

LIGHTING AND LANDSCAPING CUES CONTRIBUTING TO RESIDENTIAL  
BURGLARY RATES: A CASE STUDY OF SELECTED GAINESVILLE HOUSING  
AUTHORITY DEVELOPMENTS

By

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To my husband, my parents, and my family thank you for always believing in me

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## LIST OF ABBREVIATIONS

BCS:	British Crime Survey
CPTED:	Crime Prevention through Environmental Design
FBI:	Federal Bureau of Investigations
FGDL:	Federal Geographic Database Library
GHA:	Gainesville Housing Authority
GIS:	Geographic Information Systems
GPD:	Gainesville Police Department
GRU:	Gainesville Regional Utilities
IESNA:	Illuminating Engineering Society of North America
NCVS:	National Crime Victimization Survey
NIBRS:	National Incident-Based Reporting System
POE:	Point of Entry
RMS:	Records Management System
UCR:	Uniform Crime Reports

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The objective of the present study is to explore residential burglaries, and the contributions of lighting and landscaping cues relative to their occurrences. We employed Geographic Information Systems (GIS) to locate low-income housing developments in Gainesville, Florida (managed by the Gainesville Housing Authority) and map the occurrences of residential burglaries. Throughout the analysis of the burglary occurrences, we focused on the basic place-based crime prevention techniques, examining the possibility of successfully promoting or discouraging criminal acts of residential burglary with lighting and landscaping elements. We hypothesized that lighting and landscape maintenance directly affected the reported occurrences of residential burglaries within our select GHA developments. We identified select reported incidences in Pine Meadows, Woodland Park, and Caroline Manor, three of the Gainesville Housing Authority (GHA) developments, and conducted landscaping and lighting surveys within proximity of the point of entry for each victimized unit to determine if landscaping or lighting environmental cues played any role within the reported incidence and predator's target selection. We found that lighting levels in our study developments to be minimal at the points of entry and

landscaping often to be overgrown, contributing to opportunities of cover for potential offenders. The results of our analysis suggest that lighting and landscaping play a role in the amount of surveillability, which plays a role in decreased residential burglary opportunities. Through our research, we were unable to infer a direct relationship between lighting and landscaping cues and the occurrences of residential burglaries. Nevertheless, our studies suggest that the residential burglary occurrences were more than random criminal acts.

## CHAPTER 1 INTRODUCTION

The intent of this thesis is to explore the association (if any) between residential burglaries and environmental cues by using public housing developments located in Gainesville, Florida as a case study. The study utilizes Geographic Information Systems (GIS) to identify developments managed by the Gainesville Housing Authority (GHA) in Gainesville, Florida, which was estimated to have 114,375 residents in 2007 (U.S. Census Bureau, 2007), to determine locations of residential burglaries between January 2006 and December 2008. The study also examines the relationship between lighting and landscape cues and the occurrence of reported residential burglaries. Based on previous findings from researchers, we hypothesize that lighting and landscaping, which are specific environmental cues that influence the decision-making process, can promote or deter residential burglary by altering an offender's perception of risk.

Residential burglaries are one of the most numerous and most serious property crimes reported worldwide (UN-HABITAT, 2007), affecting not only individuals, but also entire neighborhoods and districts. In studies conducted by R.I. Mawby (2001), 54% of victim respondents claimed to be "very much affected" by residential burglary. Therefore, residential burglaries become a very important type of crime to study and analyze. Studies show that victims can suffer from excessive and enduring psychological effects, related to a deep sense of violation and insecurity (Hough, 1984; Wirtz & Harrell, 1987), including fear, anger, guilt, resentment, shame, grief, and shock (Cromwell and Birzer, 2007; Mawby, 2001; Budd, 1999). Victims have also reported that they cried and had difficulty sleeping (Mawby, 2001; Budd, 1999). Districts and neighborhoods that have fallen victim to residential burglaries are often associated with a negative stigma (UN-HABITAT, 2007). Exploring residential burglaries is also important due to the financial losses endured as a result of removal and damage to the property (Budd, 1999).

Property loss resulting from burglaries was estimated to be \$4.3 billion, or an average of \$1,991 per offense, in 2007 (FBI, 2007).

Public housing is housing that is subsidized by public funds for low-income individuals, (“Public Housing”, 2004). According to a study conducted by Rouse and Rubenstein, “crime rates in public housing complexes are in some cases... ten times higher than the national average” for residential burglaries(quoted in Bovard, 1994, p. 143). Numerous researcher findings suggest that public housing developments are typically sited in areas that are deprived financially, socially, and physically (Noelker & Harel, 1992). Furthermore, Lynch and Cantor (1992) found that socially disorganized communities were more criminogenic, and therefore had higher burglary victimization rates (DeKeseredy, 2003).

Because public housing sites tend to be socially disorganized, and therefore more criminogenic, there is a need to study and analyze residential burglaries within a public housing development setting. We selected two GHA public housing properties for the case study, taking into consideration the rate of residential burglary occurrence and the potential for victimization based on environmental cues, or signals. While the average public housing development is more criminogenic, resulting in high rates of residential burglary, the GHA developments have become an exception to the rule, according to the GHA Deputy Executive Director, and confirmed by data retrieved from GPD’s Records Management System (RMS). Residential burglaries have occurred with a minimal number of reported incidences within the GHA public housing developments. Therefore, we have selected GHA developments that reported higher incidences of residential burglary within our selected timeframe, between 2006 and 2008.

Once residential burglary patterns have been identified within the public housing development, the paper suggests connections between the residential burglaries and lighting and

landscape cues, which may have a bearing on the likelihood of residential burglaries being committed. The results of this analysis provide recommendations that may be incorporated into future city planning ordinances or building codes.

### **Residential Burglary Recording Tools**

Two tools that are useful when examining the occurrence of residential burglaries. The first tool used to examine statistics on all Part I offenses, or serious crimes by their nature and volume, is the Uniform Crime Report (UCR) Program, which was conceived in response to the need for reliable and uniform crime statistics. The Federal Bureau of Investigations (FBI) requires that reported criminal occurrences be formatted based on the UCR guidelines. The most commonly requested UCR data is published yearly and made available through the FBI's website.

Approximately 17,000 law enforcement agencies voluntarily report yearly reported criminal statistics to the FBI. As previously mentioned, the UCR program collects statistics on a total of eight Part I offenses, which include: criminal homicide, forcible rape, robbery, aggravated assault, burglary, larceny-theft, motor vehicle theft, and arson (U.S. Dept. of Justice, 2004). Each reporting law enforcement agency classifies and scores the offenses in their jurisdiction based on the UCR Handbook, reporting offenses according to handbook guidelines, rather than local or state statutes. Some law enforcement agencies are unable to submit annual UCR crime statistics due to several issues including: "computer problems, changes in record management systems or personnel shortages" (FBI, n.d.).

Currently, the UCR Program is being redesigned as the National Incident-Based Reporting System (NIBRS), a more comprehensive and detailed reporting system. The detailed information will be categorized and provided within each of the twenty-two broad offense categories. While important to study the yearly statistical occurrences of residential burglary

through the UCR, there is a second tool that, some would argue, is even more valuable to studying the occurrence of criminal activities.

The second important tool is the National Crime Victimization Survey (NCVS), which is an annual publication of the largest national forum for victims. The publication allows victims the opportunity to “describe the impact of crime and characteristics of violent offenders” (Bureau of Justice Statistics, 2008). The study is a sample of nearly 76,000 victimized households, or 135,300 victimized individuals; however it is much more accurate when describing the direct personal effects of being a target. Information regarding criminal activities, whether reported or unreported, are collected through the national survey and distributed in a published forum.

The NCVS indicates that property crime rates, including burglary, theft, and motor vehicle theft, have steadily declined since surveys began in 1973. Between 2006 and 2007 burglaries decreased by .2%, resulting in a total of 2,179,140 reported burglaries nationwide, with 67.9% of those occurrences characterized as residential burglaries. Preliminary studies suggest that 2008 experienced an average decline in property crimes of 1.6%. However, cities with populations between 100,000 and 249,999 experienced an increase of 3.1% for burglaries. By gathering data on reported criminal events and the emotional strain felt by the victimized individuals and households, the two tools, the UCR Program and the NCVS, provide a relatively comprehensive view of the crime problem affecting the United States.

### **Burglary and the Community**

Burglary is defined as “the unlawful entry of a structure to commit a felony or a theft” (U.S. Dept. of Justice, n.d.). We understand that residential burglary, or “breaking and entering” of a residence, is a worldwide problem, not associated with a city of one particular size, although larger cities are typically affected by increased criminal statistics. Residential burglaries affect everyone. By selecting public housing developments within Gainesville, Florida as a case study

and selecting residential burglaries between January 2006 and December 2008 within GPD's RMS, a program that manages all of the reported incidences within the city, we intend to establish a better understanding of the residential burglary incident and observe the effects of lighting and landscape cues on residential burglary rates within our selected public housing developments.

In 2008, the Gainesville Police Department (GPD) reported to the FBI that burglaries, which included residential, commercial and burglary of a structure, decreased by 141 total offenses, or 9.27%, from the previous year (GPD, 2008). Table 1-1 shows the number of reported burglary occurrences as well as the change in the rate of occurrence at various scales for burglaries between 2006 and 2008. So far this year, crime in Florida has decreased by 7.9%, while the city's crime rates have increased by 10%.

We are aware that the burglary occurrences reported to the FBI are not all of the occurrences within the city's RMS program. GPD's RMS data is classified differently than the statistics collected via the FBI's UCR program. While both GPD and the FBI track all reported burglary occurrences, the UCR classifies only residential, commercial burglaries and burglaries of a structure. Conveyance, or car, burglaries are classified as larceny-theft (U.S. Dept. of Justice, 2004). Therefore, GPD must report data to the FBI according to the UCR classification guidelines.

### **The Case Study**

This thesis, using a case study approach, begins by mapping the reported residential burglary occurrences based on data collected from GPD's RMS. We also map the public housing developments within the city limits, managed by the GHA. By mapping and comparing the location of the housing developments and the occurrence of residential burglaries, we are able to determine which developments experienced higher residential burglary occurrence rates between

January 2006 and December 2008. Secondly, the research tests our hypothesis that selected environmental variables, which may be physical elements or cues (or possibly both), are statistically significant and that there are particular factors associated with increased or decreased residential burglary rates. Specifically, we suggest that the location and maintenance of lighting and landscape become key aspects of the place-based crime prevention theories by minimizing visual barriers, creating territorial physical barriers, and illuminating areas without “spotlighting” any particular individuals (Gardner, 1995), thereby increasing surveillance opportunities in an attempt to reduce the risk and occurrence of residential burglary. Finally, this thesis includes recommendations to the governing ordinances for the City Commission, providing environmental design and building guidelines, related to lighting and landscape issues, to deter future residential burglaries.

### **Research Organization**

This document consists of five chapters. The research and justification of completed research is introduced in Chapter 1. Chapter 2 discusses the literature pertaining to residential burglary, while focusing exclusively on the exploration of the place-based crime prevention theories, which are often used to design interventions that seek to minimize criminal problems, and how environmental cues play a role in the occurrence of residential burglary. We also discuss the development of GIS through environmental criminology, a tool currently used to study various criminal occurrences, including residential burglary. The methodology used in the study is described in Chapter 3. The findings of our research are examined and discussed in Chapter 4. The paper concludes in Chapter 5 with recommendations to the City of Gainesville’s governing ordinances along with recommendations for further research.

Table 1-1. Reported Burglary Occurrences and Rate of Yearly Change per 100,000 Inhabitants

	2006 Crimes	2006 Crime Rate*	2007 Crimes	2007 Crime Rate*	2006 - 2007 Rate of Change	2008 Crimes	2008 Crime Rate*	2007 - 2008 Rate of Change
United States	2,183,746	729.4	2,179,140	722.5	- 0.95%	2,222,196	730.8	+ 1.16 %
Florida	170,873	944.6	181,833	996.3	+ 5.47%	188,467	1028.3	+ 3.21%
Gainesville	1,420	1290.8	1,522	1405.5	+ 8.89%	1382	1036.9	- 26.22%
Gainesville Housing Authority <sup>1</sup>	22	1115.3	24	1216.7	+ 9.09%	18	912.5	- 25.00%
Caroline Manor	2	3174.6	3	4761.9	+ 50.00%	1	1587.3	- 66.67%
Pine Meadows	3	1666.7	6	3333.3	+ 100.00%	3	1666.7	- 50.00%
Woodland Park	7	1830.1	6	1568.6	- 14.29%	6	1568.6	0.00%

Source: FBI UCR, 2006, 2007, 2008, and GPD RMS data.

\* Crime Rates are per 100,000 inhabitants.

Note: Population for the Gainesville Housing Authority was calculated by multiplying the average household size, which is 2.25 people per household, according to the 2000 Census, by the number of units in housing developments managed by the GHA, excluding Section 8 housing certificates and vouchers.

<sup>1</sup> The reported incidences within the GHA Public Housing Developments are only incidences of reported residential burglary due to the GHA not managing any commercial properties. The reported numbers from the United States, Florida, and Gainesville are based on the FBI's UCR reported guidelines, and therefore include both residential and commercial burglaries.

## CHAPTER 2 LITERATURE REVIEW

### **Introduction**

The intent of Chapter 2 is to provide a review of the literature pertaining to residential burglary and the CPTED theories, specifically the development of the theories into applicable tools, which are currently utilized to intervene in the occurrences of criminal activity, including residential burglary. The following chapter begins with a discussion of residential burglary. Next, we discuss the basic CPTED theories, which are used to explain the occurrences of and then minimize criminal activity, such as residential burglary. We explore how specific built and natural environmental cues can directly affect the rates of residential burglaries. Finally, we turn our review of the literature to the development of GIS, a tool used with many purposes and employed by several types of occupations, exploring its use in daily crime analysis within the law enforcement setting.

### **What is Residential Burglary?**

Residential burglary, defined as an “unlawful entry of a structure to commit a felony or theft,” (FBI, 2007) is a Part 1 property crime considered to be one of the most common crimes worldwide, accounting for 22.1% of the estimated 2007 United States property crimes and 67.9% of all the burglaries reported (FBI, 2007). Definitions for the term “burglary” vary worldwide, however essential elements of burglary include “breaking and entering” or the “intention of breaking” (Yang, 2006).

