

Data-Driven Approaches to Crime *and* Traffic Safety

DDACTS Webinar

“Converting Maps into Strategies”

May 25, 2010



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Data-Driven Approaches to Crime *and* Traffic Safety

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Data-Driven Approaches to Crime *and* Traffic Safety

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Data-Driven Approaches to Crime *and* Traffic Safety

DDACTS

DDACTS is an operational model that uses the integration of location-based crime and traffic data to establish effective and efficient methods for deploying law enforcement and other resources.

Data-Driven Approaches
DDACTS Goal
Crime and Traffic Safety

**Reduce the incidence of
crime, crashes and traffic
violations in a community**

Reduces Social Harm

Data-Driven Approaches
to
Crime and Traffic Safety

DDACTS

Implementation As A:

Philosophy

Strategy

Tactic

Data-Driven Approaches to Crime *and* Traffic Safety (DDACTS)

Operational Guidelines

August 2009



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Data-Driven Approaches

DDACTS Guiding Principles

Partners / Stakeholder Participation

Data Collection

Data Analysis

Strategic Operations

Information Sharing and Outreach

Monitor, Evaluate and Adjust

Outcomes



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Data Driven Approaches to Crime *and* Traffic Safety

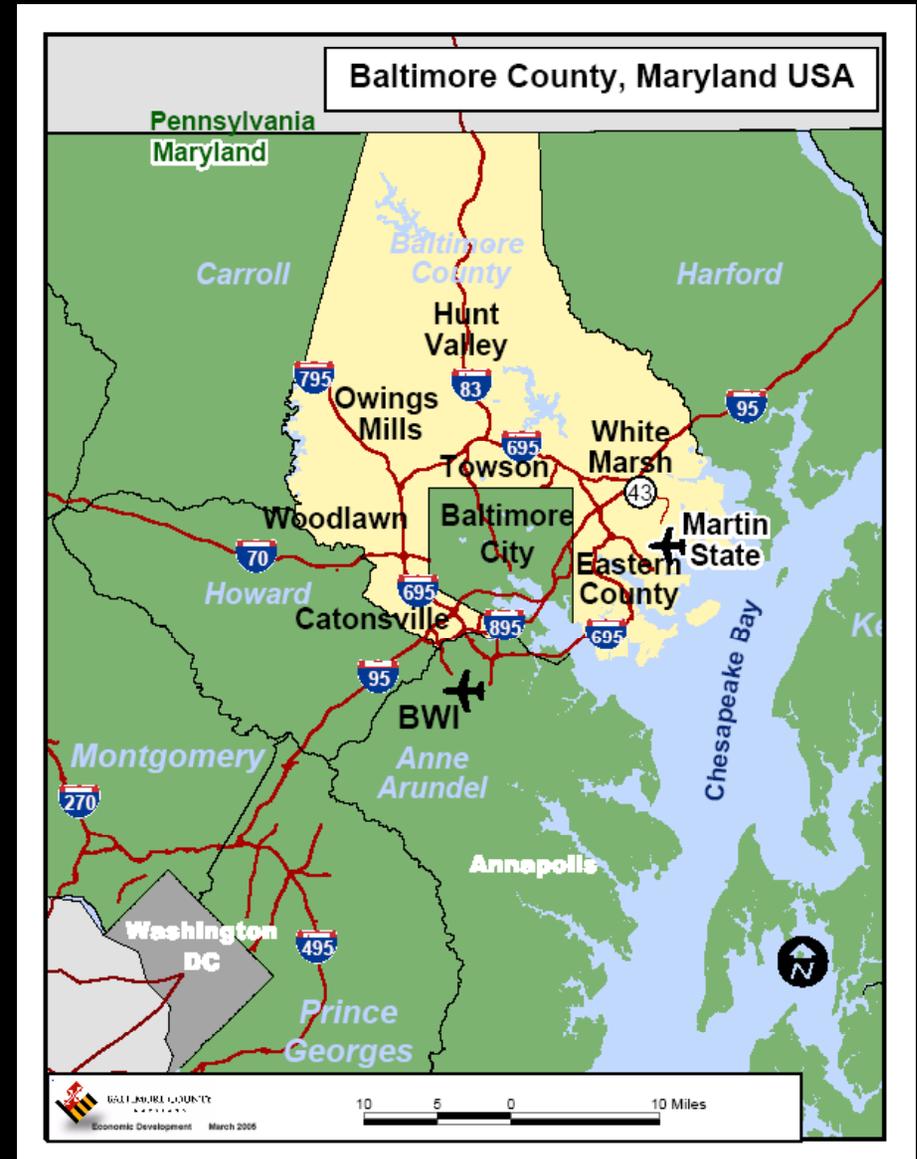


**Baltimore County Police
Department**

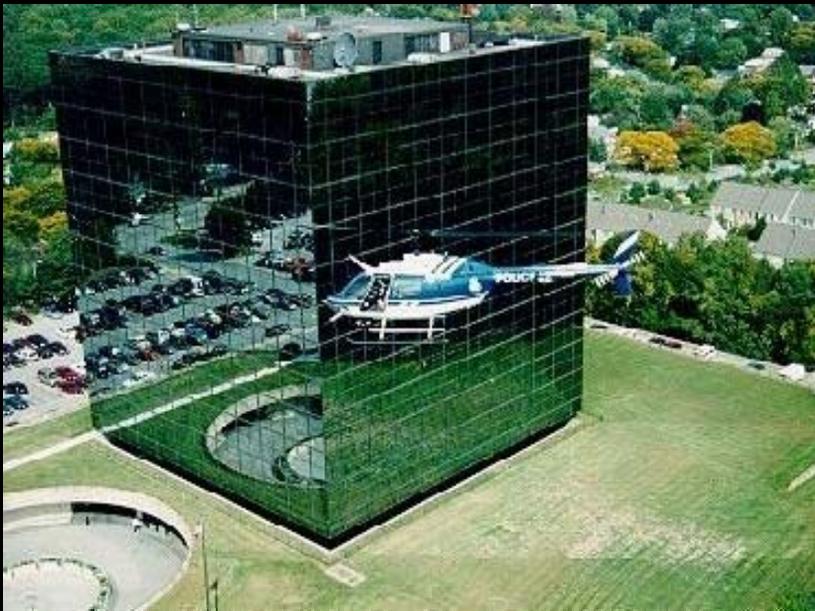
Traffic Safety is Public Safety

Overview of Baltimore County

- Population: 795,000
- Square miles: 610
- Waterfront: 173 miles
- Roads: 3028 miles
- Annual VMT: 8.3 billion



Baltimore County Police Department



- Sworn: 1918
- Total: 2579
- Precincts: 10
- Fatal Crashes: 75
- Reportable crashes: 16,700
- NR crashes: 18,200
- Part I Crime: 30,700
- Part II Crime: 34,100
- CFS: 600,000
- Arrests: 36,000

Partner and Stakeholder Participation

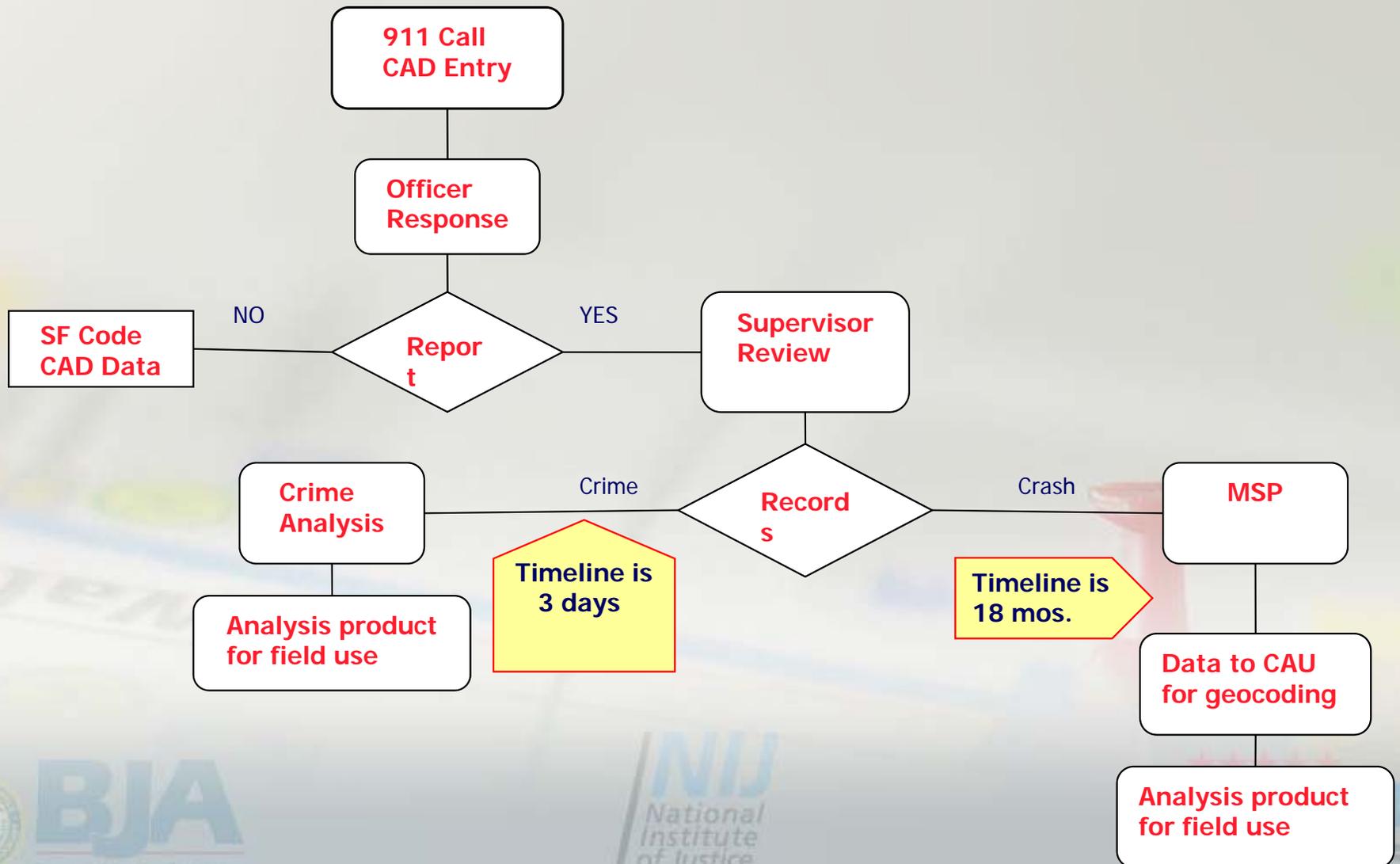
- Law Enforcement
- Highway Safety Agencies
- Community/Business



Data-Driven Approaches

Data Collection

Crime and Traffic Safety



Data-Driven Approaches

Data Collection

Crime and Traffic Safety

- Crash Data
- Crime Data
- Calls for Service
- Community Complaints
- Sources of Data

