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## 2014 Achievement Awards



## 2014 VACo Achievement Awards

Deadline: June 2, 2014

### Application Form

All applications must include the following information. Separate applications must be submitted for each eligible program. **Deadline: June 2, 2014.**

#### Program Information

Locality Hanover County

Program Title Predictive Policing/Density Analysis

Program Category Criminal Justice & Public Safety

#### Contact Information

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#### Signature of county administrator or chief administrative officer

Name Cecil R. Harris, Jr.

Title County Administrator

Signature *Cecil R. Harris*

## Call for Entries

MEMBER OF  
NATIONAL SHERIFF'S ASSN.



OFFICE OF SHERIFF  
COLONEL DAVID R. HINES  
P.O. BOX 40  
HANOVER, VIRGINIA 23069  
804-365-6110 804-730-6110

MEMBER OF  
VIRGINIA STATE SHERIFF'S ASSN.



May 28, 2014

To Whom It May Concern,

The mission of any law enforcement agency should be prevention of criminal activity. Detection and deterrence is always preferable to the action required following a criminal event. If law enforcement is able to prevent victimization based on intentional effort, the success can be measured by the approval and expectations of the citizens we serve.

Predictive policing models have continually become less reactive and more proactive, which generally results in huge cost savings for law enforcement. The model being used here in Hanover is unique to Hanover yet borrows some best practices of current analysis processes.

Predictive policing borrows from the principles of problem-oriented policing, community policing, evidence-based policing, intelligence-led policing and other proven policing models. This initiative seeks to build on the great ideas and concepts we as a law enforcement community have used for years, thereby making the transition sensible and seamless.

Sincerely,

Colonel David R. Hines, Sheriff

/ts

*A State and Nationally Accredited Law Enforcement Agency*

### **Summary Overview of Predictive Policing/Density Analysis**

As law enforcement operations and crime forecasting are greatly affected by the moving and changing of many environmental and community factors, an investigation was conducted which looked into the impact community density variables, have on the workload of the Sheriff's Office and the connection to crime forecasting initiatives. The goal being to better utilize resources for the prevention of criminal activity. This analysis was conducted using a geographic process coupled with a comparison to housing units, population density, crime trends and calls for service.

Analysis indicated the proximity of apartments to subdivisions influenced the call per acre ratio. As housing density increased, so would calls for service. As housing density decreased, particularly as you moved away from the downtown suburban service area, calls for service per acre decreased as well, giving credibility to use of a density analysis tool in contributing to a crime forecasting methodology.

Community density models can provided accurate depictions of the most likely next crime target areas. This information coupled with predictive analytics allows the Sheriff's Office to use this process for strategic placement of needed resources. Anticipation of needed resources allows the Sheriff's Office, through a mathematic process, to contribute input into the overall county comprehensive planning and growth strategies.

Ultimately, results of this research were incorporated into the Sheriff's Office crime management initiatives, a liaison from the Sheriff's Office was assigned to the Hanover County Planning Office to partner in identifying growth trends, a systematic process of recording public safety IMPACT associated with growth was developed, and a resource and growth needs formula created to assist in future budgetary models.

## **Predictive Policing/Density Analysis**

### **Project Narrative**

The Hanover County Sheriff's Office, under the leadership of Colonel David R. Hines, is the primary law enforcement agency for Hanover County and is both state and nationally accredited. The agency is composed of 236 personnel, including 189 sworn law enforcement officers, 17 sworn court services officers, 9 reserve (sworn) officers and 19 non-sworn personnel.

In an effort to keep up with the demands associated with growth and crime forecasting the Hanover Sheriff's Office developed a predictive policing density analysis system to analyze and identify the effects of geographic density variables and crime trends have on law enforcement operations and the IMPACT on resources and growth. The goal being the prevention of crime. A byproduct of this research was the development of a predictive formula using density analysis attributed to community movement and calls for service as potential "gate way" crime indicators.

This research began with a basic workload density analysis based on the reliability of identifying calls for service as a constant versus trending patterns associated with specific criminal activity, which is associated with a smaller data set. Limited data has proven to be an obstacle in the past for strong trend analysis and using calls for service proved to be a reliable source of information leading to multiple data mining processes.

Calls for Service (CFS) are generally accepted as a benchmark analysis tool in looking at the demand for police services. As such, they can be mapped and provide a larger data

set for analysis. This process uses either point symbols (symbol represents one or more calls) or a "hot spot" form (calls are assigned to specific geographic or reporting areas).

Over 66% of our top CFS can be directly attributed to quality of life issues. In addition, 50% of our top 20 generally require no law enforcement action. Also, out of our top eight Index Crimes, only larceny made it into the top 20. In looking at overall CFS, a correlation can be made directly with a patrol deputy's time responding to matters where mediation, advice, and social wisdom often resolve those "quality of life" issues that, if left unchecked, could become aggravated and lead to a potential criminal event.

The concept of CFS as a potential indicator of anticipated community crime is based on the predictive model using the "Law of Large Numbers" and fundamentals of density analysis. The law of large numbers simply states that the more events that are included in a large data set, the more expected or predictable the outcome. Density models allow for better forecasting as it applies to movement of people and history of opportunity. The anticipated results being should CFS decrease law enforcement could focus more resources on preventative measures or CFS would lead to the identification of "hot spot" criminal locations in order to deploy deterrent measures.