Burglaries are not considered to be personal or “contact” crimes, such as robberies or assaults; however, they do become very personal to the victim. Unknown persons have the opportunity to rummage through the victim’s personal belongings, which often causes emotional pain. A victim’s anguish can be life altering, causing feelings of extreme vulnerability for the

lifetime of that individual. As victims of residential “breaking and entering,” we understand the deep sense of personal violation. The knowledge alone of an intruder’s presence within a person’s residence, even without the removal of items, can cause significant distress for a victim. For example, the author felt extreme fear of a repeat victimization after becoming the target of a residential burglary. Due to the life-changing phobia, we felt the need to have an alarm system installed.<sup>1</sup>

This thesis focuses on residential burglary due to the personal nature of the crime, as well as the relationship between environmental elements and behaviors, particularly because it is “the most common property crime connected to local built environmental and design features” (UN-HABITAT, 2007). Brantingham and Brantingham (1976) discuss the importance of studying residential burglary. They say that burglary should:

exhibit a spatial distribution related to land-use patterning because it is a crime against real property... It is by far the most frequently occurring of the seven serious crimes included in the Uniform Crime Reports... It also appears to be the crime most feared and resented by the American Public... Finally, burglary is a crime which police have remarkably little success in solving and therefore a crime for which small preventative gains through prevention planning can pay large real world dividends. (Brantingham and Brantingham, 1976, p. 275)

Numerous studies show that the time of day correlates to the occurrence of residential burglary, whether successful or unsuccessful, although the “preferred” time of day for offenders has changed over the years. O’Block, Donnermeyer, and Doeren (1991) found that burglaries were as likely to occur during the day as at night. According to the 1998 British Crime Survey (BCS) (quoted in Budd, 1999), burglary risk is the same for weekends and weekdays. While they

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<sup>1</sup> The author became a victim of residential burglary in 2003. The offender entered the residence by kicking in a side door to the garage. No items were removed or appeared to be disturbed during the incident. However, the author suffered from extreme anxiety, particularly at night, and was often unable to sleep, because of fear of becoming a repeat target. Because of life-altering anxieties and phobias, the author’s family invested in a monitored alarm system.

claim that burglaries are less likely to occur when it is dark due to the likelihood of the residence being occupied, their statistics (quoted in Budd, 1999) showed that 56% of the burglaries occurred while it was dark; with thirty-two percent occurring in the evening, or between 6:00 pm and midnight. Although burglaries occur most often in the evening, they are often less successful because residences are more likely to be occupied by people. Findings from the 1998 BCS also determined that the successfulness of burglary occurrence varied depending on the day of week, resulting in lower success during the weekends. Contradictory to statistical findings from the 1998 BCS, data from the 2007 UCR Report indicated that residential burglaries occurred more often during the daytime, resulting in 63.6% of the total reported burglaries.

Regardless of the time of day or day of week for the occurrence of a residential burglary, burglars often concern themselves with similar things, including “being seen or heard while carrying out a break-in, and whether it is easy to access and depart from targeted dwellings” (DeFrances, 1993, p. 180). Therefore, it is important for residential structures to limit the opportunities that allow perpetrators to commit such acts. Theorists have identified the need to limit these opportunities, thus creating basic theories focusing on the built environment and the prevention of criminal activity.

### **Basic Theories about the Built Environment and Crime**

Numerous researchers, including Jacobs (1961), Jeffery (1977), and Newman (1972), have studied the relationships between crime and the built environment for over 40 years. Research tends to confirm a direct link between built environment characteristics and crime, or fear of crime. Generally, physical environment features influence human behavior, suggesting specifically that criminal behavior can also be influenced by physical environmental attributes. To commit a crime, Stollard argues that perpetrators need basic elements including the ability, the opportunity, and a motive. “The provision of building security through design... (seeks to)

eliminate or reduce the intruder's ability and opportunity to commit a crime" (Stollard, 1991, p. 7). Attempting to reduce crime, place-based crime prevention theories have been developed, suggesting measures for intervention or prevention.

Multiple disciplines have converged to develop a classical core of four interrelated place-based crime prevention techniques, including defensible space, crime prevention through environmental design (CPTED), situational crime prevention, and environmental criminology. The theories contain jointly shared concepts, allowing planners and other agencies to create a cooperative-application comprised of multiple theories. Every environment differs based on numerous factors, requiring the application of each theory's strategies to be context-sensitive, tailored to local physical, socio-economic, legal, political, and cultural needs (Schneider & Kitchen, 2007). To ensure context-sensitive application, a combination of theories is typically applied.

### **Defensible Space**

In the 1960s and '70s, Oscar Newman developed the defensible space theory, a defining place-based crime prevention practice. After observing crime within public housing developments, Newman hypothesized that project size and building height were factors contributing to elevated crime rates. He was intrigued by the correlation between crime rates and differently designed low-income projects sited directly adjacent to other large low-income projects.

He suggested that territorial control, boundary marking, and surveillability features could be designed within the built environment as a means to prevent or minimize criminal incidents. Ideally, intruders should be easily identifiable by residents in controlled spaces, decreasing the opportunity for users to become vulnerable to victimization. Territoriality, natural surveillance,

image, and milieu are the fundamental principles of Newman's theory, intended to identify intruders.

**Territoriality.** Territoriality is defined as the “capacity of the physical environment to create perceived zones of territorial influence” (Newman, 1972, p. 78). Territorial zones influence design and subdivide property, for the purpose of allowing residents to feel a sense of ownership of their space. Territorially sensitive designs can encourage a tenant to defend adjacent outdoor spaces by subdividing and identifying the physical space on their own (Yang, 2006).

Newman also suggests that boundaries should be clearly defined to all users, ensuring delineation between public and private uses through the use of access control mechanisms, such as fencing, shrubbery or guards. When incorporated into the design, access control mechanisms facilitate territorial impulses and behavior by impeding the actions of outsiders ('strangers'). When territories are properly delineated, residents can begin to identify illegitimate users of the space because the residents are able to naturally surveil the area.

**Natural Surveillance.** Although a controversial component, natural surveillance is the second key principle in Newman's defensible space. A study by Bennett and Wright (1984) identified surveillability and occupancy to be the most influential variables that burglary offenders considered in target selection. Defined as “the capacity of physical design to provide surveillance opportunities for residents and their agents” (Newman, 1972, p. 78), it suggests that objects of the built environment should not impede on a person's ability to observe the space. It does not imply or guarantee assistance by a witness to the victimized or reporting by the witness to law enforcement agencies. However, it does allow the resident the opportunity to question and

report the actions of the intruder. Through the placement of windows and entrances, interior and exterior spaces should be visible to rightful users.

**Image and Milieu.** Image and milieu are defined as “the capacity of design to influence the perception of a project’s uniqueness, isolation, and stigma” (Newman, 1972, p. 102). Crowe (2000, p. 54) says that public housing “communities are victims of community attitudes” that can lead to their social unacceptability. Schneider and Kitchen (2002) state that more recent planning and development in America attempts to implement sensitive designs, with the intention of alleviating the stigma of public housing. The application of defensible space should focus on the importance of appearances, ultimately affecting the stigma associated with public housing developments. Additionally, to promote safety between neighboring spaces, necessary consideration of the juxtaposition of land uses must be observed.

Image and milieu foreshadowed the development of the Broken Windows Theory, which explains the relationship between crime and community order and disorder. The theory suggests that large amounts of criminal activity tend to bring about multitudes of small, discourteous acts of criminal mischief, suggesting a lack of concern by the community, resulting in continued disarray. Yang (2006, p. 28) suggests that “neglect of the first attack on a building or person may imply to an offender that no one cares and that the attacks can continue with impunity,” often resulting in re-victimization. After victimization occurs, it is important for the user of the space to rehabilitate their space in order to minimize the opportunity for repeat occurrences.

**Access Control and Boundary Definition.** Presently, defensible space also considers access control and boundary definition as supporting factors in defensible space theory. Brown and Altman (1981, quoted in Schneider & Kitchen, 2002, p. 97) suggest that “territory is a boundary regulating mechanism facilitating the protection of privacy...through a variety of

access control mechanisms.” Boundary definition, or clearly delineating spaces in an attempt for people to decipher public and private use of a space, aids the territoriality principle of Newman’s theory. Through the use of security guards, gates, key cards, landscaping, and other necessary access control devices, a space can obstruct the movements of intruders, thereby disclosing their presence to any nearby residents (Yang, 2006).

Environmental cues are important in all of the fundamental principles of defensible space. Landscaping can contribute to defining the territoriality of a space, ensure proper natural surveillance, create a positive and attractive image, and create boundary definitions thereby creating particular areas with access control. Outdoor lighting is also important to the fundamental principles of defensible space because it also provides an opportunity for both natural and electronic surveillance to occur and attempts to portray a nice image for the space.

**Defensible Space and Public Housing.** Focusing specifically on the built environment and crime, Newman made a comparison between adjacent housing projects, Pruitt-Igoe and Carr Square Village, with older neighborhoods in St. Louis, Missouri in the 1960s. Resident profiles were the only common factor between the two developments. Building designs, the occurrence of crime, and occupancy rates of the developments varied dramatically between them.

Based on Le Corbusier’s principles of design, Pruitt-Igoe was intended to be an ideal public housing community for low-income families. However, numerous problems plagued the development from the beginning, including high rates of crime, segregation, and extreme poverty. The occupancy rate never rose above 60% within the 2870 unit high-rise public housing development, resulting in the sudden decay of the project, and ultimately in its deconstruction less than 20 years later (Newman, 1997).

Carr Square Village, a smaller-scaled row-house community, effectively created connections between its occupants. Newman observed Carr Square Village as a fully occupied development, where residents had small yards that they identified as their personal space, and routinely maintained. The development effectively displayed Newman's belief that proper design encouraged personal control and responsibility for space. Carr Square Village was a defensible space, occupied by "legitimate users" who cared to defend their space (Schneider & Kitchen, 2002). Defensible space theory has been implemented successfully in public housing designs and by policy makers, and consequently has been applied in numerous settings, including Dayton, Ohio, Yonkers and the South Bronx, New York, and throughout the United Kingdom (Schneider and Kitchen, 2007).

### **Crime Prevention through Environmental Design**

Evolving at the same time as Newman's defensible space, and significantly revised several years later to be similar in adaptation to Newman's theory, C. Ray Jeffrey's broad-based crime prevention through environmental design (CPTED) is defined as "the proper design and effective use of the built environment that can lead to a reduction in the fear and incidence of crime and an improvement in the quality of life" (NICP, n.d.). Jeffery's initial CPTED model made the assumption that:

The response [i.e., behavioral adaptation] of the individual organism to the physical environment is a product of the brain; the brain in turn is a product of genetics and the environment. The environment never influences behavior directly, but only through the brain. Any model of crime prevention must include both the brain and the physical environment. (Jeffery & Zahm 1993, p. 330)

As Jeffrey and Zahm (1993) discussed, the CPTED model is concerned with two critical elements: the physical environment and the individual organism. Based on reward and punishment stimulations, the theory aims to identify "conditions of the physical and social

environment that provide opportunities for or precipitate criminal acts...and the alteration of those conditions so that no crimes occur..." (Brantingham & Faust, 1976, p. 290). While originally almost a duplication of the defining principles of Newman's theory, Crowe (1997) has evolved the theory, now identifying nine key strategies to CPTED. Even through the evolution of the theory, the core principles continue to be natural surveillance, access control, territorial reinforcement, and proper placement of land uses. Table 2-1 compares Newman's defensible space with Crowe's CPTED strategies, derived from Jeffrey's defining principles of CPTED.

"It is clear that some CPTED applications work sometimes in some locations relative to some specific crimes" (Schneider & Kitchen, 2007, pg. 26). Because communities differ based on diverse social, economic, demographic, and physical factors, CPTED should not be considered as a "one size fits all" solution. It is not an exact science; hence a set checklist should not be used to survey every community. CPTED is rather a set of guidelines, constantly evolving based on the community in question.

**Environmental Factors contributing to Residential Burglary.** As previously discussed, CPTED attempts to minimize crime and the fear of crime by focusing on the physical environment. Brantingham (1978) suggested that the physical environment is able to emit cues or signals to users of a space regarding its physical, spatial, cultural, legal, and psychological characteristics. Through his research, Pascoe (1999, as quoted in Gamman & Pascoe, 2004) developed two models about burglary, a qualitative and quantitative model. Findings from Pascoe's qualitative model suggested criminals utilize environmental cues as "clues in their decision process when selecting targets" (Gamman & Pascoe, 2004, p. 10). These cues, both built and natural, have the ability to change the response of a potential offender on a target within a space by informing both the offender and victim of the possibility of observation. In the case of

burglary, such cues can include the perception of an easy entry or the risk of being visibly detected (Schneider & Kitchen, 2007). Research shows that numerous environmental cues, or risk factors, contribute to the frequency of residential burglary occurrence, including social, economic, demographic, biological, psychological, and physical factors.

As previously stated, considerable amounts of completed research have indicated a correlation between environmental variables and crime rates. For example, Brantingham and Brantingham (1975, p. 274) state that “knowledge of crime patterning permits the architect to abate some crime problems through building design and suggest the possibility of general urban crime control planning,” bearing directly on Oscar Newman’s research findings. DeFrances and Titus (1993) further concluded that criminals reduce their risk and increase their payoff based mainly on environmental features. Studies completed by Bennett and Wright (1984) contradicted the above-mentioned findings, stating that there was “no clear connection between the physical environment and rates of burglary” (as quoted in Stollard, 1991, p. 7).

The study conducted by Bennett and Wright (1994), did conclude that individual environmental cues, particularly surveillability, traces of occupancy, and symbolic barriers, contribute to the potential for an offender to commit a criminal act. For example, potential offenders determine the probability of occupancy based upon the presence of vehicles in the driveway or garage, or whether the gate to the fence is left open.

Nee and Taylor (1988) discuss four broad physical environmental cue categories: layout cues, wealth cues, occupancy cues, and security cues. They argue that environmental cues are comprised of the layout of the property (i.e. location of larger plants, pathways, and structures). Wealth Cues refer to the expensive or luxurious and attractive décor of a community or property. Occupancy cues refer to the appearance that the community or property is currently being

inhabited. Elements such as closed blinds, an overgrown lawn, a lack of vehicular presence, or a stack of unmoved newspapers situated in the driveway are all examples of environmental cues potentially indicating that the residence is presently uninhabited, and therefore more. Security cues can also be environmental cues by notifying the offender of security measures in place to ensure the protection of the residence, however the perceived benefit can be interpreted completely different by the resident and offender. For example, a resident may perceive an “alarmed house” sign as a security cue, warning offenders of the risk associated with targeting that particular residence. However, offenders might perceive the sign as an indicator that the residence contains something of value worth protecting, resulting in the perception of a better reward for the risk.

Other studies conducted by Byrne and Sampson (1986) concluded that variables, including poverty, ethnicity, age, composition, income, education, gender, and residency, directly contribute to the occurrence of criminal activity, as previously mentioned. Environmental criminologists also argue that the physical environment directly affects the occurrence of criminal activity. Specifically, land uses, lighting, and the design of landscape and space modify crime patterns “without doing significant damage to basic human rights” (Brantingham & Brantingham, 1981, p. 4). Further studies conducted by Macdonald and Gifford (1989) and Brown and Bentley (1993) suggest, cue combinations, rather than individual environmental cues, have more of an effect on the offender’s perception of risk.

**Prospect and Refuge Theory.** “People scan their environments in search of signals to danger [known as environmental cues], and once a danger is sighted, they attempt to escape the threat” (Fisher & Nasar, 1992, p. 36). When designers employ the basic theories of crime prevention and the built environment within the site design, the dangers are potentially

minimized. In an attempt to minimize those dangers and aid in survival from hazards, users of a space often prefer the environment, built and natural, to provide an open view and to provide protection, which is also referred to as prospect and refuge (Appleton, 1975). The promotion of observation and protection through site design ensures that users are given these important opportunities. Consequently, designers of a space must be careful not to cater to intruders, who more than often, find places that offer prospect and refuge more favorable.