East	Total Accidents	152	120	-32	-21.06%
	Hit and Run	42	28	-18	-38.10%
	Injury Accidents	37	24	-13	-35.14%
	Seat Belts Not Used	8	3	-5	-62.50%
	Fatal Crashes	0	0	0	NC
West	Total Accidents	477	418	-59	-12.37%
	Hit and Run	88	48	-18	-27.27%
	Injury Accidents	145	112	-33	-22.78%
	Seat Belts Not Used	8	8	0	0.00%
	Fatal Crashes	1	0	-1	-100.00%
North	Total Accidents	262	244	-18	-6.87%
	Hit and Run	67	51	-18	-23.88%
	Injury Accidents	84	82	-2	-2.38%
	Seat Belts Not Used	10	18	8	80.00%
	Fatal Crashes	0	0	0	NC
South	Total Accidents	428	417	-11	-2.57%
	Hit and Run	90	88	-4	-4.44%
	Injury Accidents	113	118	5	5.31%
	Seat Belts Not Used	9	18	7	77.78%
	Fatal Crashes	1	0	-1	-100.00%
Central	Total Accidents	153	114	-39	-25.49%
	Hit and Run	30	19	-11	-36.87%
	Injury Accidents	30	19	-11	-36.87%
	Seat Belts Not Used	3	2	-1	-33.33%
	Fatal Crashes	0	0	0	NC
Herm	Total Accidents	308	288	-20	-6.47%
	Hit and Run	61	62	1	1.64%
	Injury Accidents	80	78	-1	-1.25%
	Seat Belts Not Used	8	11	3	37.50%
	Fatal Crashes	1	0	-1	-100.00%



DIFFICULTY GEOCODING CRASH LOCATIONS

- Road name misspelled
- Road name missing
- Multiple designations of interstate highways
- Hit rate about 83% for MAARS data

