JUSTIFYING THE NEED FOR ADVANCED LIFE SUPPORT IN THE FIRE SERVICE

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Wichita KS

PURPOSE

Justify the need for ALS services to be provided by the fire department by using GIS and statistical analysis

How are both services currently performing?

Providing ALS from both fire services and EMS will decrease response times saving more people and providing a better service to the community.

DEFINITIONS

Advanced Life Support (ALS)- Services preformed by a Mobile Intensive Care Technician (Paramedic). This is the highest level of pre-hospital emergency care provider in the State of Kansas

Basic Life Support (BLS)- Basic life saving skills performed by Emergency Medical Technicians (EMT). EMT's usually complete their training in a semester or two

Computer Aided Dispatch (CAD) 911- Emergency call center that is responsible for dispatching emergency services

NUMBER OF AVAILABLE UNITS

Wichita and Sedgwick County fire have a total of 26 fire stations and 59 first responding apparatus.

Sedgwick County EMS responds from 14 posts with 13 units

GATHER 2006 DATA

- Gather data from RMS; Fire House
  - Assign first responders
  - Calculate all performance times
  - Geocode data
    - Matched 95%
  - Calculate each performance measure as defined by NFPA 1710

CALCULATED BENCH MARKS

- Call processing time
  - 911 dialed to alarm sounded at station
- Turnout time
  - Time from alarm sounded to unit enroute
- Drive time
  - Time from unit enroute to onscene
- Response time
  - 911 call received to unit onscene

2006 SERVICE PROVIDED

- Sedgwick County Population
  - 470,000
- WFD Medical Calls
  - 30,014 (this includes all medical calls dispatched)
  - 73% of all alarms
- EMS
  - **44,571** (this includes non-emergency scheduled transfers)

FIRE HOUSE RECORD MANAGEMENT SYSTEM (RMS)

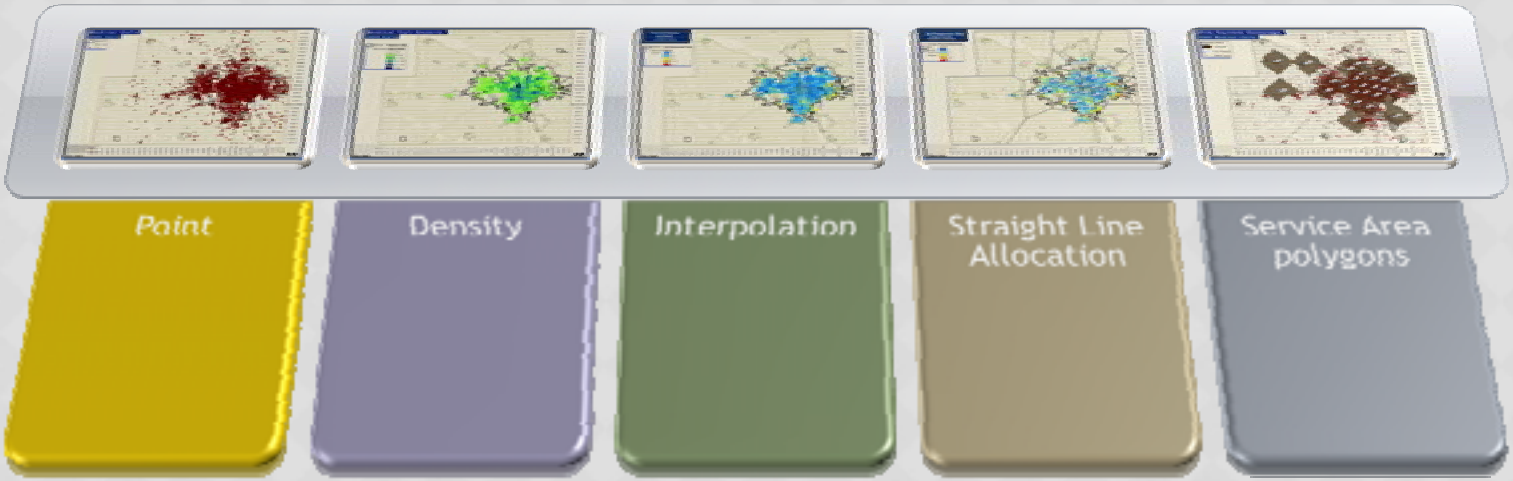
- SQL based data warehouse
- Stores records for all the incidents that Fire and EMS respond to
- Once received from dispatch the performance fields are calculated
  - Response time for each unit, order of arrival for fire, order of arrival for EMS, order of arrival regardless of agency.