Fisher and Nasar (1992, p. 37) discussed children stealing candy from a shop as an example of prospect and refuge. They say that children will “use a path to keep out of view of the merchant and the mirrors, and they seek a location where they can see (or hear) if someone is about to approach. When this safety is established, they grab the candy and exit.” Spaces that minimize “blind spots” or “lurk lines” by reducing alcoves and dense shrubbery would all be important to legitimate users of the space because offenders can use these elements as a way to observe and hear without themselves being observed.

Expanding on a study completed by Brantingham and Brantingham (1981), we hypothesize that a combination of cues, including lighting and landscape factors, have the ability to adequately modify a space to promote surveillability and protection, thereby discouraging the occurrence of residential burglaries and minimizing the dangers discussed by Appleton (1975), and Fisher and Nasar (1992). And to reiterate, we suggest that the installation, location and maintenance of lighting and landscape, or lack thereof, aid in the perception of risk, resulting in opportunities for the occurrence by a possible offender. Through the placement of these cues, the total occurrence rate of residential burglaries can potentially decrease.

**Lighting.** Numerous studies and evaluations examining the effects of lighting on criminal activity have been conducted throughout the United States and United Kingdom by researchers,

including Fleming and Burrows (1986), Painter (1994), Atkins (1991), Ramsay and Newton (1991), and Pease (1999), finding the mixed results of relationships between lighting and criminal activity, as seen in Table 2-2 – Table 2-5. HORS251, a study completed by Farrington and Welsh (2002b) reviewed the relationship between the installation of improved street lighting and levels of crime, based on assumptions listed in Table 2-6. While it does not directly affect the occurrence of criminal activity, improved lighting, even in daylight, can reduce crime by increasing the possibility for surveillance, thereby altering the “perceptions, attitudes, and behavior of residents and potential offenders” (Farrington & Welsh, 2002, p. 3).

Four of the American evaluation studies conducted by Farrington and Welsh (2002) resulted in a 7% reduction of crime when street lighting was improved, while the other four resulted in no effect. Increasingly supportive evidence from five British evaluation studies conducted more recently found that crime was reduced by 30% with the implementation of improved street lighting. Also, financial costs of crime were significantly reduced, making the improvement of street lighting a worthy and reasonable way to increase security in areas by increasing the possibility for nighttime surveillance.

Based on findings supporting the connection between lighting and crime prevention, some city governments and police departments have successfully implemented and enforced ordinances that promote opportunities for surveillance. Many governments and policing officials have been educated on the research linking lighting and crime prevention, and thus have attempted to initiate defining principles and ordinances in attempts to minimize criminal activity. According to the Tempe Police Department (n.d.), the most effective deterrent to criminal activity is to install proper lighting and ensure that it is used to its fullest potential. Therefore, the Tempe P.D. (n.d.) addresses interior and exterior lighting for home security, saying that exterior

lighting should be installed “near doors and in the rear of the house, where intruders do most of their work. All sides of [a] home should be protected by security lighting that is located high out of reach, and is vandal resistant.” Eatontown, New Jersey created an outdoor lighting ordinance guide that explains the importance of creating specific lighting ordinances and discusses specification recommendations for their outdoor lighting system. In January 2009, Dallas County proposed an amendment to their governing ordinances for selected apartment complexes. They state that lighting must not only be provided, but it must operate and be routinely maintained so that facial feature recognition are distinguishable thirty-five feet away (Dallas County, 2009).

While researchers continue to argue the direct link between lighting and crime reduction, we feel that lighting, for the most part, is important to create a sense of comfort and safety and reduce fear. Lighting, when used properly and in the right setting, can be extremely beneficial to users of the space by increasing surveillability and minimizing the fear of crime. As a result, we hypothesize that residential burglary rates within the selected GHA public housing developments are reduced with not only the installation of improved street lighting, but also with proper planting materials and routine maintenance of the planted landscape. As described below, we would hope we could generalize our findings, and similar ideas can be implemented in settings with related contexts to our selected public housing developments, in an attempt to reduce the occurrence of residential burglaries; however we know that it may not be a reasonable aspiration given the sample size.

**Landscaping.** As mentioned earlier, we hypothesize that properly maintained landscaping can help to minimize the occurrence of residential burglaries in public housing developments. Several researchers have studied the relationship between landscaping and the incidence and fear of crime. The key issues with landscaping, according to Stollard (1991, p. 51), are to not detract

“from pedestrians’ visibility” or create “secluded areas for intruders to lurk.” While most individuals employ landscaping as a tool to beautify their space, creating a pleasant and attractive property, intruders and offenders have a completely different perception and interpretation of the environment. Plants and landscaping, if not routinely manicured and maintained properly, can become an incentive for intruders to commit burglaries by creating secluded spaces, not available to easy surveillance. By using proper types of plants and continuing maintenance on the landscape by trimming back trees and shrubs, visibility can be improved, and potentially reduce the opportunities for residential burglaries to occur.

Through the use and placement of proper landscaping and planting materials, a property can specify not only the uses for spaces, but also where foot traffic is permitted and not permitted, while also ensuring that concealment of intruders does not occur. Schneider and Kitchen (2002) also note that landscaping is a great means to create boundary definition and territorial markings. However, “the appropriate selection of plant materials is important within any scheme” (Stollard, 1991, p. 52). For example, short shrubbery and plants would be ideal to line a permitted footpath, while taller plants would not be ideal. Ensuring that taller plants are not situated adjacent to doorways and windows is another important example of utilizing proper planting material. If such taller plants are situated adjacent to these areas, surveillability becomes more difficult from the interior of the structure, enabling an intruder to occupy an exterior space without being detected by the resident.

The culmination of numerous studies relating crime and vegetation, dating as far back as 1285, have found that criminal acts are facilitated by vegetation due to the available opportunities for surveillance (Pluncknett, 1960, quoted in Kuo & Sullivan, 2001). Although the presence of vegetation is not required for burglaries to occur, it increases the fear that something

will occur and also enables concealment of an offender. Schroeder, Anderson, Talbot and Kaplan (1984, quoted in Kuo & Sullivan, 2001) found that people felt safest in open, mowed areas, and felt less safe and in danger in densely vegetated areas. Studies by Shaffer and Anderson (1985) determined that not only is there a link between vegetation and fear of crime, but that dense vegetation facilitates the occurrence of criminal activity by reducing the possibility for surveillance and ultimately allowing the offender to conceal themselves (Michael & Hull, 1994 quoted in Kuo & Sullivan, 2001). Table 2-8 lists some of the findings from research that have identified the relationship between landscaping and crime.

While most studies have examined the effects of dense vegetation promoting the occurrence and fear of criminal activity, Kuo and Sullivan (2001, p. 346) hypothesized that particular types of vegetation, such as grass and low shrubbery, have the ability to preserve visibility and opportunities for surveillance, thus inhibiting crime in poor inner-city neighborhoods by “increasing surveillance and mitigating some of the psychological precursors to violence.” Their study revealed a negative link between lower amounts of vegetation and higher levels of property crimes, finding fewer total crimes with increased amounts of greenscape, such as grass and trees with taller canopies, surrounding buildings. In comparison to buildings with low amounts of vegetation, buildings with medium amounts of vegetation resulted in 40% lower property crimes, and buildings with large amounts of vegetation resulted in 48% fewer property crimes. Previous studies have also analyzed the relationship between crime and the amount of vegetation; however the study conducted by Kuo & Sullivan (2001) further examined the link, suggesting a relationship between particular types and uses of vegetation as it relates to the occurrence of criminal activity.

Based on researchers' findings, cities across the United States and United Kingdom understand that landscaping can influence the occurrence of residential burglaries. Communities, including Tempe & Tucson, Arizona, Dallas, Texas and Orlando, Florida, have incorporated elements of landscaping safety, typically related to CPTED, within their governing ordinances. Orlando, Florida's current governing ordinances address landscaping and crime prevention within their ordinances, stating that, "all greens, plazas, parks and trails shall incorporate Crime Prevention Through Environmental Design (CPTED) concepts" (City of Orlando, Sec. 68.500d6). The residential landscaping ordinances further explain that:

Landscaping should not create blind spots or hiding spots, particularly between the driveway or street sidewalk and the primary entrance of a residential structure. Properly maintained landscaping should provide maximum viewing to and from the house. (City of Orlando, Sec. 68.503 b 7)

The Tempe Police Department's website addresses a diverse range of increasing community security by reducing opportunities for criminals. The landscaping section of the Tempe Police Department's website says that residents should:

Trim shrubbery and trees so doors and windows are visible to neighbors, and from the street. Trimmed landscaping should not provide concealment for criminals. If you have a second floor, prune trees so they can't help a thief climb in second floor windows. Place trellises where they can't be used as ladders to gain entry to the upper floors. (City of Tempe, n.d.)

They further discuss specific measurements for landscaping.

- Ground plants (shrubbery and bushes) within four (4) feet of any sidewalks, driveways, doors or gates, should be maintained at a height of not more than two (2) feet.
- Ground plants between four (4) and eight (8) feet of any sidewalks, driveways, doors, or grates, should be maintained at a height of not more than four (4) feet.
- Ground plants under windows should be maintained at a height that is below the window sill.

- Trees should be trimmed so that the lower branches are more than six (6) feet off the ground.
- Place large gauge gravel on the ground near windows. The noise caused by intruders walking on it can become a psychological deterrent.
- Plant spiny (thorny) plants along fences and under windows. Such plants will discourage... intruder[s]. (City of Tempe, n.d.)

A proposed amendment to Dallas Counties (2009) governing ordinances discussed both lighting and landscaping. The amended ordinance addressed landscaping within apartment complexes, requiring small plants may not be taller than three and one-half feet, tree canopies must be at least six feet above the ground, and all landscaping must be routinely maintained.

Landscaping is an environmental cue that has a role in the perpetrator's decision of the impending risk and rewards associated with the particular residence. Ultimately, based on various conducted studies of research, including the study conducted by Kuo and Sullivan (2001), and our understanding of the need for crime-reducing techniques employed in community governing ordinances, we feel that installing context-sensitive landscaping materials and performing routine landscaping maintenance is crucial to minimizing residential burglaries.

### **Situational Crime Prevention**

Similar to C. Ray Jeffrey and CPTED, Ronald V. Clarke's theory, situational crime prevention, arose from the study of juvenile offenders and is strongly influenced by defensible space and CPTED and is a modified model of routine activity and rational choice theories (Schneider & Kitchen, 2002). Situational crime prevention aims to "design safe settings... organize effective procedures... and develop safe products" (Felson, 2002, pp. 144-145), resulting in eliminating the opportunities for criminal activity to occur. Unlike the previous place-based crime prevention theories, situational crime prevention incorporates management and use issues, along with the physical environment issue.

The defining principles of the place and crime specific theory are the availability of opportunity, and the reduction, modification, or redirection of temptation through strategic planning methods. Clarke suggests that risk, effort, reward, provocation, and shame and guilt are all primary factors leading to a given opportunity (Schneider & Kitchen, 2007, p. 27).

Supplemental elements to situational crime prevention, the rational choice theory and routine activity theory shape the situational crime prevention theory, and provide a theory that attempts to understand how offenders select targets. Clarke and Felson (1993, as quoted in Lilly, Cullen, & Ball, 2007, p. 271) determine that “though differing in scope and purpose” rational choice theory and routine activity theory “are compatible, and indeed, mutually supportive” as evident in the Table 2-7.

**Rational Choice Theory.** Rational choice theory, a necessary supporting theory to situational crime prevention that was modified and expanded by Clarke, proposes that “relationships between concepts are expressed not in mathematical terms but in the form of ‘decision’ diagrams” (Clarke & Felson, 1993, quoted in Yang, 2006, p. 16).

Rational choice theory focuses primarily on eliminating opportunities for crime. Schneider and Kitchen (2002) hypothesize that criminals make decisions based on expenditure of effort, risk factors, and expected rewards.

Situational crime prevention and rational choice...suggest that offenders make considered decisions to commit crime in specific situations based upon the perceived expenditure of effort, balanced by risk factors and expected reward. Environmental (or situational) elements that increase risks and energy, and diminished rewards reduce crime rewards, hence the opportunity, in those circumstances. (Schneider and Kitchen, 2002, p. 106)

Four main elements, including an articulated theoretical framework, a standard methodology, opportunity-reducing techniques, and a body of evaluated practice (Clarke, 1997; Yang, 2006) are employed in attempts to reduce and eliminate the opportunities for crime. Costs

and benefits are compared, consequently enabling the potential offender to make rational decisions as to how they should react. Ultimately, opportunity and rewards within the environment, or environmental cues, along with the values, beliefs, or socialization of the potential offender, are fundamental points within the occurrence of a crime, particularly how the potential offender decides to react to the opportunity. Opportunity-reducing techniques become key factors in determining the availability for criminal opportunity to exist. Consequently, supported by the literature, we suggest that the use of both simple techniques, such as target hardening, and more sophisticated techniques of deterring crime, are both important methods utilized in an attempt to reduce or prevent criminal activity, specifically residential burglary.

Situational crime prevention, originally formulated as seven components including: target hardening, target removal, removing the means to crime, reducing crime payoff, natural surveillance, surveillance by employees and environmental management, has evolved into Figure 2-1, showing the twenty-five techniques of situational crime prevention, which derived from Clarke's (1997) sixteen opportunity-reducing techniques. Lighting, one of the environmental cues we chose to evaluate based on crime prevention, is an example of an opportunity-reducing technique. Lighting becomes important to both legitimate and illegitimate inhabitants of a space by illuminating the space, which makes legitimate users have a lessened fear of crime and illegitimate users have a higher fear of being observed by others. Landscaping also becomes important to reducing criminal activity, as the evidence demonstrates. Designers must ensure that landscaping is used properly to delineate pathways and beautify, however it must be used carefully, with an eye towards maintenance, as to not create opportunistic environments for offenders.

**Routine Activity Theory.** Routine activity theory focuses on “any recurrent and prevalent activities which provide for basic population and individual needs” (Cohen & Felson, 1979, p. 593). It assumes that uniting time, space, and three elements: a motivated offender, a suitable target, and the absence of a capable guardian against crime, can influence crime rates. Police officers, security guards, and citizens can all act as guardians in an attempt to discourage the occurrence of crime by protecting targets.

Felson and Clarke (1998) identify value, inertia, visibility, and access (or VIVA) as the main elements contributing to the offender’s viewpoint to commit a criminal attack on a target. Offenders must value the target, which must be visible to the offender and capable of transport. However, if the offender is not able to make contact with the target, or particular environmental or situational factors impede on the ability to obtain the target, then a criminal act will not occur.