PREPARATION PROGRAM USED PRIOR TO GEOCODING

```
Microsoft FoxPro - geo1.prg
File Edit Database Record Program Run Text Window Help

REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"HUNTING ","HUNTING ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"HUNTING FIELD ","HUNTING FIELDS")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"HUNTING TON","HUNTINGTON")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"HUNTRIDGE","HUNT RIDGE")

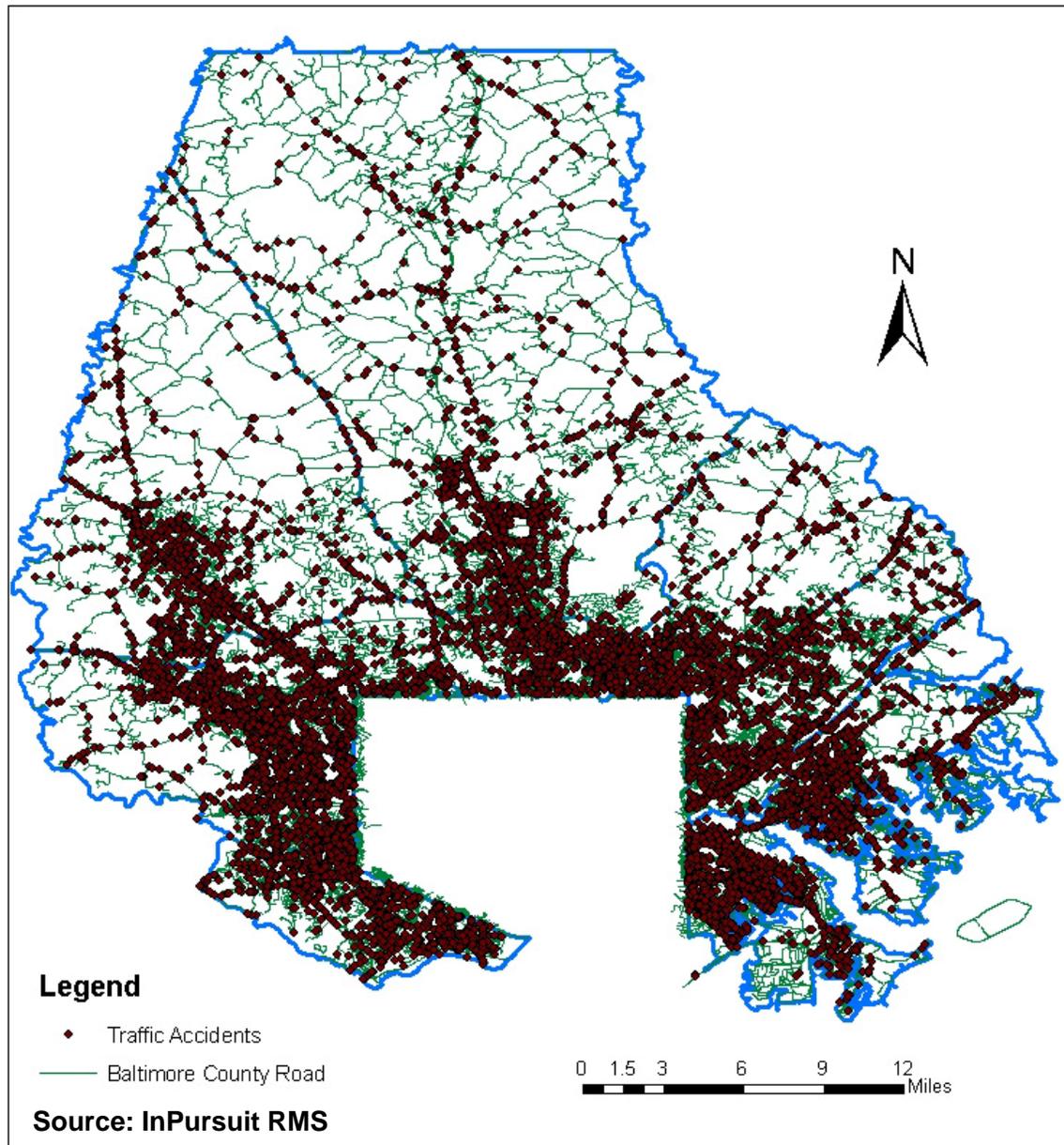
*====
@ 24,4 say "GE01 - The program has just finished the H's"
*====

REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"I695","I-695")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"I83","I-83")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"I95","I-95")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"I895","I-895")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IS0083","I-83")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IS0095","I-695")
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REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"&","& ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"I795","I-795")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"ICABOD","ICHABOD")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"INDIAN","INDIAN ")
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REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IVY","IVY ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IVY ","IVY ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IVY BROOK","IVYBROOK")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IVY DALE","IVYDALE")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"IVY WOOD","IVYWOOD")

