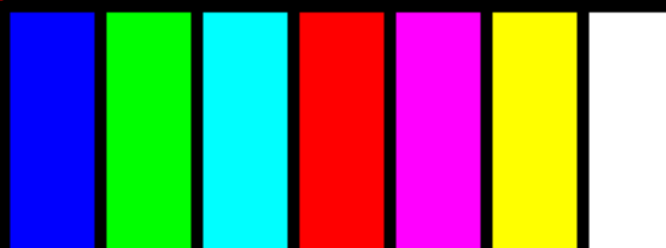


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# Improving Paramedic Response Interval

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# Washington, DC Fire & EMS Department

Adrian M. Fenty, Mayor  
Dennis L. Rubin, Fire & EMS Chief



# Introduction

- Washington, DC is home to over 600,000 people, yet the daytime population is over 1.5 million due to commuting workers, visitors, and tourists.
- Demand for service, closing of hospitals, and lengthening ED droptime make choosing the optimum locations for FEMS resources imperative.



# Introduction

- Paramedic Engine Companies (PECs) are an alternative to traditional Advanced Life Support (ALS) transport units
- PECs can return to service if the patient does not require ALS, and the Basic Life Support (BLS) transport unit can continue care and transport the patient to the hospital.



# Introduction

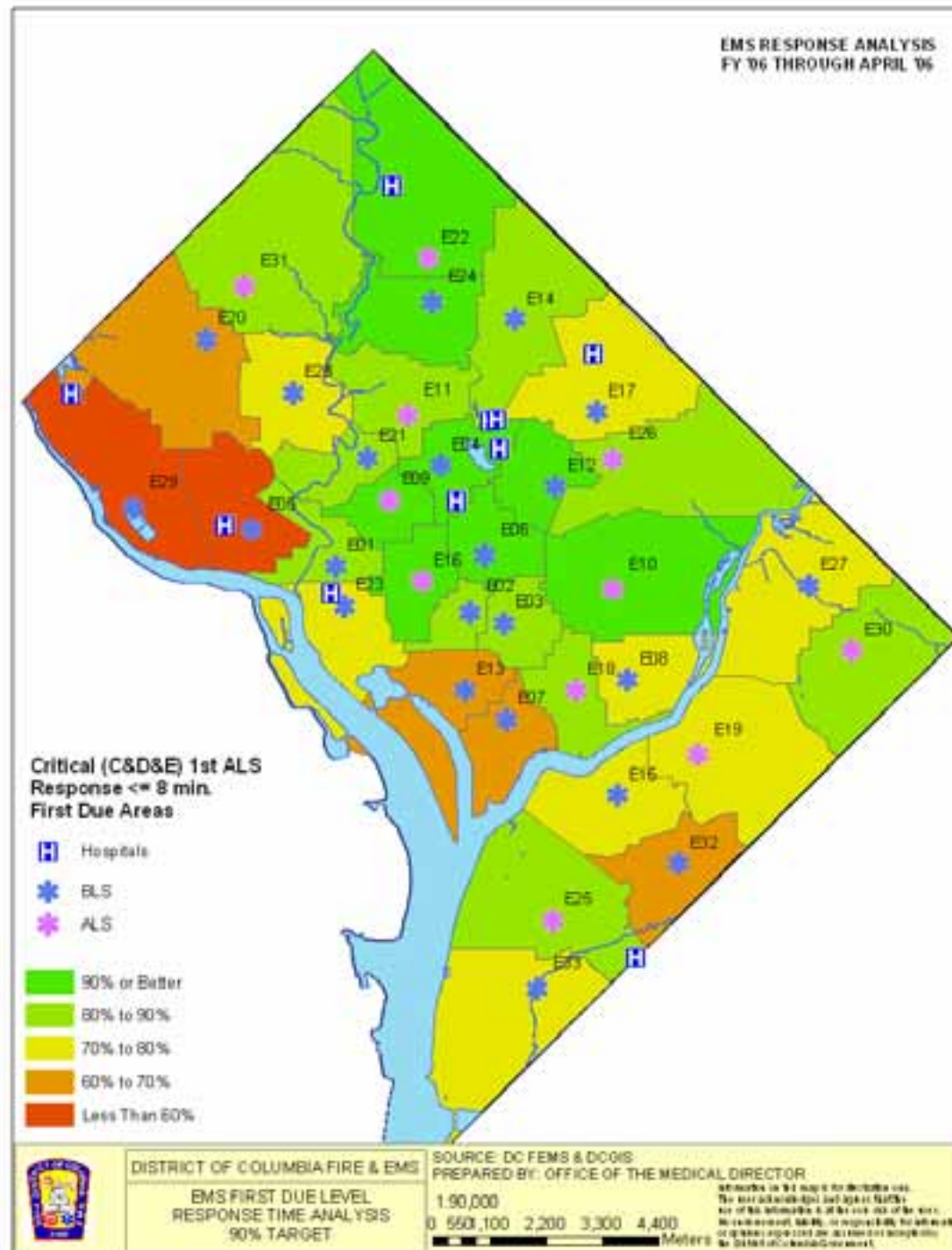
- This plan keeps the PEC available for service in its own service area. The closest appropriate units for any call are recommended automatically by the CAD system using AVL and selected by the dispatcher.