The theory effectively explains some of the increase of residential burglaries within the United States and Western Europe during the 1960’s and 70’s, and allows us to understand the importance of environmental cues as related to criminal opportunities. For example, one explanation for the higher occurrences in burglaries is that women began working full-time outside of the house. There were less people (or guardians) at home to protect potential targets from offenders. Concurrently, suitable targets for burglary increased as families invested in electronic goods, such as small televisions. Several studies suggest a correlation between daily activities and likelihood of victimization. Low levels of activity outside of the residence, both during daytime and nighttime, decrease the risk for victimization (Miethe, Stafford, & Long, 1987). Subsequently, “as people spend more time among strangers and away from their own homes, their risk of personal and property victimization rises” (Felson & Clarke, 1998).

The routine activity theory is one foundation to designing for crime prevention. Conditions can alter the opportunities for crime to occur; and if particular conditions are removed, the theory argues that the offences can be prevented altogether. Essentially, crime will not occur if either, the offender, the target, or the guardian is removed from the equation. For example, conveyance burglaries can be minimized if the driver chooses to remove all items that may be valuable to an offender from direct visibility.

### **Environmental Criminology**

Developed by Paul and Patricia Brantingham, environmental criminology, although having primarily a geographic focus, is largely based on both CPTED and defensible space principles. Environmental criminology and situational crime prevention are similar and are explained through the supplemental theories of rational choice and routine activity theories. Brantingham and Brantingham (1981) differentiate between these two approaches by stating that:

A robbery committed by a minority youth one block from his home in the ghetto and a burglary committed by a middle-class white youth one block from home in the suburbs might be treated as unrelated by the sociological imagination, but as identical (one block from home, at noon) by the geographical imagination ( Brantingham & Brantingham, 1982, p. 21).

Also known as pattern theory, environmental criminology focuses on exposing patterns of criminal and victimization occurrences. According to the theory, five things are needed for crimes to happen: a law, an offender, a victim (or target), at a time and place (Brantingham & Brantingham, 1981). Focusing on the geographical elements of crime, environmental criminology has prompted crime mapping and analysis with the assistance of Geographic Information Systems (GIS).

As previously discussed, researchers have determined a direct correlation between environmental variables and rates of criminal activity within a community. Theorists have developed defining place-based crime prevention theories to assist with the reduction of criminal

activity. Communities are able to employ context-sensitive applications of the theories by overlapping principle elements within each specific theory.

### **The Application of Geographic Information Systems in Crime Analysis**

The development of Geographic Information Systems (GIS) has provided a method to link data and spatial analysis. Relative to crime, GIS can be used to analyze and compare crime patterns across spatial dimensions. Law enforcement agencies (LEA) from the United States and the United Kingdom have incorporated GIS-based crime mapping and crime forecasting within their departments in an effort to illustrate crime patterns and trends. Relative to forecasting and analyzing crime, GIS can be used at all points of the process, manipulating data in the beginning, analyzing data, and displaying graphical representation at any point of the process (Groff & La Vigne, 2002). GIS has allowed crime analysts not only to graphically represent crime problems, but also organize, and manipulate the crime type, location, forensic details, and police resources and responses. The visual representation through GIS has aided authorities by creating graphical images of large quantities and types of stored spatial data that have been aggregated by incident type, location, and time (Schneider & Kitchen, 2002; Bichler-Robertson & Johnson, 2001). Ultimately, crime mapping has been useful to law enforcement agencies by identifying “the extent of a crime problem” and targeting “resources to deal with the problem” (Doran & Lees, 2005, p. 10).

While utilized to analyze numerous subjects, law enforcement agencies employ GIS specifically to identify and highlight suspicious incidents and events, enhance the implementation of particular policing methodologies in order to reduce overall crime and disorder, and to provide tools and technique to capture series of crimes and forecast future crime occurrences (ESRI, 2008). According to Schneider and Kitchen (2002), police crime analysts utilize computerized crime mapping typically to identify crime series, sprees, hotspots, hot dots,

hot products, and hot targets; however crime hotspots and hot targets are the most important to our study, as seen in Table 2-9.

To understand the capabilities of crime analysts with the assistance of GIS-based crime mapping, we would like to share an example of law enforcement successfully utilizing the program, resulting in the forecast of the next patterned criminal occurrence. The implementation of GIS mapping within law enforcement agencies has aided in decreasing the percent of burglary occurrences. For example, law enforcement in Hartford, Connecticut has seen a decrease in burglaries as they have started creating weekly and 28-day burglary maps. By graphically representing the time of day and the day of week of burglary occurrences, the agency has been able to recognize trends and deploy resources, resulting in a 34% decrease of all burglaries within the city (Schwarz, n.d.). The Crime Analysis Unit at the Gainesville Police Department in Gainesville, Florida also employs crime mapping and forecasting within their policing.

Employing the information-led-policing technique, they provide crime-forecasting information to the patrol units on a daily basis. The crime analysts examine motives of incidences and take into consideration similarities with past occurrences, and release a “Crime Snapshot” to their officers, as a means of keeping the officers current on all incidences. The Crime Analysts provide information to officers based on the pattern of the past occurrences, and request increased patrol in the specified area where the analyst believes there is a good chance of another occurrence.<sup>2</sup>

### **Summary**

Individuals, as well as entire communities, can be dramatically affected by the occurrence of residential burglary. Over the past couple of years, property crimes have decreased, although

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<sup>2</sup> Based on personal observations and experiences.

residential burglaries have continued to occur. Theorists have developed place-based crime prevention theories to explain and minimize the occurrence of place-based crimes, such as residential burglary. Research has suggested a link between environmental cues, or “signs,” and burglary, specifically suggesting that multiple cues have more of an effect on the selected target by the offender. Specifically, lighting and landscaping have been suggested as key environmental factors, in the promotion or deterrence of the fear and incidence of criminal activity. Therefore, we hypothesize that the inclusion and maintenance of both lighting and landscape aid in the deterrence of residential burglary incidences. Specifically, we hypothesize that the proper siting, use, and maintenance of lighting and landscaping materials aid in the deterrence of residential burglaries within the selected GHA public housing developments.

This chapter provided an overview of the place-based theories associated with crime prevention and the physical environment, both built and natural. We began by discussing residential burglary and the effects on its victims. Secondly, we discussed defensible space, crime prevention through environmental design (CPTED), situational crime prevention, and environmental criminology, the place-based crime prevention theories. We explored how GIS became employed by law enforcement agencies as a geographic analysis tool, crucial to the study and evaluation of criminal acts. We also explored the idea that the installation, location, and routine maintenance of both lighting and landscape aid in the reduction of criminal activity, particularly residential burglary, by allowing surveillance to occur easily without obstruction.

Table 2-1. Comparison of Defensible Space Principles and CPTED Strategies

Defensible Space Principles (Newman)	CPTED Strategies (Crowe)
Territoriality boundary definition	Border definition of controlled space
Territoriality boundary definition access control	Clearly marked transitional zones
Surveillance access control	Attention directed to gathering area
Image and milieu: activity generation	Place safe activities in unsafe areas
Image and milieu: activity generation	Place unsafe activities in safe locations
Boundary definition access control	Reduce use conflicts with natural barriers
None	Better scheduling of space
Surveillance	Increase perception of natural surveillance in spaces by design
None	Overcome distance and isolation by communication.

Source: Schneider & Kitchen, 2002, p. 102

Table 2-2. Conclusions Relating Improved Street Lighting and Crime

Researcher	Conclusion
Painter (1994)	A decline of disorder and fear of crime while increasing pedestrian street use
Ramsay and Newton (1991)	Lighting alone has very little effect on crime
Atkins, Husain, & Storey (1991)	No effect of street lighting on crime
Pease (1999)	There is potential in reducing crime through improved street lighting
Painter & Tilly (1999, p. 48)	Inescapable conclusion that street lighting can help in crime control.

Source: Adopted from Farrington, 2002, p. 2

Table 2-3. How Improved Lighting Could Affect Crime

How Improved Lighting could REDUCE Crime	How Improved Lighting could INCREASE Crime
<p><b>In Darkness:</b></p> <ul style="list-style-type: none"> <li>• Improved lighting deters potential offenders by increasing the risk that they will be seen or recognized when committing crimes.</li> <li>• Police become more visible, thus leading to a decision to desist from crime.</li> <li>• If improved lighting leads to the arrest and imprisonment of repeat offenders, they can no longer commit crimes in the area.</li> <li>• New lighting can encourage residents to spend more time on their stoops or in their front yards in the evenings and thus increase informal surveillance.</li> <li>• Improved lighting can encourage more people to walk at night, which would increase informal surveillance.</li> </ul>	<p><b>In Darkness:</b></p> <ul style="list-style-type: none"> <li>• Increased social activity outside the home in the evenings can increase the number of unoccupied homes available for burglary.</li> <li>• Increased visibility of potential victims allows better assessment of their vulnerability and the value of what they carry. Offenders might more easily be able to see if parked cars contain valuable items.</li> <li>• Increase visibility allows better judgment of the proximity “capable guardians” who might intervene in crime.</li> <li>• Better lighting might facilitate activities like drug dealing and prostitution</li> <li>• Better lit streets might attract disorderly youths from nearby areas.</li> <li>• Improved lighting of rarely used footpaths might facilitate undesirable behavior</li> </ul>
<p><b>In Daylight:</b></p> <ul style="list-style-type: none"> <li>• New lighting shows that city government and the police are determined to control crime. As a result, potential offenders might no longer see the neighborhood as affording easy pickings. In addition, citizens might be motivated to pass on information about offenders.</li> <li>• Better lighting can increase community pride and cohesiveness, leading to a greater willingness to intervene in crime and to report it.</li> <li>• If offenders commit crime in both light and darkness, nighttime arrests and subsequent imprisonment would reduce both daytime and nighttime crime.</li> </ul>	<p><b>In Daylight:</b></p> <ul style="list-style-type: none"> <li>• Disorderly activities focused upon a newly illuminated area can spill over into the use of that place as a daylight meeting point.</li> </ul>

Source: Clarke, 2008, p. 6 – 7 (adopted from Pease 1999)

Table 2-4. Eight Street Lighting Evaluations in the United States

Study	City	Intervention Area	Increase in Lighting	Other Intervention	Outcome Measure	Follow-Up (Months)	Effect
Atlanta Regional Com. (1974)	Atlanta, GA	City center	4 times	None	Crime (robbery, assault, and burglary)	12	Desirable effect; no displacement
DIFL <sup>1</sup> (1974)	Milwaukee, WI	Residential and commercial area	7 times	None	Crime (property and person categories)	12	Desirable effect, some displacement
Inskip and Goff (1974)	Portland, OR	Residential neighborhood (high crime)	2 times	None	Crime (robbery, assault, and burglary)	6 or 11	Null effect, no displacement or diffusion
Wright et al. (1974)	Kansas City	Residential and commercial areas	No information	None	Crime (violent and property offenses)	12	Desirable effect (for violence); some displacement
Harrisburg P.D. (1976)	Harrisburg, PA	Residential neighborhood	No information	None	Crime (violent and property offenses)	12	Null effect; no displacement
Sternhell (1977)	New Orleans, LA	Residential and commercial areas	No information	None	Crime (burglary, vehicle theft, and assault)	29	Null effect, no displacement
Lewis and Sullivan (1979)	Fort Worth, TX	Residential neighborhood	3 times	None	Crime (total)	12	Desirable effect; possible displacement
Ouinet and Nunn (1998)	Indianapolis, IN	Residential neighborhood	No information	Police initiates	Calls for service (violent and property crime)	7 to 19	Null effect; no displacement

Source: Clarke, 2008, p. 12

<sup>1</sup> Department of Intergovernmental Fiscale Liaison

Table 2-5. Three Street Lighting Evaluations in the United Kingdom

Study	City	Intervention Area	Increase in Lighting	Other Intervention	Outcome Measure	Follow-Up (Months)	Effect
Shaftoe (1994)	Bristol	Residential neighborhood	2 times	None	Crime (total)	12	Desirable effect; diffusion and displacement not measured
Painter and Farrington	Dudley	Local authority housing estate	2 times	None	Crime (total and types of offenses)	12	Desirable effect; no displacement
Painter and Farrington (1999)	Stoke-on-Trent	Local authority housing estate	5 times	None	Crime (total and types of offenses)	12	Desirable effect; diffusion, no displacement

Source: Clarke, 2008, p. 13

Table 2-6. Causal Links between Street Lighting and Crime

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- Lighting may reduce crime by improving visibility. This deters potential offenders by increasing the risks that they will be recognized or interrupted in the course of their activities (Mayhew *et al.*, 1979). The presence of police and other authority Figures also becomes more visible.
  - Lighting improvements may encourage increased street usage, which intensifies natural surveillance. The change in routine activity patterns works to reduce crime because it increases the flow of potentially capable guardians (Cohen and Felson, 1979). From the potential offender's perspective, the proximity of other pedestrians acts as a deterrent since the risks of being recognized or interrupted when attacking personal or property targets are increased. From the potential victim's perspective, perceived risks and fear of crime are reduced.
  - Enhanced visibility and increased street usage may interact to heighten possibilities for informal surveillance. Pedestrian density and flow and surveillance have long been regarded as crucial for crime control since they can influence potential offenders' perceptions of the likely risks of being caught (Newman, 1972; Bennett and Wright, 1984).
  - The renovation of a highly noticeable component of the physical environment combined with changed social dynamics may act as a psychological deterrent. Potential offenders may judge that the image of the location is improving and that social control, order, and surveillance have increased (Taylor and Gottfredson, 1986). They may deduce that crime in the relit location is riskier than elsewhere and this can influence behavior in two ways. First, potential offenders living in the area will be deterred from committing offences or escalating their activities. Second, potential offenders from outside the area will be deterred from entering it (Wilson and Kelling, 1982). However, crimes may be displaced from the relit area to other places.
  - Lighting may improve community confidence. It provides a highly noticeable sign that local authorities are investing in the fabric of the area. This offsets any previous feelings of neglect and stimulates a general "feel good" factor. It may also encourage informal social control and interventions by residents to prevent crime and disorder. Fear of crime may be reduced.
  - Improved illumination may reduce fear of crime because it physically improves the environment and alters public perceptions of it. People sense that a well-lit environment is less dangerous than one that is dark (Warr, 1990). The positive image of the night-time environment in the relit area is shared by residents and pedestrians. As actual and perceived risks of victimization lessen, the area becomes used by a wider cross-section of the community. The changed social mix and activity patterns within the locality reduce the risk and fear of crime.
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Source: Farrington & Welsh, 2002, p. 3 - 4

Table 2-7. Routine Activity and Rational Choice; Comparing and Contrasting the Approaches

	Routine Activity	Rational Choice
Organizing perspective	Yes	Yes
Explanatory focus:		
Criminal event	Yes	Yes
Criminal dispositions	No	Yes
Level of explanation	Macro	Micro
Causal theory	Yes	No
Situational focus	Yes	Yes
Crime specific	Yes	Yes
Rational offender	Implicit	Explicit
Policy orientation	Implicit	Explicit
Disciplinary parentage	Geography, demography, human ecology	Psychology, economics, sociology of deviance, environmental criminology

