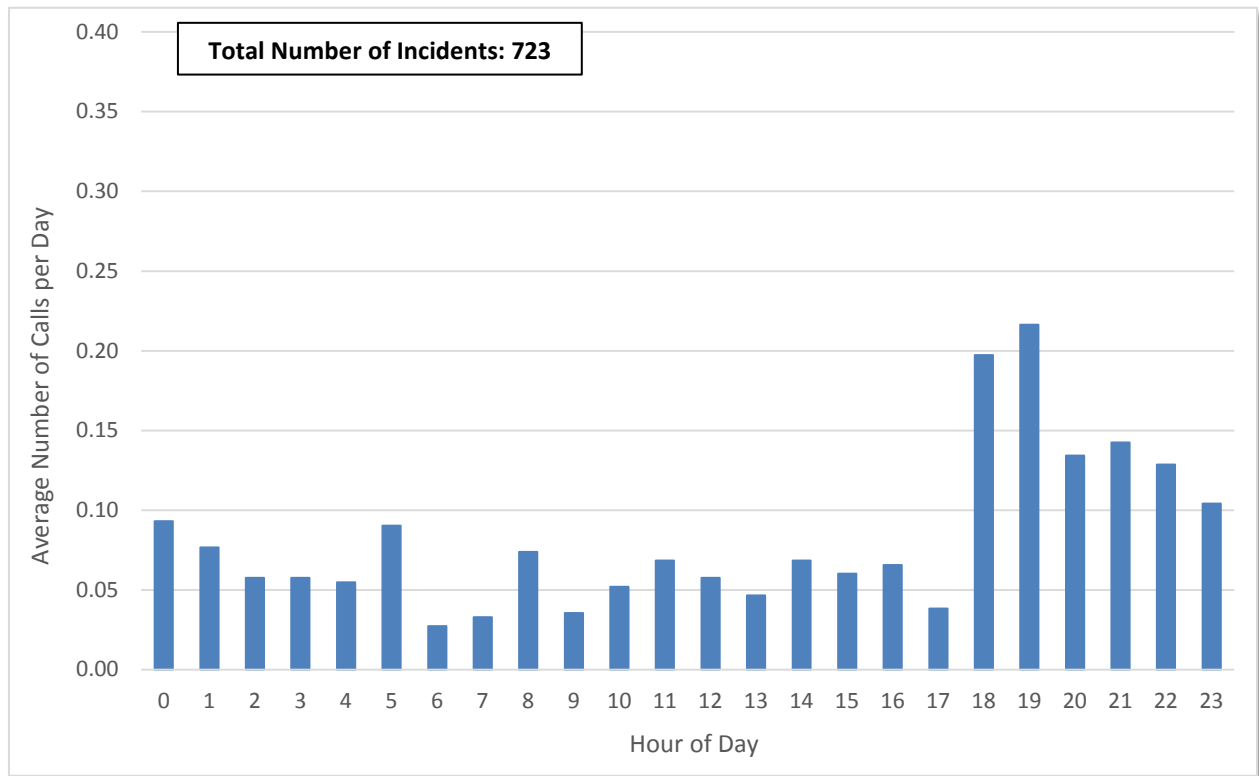


Figure 34: Average Calls per Day by Hour of Day WEEKEND/EVENING - Hollymead

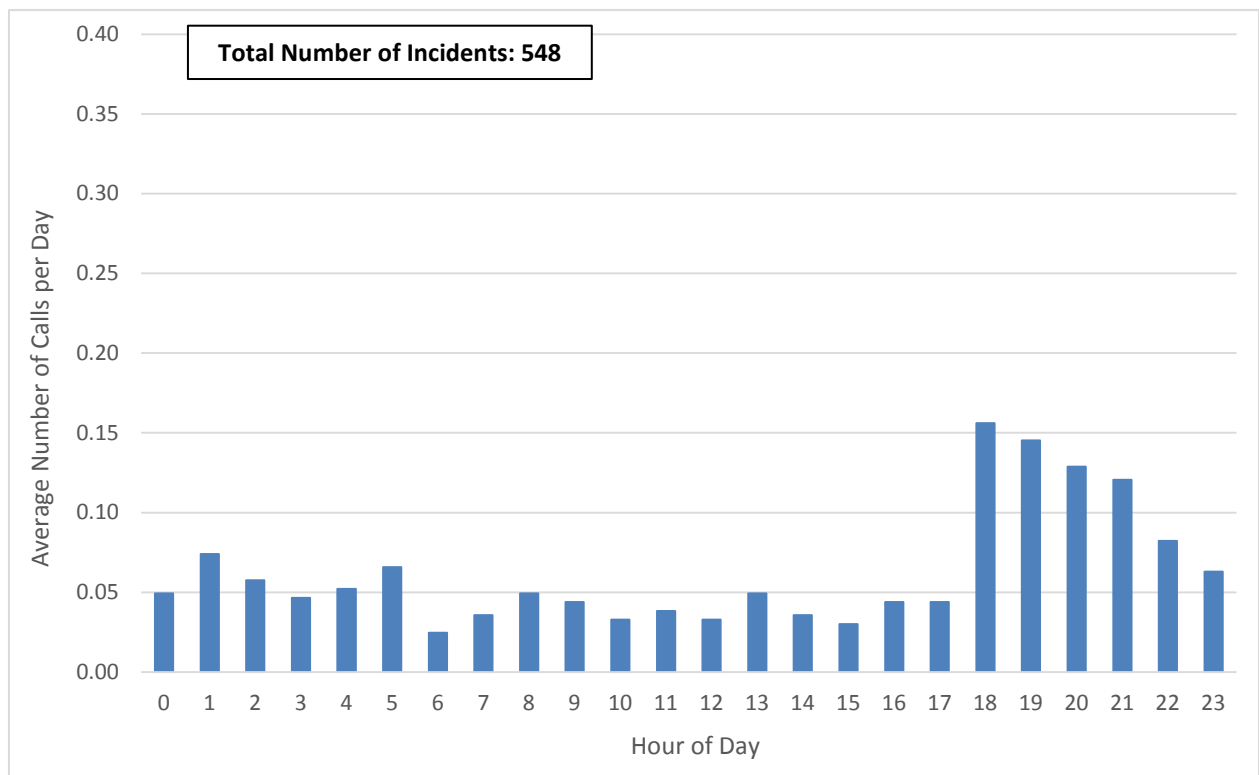


Figure 35: Average Calls per Day by Hour of Day WEEKEND/EVENING - Monticello

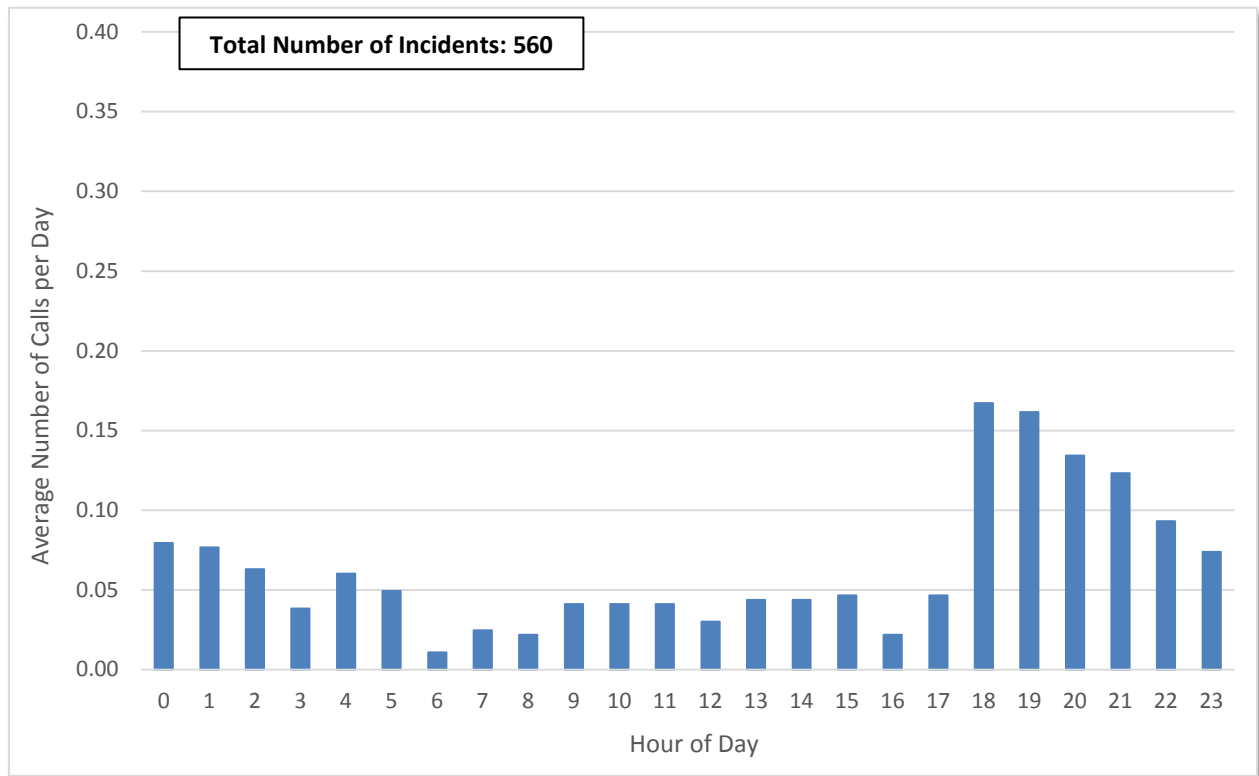


Figure 36: Average Calls per Day by Hour of Day WEEKEND/EVENING - Seminole

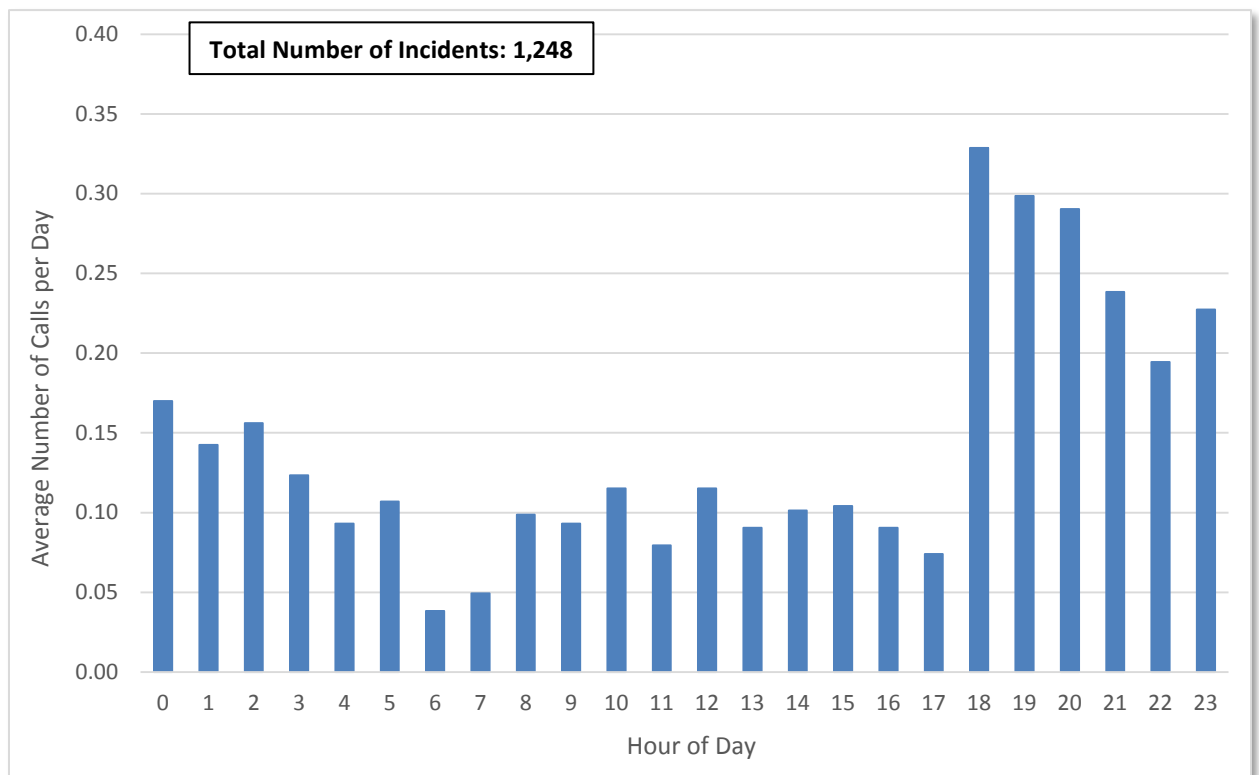


Figure 37: Average Calls per Day by Hour of Day WEEKEND/EVENING - SVRS

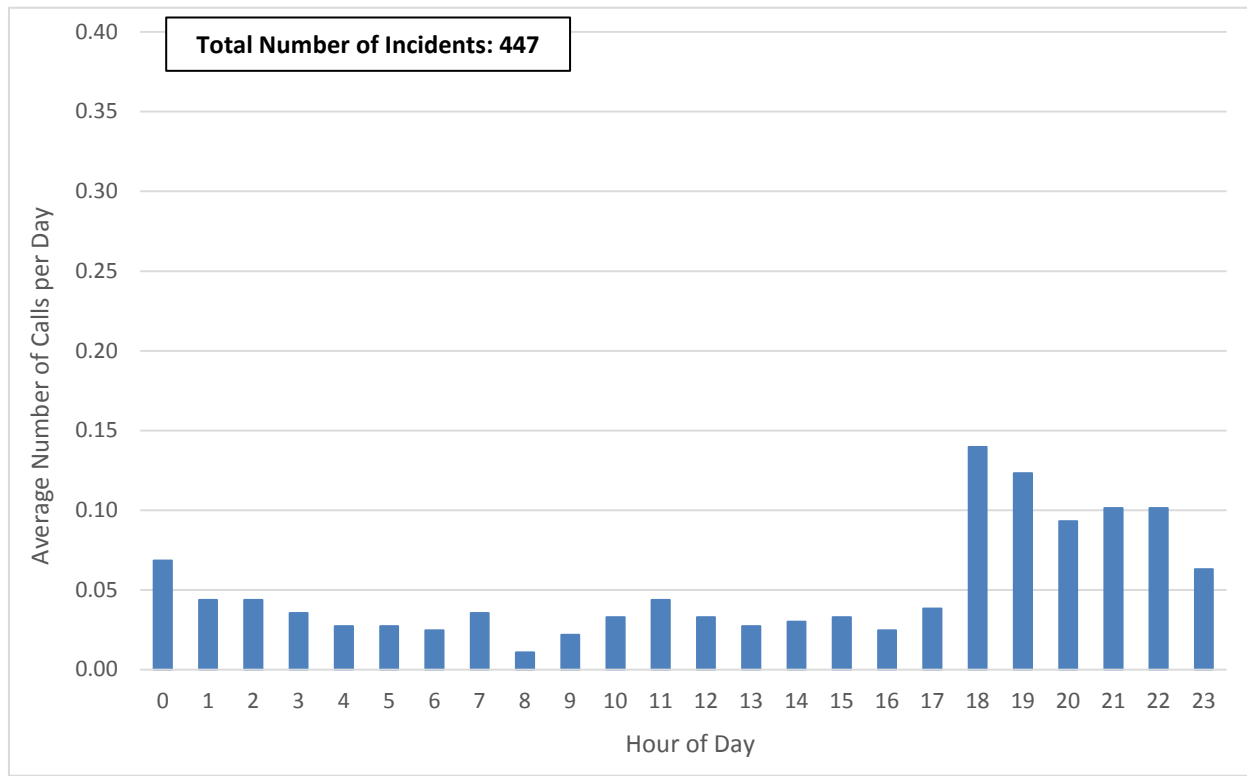
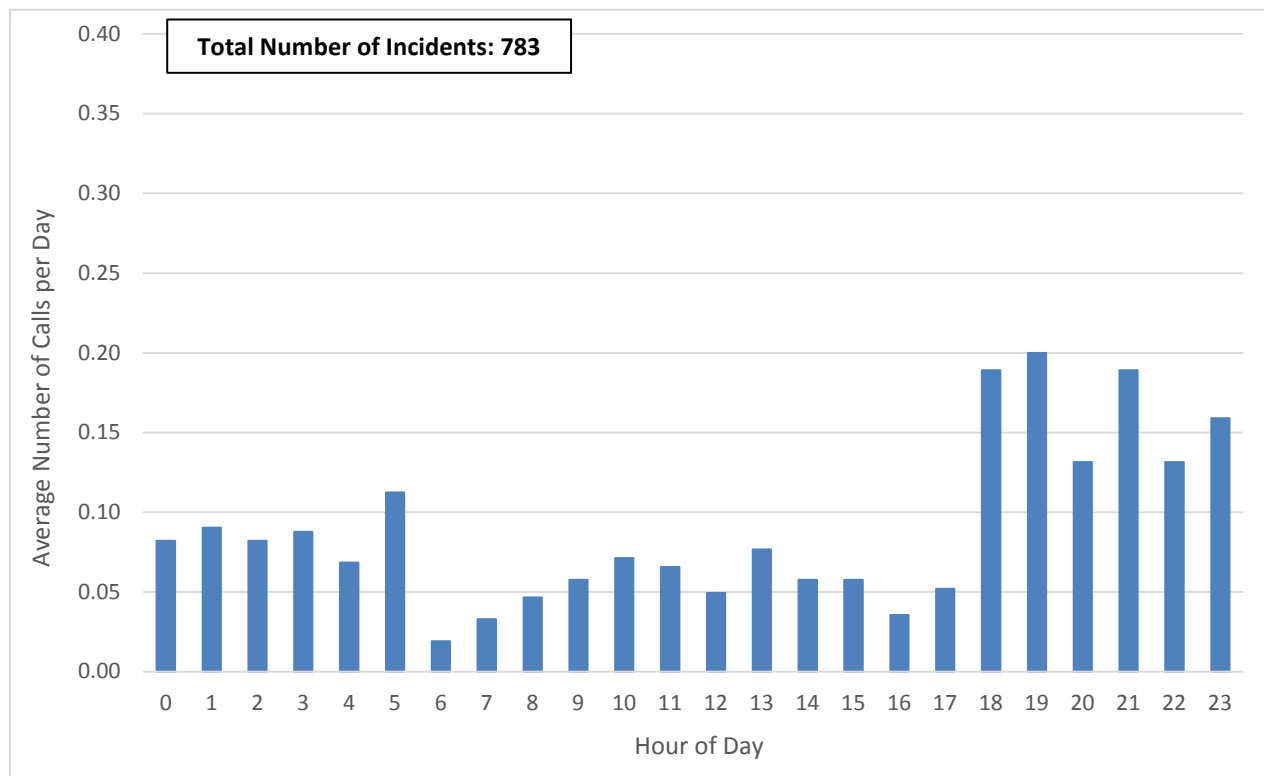


Figure 38: Average Calls per Day by Hour of Day WEEKEND/EVENING - WARS



EMS requests accounted for 67.3% of the total requests for service during 2017 and averaged 24.0 requests per day (Figure 1; Table 1).

“Illness and Other” was the most frequent community demand (averaging 6.8 requests per day), followed by “Fall and Injury” (averaging 4.7 requests per day).

EMS related incidents are an aggregated category of the various final incident types available in the CAD data file. Table 32 provides details for these EMS related incidents by nature of the call. “Sick Person Ambulance Level” was the most frequent community demand (1,166/8,777 or 13.3% of calls), followed by “Chest Pain” (1,100/8,777 or 12.5% of calls) and “Fall Ambulance Level” (1,023/8,777 or 11.7% of calls).

Details for calls classified to the “Other” program area appear in Table 76 in the Appendix.

Table 32: Total EMS Related Calls by Nature of Call

Nature of Call	Number of Calls	Percentage of Total EMS Demands
Sick Person Ambulance Level	1,166	13.3
Chest Pain	1,100	12.5
Fall Ambulance Level	1,023	11.7
Breathing Problems	1,013	11.5
F/R MVC Minor/Unknown Injuries	688	7.8
Sick Person Trauma Level	403	4.6
Unconscious Medic Level	332	3.8
Abdominal Pain	277	3.2
Seizure Medic Level	255	2.9
Fall Trauma Level	247	2.8
Injured Person Ambulance Level	216	2.5
Stroke Trauma Level	212	2.4
Unknown Problem/Man Down	171	1.9
Cardiac Arrest	142	1.6
Medical Alarm Forced Entry	120	1.4
F/R MVC Significant Impact No Entrapment	119	1.4
Hemorrhage	119	1.4
Diabetic Trauma Level	115	1.3
Back Pain	109	1.2
Allergic Reaction Trauma Level	95	1.1
Medical Alarm	92	1.0
Stroke Ambulance Level	76	0.9
Unconscious Ambulance Level	69	0.8
Overdose Ambulance Level	61	0.7
Diabetic Ambulance Level	55	0.6
Injured Person Trauma Level	52	0.6
Overdose Medic Level	51	0.6
Psychiatric Ambulance Level	48	0.5
Seizure Ambulance Level	46	0.5
F/R MVC Motorcycle/ATV	35	0.4
Standby Routine	35	0.4
Allergic Reaction Ambulance Level	33	0.4
Choking Medic Level	23	0.3
F/R MVC Pedestrian Struck	23	0.3
OB/Pregnancy Ambulance Level	21	0.2
OB/Pregnancy Trauma Level	17	0.2
Choking Ambulance Level	16	0.2
Heat Exposure Ambulance Level	14	0.2

Nature of Call	Number of Calls	Percentage of Total EMS Demands
MVC Past w/ Injury	13	0.1
Gunshot Wound 1 Patient	12	0.1
Animal Bite Ambulance Level	7	0.1
Psychiatric Medic Level	7	0.1
Psychiatric Trauma Level ¹	7	0.1
Injured Person Medic Level	6	0.1
Eye Injury	5	0.1
Burns Ambulance Level	4	0.0
Obvious Death	4	0.0
Eye Chemical Burn	3	0.0
Industrial Acc Ambulance Level	3	0.0
Stabbing 1 Patient	3	0.0
Burns Medic Level	2	0.0
Cold Exposure Ambulance Level	2	0.0
Electrical Injury Ambulance Level	2	0.0
Heat Exposure Medic Level	2	0.0
Standby Emergency	2	0.0
Cold Exposure Medic Level	1	0.0
Gunshot Wound 2 Patients	1	0.0
Industrial Acc Trauma Level	1	0.0
MCI Level 3 Aircraft - 26+ Patients	1	0.0
Total	8,777	100.0

¹Edited; original entry is reported as Psychiatric Trauma Level.”

ACFR made a total of 15,550 responses to EMS related calls (Table 3; Table 33). Total busy time was 10,827.0 hours, and the average busy minutes per response was 42.2 minutes. RS8 (2,090 responses; 1,937.6 busy hours), RS11 (1,473 responses; 1,332.0 busy hours), and RS12 (1,115 responses; 1,042.2 busy hours) were the most utilized ambulances (Table 33). E111 (687 responses; 266.3 busy hours) was the most utilized engine for EMS related calls based on busy hours; E82 made 688 responses (190.2 busy hours).

Table 33: Workload by Unit for EMS Related Calls

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
ACFR	BC10	Battalion Chief	6	6	2.0	19.7
	BC11	Battalion Chief	77	77	34.6	26.9
	BC12	Battalion Chief	54	54	17.2	19.1
	BC13	Battalion Chief	66	65	32.3	29.8
	BC14	Battalion Chief	62	60	21.7	21.7
	BC15	Battalion Chief	17	17	10.7	37.8
	CHF10	Chief	1	1	0.3	18.1
	CHF11	Chief	2	2	0.3	10.1
	CHF12	Chief	5	5	1.6	19.1
	CHF13	Chief	4	4	0.8	11.5
	E112	Engine	2	2	4.1	123.3
	FM10	Fire Marshal	9	9	4.8	32.2
	FM12	Fire Marshal	3	3	2.9	57.6
	FM13	Fire Marshal	4	4	2.3	34.0
	FM14	Fire Marshal	9	9	5.0	33.2
	OMD6	Medical Director	13	13	14.6	67.4
	OMD8	Medical Director	3	3	0.6	12.1
	RS17	Ambulance	5	4	4.0	60.3
	RS18	Ambulance	50	49	47.0	57.5
	RS19	Ambulance	35	35	31.9	54.8
	TN10	Training	3	3	0.6	11.1
	TN14	Training	1	1	0.4	25.4
	ACFR Total		431	426	239.6	33.8
Berkmar	RS8	Ambulance	2,090	2,064	1,937.6	56.3
	Berkmar Total		2,090	2,064	1,937.6	56.3
Crozet	B53	Brush	4	4	1.5	22.3
	B55	Brush	3	3	0.2	4.4
	C50	Car	14	14	5.5	23.5
	C52	Car	2	2	0.7	21.6
	CHF50	Chief	14	14	7.8	33.2
	CHF51	Chief	14	14	8.2	35.2

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	CHF52	Chief	5	5	1.3	15.1
	CHF53	Chief	6	6	1.0	10.1
	E52	Engine	104	101	43.1	25.6
	E56	Engine	23	23	7.6	19.9
	E58	Engine	84	84	15.1	10.8
	T59	Tanker	1	1	0.5	27.6
	TO54	Tower	1	1	3.9	234.0
	U59	Utility	1	1	0.3	15.0
	Crozet Total		276	273	96.6	21.2
Earlsville	B43	Brush	3	3	9.9	197.4
	B46	Brush	2	2	0.8	24.0
	C40	Car	48	48	18.7	23.4
	C41	Car	1	1	0.3	18.5
	C42	Car	11	11	4.4	24.0
	CHF41	Chief	3	3	1.8	36.1
	CHF42	Chief	9	9	4.6	30.5
	E41	Engine	52	51	22.6	26.6
	E45	Engine	31	31	14.5	28.0
	RS4	Ambulance	258	254	268.4	63.4
	Earlsville Total		418	413	346.0	50.3
East Rivanna	B25	Brush	2	2	1.6	46.7
	C20	Car	41	41	15.7	22.9
	C21	Car	3	3	1.5	29.4
	C22	Car	14	14	4.7	20.2
	CHF21	Chief	24	23	7.4	19.2
	CHF22	Chief	3	3	1.3	26.5
	E21	Engine	546	542	214.1	23.7
	E24	Engine	39	38	13.3	21.0
	T26	Tanker	2	2	2.8	85.3
	T28	Tanker	1	1	1.1	66.3
	TO29	Tower	3	3	0.8	16.1
	East Rivanna Total		678	672	264.3	23.6
Hollymead	C121	Car	2	2	0.1	4.1
	E121	Engine	410	405	152.1	22.5
	RS12	Ambulance	1115	1098	1042.2	56.9
	T121	Tanker	1	1	4.0	241.4
	TO121	Tower	23	23	7.7	20.2
	Hollymead Total		1551	1529	1206.2	47.3
Ivy	C151	Car	1	1	0.0	2.9

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	CHF150	Chief	28	28	13.3	28.6
	E151	Engine	437	436	155.8	21.4
	RS15	Ambulance	635	627	534.7	51.2
	Ivy Total		1,101	1,092	703.9	38.7
Monticello	C111	Car	1	1	0.4	24.3
	E111	Engine	687	683	266.3	23.4
	RS11	Ambulance	1,473	1,451	1,332.0	55.1
	SQ11	Squad	2	2	0.7	21.8
	Monticello Total		2,163	2,137	1,599.4	44.9
North Garden	B31	Brush	1	1	0.0	1.4
	B36	Brush	7	7	2.3	20.0
	C30	Car	88	87	42.0	29.0
	C31	Car	68	68	33.4	29.4
	CHF30	Chief	3	3	1.0	19.8
	CHF31	Chief	44	44	24.6	33.5
	CHF32	Chief	4	4	1.4	20.5
	CHF33	Chief	21	21	9.9	28.2
	E32	Engine	61	60	29.4	29.4
	E34	Engine	21	21	8.6	24.6
	U35	Utility	7	7	2.5	21.7
	U38	Utility	266	265	74.8	16.9
	North Garden Total		591	588	229.9	23.5
Pantops	RS16	Ambulance	795	785	684.6	52.3
	Pantops Total		795	785	684.6	52.3
Scottsville	B75	Brush	126	125	50.8	24.4
	C70	Car	22	22	17.6	48.0
	C71	Car	4	4	1.0	14.9
	C72	Car	2	2	1.9	56.7
	CHF70	Chief	5	5	3.6	43.3
	CHF71	Chief	1	1	0.6	37.3
	CHF72	Chief	12	12	6.7	33.6
	E72	Engine	52	52	14.4	16.6
	E73	Engine	70	70	24.2	20.7
	T79	Tanker	1	1	0.9	56.1
	U76	Utility	7	7	4.3	36.6
	Scottsville Total		302	301	126.0	25.1
Seminole	C82	Car	2	2	0.1	3.1
	C89	Car	299	295	81.2	16.5
	CHF80	Chief	18	18	6.7	22.4

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	CHF81	Chief	7	7	2.8	23.9
	CHF82	Chief	3	3	0.6	12.7
	CHF83	Chief	22	22	5.6	15.2
	CHF84	Chief	7	7	2.1	18.2
	CHF85	Chief	6	6	3.0	29.9
	E81	Engine	478	473	130.3	16.5
	E82	Engine	688	685	190.2	16.7
	E85	Engine	27	27	5.0	11.1
	TO88	Tower	49	49	16.7	20.4
	U86	Utility	1	1	0.8	49.6
	Seminole Total		1,607	1,595	445.2	16.7
Stony Point	B64	Brush	6	6	4.1	40.9
	C60	Car	3	3	1.8	35.4
	C61	Car	27	27	22.6	50.2
	C62	Car	4	4	2.1	31.2
	CHF60	Chief	39	39	18.9	29.1
	CHF61	Chief	5	5	1.8	21.9
	CHF62	Chief	16	16	6.8	25.6
	E61	Engine	86	86	44.6	31.1
	E62	Engine	117	114	70.2	36.9
	U65	Utility	3	3	5.7	114.5
	Stony Point Total		306	303	178.6	35.4
SVRS	C700	Car	1	1	1.3	77.3
	C708	Car	1	1	0.0	2.5
	RS7	Ambulance	347	344	419.2	73.1
	RS703	Ambulance	3	3	2.1	41.1
	RS705	Ambulance	162	160	189.6	71.1
	RS706	Ambulance	96	95	99.3	62.7
	RS707	Ambulance	172	171	179.3	62.9
	SVRS Total		782	775	890.8	69.0
WARS	C506	Car	96	96	50.9	31.8
	C507	Car	6	6	22.0	220.5
	C508	Car	687	684	287.3	25.2
	DUTY5	Utility	12	12	5.3	26.5
	GAT5	Gator	7	7	19.9	170.9
	RS501	Ambulance	714	707	637.3	54.1
	RS502	Ambulance	713	706	672.6	57.2
	RS503	Ambulance	192	192	162.0	50.6
	SQ505	Squad	31	31	13.5	26.0

Station	Unit	Unit Type	Number of Responses ¹	Responses with Time Data ²	Total Busy Hours	Average Busy Minutes per Response
	WR509	Water Rescue	1	1	7.5	448.3
	WARS Total		2,459	2,442	1,878.3	46.1
	Total		15,550	15,395	10,827.0	42.2

¹“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix, regardless of calculated busy time.