# Overview

- First paramedic on the scene for a critical call is 8 minutes or less 90 percent of the time per NFPA 1710.
- City-wide ALS response performance was hovering around 82% in early FY 2006.
- We needed to decide where and when to add paramedic resources.







# Goal

Improve the city-wide ALS response interval by determining where to place ALS resources, which are limited by the availability of paramedics.



# Method Overview

- Mapped the incident locations in ArcMap
- Extracted them by Station Areas.
- Aggregated the performance by those areas and displayed the results in a standard format in maps and in a table.
- Chose the areas that could best benefit based on the insufficient performance AND the number of patient contacts that could be improved.
- Re-assigned some units and established new ones at some stations.



# Method (1/7)

- Obtain EMS incidents from the Computer Assisted Dispatch system (CAD). These have XY co-ordinates in MD state plane – no geocoding!
- Spatial join by Station First Due (also use Census Tracts, Battalions, Census Blocks, and Neighborhoods).
- Import into MS Access and match with table of responses that have the earliest arrival time by unit type.



# Method (2/7)

- Divide the number of ALS unit arrivals (YTD) that are less than or equal to eight minutes by the total number of responses for that area to determine the performance level.
- The issue with only examining the performance level is that there may be areas that have poor performance but also do not have many critical calls.



# Method (3/7)

The results were placed in a matrix by station area that displays:

- Station,
- Number of ALS unit arrivals  $\leq 8$  min.,
- Total number of critical calls,
- Percentage of ALS unit arrivals  $\leq 8$  min.,
- The number of ALS unit arrivals that are  $> 8$  minutes.



# Method (4/7)

- That matrix is then sorted by percentage with the ten poorest performing stations flagged.
- The matrix is then sorted from most to least number of ALS unit arrivals that are greater than 8 minutes.



# FY '06 THROUGH APR 06

CO AREA	ALS IN	ALS ALL	% ALS <= 8MIN	ALS OOT	PEC / BLS
E32	902	1359	66.4%	457	BLS
E15	892	1255	71.1%	363	BLS
E27	977	1338	73.0%	361	BLS
E33	879	1209	72.7%	330	BLS
E30	1692	2012	84.1%	320	PEC
E07	501	793	63.2%	292	BLS
E19	651	915	71.1%	264	PEC
E20	461	710	64.9%	249	BLS
E26	1238	1461	84.7%	223	PEC
E17	825	1034	79.8%	209	BLS
E10	2388	2581	92.5%	193	PEC
E11	1595	1786	89.3%	191	PEC
E08	675	864	78.1%	189	BLS
E03	1086	1272	85.4%	186	BLS
E13	278	444	62.6%	166	BLS
E23	467	608	76.8%	141	BLS
E14	596	730	81.6%	134	BLS
E06	1311	1428	91.8%	117	BLS
E25	738	851	86.7%	113	PEC
E02	714	825	86.5%	111	BLS
E01	592	690	85.8%	98	BLS
E18	675	769	87.8%	94	PEC
E05	137	230	59.6%	93	BLS
E31	373	466	80.0%	93	PEC
E22	904	996	90.8%	92	PEC
E21	443	528	83.9%	85	BLS
E16	1258	1342	93.7%	84	PEC
E04	723	794	91.1%	71	BLS
E29	30	97	30.9%	67	BLS
E28	164	230	71.3%	66	BLS
E24	621	682	91.1%	61	BLS
E12	671	732	91.7%	61	BLS
E09	754	779	96.8%	25	PEC
CITY WIDE	26211	31810	82.4%	5599	



(5/7)

**BOLD = TOP 10 FIRST DUES NEEDING BETTER ALS PERFORMANCE**  
SORT ORDER IS BASED ON GREATEST NUMBER OF ALS CALLS OUT OF TARGET

2	= 0 TO 60%	OF ALS IN <= 8 MIN
4	= 60 TO 70%	OF ALS IN <= 8 MIN
8	= 70 TO 80%	OF ALS IN <= 8 MIN
11	= 80 TO 90%	OF ALS IN <= 8 MIN
8	= 90 TO 100%	OF ALS IN <= 8 MIN

33



# Method (6/7)

- The stations that rank highest on both criteria are targeted to get the next available PECs.
- Stations can only house a finite number of units, so it is not practical to place as many units as are needed at a particular station.