Using CFS, this data was applied to a geographic formula using "per acre," "per unit," and "per person" with the variables being a comparison between apartments (considered the highest possible density housing) and subdivisions in and out of the suburban service area. CFS were also linked to a GIS mapping process by parcel. This process allowed for a highly visual tool in identifying from the county level, to zones, to beats, to

neighborhoods and even an individual residence as to where law enforcement service were being utilized and at what levels.

In addition a CFS and density analysis of all apartments inside and outside of the suburban service and all subdivisions inside and outside of the suburban service area were conducted. This analysis incorporated thousands of homes and thousands of acres within the county and affirmed the theory of CFS and density as core forecast elements of gateway activity and community movement.

After completing an overall analysis of CFS in comparison with high- and low-density housing, the data indicated a direct correlation to an increase in CFS in high-density areas and an increase in criminal activity in those areas. High-density housing is a place where due to intentional construction design, density is encouraged and increased as opposed to broad-based expansive construction initiatives.

A comparative analysis of calls per person and calls per unit also indicated a measurable difference in CFS. 66% of our primary CFS can be considered "quality of life issues." The highest concentration of CFS in the entire county is centered on our highest density areas. Based on this data analyzed we were able to conclude that high-density housing brings with it a rapid increase on demands for law enforcement services and the potential to impact quality of life issues.

Based on density averages in Hanover County:

- You are 10 times more likely to receive a call for service in a subdivision within the suburban service area than in a subdivision outside the suburban service area.
- You are 16 times more likely to receive a call for service in an apartment complex than in subdivisions within the suburban service area.
- You are 163 times more likely to receive a call for service in an apartment complex than in subdivisions outside of the suburban service area.

In response to this data and understanding the need to plan appropriate law enforcement resource placement and allocation, four areas were identified and an effective response methodology was were implemented. First identification of high CFS areas for resource placement, second development of a density resource formula to serve as a guide during county growth and strategic planning initiatives, third establishment of partnerships with county planning agencies to monitor growth initiatives and fourth inclusion of density formulas into a crime forecasting strategy.

As calls per acre, per unit, and per person can be applied to a smaller geographic area based on density formula and CFS, resources can be better allocated to a definable area. This "hot spot" analysis directly affects the movement of law enforcement resources in both the deterrent and response application.

After establishing density and CFS as fundamental elements needed in a forecast process a concept and formula were designed to identify criminal probabilities associated with a specific criminal act versus the general nature of using CFS. The concept suggests just



as noise and light is altered through water due to its density, movement of people is altered due to community density as well.

The challenge in affirming this concept was associated with the way data is traditionally stored such as in spread sheets or records and intelligence databases. In order to effectively use this concept, data needs to be funneled through a GIS application using definable barriers. Partnerships were established with Clay County Sheriff's Office in Jacksonville Florida, Los Angeles Police Department (LAPD), University of California (UCLA), Santa Cruz Police in California, Target corporation, Hanover Association of Businesses and Chamber of Commerce (HABCC) and most recently the University of Virginia (UVA) in overcoming this challenge. Each of the organizations have touched on concepts attempting to forecast crime and provided additional experience contributing to the design of our density analysis model. As a result, GIS applications were created that remove disparate data that might render ineffective density data associated with less or more dense geographic areas.

Using a data mining process that takes into account incident variables was needed in order to define a potential geographic location or create a neighborhood profile. To do this you must define barriers and then from those barriers conduct a CFS and density analysis. A density analysis coupled with CFS and historical trending provides data indicative of community movement and opportunity. Through density analysis merged with CFS and historical trending data and predictive analytics we are able to get a snapshot of community work schedules, areas identified as higher criminal opportunity



and the movement of people. Analysis of this data is used in a three tiered crime forecast of low probability, moderate probability and high probability.

This analysis process was applied to a high density area of Hanover County known as Mechanicsville. A series of larcenies from vehicles had occurred in a neighborhood where data indicated it as a law enforcement "hot spot". Data was pulled through our GIS application then applied to our created density formula of  $\text{Event} = \text{Time} (\text{Area} \times \text{Density})$  Area or  $E = T(A \times D)$ . The result was a forecast only 12 hours off of the forecasted event time and exactly in the defined geographic area. This density tool continues to be used today and has had additional successes.

This success uses data and filters it through equations and GIS process. Whereas it is not a 100% accurate predictor of criminal activity it does serve as a proven methodology of using data to effectively manage resources and fill in gaps in the absence of direct intelligence. Ultimately this research has led to identification of high CFS areas for resource placement more accurate than the latest "hot spot" analysis processes, development of a density resource formula used to serve as a guide during county growth and strategic planning initiatives, the establishment of partnerships with county planning agencies to monitor growth initiatives and inclusion of density formulas into a predictive analytics strategy which has demonstrated successful results in placement of limited law enforcement resources.

## **Supporting Documents**

### **Excerpt from Hanover Sheriff's Office Administrative Order 15:1 Crime Analysis and Intelligence Unit Page 4 ref: Use of Analysis Information**

#### **6. Use of Crime Analysis and Intelligence Information**

Crime Analysis and Intelligence information will be used by the Sheriff and all commanders in:

- A. Short range tactical planning of crime reduction techniques and strategies.
- B. In the development of departmental plans for a response to operational problems.
- C. In long range planning, particularly as it relates to predicting manpower and resource need for a multi-year period.