²“Responses with Time Data” reflects the number of responses in the CAD data file with available “AlarmDateTime” values and “InServiceDateTime” values.

ACFR dispatched multiple units to 51.6% of EMS related calls (4,525/8,764; Table 34). On average, 1.8 units were dispatched per EMS related call (15,550/8,764; Table 3).

Table 34: Number of Responding Units by EMS Related Call Type

Call Category	Number of Responding Units ¹							Total
	1	2	3	4	5	6	7 or more	
Aircraft Emergency	0	0	0	0	0	0	1	1
Alarm	98	71	33	7	0	0	0	209
Cardiac and Stroke	546	669	225	54	22	9	4	1,529
Difficulty Breathing	335	546	137	27	4	1	0	1,050
Fall and Injury	1,128	402	126	39	6	2	0	1,703
Illness and Other	1,760	513	160	43	2	0	0	2,478
MVC	64	362	221	126	64	22	18	877
Obvious Death	3	1	0	0	0	0	0	4
Overdose and Psychiatric	83	60	22	7	2	0	0	174
Seizure and Unconsciousness	194	370	114	22	2	0	0	702
Standby	28	5	4	0	0	0	0	37
Total	4,239	2,999	1,042	325	102	34	23	8,764
Percentage	48.4	34.2	11.9	3.7	1.2	0.4	0.3	100.0

¹Responses include the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix.

Transport

We analyzed outcomes of EMS calls through an examination of “AtHospitalDateTime” data available in the CAD data file. Calls were considered to be ACFR transport calls if at least one response associated with a call reported a date and time value in the “AtHospitalDateTime” field. All other calls were considered to be ACFR non-transport calls.

The number of EMS calls requiring transports totaled 5,826, averaging 16.0 transport calls per day (Table 35). Approximately 66.8% of EMS calls resulted in patients being transported to the hospital. Calls classified as “Illness and Other” had the highest transport rate at 76.8%, followed by calls classified as “Difficulty Breathing” at 74.9%.

Duration of a call is defined as the difference between the first ACFR unit “AlarmDateTime” and the last ACFR unit “InServiceDateTime.” On average, the duration of a non-transport EMS call was 32.2 minutes, and the average duration of a transport EMS call was 73.5 minutes.

Table 35: EMS Non-Transport and Transport Calls by Call Type

Call Category	Non-Transport		Transport		Total Number of Calls ¹	Transport Rate (%)
	Average Call Duration (Minutes)	Number of Calls ¹	Average Call Duration (Minutes) ²	Number of Calls ¹		
Aircraft Emergency	241.4	1	--	0	1	0.0
Alarm	12.6	190	74.8	19	209	9.1
Cardiac and Stroke	34.7	401	74.5	1,124	1,525	73.7
Difficulty Breathing	26.4	263	75.2	786	1,049	74.9
Fall and Injury	28.8	512	72.0	1,178	1,690	69.7
Illness and Other	29.2	572	72.2	1,890	2,462	76.8
MVC	33.6	591	78.5	286	877	32.6
Obvious Death	17.1	4	--	0	4	0.0
Overdose and Psychiatric	27.4	70	74.6	104	174	59.8
Seizure and Unconsciousness	26.1	261	74.1	439	700	62.7
Standby	268.2	37	--	0	37	0.0
Total	32.2	2,902	73.5	5,826	8,728	66.8

¹“Number of Calls” reflects an adjusted number of unique incidents to correspond with number of responses following the application of exclusion criteria, as noted in Table 71 in the Appendix.

²An additional call was excluded from this analysis due to a call duration that was nearly 30 days long (call ID 3033756).

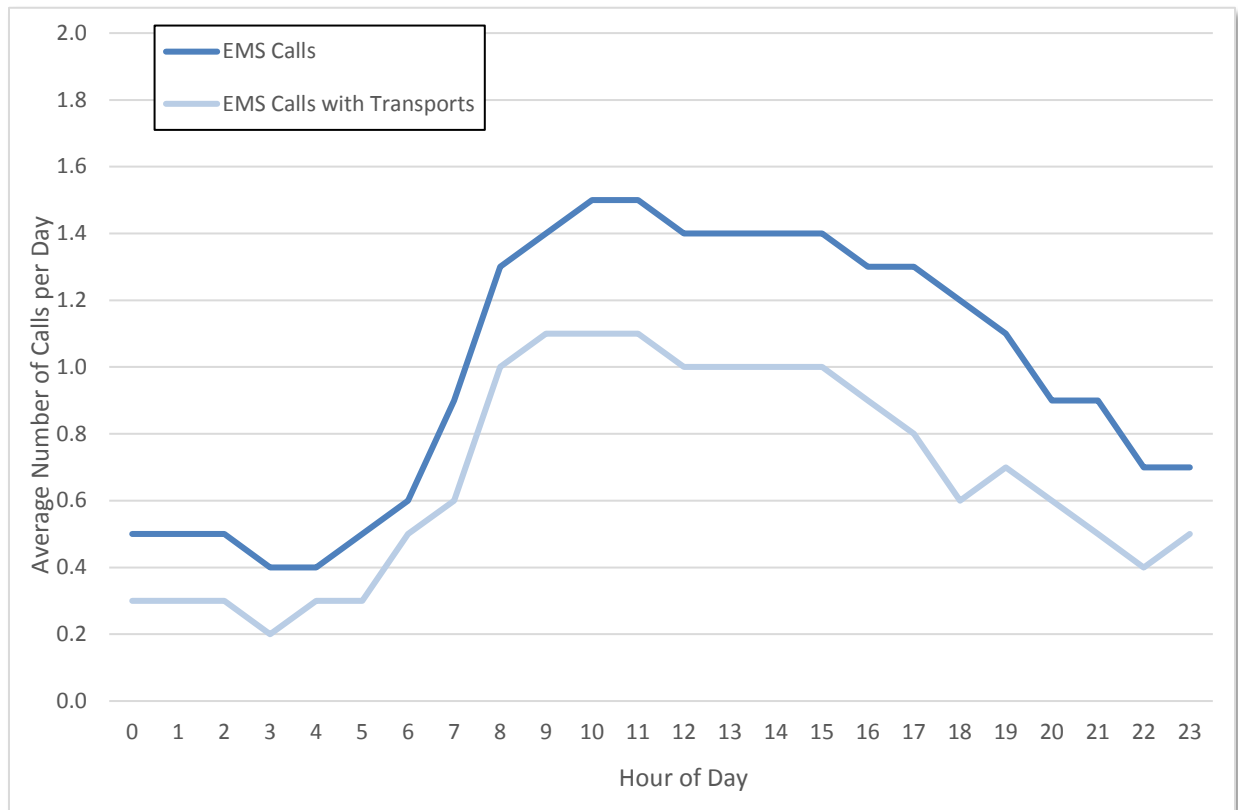
We also analyzed variation of total EMS requests and transport requests by hour of day (Table 36; Figure 39). The variation of total EMS requests and EMS transport requests followed a similar pattern. The busiest period for both EMS and EMS transport requests occurred from approximately 0900 to 1100. The peak transport rate occurred at 0600, wherein 182 of 233 EMS calls (78.1%) resulted in ACFR transporting one or more patients to the hospital per call.

Table 36: Total EMS Calls and EMS Calls with Transports and Average Calls per Day by Hour of Day

Hour of Day	Number of EMS Calls ¹	Number of EMS Calls with Transports ¹	Average EMS Calls per Day	Average EMS Calls with Transports per Day	Transport Rate (%)
0	197	122	0.5	0.3	61.9
1	184	106	0.5	0.3	57.6
2	168	103	0.5	0.3	61.3
3	143	84	0.4	0.2	58.7
4	131	92	0.4	0.3	70.2
5	165	114	0.5	0.3	69.1
6	233	182	0.6	0.5	78.1
7	338	230	0.9	0.6	68.0
8	486	363	1.3	1.0	74.7
9	526	400	1.4	1.1	76.0
10	539	406	1.5	1.1	75.3
11	542	391	1.5	1.1	72.1
12	510	368	1.4	1.0	72.2
13	517	361	1.4	1.0	69.8
14	527	351	1.4	1.0	66.6
15	524	347	1.4	1.0	66.2
16	485	329	1.3	0.9	67.8
17	482	296	1.3	0.8	61.4
18	427	223	1.2	0.6	52.2
19	419	239	1.1	0.7	57.0
20	331	204	0.9	0.6	61.6
21	334	188	0.9	0.5	56.3
22	268	162	0.7	0.4	60.4
23	252	165	0.7	0.5	65.5
Total	8,728	5,826	23.9	16.0	66.8

¹“Number of Calls” reflects an adjusted number of unique incidents to correspond with number of responses following the application of exclusion criteria, as noted in Table 71 in the Appendix.

Figure 39: Average Number of EMS Calls and EMS Calls with Transports per Day by Hour of Day



REVIEW OF SYSTEM PERFORMANCE

The first step in determining the current state of the system's deployment model is to establish baseline measures of performance. This analysis is crucial to the ability to discuss alternatives to the status quo and in identifying opportunities for improvement. This portion of the analysis will focus efforts on elements of response time and the cascade of events that lead to timely response with the appropriate apparatus and personnel to mitigate the event. Response time goals should be looked at in terms of total reflex time, or total response time, which includes the dispatch or call processing time, turnout time, and travel time.

Cascade of Events

The cascade of events is the sum of the individual elements of time beginning with a state of normalcy and continuing until normalcy is once again restored through the mitigation of the event. The elements of time that are important to the ultimate outcome of a structure fire or critical medical emergency begin with the initiation of the event. For example, the first onset of chest pain begins the biological and scientific time clock for heart damage irrespective of when 911 is notified. Similarly, a fire may begin and burn undetected for a period of time before the fire department is notified. The emergency response system does not have control over the time interval for recognition or the choice to request assistance.

Therefore, ACFR utilizes quantifiable "hard" data points to measure and manage system performance. These elements include alarm processing, turnout time, travel time, and the time spent on scene. An example of the cascade of events and the elements of performance utilized by ACFR is provided on the next page (Figure 40).¹

Detection

Detection is the element of time between the time an event occurs and someone detects it, and the emergency response system has been notified. This is typically accomplished by calling the 911 Primary Safety Answering Point (PSAP).

Call Processing

This is the element of time measured between when 911 answers the 911 call, processes the information, and subsequently dispatches ACFR.

¹ Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

Turnout Time

This is the element of time that is measured between the time the fire department is dispatched or alerted of the emergency incident, and the time when the ACFR unit is enroute to the call.

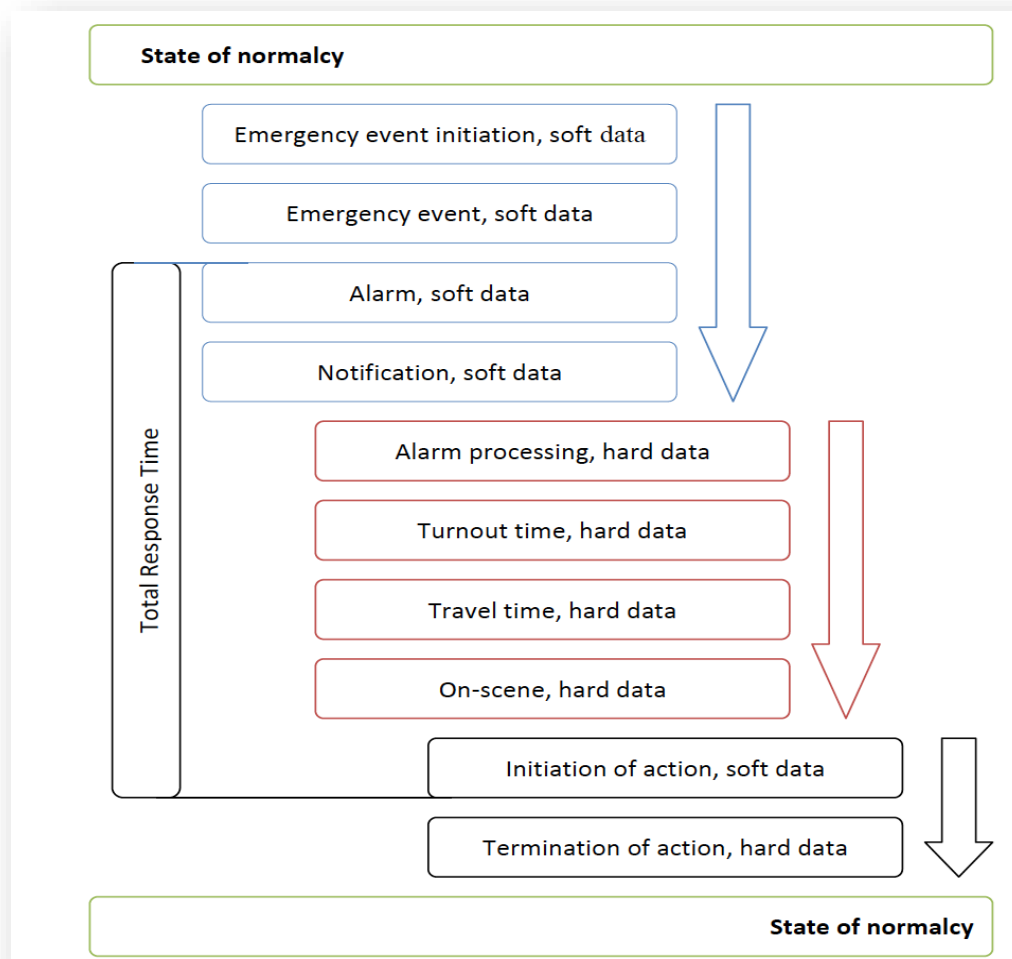
Travel Time

The travel time is the element of time between when the unit went enroute, or began to travel to the incident, and their arrival on scene.

Total Response Time

The total response time, or total reflex time, is the total time required to arrive on scene beginning with 911 answering the phone request for service and the time that the units arrive on scene.

Figure 40: Cascade of Events



Comparison of Workloads by Demand Zone

Another method for assessing the effectiveness of the distribution model is to analyze the demand for services across the distribution model. Workload is assessed at the station demand zone level by call volume and by response volume. For the purposes of these analyses, all calls were classified as either Fire or EMS only. Station demand zones were based upon “FireFirstDue,” “RescueFirstDueDay,” and “RescueFirstDueNight” entries in the CAD data file. Call volume reflects the number of incoming calls assigned to a first due station, whether or not a unit assigned to the first due station responded. Similarly, response volume reflects the number of responses made to incoming calls assigned to a first due station, whether or not these responses were made by units assigned to the first due station. Percent of department workload is calculated based on number of responses.

Analyses illustrate that Seminole was the top demand zone, requiring 21.4% of ACFR’s total responses to fire related calls, 25.5% of ACFR’s total responses to EMS related calls during the MFDAYLIGHT (MFD) period, and 26.0% of ACFR’s total responses to EMS related calls during the WEEKEND/EVENING (W/E) period (Table 37; Figure 41 through Figure 43). Crozet was the second highest demand zone for fire related calls, requiring 13.8% of ACFR’s total responses to fire related calls. Pantops was the second highest demand zone for EMS related calls during the MFD period, requiring 17.7% of ACFR’s total responses to EMS related calls during this time period. WARS was the second highest demand zone for EMS related calls during the W/E period, requiring 21.3% of ACFR’s total responses to EMS related calls during this time period.

Table 37: Department Workload by Station Demand Zone

Station Demand Zone	Number of Calls ¹			Number of Responses ²			Percent of Department Workload ³		
	Fire	EMS MFD	EMS W/E	Fire	EMS MFD	EMS W/E	Fire	EMS MFD	EMS W/E
Buckingham	--	10	15	--	24	27	--	0.3	0.3
CARS	--	41	903	--	58	1,706	--	0.6	17.3
City	92	--	--	138	--	--	2.2	--	--
Crozet	319	--	--	855	--	--	13.8	--	--
Earlysville	150	149	--	370	260	--	6.0	2.7	--
East Rivanna	329	--	--	701	--	--	11.3	--	--
Fluvanna	2	2	2	2	5	2	0.0	0.1	0.0
Greene	3	2	1	6	2	1	0.1	0.0	0.0
Hollymead	181	465	653	345	908	1,262	5.6	9.6	12.8
Ivy	276	436	--	525	949	--	8.5	10.0	--
Monticello	334	513	638	641	939	1,048	10.3	9.9	10.6

Station Demand Zone	Number of Calls ¹			Number of Responses ²			Percent of Department Workload ³		
	Fire	EMS MFD	EMS W/E	Fire	EMS MFD	EMS W/E	Fire	EMS MFD	EMS W/E
Nelson	4	3	1	8	4	2	0.1	0.0	0.0
North Garden	166	--	--	498	--	--	8.0	--	--
Orange	1	--	--	1	--	--	0.0	--	--
Pantops	--	967	--	--	1,672	--	--	17.7	--
Scottsville	189	--	--	527	--	--	8.5	--	--
Seminole	576	1,474	1,492	1,330	2,412	2,571	21.4	25.5	26.0
Stony Point	87	--	--	234	--	--	3.8	--	--
SVRS	--	367	524	--	675	1,115	--	7.1	11.3
WARS	--	682	913	--	1,511	2,108	--	16.0	21.3
Not Identified	14	16	20	24	42	43	0.4	0.4	0.4
Total	2,723	5,127	5,162	6,205	9,461	9,885	100.0	100.0	100.0

MFD = MFDAYLIGHT; W/E = WEEKEND/EVENING

¹“Number of Calls” reflects an adjusted number of unique incidents to correspond with number of responses following the application of exclusion criteria, as noted in Table 71 in the Appendix.

²“Number of Responses” reflects the total number of entries in the CAD data file following the application of exclusion criteria, as noted in Table 71 in the Appendix.

³“Percent of Department Workload” is calculated using “Number of Responses” values.

Figure 41: Department Workload by Station Demand Zone – Fire First Due Station

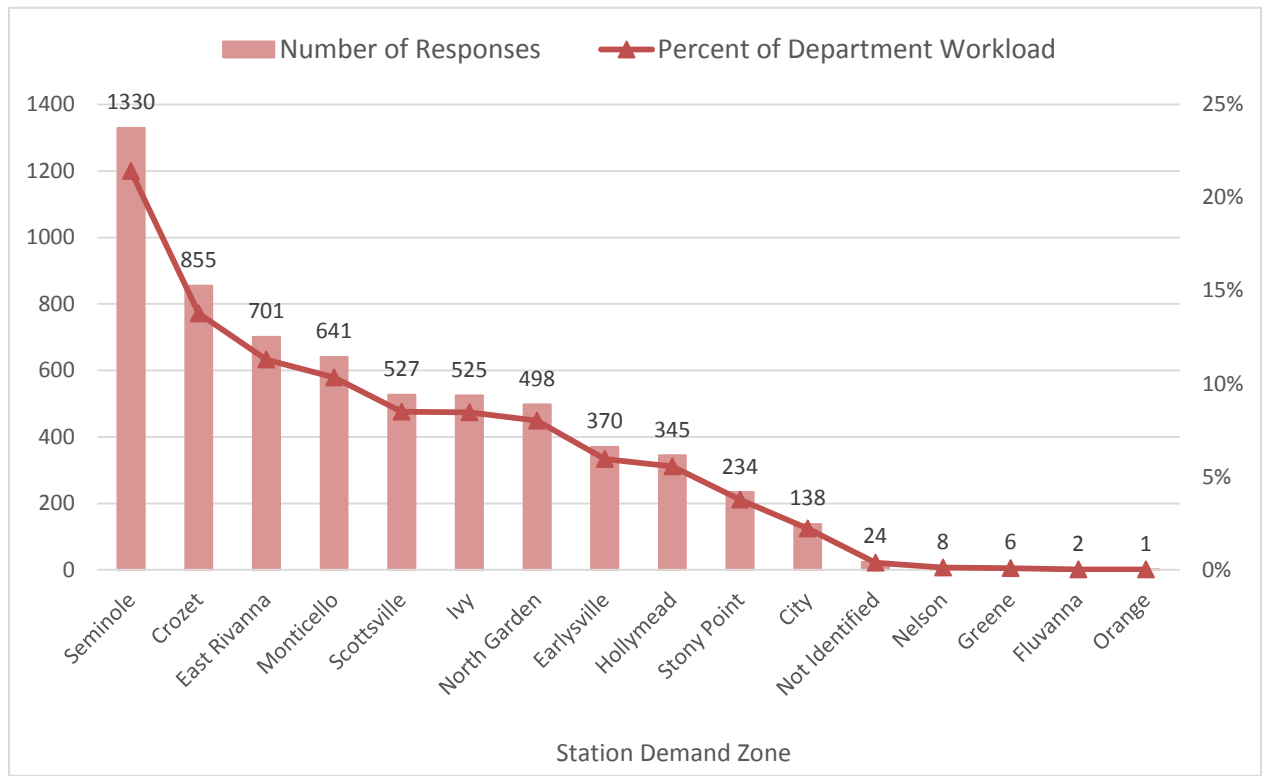


Figure 42: Department Workload by Station Demand Zone – EMS MFDAYLIGHT First Due Station

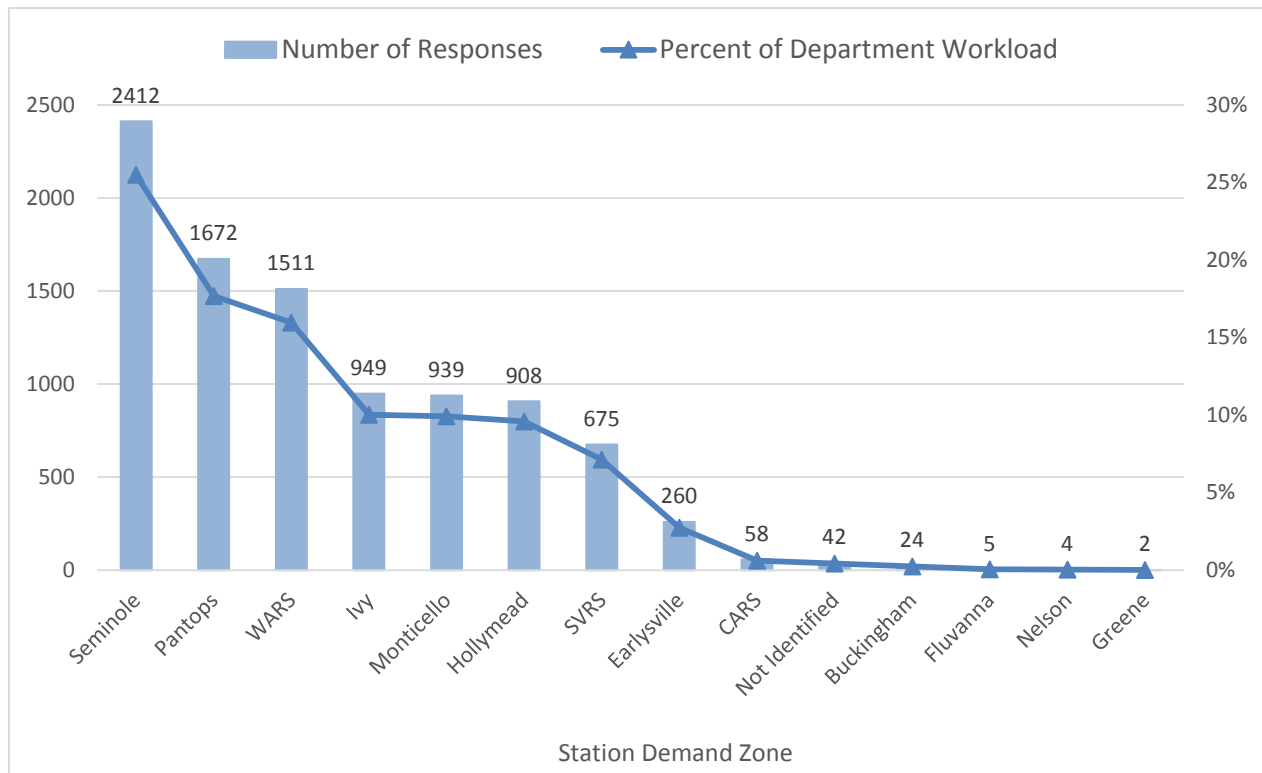
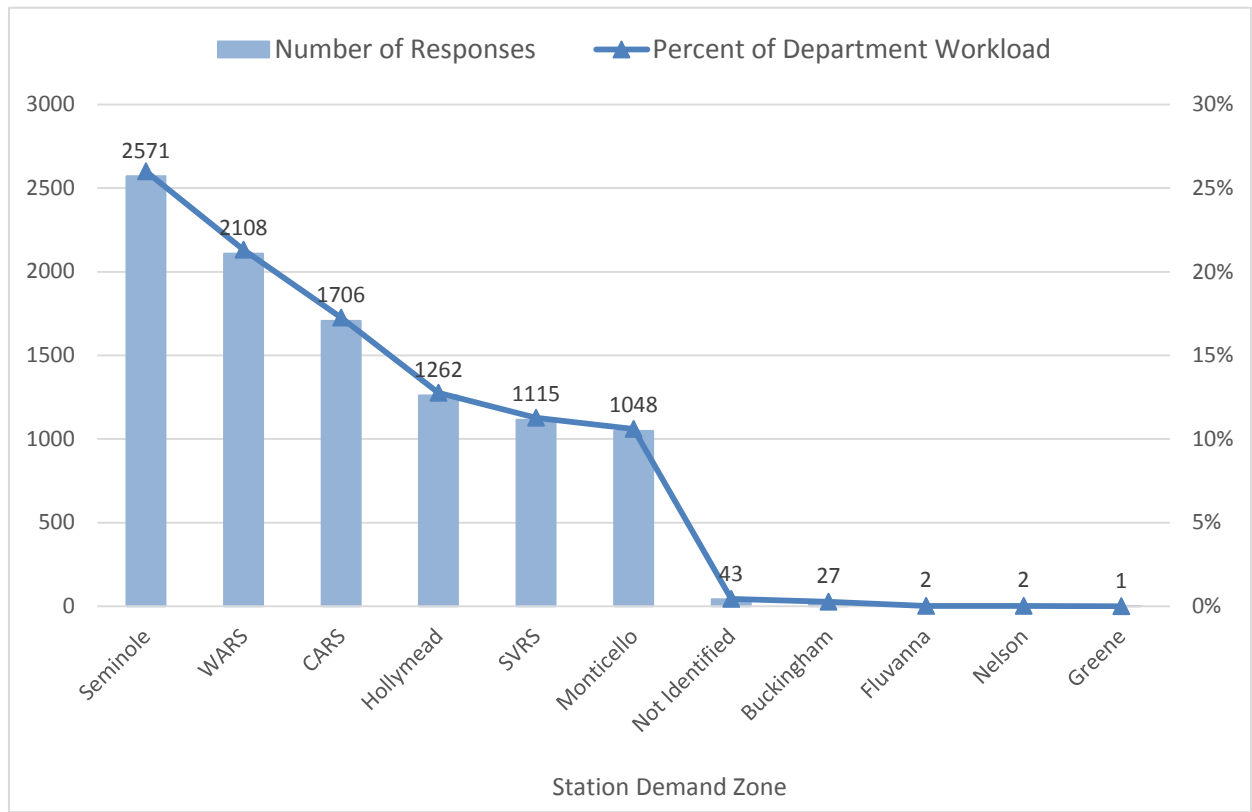


Figure 43: Department Workload by Station Demand Zone – EMS WEEKEND/EVENING First Due Station



Finally, workload by station demand zone and program was analyzed for both comparative purposes as well as for introspection into potential system failures (Table 38 through Table 40). For the purposes of these analyses, all calls were first classified as either Fire or EMS only to be able to associate the relevant “FireFirstDue,” “RescueFirstDueDay,” and “RescueFirstDueNight” entries in the CAD data file as the station demand zones. Calls were then further classified into expanded program areas under those two categories.