# Method

(7/7)

If there is a near tie on priority, the station locations are examined on the map to determine which locations can help fill in coverage gaps in the best way.



# Results

- By prioritizing in this way, we were able to give the city better coverage per ALS resource.
- We also noticed that performance was better in the central area of the city, most likely due to ALS transport units leaving the central hospitals, so we also tended to place new resources on the periphery of the city.



# Results

City-wide ALS performance reached a high of 91.9% in July 2007. The year-to-date monthly average is now 89.5%. The individual station areas vary from 71.9% to 95.9% YTD through September 2007.



FY '06  
TO  
APR  
'06  
11  
PECs

CO_AREA	ALS IN	ALS ALL	% ALS <= 8 MIN	ALS OOT	PEC / BLS
E32	902	1359	66.4%	457	BLS
E15	892	1255	71.1%	363	BLS
E27	977	1330	73.0%	361	BLS
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E12	671	732	91.7%	61	BLS
E09	754	779	96.8%	25	PEC
CITY WIDE	26211	31810	82.4%	5599	

**BOLD = TOP 10 FIRST DUES NEEDING BETTER ALS PERFORM.**  
SORT ORDER IS BASED ON GREATEST NUMBER OF ALS CALLS OUT

2	= 0 TO 60%	OF ALS IN <= 8 MIN
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8	= 70 TO 80%	OF ALS IN <= 8 MIN
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0	= 90 TO 100%	OF ALS IN <= 8 MIN