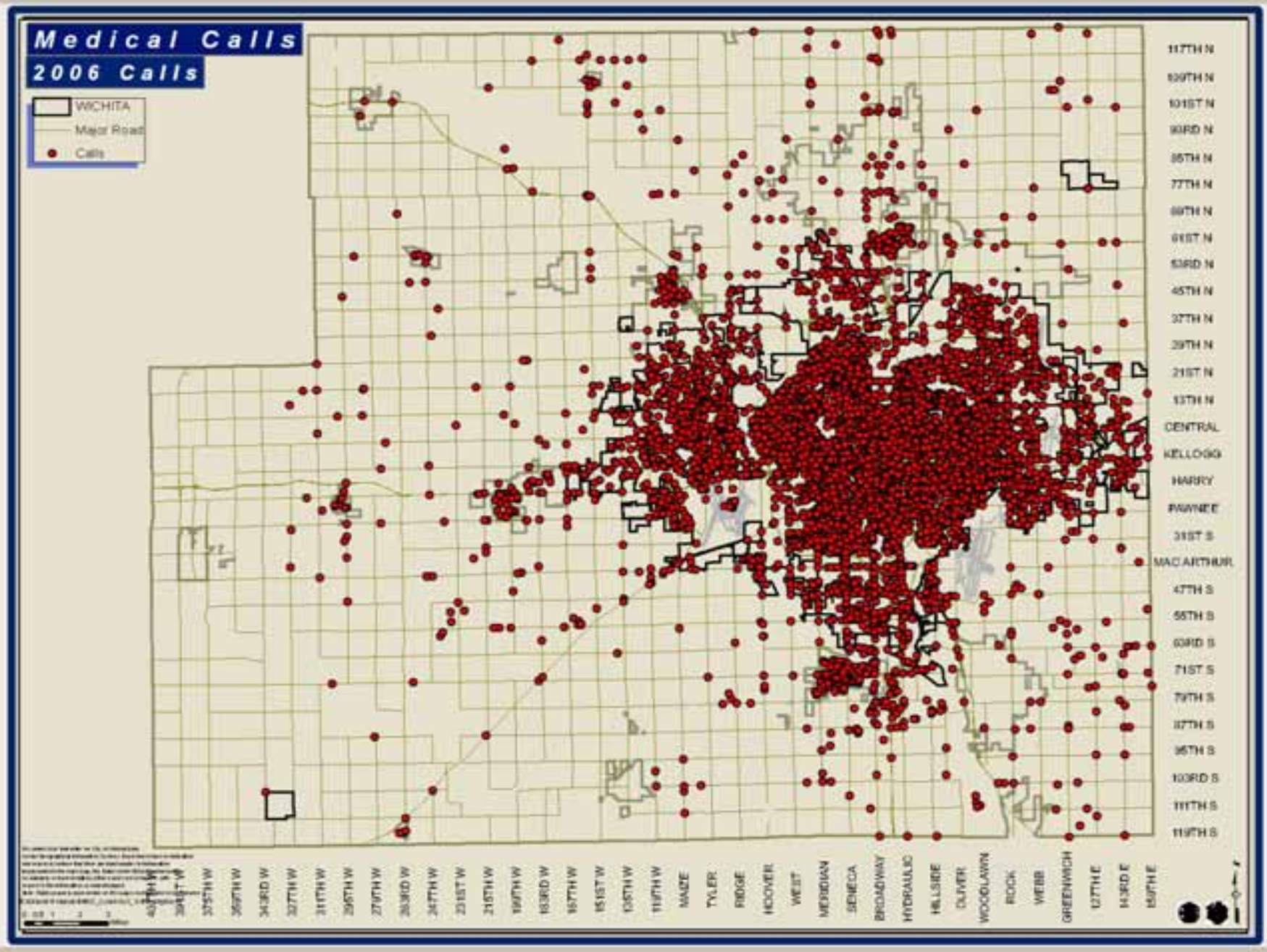
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 1710

- National standard for acceptable response times
  - BLS will have a response of 6 minutes or less 90% of the time
  - ALS will have a response of 10 minutes or less 90% of the time
- The reason for using a fractal measure instead of a mean is that it does not allow outliers to influence the performance assessment

GEOGRAPHIC ANALYSIS

- Geocode Data
- Generate necessary surfaces
  - Point, Density, Interpolation, Straight Line Allocation, Service Area polygons
- Perform analysis




Medical Calls
2006 Calls
WICHITA
Major Road
Calls
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
29TH N
21ST N
13TH N
CENTRAL
KELLOGG
HARRY
PAWNEE
31ST S
MACARTHUR
47TH S
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71ST S
79TH S
87TH S
95TH S
103RD S
111TH S
119TH S
375TH W
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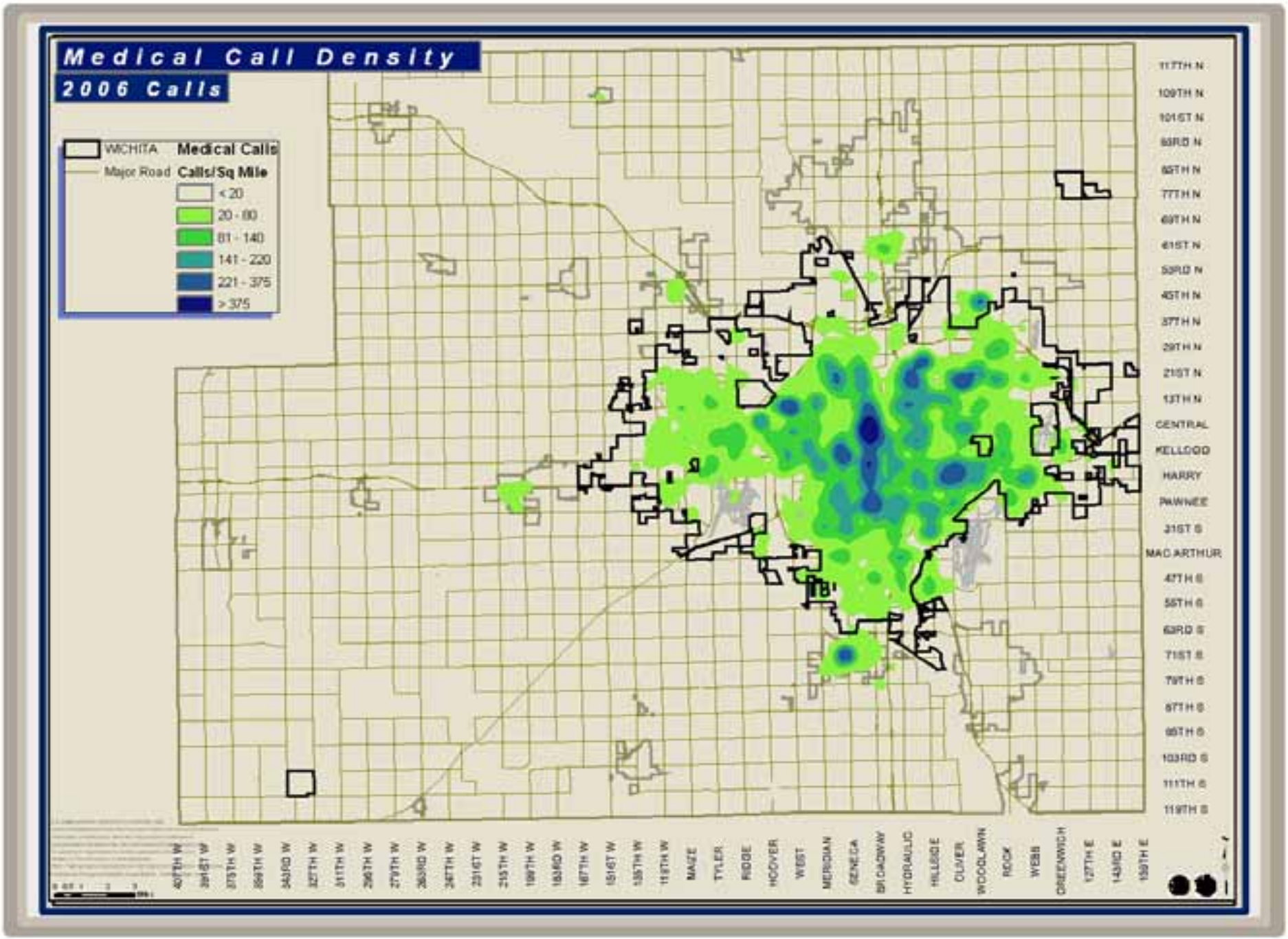
TYLER
RIDGE
HOOVER
WEST
MERIDIAN
SENECA
BROADWAY
HYDRAULIC
HILLSIDE
OLIVER
WOODLAWN
ROCK
WEBB
GREENWICH
127TH E
143RD E
159TH E