Source: Clarke & Felson, 1993, quoted in Yang, 2006, p. 20

Table 2-8. Findings Relating Landscaping and Crime and Fear of Crime

Researcher	Conclusion
Schroeder & Anders (1984)	Individuals feel most vulnerable in densely forested areas and safest in open, mowed areas.
Talbot & Kaplan (1984)	Most preferred scenic photos were parks or neighborhood scenes with natural and built elements...trees were widely spaced throughout fairly open grassy areas with buildings visible in the background. Least preferred scenic photos were unmanaged areas with heavy vegetation and undergrowth, dense groupings of mostly dead trees, and dominated by weeds.
Shaffer & Anderson (1984)	"...vegetation may increase both perceptions of attractiveness and security if the vegetation is well-maintained and attractively landscaped. The presence of unmaintained, natural vegetation might have the opposite effect on security perceptions, particularly in isolated, rundown areas" (p. 320).
Nasar & Fisher (1993)	"... an increase in fear related to concealment for offenders, and blocked prospect and escape for victims" Policies to prevent these areas for concealment call for "trimmed vegetation, lighting of dark pathways, and lighting and cameras in parking lots" (pp. 202 – 203).
Fisher & Nasar (1992)	"Fear of crime is higher where vegetation blocks views" (as quoted in Kuo & Sullivan, 2001, p. 345).
Michael & Hull (1994)	
Michael, Hull, & Zahm (1999)	"Physical features – especially vegetation – play an important role in the offense by allowing criminals to unobtrusively observe victims for useful information" (p. 382). "...vegetation was neither necessary nor sufficient for a crime to take place" (as quoted in Kuo & Sullivan, 2001, p. 345).
Kuo & Sullivan (2001)	"... Dense vegetation provides potential cover for criminal activities, possibly increasing the likelihood of crime and certainly increasing the fear of crime. Large shrubs, underbrush, and dense woods all substantially diminish visibility and therefore are capable of supporting criminal activity" (p. 345).
Nasar (1982)	"In residential settings...higher levels of vegetation were associated with less fear of crime" (as quoted in Kuo & Sullivan, 2001, p. 348).
Brower, Dockett, & Taylor (1983)	"...properties appeared safer when trees and shrubs were included than when they were not" (as quoted in Kuo & Sullivan, 2001, p. 348).
Kuo, Bacaicoa, & Sullivan (1998b)	"...the presence and density of trees had clear, consistent, and substantial effects on residents' preference and sense of safety, tree placement had essentially no effect on preference and an inconsistent effect on sense of safety" (p. 48).

Source: Adopted from Schroeder & Anders (1984), Talbot & Kaplan, Shaffer & Anderson (1984), Nasar & Fisher (1993), Kuo, Bacaicoa, & Sullivan (1998a), Michael, Hull, & Zahm (1999), Kuo & Sullivan (2001), Nasar (1982), Brower, Dockett, & Taylor (1983), and Kuo, Bacaicoa, & Sullivan (1998b).

Table 2-9. Defining Criminal-Mapping Trends and Patterns

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<b>Crime Series</b>	Recurrence of similar crimes committed by one offender
<b>Crime Hotspots</b>	Small areas or specific locations in which an unusual amount of crime activity occurs that may be committed by one or more offenders
<b>Crime Hot Dots</b>	An individual associated with an unusual amount of criminal activity, either as an offender or a victim
<b>Hot Products</b>	Types of property that are the repeated target of crime
<b>Hot targets</b>	Particular types of target that are victimized but that are not confined to one geographic location

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Source: Schneider and Kitchen, 2002, p. 109

## TWENTY FIVE TECHNIQUES OF SITUATIONAL PREVENTION

Increase the Effort	Increase the Risks	Reduce the Rewards	Reduce Provocations	Remove Excuses
<b>Harden Targets</b> <ul style="list-style-type: none"> <li>Steering column locks and immobilizers</li> <li>Anti-robbery screens</li> <li>Tamper-proof packaging</li> </ul>	<b>Extend guardianship</b> <ul style="list-style-type: none"> <li>Take routine precautions: go out in group at night, leave signs of occupancy, carry phone</li> <li>"Cocoon" neighborhood watch</li> </ul>	<b>Conceal targets</b> <ul style="list-style-type: none"> <li>Off-street parking</li> <li>Gender-neutral phone directories</li> <li>Unmarked bullion trucks</li> </ul>	<b>Reduce frustrations and stress</b> <ul style="list-style-type: none"> <li>Efficient queues and polite service</li> <li>Expanded seating</li> <li>Soothing music/muted lights</li> </ul>	<b>Set rules</b> <ul style="list-style-type: none"> <li>Rental agreements</li> <li>Harassment codes</li> <li>Hotel registration</li> </ul>
<b>Control access to facilities</b> <ul style="list-style-type: none"> <li>Entry phones</li> <li>Electronic card access</li> <li>Baggage screening</li> </ul>	<b>Assist natural surveillance</b> <ul style="list-style-type: none"> <li>Improved street lighting</li> <li>Defensible space design</li> <li>Support whistleblowers</li> </ul>	<b>Remove targets</b> <ul style="list-style-type: none"> <li>Removable car radio</li> <li>Women's refuges</li> <li>Pre-paid cards for pay phones</li> </ul>	<b>Avoid disputes</b> <ul style="list-style-type: none"> <li>Separate enclosures for rival soccer fans</li> <li>Reduce crowding in pubs</li> <li>Fixed cab fares</li> </ul>	<b>Post instructions</b> <ul style="list-style-type: none"> <li>"No Parking"</li> <li>"Private Property"</li> <li>"Extinguish camp fires"</li> </ul>
<b>Screen exits</b> <ul style="list-style-type: none"> <li>Ticket needed for exit</li> <li>Export documents</li> <li>Electronic merchandise tags</li> </ul>	<b>Reduce anonymity</b> <ul style="list-style-type: none"> <li>Taxi driver IDs</li> <li>"How's my driving?" decals</li> <li>School uniforms</li> </ul>	<b>Identify property</b> <ul style="list-style-type: none"> <li>Property marking</li> <li>Vehicle licensing and parts marking</li> <li>Cattle branding</li> </ul>	<b>Reduce emotional arousal</b> <ul style="list-style-type: none"> <li>Controls on violent pornography</li> <li>Enforce good behavior on soccer field</li> <li>Prohibit racial slurs</li> </ul>	<b>Alert conscience</b> <ul style="list-style-type: none"> <li>Roadside speed display boards</li> <li>Signatures for customs declarations</li> <li>"Shoplifting is stealing"</li> </ul>
<b>Deflect offenders</b> <ul style="list-style-type: none"> <li>Street closures</li> <li>Separate bathrooms for women</li> <li>Disperse pubs</li> </ul>	<b>Utilize place managers</b> <ul style="list-style-type: none"> <li>CCTV for double-deck buses</li> <li>Two clerks for convenience stores</li> <li>Reward vigilance</li> </ul>	<b>Disrupt markets</b> <ul style="list-style-type: none"> <li>Monitor pawn shops</li> <li>Controls on classified ads</li> <li>License street vendors</li> </ul>	<b>Neutralize peer pressure</b> <ul style="list-style-type: none"> <li>"Idiots drink and drive"</li> <li>"It's OK to say No"</li> <li>Disperse troublemakers at school</li> </ul>	<b>Assist compliance</b> <ul style="list-style-type: none"> <li>Easy library checkout</li> <li>Public lavatories</li> <li>Litter bins</li> </ul>
<b>Control tools/weapons</b> <ul style="list-style-type: none"> <li>"Smart" guns</li> <li>Disabling stolen cell phones</li> <li>Restrict spray paint sales to juveniles</li> </ul>	<b>Strengthen formal surveillance</b> <ul style="list-style-type: none"> <li>Rat light cameras</li> <li>Burglar alarms</li> <li>Security guards</li> </ul>	<b>Deny benefits</b> <ul style="list-style-type: none"> <li>Ink merchandise tags</li> <li>Graffiti cleaning</li> <li>Speed humps</li> </ul>	<b>Discourage imitation</b> <ul style="list-style-type: none"> <li>Rapid repair of vandalism</li> <li>V-chips on TVs</li> <li>Censor details of music operetta</li> </ul>	<b>Control drugs and alcohol</b> <ul style="list-style-type: none"> <li>Breathalyzers in pubs</li> <li>Server intervention</li> <li>Alcohol-free events</li> </ul>

Figure 2-1. Twenty-five Techniques of Situational Prevention. [Adapted from Popcenter. Nd. Twenty-five Techniques of Situational Prevention. Retrieved October 2, 2009 from <http://www.popcenter.org/25techniques/>].

## CHAPTER 3 METHODOLOGY

### **Introduction**

This thesis uses case study methodology involving a review of data sets and informal, unstructured interviews to understand the relationship between occurrences of residential burglaries and lighting and landscaping environmental cues. Particularly, this research looks at the occurrence of residential burglaries within selected Gainesville Housing Authority (GHA) developments, to determine if lighting and/or landscape may have played any role within the occurrences of residential burglaries. To examine the occurrence of the residential burglaries in our study developments, we completed mapping exercises, conducted informal interviews and site visits, and reviewed documentation pertaining to our selected topic.

Case studies typically allow for an in-depth analysis of the topic in consideration. The methodology allows the researcher to form conclusions and develop recommendations for the future. According to Yin (1984, p. 19-20), case studies are “preferred in examining contemporary events, but when the relevant behaviors cannot be manipulated... The case study’s unique strength is its ability to deal with a full variety of evidence – documents, artifacts, interviews, and observations.” Our study involved researching the literature pertaining to the subject, and then selecting, developing, and analyzing the case study, through the collection of data, which includes data from the Gainesville, Florida Police Department (GPD), the Gainesville, Florida Housing Authority (GHA), and the Alachua County, Florida Property Appraiser, as well as historical documents pertaining to the lighting and landscaping of the selected sites. Our research also includes observations of the selected sites, examining the inclusion, location, and upkeep of our selected environmental cues.

The goal of this research is to better understand the occurrence of residential burglaries within our selected sites, and to understand the role that lighting and landscaping cues play within reported incidences.

### **Topic Selection**

Yang's (2006) dissertation intrigued the author, examining the idea of environmental cues, as they relate to residential burglary and repeat victimization. After further reading regarding residential burglaries, we understood that residential burglary is traditionally more problematic within public housing developments. After previously observing residential areas, specifically during nighttime hours, the author recognized that lighting has a large impact on the incidence and fear of crime, even during daylight hours.

During the author's informal conversations, Corporal Jaime Kurnick mentioned concern with the lack of substantial ordinances related to landscaping in the City of Gainesville's Code of Ordinance. Understanding that a landscaping ordinance would be extremely beneficial to GPD's ability to successfully patrol the city, we felt the necessity to examine how landscaping relates to (what would typically be) the more criminogenic areas of the city. Based on discussions with Dr. Schneider and Corporal Kurnick, as well as a review of the literature, we hypothesize that lighting and landscaping are key environmental cues or risk factors pertaining to residential burglaries. Any findings of their relationship, further recommendations to the commission, and recommendations for future research hopefully will be beneficial to the Gainesville Police Department, the City Commission, and the citizens of Gainesville, Florida.

After selection of our topic, our work began by focusing on archival data. In so doing, we gathered literature pertaining to place-based crime prevention techniques, focusing specifically how they alter the incidence of and fear of crime. Particularly, we focused on literature that suggested that environmental cues, which serve as risk factors to legitimate and illegitimate users

of a space, have a direct correlation to the occurrence of residential burglary. As we previously discussed, research suggests that lighting and landscaping are key environmental cues within an offender's selection to target residences. Therefore, we chose to evaluate how the implementation and maintenance of lighting and landscaping deter or promote the occurrence of residential burglaries.

Next, the author and a Crime Prevention Officer for GPD attended a meeting with the Deputy Executive Director of the Gainesville Housing Authority to discuss our interest in the topic as it relates to their properties. We discussed research goals for our analysis, findings, and further recommendations. During our meeting, we obtained documentation relating to the GHA and their properties.

### **Selection of Case Studies**

#### **Mapping the Study Areas**

We began the process of selecting our case study by gathering residential burglary data from the Gainesville Police Department's Records Management System (RMS). Through the department's "Tracking" map, a map synchronized daily to illustrate the reported incidences, we created a query that allowed us to select all residential burglaries, known as signal 21R's, that occurred between January 1, 2006 and December 31, 2008. Once the query was run, our GIS map displayed all of the residential burglaries that occurred within our selected time frame and within the jurisdiction of GPD. Employing GIS, our initial query of residential burglaries within our time frame resulted in approximately 3,312 reported residential burglary incidences, which is mapped in Figure 3-1.

Next, we determined the location of all of the GHA public housing properties by inserting the tax parcel shapefile layer for Alachua County, within our map, which was available through the Alachua County Property Appraiser's website. By searching the Alachua County Property

Appraiser’s website for parcels by owner name, we were able to determine the parcel identification numbers for all of the GHA properties. Searching by attributes within GIS, we extracted each GHA public housing development, identified by the parcel identification number or the physical address. A map of the extracted GHA parcels can be seen in Figure 3-2. We also created a point shapefile locating each GHA development, seen in Figure 4-3 in the Findings section.

### **Physical Address Verification**

According to Tables 3-1 and 3-2, which lists and describes all of the managed developments, select GHA developments share a physical address with individual unit numbers, while other housing developments are listed as the block ranges in which they span. For example, Pine Meadows has a physical address of 2626 East University Avenue and has individual unit numbers, while Caroline Manor has units with separate physical addresses that are all on SE 25<sup>th</sup> Terrace. Physically verifying the block range addresses was necessary to identify the address ranges and boundaries of the development<sup>1</sup>.

Select mapped residential burglaries did not geocode within individual parcels of the Alachua County parcel shapefile, rather they geocoded<sup>2</sup> within the roadway. Properly geocoding reported residential burglaries became challenging within the Seminary Lane development. To gain further knowledge of the exact location of the reported incidences, the author determined

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<sup>1</sup> The author visited properties managed by the Gainesville Housing Authority on September 6, 2009 to physically verify individual unit addresses. These developments included: Lake Terrace, Caroline Manor, Pine Meadows, and Forest Pines.

<sup>2</sup> “Geocoding is the process of assigning a location, usually in the form of coordinate values (points), to an address by comparing the descriptive location elements in the address to those present in the reference material.” (ESRI, 2008)

their locations by physically verifying the addresses within the developments in question<sup>3</sup>. After locating all of the properties, we determined that GHA manages a total of ten developments, which are visible in Figure 3.2, illustrated as parcels, and Figure 4-3, illustrated as points, in the Findings section.

Finally, we examined the reported incidences' proximity to all GHA developments, by overlaying all of our GIS layers. From this analysis, we selected our study areas and victimized units for our case study.

### **Selection of Case Reports**

Reported incidences of residential burglary were low within our time frame for the properties managed by the GHA, consisting of sixty-four reported incidences. As a result, we selected the two developments, our treatment sites, which not only had the highest number of reported incidences, but that also encountered repeat victimization. To select the study areas, we extracted the reported incidences for each development, creating ten different shapefiles, seen in Figure 3-3. We also examined the attribute table, finding the units that had more than one reported incident.