# **HANOVER COUNTY SHERIFF'S OFFICE**

## ***Public Safety Impact Statement***

**COLONEL DAVID R. HINES, SHERIFF**

### **Hanover County Proposed Comprehensive Plan**

#### **Sheriff's Office Density Analysis and Overview**

As we continue to partner with entities within our County Government such as the Planning Department, the Board of Supervisors, Fire/EMS, as well as with our Hanover community, the Sheriff's Office consistently evaluates anticipated growth trends in an effort to better prepare to meet the needs of the citizens we serve. While the Sheriff's Office is not opposed to community growth, we realize the vital need for staffing and resources to be in sync with growth trends and future planning initiatives.

Since 1980, every Virginia locality has been required by state law to have a comprehensive plan. The purpose of a comprehensive plan is to guide and accomplish the coordinated development of an area which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, order, convenience, prosperity and general welfare of its citizens.

The comprehensive plan is general in nature. It is accompanied by maps, plats, charts and descriptive information, which show long-range recommendations for the general development of the county.

The design for the comprehensive plan is to guide the physical development of our community. Once adopted, developers, county staff, the Planning Commission, and the Board of Supervisors use it to develop and implement a course of growth in the county. Essentially, the plan attempts to outline where our community has been, where it is presently, where it wants to go and how it plans to get there.

State law requires that "at least once every five years the comprehensive plan shall be reviewed by the local planning commission to determine whether it is advisable to amend the plan." *Virginia Code §15.2-2230*. The most recent update was in 2007.

Our community is continually changing. The update is used to assess new needs, develop solutions for new and long-term challenges, and plan for new growth while enhancing our existing community.

The comprehensive plan finds its “engine” under the designation of land use. Land use designations assist in interpreting the intent of the comprehensive plan. They are used with land development standards specific to that designation when the Planning Commission and Board of Supervisors consider certain development proposals, such as rezoning and special use permits. Essentially, a land use designation denotes what is considered to be the most appropriate future use of a property and can indicate development intensity for a specific area or parcel.

Promoting “development intensity” is where challenges are identified for the public safety community. Just as planning takes into consideration infrastructure to support roadways, water and sewer, so must public safety be considered. Development intensity can determine the pace at which public safety resources must be garnered. As such, public safety is a critical infrastructure that must be included in any county growth or comprehensive plan.

Development intensity or promoted growth formalizes a process of concentrating people and activity in a defined geographic area. Development and construction determine the area design and contribute to the speed in which an area or community is populated. When infrastructure is out of sync with development, critical support responsibilities can be stifled. Development generally takes the form of high or low density housing, or commercial and industrial growth as it applies to increased population and service needs. This model of development impacts comprehensive planning through three core elements:

1. housing and its density,
2. commercial and industrial growth, and
3. anticipated population increases.

### **1. High Density Housing**

As law enforcement operations are greatly affected by community growth and development, a study was conducted which looked into the impact high-density housing, as an independent variable, has on the community. This research was conducted using a density analysis geographic process coupled with a comparison to units/parcels, population density, and calls for service.

An analysis of every identifiable apartment complex (highest density residential) and subdivision in Hanover County with query access for calls for service was conducted. Approximately 27,329 acres were analyzed and the results indicated conclusively that, in high-density housing areas, law enforcement calls for service per acre are more numerous

on average than in areas of single family dwelling homes. Calls for service per acre were also significantly lower in residential areas outside of the suburban service area. The analysis shows that high density residential growth and construction serves as a rapid promoter of population density, higher law enforcement calls for service and the potential for increased criminal activity.

In looking at 2012 data, it was discovered that, in a combined average of apartments within the suburban service area, the average number of calls per acre was 9.84. In the one apartment complex outside of the suburban service area, the number of calls per acre was 3.09. Subdivisions within the suburban service area averaged 0.6 calls per acre, and subdivisions outside of the suburban service area averaged 0.06 calls per acre. Based on these averages, it is 16 times more likely that law enforcement services will be requested in a high-density housing area than in a single-family dwelling when comparing all single-family dwellings within the suburban service area.

Further analysis indicated the proximity of apartments to subdivisions influenced the call per acre ratio. As housing density increased, so would calls for service. As housing density decreased, particularly in areas further from the downtown suburban service area, calls for service per acre decreased as well. In general, living adjacent to high density housing increases the expected need for law enforcement service calls and potentially higher victimization rates.

Ultimately, this high density research concluded that the rapid increase in calls for service for law enforcement can be directly attributed to high-density housing. As this type of growth will continue to be part of the strategic planning of the county, the challenges associated with increased service calls should be met with proper planning and funding to address the increase in citizen service needs. Encouragement of high density housing without adequate resource allocation for law enforcement could lead to areas of community degeneration.

## **2. Commercial Growth**

In addition to high-density housing, the Sheriff's Office also examined the impact commercial development can have on citizen law enforcement needs. Two proposed developments were examined to demonstrate the impact of these types of commercial developments. These two developments are the proposed movie theater in Mechanicsville and the new outlet mall south of Ashland.

## Movie Theater

The movie theater proposal would allow for a 12-screen movie theater with a seating capacity of 2,566. With this seating capacity, the theater will serve to promote large gatherings. As with any venue that structurally supports or attracts large crowds, an anticipation of increased law enforcement response is expected.

Research into this proposal suggests that should the approval and construction of this facility be completed, an increase in law enforcement calls for service could occur at the facility and potentially in the surrounding neighborhoods. Regional data supports the types of calls projected consist of primarily quality of life and nuisance issues, traffic accidents, and suspicious and alcohol/drug incidents.