DENSITY

- Spatial Analyst tool
  - Will generate a raster surface that will show where the medical calls are most concentrated.
- This will graphically show where the areas with a greater call demand are in turn representing where units are responding to a majority of the time.


Medical Call Density
2006 Calls
WICHITA
Major Road
Medical Calls
Calls/Sq Mile
< 20
20 - 80
81 - 140
141 - 220
221 - 375
> 375
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
29TH N
21ST N
13TH N
CENTRAL
KELLOGG
HARRY
PAWNEE
31ST S
MACARTHUR
47TH S
55TH S
63RD S
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79TH S
87TH S
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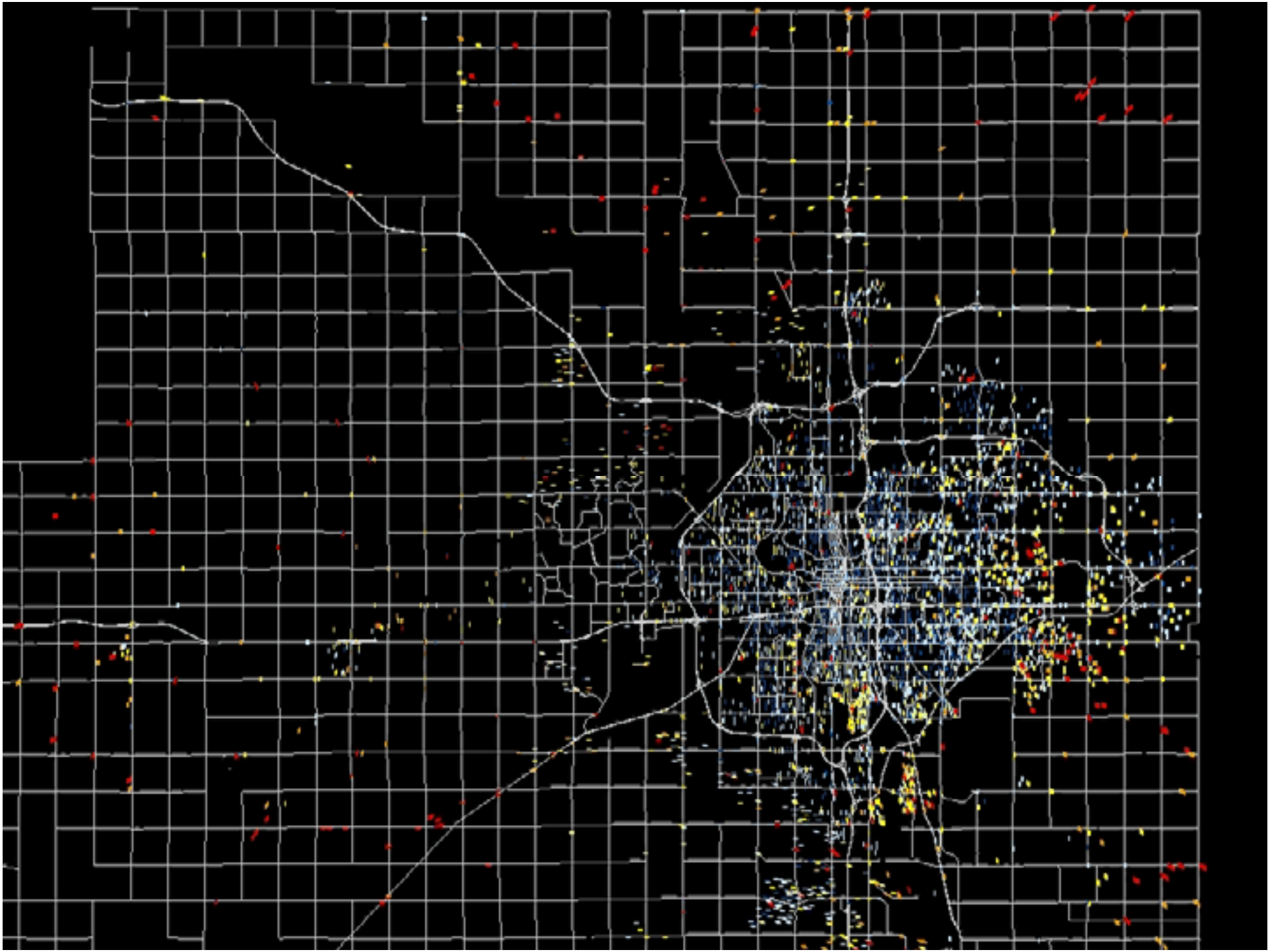
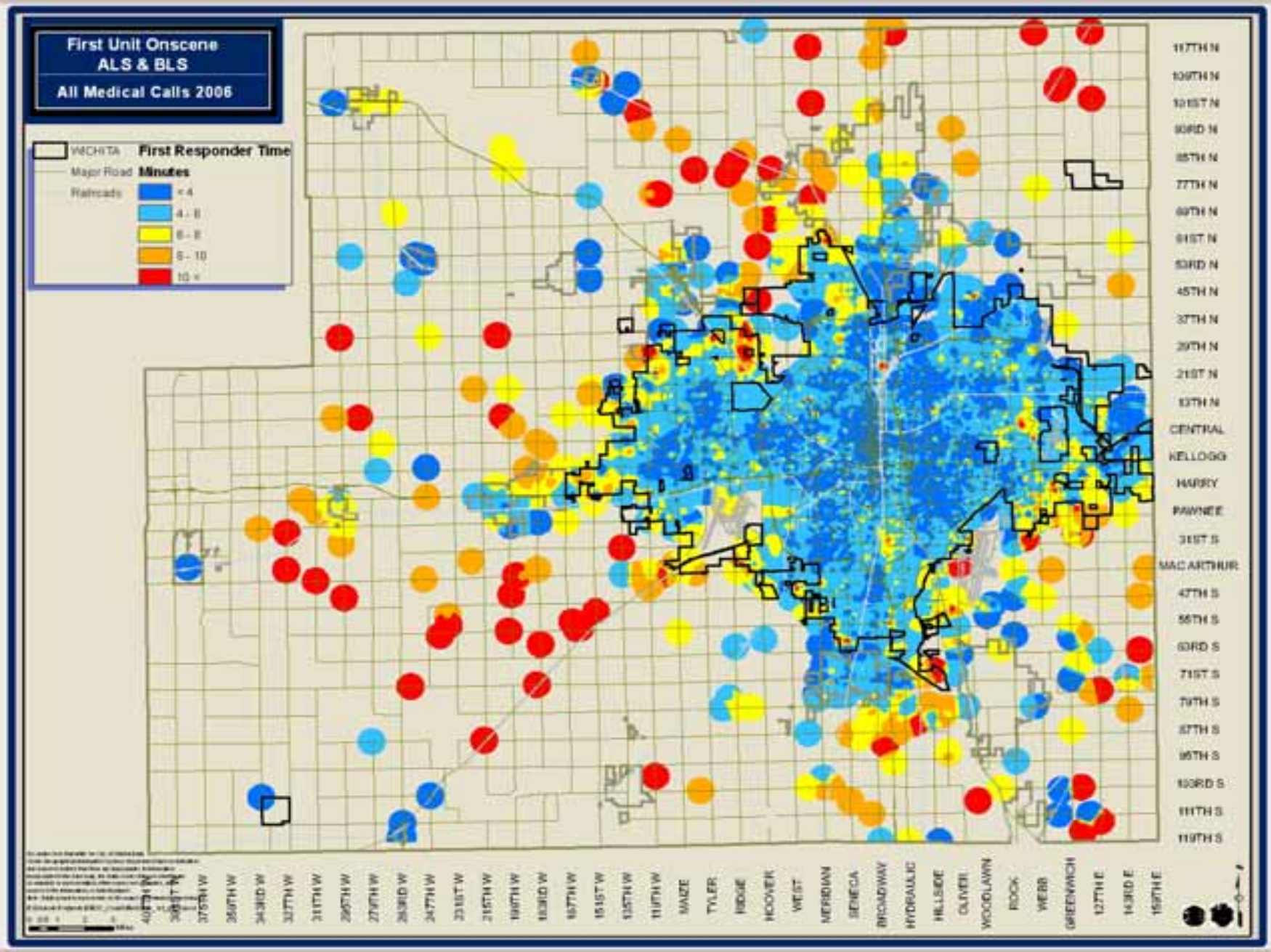
BROADWAY
HYDRAULIC
HILLSIDE
OLIVER
WOODLAWN
ROCK
WEBB
GREENWICH
127TH E
143RD E
159TH E