All of the developments had unique qualities, making the selection of study areas a difficult decision. For example, two properties managed by the GHA are high-rise structures; other properties are duplex and triplex units; and still other properties are single family units<sup>4</sup>. Each type of property has pros and cons when choosing to examine its relationship to burglary occurrences. While we believe it is important to observe residential burglaries within different

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<sup>3</sup> The author visited properties managed by the Gainesville Housing Authority on September 13, 2009 to physically verify the location of the reported incidence due to the reported incidences being geocoded within the roadway. These developments included: Woodland Park, Caroline Manor, Lake Terrace, and Pine Meadows.

<sup>4</sup> Property characteristics were derived from development description documents obtained from the Gainesville Housing Authority (GHA). Reference tables 3-1 and 3-2 to view the GHA documents.

types of properties, we understood that by examining the developments that experienced the highest number of reported incidences, we would have a greater chance for better understanding how landscaping and lighting serve as risk factors for offenders. While observing developments that are characteristically similar may skew our analysis, we felt that an analysis completed on a development experiencing minimal numbers of residential burglary would be uninformative to our study. Consequently, we selected Pine Meadows, located at 2626 East University Avenue, and Woodland Park, located at 1900 SE 4th Street, as our study areas.

Finally, in the process of selecting our two developments for the case study, we compared the amount of reported residential burglary occurrences within each identified GHA housing development. As previously mentioned, the developments had few reported incidences, with as little as one reported incidence within our three-year time frame and as many as nineteen reported incidences. Particular reported incidences appeared more domestic in nature<sup>5</sup>. As a result, the reports that appeared more domestic in nature were removed from the total incidences studied for each selected development chosen for observation to ensure an analysis of legitimate reported occurrences. Reports that omitted unit numbers were also removed from our selected case reports.

Within our selected study areas, there were originally a total of 31 reported incidences. We were responsible for examining a total of 19 residential burglaries after removing the “domestic” case reports. Victimized unit numbers were replaced with surrogate numbers to protect the identity of the victims. We also selected control sites. The first site was a Gainesville Housing Authority development that had low victimization rates to compare with our selected study

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<sup>5</sup> We defined these “domestic incidences” as incidences that occurred between acquaintances, lover’s quarrels, and instances where the offender used a misplaced key to enter the structure. These incidences often involved an individual that attempted to force their way into a unit during a dispute.

developments. While there were developments that experienced only one and three incidences for our selected time frame, the characteristics of the developments were much different than our study developments, as they both were high-rise apartment buildings. Therefore, we chose Caroline Manor, which experienced six reported residential burglaries, as a low-incident development to compare with our study areas. We followed the same identification process, using GIS, RMS data, and the Alachua County parcel shapefile, to identify all victimized units during our study time frame. We extracted the burglary incidences in GIS, and examined officer narratives with the intention of removing “domestic” cases. We removed cases that had unidentifiable unit numbers, and identified the points of entry for the three reported residential burglaries that we selected.

Furthermore, we selected a second control development to compare with our treatment sites. Based on information derived from a conversation held with Corporal Kurnick, the researcher identified Tree Trail Apartments to make comparisons with the victimized units of the selected GHA properties. Tree Trail Apartments is a notoriously low-income high-crime development located in the northeast section of Gainesville, Florida.

Reported incidences within our study and comparison developments were mapped, using GIS and an orthogonal image<sup>6</sup> layer, by creating a shapefile and inserting points for victimized units and points of entry, as seen in Figures included in the Findings section. Pine Meadows is included in Figures 4-6 and 4-7; Woodland Park is included in Figures 4-14 and 4-15; and Caroline Manor is included in Figures 4-25 and 4-26.

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<sup>6</sup> Orthogonal images are a type of satellite imagery that can be imported into GIS.

## **Development of Case Study**

### **Mapping Analysis**

We began developing our case study by re-examining our victimized units within our study areas. We analyzed our GIS map, looking at the estimated time of incidence (TOI) and day of incidence (DOI). We created a “day/evening” field within the attribute table that allowed us to understand whether incidences occurred during daylight or nighttime hours. During this process, we were able to examine the orthogonal image layer, thereby gaining some understanding of the location of victimized units in relation to the study site and surrounding greenscape.

We obtained a shapefile from the city’s Public Works department, detailing the positions of all light fixtures and poles. The shapefile’s attribute table listed the installation date for each fixture, the mounted height, and the direction that the arm is facing. This allowed us to determine the location of all city-managed lighting fixtures within our developments, and more specifically their proximity to our estimated points of entry. The direction that the arm is facing is also an important field within the shapefile because it allowed the researcher to determine the direction in which the light is oriented. Maps of lighting fixture locations within our selected developments can be reviewed in the Findings Section, Figures 4-9, 4-18, and 4-22.

### **Meetings & Informal Interviews with Key Informants**

Our case study included unstructured, informal interviews and meetings with key informants. Throughout the process of selecting and narrowing down our thesis topic and working directly with the Gainesville Police Department, we were able to gather significant information and details that we feel would not have been achieved through the formal interview process. We collected data available to the public during informal interviews with key informants. We attended several meetings with professionals knowledgeable of our the subject, including: Deputy Executive Director of the Gainesville Housing Authority, Supervisory

Corporal of the Crime Analysis Unit at the Gainesville Police Department, Crime Prevention Officer of the Gainesville Police Department, and the GIS Specialist for the city's Public Works Department. The informal interviews not only allowed the researcher to obtain documentation available to the public about the subject, it provided insight regarding the relationship between our selected environmental cues and the occurrence of residential burglary. Questions related to the state of the landscaping and lighting as they related to the historical occurrence of each residential burglary were mentioned, but not discussed thoroughly due to a lack of historical knowledge relating to the state of both cues at the time of reported incidents.

Discussions between the researcher and informants were completed in a professional manner, and the gathered information was documented. Subjects discussed within the informal conversations included: current city ordinances related to landscaping and lighting, the occurrence of residential burglary within the public housing developments, description of the selected housing developments, and the locations of all light fixtures, within our selected study and comparison areas, maintained by Gainesville Regional Utilities. Other key informants were identified through our informal discussions with selected professionals; however due to time restrictions, we did not have the ability to conduct interviews with all suggested informants. The informants we met with agreed to further contact, if needed to complete research.

The researcher entered each interview with an overall topic to guide the informal interview; however no questions were prepared prior to the meetings. Open-ended questions were developed based on the responses received from the informants. Results of all interview findings were analyzed and compared to the documentation received from each informant and other documents obtained during the research process.

## **Observation**

The researcher selected the Caroline Manor development to make comparisons with the Pine Meadows and Woodland Park developments, all of which are managed by the Gainesville Housing Authority, as study areas for the case study. See Figure 4-4 for a map of the selected developments' locations. Escorted by law enforcement, the researcher visited each selected public housing development during daytime and nighttime hours by automobile and foot, locating the point of entry for each selected case report and observing the current quality and proximity of landscaping and lighting as they relate to the possibility for surveillance.

When analyzing the possibility for surveillance, we were concerned with ability of observation from the point of entry, as well as, observing the point of entry from other locations. While we replaced the victimized unit numbers with surrogate numbers to protect the identity of the victims, the unit numbers remained within our reference material for locating units during our site visits. Points of entry were estimated based on the officer narratives in the case reports prior to site visits, visible signs of forced entry and signs of repair during site visits, and suggestions from the escorting law enforcement officer.

**Daytime Site Visit.** During the daytime site visits<sup>7</sup> to the selected developments, the researcher focused on analysis related specifically to landscaping, taking note of the possibility for observation and surveillance to occur. Employing GIS maps, the location of victimized units was identified. As previously mentioned, the majority of the points of entry were estimated from the officer narrative provided in the case report.

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<sup>7</sup> Daytime site visits to Pine Meadows and Woodland Park were conducted on September 18, 2009, approximately 11:00 am – 1:00 pm. The researcher conducted lighting and landscaping surveys in the numerical order of the unit numbers.

The researcher then conducted a physical landscaping survey, documenting the types of vegetation, height, density, and ability for surveillance of landscaping features located within close proximity, which we considered to be adjacent or up to thirty yards, of the victimized units and points of entry. Analysis was conducted, examining the potential relationship between the proximity and type of landscaping and our selected units' points of entry.

The research also observed lighting fixtures during daytime visits, taking note of the proximity of fixtures to the residential units and determining the current state of the fixtures. Figures 4-11, 4-20, and 4-28 in the Findings section depict the placement of each lighting fixture within our study developments. The researcher completed a lighting survey, documenting the lighting fixtures, including exterior porch lights, within close proximity of the victimized units' and points of entry. The researcher also documented the type of fixture, height of fixture, the direction the fixture was facing, the type of bulb and the type head of the fixture. While unable to gain an understanding of the lighting quality during the day, we were able to select specific locations to further measure the quality of lighting, for our evening visit, based on the proximity of the lighting fixture to the victimized units' points of entry.

**Evening Site Visit.** Evening site visits<sup>8</sup> to the selected developments and comparison development allowed the researcher to analyze lighting and landscaping, while specifically focusing on lighting cues. With the assistance of law enforcement and employing a light meter, the researcher observed, measured, and documented the amount of light emitted from select light fixtures in relation to the points of entry for the victimized units. Light measurements were also

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<sup>8</sup> Evening site visits to Pine Meadows, Woodland Park, and Caroline Manor were conducted on September 23, 2009, approximately 8:00 – 10:00 pm. The researcher conducted lighting and landscaping surveys in the numerical order of the unit numbers.

collected in select locations of the development, indicated in Figures 4-10, 4-19, and 4-23 in the Findings section.

The researcher also examined the landscaping during the evening site visits. While the researcher had some understanding of how landscaping might potentially interact with an offender's target selection and point of entry, visiting the sites in the darkness allowed the researcher and escorting law enforcement officer to visualize the potential ease or difficulty an offender would have when committing a burglary in the cover of darkness. The conducted physical lighting and landscaping surveys can be reviewed in the Findings section, Tables 4-1 through 4-6. Light meter readings were also taken underneath 6 light fixtures at each development. The readings occurred on different sides of the property to determine the difference in lighting levels throughout the developments.

Each site was photographed, concentrating most of the imagery on the lighting and landscaping within close proximity to the victimized units. Photos were also taken of the estimated points of entry within the selected victimized units. Select photographs were included in this document showing examples of upkeep to landscaping and lighting in proximity to the victimized units (whether minimal or acceptable to standards). Lack of lighting during evening visits in specific locations of the selected developments made it difficult to obtain images. Therefore, minimal evening site visit photographs are included as examples. Refer to the Figures in the Finding section to view examples of landscaping and lighting we observed during our site visits.

### **Review of Documents**

Several documents were identified and gathered for review and analysis after we completed the selection of our developments for our case study. Most of the documents pertained

to the location and layout of the developments. We also obtained information regarding policies strictly enforced within the developments. These documents include:

- City of Gainesville Code of Ordinances;
- Officer narratives for reported residential burglaries;
- Development name, locations, descriptions, and number of bedrooms managed by the Gainesville Housing Authority;
- Pine Meadows and Woodland Park Site Maps;
- Tax parcels within the city of Gainesville;
- City of Gainesville's 2000-2010 Future Land Use Map, including 12/05, 12/06, and 12/07 amendments; and
- An automotive policy drafted by the Gainesville Housing Authority

By reviewing the documents, the researcher was able to determine the state of each study development and the surrounding areas at the time of victimization. The researcher determined when lighting fixtures were installed, maintained, replaced, etc. More importantly, the researcher was able to determine the type of lighting fixtures being used within the selected public housing developments during our selected time frame.

The researcher was also able to determine the required standards of both cues, as mandated in the governing Code of Ordinances.

### **Analysis of Case Study**

The researcher reviewed the Code of Ordinances for the City of Gainesville to identify any lighting and landscaping ordinances that have been implemented, or were implemented at the time of incidence, attempting to minimize or alter the occurrence of any type of criminal activity.

The researcher also compared the selected “high-crime” study developments with Caroline Manor, a GHA development that experienced a lower incidence of crime during our selected time frame. Analysis of Caroline Manor, a development similar in characteristic, and a review of the physical surveys conducted at all selected developments allowed the researcher to gain an understanding of the occurrence of residential burglaries by identifying the differences in reported incidences, specifically in the role that lighting and landscaping might have played. To calculate the victimization rates for our developments, the researcher employed the 2000 US Census, estimating that the average household contains 2.25 individuals. To calculate the estimated population per each development, the average number of persons in a household was multiplied by the number of units in each development. Population per 100,000 persons was calculated by dividing the estimated population for each development by 100,000. Finally the residential burglary rates within our selected developments were calculated by subtracting the current number of incidences from the previous year’s number of incidences, dividing the answer by the estimated population per 100,000 persons.

Next, the researcher created a two-block buffer around the selected developments of study, using GIS and the orthogonal layer. The number of reported residential burglaries within the buffer area was compared to the overall occurrences within the housing developments. Using GIS, the researcher examined the locations of each reported residential burglary within the created buffer. The researcher also examined the land uses and demographic characteristics of the structures within the two-block buffer zone. Land uses within the created buffer were determined by examining the city’s 2000-2010 future land use map. By examining the land use maps, the researcher estimated the types of properties that surrounded the study areas. Existing land use maps effective between January 1, 2006 and December 31, 2008 were unavailable.

As previously mentioned the researcher conducted physical lighting and landscaping surveys during day and evening site visits. Analysis was completed on the conducted surveys by comparing the environmental cues within proximity of the points of entry within victimized units. The landscaping survey, as seen in Tables 4-4, 4-6, and 4-8, identified the type of landscaping<sup>9</sup>, height, density, distance to points of entry, and view obstruction. The lighting survey, as seen in Tables 4-5, 4-7, and 4-9, identified the number and types of lighting fixtures<sup>10</sup>, distance of light sources to the points of entry, mounted height of the fixtures, light measurement at 5' and ground level, type of bulbs, and type of fixture heads. Lighting also examined the cone of vision and coverage where applicable. We then analyzed the potential role that lighting and landscaping played in each incident, as it related to the estimated time and date of occurrence.

The researcher also reviewed the attribute table within the light fixtures and light supports shapefiles, obtained from the city's Public Works department, and compared it with the observed lighting fixtures within proximity of the victimized units' points of entry. Our intentions were to compare requested work orders for repair, replacement, and installation of lighting fixtures. We intended to locate work orders within the development and during the time frame of January 2006 to December 2008. Our intention was to compare the victimization dates with the requested work orders. However, we were unable to obtain such documentation. Therefore, we made the assumption that all lighting fixtures within proximity to the points of entry were in working condition, and measurable at the same readings we obtained during our site visits.

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<sup>9</sup> The type of landscaping examined included: plantings, automobiles, and non-structural walls near the residence entrances.

<sup>10</sup> The types of light fixtures examined included: street lights, and exterior house lights.