33

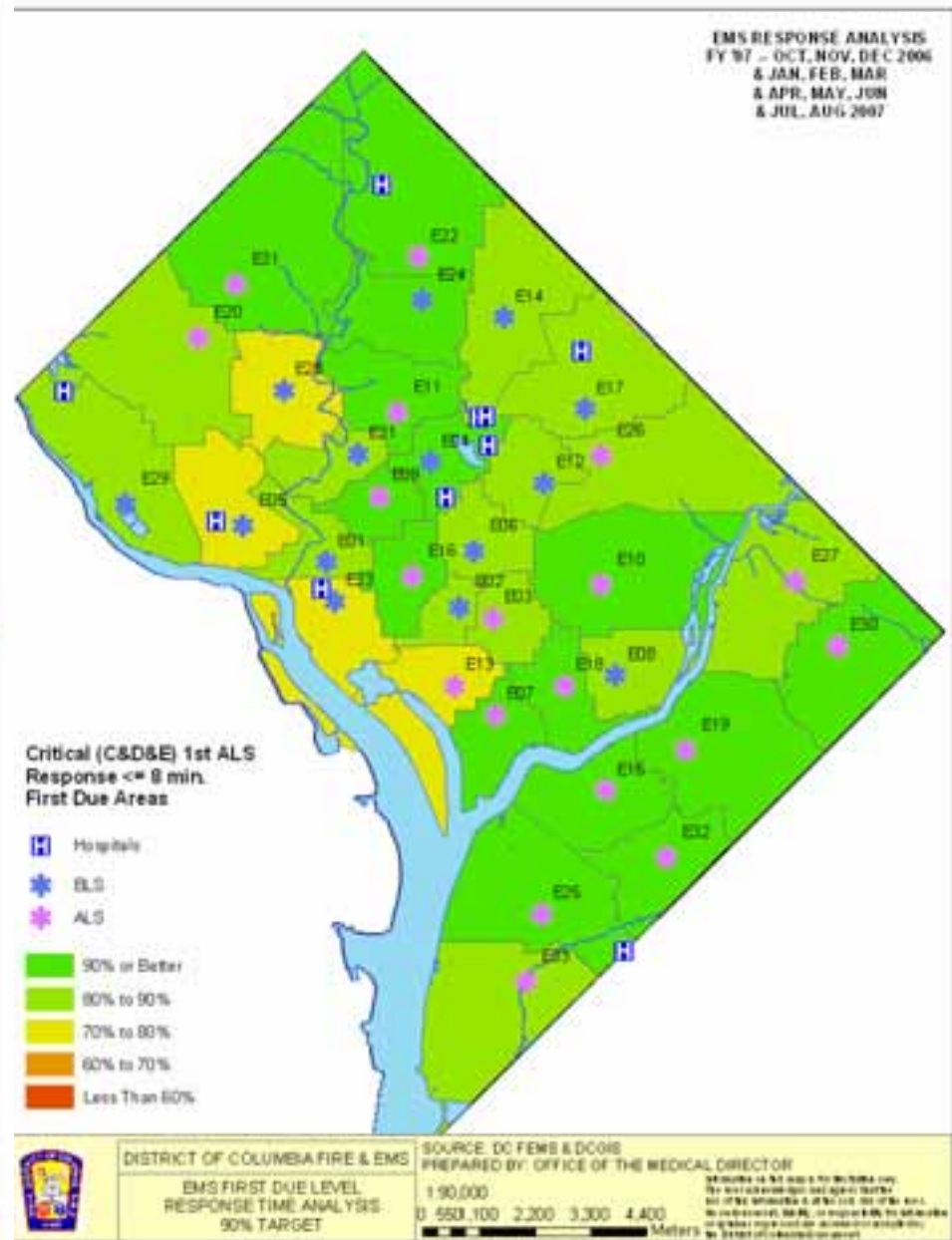
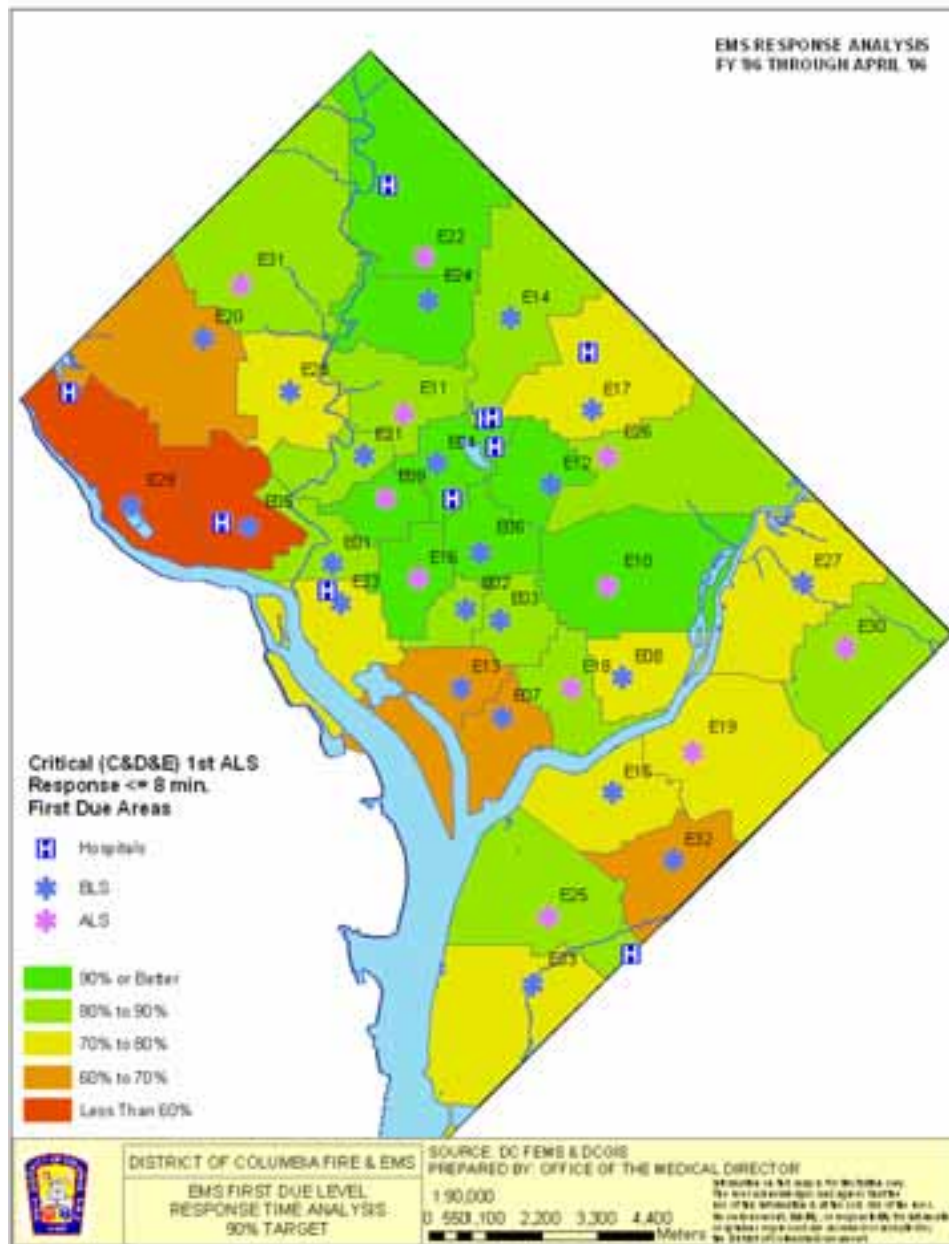
CO_AREA	ALS IN	ALS ALL	% ALS <= 8 min	ALS OOT	PEC / BLS
E-30	3312	3639	91.0%	327	PEC
E-6	2541	2866	88.7%	325	BLS
E-17	1482	1805	82.1%	323	BLS
E-23	885	1200	73.8%	315	BLS
E-26	2375	2688	88.4%	313	PEC
E-10	4395	4701	93.5%	306	PEC
E-27	2293	2584	88.7%	291	PEC
E-2	1401	1674	83.7%	273	BLS
E-33	2242	2495	89.9%	253	PEC
E-8	1154	1391	83.0%	237	BLS
E-32	2323	2558	90.8%	235	PEC
E-3	1850	2073	89.2%	223	PEC
E-1	1078	1298	83.1%	220	BLS
E-14	1119	1328	84.3%	209	BLS
E-13	796	998	79.8%	202	PEC
E-16	2482	2679	92.6%	197	PEC
E-22	1696	1880	90.2%	184	PEC
E-20	980	1163	84.3%	183	PEC
E-15	2222	2393	92.9%	171	PEC
E-12	1144	1291	88.6%	147	BLS
E-11	3210	3348	95.9%	138	PEC
E-5	348	484	71.9%	136	BLS
E-24	1203	1337	90.0%	134	BLS
E-21	769	895	85.9%	126	BLS
E-25	1645	1766	93.1%	121	PEC
E-7	1197	1313	91.2%	116	PEC
E-18	1159	1257	92.2%	98	PEC
E-19	1686	1784	94.5%	98	PEC
E-28	295	386	76.4%	91	BLS
E-9	1272	1361	93.5%	89	PEC
E-4	1377	1449	95.0%	72	BLS
E-31	750	800	93.8%	50	PEC
E-29	129	149	86.6%	20	BLS
citywide	52810	59033	89.5%	6223	