INTERPOLATION

- Most powerful tool to geographically demonstrate the response time for different areas
  - Generating a surface using interpolation will predict the values for cells in a raster from a limited number of sample data points.
    - Accomplished by assigning the Z-value the response time of the first unit onscene
- Interpolation surfaces generated for
  - EMS first unit onscene, fire first unit onscene, first unit onscene from either agency


First Unit Onscene
ALS & BLS
All Medical Calls 2006
WICHITA
Major Road
Railroads
First Responder Time
Minutes
< 4
4 - 6
6 - 8
8 - 10
10 <
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
29TH N
21ST N
13TH N
CENTRAL
KELLOGG
HARRY
PAWNEE
31ST S
MAC ARTHUR
47TH S
55TH S
63RD S
71ST S
79TH S
87TH S
95TH S
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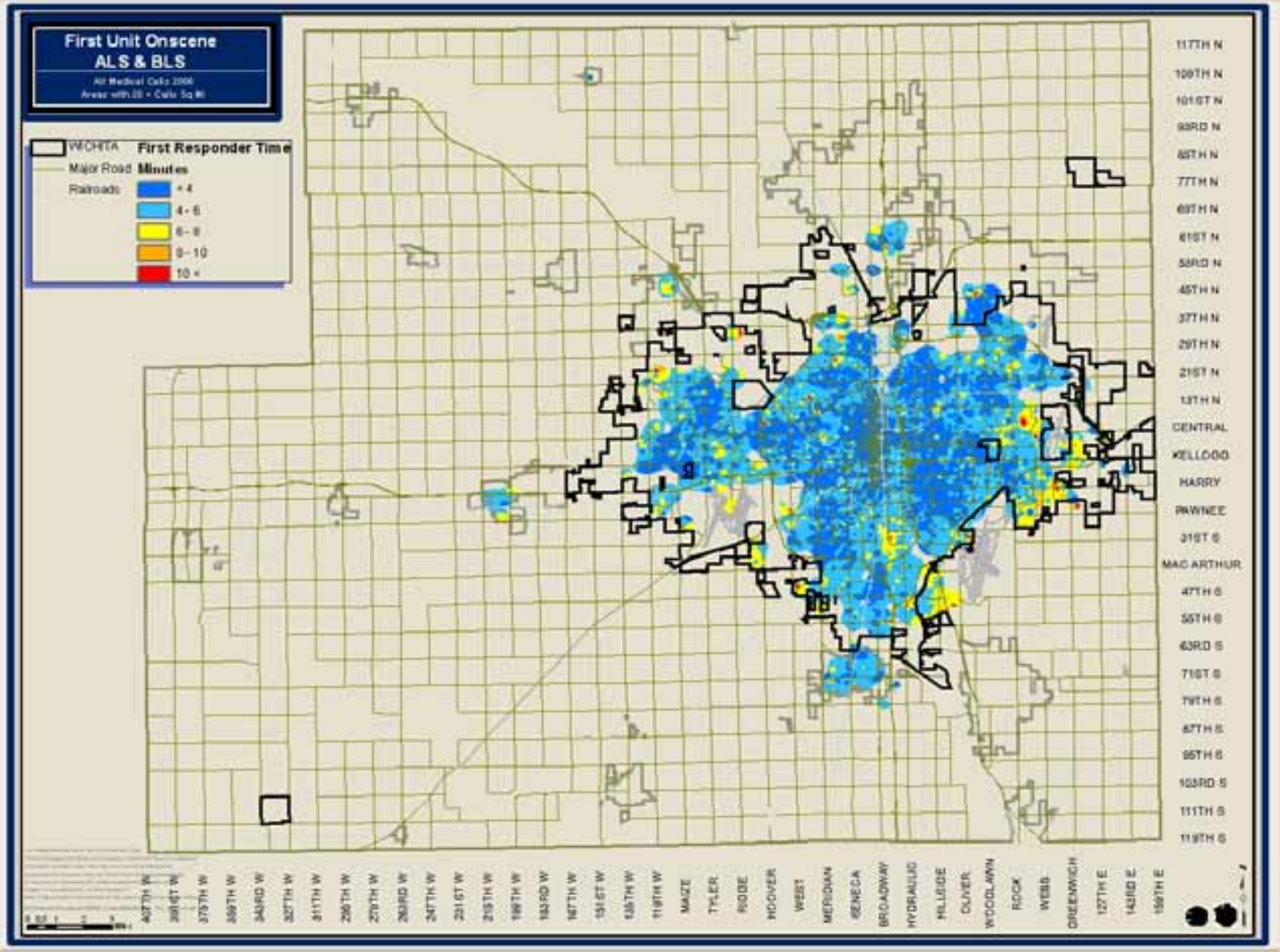
WEBB
GREENWICH
127TH E
143RD E
159TH E