*====
@ 24,4 say "GE01 - The program has just finished the I's"
*====

REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JACKSON","JACKSON ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JACKSON ","JACKSON ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JAY DEE","JAYDEE")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JEROME","JEROME ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JEROME ","JEROME ")
REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JODYKNOLL","JODY KNOLL")
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REPLACE ALL ST_TMP WITH STRTRAN(ST_TMP,"JOHNNYCAKE ","JOHNNYCAKE ")
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VEHICLE CRASHES IN BALTIMORE COUNTY 2008



Total: 34,040

Data-Driven Approaches to Data Analysis Crime and Traffic Safety

- **Types of analysis**
- **Hot spots**
- **Mapping**



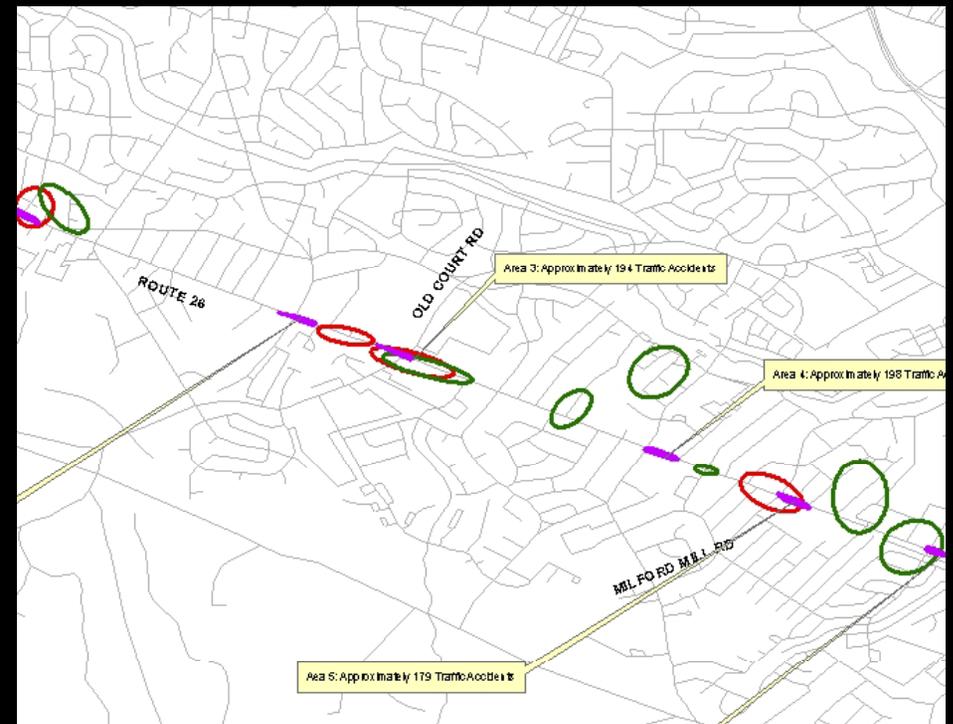
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METHODS USED TO IDENTIFY HIGH CONCENTRATIONS OF CRASHES AND CRIMES

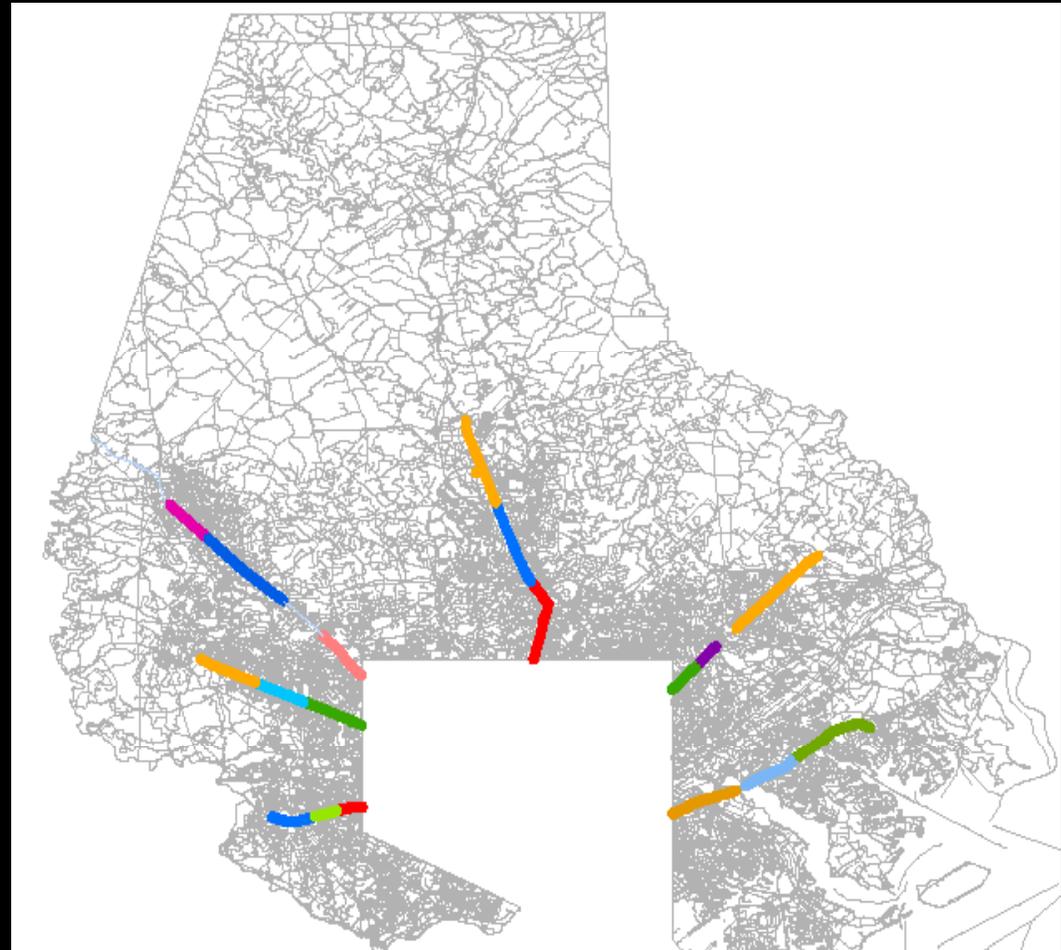
- Geo-referenced crashes and crimes
- Used CrimeStat III to identify accident-crime clusters
- Nearest Neighbor Hierarchical Spatial Clustering
- Ellipses delimit statistically significant points with 95% confidence interval level (crashes or crimes)
- Clusters represented by ellipses in ArcMap



Purple Ellipses: Crashes
Green Ellipses: Burglaries
Red Ellipses: Robberies

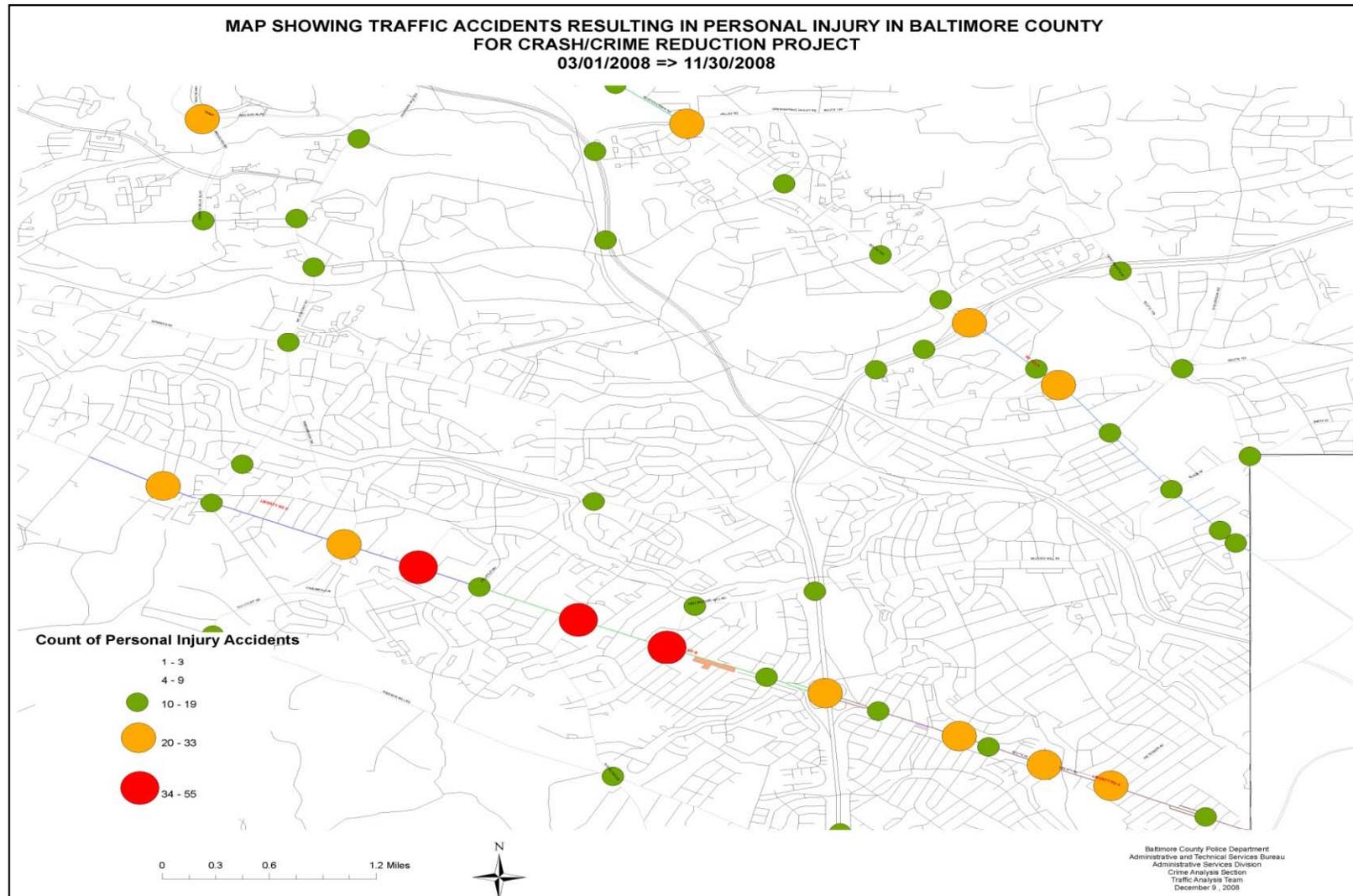
TARGET ROADS

- SIX ARTERIAL ROADS SELECTED
 - ◆ BALTIMORE NATIONAL PIKE
 - ◆ LIBERTY ROAD
 - ◆ REISTERSTOWN ROAD
 - ◆ YORK ROAD
 - ◆ BELAIR ROAD
 - ◆ EASTERN BOULEVARD