The area proposed for construction is a densely populated area of Hanover County and includes high demands on traffic movement and control as well as responses to reported criminal activity. In a one-mile radius from the proposed site, 4,966 calls for service were received between July 2012 and July 2013, and the intersection at the northwest corner of the site is the location of the second highest number of motor vehicle accidents in the county. The top four accident locations in the county are the intersections at Mechanicsville Turnpike and Bell Creek Road, Mechanicsville Turnpike and Lee Davis Road, Mechanicsville Turnpike and Elm Road, and Mechanicsville Turnpike and Old Hickory Road. The seventh highest accident location is the intersection of Mechanicsville Turnpike and Creighton Road.

All of these high accident locations are in proximity of the proposed theater. Congestion, history of traffic accidents, and activity at Lee-Davis High School also present significant challenges to the safe movement of traffic in the proposed area. In addition, expansion in this area is not expected to be completed until 2018. However, construction until that point will also add to expected traffic concerns. A theater will not eliminate already identified needs in this community. Instead, it will add to current demands for law enforcement service.

The county is also reviewing the possibility of a nearby road closing (Brandy Creek Road) and traffic initiatives with the theater project manager as proposed plans are being reviewed. The Sheriff's Office would discourage any initiative that would add to current vehicular congestion at the Lee Davis Road and Mechanicsville Turnpike intersection or limit ease of access to travel corridors for nearby residents.



Regional theater management has, in most cases, established a general standard that, during weekends and anticipated capacity crowds, off-duty law enforcement officers are hired for extra security. The experts in identifying security needs are often the facility managers. This regional, state and national trend of hiring off-duty officers at theaters supports the understanding by the theater industry that the propensity for criminal activity and law enforcement response is increased. As officer presence is a known deterrent to criminal activity, calls for service could increase above regional trends if off-duty officers are not available. Sheriff's Office staffing could be strained to meet off-duty demands.

Theaters serve as gathering points for large crowds. Regional data shows that there could be an increase in calls for service with the potential to impact nearby neighborhoods and businesses. Research into this neighborhood impact is based on historical trending and density analysis. An area where trend increases in criminal activity have occurred will most likely impact those areas adjacent to the geographic location.

Regional research indicates increases in calls affecting quality of life could occur and could impact adjacent residential communities. In addition, this location in comparison to regional theater locations is expected to draw non-residential crowds from the surrounding regions. Currently 52% of our current adult arrests are of non-residents. This number is anticipated to increase as more transient traffic is expected.

A theater does not promote a one-time event large crowd. Instead, it would require an unending commitment of law enforcement resources to meet the needs associated with large gatherings. Just as any large crowd event, such as a football game or community gathering, this type of facility has the potential to accrue capacity crowds. Law enforcement must be prepared to respond to large-scale critical events and manage increased service calls when needs arise.

Should the proposed theater be approved, long-term allocation of resources will need to be considered as continual efforts and responses to this facility will be anticipated. In addition, there is an expectation that this facility will have an immediate impact and draw upon current available Sheriff's Office resources.

### Outlet Mall

There is an anticipated outlet mall to be built south of Ashland. A comparison study of a similar mall in another jurisdiction showed a marked increase in law enforcement activity.



That jurisdiction averages between 350 and 425 calls annually for service at its outlet mall.

These calls range from robbery to domestics, drugs, accidents, vandalisms and quality of life issues. Using the International Association of Chiefs of Police (IACP) and the Governor's Center for Local Government Services patrol staffing and call weighing formulas, the need for 1.2 additional officers is identified just to handle the expected increase in call volume at the operation of this facility.

The call volume for that jurisdiction's outlet mall was also impacted by seasons and significant events. During the holiday season, the county police department had to establish a field office to work out of during peak commercial seasons to handle the increased concentrated work load.

Another consideration is the location of the compared outlet mall is not as readily accessible to higher population densities as the proposed Hanover outlet mall would be and, at this point, it is unknown as to what vendors will be occupying this space. As a result, the potential for more calls for service than the examined outlet mall experienced is a probability and could impact the anticipated service needs.

### **3. Population Growth**

The Hanover County proposed comprehensive plan estimates the population to be approximately 137,000 people by the year 2032. This is using an annual 1.5 increase estimate over the next 20 years strictly for planning purposes. Growth trends might indicate a higher population increase over the years as 1.5 is considered by the Hanover Planning Department to be a very conservative estimate.

The International Association of Chiefs of Police (IACP) and the Governor's Center for Local Government Services use nationally tested mathematical formulas to provide guidance in planning patrol staffing needs. Law enforcement patrol estimates may be made based upon the assumption that, on the average in any community, 550 complaints or incidents will occur annually for every 1,000 residents, or .55 per resident when call for service data is not available. Current calls for service data can be used with IACP formulas in looking at immediate future trends and needs; however, this formula serves as a valuable tool in looking at 5, 10 and even 20 year needs.

As an example, if the population of Hanover is expected to increase by 37,000 over the next 20 years, it can be estimated that the Sheriff's Office will handle at a minimum an

additional 20,350 complaints or incidents (37,000 population  $\times$  0.55 = 20,350 complaints or incidents). Estimates are much higher when the community is influenced by high nonresident transient activity or high-density and commercial areas. This formula serves as a basic component of a complex staffing planning process that encompasses many variables.