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33

FY '07  
TO  
AUG  
'07  
19  
PECs



# Conclusion

- Using GIS (including data analysis pre and post mapping) has helped us to sensibly choose the best places to locate our limited resources in order to improve service to the public that we serve.
- Due to the quality of our method, and verification of our results by the City Administrator's office (CapStat), the city has supported the funding of these improvements.





Thank you!



Erik Johnson, EMT-P, CPM



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<b>Unit:</b>	<b>Date in service:</b>	<b>FY:</b>
PEC 16	May 18, 2003	2003
PEC 25	May 18, 2003	2003
PEC 30	Oct. 19, 2003	2004
PEC 31	Apr. 4, 2004	2004
PEC 10	Dec 5, 2004	2005
PEC 22	Dec 5, 2004	2005
PEC 18	Sept. 18, 2005	2005
PEC 9	Sept. 18, 2005	2005
PEC 11	Apr. 16, 2006	2006
PEC 19	Apr. 16, 2006	2006
PEC 26	Apr. 16, 2006	2006
PEC 7	May 28, 2006	2006
PEC 33	Aug. 6, 2006	2006
PEC 20	Oct. 14, 2006	2007
PEC 15	Nov. 26, 2006	2007
PEC 3	Nov. 26, 2006	2007
PEC 27	Jan. 5, 2007	2007
PEC 32	Jan. 12, 2007	2007
PEC 13	Apr. 29, 2007	2007

Before  
After





# Notes

- MPDS ver 11 for 911 call triage.
- Implementing Deccan Live MUM for dynamic deployment.
- The location of long-term care facilities (nursing homes) impacted the choices, we “zoomed in” on some of the station areas. Our protocols do not always dictate sending a first responder unit because they need a transport unit.