- EACH ROAD SPLIT INTO 3 SECTIONS FOR DIRECTED PATROL, SPEED ABATEMENT, AND PROGRAM MONITORING



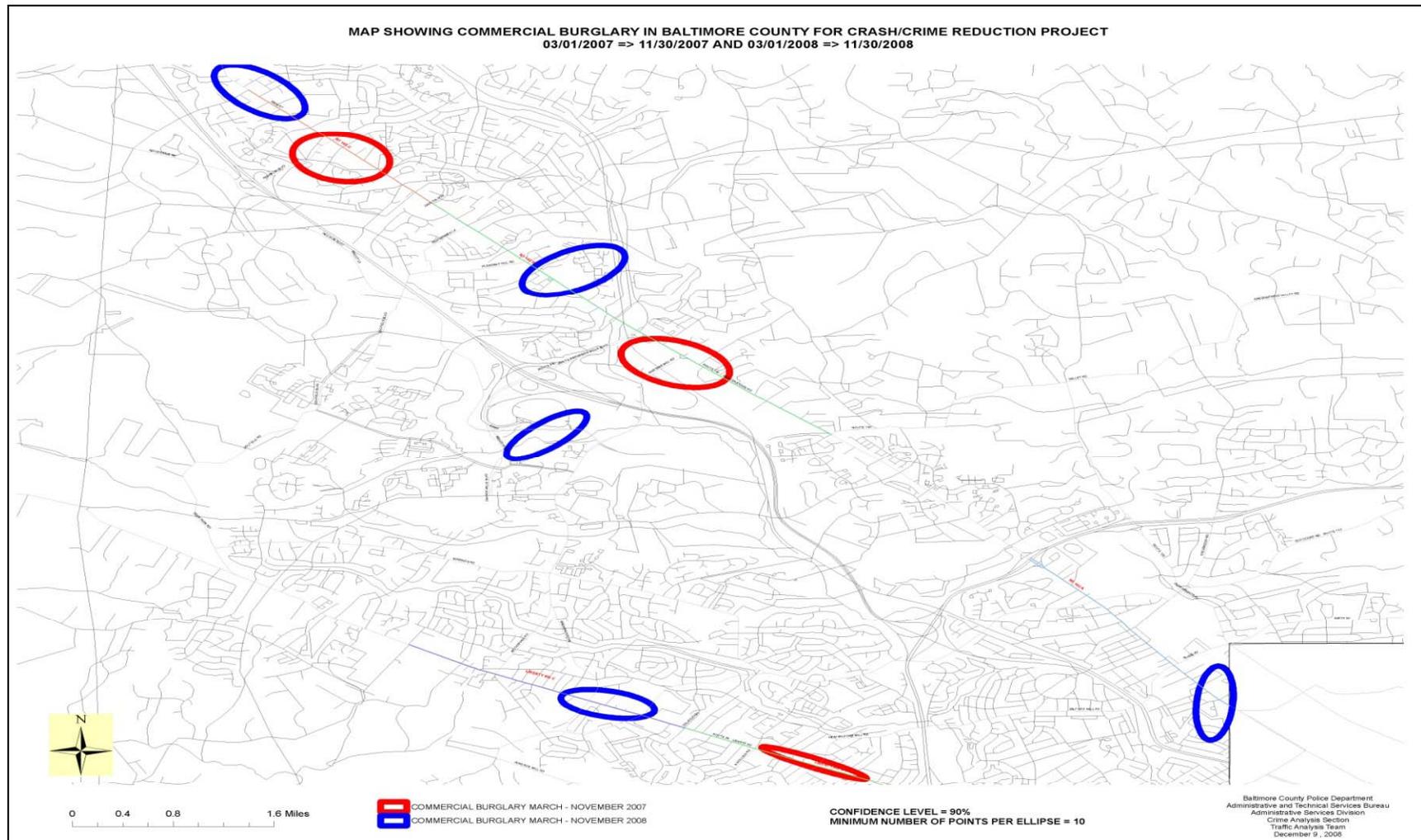
METHODS USED TO IDENTIFY AREAS EXPERIENCING HIGH AMOUNTS OF CRIME AND PERSONAL INJURY CRASHES

- Identified point locations for each crime type and personal injury crashes



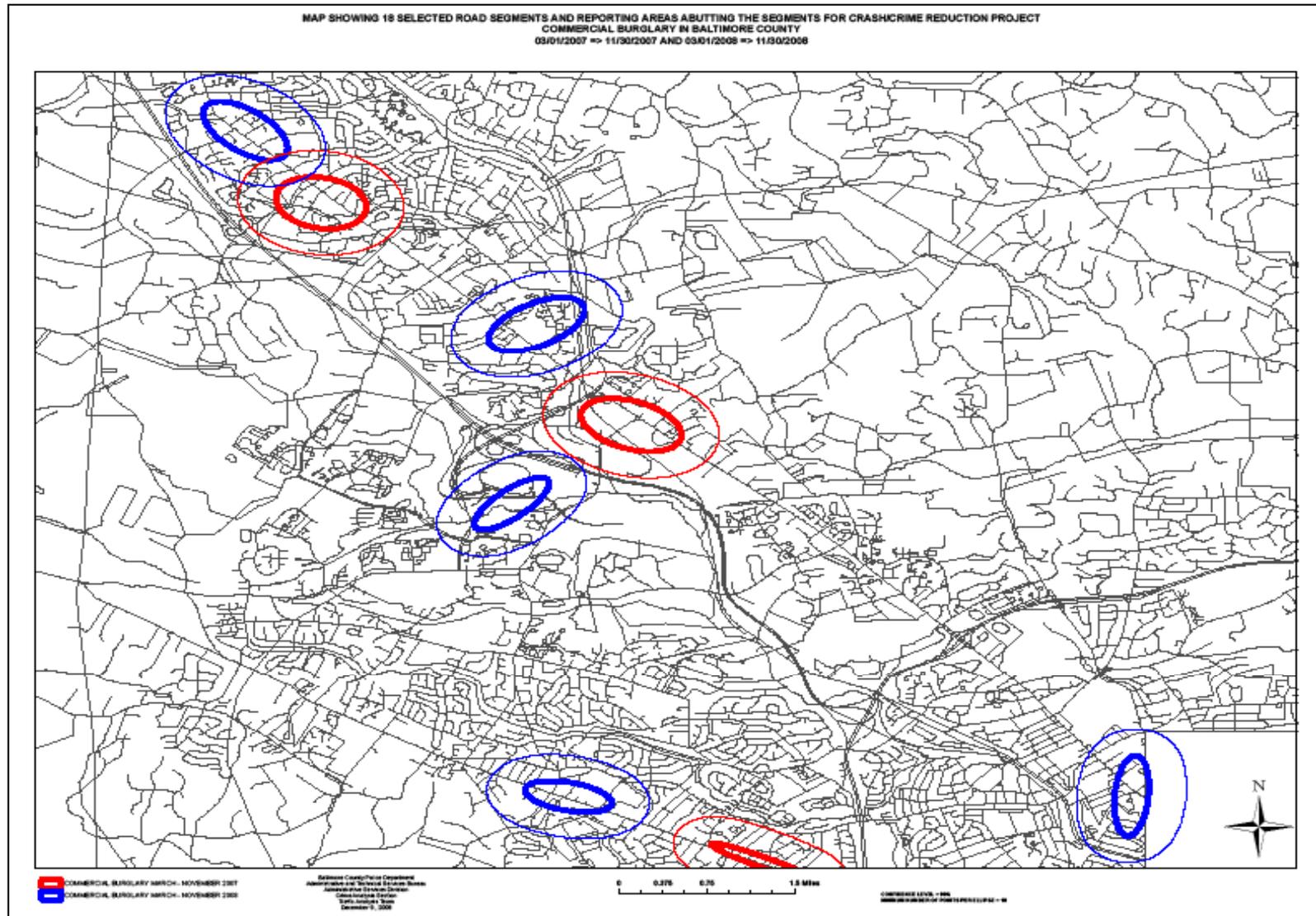
NEAREST NEIGHBOR HIERARCHICAL ELLIPSES

- Constructed Nearest Neighbor Hierarchical ellipses for each crime type and personal injury crashes from March to November of 2007 (red) and 2008 (blue), using CrimeStat III with 90% confidence interval and minimum of 10 incidents per ellipse except for commercial robbery (5 or more)



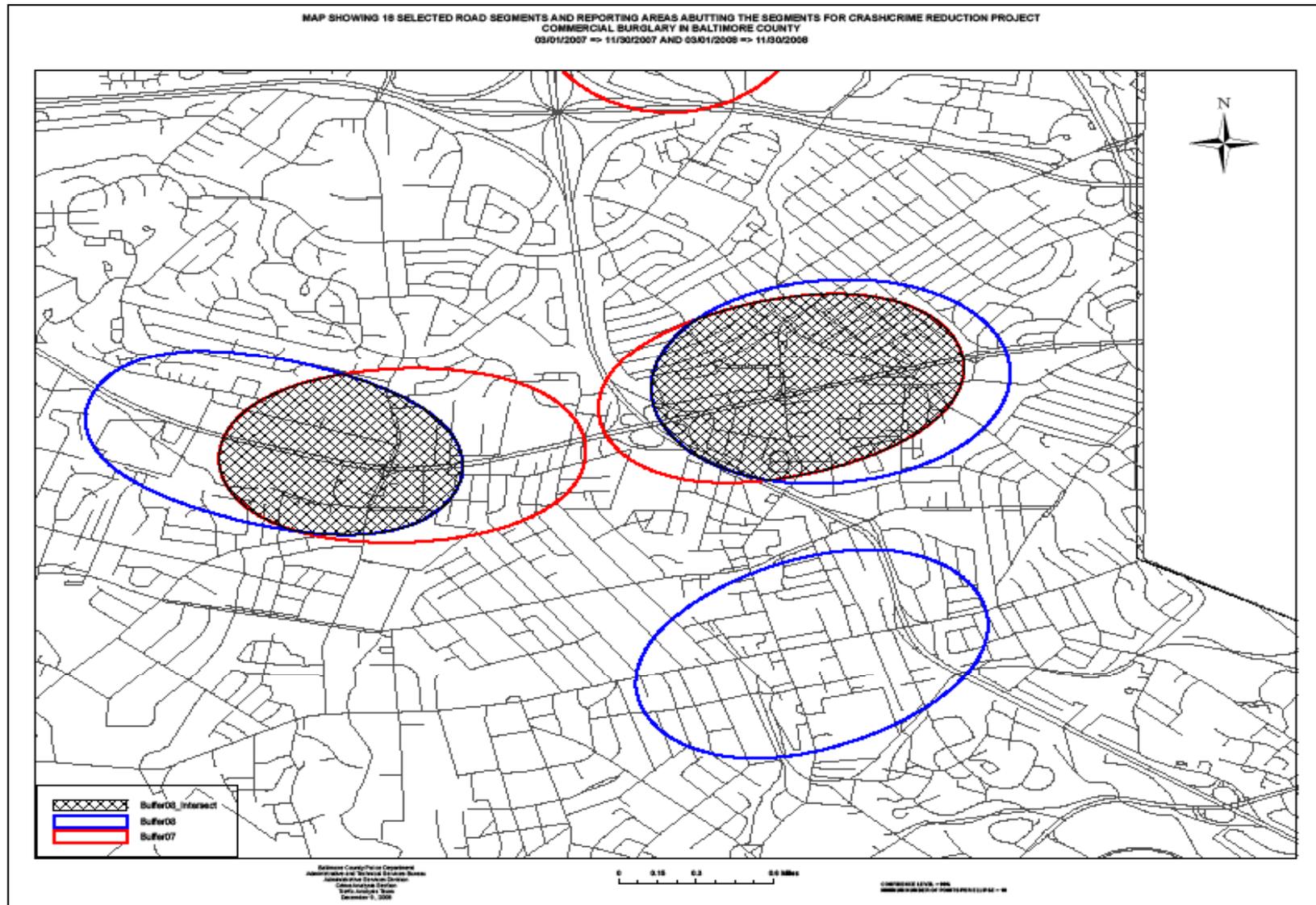
BUFFERED EACH ELLIPSE

- Buffered each ellipse by 0.25 miles (commercial burglary)



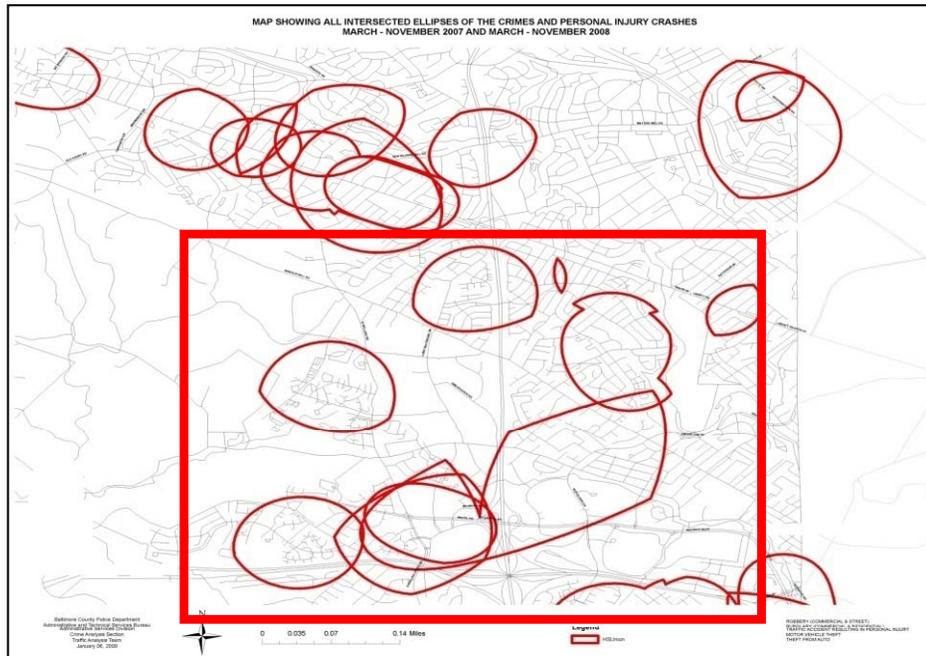
FOUND THE INTERSECTIONS OF ELLIPSES

- Found the intersections between 2007 and 2008 buffered ellipses (commercial burglary in one area)

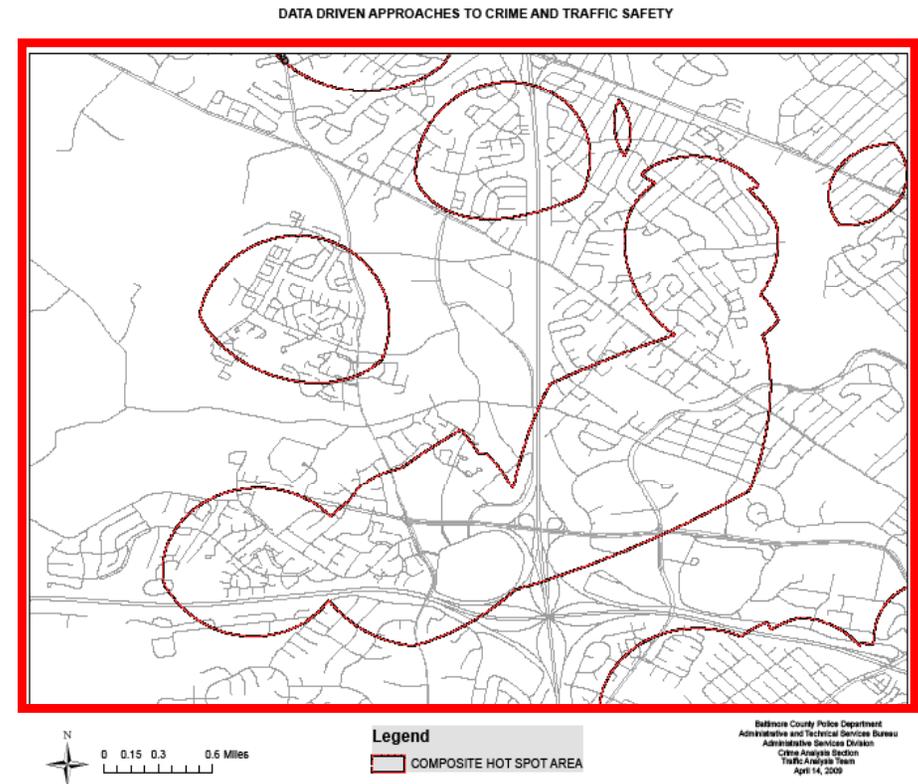


UNION AND DISSOLVE TOOLS

The union tool was used to combine the buffered intersections



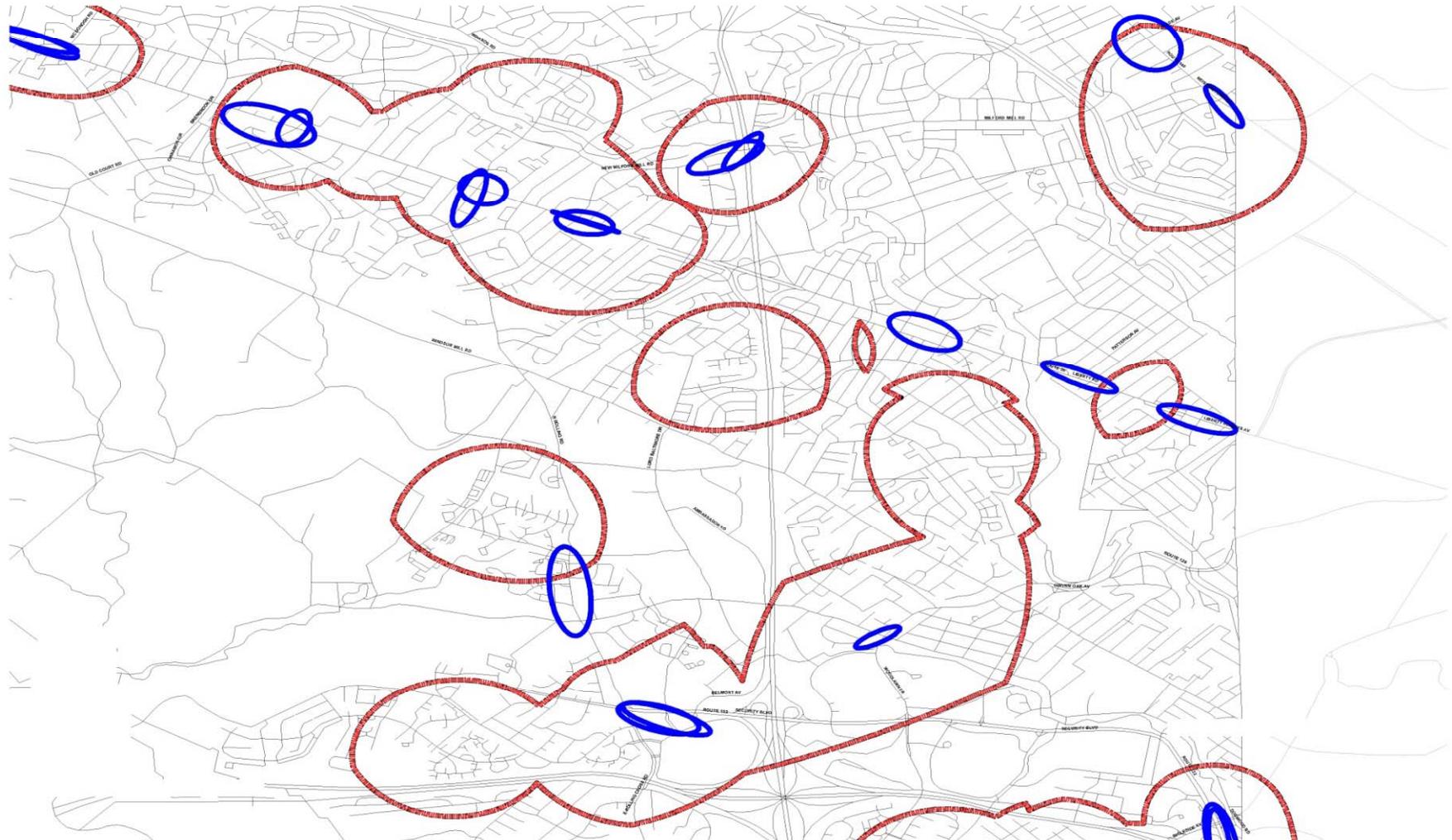
The dissolve tool was used to create composite hot spots



COMPOSITE HOT SPOT AREAS

- Dissolved tool was used to make the composite hot spots

COMPOSITE HOT SPOTS OF SELECTED CRIMES AND PERSONAL INJURY CRASHES
MARCH - NOVEMBER 2007 AND MARCH - NOVEMBER 2008



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Crime Analysis Section
Traffic Analysis Team
January 06, 2009



0 0.035 0.07 0.14 Miles

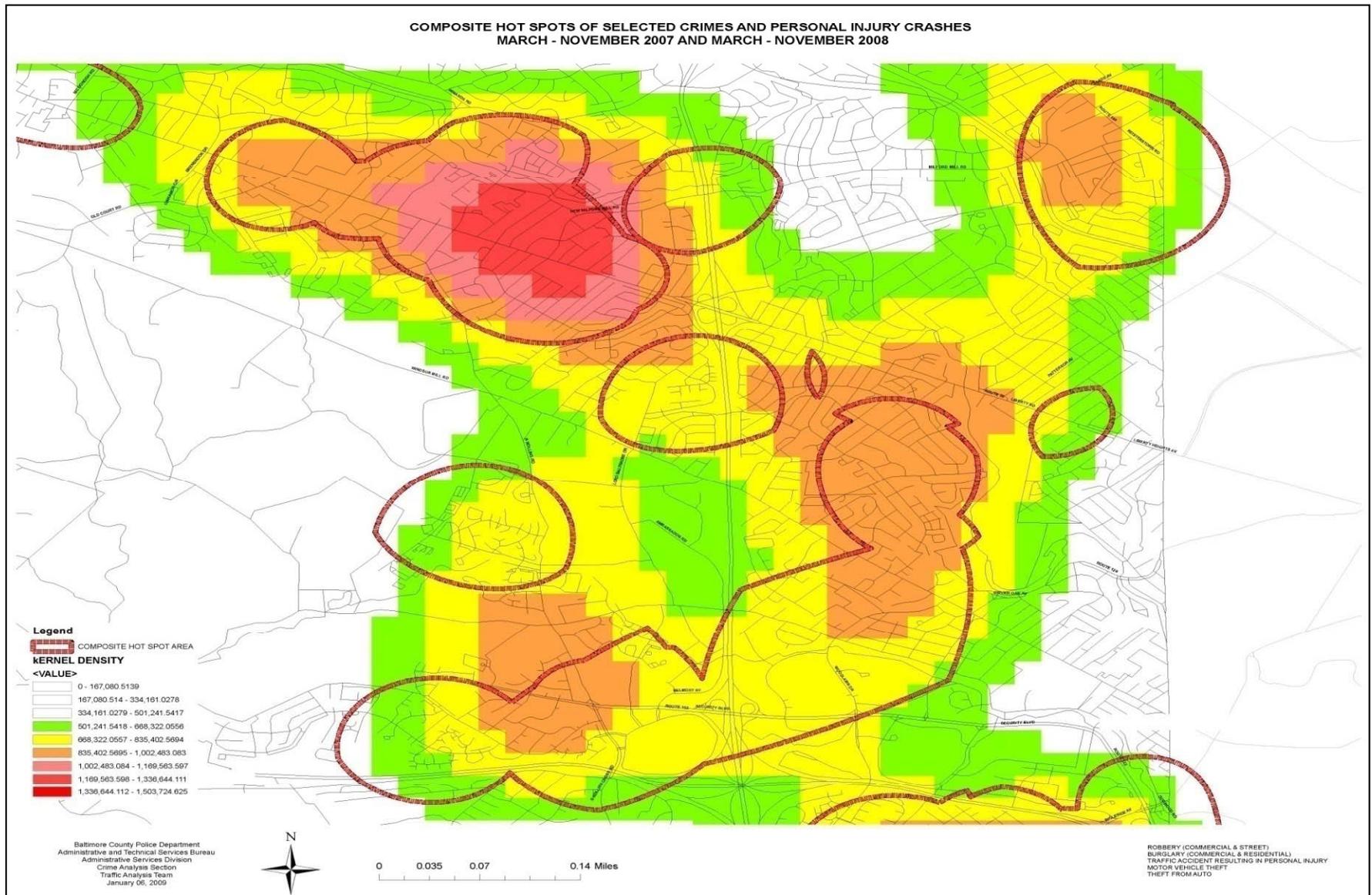
Legend

- COMPOSITE HOT SPOT AREA
- PERSONAL INJURY MARCH - NOVEMBER 2007 & 2008