If we look at population increases as a single variable, in using this formula and the expected calls for service in 20 years, in order to meet the demands of population increase alone (using only minimum hour time and growth standards), the Sheriff's Office will need to consistently add 4 additional patrol officers annually over the next 20 years to manage the anticipated calls for service.

This long-range staffing formula serves as a snapshot of anticipated future needs; however, it's important to note the formula is based on an estimation of anticipated increases in calls for service. It does not account for needed investigative support, training and administrative needs, nor does it reflect current staffing needs. These additional staffing needs are formulated into a comprehensive process of balancing community service expectations, officer needed support, and training requirements.

#### Proposed Comprehensive Plan (Multi-Use Land Designation)

The proposed comprehensive plan continues to build upon the vision of controlled growth within defined geographic areas. The controls in the area of "land designation" define the look of our community in years to come. Land designations, which promote high density or commercial growth, are those areas that will have the most immediate impact upon public safety and law enforcement resources.

The previous comprehensive plan allowed for a density of 30 homes per acre in certain areas. The proposed plan sets as a new standard 15 homes per acre. This standard serves to control density at lower levels; however, the proposed plan under the "multi-use" land designation allows for many new locations of 15 homes per acre, which previously did not allow for any dense residential growth.

In the previous plan there was limited "multi-family" designation left to develop. Many of the new proposed "multi-use" areas under the previous comprehensive plan allowed for only commercial or industrial growth. The proposed comprehensive plan now allows for the potential of high-density housing (15 homes per acre) in "multi-use" areas. This effectively increases the locations for potential expansive high-density housing throughout the suburban service area, above what the previous plan had allocated.

According to comprehensive plan definitions, this new "multi-use" designation speaks to two points to consider regarding the impact of high density housing:

1. *"Design mixed-use developments to provide a wide range of housing types with higher densities, to address the changing needs of future residents of the County."*
2. *"Project phasing shall be done in a manner that ensures the primary emphasis of this designation is business and professional uses. This shall be done through an appropriate balance of residential and business or professional construction with a master planned development, and establishing the residential development within a project."*

Multi-use designations propose higher density housing with business or professional construction and leave less regulated standards of growth by not defining what formula is used in determining an "appropriate balance" of growth.

For example:

1. Under the previous plan, the area adjacent to the intersection of New Ashcake and Route 301 was designated as commercial use only. The proposed "multi-use" designation allows for commercial and high-density housing in that area and areas to the south.
2. At Route 1 and Mt. Hope Church Road, the previous plan allowed for "subdivision high" (4-8 homes per acre). Under the proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.
3. At Creighton Parkway and Mechanicsville Turnpike, the previous plan allowed for "commercial use" only. Under the proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.
4. At Cobbs Road and Route 1, the previous plan allowed for only "commercial" and "industrial" use. Under the proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.
5. At Route 33 and Ashland Road to Winn's Church Road, the previous plan allowed for only a business park designation. Under the proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.
6. At Creighton Road and Cold Harbor Road to Interstate 295, the previous plan allowed for "office" and "industrial" use only. Under the proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.
7. At Pole Green Road and Bell Creek Road to Interstate 295, the previous plan allowed for "Business Park," "Commercial," and "Office Service" only. Under the

proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.

8. At Cedar Lane and Route 1 South, the previous plan allowed for "Commercial" use only. Under the proposed "multi-use" designation, it allows for commercial growth and up to 15 homes per acre.

The proposed comprehensive plan's use of a "multi-use" land designation now eliminates stricter standards of land designation in a definable plan and promotes a seemingly more unregulated plan leaving definitions and growth standards up to the purview of planners and elected officials now and in the years to come. This proposed plan sets the stage for a more unpredictable platform of growth in "multi-use" areas and adds multiple high-density residential areas above what was allocated in the previous comprehensive plan.

The challenge with the proposed plan, as we recognize current support staffing and operation deficit, is that it fails to consider the impact of projected growth on public safety services.

### **Conclusion**

The Sheriff's Office is not opposed to growth; however, public safety must be ready for commercial growth, high-density housing, and increases in population. As identified in the aforementioned examples (high-density housing, movie theater, outlet mall, and population growth), public safety must be considered and prepared for in the county's comprehensive plan. Increase in commercial growth brings with it additional responsibilities upon law enforcement and increased workloads. Residential growth research indicates a direct correlation between increases in law enforcement calls for service and high-density development.

In addition to increases in density, commercial facilities have the propensity to draw not only from the local community, but from neighboring jurisdictions as well. This adds to the potential for unexpected increases in population and public safety service needs.

High-density housing and commercial growth undoubtedly have an impact on public safety services by increasing community service needs. Management of that growth must be in sync with infrastructure. Should growth surpass infrastructure, the results will be either short lived growth or failure to meet expanded citizen service needs.

As the Sheriff's Office has seen no increase in authorized strength over the last five years, any additional promotion of growth or development will present response and service challenges to a workforce already operating beyond maximum capacity. The institution

of a growth plan without consideration of immediate public safety needs and promotion of future growth without standards of support for the public safety community demonstrates a failure to include a critical piece of infrastructure that impacts the needs of every citizen, visitor, and business in Hanover County.

Should the Hanover County Board of Supervisors move forward with this proposed comprehensive plan and the highlighted proposed developments, several factors must be considered and acted upon in order to effectively meet the public safety needs of our Hanover community now and in the future.