For calls originally classified as Fire to associate a “FireFirstDue” entry as the station demand zone, Seminole had the highest demand for services related to fire (1,133/5,416 responses; 20.9%), hazmat (151/589 responses; 25.6%), and rescue (26/40 responses; 65.0%) calls. Crozet had the second highest demand for services related to fire (707/5,416 responses; 13.1%), hazmat (113/589 responses; 19.2%), and rescue (7/40 responses; 17.5%) calls. Crozet had the highest demand for services related to agency assist (11/59 responses; 18.6%) and public service (17/101 responses; 16.8%) calls.

Table 38: Number of Responses by Station Demand Zone and Program - Fire First Due Station

Station Demand Zone	Program					Total
	Agency Assist	Fire	Hazmat	Public Service	Rescue	
City	8	113	13	3	1	138
Crozet	11	707	113	17	7	855
Earlsville	1	334	25	10	0	370
East Rivanna	0	616	77	8	0	701
Fluvanna	0	2	0	0	0	2
Greene	0	6	0	0	0	6
Hollymead	0	269	61	14	1	345
Ivy	7	473	37	8	0	525
Monticello	9	570	47	15	0	641
Nelson	0	8	0	0	0	8
North Garden	8	478	9	3	0	498
Orange	0	1	0	0	0	1
Scottsville	3	488	31	5	0	527
Seminole	6	1,133	151	14	26	1,330
Stony Point	6	198	21	4	5	234
Not Identified	0	20	4	0	0	24
Total	59	5,416	589	101	40	6,205

For calls originally classified as EMS and occurring during the MFDAYLIGHT period to associate a “RescueFirstDueDay” entry as the station demand zone, Seminole had the highest demand for services related to agency assist (135/505 responses; 26.7%), EMS (1,987/7,754 responses; 25.6%), police-related (84/371 responses; 22.6%), and public service (167/331 responses; 50.5%) calls. Hollymead had the highest demand for services related to fire calls as the EMS first due station, due to “Air Carrier Major Difficulty” calls (14/22 responses; 63.6%). Ivy had the highest demand for services related to rescue calls (95/475 responses; 20.0%).

Table 39: Number of Responses by Station Demand Zone and Program - EMS MFDAYLIGHT First Due Station

Station Demand Zone	Program							Total
	Agency Assist	EMS	Fire ¹	Hazmat	Police-Related	Public Service	Rescue	
Buckingham	0	16	0	0	5	3	0	24
CARS	15	35	1	0	6	1	0	58
Earlsville	8	209	0	0	4	8	31	260
Fluvanna	0	5	0	0	0	0	0	5
Greene	0	0	0	0	0	0	2	2
Hollymead	59	707	14	0	54	20	54	908
Ivy	71	715	0	3	47	18	95	949
Monticello	65	784	2	0	37	16	35	939
Nelson	0	1	0	0	0	0	3	4
Pantops	55	1,452	1	0	55	21	88	1,672
Seminole	135	1,987	4	0	84	167	35	2,412
SVRS	44	542	0	0	15	15	59	675
WARS	49	1,269	0	0	59	61	73	1,511
Not Identified	4	32	0	0	5	1	0	42
Total	505	7,754	22	3	371	331	475	9,461

¹CAD call types of “Air Carrier Major Difficulty” and “Elevator Emerg w/out Patient” were originally classified as “ResponseType” EMS in the CAD data file, and retained as EMS response types for the first wave of classifications into either Fire or EMS categories in order to determine the appropriate first due station variable to use (i.e., “FireFirstDue,” “RescueFirstDueDay,” or “RescueFirstDueNight”); these call types were later classified into the program area Fire, however, during the second wave of classifications.

For calls originally classified as EMS and occurring during the WEEKEND/EVENING period to associate a “RescueFirstDueNight” entry as the station demand zone, Seminole had the highest demand for services related to agency assist (201/711 responses; 28.3%), EMS (2,104/7,796; 27.0%), and public service (123/266 responses; 46.2%) calls. CARS had the highest demand for services related to fire calls as the EMS first due station, due to “Aircraft Crash” calls (21/29 responses; 72.4%). CARS also had the highest demand for services for police-related (153/543 responses; 28.2%) and rescue (155/535 responses; 29.0%) calls.

Table 40: Number of Responses by Station Demand Zone and Program - EMS WEEKEND/EVENING First Due Station

Station Demand Zone	Program							Total
	Agency Assist	EMS	Fire ¹	Hazmat	Police-Related	Public Service	Rescue	
Buckingham	0	22	0	0	0	0	5	27
CARS	166	1,185	21	0	153	26	155	1,706
Fluvanna	1	0	0	0	0	0	1	2
Greene	0	1	0	0	0	0	0	1
Hollymead	76	1,019	0	0	69	36	62	1,262
Monticello	62	879	1	2	46	17	41	1,048
Nelson	0	2	0	0	0	0	0	2
Seminole	201	2,104	7	3	96	123	37	2,571
SVRS	64	881	0	0	69	18	83	1,115
WARS	137	1,678	0	0	103	46	144	2,108
Not Identified	4	25	0	0	7	0	7	43
Total	711	7,796	29	5	543	266	535	9,885

¹CAD call types of “Aircraft Crash” and “Elevator Emerg w/out Patient” were originally classified as “ResponseType” EMS in the CAD data file, and retained as EMS response types for the first wave of classifications into either Fire or EMS categories in order to determine the appropriate first due station variable to use (i.e., “FireFirstDue,” “RescueFirstDueDay,” or “RescueFirstDueNight”); these call types were later classified into the program area Fire, however, during the second wave of classifications.

Another measure, time on task, is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) values represent the proportion of the work period (24 hours) that is utilized responding to requests for service.

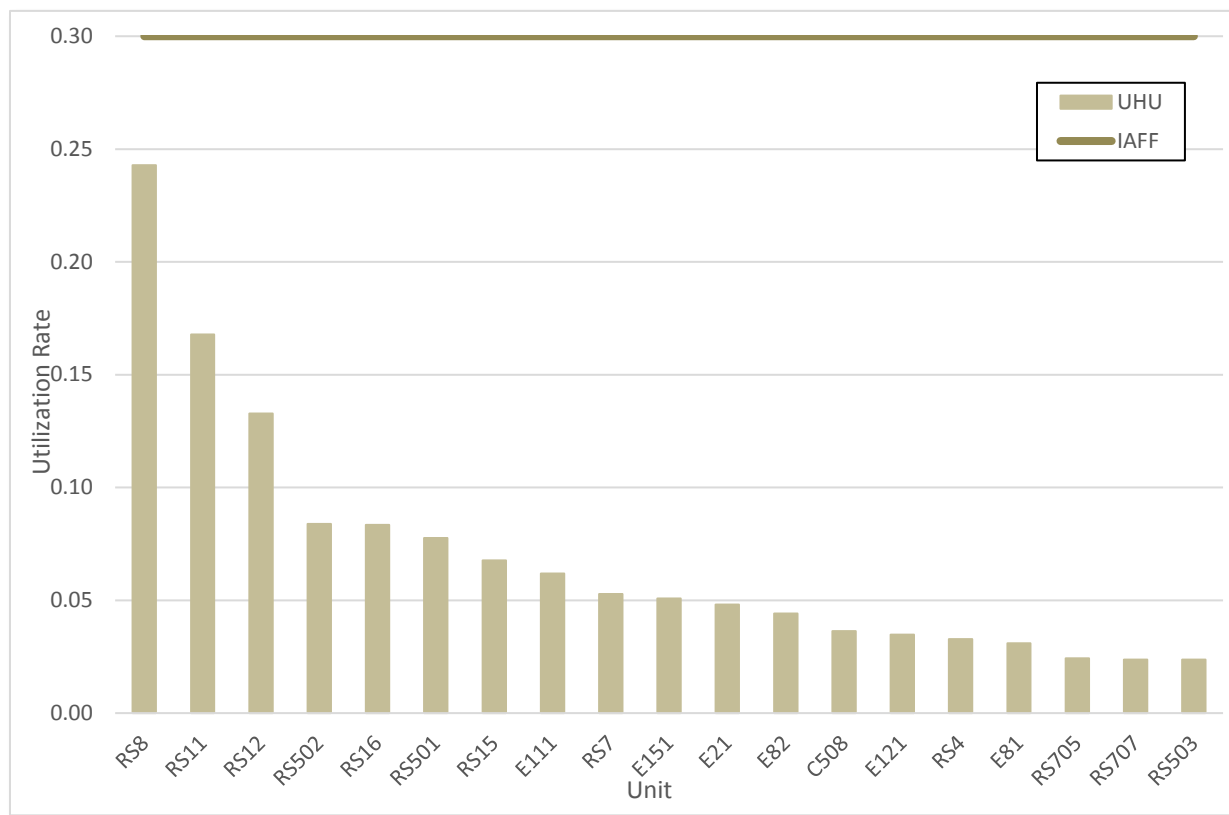
Historically, the International Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.30, or 30% workload as an upper threshold.² In other words, this recommendation would have personnel spend no more than 7.2 hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire inspections. The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, FITCH recommends that an upper unit utilization threshold of approximately 0.30, or 30%, would be considered best practice. In other

² International Association of Firefighters. (1995). *Emergency Medical Services: A Guidebook for Fire-Based Systems*. Washington, DC: Author. (p. 11)

words, units and personnel should not exceed 30%, or 7.2 hours, of their work day responding to calls. These recommendations are also validated in the literature. For example, in their review of the City of Rolling Meadows, the Illinois Fire Chiefs Association utilized a UHU threshold of 0.30 as an indication to add additional resources.³ Similarly, in a standards of cover study facilitated by the Center for Public Safety Excellence, the Castle Rock Fire and Rescue Department utilizes a UHU of 0.30 as the upper limit in their standards of cover due to the necessity to accomplish other non-emergency activities.⁴

UHU analyses included all ACFR units, and all units were considered to be 24-hour units; however, only units with UHU values > 0.02 are presented in Figure 44 below. All units had UHU values below 0.30.

Figure 44: Unit Hour Utilization



³ Illinois Fire Chiefs Association. (2012). *An Assessment of Deployment and Station Location: Rolling Meadows Fire Department*. Rolling Meadows, Illinois: Author. (pp. 54-55)

⁴ Castle Rock Fire and Rescue Department. (2011). *Community Risk Analysis and Standards of Cover*. Castle Rock, Colorado: Author. (p. 58)

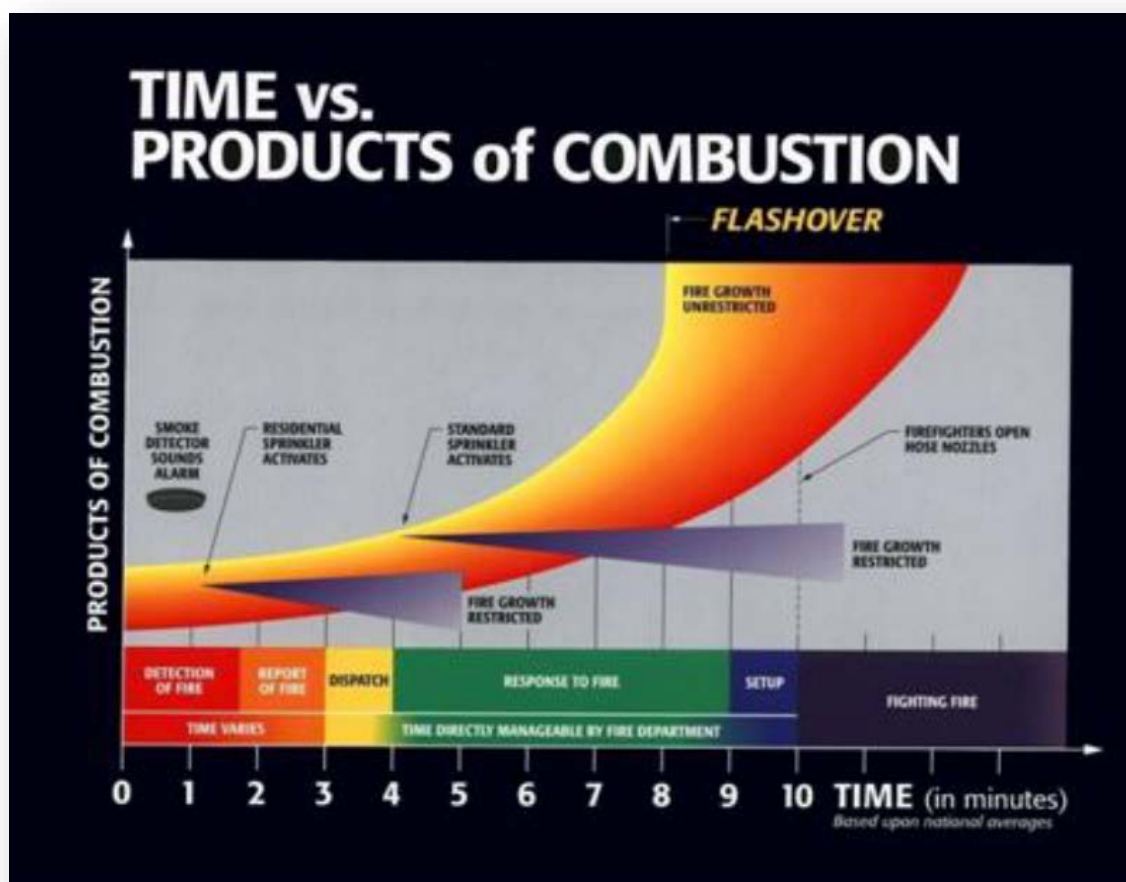
RESPONSE TIME CONTINUUM

Fire

The number one priority with structural fire incidents is to save lives followed by the minimization of property damage. A direct relationship exists between the timeliness of the response and the survivability of unprotected occupants and property damage. The most identifiable point of fire behavior is flashover.

Flashover is the point in fire growth where the contents of an entire area, including the smoke, reach their ignition temperature, resulting in a rapid-fire growth rendering the area un-survivable by civilians and untenable for firefighters. Best practices would result in the fire department arriving and attacking the fire prior to the point of flashover. A representation of the traditional time temperature curve and the cascade of events is provided in Figure 45.⁵

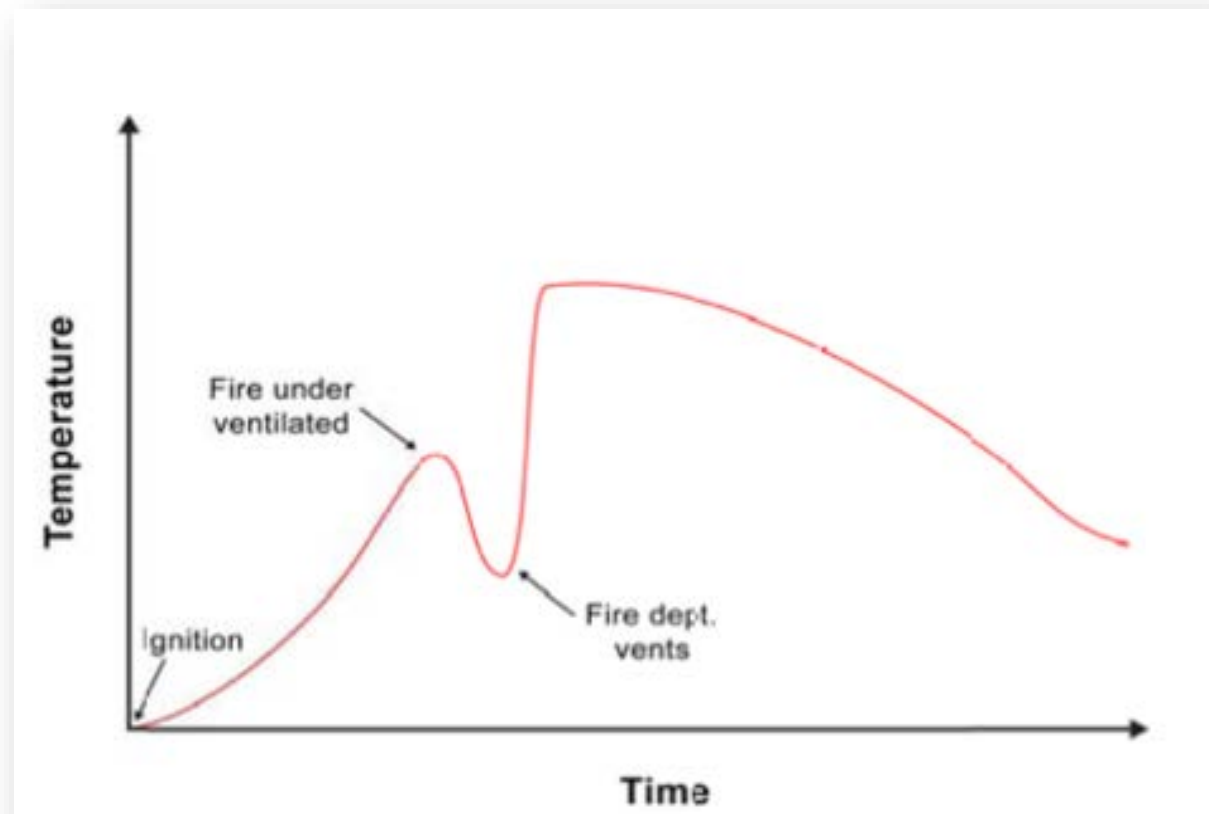
Figure 45: Example of Traditional Time Temperature Curve



⁵ Example of Traditional Time Temperature Curve. Retrieved at <http://www.usfa.fema.gov/downloads/pdf/coffee-break/time-vs-products-of-combustion.pdf>

Recent studies by Underwriter's Laboratories (UL) have found that in compartment fires such as structure fires, flashover occurs within four minutes in modern fire environment. In addition, the UL research has identified an updated time temperature curve due to fires being ventilation-controlled rather than fuel-controlled as represented in the traditional time temperature curve. While this ventilation-controlled environment continues to provide a high risk to unprotected occupants to smoke and high heat, it does provide some advantage to property conservation efforts, as water may be applied to the fire prior to ventilation and the subsequent flashover. An example of UL's ventilation-controlled time temperature curve is provided in Figure 46.⁶

Figure 46: Ventilation-Controlled Time Temperature Curve



EMS

The effective response to EMS incidents also has a direct correlation to the ability to respond within a specified period of time. However, unlike structure fires, responding to EMS incidents introduces considerable variability in the level of clinical acuity. From this perspective, the association of response time and clinical outcome varies depending on the severity of the injury or the illness. Research has demonstrated that the overwhelming majority of requests for EMS are not time

⁶ UL/NIST Ventilation Controlled Time Temperature Curve. Retrieved from http://www.nist.gov/fire/fire_behavior.cfm

sensitive between five minutes and 11 minutes for emergency responses and 13 minutes for non-emergency responses.⁷ The 12-minute upper threshold is only the upper limit of the available research and is not a clinically significant time measure, as patients were not found to have a significantly different clinical outcome when the 12-minute threshold was exceeded.⁸

Out-of-hospital sudden cardiac arrest is the most identifiable and measured incident type for EMS. In an effort to demonstrate the relationship between response time and clinical outcome, a representation of the cascade of events and the time to defibrillation (shock) is presented in Figure 47. The American Heart Association (AHA) has determined that brain damage will begin to occur between four and six minutes and become irreversible after ten minutes without intervention.

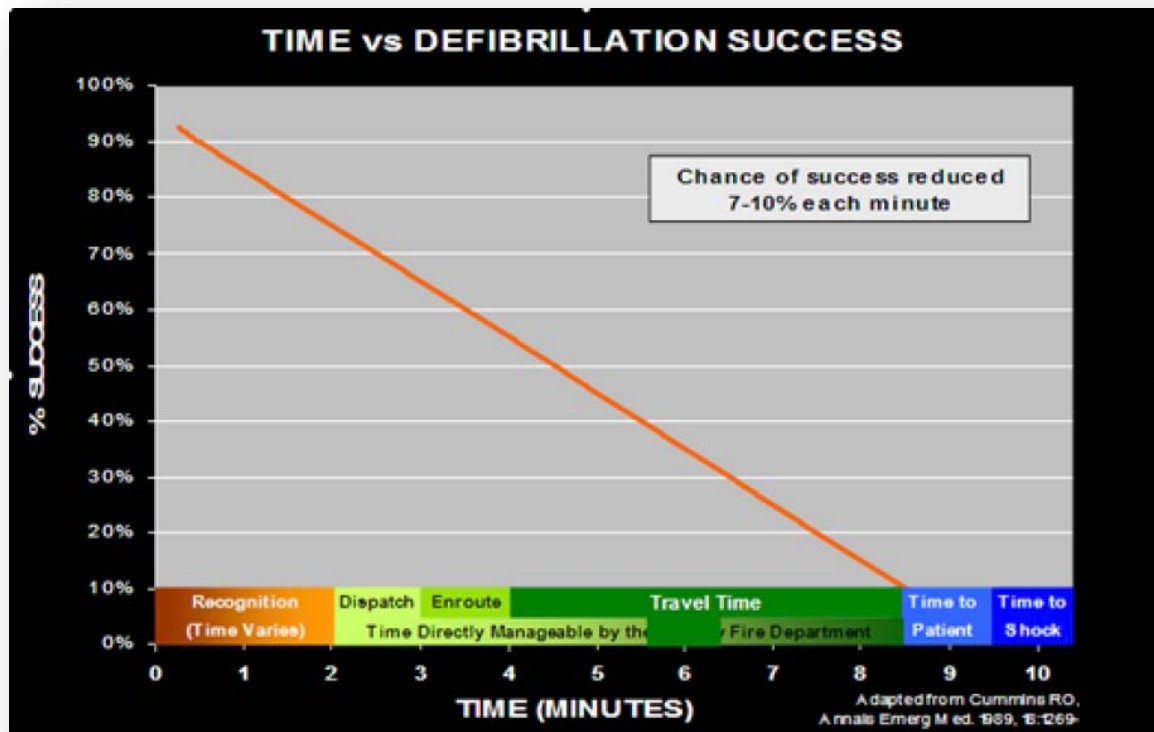
Modern sudden cardiac arrest protocols recognize that high quality Cardio-Pulmonary Resuscitation (CPR) at the Basic Life Support (BLS) level is a quality intervention until defibrillation can be delivered in shockable rhythms. Figure 47 below⁹ is representative of a sudden cardiac arrest that is presenting in a shockable heart rhythm such as Ventricular Fibrillation or Ventricular Tachycardia.

⁷ Blackwell, T.H., & Kaufman, J.S. (April 2002). Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Academic Emergency Medicine*, 9(4): 289-295.

⁸ Blackwell, T.H., et al. (Oct-Dec 2009). Lack of association between prehospital response times and patient outcomes. *Prehospital Emergency Care*, 13(4): 444-450.

⁹ Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

Figure 47: Cascade of Events for Sudden Cardiac Arrest with Shockable Rhythm



DESCRIPTION OF FIRST ARRIVING UNIT PERFORMANCE

Additional analyses related to the response characteristics of first arriving units were conducted. The analyses in this first section focused on emergency (lights and sirens) responses from primary front-line units arriving first on scene, irrespective of station demand zone, for all distinct incidents. Call status as emergency or non-emergency was assigned per call type by ACFR and was based on “CADCallType” from the CAD data file. Units were identified as primary front-line units by ACFR. Due to the restriction of these analyses to select responses and units, maximum available sample size for these analyses is 10,589.

To first recap the data presented in Table 12, Figure 6, and Table 13, ACFR had an overall average dispatch time of 2.8 minutes, and a dispatch time of 4.4 minutes at the 90th percentile (Table 41). Overall, ACFR had an average turnout time of 1.4 minutes, and a turnout time of 2.4 minutes at the 90th percentile. A total of 40.5% of calls experienced turnout times of one minute or less, and 84.0% of calls experienced turnout times of two minutes or less (Figure 48). The overall average travel time was 6.8 minutes; performance at the 90th percentile for travel time was 13.2 minutes. A total of 17.4% of calls experienced travel times of three minutes or less, and 32.2% of calls experienced travel times of four minutes or less (Figure 49). The average response time was 10.8 minutes; performance at the 90th percentile for response time was 18.6 minutes.