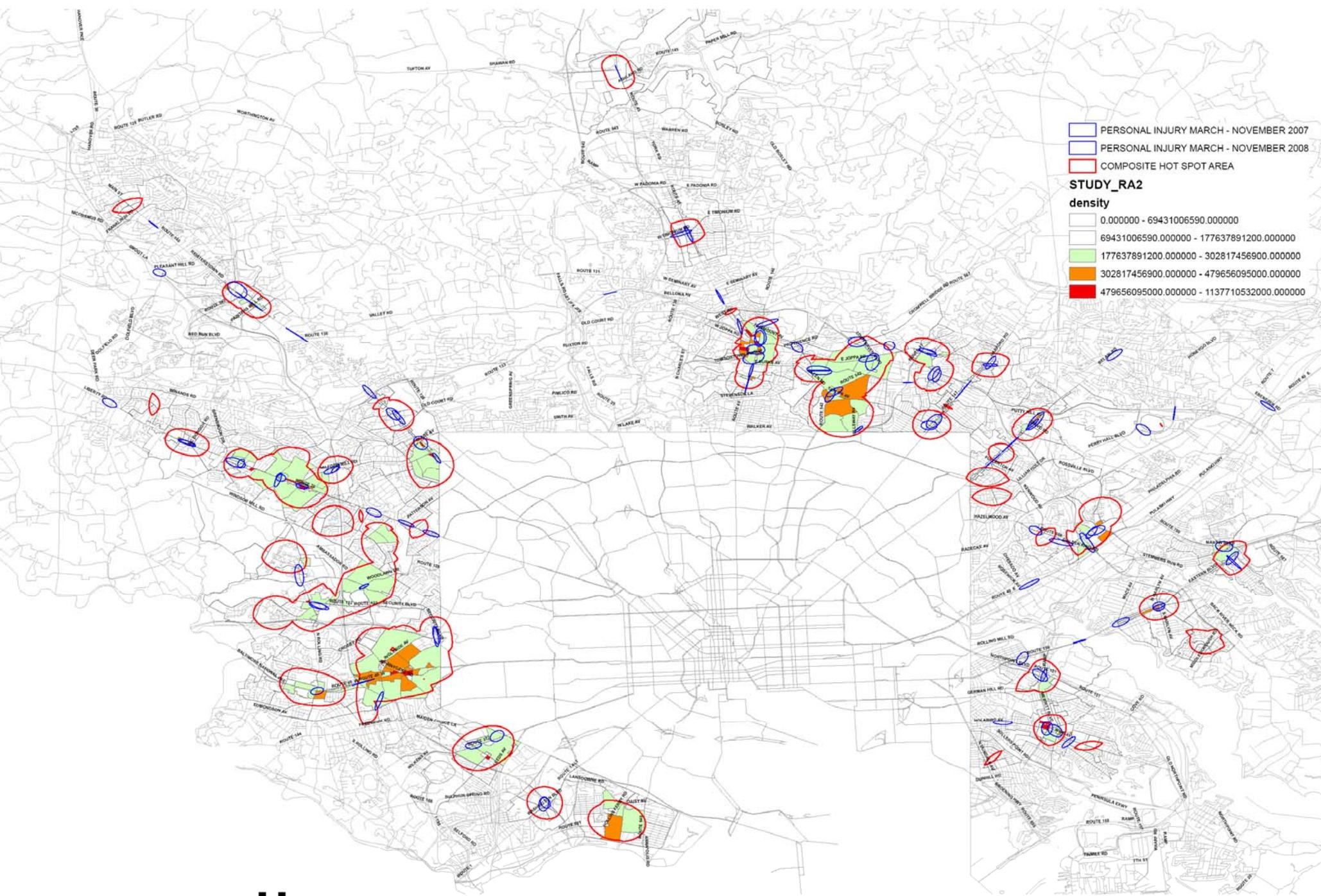
ROBBERY (COMMERCIAL & STREET)
BURGLARY (COMMERCIAL & RESIDENTIAL)
TRAFFIC ACCIDENT RESULTING IN PERSONAL INJURY
MOTOR VEHICLE THEFT
THEFT FROM AUTO

KERNEL DENSITY

- Applied Kernel Density method using point locations to identify active area within the composite hot spot polygons



**COMPOSITE HOT SPOTS OF SELECTED CRIMES AND PERSONAL INJURY CRASHES
MARCH - NOVEMBER 2007 AND MARCH - NOVEMBER 2008**



PERSONAL INJURY MARCH - NOVEMBER 2007
 PERSONAL INJURY MARCH - NOVEMBER 2008
 COMPOSITE HOT SPOT AREA

STUDY_RA2

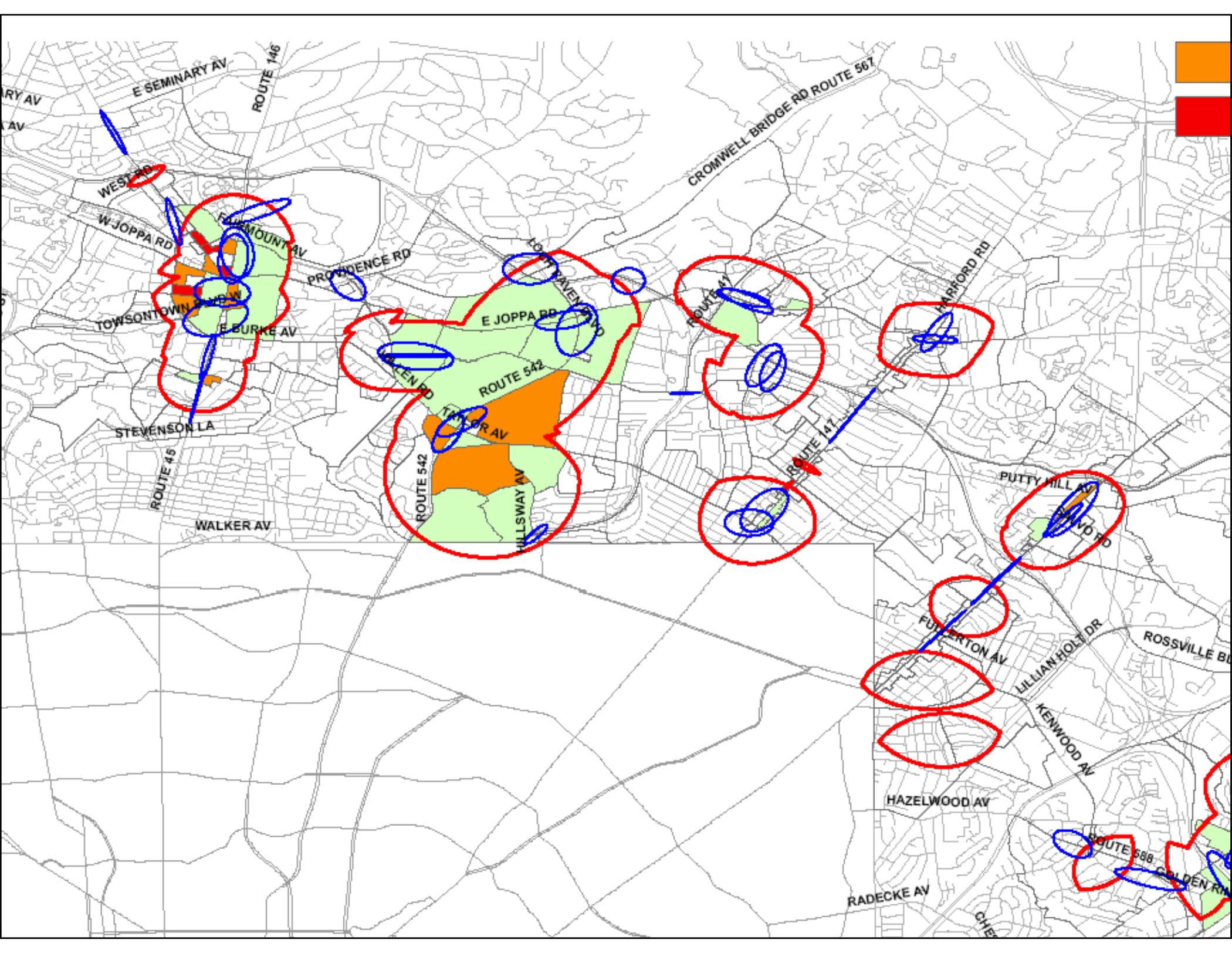
density

	0.000000 - 69431006590.000000
	69431006590.000000 - 177637891200.000000
	177637891200.000000 - 302817456900.000000
	302817456900.000000 - 479656095000.000000
	479656095000.000000 - 1137710532000.000000

Baltimore County Police Department
 Administrative and Technical Services Bureau
 Administrative Services Division
 Crime Analysis Section
 Traffic Analysis Team
 January 02, 2009



ROBBERY (COMMERCIAL & STREET)
 BURGLARY (COMMERCIAL & RESIDENTIAL)
 TRAFFIC ACCIDENT RESULTING IN PERSONAL INJURY
 MOTOR VEHICLE THEFT
 THEFT FROM AUTO



Data-Driven Approaches to Strategic Operations for Crime and Traffic Safety

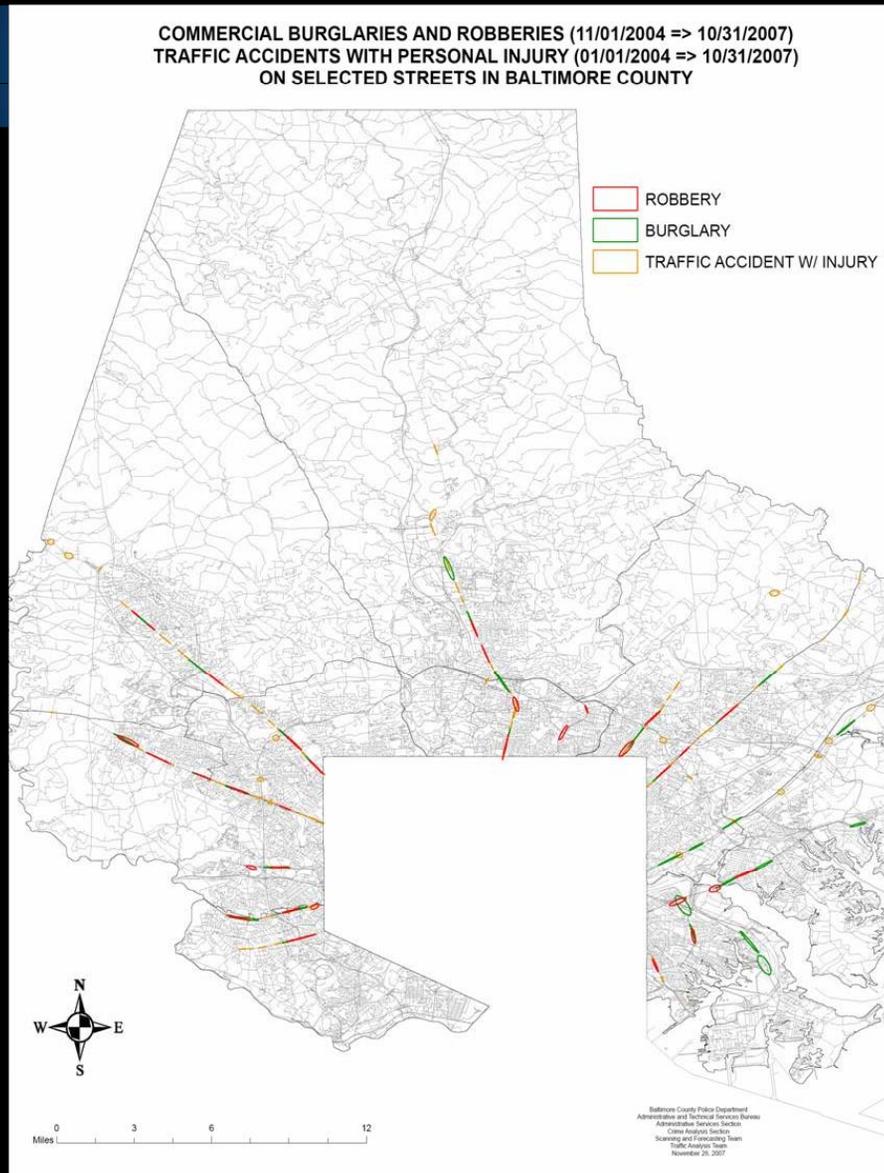
- ✓ Objectives/action plans
- ✓ Use of patrol resources
- ✓ Grants
- ✓ Integration of other programs



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2008 Crash Crime Project



- 51,598 on-duty hours
- 65,164 enforcement contacts
- 1169 arrests
- 4000+ overtime hours
- 10,106 enforcement contacts
- 75 arrests

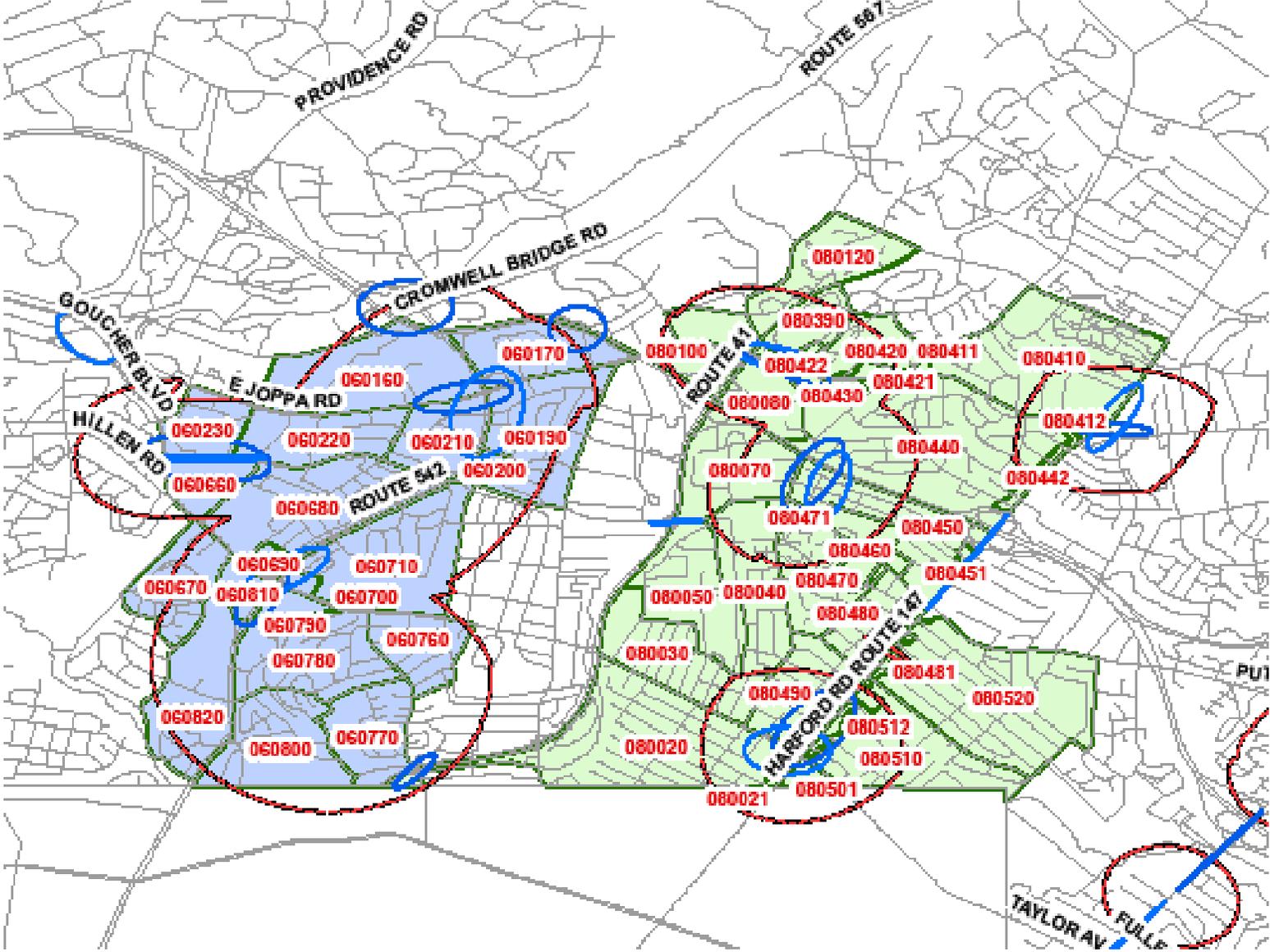


DDACTS 2009

- Analysis
- Site Selection
- Objectives/Action Plans