These factors are as follows:

1. allocation of funding/resources to meet current Sheriff's Office staffing and operational needs,
2. standards developed for inclusion of the Sheriff's Office in overarching planning processes,
3. standards developed to include funding of Sheriff's Office future staffing and operational needs,
4. assurances of adherence to projected Sheriff's Office planning initiatives, and
5. adjustment of County five-year personnel plan to reflect Sheriff's Office proposals.  
*(In the current five-year county service level plan, there are no new positions budgeted for the Sheriff's Office through FY 2018. This is not sufficient and will indicate no authorized staffing increases for a period of nine years.)*

Through partnerships with our Board of Supervisors, Planning Department, County agencies and community, we can be better prepared for our future. With proper planning, inclusion of public safety as a critical component of the comprehensive planning process will only serve to better meet the needs of our Hanover citizens. Together, we can ensure Hanover County continues to be one of the finest and safest places in which to live and work.

## Supporting Documents

### **High Density Geographic Manpower Analysis Formula** **Area Review – A Selected High Density Location 2013** (Numbers/Data for Example Only)

#### Assignment-Availability Factor (Wilson, 1972)

Employee's Total hours available	2920	Hours in the year per 8 hour shift
Minus, regular days off	832	Two day weekend hours
Minus, sick leave off	24	
Minus, personal leave off	16	
Minus, annual leave & holidays	224	
Minus, training time	<u>40</u>	
<b>TOTAL</b>	<b>1784</b>	
<b>Actual Hours Available</b>	<b>1784</b>	
<b>Availability Factor "C"</b>	<b>1.636771</b>	

#### **WORKLOAD COMPUTATION WORKSHEET**

(Based on 12 month statistics of calls for service)

Total Calls for Service		
Subtract Type "1" calls	253	
Subtract Type "2" calls	50	"120 min)
Subtract Officer Initiated Calls	203	"70 Min)
<b>Total # of all other calls for service</b>	<u>0</u>	
	0	
Type "1" calls		
Average call processing time	50	
Total time process type "1" calls	120	minutes
<b>Total # of type "1" calls</b>	<u>6000</u>	minutes
	100	hours
Type "2" calls		
Average call processing time	203	
Total time process type "2" calls	70	minutes
<b>Total # of type "2" calls</b>	<u>14210</u>	minutes
	236.8333	hours
Officer Initiated Calls		
Average call processing time	99	
Total time process Officer calls	70	minutes
<b>Total Officer Initiated Call Time</b>	<u>6930</u>	minutes
	115.5	hours
All other Calls for Service		

Average call processing time	12	
Total time process all other calls	70	minutes
<b>Total All Other Calls for Service</b>	<u>840</u>	minutes
	14	hours

monthly apartment  
meeting

### WORKLOAD ANALYSIS WORKSHEET

Total # of Type "1" calls hours		
Total # of Type "2" calls hours	100	
Total Officer Initiated Call Time hours	236.8333	
Total time All Other Calls for Service hours	297.3	
<b>Total Workload Analysis</b>	<u>115.5</u>	
	749.6333	hours

1248  
 Hours dedicated  
 1784 / 6 = 297.3

### MANPOWER ALLOCATION WORKSHEET

Total hours of Workload			
Multiplying Factor	749.6333		
Total work hours to be staffed	<u>1.2</u>	constant	(time analysis)
	899.56	hours	
Divide by 365 days of the year			
Length of shift	2.464548		
<b>Work Units</b>	9		
	0.273839		
Work Units			
Availability Factor "C"	0.273839		
	1.636771		

### **TOTAL STAFFING REQUIREMENTS FOR THE SELECTED HIGH DENSITY LOCATION**

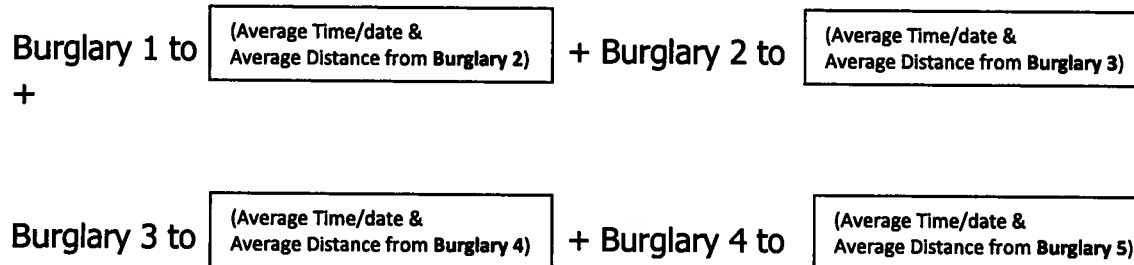
**0.448211**



## **Supporting Documents**

### **Time and Distance Forecast Data Mining Model**

Goal = Highlight mapping area where a known event has occurred and identify averages for 2<sup>nd</sup> event likely time and averages for 2<sup>nd</sup> event radius.



(Continue process with all burglaries or an event in highlighted area within the last year to obtain averages). The result would be average distance from a new burglary to probability of 2<sup>nd</sup> burglary and average time for 2<sup>nd</sup> burglary to occur. Use of density analysis tool formulates the distance probability by examining community activity, travel routes and high density housing.