The researcher identified another low-income housing development within city limits that shared similar characteristics related to property size and number of units<sup>11</sup>. Rates of reported incidences were compared between the GHA properties and the low-income properties. Our intention for comparing Tree Trail with our study developments was to understand if the victimization rates were different between the different low-income housing developments.

### **Summary**

After reviewing and mapping the residential burglary data and determining the location of the ten public housing developments managed by the GHA, the researcher selected two developments managed by the Gainesville Housing Authority (GHA), as the treatments sites. Selection of the study and comparison developments was made after determining the developments with the highest and lowest<sup>13</sup> number of residential burglaries. GIS mapping analysis was completed, determining the proximity of residential burglaries within our selected developments to a surrounding two-block buffer area. The researcher also selected two control sites to examine the occurrence of residential burglaries, comparing them directly to our selected GHA study developments.

The researcher developed the case study through informal, unstructured interviews were conducted with several key informants, including law enforcement officials, directors of the GHA, and informants familiar with lighting work requests submitted during our time frame. Site visits were conducted, analyzing the current state in proximity to the victimized units within our selected housing developments. During site visits, we completed an analysis of the victimized

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<sup>11</sup> (Personal conversation with Cpl. Jaime Kurnick, Crime Analysis Unit, Gainesville Police Department, September 21, 2009)

<sup>13</sup> The two developments with the lowest amount of victimization, The 400 Building and Oak Park, were not selected as the comparison development due to the difference in unit type. Both study developments are single and duplex-family units. The 400 Building and Oak Park are high-rise apartment buildings.

units, taking note of proximity and maintenance of lighting and landscaping. Evening site visits were completed to gain an understanding of the quality of light at each point of entry. We also examined documentation regarding the types and locations of lighting fixtures within our high and low-incidence selected developments and compared the incidence of residential burglaries for our selected developments with the occurrence in other low-income housing developments.

Table 3-1. Gainesville Housing Authority Development Description A (1991)

# of Units	Description	Bedrooms					
		0	1	2	3	4	5
101	Oak Park, 100 N.E. 8 <sup>th</sup> Avenue Elderly Highrise, (Six Floors) Completed: May, 1970	60	40	1			
101	The 400, 400 N.W. 1 <sup>st</sup> Avenue Elderly Highrise, (Seven floors) Completed: February, 1979		101				
70	Sunshine Park, 1901 N.W. 2 <sup>nd</sup> Street Elderly Row Houses, (Single Story) Completed: May, 1971		70				
100	Lake Terrace, S.E. 26 <sup>th</sup> Terrace & Street Single and Duplex Family Units Completed: December, 1968		20	34	32	14	
<b>28</b>	<b>Caroline Manor, S.E. 25<sup>th</sup> Terrace Duplex Family Units Completed: April, 1970</b>			<b>28</b>			
<b>80</b>	<b>Pine Meadows, 2626 East University Avenue Single &amp; Duplex Family Units Completed: February, 1970</b>		<b>16</b>	<b>27</b>	<b>26</b>	<b>9</b>	<b>2</b>
<b>170</b>	<b>Woodland Park, 1900 S.E. 4<sup>th</sup> Street Single &amp; Duplex Family Units Completed: February, 1970</b>		<b>34</b>	<b>58</b>	<b>54</b>	<b>16</b>	<b>8</b>
36	Forest Pines, N.E. 25 <sup>th</sup> Street & Terrace. & N.E. 26 <sup>th</sup> Terrace. Single Family Units Acquired: March, 1971					4	32
53	Seminary Lane, 1019 N.W. 5 <sup>th</sup> Avenue Duplex & Triplex Townhouse Units Completed: March, 1979			40	13		
50	Eastwood Meadows, 925 S.E. 43 <sup>rd</sup> Street Single Family Units Completed: May, 1981				47	3	
853	Section 8 Existing Housing Rental Assistance						
	Certificates (432)	8	100	220	83	21	
	Vouchers (402)		45	347	10		
	MOD Rehab. (19)			19			
642	Total	68	426	774	265	67	42

Source: Gainesville Housing Authority, 1991

Table 3-2. Gainesville Housing Authority Development Description B (May 2009)<sup>15</sup>

Project	# of Units	Description	Bedrooms					
			0	1	2	3	4	5
63-30 003	100	Lake Terrace, S.E. 26 <sup>th</sup> Terrace & Street Single and Duplex Family Units Completed December, 1968		20	34	32	14	
<b>63-60 006</b>	<b>28</b>	<b>Caroline Manor, S.E. 25<sup>th</sup> Terrace Duplex Family Units Completed April, 1970</b>			<b>28</b>			
<b>63-13 001</b>	<b>80</b>	<b>Pine Meadows, 2626 East University Avenue Single &amp; Duplex Family Units Completed February, 1970</b>		<b>16</b>	<b>27</b>	<b>26</b>	<b>9</b>	<b>2</b>
<b>63-11 63-12 001</b>	<b>170</b>	<b>Woodland Park, 1900 S.E. 4<sup>th</sup> Street Single &amp; Duplex Family Units Completed February, 1970</b>		<b>34</b>	<b>58</b>	<b>54</b>	<b>16</b>	<b>8</b>
64-50 005	36	Forest Pines, N.E. 25 <sup>th</sup> Street & Terrace & N.E. 26 <sup>th</sup> Terrace Single Family Units Acquired March, 1971					4	32
63-70 007	50	Eastwood Meadows, 925 S.E. 43 <sup>rd</sup> Street Single Family Units Completed: May, 1981				47	3	
63-20 002	101	Oak Park, 100 N.E. 8 <sup>th</sup> Avenue Elderly Highrise, (Six Floors) Completed: May, 1970	60	40	1			
63-40 004	70	Sunshine Park, 1901 N.W. 2 <sup>nd</sup> Street Elderly Row Houses, (Single Story) Completed: May, 1971		70				
		<b>Section 8 Existing Housing Rental Assistance</b>						
	1277	Housing Choice Vouchers						
		<b>Section 8 New Construction</b> (Managed by GHA, owned by Gainesville Florida Housing Corporation, Inc.)						
64-40	50	The 400, 400 N.W. 1 <sup>st</sup> Avenue Elderly Highrise, (Seven floors) Completed: February, 1979		101				
2013 Total			60	281	148	159	46	42

Source: Gainesville Housing Authority, 2009

<sup>15</sup> Contact persons and information for development managers was omitted to protect their identity.

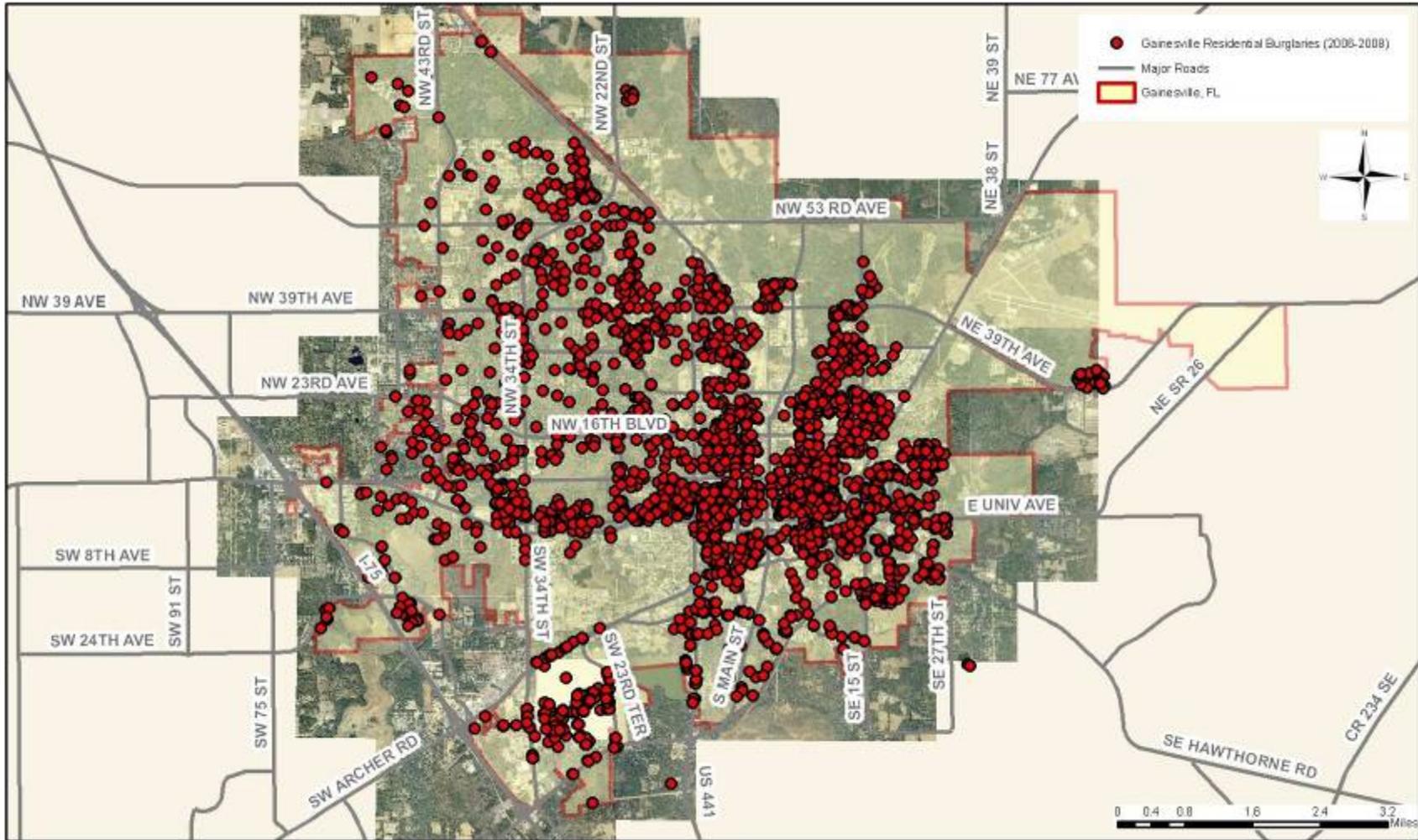


Figure 3-1. City-Wide Reported Residential Burglaries between 2006 and 2008.

Source: Florida Geographic (FGDL), and the Gainesville Police Department (GPD).

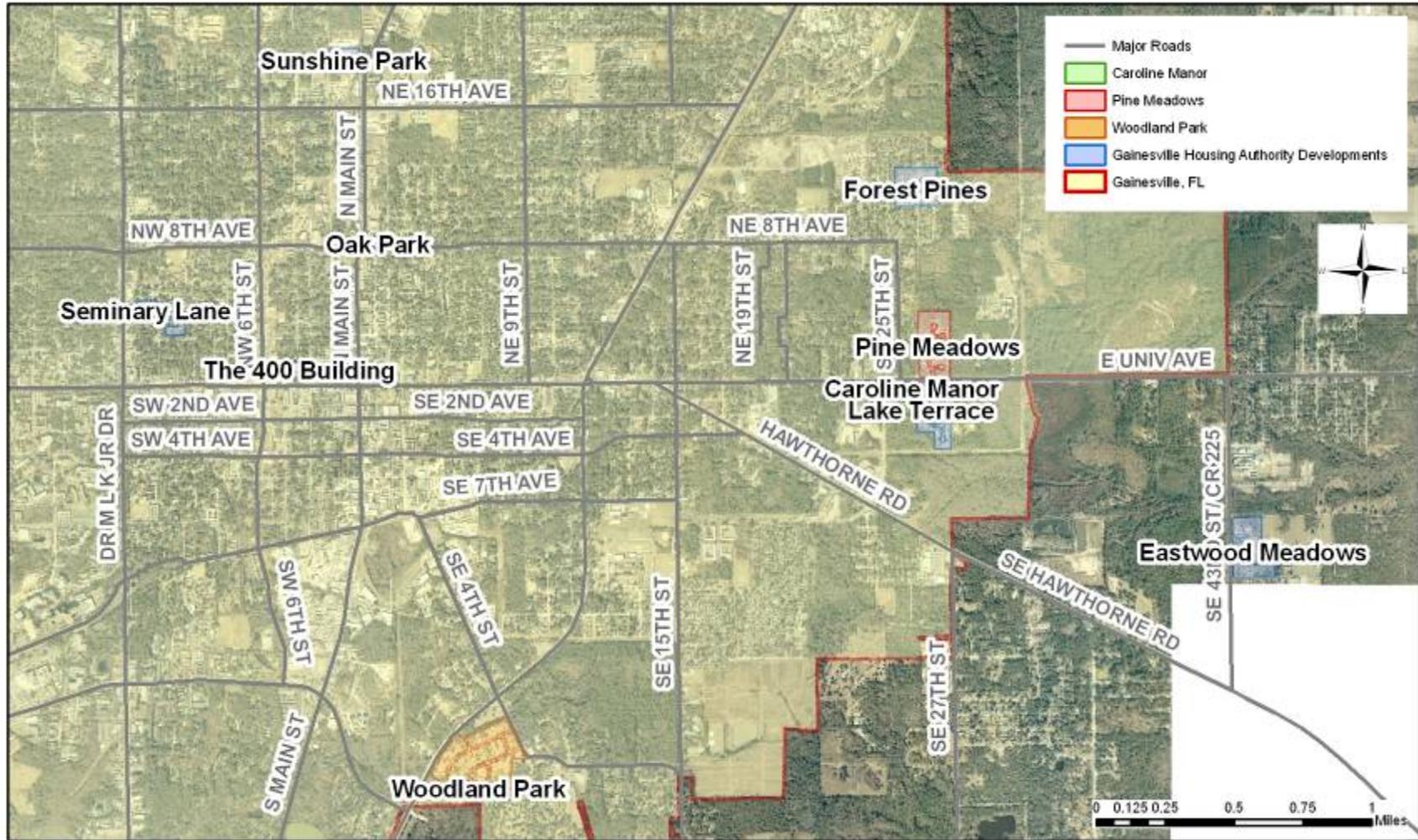


Figure 3-2. Gainesville Housing Authority Properties Extracted from the Alachua County Property Appraiser's Parcels.

Sources: Alachua County Property Appraiser, FGDL, and GPD.