Table 41: Description of First Arriving Unit Emergency Response Performance in Minutes

Measure	Average	90th Percentile	Sample Size
Dispatch Time	2.8	4.4	10,589
Turnout Time	1.4	2.4	10,410
Travel Time	6.8	13.2	10,410
Response Time	10.8	18.6	10,589

Figure 48: Distribution of Turnout Time of First Arriving Unit

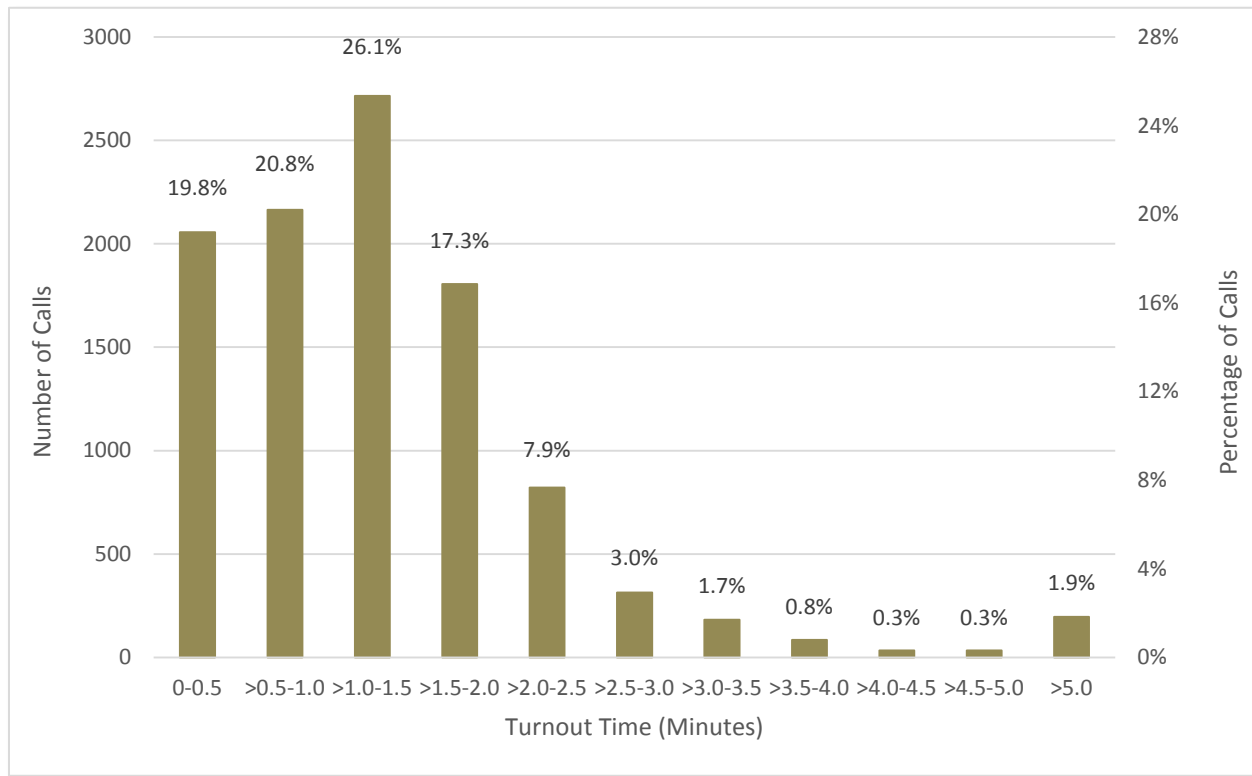
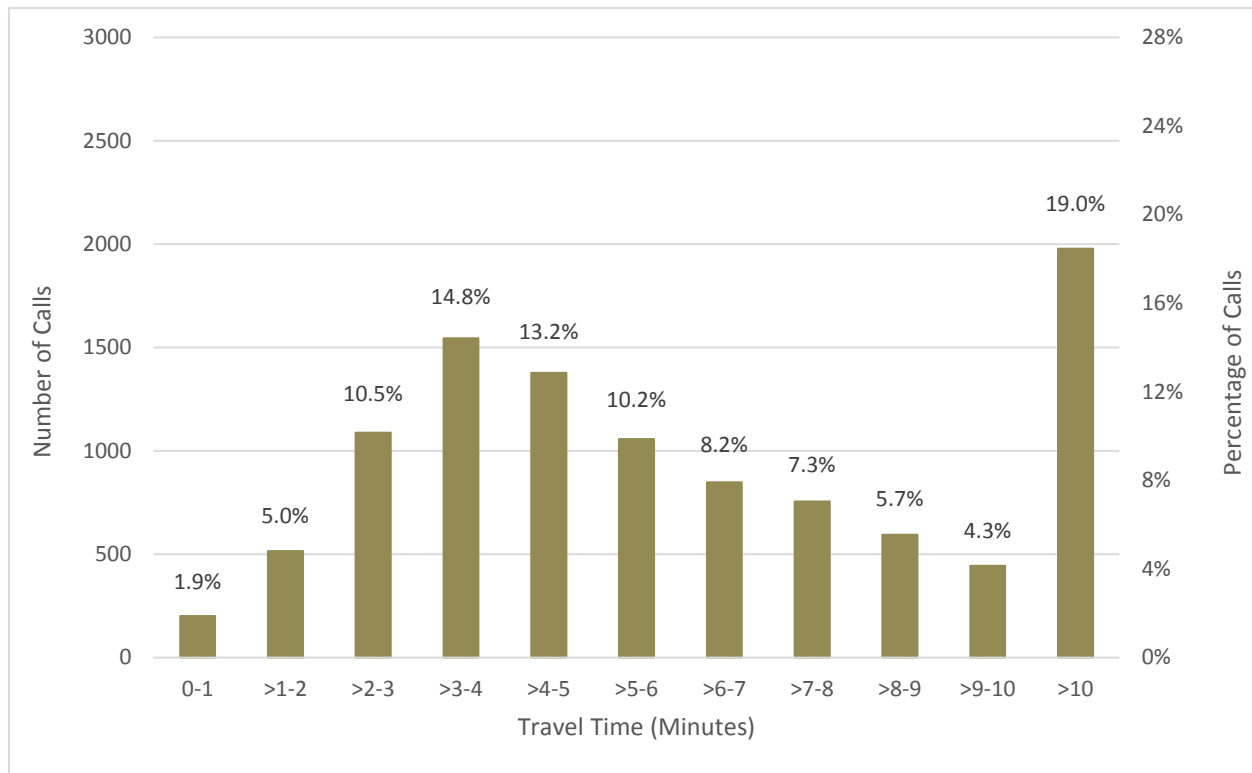


Figure 49: Distribution of Travel Time of First Arriving Unit



National recommendations provide differentiation between EMS and fire/special operations incidents. For example, the best practice for an EMS incident is a turnout time of 60 seconds or less 90% of the time. Due to the necessity to don personal protective equipment prior to responding to fire related incidents, best practices provide either 80 seconds (NFPA) or 90 seconds (CFAI) or less at the 90th percentile for turnout times associated with fire calls. Therefore, turnout time and travel time is also reported by the major program areas of EMS and fire.

For EMS incidents, ACFR had an average turnout time of 1.3 minutes (Table 12), and a turnout time of 2.3 minutes at the 90th percentile (Table 13). A total of 41.1% of calls experienced turnout times of one minute or less, and 85.4% of calls experienced turnout times of two minutes or less (Figure 50). The average travel time for EMS incidents was 6.8 minutes; performance at the 90th percentile for travel time was 13.3 minutes. A total of 17.8% of calls experienced travel times of three minutes or less, and 32.9% of calls experienced travel times of four minutes or less (Figure 51). The average response time for EMS calls was 10.5 minutes; performance at the 90th percentile for response time was 18.2 minutes.

For fire related incidents, ACFR had an average turnout time of 1.6 minutes (Table 12), and a turnout time of 3.0 minutes at the 90th percentile (Table 13). A total of 37.6% of calls experienced turnout times of one minute or less, and 78.3% of calls experienced turnout times of two minutes or less (Figure 52). The average travel time for fire related incidents was 6.6 minutes; performance at the 90th percentile for travel time was 12.2 minutes. A total of 17.4% of calls experienced travel times of three minutes or less, and 31.6% of calls experienced travel times of four minutes or less (Figure 53). The average response time for fire related calls was 10.7 minutes; performance at the 90th percentile for response time was 18.2 minutes.

Figure 50: Distribution of Turnout Time for EMS Incidents

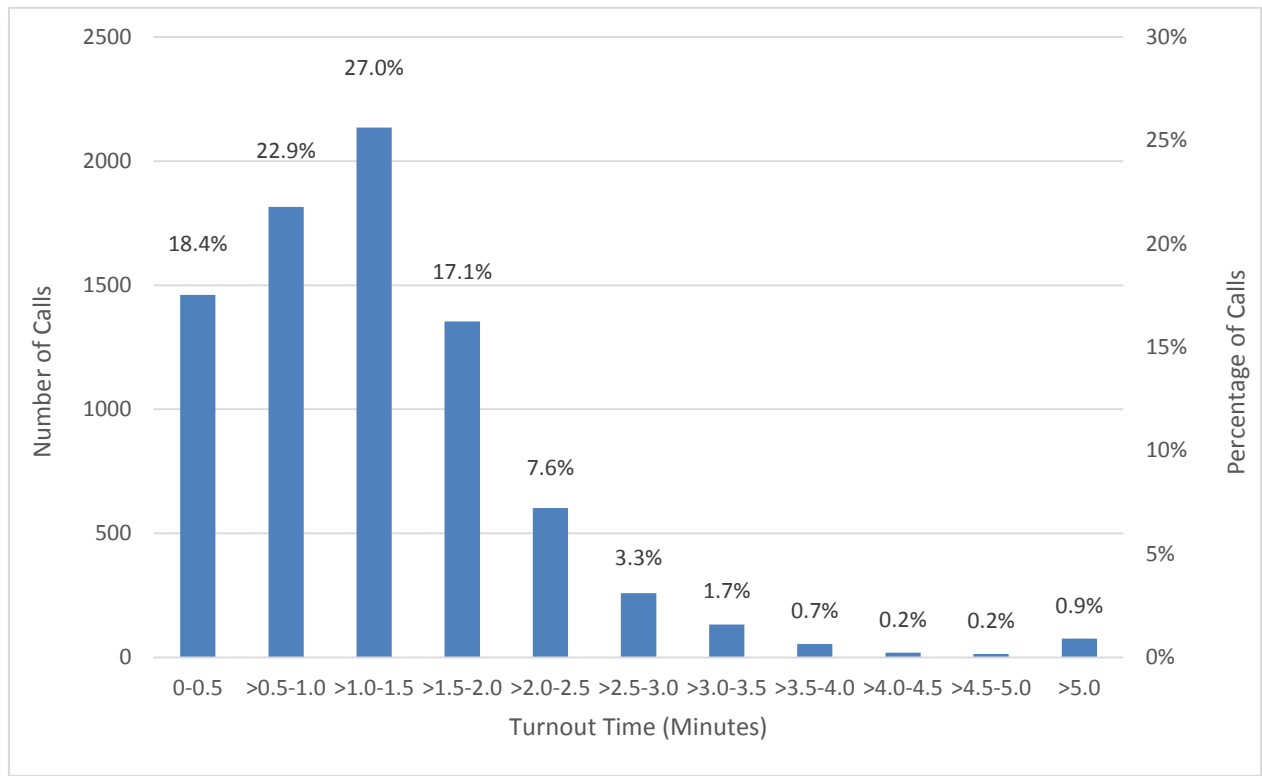


Figure 51: Distribution of Travel Time for EMS Incidents

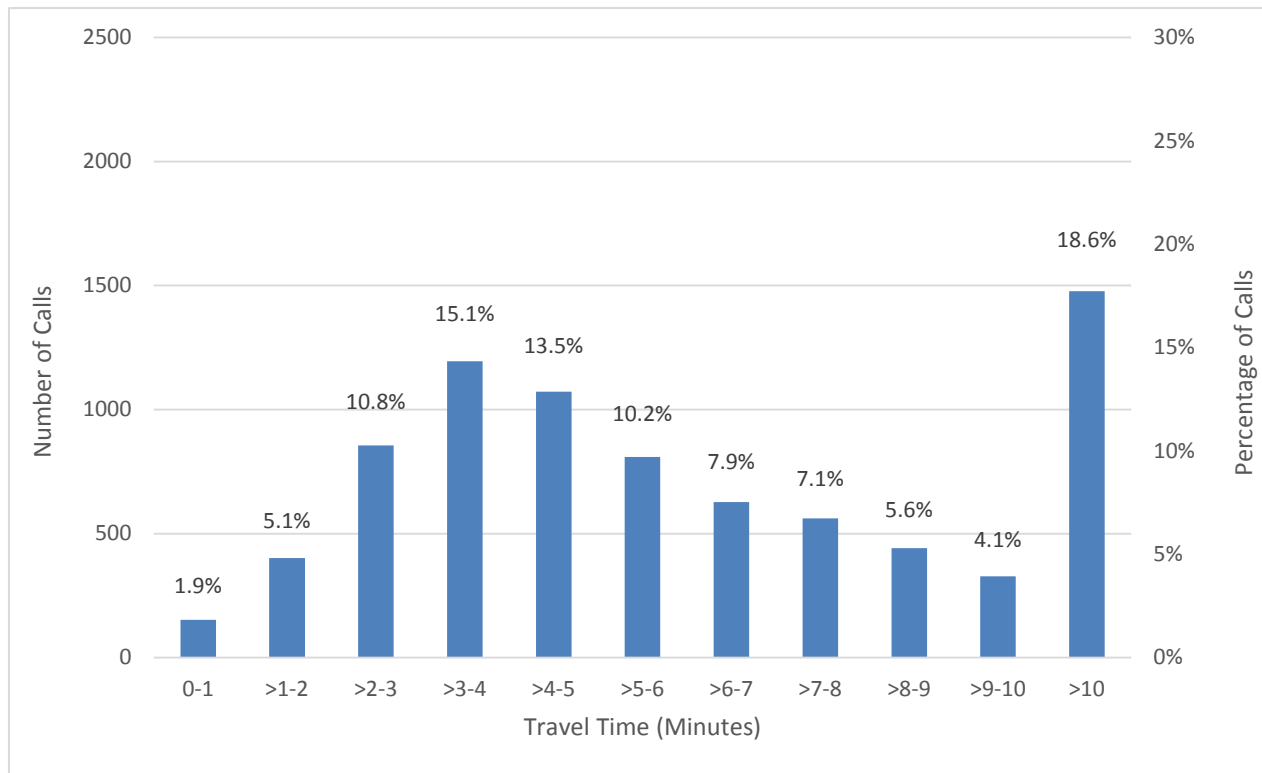


Figure 52: Distribution of Turnout Time for Fire Related Incidents

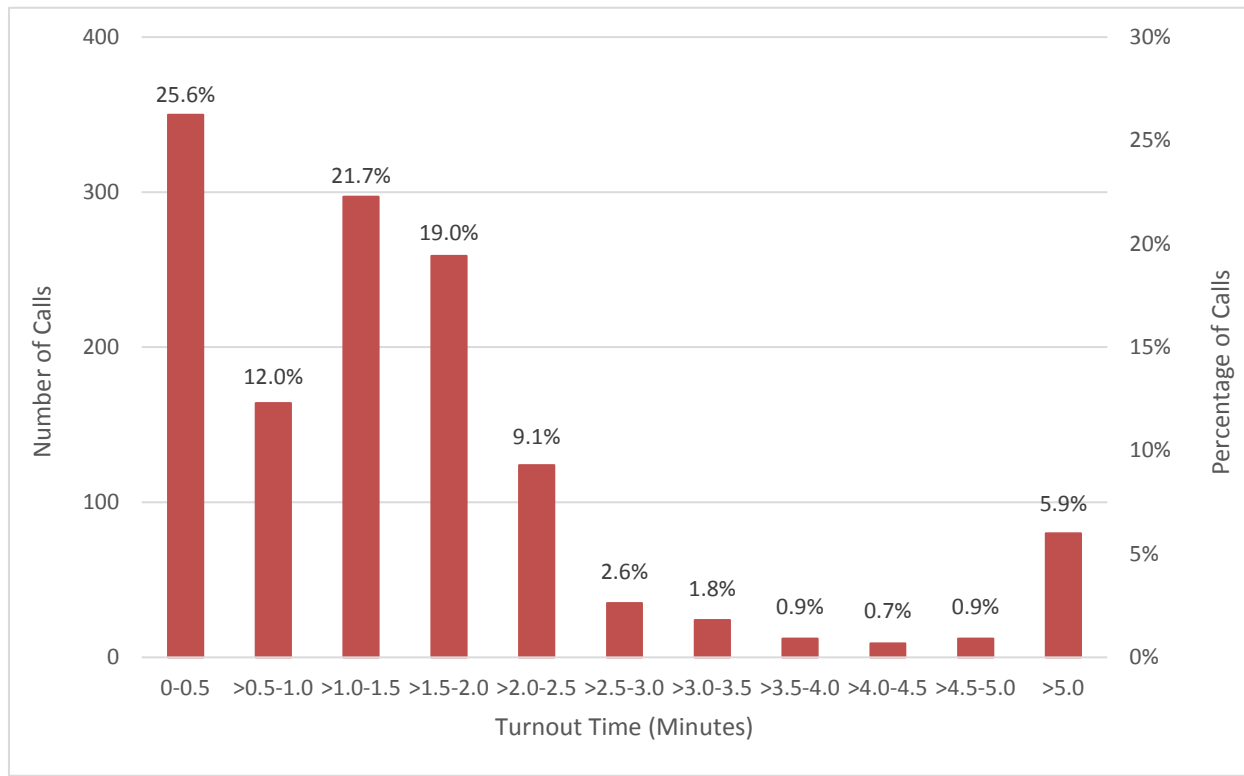
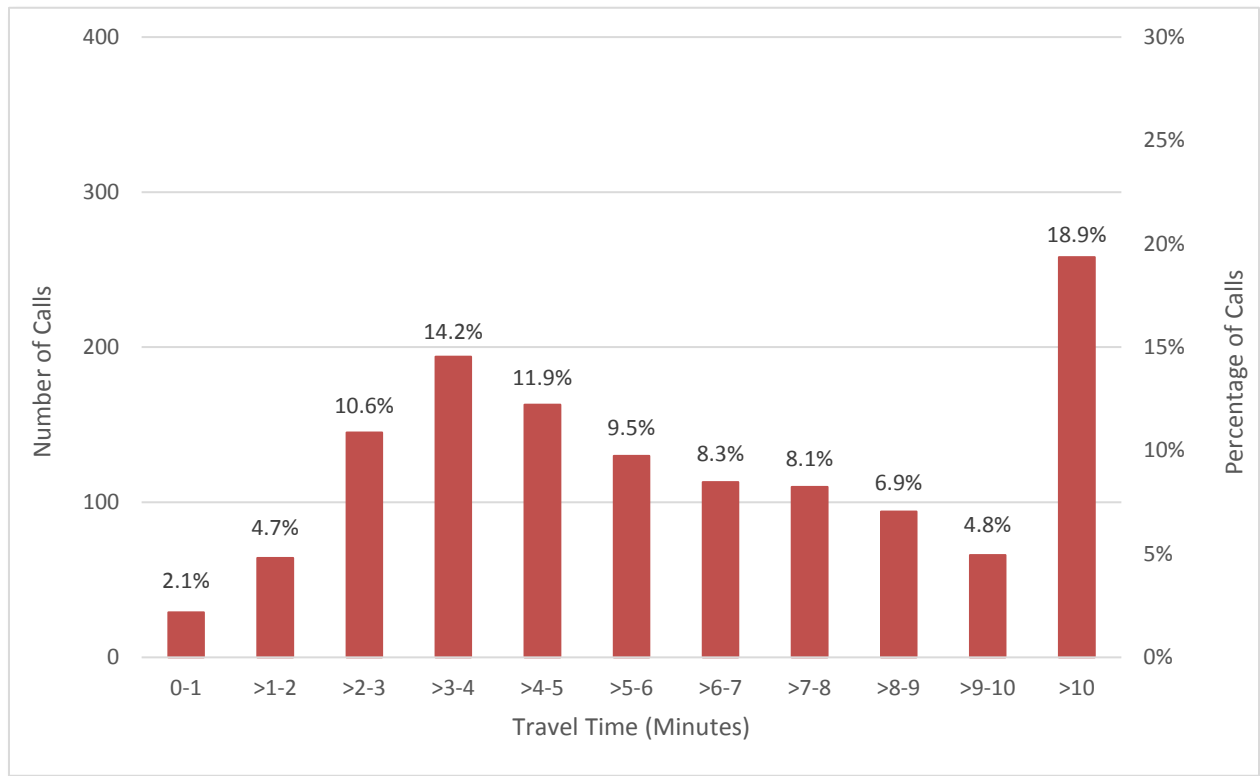


Figure 53: Distribution of Travel Time for Fire Related Incidents



First Arriving Unit Response Time by Station Demand Zone

Further analyses were conducted by station demand zone to measure the performance of the first arriving primary front-line units to emergency calls in each demand zone by “FireFirstDue” for fire related calls, by “RescueFirstDueDay” for EMS related calls during the MFDAYLIGHT period, and by “RescueFirstDueNight” for EMS related calls during the WEEKEND/EVENING period, regardless of where the unit is assigned or originated. Performance times are reported at both the average and 90th percentile values.

With respect to turnout time for fire related calls, first arriving primary front-line units responding to calls in the demand zone for fire first due station Stony Point had the lowest average turnout time at 0.9 minutes (1.9 minutes at the 90th percentile; Table 42; Table 43; Figure 54; Figure 55). First arriving primary front-line units responding to calls in the demand zone for fire first due station North Garden had the highest average turnout time at 4.0 minutes (9.3 minutes at the 90th percentile).

With respect to travel time for fire related calls, first arriving primary front-line units responding to calls in the demand zone for fire first due station Seminole had the lowest average travel time at 4.4 minutes (7.5 minutes at the 90th percentile). First arriving primary front-line units responding to calls in the demand zone for fire first due station Scottsville had the highest average travel time at 9.5 minutes (16.3 minutes at the 90th percentile).

Table 42: Average First Arrival Performance in Minutes – Fire First Due Station

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size ¹
City	5.8	1.7	7.4	14.3	40
Crozet	4.6	2.3	7.1	14.0	168
Earlysville	2.6	2.0	9.3	13.7	85
East Rivanna	2.6	1.3	8.4	12.2	198
Hollymead	2.1	1.5	6.0	9.5	103
Ivy	4.2	1.3	6.8	12.3	164
Monticello	2.4	1.1	6.5	9.8	196
North Garden	5.6	4.0	8.4	17.9	65
Scottsville	6.1	3.0	9.5	18.3	73
Seminole	2.7	1.3	4.4	8.2	430
Stony Point	2.6	0.9	9.1	12.7	43
Total²	3.3	1.6	6.7	11.5	1,574

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per first due station noted; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

²Responses associated with station demand zones Fluvanna (n=1), Greene (n=2), Nelson (n=3), and Not Identified (n=3) are not presented individually in the table, but are included in the total values.

Table 43: 90th Percentile First Arrival Performance in Minutes - Fire First Due Station

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size ¹
City	16.9	2.7	12.2	24.3	40
Crozet	9.0	7.1	12.7	20.3	168
Earlysville	5.8	4.7	16.8	21.6	85
East Rivanna	4.3	2.4	13.4	17.5	198
Hollymead	4.6	2.5	11.5	16.1	103
Ivy	3.4	2.0	11.6	15.6	164
Monticello	3.6	1.8	11.2	16.8	196
North Garden	12.0	9.3	15.7	24.7	65
Scottsville	12.3	9.4	16.3	28.8	73
Seminole	4.7	2.2	7.5	11.6	430
Stony Point	4.5	1.9	17.2	21.4	43
Total²	6.2	3.1	12.3	18.9	1,574

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per first due station noted; sample sizes corresponding to individual table values may be slightly lower due to missing time data.

²Responses associated with station demand zones Fluvanna (n=1), Greene (n=2), Nelson (n=3), and Not Identified (n=3) are not presented individually in the table, but are included in the total values.

Figure 54: Average First Arrival Performance in Minutes - Fire First Due Station

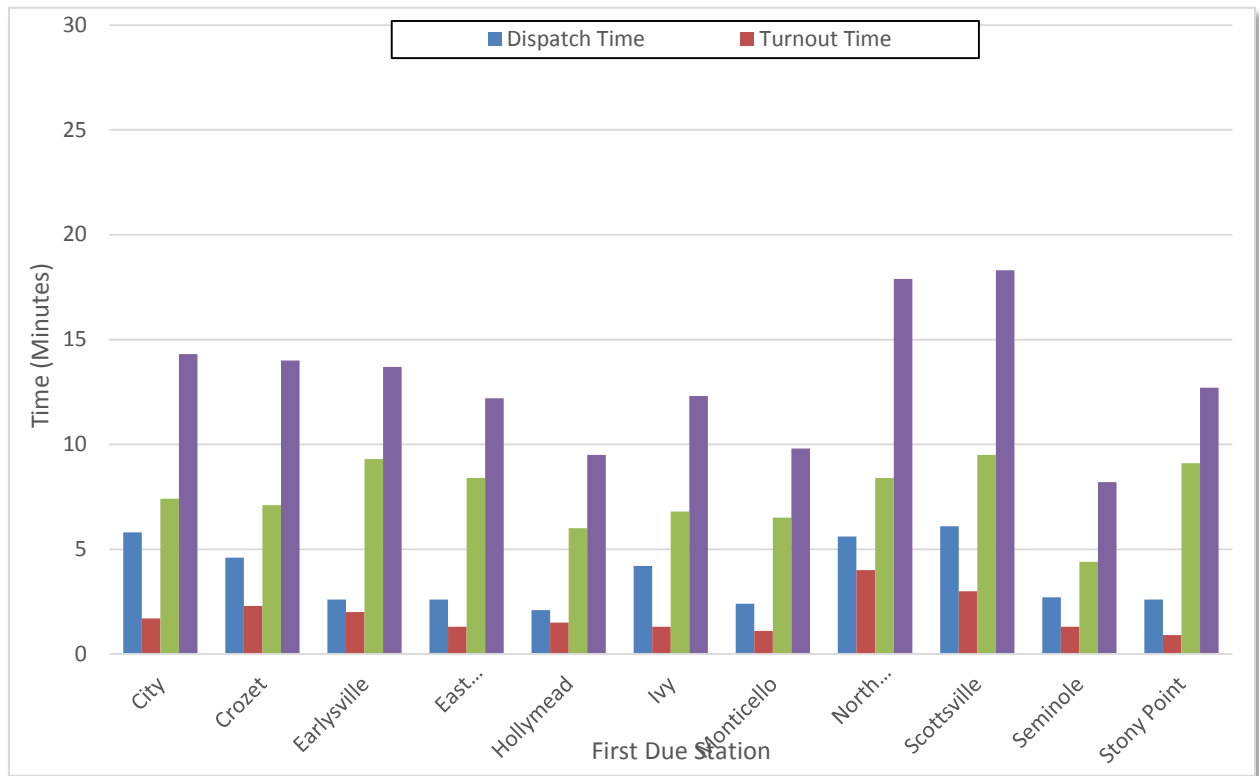
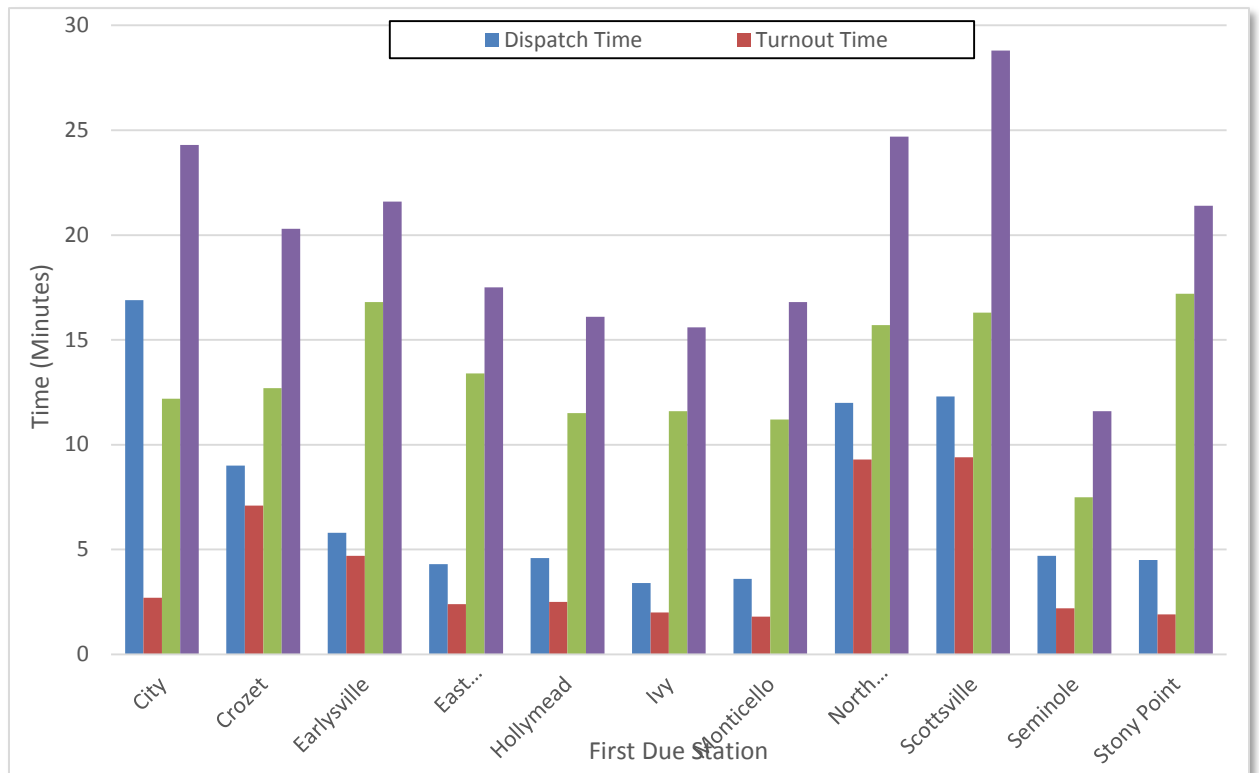


Figure 55: 90th Percentile First Arrival Performance in Minutes - Fire First Due Station



With respect to turnout time for EMS related calls during the MFDAYLIGHT period, first arriving primary front-line units responding to calls in the demand zone for rescue day first due station Monticello had the lowest average turnout time at 0.9 minutes (1.4 minutes at the 90th percentile; Table 44; Table 45; Figure 56; Figure 57). First arriving primary front-line units responding to calls in the demand zone for rescue day first due station Earlysville had the highest average turnout time at 1.4 minutes (2.0 minutes at the 90th percentile).