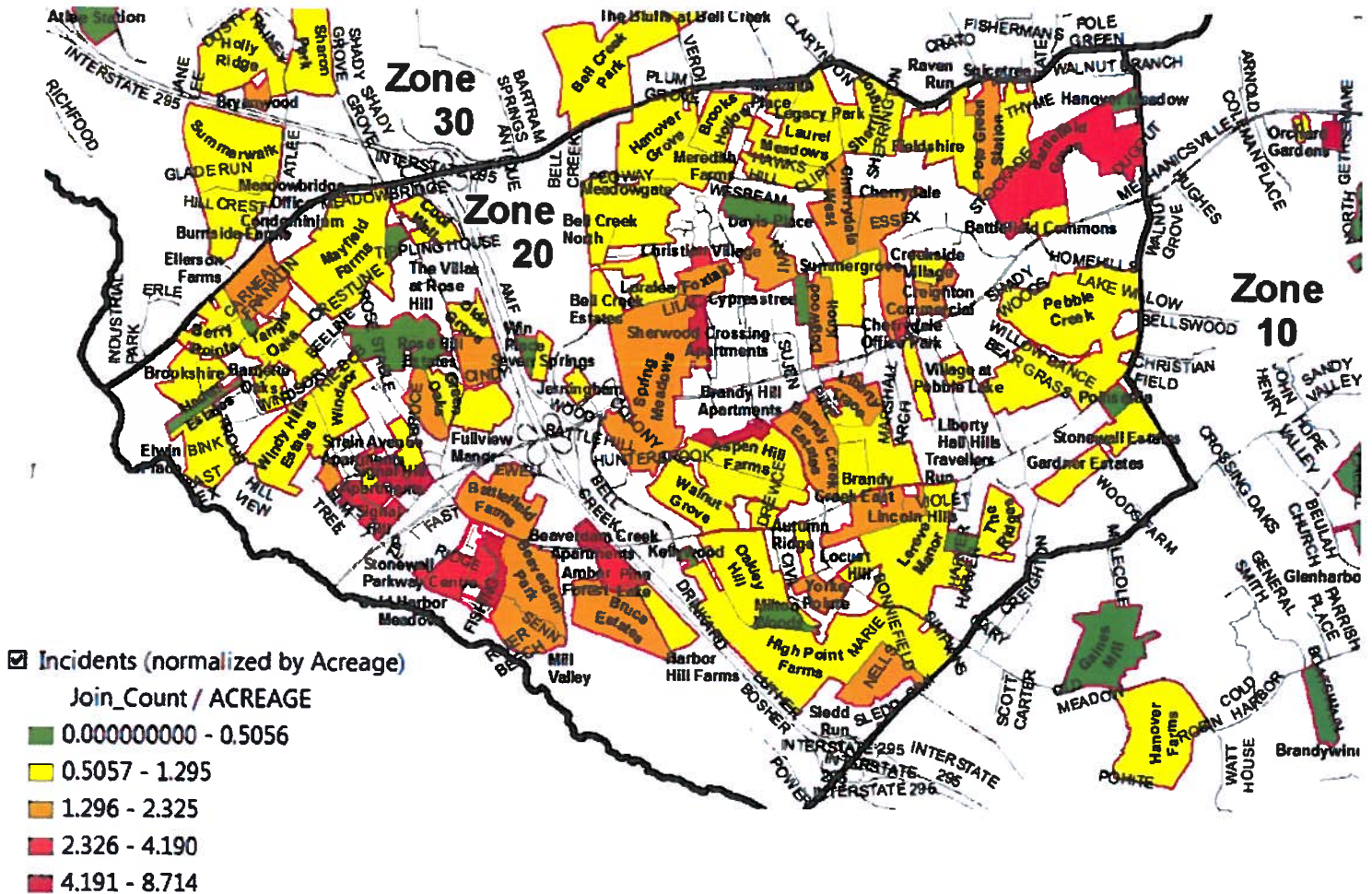
By using GIS density tool to highlight the incident area historical data will take into account based on previous incidents the probability of a 2<sup>nd</sup> or subsequent incident specific to the unique qualities of the event area. Community blight, density building/housing and transportation routes are layered into the analysis. According to the density analysis the radius would be different in a suburban service area vs. a farming area.

Time could fluctuate as well however radius due to density, travel and opportunity would change. As a GIS feature pulls from a defined area and in the highlighted pull calculates the averages, this process based on historical averages will account for the unique environment of the highlighted location and create neighborhood profiles to be applied to known risk terrain modeling.

This density process combines historical data and provides geographic profiling leading to a projected event location.