- Resources/Partners



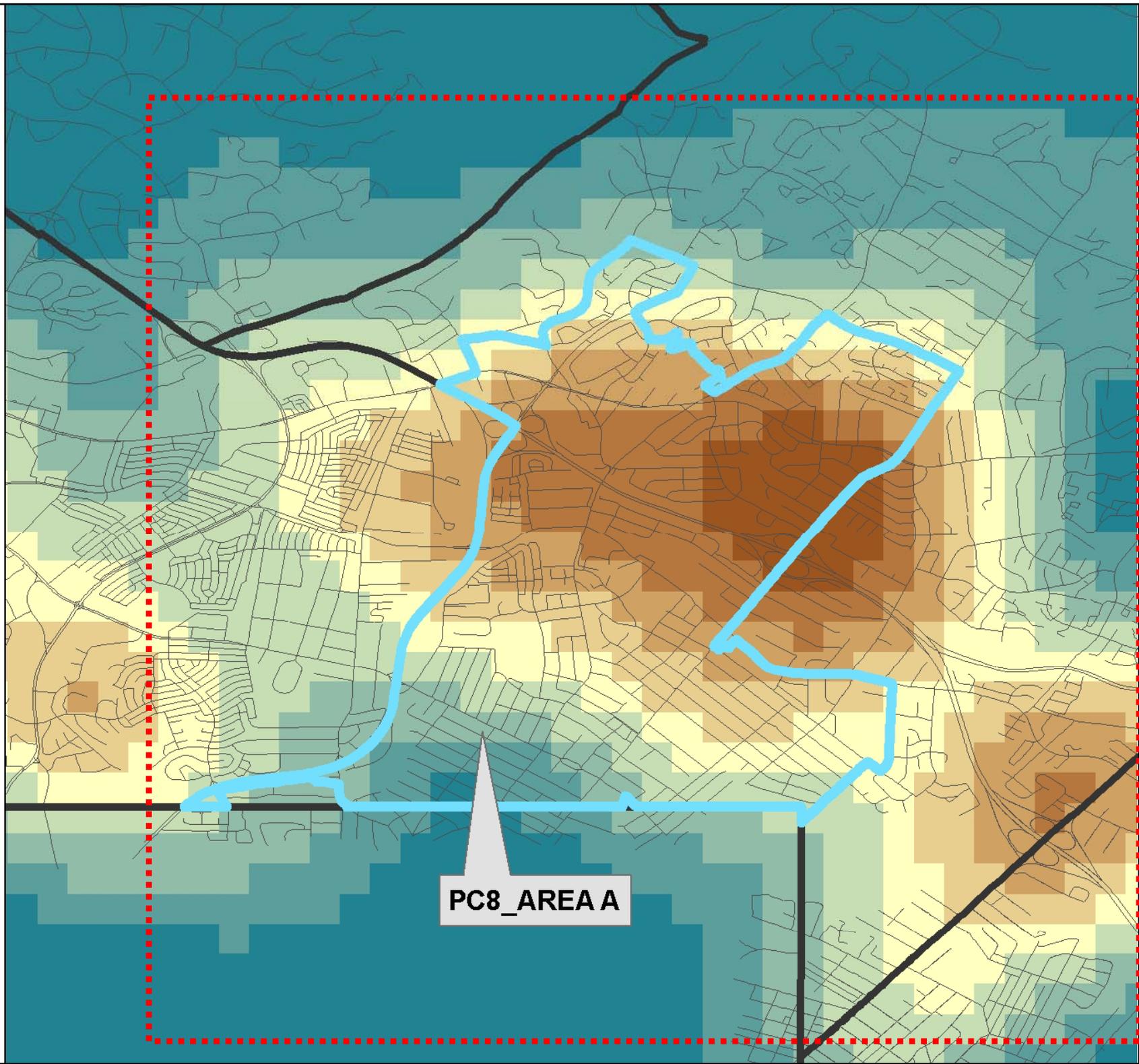
DDACTS Areas: Towson/Parkville



DDACTS 2010

- ❖ Expansion of the 2009 approach
- ❖ Focus on traffic safety
 - Pedestrian Safety
 - Seatbelt Enforcement
 - DUI Study





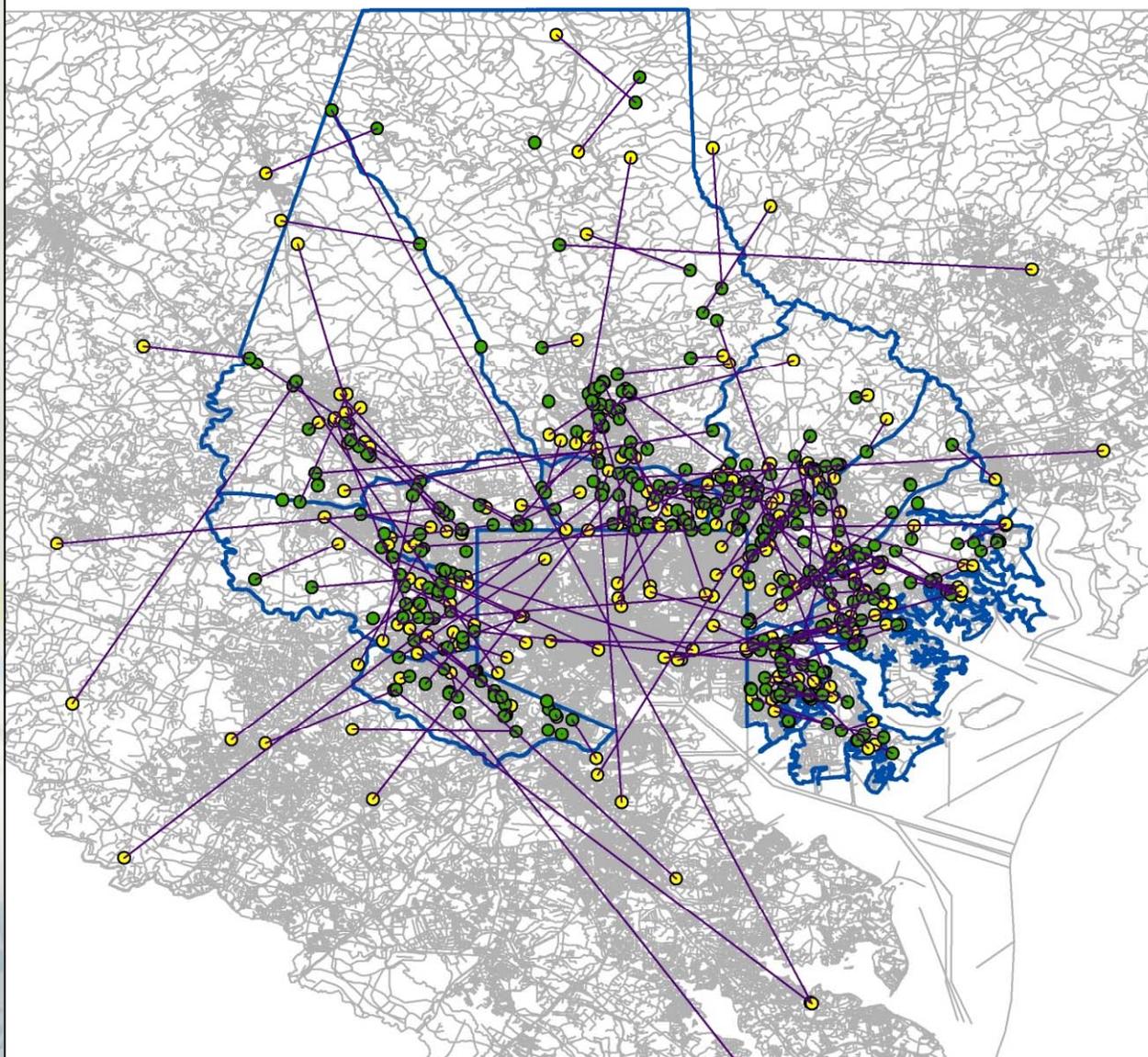
PC8_AREA A

DUI Crash Locations and Driver Address

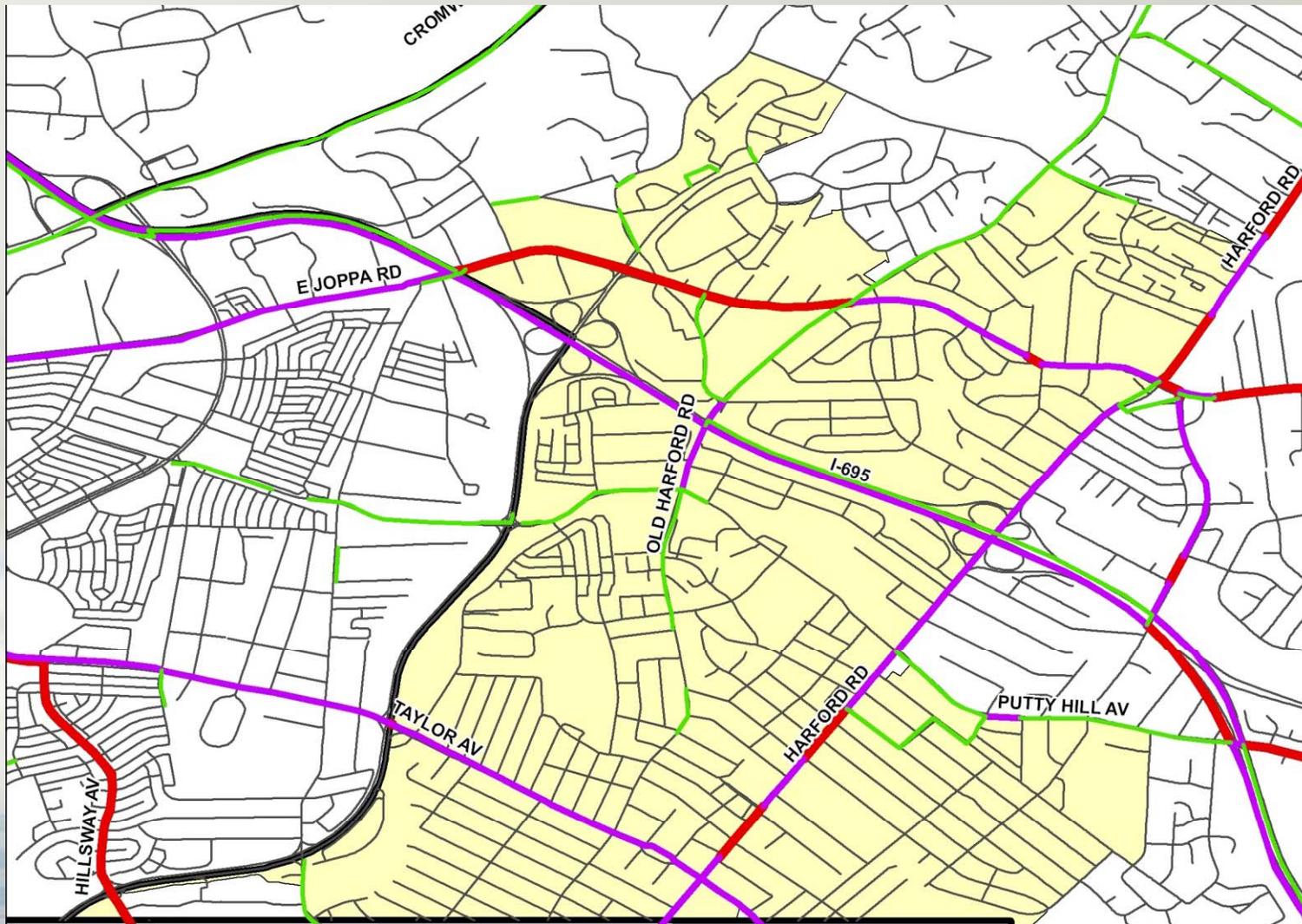
Data-Driven Approaches
To
Crime and Traffic Safety

Green=Crash

Yellow=Address



Most Frequently Traveled Road Segments by Drivers in DUI Crashes



Information Sharing and Outreach

Data-Driven Approaches to Crime and Safety

- ❖ External Communications
- ❖ Internal Communications
- ❖ Media



Monitor, Evaluation, and Adjustments

Data Driven Approaches to Crime and Traffic Safety

- **Supervision**
- **Data collection**
- **Updating the plan**
- **Strategic planning**



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Data-Driven Approaches

Evaluation of Objectives

Crime and Traffic Safety

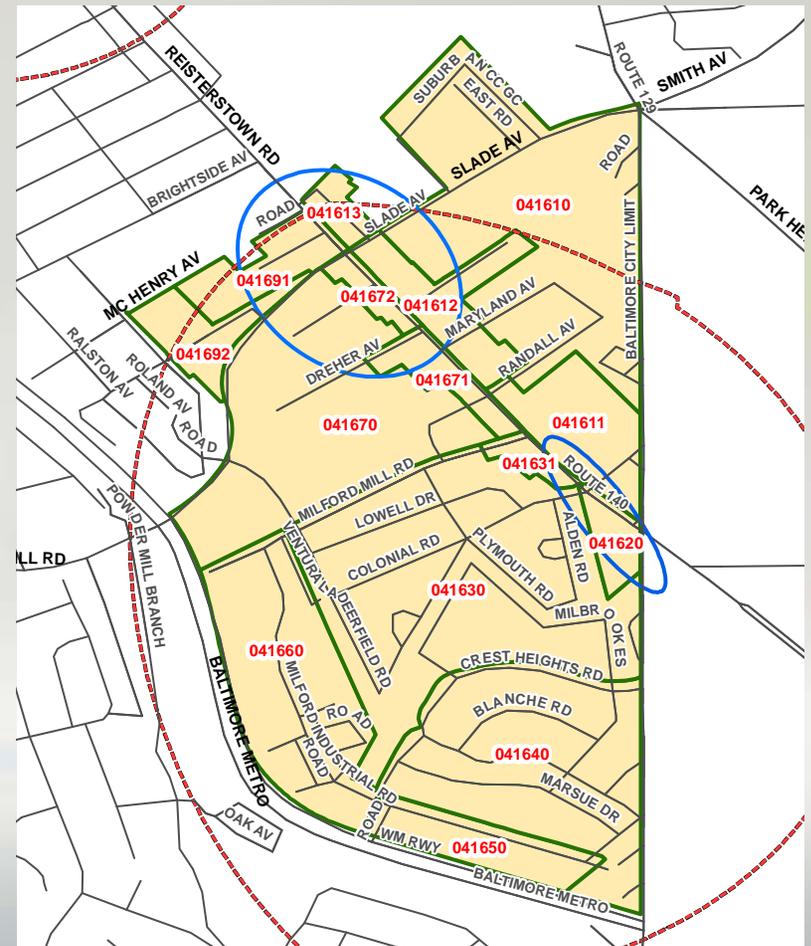
❖ Target Area: Pikesville

❖ Enforcement:

- 3314 hours
- 6985 contacts

❖ Results:

- Robbery: **-16%**
- Burglary: **-24%**
- Auto Theft: **-40%**
- Injury Crashes: **-43%**



Data-Driven Approaches

Evaluation of Objectives

Crime and Traffic Safety

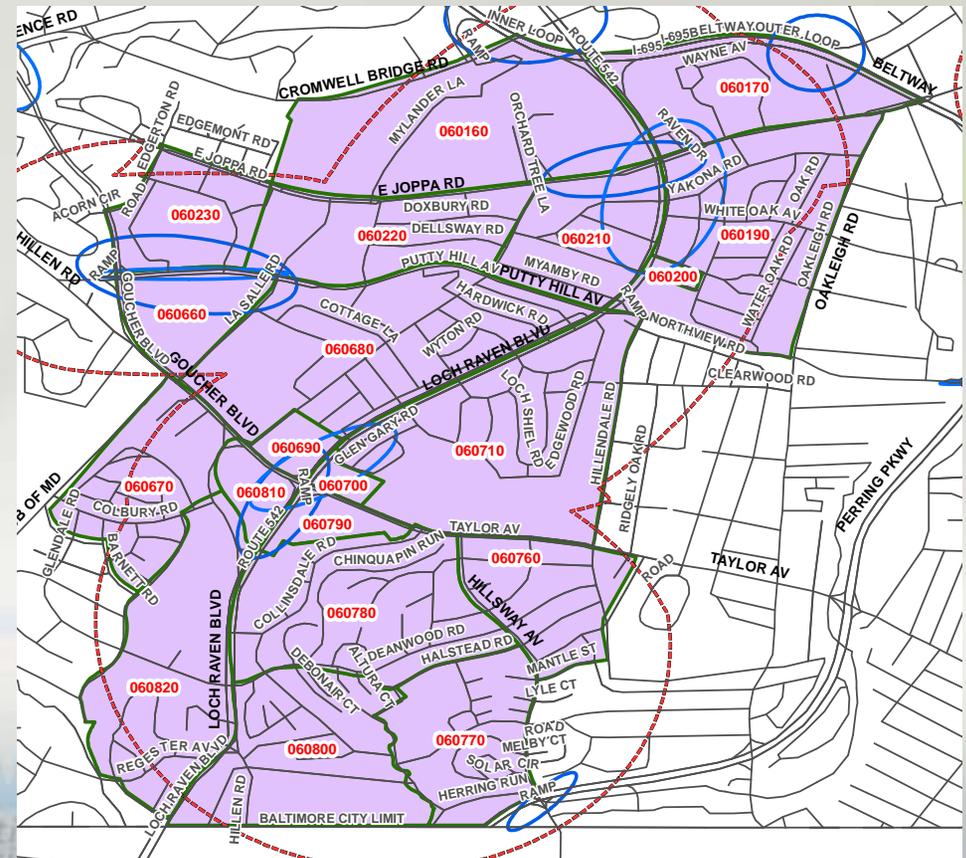
❖ Target Area: Loch Raven

❖ Enforcement:

- 3188 hours
- 5686 contacts

❖ Results:

- Robbery: **-6%**
- Burglary: **-6%**
- Injury Crashes: **-6%**



Data-Driven Approaches to Outcomes Crime and Traffic Safety

However beautiful the strategy,
you should occasionally look at
the results.

Winston Churchill



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2008 Evaluation Results