First Unit Onscene
ALS & BLS
All Medical Calls 2006
Areas with 20 + Calls Sq Mi
WICHITA
Major Road
Railroads
First Responder Time
Minutes
< 4
4 - 6
6 - 8
8 - 10
10 +
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
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21ST N
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CENTRAL
KELLOGG
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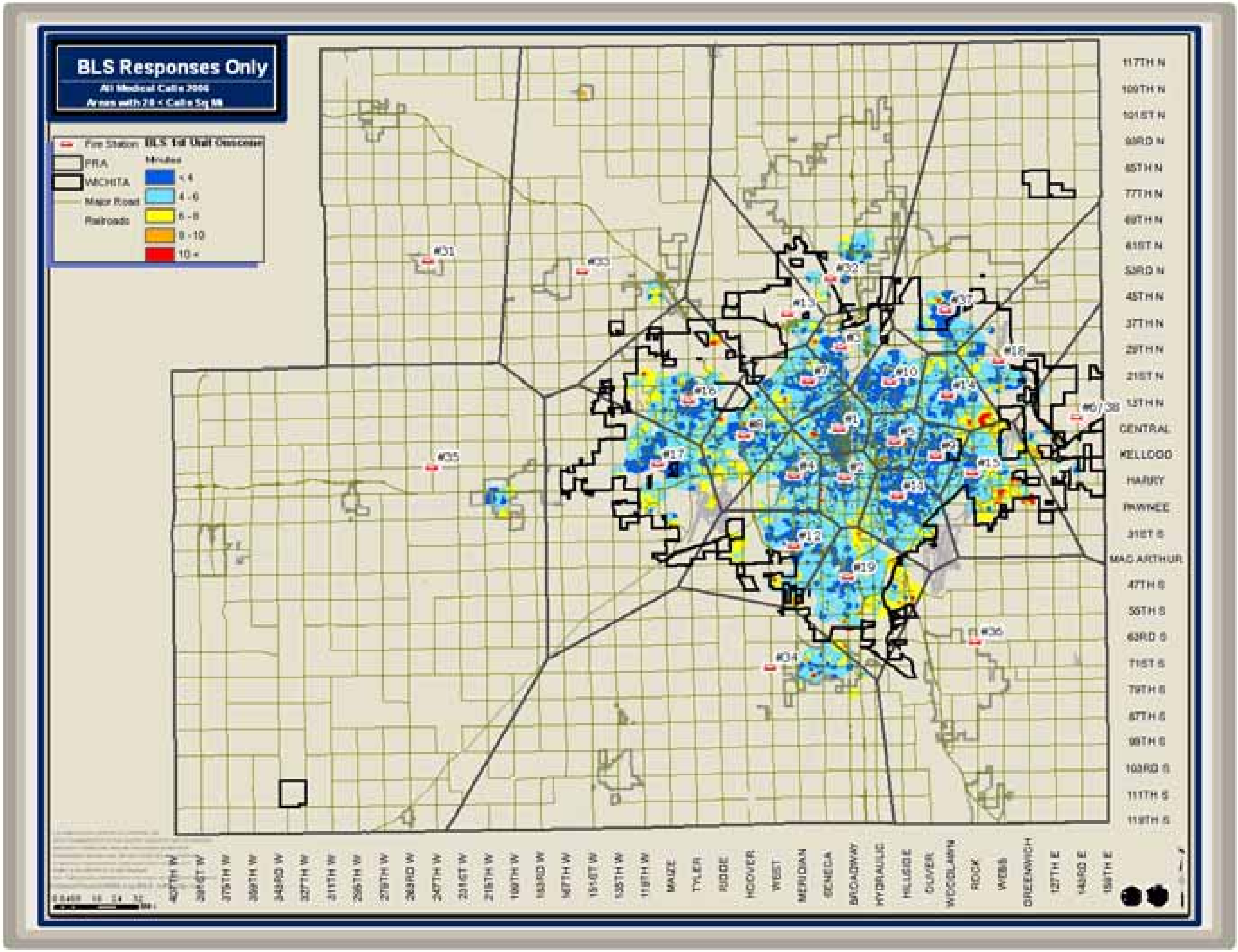
127TH E
143RD E
159TH E

ALLOCATION

- Establishes Primary Response Areas (PRA) for each agency
  - Simulates how recommendations are made from CAD 911
  - Can also explain if there is a correlation between slower response times and the edges of each stations PRA