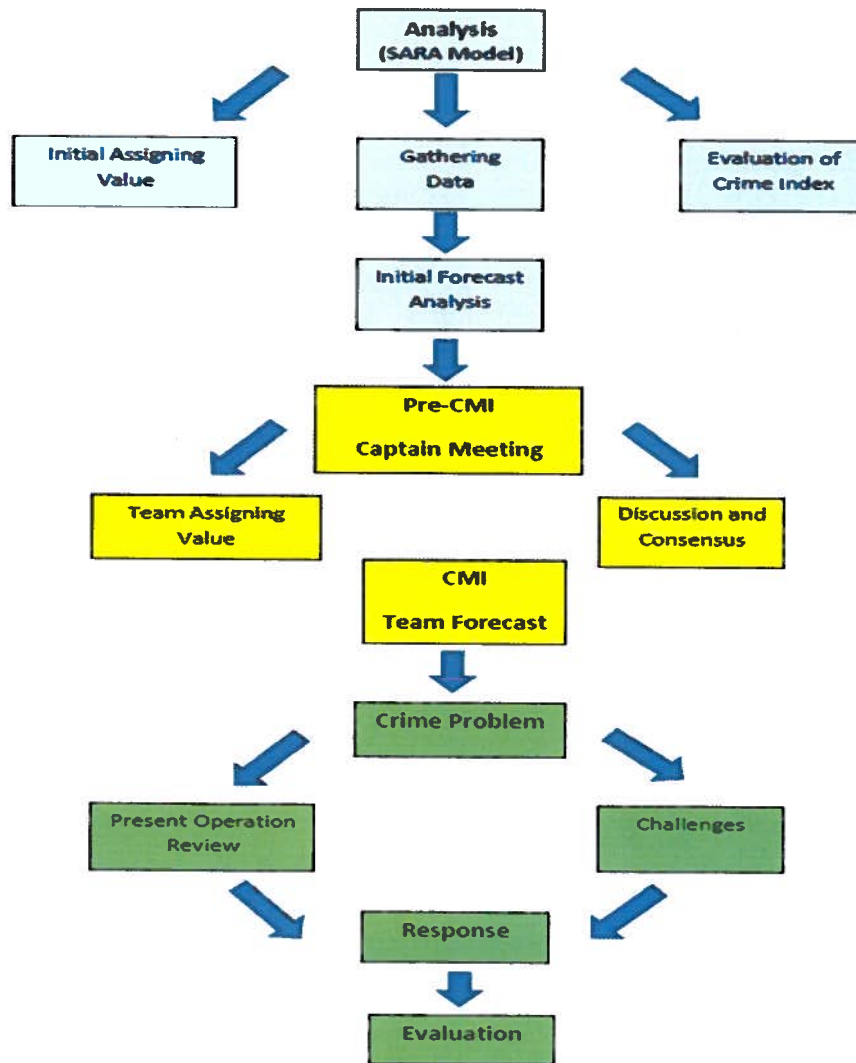
## Supporting Documents

# Density Analysis



Areas highlighted in the darkest red are areas identified as the most probable to require law enforcement services.

### Predictive Model and CMI Flow Chart

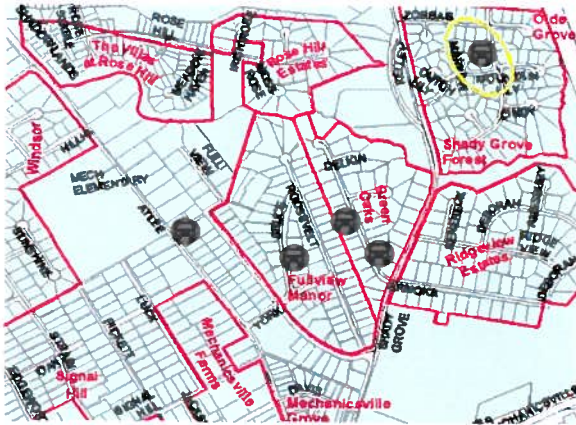


This flowchart represents the process in which density data is assigned value and reviewed. It is collected and filtered through a management process called Crime Management Initiative or CMI.

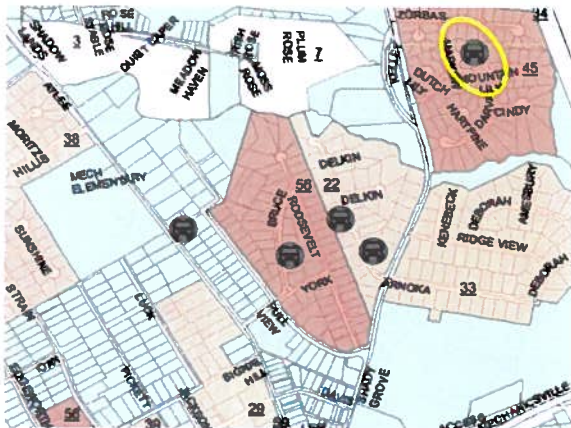


## Supporting Documents

### Density Analysis Created GIS Tool



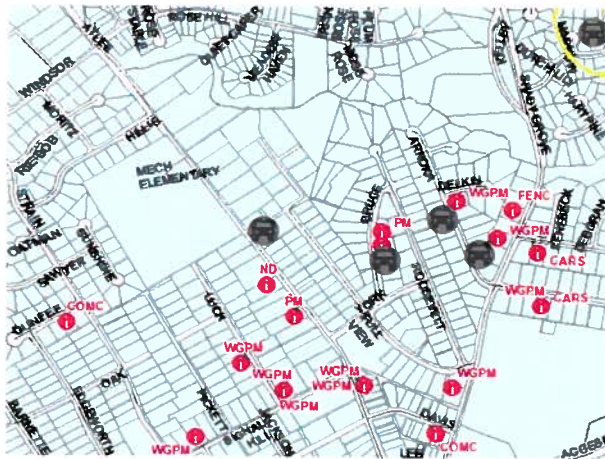
This map identifies 4 larceny from autos that occurred. The circled auto icon had not occurred yet. Using density analysis in a predictive policing model we were able to forecast the most probable next occurrence.



Utilizing available data and dividing by defined geographic boundaries high activity areas are identified that point to potential crime areas or high activity areas. Notice the darker red in the forecast area.



Numbers indicate increased activity and help to define the potential movement and active areas within the community. The numbers data source is attributed to law enforcement calls for service and defined geographic boundaries. This was examined to try and identify probably suspect travel directions.



## Successful Forecast