With respect to travel time for EMS related calls during the MFDAYLIGHT period, first arriving primary front-line units responding to calls in the demand zone for rescue day first due stations Hollymead and Seminole had the lowest average travel time at 5.0 minutes (8.0 minutes at the 90th percentile for Hollymead and 8.5 minutes at the 90th percentile for Seminole). First arriving primary front-line units responding to calls in the demand zone for rescue day first due station SVRS had the highest average travel time at 12.7 minutes (22.0 minutes at the 90th percentile).

Table 44: Average First Arrival Performance in Minutes – EMS MFDAYLIGHT First Due Station

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size ¹
Earlysville	3.3	1.4	11.3	15.8	131
Hollymead	3.0	1.1	5.0	9.0	443
Ivy	2.4	1.2	7.5	11.1	382
Monticello	2.5	0.9	6.3	9.7	469
Pantops	2.0	1.0	6.9	9.8	892
Seminole	2.4	1.1	5.0	8.5	1,314
SVRS	3.0	1.1	12.7	16.2	325
WARS	3.1	1.2	6.6	10.7	611
Total²	2.6	1.1	6.7	10.2	4,605

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per first due station noted; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

²Responses associated with station demand zones Buckingham (n=8), CARS (n=14), Fluvanna (n=2), Greene (n=1), Nelson (n=1), and Not Identified (n=12) are not presented individually in the table, but are included in the total values.

Table 45: 90th Percentile First Arrival Performance in Minutes - EMS MFDAYLIGHT First Due Station

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size ¹
Earlsville	3.6	2.0	20.5	25.7	131
Hollymead	4.0	1.8	8.0	13.5	443
Ivy	3.6	1.8	14.5	17.3	382
Monticello	3.2	1.4	12.8	17.8	469
Pantops	3.0	1.9	11.9	15.5	892
Seminole	3.5	1.8	8.5	12.0	1,314
SVRS	4.6	1.8	22.0	26.2	325
WARS	5.5	2.3	13.8	19.8	611
Total²	3.8	1.9	12.6	17.5	4,605

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per first due station noted; sample sizes corresponding to individual table values may be slightly lower due to missing time data.

²Responses associated with station demand zones Buckingham (n=8), CARS (n=14), Fluvanna (n=2), Greene (n=1), Nelson (n=1), and Not Identified (n=12) are not presented individually in the table, but are included in the total values.

Figure 56: Average First Arrival Performance in Minutes - EMS MFDAYLIGHT First Due Station

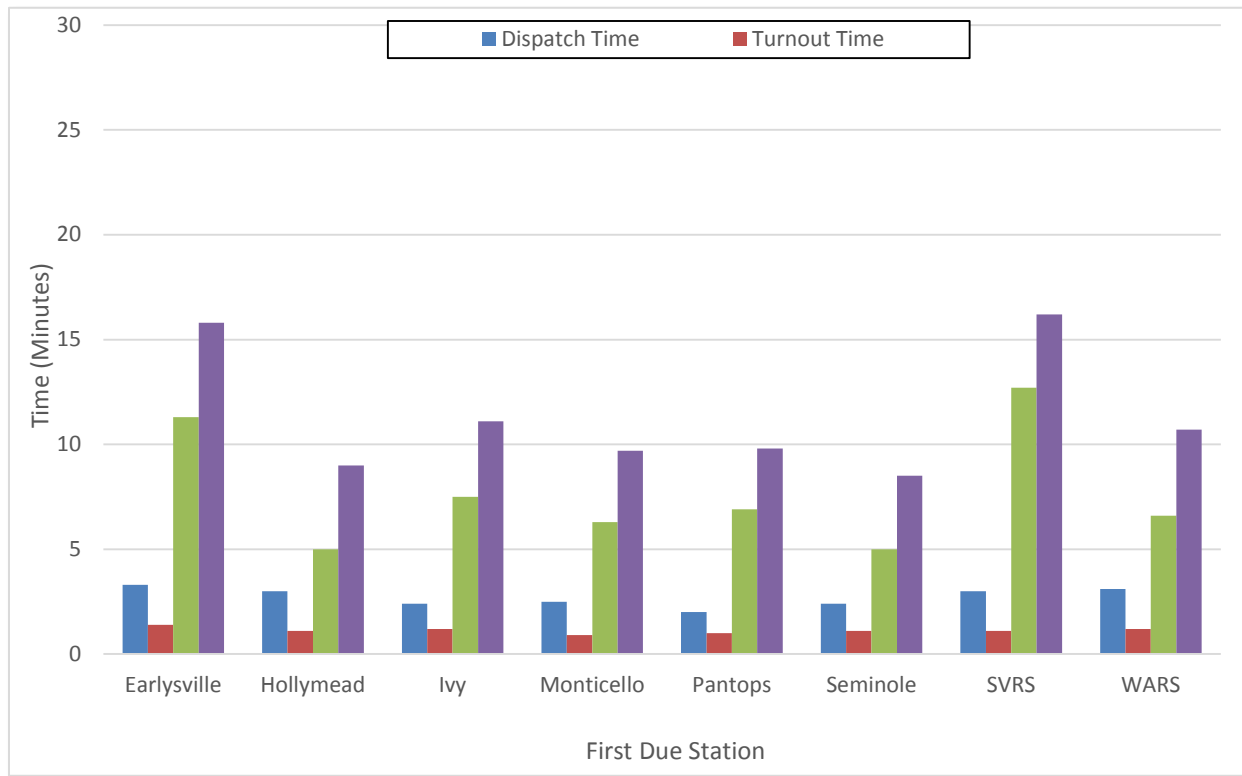
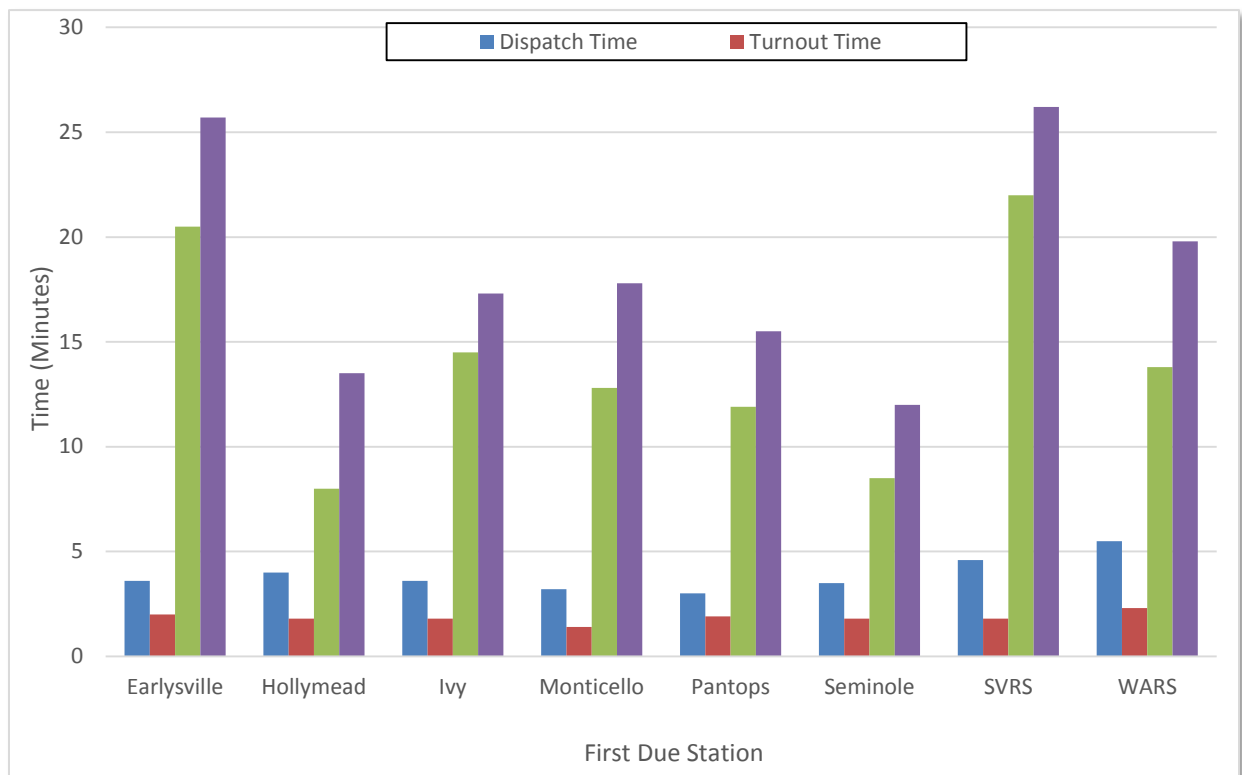


Figure 57: 90th Percentile First Arrival Performance in Minutes - EMS MFDAYLIGHT First Due Station



With respect to turnout time for EMS related calls during the WEEKEND/EVENING period, first arriving primary front-line units responding to calls in the demand zone for rescue night first due station Monticello had the lowest average turnout time at 1.1 minutes (1.9 minutes at the 90th percentile; Table 46; Table 47; Figure 58; Figure 59). First arriving primary front-line units responding to calls in the demand zone for rescue night first due station SVRS had the highest average turnout time at 2.0 minutes (3.6 minutes at the 90th percentile).

With respect to travel time for EMS related calls during the WEEKEND/EVENING period, first arriving primary front-line units responding to calls in the demand zone for rescue night first due station Seminole had the lowest average travel time at 4.9 minutes (7.9 minutes at the 90th percentile). First arriving primary front-line units responding to calls in the demand zone for rescue night first due station SVRS had the highest average travel time at 11.9 minutes (21.9 minutes at the 90th percentile).

Table 46: Average First Arrival Performance in Minutes – EMS WEEKEND/EVENING First Due Station

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size ¹
CARS	3.4	1.6	7.8	12.7	670
Hollymead	2.8	1.4	7.2	11.4	586
Monticello	2.5	1.1	7.3	10.9	573
Seminole	2.5	1.5	4.9	8.8	1,272
SVRS	3.5	2.0	11.9	16.9	460
WARS	2.7	1.5	6.7	10.7	814
Total²	2.8	1.5	7.0	11.2	4,410

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per first due station noted; sample sizes corresponding to individual table values may be slightly lower due to missing time data such that the sum of average dispatch, turnout, and travel times may not equal average response time.

²Responses associated with station demand zones Buckingham (n=14), Fluvanna (n=2), Greene (n=1), and Not Identified (n=17) are not presented individually in the table, but are included in the total values.

Table 47: 90th Percentile First Arrival Performance in Minutes – EMS WEEKEND/EVENING First Due Station

First Due Station	Dispatch Time	Turnout Time	Travel Time	Response Time	Sample Size ¹
CARS	5.0	2.7	13.9	20.1	670
Hollymead	4.0	2.3	13.7	19.2	586
Monticello	3.6	1.9	14.5	18.6	573
Seminole	3.7	2.6	7.9	13.0	1,272
SVRS	7.7	3.6	21.9	27.5	460
WARS	4.8	2.6	13.3	18.4	814
Total²	4.4	2.6	13.9	19.5	4,410

¹Sample sizes depicted represent the total number of first arrivals made by ACFR primary front-line units during 2017 per first due station noted; sample sizes corresponding to individual table values may be slightly lower due to missing time data.

²Responses associated with station demand zones Buckingham (n=14), Fluvanna (n=2), Greene (n=1), and Not Identified (n=17) are not presented individually in the table, but are included in the total values.

Figure 58: Average First Arrival Performance in Minutes - EMS WEEKEND/EVENING First Due Station

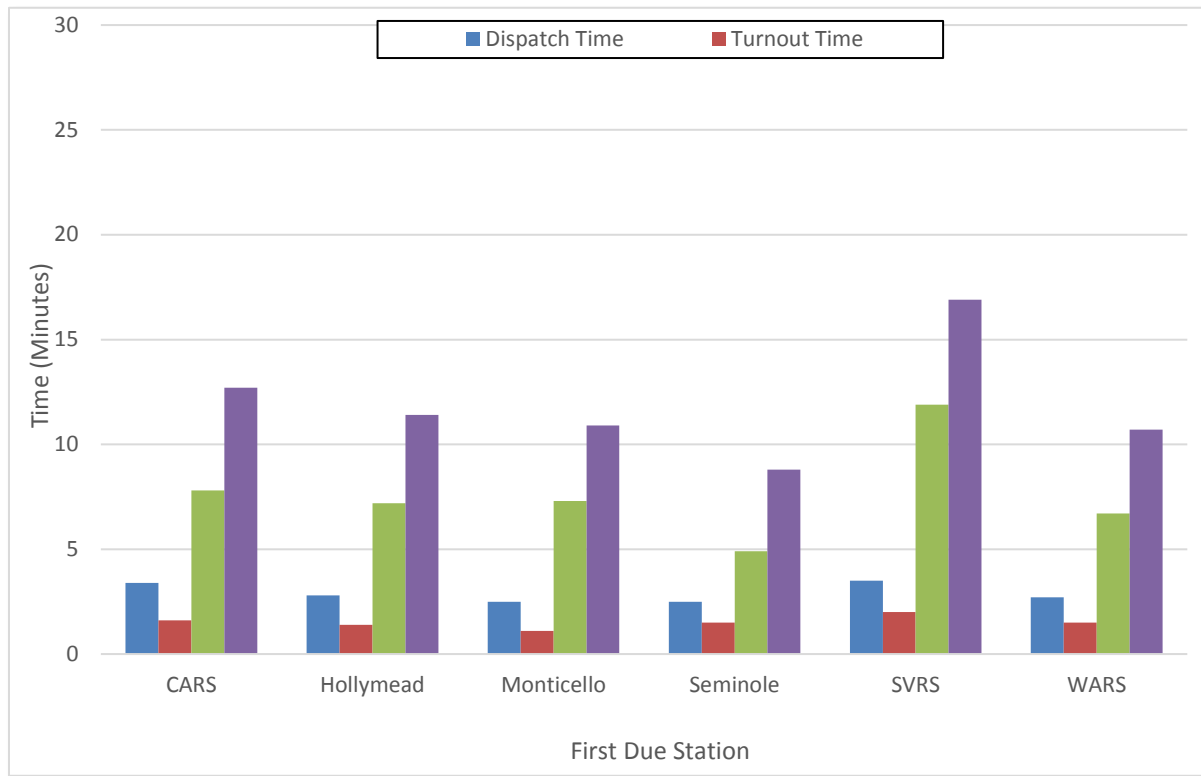
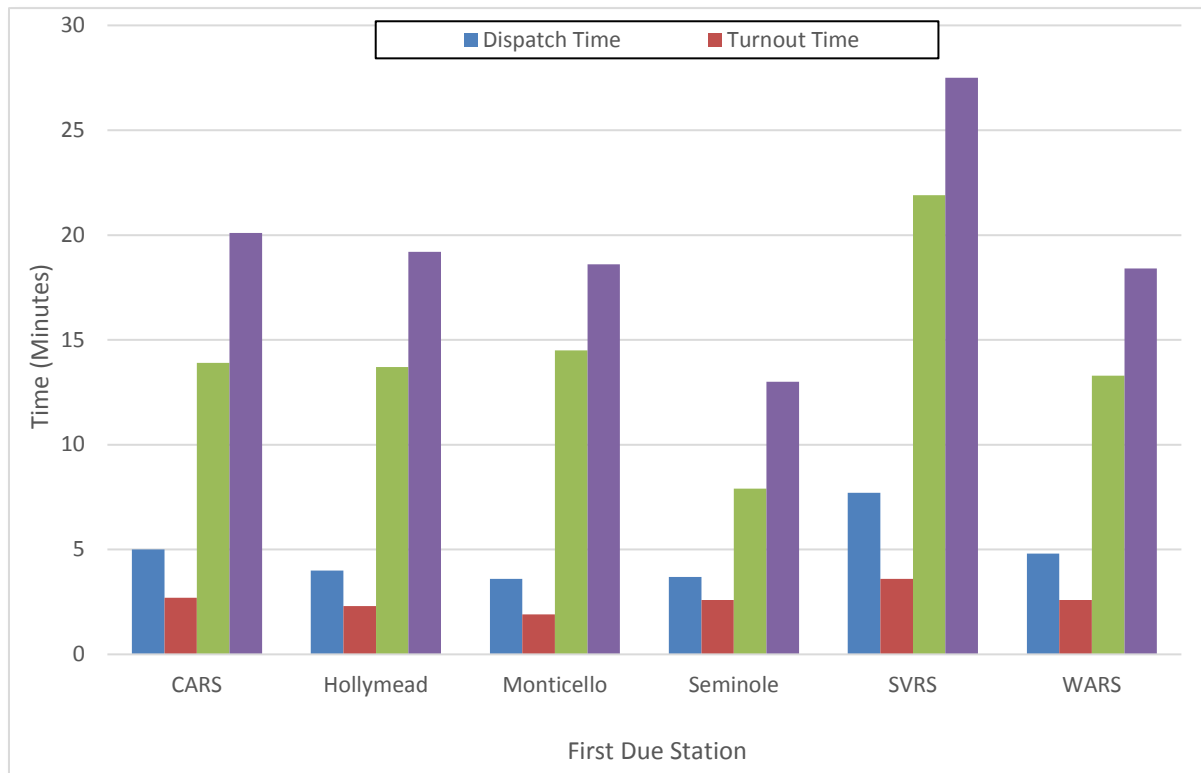


Figure 59: 90th Percentile First Arrival Performance in Minutes - EMS WEEKEND/EVENING First Due Station



Effective Response Force Capabilities for Structure Fires

The capability of an Effective Response Force (ERF) to assemble in a timely manner with the appropriate personnel, apparatus, and equipment is important to the success of a significant structural fire event. Therefore, it is important to measure the capabilities of assembling an ERF. In most fire departments, the distribution model performs satisfactorily, but it is not uncommon to be challenged to assemble an ERF in the recommended timeframes.

Several factors affect the capabilities to assemble an ERF such as the number of fire stations, number of units, and number of personnel on each unit. Each of these policy decisions should be made in relation to the community's specific risks and the willingness to assume risk.

Analyses of performance for station demand zones were based on an examination of travel times by any unit arriving on scene in response to a structure fire call in the station's area identified as first due for fire related calls (Table 48 through Table 50; Figure 60 through Figure 62). Analyses were not restricted to primary front-line units.

While fire first due station North Garden and had times for units arriving up to 16th to the scene, table data are presented up to the 10th arrival only for all station demand zones. In select cases, small or zero sample sizes precluded calculation or presentation of performance metrics. For this reason, limited figure data are presented.

Table 48: Structure Fire: Average Travel Time in Minutes for ERF by First Due Station

First Due Station	Order of Arrival									
	1	2	3	4	5	6	7	8	9	10
City	4.6	8.1	8.9	8.6	--	--	--	--	--	--
Crozet	6.3	10.4	9.4	11.9	--	--	--	--	--	--
Earlsville	7.2	9.7	11.5	17.1	14.1	12.5	19.2	19.4	19.4	21.6
East Rivanna	5.8	7.9	9.6	10.9	14.8	11.5	10.3	17.2	29.8	28.1
Hollymead	5.6	7.0	11.6	9.7	14.1	14.8	15.6	20.5	--	--
Ivy	6.7	9.1	10.8	12.7	14.4	12.6	13.5	13.5	--	--
Monticello	5.2	8.1	12.5	13.1	11.1	20.7	20.6	23.8	21.3	27.1
North Garden	7.9	10.7	9.3	15.3	16.2	17.0	14.1	25.5	26.0	29.5
Scottsville	6.6	10.8	11.5	14.1	23.6	27.6	25.1	--	--	--
Seminole	3.7	4.2	5.1	7.8	6.0	8.3	13.7	12.9	30.3	47.6
Stony Point	7.6	9.0	7.7	12.1	12.8	15.6	--	--	--	--
Total	5.4	7.6	8.8	11.3	12.2	14.0	15.7	18.0	24.2	28.1

Table 49: Structure Fire: 90th Percentile Travel Time in Minutes for ERF by First Due Station

First Due Station	Order of Arrival									
	1	2	3	4	5	6	7	8	9	10
City	--	--	--	--	--	--	--	--	--	--
Crozet	--	--	--	--	--	--	--	--	--	--
Earlsville	--	--	--	--	--	--	--	--	--	--
East Rivanna	--	--	--	--	--	--	--	--	--	--
Hollymead	--	--	--	--	--	--	--	--	--	--
Ivy	--	--	--	--	--	--	--	--	--	--
Monticello	10.8	15.0	--	--	--	--	--	--	--	--
North Garden	--	--	--	--	--	--	--	--	--	--
Scottsville	--	--	--	--	--	--	--	--	--	--
Seminole	5.8	6.7	8.0	12.9	12.4	--	--	--	--	--
Stony Point	--	--	--	--	--	--	--	--	--	--
Total	10.3	13.7	15.8	20.1	24.1	24.9	25.5	29.6	42.0	61.0

Table 50: Structure Fire: Sample Size for ERF Analysis by First Due Station

First Due Station	Order of Arrival									
	1	2	3	4	5	6	7	8	9	10
City	7	4	2	2	0	0	0	0	0	0
Crozet	9	9	3	3	0	0	0	0	0	0
Earlsville	7	6	5	4	4	3	3	3	2	2
East Rivanna	7	7	7	7	6	3	3	2	2	2
Hollymead	7	7	5	4	2	2	2	2	1	1
Ivy	9	8	5	5	3	3	3	2	1	1
Monticello	20	16	9	6	5	4	2	2	2	2
North Garden	6	6	6	4	4	3	2	2	2	2
Scottsville	9	7	6	4	3	2	2	1	1	1
Seminole	36	30	26	17	13	9	7	6	3	2
Stony Point	2	3	3	3	3	2	0	0	0	0
Total	119	103	77	59	43	31	24	20	14	13

Figure 60: 90th Percentile ERF Travel Performance for Structure Fires Overall

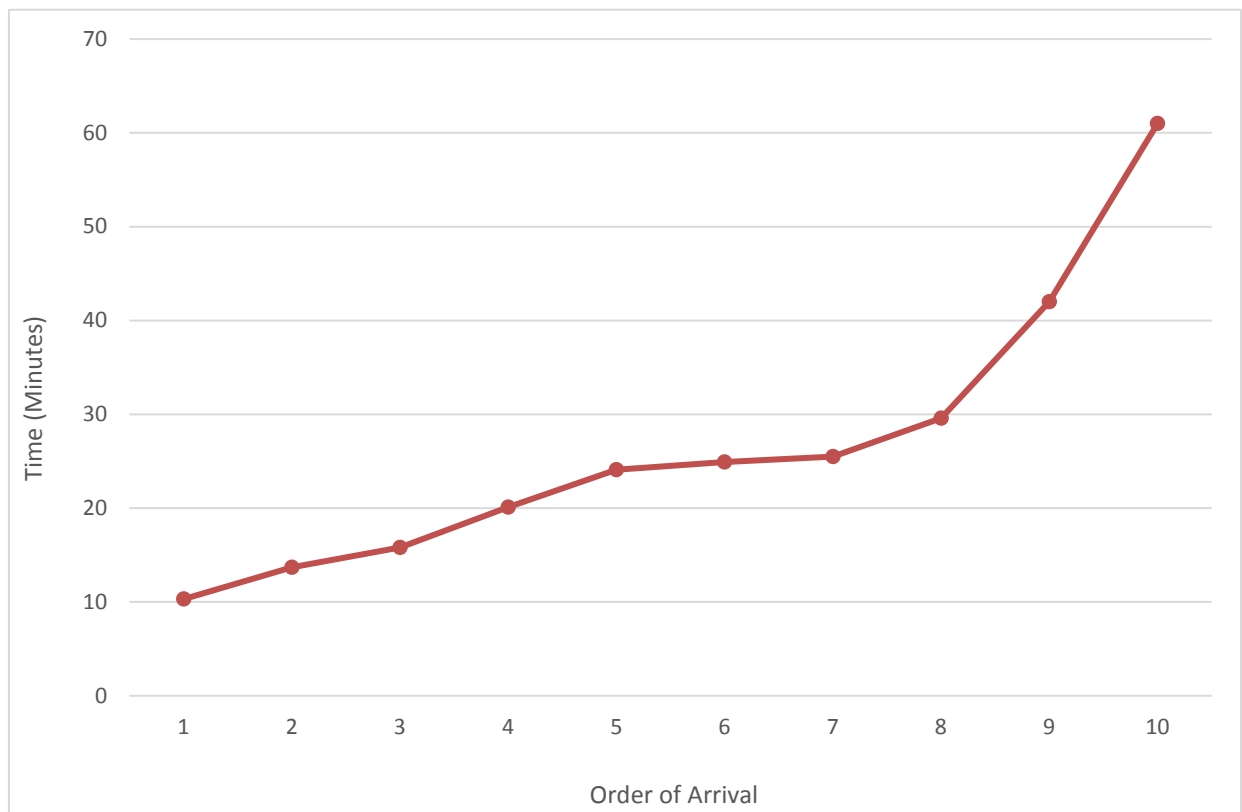
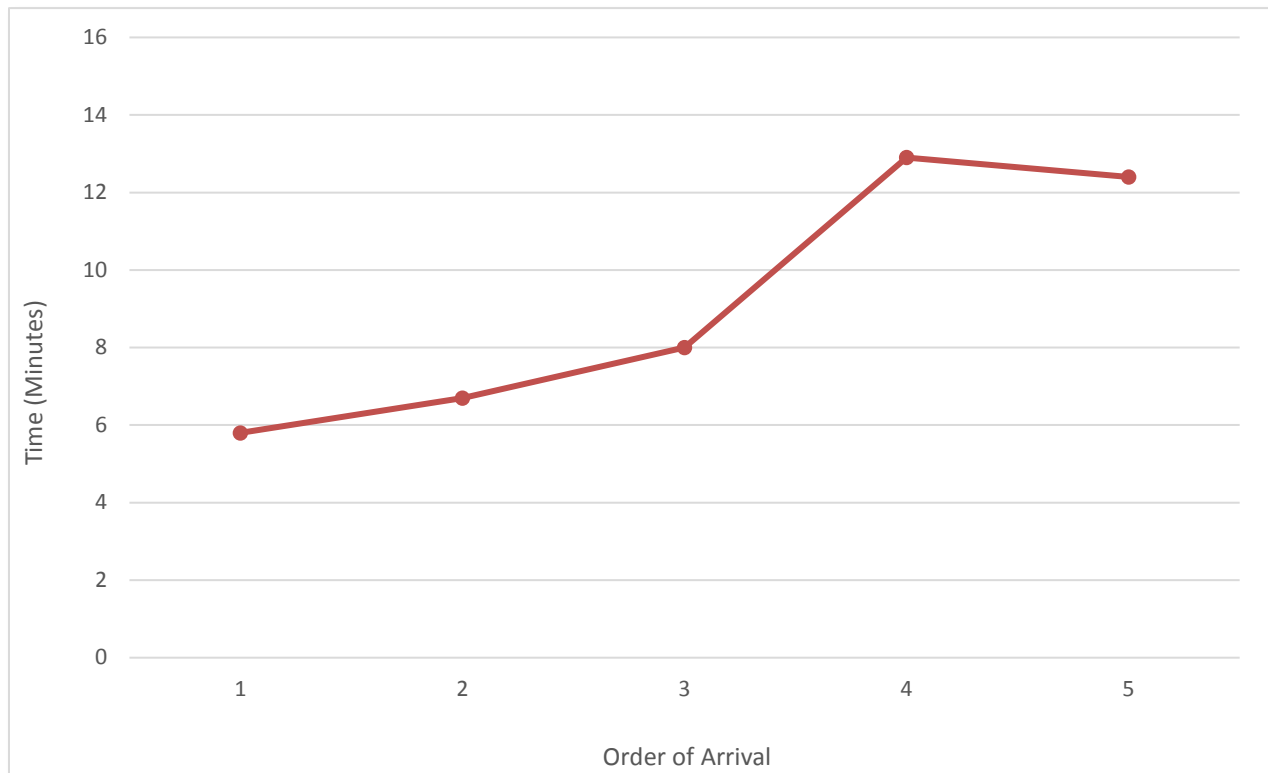