BLS Responses Only
Fire Station
PRA
WICHITA
Major Road
Railroads
Minutes
< 4
4 - 6
6 - 8
8 - 10
10 <
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
29TH N
21ST N
13TH N
CENTRAL
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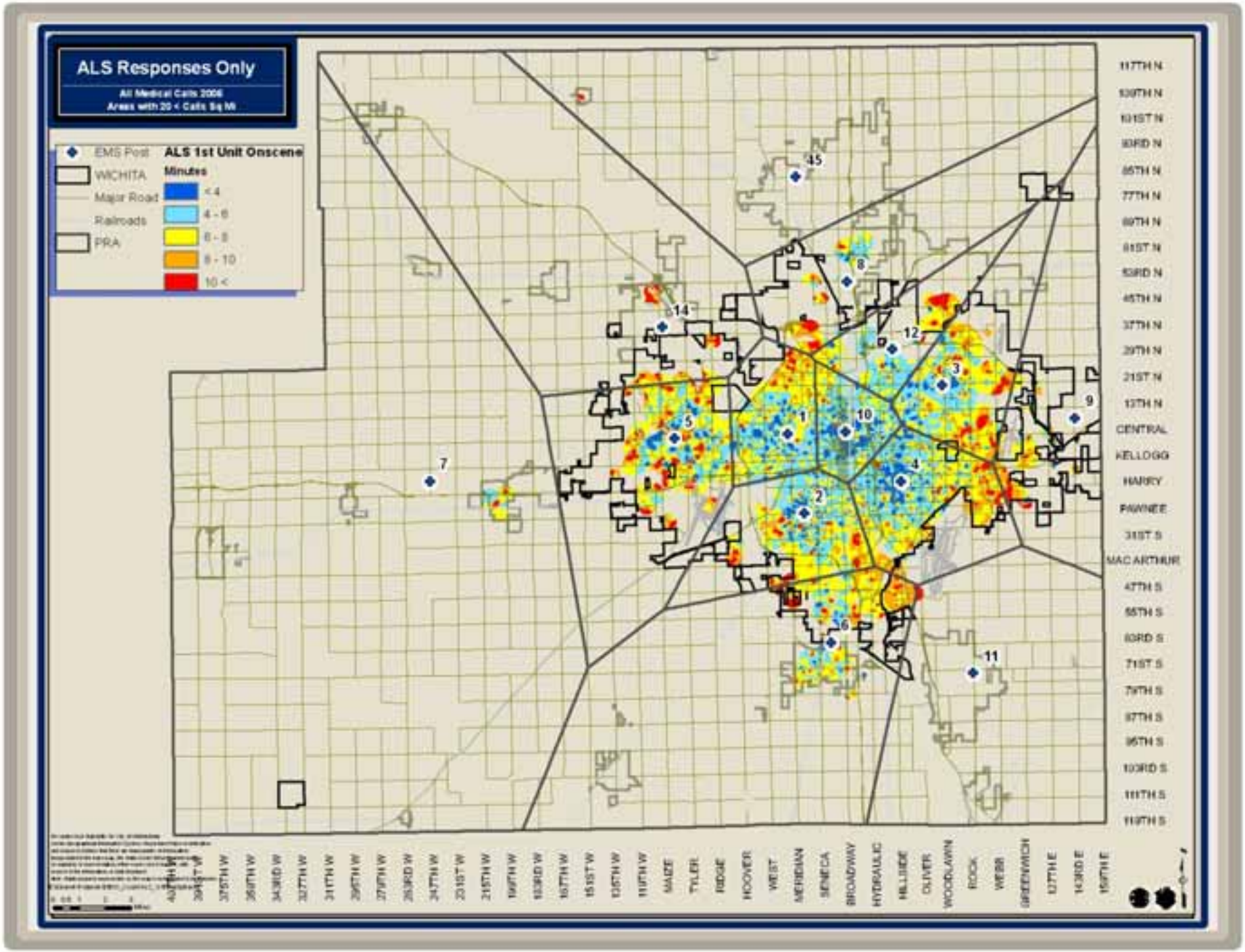
ALS Responses Only
All Medical Calls 2006
Areas with 20 < Calls Sq Mi
EMS Post
WICHITA
Major Road
Railroads
PRA
ALS 1st Unit Onscene
Minutes
< 4
4 - 6
6 - 8
8 - 10
10 <
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
29TH N
21ST N
13TH N
CENTRAL
KELLOGG
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159TH E
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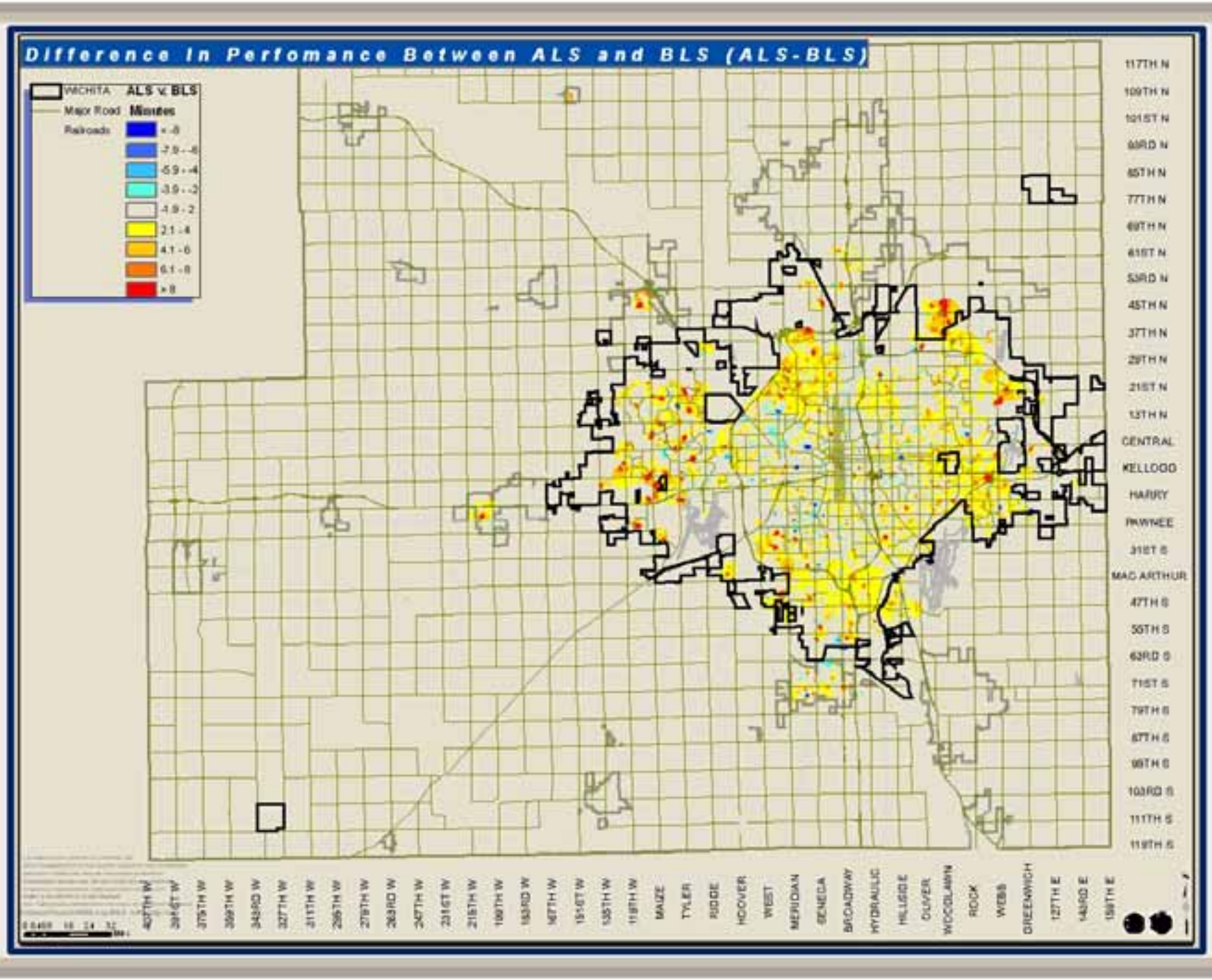
RASTER CALCULATOR