➤ Robbery

- ◆ Overall reduction of 13.6%
- ◆ Reductions on 5 roadways
- ◆ 13 of 18 segments

➤ Burglary

- ◆ Overall increase of 2.4%
- ◆ Reductions on 2 roadways
- ◆ 9 of 18 segments

➤ Crashes

- ◆ Overall reduction of 6%
- ◆ Reductions on 5 roadways
- ◆ 13 of 18 segments
- ◆ Personal injury crashes declined 14.7%



2009 Results: Crime

Burglary

- Reductions in 12 of 15 target areas
- Overall decrease of 18.1%

Robbery

- Reductions in 13 of 15 target areas
- Overall Decrease of 32%

Motor Vehicle Theft

- Reductions in all 15 areas
- Overall decrease of 43.5%



2009 Results: Traffic

Traffic Crashes

- ❖ Reductions in 10 of 15 target areas
- ❖ Identification of problem zones

Traffic Stops

- ❖ Increases in 12 of 15 target areas
- ❖ Overall increase of 39.3% or 8965 total stops
- ❖ Over 54,000 enforcement hours in the target areas



WHAT CAN DDACTS DO FOR YOUR AGENCY?

- ✓ Relationship between crashes and crime
- ✓ Renewed emphasis on traffic safety
- ✓ Flexible approach
- ✓ Accreditation



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Data-Driven Approaches Keys to Success Crime and Traffic Safety

- ◆ Data and Analysis
- ◆ Planning and Evaluation
- ◆ Flexibility





Captain Howard B. Hall

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DDACTS

Return On Investment

Cost Effective Approach

Reduction in Social Harm

Fewer Calls for Service

Increased Time For High-Visibility Patrols

Increased Deterrence

Increased Field Contacts

Data-Driven Approaches
Questions
Crime and Traffic Safety

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Earl Hardy

202-366-4292



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