Figure 61: 90th Percentile ERF Travel Performance for Structure Fires by First Due Station Monticello



Figure 62: 90th Percentile ERF Travel Performance for Structure Fires by First Due Station Seminole



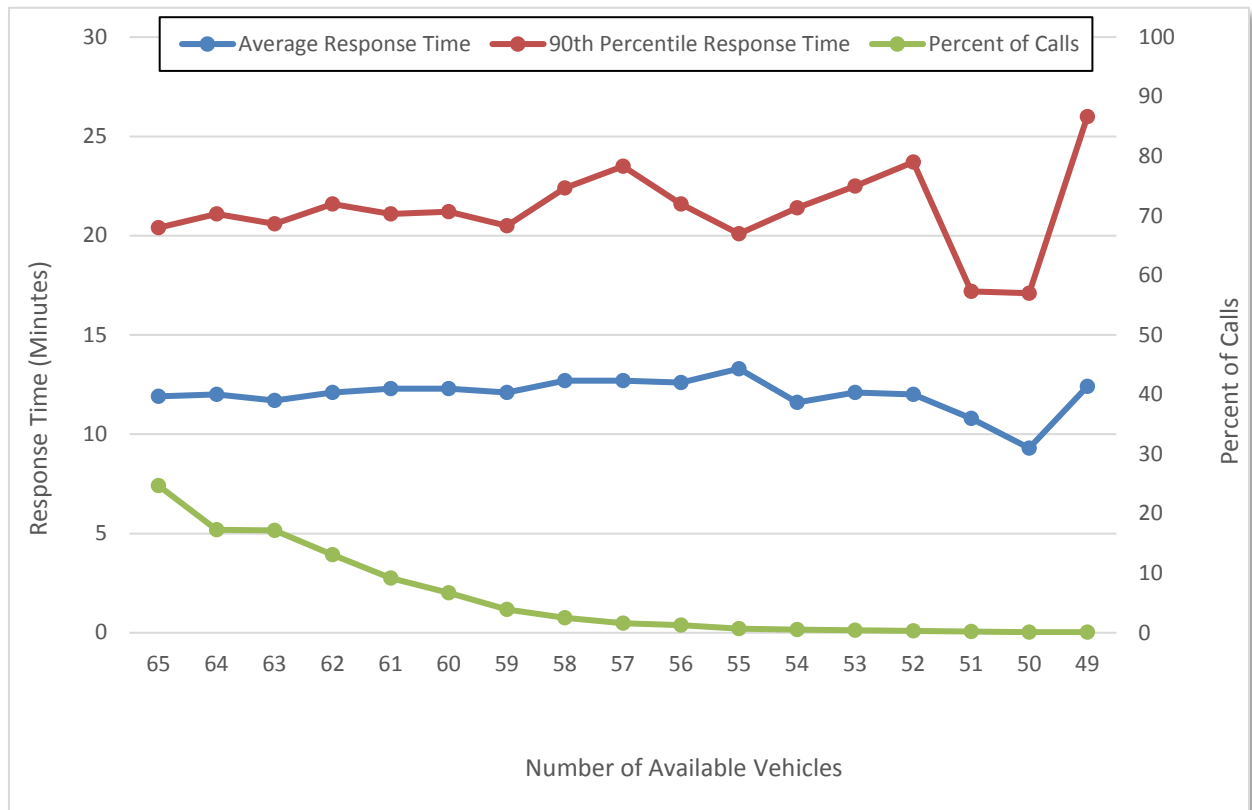
Response Time Performance by Available Vehicles

We investigated whether response time performance deteriorated when there were fewer vehicles available (Table 51; Figure 63). We assumed that the department constantly staffs 65 primary front-line units. Calls to which primary front-line units responded in 2017 were used to determine number of available primary front-line units at the time each call was received. Performance times were then based on primary front-line units responding to lights and sirens (emergency) calls only.

Table 51: Average and 90th Percentile Performance Times in Minutes by Number of Available Vehicles

Number of Available Vehicles	Average				90th Percentile				Sample Size Calls	% of Calls
	Dispatch Time	Turnout Time	Travel Time	Response Time	Dispatch Time	Turnout Time	Travel Time	Response Time		
65	3.4	1.6	7.2	11.9	5.8	2.8	13.9	20.4	2,874	24.7
64	3.4	1.4	7.4	12.0	6.0	2.4	14.7	21.1	2,015	17.3
63	3.2	1.4	7.5	11.7	5.4	2.4	14.7	20.6	2,005	17.2
62	3.8	1.4	7.2	12.1	8.0	2.3	13.9	21.6	1,522	13.1
61	3.9	1.4	7.5	12.3	7.8	2.3	14.5	21.1	1,071	9.2
60	3.8	1.3	7.5	12.3	7.1	2.3	14.5	21.2	784	6.7
59	3.7	1.2	7.4	12.1	8.8	2.1	13.4	20.5	449	3.9
58	4.1	1.2	7.7	12.7	6.5	2.1	14.7	22.4	295	2.5
57	4.1	1.2	7.9	12.7	9.4	2.2	16.3	23.5	190	1.6
56	3.7	1.1	8.6	12.6	6.6	2.2	17.9	21.6	146	1.3
55	6.3	1.1	7.1	13.3	14.4	2.1	12.1	20.1	87	0.7
54	3.7	1.4	7.7	11.6	6.1	2.8	13.7	21.4	62	0.5
53	3.4	1.3	8.9	12.1	6.6	2.1	16.1	22.5	42	0.4
52	3.7	0.8	8.0	12.0	11.2	1.6	15.5	23.7	35	0.3
51	2.9	0.9	7.2	10.8	5.9	2.0	14.0	17.2	22	0.2
50	1.8	1.1	6.2	9.3	2.9	2.2	14.2	17.1	13	0.1
49	4.1	0.9	7.2	12.4	13.9	1.7	20.3	26.0	11	0.1
48	1.8	1.0	8.6	11.3	--	--	--	--	3	0.0
47	2.6	1.2	10.7	13.3	--	--	--	--	5	0.0
46	15.0	0.7	15.1	30.8	--	--	--	--	1	0.0

Figure 63: Average and 90th Percentile Response Times by Number of Available Vehicles



Reliability Factors

Percentage of Department Compliance

The first step in assessing the reliability of the deployment model or system performance is to examine the department's availability to handle the requests for service from within the department's jurisdiction. These analyses utilized the original "FRITS_Final_Incidents_2017" and "FRITS_Final_Apparatus_2017" CAD data files with no exclusions applied. These data files included incidents and responses associated with the agencies "Albemarle County Tier" and "Charlottesville City Tier."

There were 14,360 unique incidents in the data files associated with the jurisdiction "Albemarle"; 12,537 of these incidents had an associated "IncidentNumberAlbemarle," indicating an overall ACFR compliance rate of 87.3% for 2017. The 1,823 remaining calls occurring in the Albemarle jurisdiction were handled by the agency "Charlottesville City Tier," and included responses from units assigned to "CARS" and "City." These calls included 1,746 EMS calls and 77 fire calls (Table 52).

Table 52: Calls in the Albemarle Jurisdiction Handled by the Charlottesville City Tier

Nature of Call	Number of Calls
EMS	1,746
Abdominal Pain	57
Alarm for Police Response	1
Allergic Reaction Ambulance Level	2
Allergic Reaction Trauma Level	4
Animal Bite Ambulance Level	2
Animal Complaint/Investigation	1
Assault Trauma Level	1
Assist Agency	572
Assist Citizen	3
Back Pain	28
Breathing Problems	38
Burns Ambulance Level	2
Cardiac Arrest	4
Chest Pain	30
Choking Ambulance Level	4
Cold Exposure Ambulance Level	1
Diabetic Ambulance Level	6
Diabetic Trauma Level	2
Drowning Out of Water Ambulance Level	1
Drunk in Public	1
Elevator Emerg w/out Patient	3
Eye Injury	1

Nature of Call	Number of Calls
F/R MVC Minor/Unknown Injuries	13
F/R MVC Motorcycle/ATV	3
F/R MVC Pedestrian Struck	9
F/R MVC Significant Impact No Entrapment	1
Fall Ambulance Level	259
Fall Trauma Level	11
Heat Exposure Ambulance Level	3
Hemorrhage	30
Injured Person Ambulance Level	58
Injured Person Medic Level	3
Injured Person Trauma Level	4
Lockout - Vehicle or Residential	2
Lost/Found Property	2
Medical Alarm	23
Mental Person	1
Motor Vehicle Crash No Injuries	2
Mutual Aid Request Rescue	3
OB/Pregnancy Ambulance Level	4
Obvious Death	2
Overdose Ambulance Level	39
Overdose Medic Level	3
PD MVC Minor/Unknown Injuries	3
Psychiatric Ambulance Level	8
Psychiatric Trauma Level ¹	1
Public Service	54
Seizure Ambulance Level	7
Seizure Medic Level	12
Shoplifting	1
Sick Person Ambulance Level	250
Sick Person Trauma Level	47
Special RS Access Issue	1
Special RS Vertical	1
Standby Emergency	1
Standby Routine	28
Stroke Ambulance Level	13
Stroke Trauma Level	21
Unconscious Ambulance Level	9
Unconscious Medic Level	8
Unknown Problem/Man Down	41
Welfare Check	1

Nature of Call	Number of Calls
Fire	77
Bomb Threat	3
Fire Alarm	30
Fire Assist PD	1
Fire Motor Vehicle Crash No Injuries Fluids Down	9
Fire Public Service Call	1
Gas Leak - Propane/ LP/ Etc.	11
Hazmat o	2
Lines Down	1
Smell of Smoke/Electrical Commercial	2
Smoke in Structure Commercial	2
Structure Fire - Commercial	1
Suspicious Package	9
Transformer Fire	1
Tree on Power Line	1
Unusual Odor	1
Vehicle Fire	2
Total	1,823

*Edited; original entry is reported as Psychiatric Trauma Level.”

Units assigned to CARS made 2,794 responses to 1,781 calls in the Albemarle jurisdiction without ACFR units; units assigned to City made 927 responses to 532 calls in the Albemarle jurisdiction without ACFR units (see Table 53 through Table 56 for additional call details related to month, day of week, hour of day, and time period; see Table 57 through Table 59 for call details by first due station). There were 490 calls in the Albemarle jurisdiction wherein one or more units assigned to CARS and to City responded without ACFR units.

Table 53: Total Calls by Month - CARS and City Units without ACFR Units

Month	Number of Calls	
	CARS	City
January	151	41
February	165	51
March	140	48
April	163	49
May	139	46
June	120	36
July	135	35
August	112	34
September	176	48
October	180	63
November	180	49
December	120	32
Total	1,781	532

Table 54: Total Calls by Day of Week - CARS and City Units without ACFR Units

Day of Week	Number of Calls	
	CARS	City
Sunday	374	53
Monday	216	80
Tuesday	197	76
Wednesday	187	78
Thursday	203	89
Friday	217	77
Saturday	387	79
Total	1,781	532

Table 55: Total Calls by Hour of Day - CARS and City Units without ACFR Units

Hour of Day	Number of Calls	
	CARS	City
0	95	27
1	93	26
2	73	12
3	49	6
4	63	13
5	44	14
6	27	11
7	45	21
8	64	27
9	71	25
10	64	29
11	55	27
12	70	31
13	63	31
14	55	24
15	67	31
16	68	31
17	67	27
18	126	20
19	137	23
20	115	21
21	100	22
22	79	14
23	91	19
Total	1,781	532

Table 56: Total Calls by Time Period - CARS and City Units without ACFR Units

Time Period	Number of Calls	
	CARS	City
MFDAYLIGHT	325	258
WEEKEND/EVENING	1,456	274
Total	1,781	532

As noted previously, there were 14,360 unique incidents in the data files associated with the jurisdiction “Albemarle”; 12,537 of these incidents had an associated “IncidentNumberAlbemarle,” indicating an overall ACFR compliance rate of 87.3% for 2017. The 1,823 remaining calls occurring in the Albemarle jurisdiction were handled by the agency “Charlottesville City Tier,” and included responses from units assigned to “CARS” and “City.”

However, for the 77 fire related calls to which an ACFR unit did not respond, a City unit was first due for 72 of these 77 calls; for the 1,455 EMS related calls during the WEEKEND/EVENING period to which an ACFR unit did not respond, a CARS unit was first due for 1,088 of these 1,455 calls. If these calls are removed from compliance considerations, given that the system planned for CARS and City units to respond under these circumstances, then ACFR responded to 12,537 of 13,195 calls (95.0%) wherein units from ACFR stations were assigned as first due.

Table 57: Total Calls by Fire First Due Station - CARS and City Units without ACFR Units

First Due Station	Number of Calls	
	CARS	City
City	62	72
Ivy	3	4
Seminole	0	1
Total	65	77

Table 58: Total Calls by EMS MFDAYLIGHT First Due Station - CARS and City Units without ACFR Units

First Due Station	Number of Calls	
	CARS	City
Ivy	264	206
Monticello	4	0
Pantops	5	0
Seminole	6	1
Not Identified	1	0
Total	280	207

Table 59: Total Calls by EMS WEEKEND/EVENING First Due Station - CARS and City Units without ACFR Units

First Due Station	Number of Calls	
	CARS	City
CARS	1,070	243
Hollymead	4	0
Monticello	48	0
Seminole	303	4
SVRS	7	0
WARS	3	0
Not Identified	1	1
Total	14,36	248

Percentage of First Due Compliance

The reliability of the distribution model is a factor of how often the response model is available and able to respond to a call within the assigned demand zone. This analysis utilized all dispatched calls within any station demand zone reported in the CAD data file, and the performance included responses from all units in ACFR’s jurisdiction. Station demand zones were based upon “FireFirstDueID,” “RescueFirstDueDayID,” and “RescueFirstDueNightID” or “FireFirstDue,” “RescueFirstDueDay,” and “RescueFirstDueNight” entries in the CAD data file, and calls were classified as either Fire or EMS to associate with a first due station. Table and figure data are presented twice for each variable set—once to depict first due compliance separately by specific station ID (e.g., F02 East Rivanna and R02 East Rivanna; relevant tables and figures are marked with the Roman numeral I), and once to depict first due compliance in a combined manner (e.g., F02 + R02 = East Rivanna; tables and figures are marked with the Roman numeral II). Overall, first due stations responded with one or more units to 9,670 of 11,880 calls (81.4%) occurring in ACFR specified demand zones (see the shaded cells in Table 60, Table 62, and Table 65). If units assigned to F and R stations that can be matched are combined, first due stations responded with one or more units to 10,557 of 11,880 calls (88.9%) occurring in ACFR demand zones (see the shaded cells in Table 61, Table 63, and Table 65).

For calls originally classified as Fire to associate a “FireFirstDueID” entry as the station demand zone (Table 60; Figure 64), F03 North Garden had the highest rate of compliance, responding with one or more units to 164 of 166 calls (98.8%) when it was the first due station for fire related calls. All stations had > 90% rates of compliance for fire related calls during 2017 except for F11 Monticello (295/334 calls; 88.3%) and F12 Hollymead (157/181 calls; 86.7%). For calls originally classified as Fire to associate a “FireFirstDue” entry as the station demand zone to combine entries, see Table 67 and Figure 65.

Table 60: First Due Compliance by Station Demand Zone – Number of Calls for Fire First Due Station I

Station Demand Zone	Responding Unit's Assigned Station																				Total'
	ACFR	F02 East Rivanna	F03 North Garden	F04 Earlysville	F05 Crozet	F06 Stony Point	F07 Scottsville	F08 Seminole	F11 Monticello	F12 Hollymead	F15 Ivy	R02 East Rivanna	R04 Earlysville	R05 WARS	R07 SVRS	R08 Berkmar	R11 Monticello	R15 Ivy	R16 Pantops	RS12 Hollymead	
F01 City	0	0	0	0	0	2	0	8	0	0	1	0	0	0	0	1	0	2	1	0	15
F02 East Rivanna	57	303	4	0	0	20	0	24	68	6	10	13	0	0	1	0	2	0	4	0	329
F03 North Garden	20	9	164	0	9	0	9	5	15	0	14	0	0	0	2	0	2	4	0	0	166
F04 Earlysville	25	3	0	136	5	10	0	18	2	27	8	0	3	0	0	0	0	0	0	3	150
F05 Crozet	36	3	18	6	310	1	0	5	4	3	75	0	0	10	0	0	0	1	0	1	319
F06 Stony Point	11	5	0	0	0	85	0	5	4	4	2	0	0	0	0	0	0	0	0	1	87

Station Demand Zone	Responding Unit's Assigned Station																				
	ACFR	F02 East Rivanna	F03 North Garden	F04 Earlysville	F05 Crozet	F06 Stony Point	F07 Scottsville	F08 Seminole	F11 Monticello	F12 Hollymead	F15 Ivy	R02 East Rivanna	R04 Earlysville	R05 WARS	R07 SVRS	R08 Berkmar	R11 Monticello	R15 Ivy	R16 Pantops	RS12 Hollymead	Total ¹
F07 Scottsville	16	7	27	0	0	1	184	3	30	1	4	0	0	1	15	0	3	0	1	0	189
F08 Seminole	120	3	1	17	2	4	0	536	13	91	54	4	0	0	0	23	0	3	0	6	576
F10 City	5	0	1	0	0	1	0	4	12	1	38	0	1	0	0	0	2	1	0	0	45
F11 Monticello	80	55	5	1	0	4	7	21	295	8	37	14	0	1	2	0	15	2	2	0	334
F12 Hollymead	36	3	0	27	0	12	0	29	3	157	6	0	0	0	0	2	1	0	0	7	181
F15 Ivy	46	2	7	11	33	1	0	23	28	9	255	0	0	2	0	2	1	6	0	0	276
FHQ City	4	4	0	0	0	0	0	4	26	0	6	0	0	1	0	0	1	0	0	0	32
MA ²	0	2	0	2	2	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	10
Not Identified	1	1	2	1	1	0	1	7	0	2	1	0	0	0	0	0	0	0	0	0	14
Total	457	400	229	201	362	142	203	692	500	310	511	31	4	15	20	28	27	19	8	18	2723

¹“Total” values may not equal the sum of the cell values across columns per row because units from multiple stations may have responded to a call within the given station demand zone.

²“MA” code was assigned by ACFR to Fluvanna, Greene, Nelson, and Orange in the CAD data file.

Table 61: First Due Compliance by Station Demand Zone – Number of Calls for Fire First Due Station II

Station Demand Zone	Responding Unit's Assigned Station															Total ¹
	ACFR	Berkmar	Crozet	Earlsville	East Rivanna	Hollymead	Ivy	Monticello	North Garden	Pantops	Scottsville	Seminole	Stony Point	SVRS	WARS	
City	9	1	0	1	4	1	47	40	1	1	0	16	3	0	1	92
Crozet	36	0	310	6	3	4	75	4	18	0	0	5	1	0	10	319
Earlsville	25	0	5	137	3	27	8	2	0	0	0	18	10	0	0	150
East Rivanna	57	0	0	0	306	6	10	68	4	4	0	24	20	1	0	329
Fluvanna	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Greene	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	3
Hollymead	36	2	0	27	3	157	6	4	0	0	0	29	12	0	0	181
Ivy	46	2	33	11	2	9	256	28	7	0	0	23	1	0	2	276
Monticello	80	0	0	1	64	8	37	298	5	2	7	21	4	2	1	334
Nelson	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	4
North Garden	20	0	9	0	9	0	14	16	164	0	9	5	0	2	0	166
Orange	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Scottsville	16	0	0	0	7	1	4	32	27	1	184	3	1	15	1	189
Seminole	120	23	2	17	7	91	54	13	1	0	0	536	4	0	0	576
Stony Point	11	0	0	0	5	4	2	4	0	0	0	5	85	0	0	87
Not Identified	1	0	1	1	1	2	1	0	2	0	1	7	0	0	0	14
Total	457	28	362	203	416	311	514	509	229	8	203	692	142	20	15	2723

¹“Total” values may not equal the sum of the cell values across columns per row because units from multiple stations may have responded to a call within the given station demand zone.

Figure 64: Percentage of First Due Compliance by Station Demand Zone – Fire First Due Station I

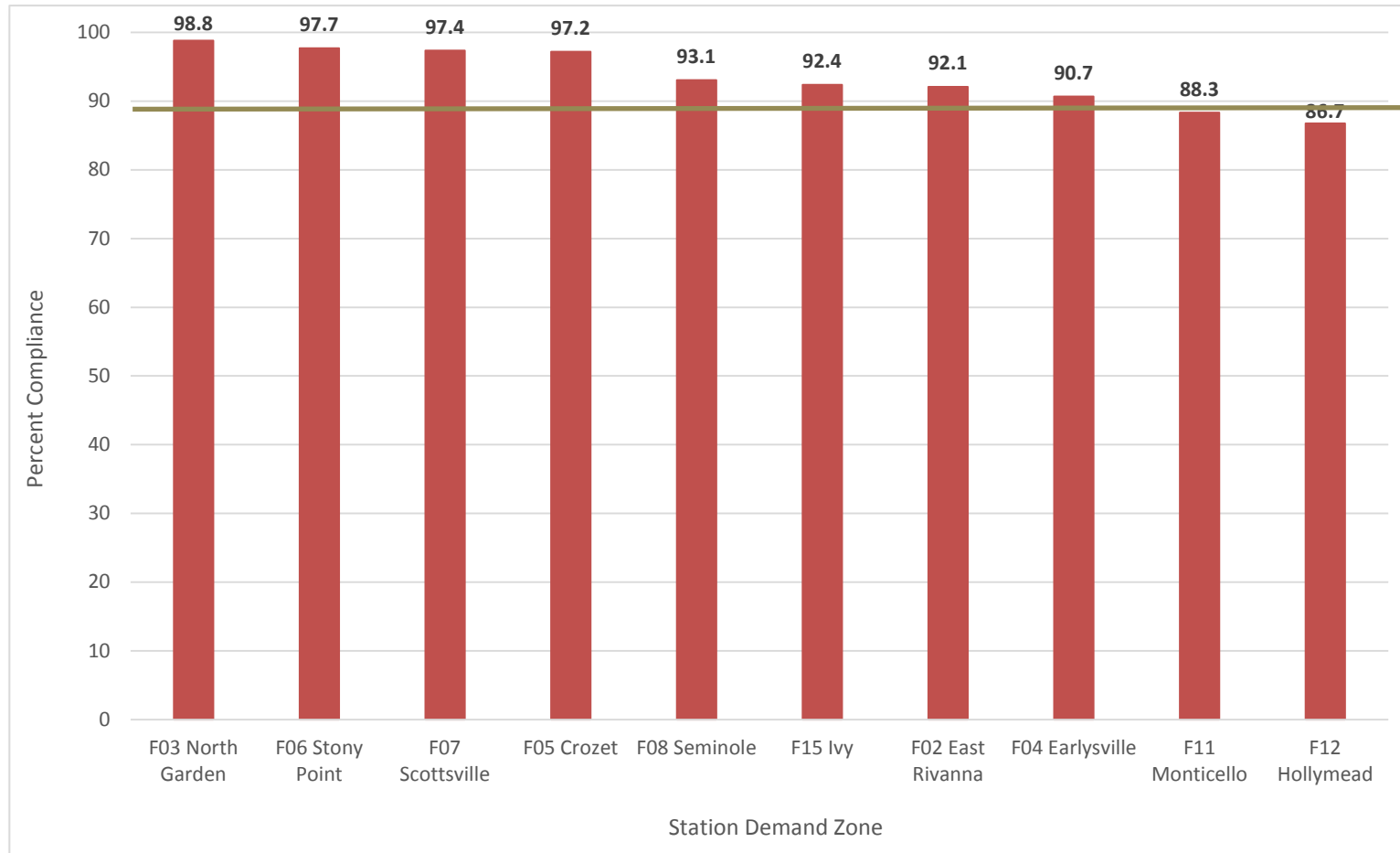
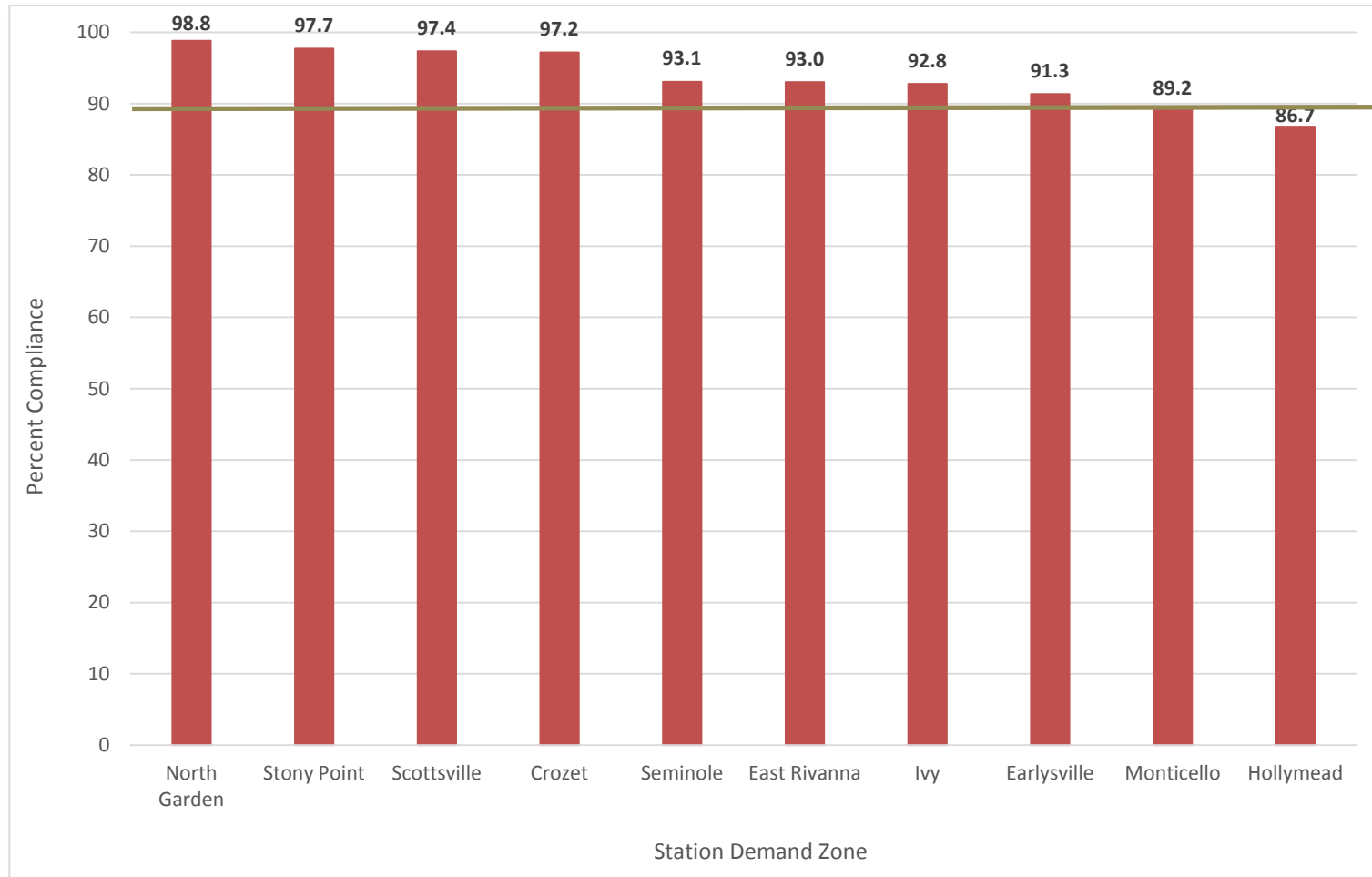


Figure 65: Percentage of First Due Compliance by Station Demand Zone – Fire First Due Station II



For calls originally classified as EMS and occurring during the MFDAYLIGHT period to associate a “RescueFirstDueDayID” entry as the station demand zone (Table 62; Figure 66), WARS had the highest rate of compliance, responding with one or more units to 650 of 682 calls (95.3%) when it was the first due station for EMS related calls. All other stations had compliance rates below 90% for EMS related calls during the MFDAYLIGHT period in 2017. Ro8 Seminole had the lowest rate of compliance, responding with one or more units from Ro8 Berkmar to 924 of 1474 calls (62.7%) when it was the first due station. One or more units from Fo8 Seminole responded to 664 calls when Ro8 Seminole was the first due station, and one or more units from RS12 Hollymead responded to 243 calls when Ro8 Seminole was the first due station. For calls originally classified as EMS and occurring during the MFDAYLIGHT period to associate a “RescueFirstDueDay” entry as the station demand zone to combine entries, see Table 63 and Figure 67.