- Illustrates the difference in first responder performance between the two agencies.
  - This is accomplished by subtracting the ALS interpolation from the BLS interpolation.
  - Resulting is a raster that shows where one service out performs the other.


Difference In Perfomance Between ALS and BLS (ALS-BLS)
WICHITA
Major Road
Railroads
ALS v. BLS
Minutes
< -8
-7.9 - -6
-5.9 - -4
-3.9 - -2
-1.9 - 2
2.1 - 4
4.1 - 6
6.1 - 8
> 8
117TH N
109TH N
101ST N
93RD N
85TH N
77TH N
69TH N
61ST N
53RD N
45TH N
37TH N
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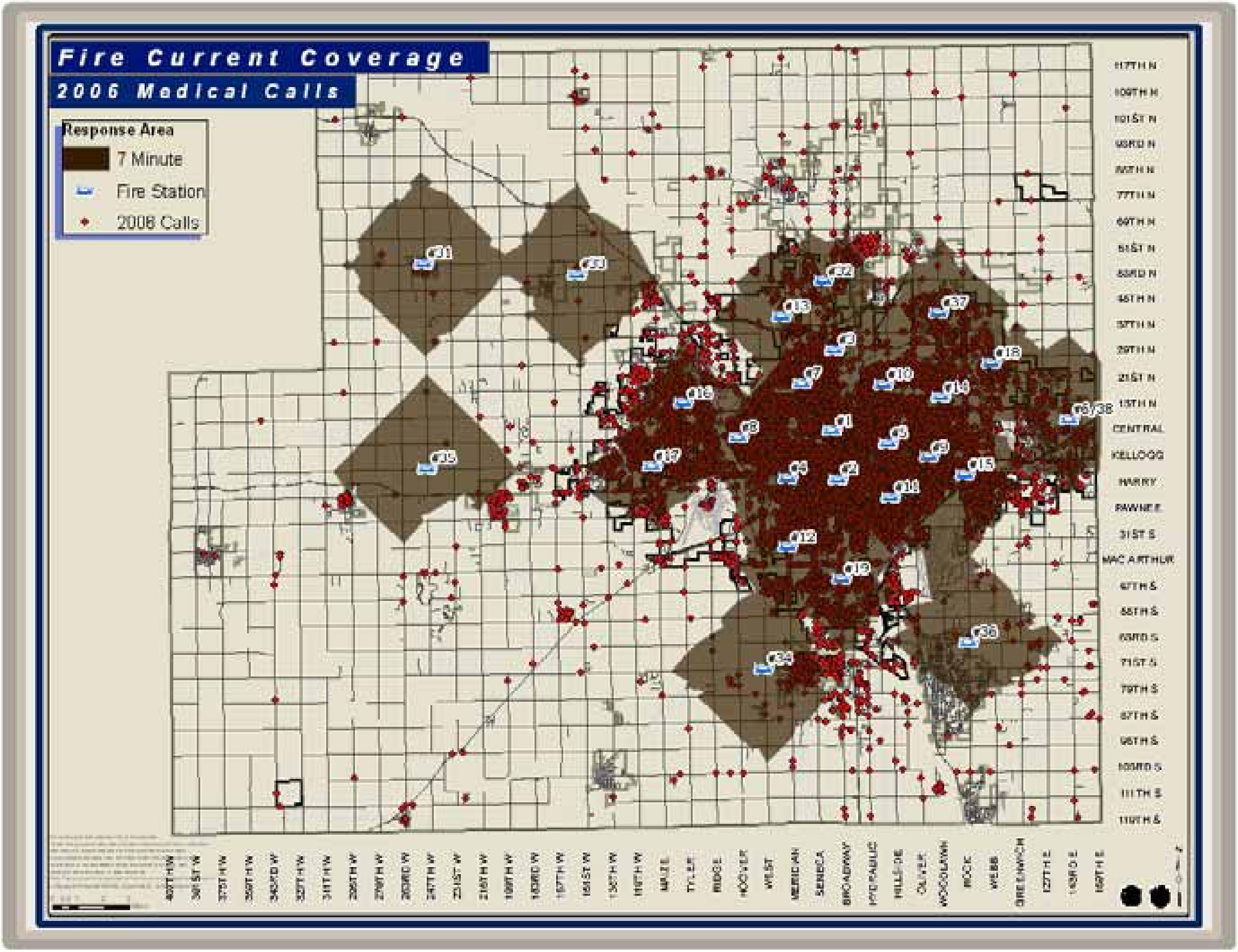
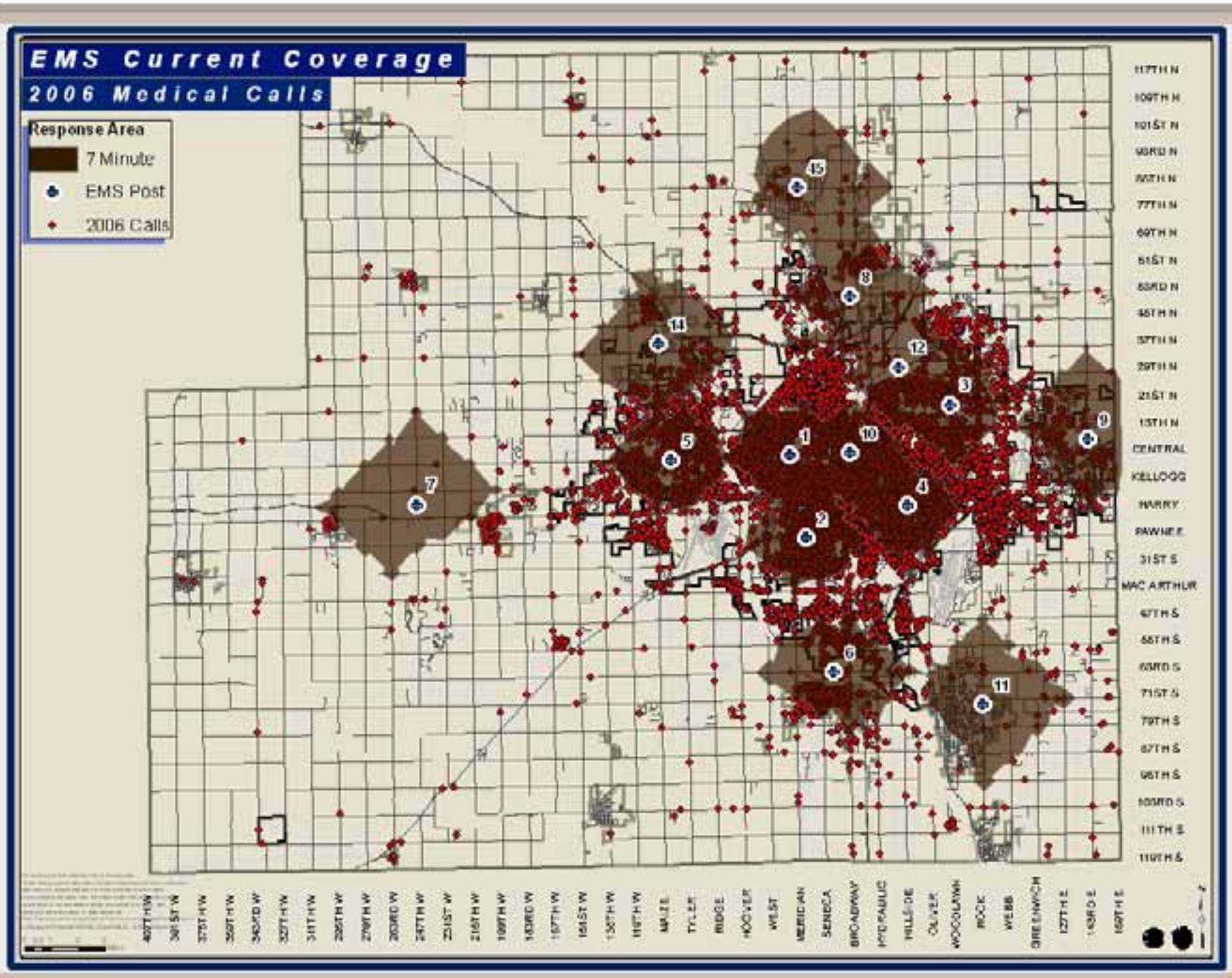
NETWORK ANALYSIS

- Capability to generate realistic drive time service areas and routes based on speed limits and one way restrictions.
- Service areas represent a 7 minute response
  - 3min call processing and turnout time
  - 4 min drive time
- After the polygons have been generated a count of all the medical calls that EMS could serve in a 7 minute response can be compared to how many calls fire could serve in a 7 minute response area


Fire Current Coverage
2006 Medical Calls
Response Area
7 Minute
Fire Station
2006 Calls
CENTRAL
KELLOGG
HARRY
PAWNEE
MAC ARTHUR
MAIZE
TYLER
RIDGE
HOOVER
WEST
MERIDIAN
SENECA
BROADWAY
HYDRAULIC
HILLSIDE
OLIVER
WOODLAWN
ROCK
WEBB
GREENWICH


EMS Current Coverage
2006 Medical Calls
Response Area
7 Minute
EMS Post
2006 Calls
CENTRAL
KELLOGG
HARRY
PAWNEE
31ST S
MAC ARTHUR
MERIDIAN
SENECA
BROADWAY
PORTABLE
HILLSIDE
OLIVER
WOODLAWN
ROCK
WEBB
GREENWICH
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PERFORMANCE STATISTICS

- Fire
  - Responded in 6:13 at 90%
  - 7 minute response to 91% of all medical calls
- EMS
  - Responded in 10:15 at 90%
  - 7 minute response to 69% of all medical calls

SERVICE TO CORE AND FRINGE AREAS

- The city's core receives adequate coverage from both ALS and BLS
- ALS can not currently provide sufficient coverage to the fringe areas
- BLS provides more effective coverage to the fringe areas
- First Unit Onscene ALS & BLS best represents what level of service the system could provide

CONCLUSION

- Core area of the city would not see a significant increase in performance.
- Fringe areas would receive the greatest service improvement
  - Fringe areas prove to be a problem for many municipalities, partually due to the fact that cities grow faster than new resources can be allocated to serve those areas.