Table 62: First Due Compliance by Station Demand Zone – Number of Calls for EMS MFDAYLIGHT First Due Station I

Station Demand Zone	Responding Unit's Assigned Station																			
	ACFR	F02 East Rivanna	F03 North Garden	F04 Earlysville	F05 Crozet	F06 Stony Point	F07 Scottsville	F08 Seminole	F11 Monticello	F12 Hollymead	F15 Ivy	R02 East Rivanna	R04 Earlysville	R05 WARS	R07 SVRS	R08 Berkmar ³	R11 Monticello	R15 Ivy	R16 Pantops	RS12 Hollymead
MA ²	1	0	0	0	0	0	6	0	0	0	0	0	0	2	12	0	0	0	1	1
R01 CARS	7	1	0	0	0	0	0	8	8	2	3	0	1	2	2	8	5	3	1	3
R04 Earlysville	22	0	0	38	0	0	0	11	0	12	1	0	107	2	1	17	0	6	1	32
R05 WARS	13	0	29	1	107	0	0	0	3	0	54	0	0	650	0	3	2	26	0	0
R07 SVRS	19	5	41	0	0	0	89	1	22	0	9	0	0	2	311	4	54	7	5	1
R08 Seminole ³	97	1	0	4	0	1	0	664	2	31	18	0	27	2	4	924	26	228	39	243
R11 Monticello	61	15	26	0	0	2	4	3	240	4	12	0	1	3	28	10	398	30	55	16
R12 Hollymead	55	4	0	16	0	63	1	28	2	208	1	0	80	1	1	37	5	9	7	324
R15 Ivy	52	3	86	4	9	0	0	19	18	4	180	0	2	21	7	38	41	314	8	20
R16 Pantops	62	331	0	1	0	74	0	7	101	3	8	3	6	1	16	59	172	24	724	32
Not Identified	4	0	2	0	0	0	0	7	1	2	5	0	0	0	2	6	4	3	1	2
Total	393	360	184	64	116	140	100	748	397	266	291	3	224	686	384	1106	707	650	842	674

¹“Total” values may not equal the sum of the cell values across columns per row because units from multiple stations may have responded to a call within the given station demand zone.

²“MA” code was assigned by ACFR to Buckingham, Fluvanna, Greene, and Nelson in the CAD data file.

³R08 Seminole and R08 Berkmar were assumed to be matched for the purposes of compliance.

Table 63: First Due Compliance by Station Demand Zone – Number of Calls for EMS MFDAYLIGHT First Due Station II

Station Demand Zone	Responding Unit's Assigned Station															Total
	ACFR	Berkmar	Crozet	Earlsville	East Rivanna	Hollymead	Ivy	Monticello	North Garden	Pantops	Scottsville	Seminole	Stony Point	SVRS	WARS	
Buckingham	0	0	0	0	0	0	0	0	0	0	5	0	0	10	0	10
CARS	7	8	0	1	1	5	5	12	0	1	0	8	0	2	2	41
Earlsville	22	17	0	133	0	37	7	0	0	1	0	11	0	1	2	149
Fluvanna	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	2
Greene	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Hollymead	55	37	0	89	4	384	9	7	0	7	1	28	63	1	1	465
Ivy	52	38	9	6	3	21	372	54	86	8	0	19	0	7	21	436
Monticello	61	10	0	1	15	18	38	454	26	55	4	3	2	28	3	513
Nelson	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3
Pantops	62	59	0	7	332	32	31	241	0	724	0	7	74	16	1	967
Seminole	97	924	0	31	1	260	241	28	0	39	0	664	1	4	2	1474
SVRS	19	4	0	0	5	1	14	69	41	5	89	1	0	311	2	367
WARS	13	3	107	1	0	0	72	5	29	0	0	0	0	0	650	682
Not Identified	4	6	0	0	0	2	7	4	2	1	0	7	0	2	0	16
Total	393	1106	116	269	361	761	796	874	184	842	100	748	140	384	686	5127

"Total" values may not equal the sum of the cell values across columns per row because units from multiple stations may have responded to a call within the given station demand zone.

Figure 66: Percentage of First Due Compliance by Station Demand Zone – EMS MFDAYLIGHT First Due Station I

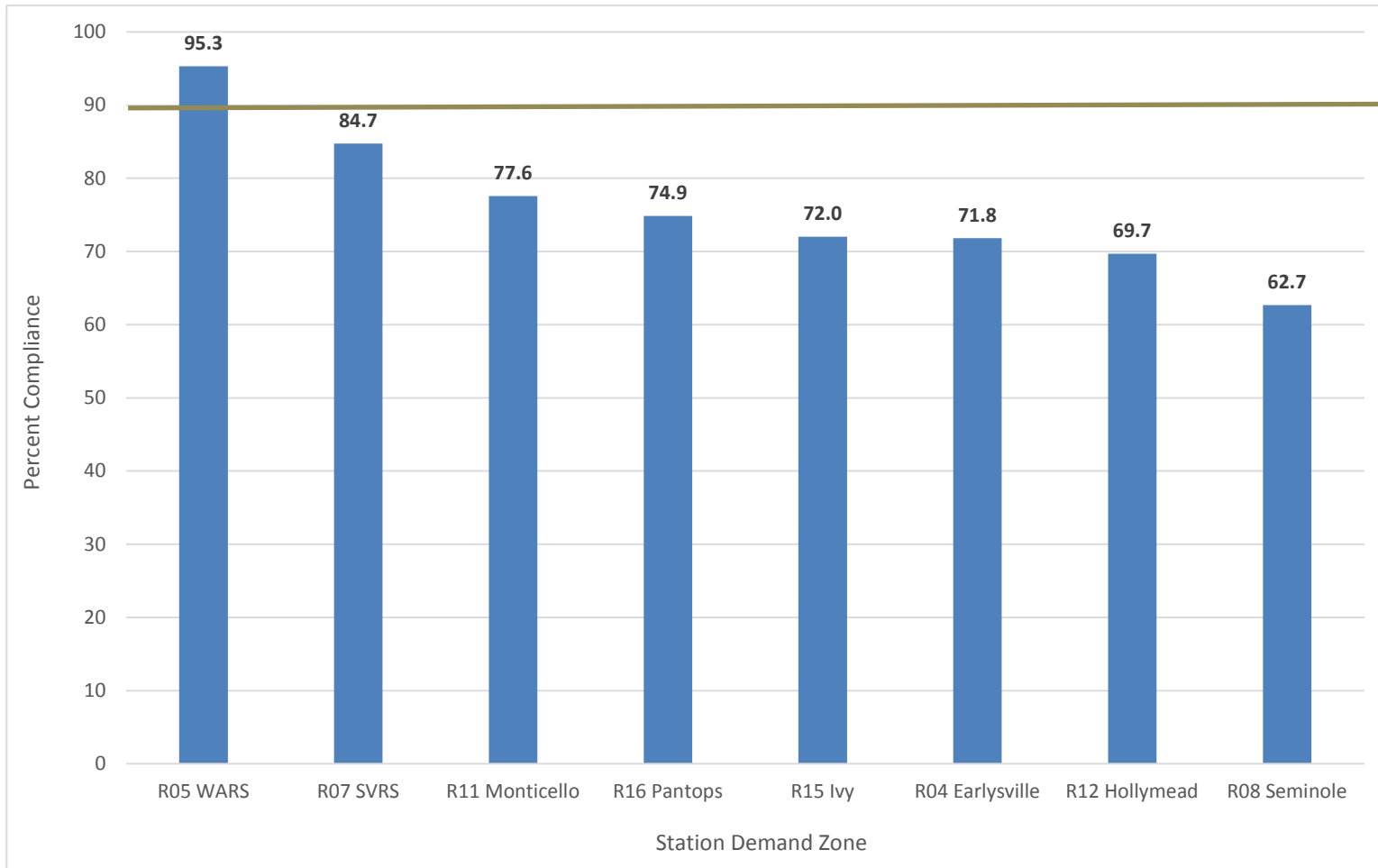
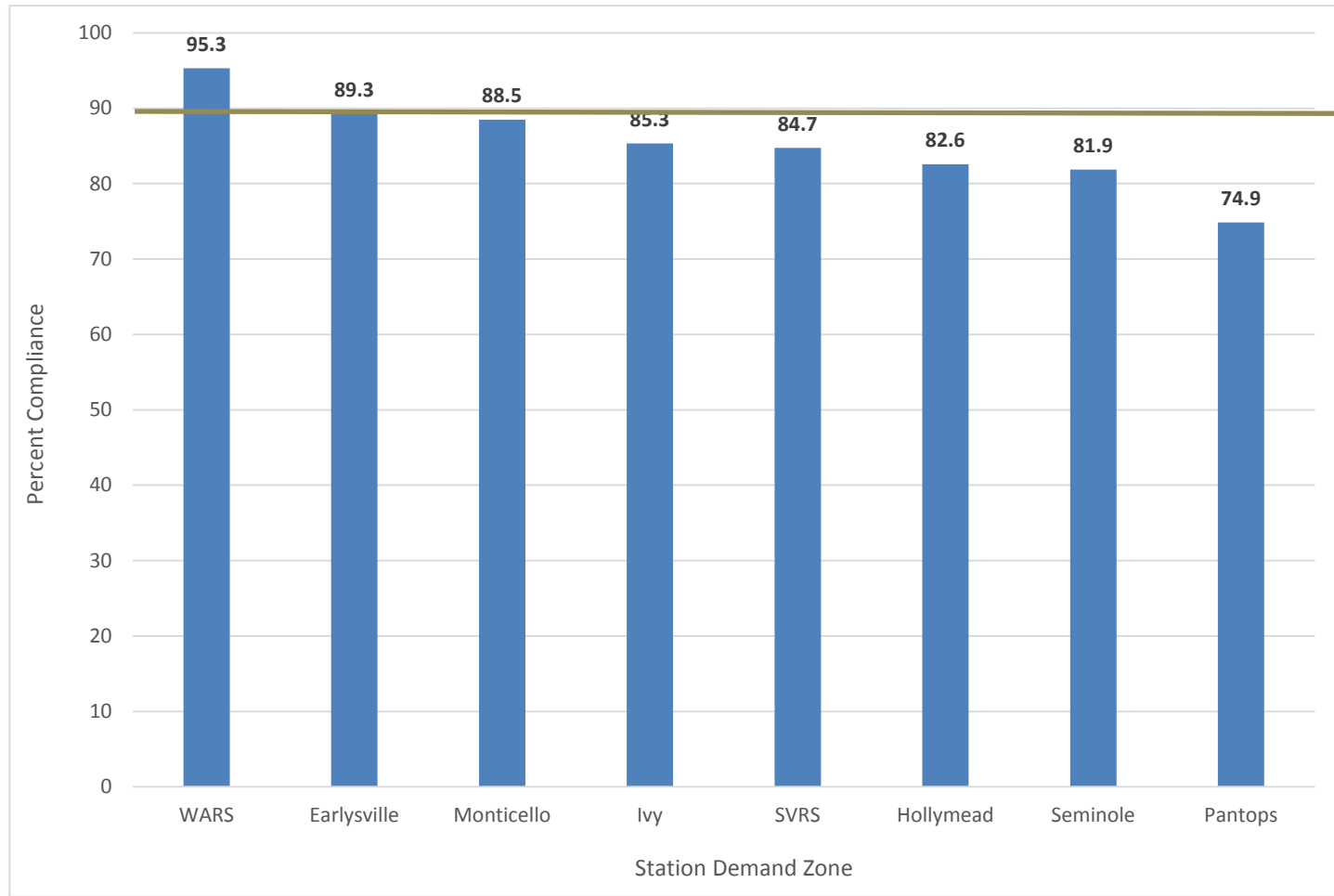


Figure 67: Percentage of First Due Compliance by Station Demand Zone – EMS MFDAYLIGHT First Due Station II



For calls originally classified as EMS and occurring during the WEEKEND/EVENING period to associate a “RescueFirstDueNightID” entry as the station demand zone (Table 64; Figure 68), R05 WARS had the highest rate of compliance, responding with one or more units to 869 of 913 calls (95.2%) when it was the first due station for EMS related calls. All other stations had compliance rates < 90%. While R05 WARS responded with one or more units to 95.2% of calls in its demand zone, F05 Crozet responded with one or more units to 131 calls when R05 WARS was the first due station for EMS related calls during the WEEKEND/EVENING period. For calls originally classified as EMS and occurring during the WEEKEND/EVENING period to associate a “RescueFirstDueNight” entry as the station demand zone to combine entries, see Table 65 and Figure 69.

Table 64: First Due Compliance by Station Demand Zone – Number of Calls for EMS WEEKEND/EVENING First Due Station I

Station Demand Zone	Responding Unit's Assigned Station																				Total ¹
	ACFR	F02 East Rivanna	F03 North Garden	F04 Earlysville	F05 Crozet	F06 Stony Point	F07 Scottsville	F08 Seminole	F11 Monticello	F12 Hollymead	F15 Ivy	R02 East Rivanna	R04 Earlysville	R05 WARS	R07 SVRS	R08 Berkmar ³	R11 Monticello	R15 Ivy	R16 Pantops	RS12 Hollymead	
MA ²	2	2	0	0	0	0	4	0	0	0	0	0	0	1	15	0	1	0	0	1	19
R01 CARS	68	329	126	6	5	43	4	85	116	3	186	2	3	18	11	64	187	47	14	10	903
R05 WARS	19	2	50	5	131	0	0	4	7	1	97	0	2	869	0	2	5	16	0	0	913
R07 SVRS	23	1	39	0	0	0	151	0	64	0	3	0	0	6	420	4	223	2	0	0	524
R08 Seminole ³	97	2	0	31	0	1	0	731	1	23	27	1	14	5	0	1153	10	2	0	89	1492
R11 Monticello	37	31	30	0	1	4	6	1	287	0	15	1	0	0	16	16	543	2	4	1	638
R12 Hollymead	66	5	1	77	1	77	0	15	1	241	0	0	42	6	0	63	7	1	0	508	653
Not Identified	2	0	0	1	1	0	1	9	1	5	2	0	0	1	2	9	0	0	0	3	20
Total	314	372	246	120	139	125	166	845	477	273	330	4	61	906	464	1311	976	70	18	612	5162

¹“Total” values may not equal the sum of the cell values across columns per row because units from multiple stations may have responded to a call within the given station demand zone.

²“MA” code was assigned by ACFR to Buckingham, Fluvanna, Greene, and Nelson in the CAD data file.

³R08 Seminole and R08 Berkmar were assumed to be matched for the purposes of compliance.

Table 65: First Due Compliance by Station Demand Zone – Number of Calls for EMS WEEKEND/EVENING First Due Station II

Station Demand Zone	Responding Unit's Assigned Station															Total ¹
	ACFR	Berkmar	Crozet	Earlsville	East Rivanna	Hollymead	Ivy	Monticello	North Garden	Pantops	Scottsville	Seminole	Stony Point	SVRS	WARS	
Buckingham	2	0	0	0	0	0	0	1	0	0	4	0	0	15	0	15
CARS	68	64	5	9	331	13	218	278	126	14	4	85	43	11	18	903
Fluvanna	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Greene	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Hollymead	66	63	1	113	5	576	1	8	1	0	0	15	77	0	6	653
Monticello	37	16	1	0	32	1	16	613	30	4	6	1	4	16	0	638
Nelson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Seminole	97	1153	0	43	3	104	29	11	0	0	0	731	1	0	5	1492
SVRS	23	4	0	0	1	0	5	256	39	0	151	0	0	420	6	524
WARS	19	2	131	6	2	1	105	12	50	0	0	4	0	0	869	913
Not Identified	2	9	1	1	0	6	2	1	0	0	1	9	0	2	1	20
Total	314	1311	139	172	376	702	376	1180	246	18	166	845	125	464	906	5162

¹“Total” values may not equal the sum of the cell values across columns per row because units from multiple stations may have responded to a call within the given station demand zone.

Figure 68: Percentage of First Due Compliance by Station Demand Zone – EMS WEEKEND/EVENING First Due Station I

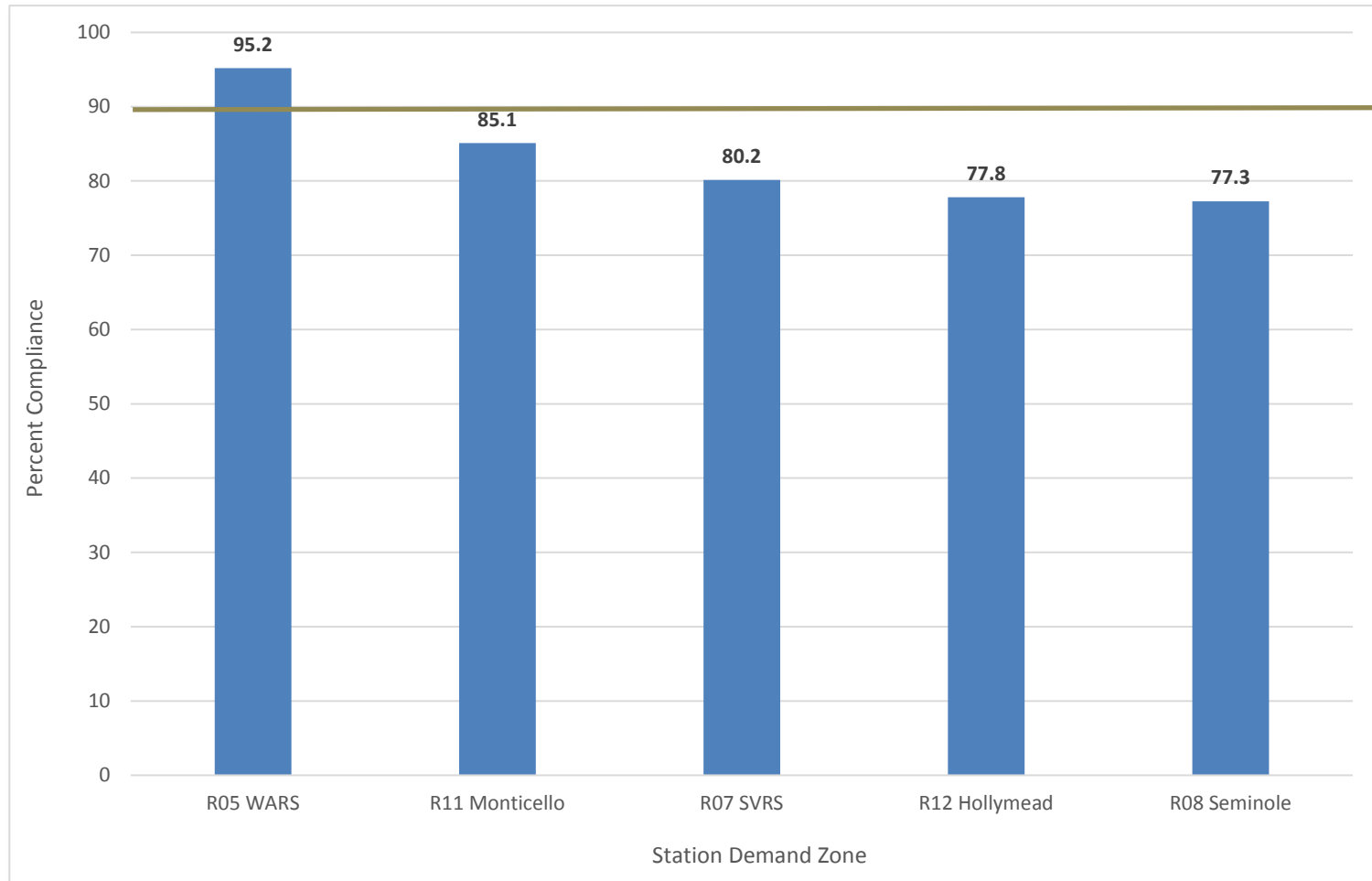
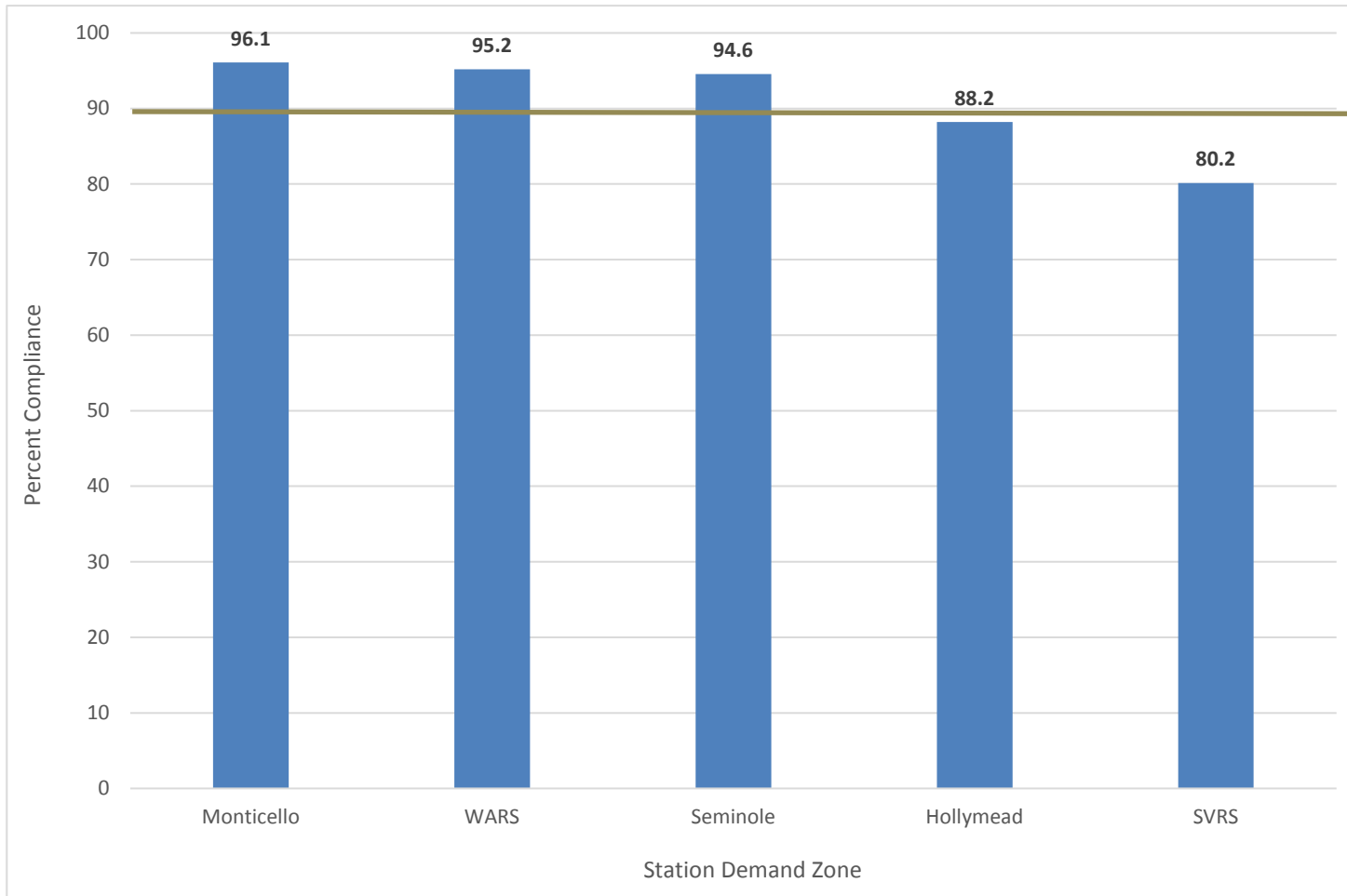


Figure 69: Percentage of First Due Compliance by Station Demand Zone – EMS WEEKEND/EVENING First Due Station II



Overlapped or Simultaneous Call Analysis

Overlapped or simultaneous calls are defined as another call being received for a first due station while one or more calls are already ongoing for the same first due station. For example, if there is an ongoing call in station 1's zone wherein all units have not yet been cleared, and another request for service occurs in station 1's zone, those two calls would be captured as overlapped calls.

Understanding the percentage of overlapped calls will help to determine the number of units to staff for each station. In general, the larger the call volume for a first due station, the greater the likelihood of overlapped calls occurring. The distribution of the demand throughout the day will impact the chance of having overlapped calls. Additionally, the duration of a call plays a significant role; the longer it takes to clear a request, the greater the likelihood of having an overlapping request.

Results for these analyses are reported by fire first due station, EMS MFDAYLIGHT first due station, and EMS WEEKEND/EVENING first due station. Note that for calls in any of these three categories, overlapped calls represent any call classified in its respective category overlapping with another call only in its respective category. For example, during 2017, Crozet was assigned as the fire first due station for 319 fire related calls. At least one ACFR unit was still out on the call (i.e., not yet returned to service) for nine of these 319 calls when another fire related call was received for Crozet as the fire first due station. Similarly, during 2017, Earlysville was assigned as the first due rescue during MFDAYLIGHT for 149 EMS related calls. At least one ACFR unit was still out on the call for nine of these 149 calls when another EMS related call was received for Earlysville as the MFDAYLIGHT rescue first due station.

As fire first due stations, Monticello and North Garden had the highest percentage of overlapped calls during 2017 for fire related calls (4.2%; Table 66; Figure 70). For MFDAYLIGHT rescue first due stations, Seminole had the highest percentage of overlapped calls during 2017 for EMS related calls (34.3%; Table 67; Figure 71). For WEEKEND/EVENING rescue first due stations, Seminole also had the highest percentage of overlapped calls during 2017 for EMS related calls (15.4%; Table 68; Figure 72).

Table 66: Overlapped Calls by First Due Station - Fire First Due Station

First Due Station	Overlapped Calls	Total Calls	Percentage of Overlapped Calls
Crozet	9	319	2.8
Earlysville	1	150	0.7
East Rivanna	11	329	3.3
Hollymead	5	181	2.8
Ivy	3	276	1.1
Monticello	14	334	4.2
North Garden	7	166	4.2
Scottsville	7	189	3.7
Seminole	19	576	3.3
Stony Point	0	87	0.0

Figure 70: Percentage of Overlapped Calls by First Due Station - Fire First Due Station

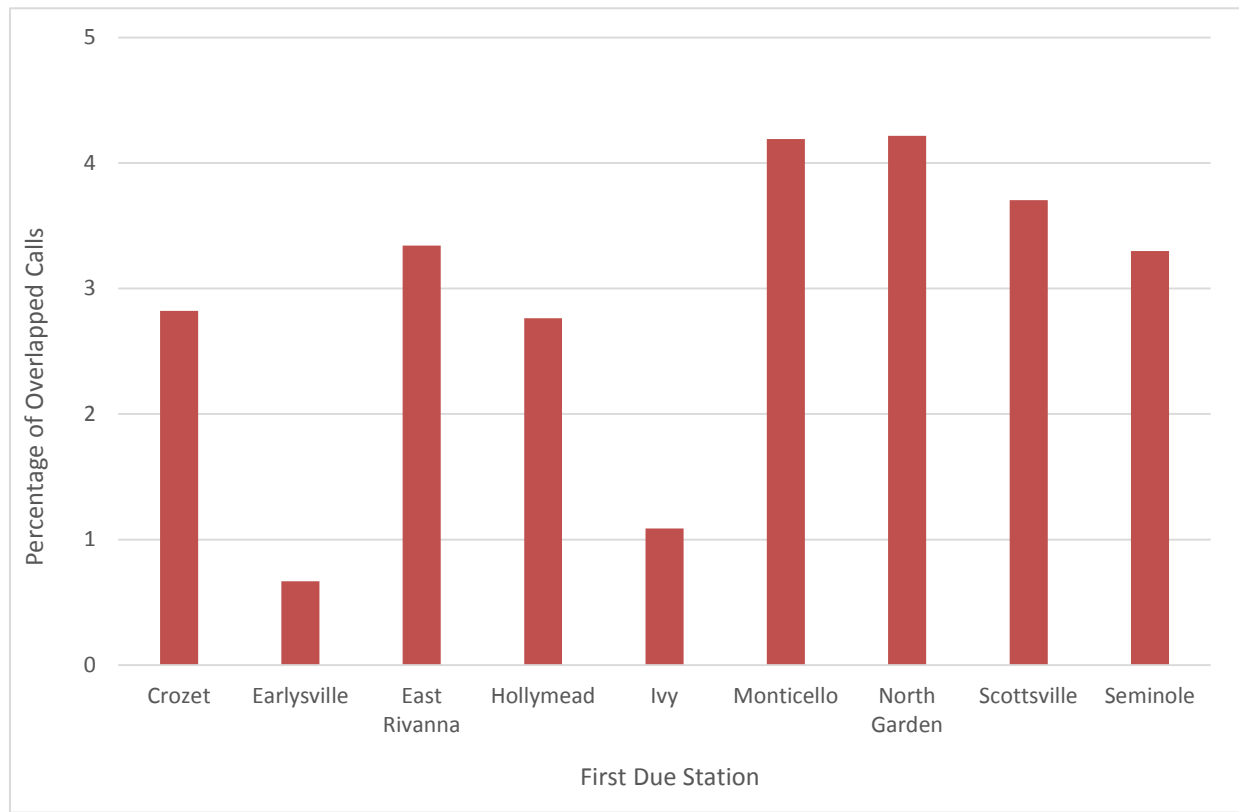


Table 67: Overlapped EMS Calls by First Due Station – EMS MFDAYLIGHT First Due Station

First Due Station	Overlapped EMS Calls	Total Calls	Percentage of Overlapped EMS Calls
CARS	0	41	0.0
Earlysville	9	149	6.0
Hollymead	72	465	15.5
Ivy	65	436	14.9
Monticello	69	513	13.5
Pantops	238	967	24.6
Seminole	506	1,474	34.3
SVRS	61	367	16.6
WARS	138	682	20.2

Figure 71: Percentage of Overlapped EMS Calls by First Due Station - EMS MFDAYLIGHT First Due Station

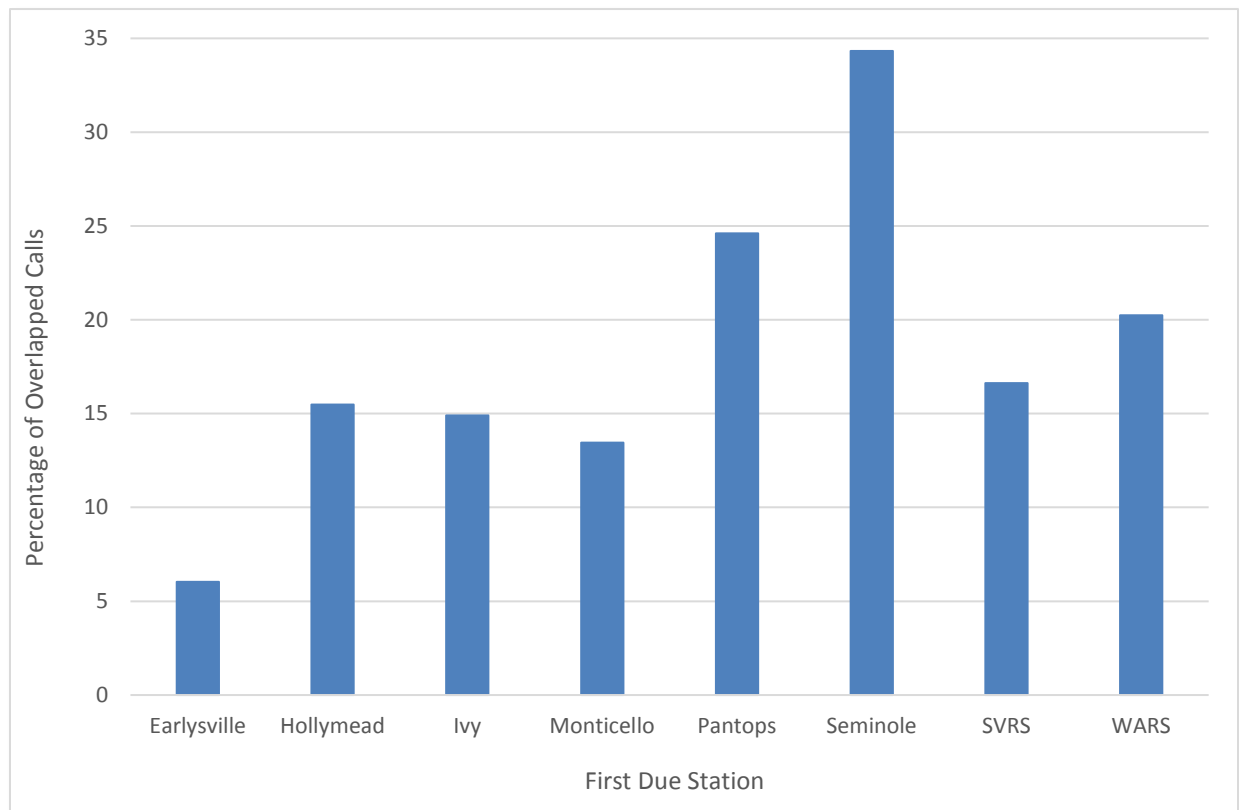
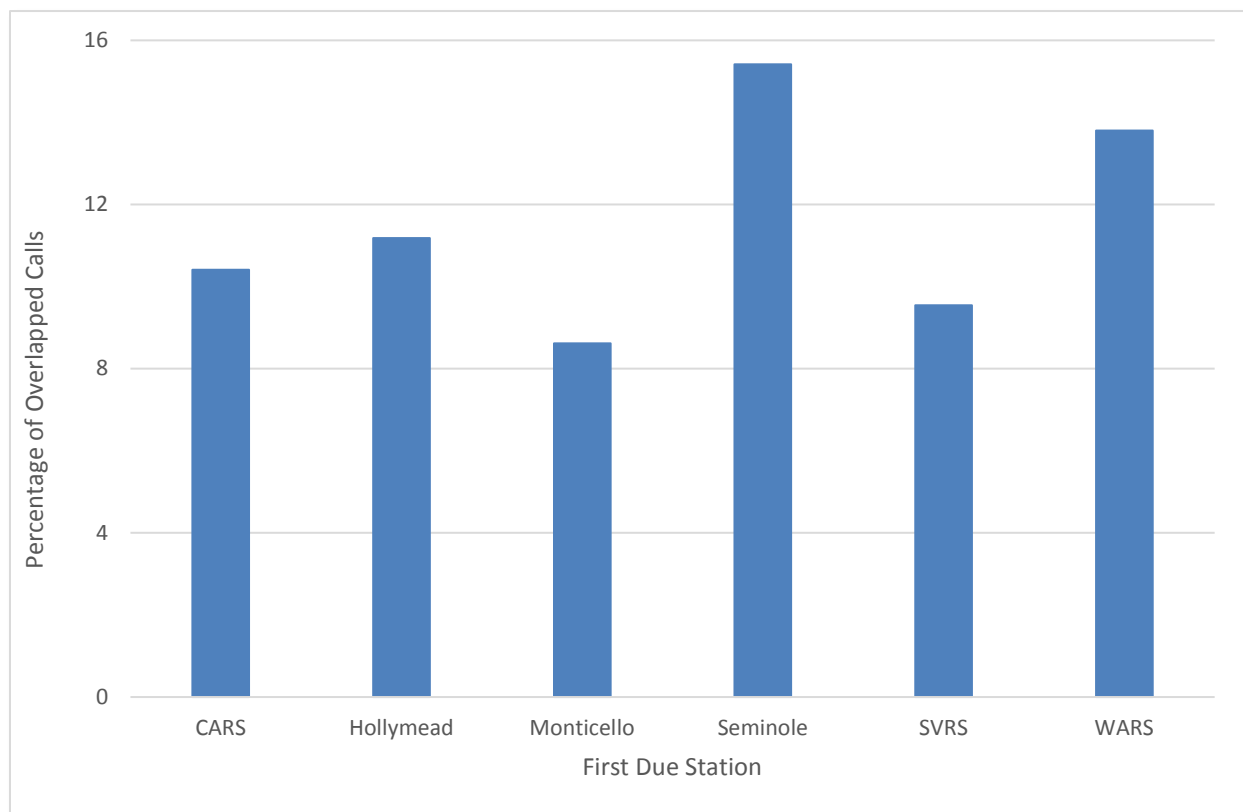


Table 68: Overlapped Fire Calls by First Due Station - EMS WEEKEND/EVENING First Due Station

First Due Station	Overlapped Fire Calls	Total Calls	Percentage of Overlapped Fire Calls
CARS	94	903	10.4
Hollymead	73	653	11.2
Monticello	55	638	8.6
Seminole	230	1,492	15.4
SVRS	50	524	9.5
WARS	126	913	13.8

Figure 72: Percentage of Overlapped Fire Calls by First Due Station - EMS WEEKEND/EVENING First Due Station



APPENDIX

This section reflects the audit, exclusion, and classification activities performed on the full CAD data files spanning January 1, 2017 to December 31, 2017. The “FRITS_Final_Incidents_2017” data file contained 22,971 entries (13,039 of these entries had a corresponding “IncidentNumberAlbemarle” value); prior to any exclusion activity, the “FRITS_Final_Apparatus_2017” data file originally contained 53,456 entries (27,227 of these entries had a corresponding “IncidentNumberAlbemarle” value). All audit and exclusion activities were performed on the “FRITS_Final_Apparatus_2017” data file; the “FRITS_Final_Incidents_2017” data file was used to map select variables (e.g., “TimeOfDay”) to entries in the unit-level data file by “CallID.” Unique incidents were otherwise identified using the unit-level data file.

Table 69: Exclusion Activity in Preparation for Identification of Unique Calls

Exclusion Activity ¹	Frequency (n)	Percent of Total (%)
Total Entries in Data Set	53,456	--
Missing “CallID” ²	115	0.2
Entries without Corresponding “IncidentNumberAlbemarle”	26,187	49.0
Entries for Units P92, P93, P94, and P95 ³	11	0.0
Total Remaining Entries in Data Set	27,143	50.8
Total Unique Calls Represented by Remaining Entries	13,038	--

¹Exclusion activities were performed sequentially, such that frequency and percent data are additive.

²These 115 entries were also missing address, call type, response type, and other key data. “CallID” could not be identified using other data in the file. Sixty-four of these 115 entries were relevant to ACFR units, and appear to represent 36 unique calls that are otherwise not accounted for in the data file or in this report (see Table 70 for these 36 incident numbers).

³All 11 entries had a corresponding “IncidentNumberAlbemarle”; however, these four units were noted to be ARFF units owned and operated by the airport, and units that don’t typically leave airport property. Unique calls would still be reflected for ACFR as long as an ACFR unit also responded to the call. There was only one unique call in the data file for which there was a response by an airport-owned ARFF unit and no responses by any ACFR unit (incident number 2017-00007961).

Table 70: Unique Incident Numbers for ACFR-Related Responses with No Corresponding “CallID”¹

“IncidentNumberAlbemarle”	
2017-00000223	2017-00007277
2017-00000623	2017-00007793
2017-00000957	2017-00008047
2017-00000976	2017-00008082
2017-00001090	2017-00008900
2017-00001301	2017-00008903
2017-00002069	2017-00009525
2017-00002070	2017-00009961
2017-00002074	2017-00010240
2017-00004731	2017-00010465
2017-00005045	2017-00010590
2017-00005176	2017-00011173
2017-00005432	2017-00011329
2017-00005486	2017-00012339
2017-00006096	2017-00012851
2017-00006296	2017-00013146
2017-00006584	2017-00013255
2017-00007219	2017-00013318

¹These 36 unique incident numbers for ACFR-related responses corresponded to 64 entries in the data file.

Table 71: Exclusion Activity in Preparation for Identification of Unique Responses

Exclusion Activity ¹	Frequency (n)	Percent of Total (%)
Total Entries in Data Set	27,143	--
ST# "ApparatusCallSign" Entries ²	1,482	5.5
ST2	154	0.6
ST3	298	1.1
ST4	108	0.4
ST5	342	1.3
ST6	88	0.3
ST7	320	1.2
ST8	172	0.6
Cancelled Responses with No Enroute Times	18	0.1
Drill or Exercise Responses	2	0.0
Duplicate Entries ³	90	0.3
Total Remaining Entries in Data Set	25,551	94.1
Total Unique Calls Represented by Remaining Entries	13,012	--

¹Exclusion activities were performed sequentially, such that frequency and percent data are additive.

²ACFR noted that ST# entries for "ApparatusCallSign" in the CAD data file indicated a tone or re-tone and should not be considered as unit-level responses.

³Duplicate entries are best identified when the "CallID," "ApparatusCallSign," and "AlarmDateTime" are identical for more than one entry (row of data); "AlarmDateTime" is included to allow for a unit to be legitimately dispatched more than once to the same call (returning to service in between dispatches).

Table 72: Audit for Busy and Performance Time Analyses

Audit Activity ¹	Frequency (n)	Percent of Total (%)
Total Entries in Data Set	25,551	--
"AlarmDateTime" < "IncidentDateTime" ²	4	0.0
"EnrouteDateTime" < "IncidentDateTime"	3	0.0
"EnrouteDateTime" < "AlarmDateTime" ³	125	0.5
"ArrivalDateTime" < "IncidentDateTime"	0	0.0
"ArrivalDateTime" < "AlarmDateTime"	48	0.2
"ArrivalDateTime" < "EnrouteDateTime"	63	0.2
"LeftSceneDateTime" < "IncidentDateTime"	0	0.0
"LeftSceneDateTime" < "AlarmDateTime"	16	0.1
"LeftSceneDateTime" < "EnrouteDateTime"	23	0.1
"LeftSceneDateTime" < "ArrivalDateTime"	30	0.1
"AtHospitalDateTime" < "IncidentDateTime"	0	0.0
"AtHospitalDateTime" < "AlarmDateTime"	5	0.0
"AtHospitalDateTime" < "EnrouteDateTime"	18	0.1
"AtHospitalDateTime" < "ArrivalDateTime"	26	0.1
"AtHospitalDateTime" < "LeftSceneDateTime"	0	0.0
"InServiceDateTime" < "IncidentDateTime"	0	0.0
"InServiceDateTime" < "AlarmDateTime"	0	0.0
"InServiceDateTime" < "EnrouteDateTime"	0	0.0
"InServiceDateTime" < "ArrivalDateTime"	0	0.0
"InServiceDateTime" < "LeftSceneDateTime"	0	0.0
"InServiceDateTime" < "AtHospitalDateTime"	0	0.0
Entries with ≥ One Time Value Out of Logical Temporal Order	223	0.9
"EnrouteDateTime" Missing When "ArrivalDateTime" Reported	576	2.3
"ArrivalDateTime" Missing When "LeftSceneDateTime" Reported	169	0.7
"LeftSceneDateTime" Missing When "ArrivalDateTime" Reported	12,107	47.4
Missing "InServiceDateTime"	13	0.1

¹Audit activities were independent of one another, such that frequency and percent data are not intended to be additive; some entries surfaced during multiple activities.

²All four entries were associated with incident number 2017-00007570; three of these four entries also reported "EnrouteDateTime" values < "IncidentDateTime" values.

³Three of these 125 entries also reported "EnrouteDateTime" values < "IncidentDateTime" values, as noted above.

Table 73: Exclusion Activity in Preparation for Busy Time Analyses

Exclusion Activity	Frequency (n)	Percent of Total (%)
Total Entries in Data Set	25,551	--
Entries with $\geq$ One Time Value Out of Logical Temporal Order	223	0.9
Total Remaining Entries in Data Set	25,328¹	99.1
Total Unique Calls Represented by Remaining Entries	12,964	--

¹Nine entries missing in service times.

Table 74: Exclusion Activity in Preparation for Performance Time Analyses

Exclusion Activity	Frequency (n)	Percent of Total (%)
Total Entries in Data Set	25,328	--
Calculated Dispatch Time $\geq$ 100 SDs Above Mean ¹	1	0.0
Total Remaining Entries in Data Set	25,327	~100.0
Total Unique Calls Represented by Remaining Entries	12,964	--

¹Calculated time for this entry was 43,221.0 minutes or approximately 30 days (z-score = 158.9); entry was associated with call ID 3033756 with an incident date of December 18, 2017 and an alarm date of January 17, 2018. This entire call was also excluded from call duration analyses related to transports.

Table 75: Classification of Incident Type from CAD Data File into Program and Call Category

Program	Call Category	“CADCallType” from CAD Data File
Agency Assist	Agency Assist	Assist Agency
		Fire Assist PD
EMS	Aircraft Emergency	MCI Level 3 Aircraft - 26+ Patients
	Alarm	Medical Alarm
		Medical Alarm Forced Entry
	Cardiac and Stroke	Cardiac Arrest
		Chest Pain
		Stroke Ambulance Level
	Difficulty Breathing	Stroke Trauma Level
		Breathing Problems
		Choking Ambulance Level
	Fall and Injury	Choking Medic Level
		Animal Bite Ambulance Level
		Animal Bite Trauma Level
		Assault Trauma Level
		Burns Ambulance Level
		Burns Medic Level
		Drowning Out of Water Ambulance Level
		Electrical Injury Ambulance Level
		Eye Chemical Burn
		Eye Injury
		Fall Ambulance Level
		Fall Trauma Level
		Gunshot Wound 1 Patient
		Gunshot Wound 2 Patients
		Hemorrhage
		Industrial Acc Ambulance Level
		Industrial Acc Trauma Level
		Injured Person Ambulance Level
		Injured Person Medic Level
		Injured Person Trauma Level
		Sexual Assault Amb
		Sexual Assault Ambulance Level
		Shooting/Stabbing
		Stabbing 1 Patient
		Stabbing 3 Patients
	Illness and Other	Abdominal Pain
		Allergic Reaction Ambulance Level
		Allergic Reaction Trauma Level
		Back Pain
		Cold Exposure Ambulance Level
		Cold Exposure Medic Level
		Diabetic Ambulance Level
		Diabetic Trauma Level
		Heat Exposure Ambulance Level

Program	Call Category	“CADCallType” from CAD Data File
		Heat Exposure Medic Level
		OB/Pregnancy Ambulance Level
		OB/Pregnancy Trauma Level
		Sick Person Ambulance Level
		Sick Person Trauma Level
		Unknown Problem/Man Down
	MVC	F/R MVC Minor/Unknown Injuries
		F/R MVC Motorcycle/ATV
		F/R MVC Pedestrian Struck
		F/R MVC Significant Impact No Entrapment
		MVC Past w/ Injury
	Obvious Death	Obvious Death
	Overdose and Psychiatric	Overdose Ambulance Level
		Overdose Medic Level
		Psychiatric Ambulance Level
		Psychiatric Medic Level
	Seizure and Unconsciousness	Psychiatric Trauma Level'
		Seizure Ambulance Level
		Seizure Medic Level
		Unconscious Ambulance Level
		Unconscious Medic Level
	Standby	Standby Emergency
		Standby Routine
Fire	Aircraft Emergency	Air Carrier Major Difficulty
		Aircraft Crash
		Single Engine Major Difficulty
		Single Engine Minor Difficulty
	Alarm	Fire Alarm
	Elevator Emergency	Elevator Emerg w/ Patient
		Elevator Emerg w/out Patient
	Fire Other	Bomb Threat
		Lines Down
		Tree Down
		Tree on Power Line
		Unusual Odor
		Water Hazard in Structure
	Mutual Aid	Mutual Aid Request Fire
	MVC - Fluids Down	Fire Motor Vehicle Crash No Injuries Fluids Down
	Outside Fire	Brush Fire
		Dumpster Fire
		Outdoor Smoke investigation - Non Brush Fire
		Transformer Fire
		Trash Fire
	Structure Fire	Appliance Fire Contained Comm
		Appliance Fire Contained Residential
		Chimney Fire - Residential

Program	Call Category	"CADCallType" from CAD Data File
		Fire Threatening Comm Building
		Fire Threatening Residence
		Structure Fire - Commercial
		Structure Fire - Commercial w/ Entrapment
		Structure Fire - Residential
		Structure Fire - Residential w/ Entrapment
	Structure Fire - Reduced Response	Smell of Smoke/Electrical Commercial
		Smell of Smoke/Electrical Residential
		Smoke in Structure Commercial
		Smoke in Structure Residential
		Sparks from Outlet Commercial
	Vehicle Fire	Vehicle Fire
Hazmat	Hazmat	CO Alarm w/ Patient Ambulance Level
		CO Alarm w/out Patient
		Gas Leak - Propane/ LP/ Etc.
		Hazmat 0
		Hazmat 1
		Hazmat 2
		Hazmat 2 Chemical Spill
		Hazmat 2 Fuel or Automotive Product
		Hazmat 2 Other Chemicals
		Hazmat 2 Unknown Powder
		Hazmat 3
		Hazmat Alarm
		Smell of Fuel in Commercial
		Smell of Fuel in Residential Structure
		Suspicious Package
Police-Related	Police-Related	911 Hang up
		Alarm for Police Response
		Animal Complaint/Investigation
		Assault Criminal
		Assist Citizen
		Breaking and Entering
		Death Investigation
		Disabled Vehicle
		Disorder - Non Domestic Disturbance
		Disorder w/ Weapon
		Domestic Disturbance
		Drug Investigation
		Drunk in Public
		Escort/Transport
		Extra Patrol
		Hit and Run Motor Vehicle Crash
		Larceny
		Lockout - Vehicle or Residential
		Lost/Found Property

Program	Call Category	"CADCallType" from CAD Data File
		Loud Music/Noise Complaint
		Mental Person
		Miscellaneous Criminal
		Miscellaneous Non-Criminal
		Motor Vehicle Crash No Injuries
		Ordinance Violations
		PD MVC Minor/Unknown Injuries
		PD MVC Motorcycle/ATV
		PD MVC No Injuries Fluids Down
		PD MVC Pedestrian Struck
		PD MVC Sig Impact No Entrapment
		PD MVC w/ Entrapment
		Phone Message
		Robbery w/ Weapon
		Sex Offense
		Shoplifting
		Special Detail
		Suspicious Activity - Person/Vehicle/Circumstance
		Traffic Hazard
		Traffic Stop
		Trespassing
		Vandalism
		Warrant Service
		Welfare Check
Public Service	Public Service	Animal Rescue
		Fire Public Service Call
		Public Service
		Smoke Detector Install
Rescue	Mutual Aid	Mutual Aid Request Rescue
	Rescue	F/R MVC w/ Entrapment
		Industrial Acc Entrapment Level 1
		Industrial Acc Entrapment Level 3
		Special RS Access Issue
		Special RS Confined Space
		Special RS Structure Collapse w/ Entrapment
		Special RS Vertical
		Tree into a structure, no injuries
		Vehicle into a structure, no injuries
	Water Rescue	Drowning in Swift Water/Lake/Pond
		Water Rescue Not Drowning

*Edited; original entry is reported as Psychiatric Trauma Level."

Table 76: Total Other Related Calls by Nature of Call

Nature of Call	Number of Calls	Percentage of Total Other Demands
Assist Agency	479	26.1
Public Service	401	21.9
F/R MVC w/ Entrapment	145	7.9
PD MVC Minor/Unknown Injuries	84	4.6
Lockout - Vehicle or Residential	78	4.3
Gas Leak - Propane/ LP/ Etc.	69	3.8
PD MVC No Injuries Fluids Down	61	3.3
CO Alarm w/out Patient	52	2.8
Fire Public Service Call	49	2.7
Motor Vehicle Crash No Injuries	35	1.9
Fire Assist PD	34	1.9
Smoke Detector Install	32	1.7
Hazmat 0	24	1.3
Mutual Aid Request Rescue	23	1.3
Disorder - Non Domestic Disturbance	20	1.1
Traffic Hazard	20	1.1
PD MVC w/ Entrapment	18	1.0
Suspicious Package	18	1.0
Disabled Vehicle	15	0.8
Animal Rescue	13	0.7
Alarm for Police Response	11	0.6
Vehicle into a structure, no injuries	11	0.6
911 Hang up	10	0.5
Special RS Access Issue	10	0.5
Hazmat 2 Other Chemicals	9	0.5
Hazmat 3	9	0.5
PD MVC Sig Impact No Entrapment	9	0.5
Mental Person	8	0.4
Animal Complaint/Investigation	6	0.3
Assault Criminal	5	0.3
Assist Citizen	5	0.3
Drowning in Swift Water/Lake/Pond	5	0.3
Hazmat 1	5	0.3
Miscellaneous Non-Criminal	5	0.3
Industrial Acc Entrapment Level 1	4	0.2
PD MVC Motorcycle/ATV	4	0.2
Smell of Fuel in Commercial	4	0.2
Special RS Vertical	4	0.2
Suspicious Activity - Person/Vehicle/Circumstance	4	0.2
Water Rescue Not Drowning	4	0.2
CO Alarm w/ Patient Ambulance Level	3	0.2
Domestic Disturbance	3	0.2
Death Investigation	2	0.1
Hit and Run Motor Vehicle Crash	2	0.1
PD MVC Pedestrian Struck	2	0.1
Sex Offense	2	0.1

Nature of Call	Number of Calls	Percentage of Total Other Demands
Traffic Stop	2	0.1
Welfare Check	2	0.1
Breaking and Entering	1	0.1
Drug Investigation	1	0.1
Drunk in Public	1	0.1
Extra Patrol	1	0.1
Hazmat 2	1	0.1
Hazmat 2 Fuel or Automotive Product	1	0.1
Hazmat Alarm	1	0.1
Larceny	1	0.1
Lost/Found Property	1	0.1
Miscellaneous Criminal	1	0.1
Robbery w/ Weapon	1	0.1
Smell of Fuel in Residential Structure	1	0.1
Special Detail	1	0.1
Special RS Confined Space	1	0.1
Warrant Service	1	0.1
Total	1,835	100.0



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