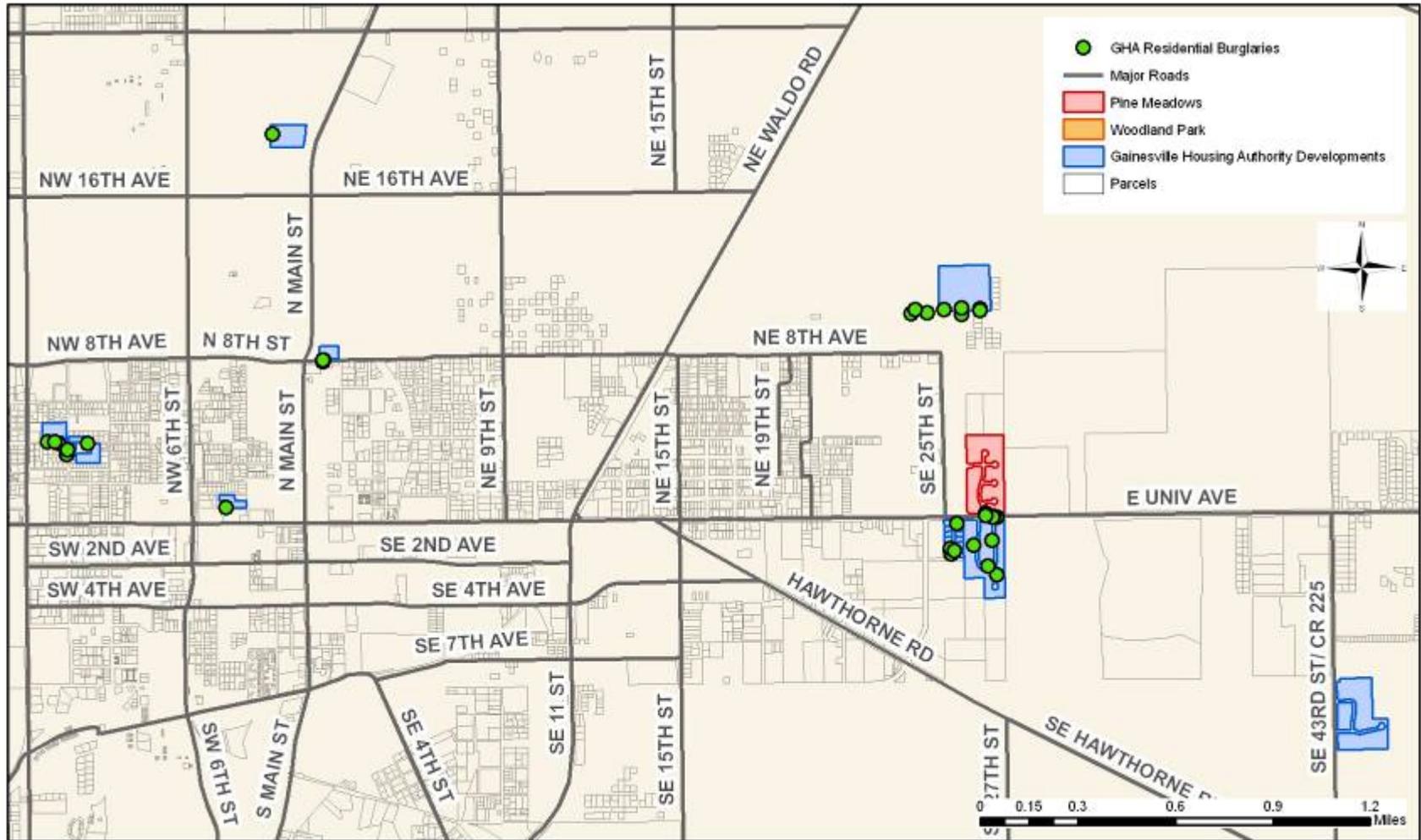


Figure 3-3. Residential Burglary Occurrences in Gainesville Housing Development Properties

Sources: Alachua County Property Appraiser, FGDL, and GPD.

Note: There were no burglaries recorded for Eastwood Meadows due to its location outside of the city limits. Burglaries may not appear at their exact incident location due to problems with geocoding.

## CHAPTER 4 FINDINGS & DISCUSSION

### **Introduction**

This research aims to establish the relationship between lighting and landscaping cues as they relate to the occurrence of residential burglaries. Specifically, we aim to determine whether lighting and landscaping (or the lack of) had a role in incidences of residential burglary, within our selected developments, by minimizing or maximizing opportunities for surveillance by other users of the space. This chapter provides the results of our analysis: (1) a summary of the Pinewood Meadows findings, including location of victimized units, landscaping, and lighting observations; (2); a summary of the Woodland Park findings, including location of victimized units, landscaping, and lighting observations; (3) a summary of the reported residential burglaries within the Gainesville Housing Authority (GHA) properties and in close proximity; (4) a comparison of the Caroline Manor development to the selected study areas; (5) and comparison of our selected study developments with another low-income housing development in the city. We conclude the section with a summary and discussion of our findings.

As previously stated, we selected public housing developments managed by the Gainesville Housing Authority (GHA) due to previous studies suggesting that residential burglary rates are often ten times higher within these areas. The public housing developments we selected are located in Gainesville, Florida and patrolled by the Gainesville Police Department (GPD). Gainesville, approximately 17,648 acres, is located in the middle of Alachua County, as shown in Figure 4-1. Figure 4-2 shows the location of Gainesville within Alachua County. The location of all GHA-managed developments is seen in Figure 4-3, while Figure 4-4 shows the location of our selected study developments and our low-incidence comparison development. Approximately 34% of the area within the Gainesville city limits is zoned residential.

## Evaluation of Victimized Developments

After gathering the case reports of all reported residential burglaries within our time frame and determining the occurrences within public housing developments, we found that residential burglary rates were much lower, within all ten of the housing developments managed by the GHA, than we expected. Certain developments reported as little as one and three residential burglaries within the study time frame. Residential burglary rates within all of the GHA developments were close to the rates for the city, although they were lower per 100,000 people. While GHA residential burglary rates were generally lower than the city's rates, we noted that the rates documented within our selected developments were significantly higher. Refer to Table 4-1 to review the burglary rates. Although the rates are higher and the rate of change is much greater between our selected developments and the calculated rate of change of the city, it is important to note that this is due to the smaller population within the developments. A small change in the number of incidences reported within the study developments creates a large difference in crime rates. For example, Pine Meadows reported a total of 9 residential burglaries within the time frame. Between 2006 and 2007 the rate increased by 100% and then decreased by 50% between 2007 and 2008. As we said before, this is due to the low estimated population.

Between 2006 and 2008, the city was victimized a reported 3,312 times, 39.3% of which occurred during the evening hours. During the same time frame, properties managed by the GHA reported a total of 64 incidences. A total of 31 reported incidences occurred within the boundaries of our two selected study developments, Pine Meadows and Woodland Park, while six total occurrences were reported within Caroline Manor, our low-incidence comparison site. Table 4-2 shows a breakdown of the reported incidences per year for the GHA developments.

## **Residential Burglaries in our Study Developments**

Victimization rates within our selected developments were significantly less than reported incidences for Gainesville, FL, resulting in only 1.9% of the city-wide residential burglaries. There were originally a total of 31 reported residential burglaries within our selected study areas, Pine Meadows and Woodland Park. Caroline Manor also experience six reported residential burglaries during the same time period. However, as we previously stated, the reported incidences were reviewed, paying special attention to the officer narrative. Reports that we reasoned to be domestic-in-nature were removed from the total occurrences. After determining the reported burglaries occurrences we were responsible for examining, we determined that we were examining the occurrence of 22 reported incidences, 6 within Pinewood Meadows, 13 within Woodland Park, and 3 within Caroline Manor, shown in Table 4-3.

### **The Pine Meadows Development**

**Development Profile.** The Pine Meadows development is a public housing development managed by the Gainesville Housing Authority. Located at 2626 East University Avenue, the 80 single and duplex-unit development covers approximately 17.7 acres of land. The site is bounded by East University Avenue to the south, NE 25th Terrace to the west, wood frontage to the north, and Lofton High School and Morningside Nature Center to the east. Shown in Figure 4-5, the single and duplex-unit development is situated within the northeast part of town. Major roads within close proximity include: East University Avenue and NE 25<sup>th</sup> Street. Residents enter the development by way of NE 25th Terrace or NE 26th Terrace, directly north of East University Avenue. Several interior roadways run through the development including: NE 3rd Place, NE 2nd Place, NE 1st Place, and NE 26th Terrace. NE 26<sup>th</sup> Terrace serves as a divider between the two halves of the development.

Two other housing developments managed by the GHA, Lake Terrace and Caroline Manor, are situated directly south of our study development, on the south side of East University Avenue.

As we previously discussed, we narrowed down the recorded occurrences of residential burglary based on their domestic-nature. GPD's Records Management System (RMS) originally indicated a total of 12 reported residential burglaries within our selected time frame. After we examined the officer narratives and removed selected records, which we deemed to be domestic in nature, we were responsible for examining the occurrence of six residential burglaries.

**Location of Victimized Units.** When we examined the site map of the Pine Meadows development, we immediately identified that all six selected case reports occurred on the east side of the development, as depicted in Figure 4-6, which is separated from the rest of the property by NE 26<sup>th</sup> Terrace. The east side of the development is bounded by several acres of wood frontage, separating Pinewood Meadows from Lofton High School and Morningside Nature Center. Even more importantly, all points of entry (POE) occurred within the rear communal area shared by groups of units. Refer to Figure 4-7 to view the approximate points of entry.

Unit A, victimized in 2006, was entered via the north-east living room window at an unknown hour of the day. Unit B was victimized in 2007, also during unknown hours. The offender gained entry into the residence via the rear door. Unit C was victimized in 2008. It is unknown how the offender gained entry into the residence; however it is known that entry was made during evening hours. Unit D, also victimized in 2008, was entered by means of the south window during the day. All of the above-mentioned victimized units are situated around a large

communal area, which serves as a communal “back yard” for approximately 14 units, or 31 bedrooms, within the south-east portion of the site.

Offenders gained entry into unit E, which was victimized a total of two times in a months span in 2007, both times via the north-east Bedroom window. The victimized unit is situated farthest north-east within the eastern section of the development. The rear of the unit faces a fence and wood frontage.

**Landscape Survey.** A landscape survey was conducted within Pine Meadows at the locations of victimized units. Because we were unable to obtain documentation regarding the maintenance of the landscaping, particularly vegetation, at the time of occurrence, we are unable to fully understand the exact state of the plantings within proximity of the victimized unit’s points of entry. Therefore, our survey focuses on the current state of the proximal landscaping. Refer to Table 4-3 to view the landscape survey conducted during site visits and the features observed within the Pine Meadows development.

Three instances of landscaping were in close proximity to the unit we identified as “A.” We observed vegetative landscaping, including a 4.5’ bush and an approximately 45’ tree that were minimally dense, that provided minimal view obstruction during daytime hours, both to and from the point of entry. However, branches from the tree were as low as 4’ from ground level, which did partial view obstruction. During evening site visits, we observed that the combination of the landscaping features surrounding unit A only added to the opportunity for an offender to commit residential burglaries by providing added amounts of cover.

We observed the primary entry of the residence to be situated approximately 10’ away from the point of entry. The primary entrance is comprised of two non-structural walls creating a private entry way for the residence. The solid walls are approximately 8 feet tall, making

visibility from the front side of the residence and street, NE 1<sup>st</sup> Place, extremely difficult. Figure 4-8 illustrates the obstruction of visibility due to the solid non-structural walls.

While our intention for the landscaping survey was to observe the landscaping in proximity to the point of entry for the reported incidences, we did take note of landscaping around our victimized units that we felt could become problematic in the future. One example of vegetative landscaping that could serve as dense cover to predators was situated on the southern side of unit A. The bushes directly in front of unit A and its adjacent unit are both extremely dense and extremely tall. View Figure 4-9 to see a photo of the bushes we observed at the specified location. The bushes reached up to and above the 8 foot roof line, and were extremely dense, contributing to a high level of cover for offenders, whom would possibly select the adjacent windows as target points of entry.

The only example of landscaping in proximity to unit “B” was a tree, situated approximately 4 feet away from the estimated point of entry, the back door. While the tree minimally obstructed the view of the back door at the time of our site visit, we are unaware of the state of the tree in 2007, when the burglary occurred. Similar to every unit within our selected study developments, the victimized unit had two 8 foot un-structural walls that created a private entrance to the primary entryway of the resident; however we feel that, due to its location from the point of entry, it was not influential in the offender’s selection of target.

We were unaware of the exact point of entry within unit C, which was victimized during the evening hours. Therefore, it made it difficult to analyze landscaping in proximity to the point of entry. However, there are several landscaping elements that might have served as a cue to the offender in target selection. A minimally-dense tree, located approximately 10 feet from the rear porch and rear door, minimally obstructs the view of the rear door from any of the surrounding

units or the interior, communal space. As mentioned in all of the previous victimized units, we observed a non-load bearing wall that contributed to minimal amounts of surveillability from the interior communal space.

The wood line to the east is within 18 yards of the south window of victimized unit D, and contributes to a maximum obstruction of view from the interior of the woods towards the point of entry. There is also a large oak tree approximately 20 yards away from the point of entry; however its branches are, at minimum 30 feet in the air, and did not provide an obstruction of the view towards the point of entry at the time of our site visit. The layout of the unit allows the porch and exit to the porch to obstruct the view to several windows on the rear of the unit, from other units situated directly west.

Unit E, the last unit that we observed in Pine Meadows, was victimized two times within a one-month span. Both incidences took place during daytime hours. As we previously mentioned, unit E is in the north-eastern most portion of the east side of the development. The estimated point of entry was approximately 10 yards, or 30 feet, south of the northern wood line and 15 yards to the west of the eastern wood line. The wood line contributed to a moderate view obstruction to the points of entry from the woods. Even more importantly, the fence-line dividing the unit with the wood line has large areas in which people can climb beneath the fencing. Large amounts of debris allow us to believe that individuals use this as a footpath. Similar to unit D, the rear door and porch provide ample amounts of cover to many of the windows on the rear side of the unit. Refer to Figure 4-10 to view an example of the debris and holes in the fence

Although our intentions were to observe the possibility for automobiles, which we considered to be a part of landscaping, to obstruct views to points of entry on our selected victimized, we found that there were no instances where automobiles would have played a role in

obstructing views thereby increasing opportunities for offenders. Because all of the points of entry occurred at the exterior of the residence, typically within a communal backyard, automobiles, legally, would never be parked in these areas. We observed numerous vehicles parked within driveways and on the sides of the streets. This is to be expected given the narrow and short driveways with the number of vehicles that potentially reside at the location.

**Lighting Survey.** A lighting survey was conducted within Pine Meadows at the locations of victimized units. We also employed a shapefile of the light fixtures and supports that we acquired from the city's Public Works department to locate and determine the types and characteristics of light fixtures within the development, which can be seen in Figure 4-11. Refer to Table 4-5 to view the lighting fixtures observed within the Pine Meadows development.

The only measurable light that we were able to obtain within proximity to the point of entry for victimized unit A was the exterior house light, located on the back porch of the residence. Positioned at the height of the door, approximately 6 feet high, and situated 11 feet from the north-east living room window, the incandescent light bulb provided inadequate light measure readings. We found light measurement readings at 5 feet to be 0.04 foot candles and at ground level, a minimal 0.01 foot candles.

Exterior house lights, located next to the rear doors, of units B and C were in proximity to the point of entry the offender targeted on unit B, approximately 16 feet and 19 yards away from the point of entry. Similar to the majority of the units located in Pine Meadows, the light fixtures are mounted at the door height, approximately 6 feet. Incandescent light bulbs are used in the porch fixtures to illuminate the immediate surrounding area. We found the light measurement readings to be the same as in unit A, 0.04 foot candles at 5 feet and 0.01 foot candles at ground level.

As previously mentioned, we were unable to determine the point of entry for victimized unit C. Therefore, we conducted the survey at light fixtures within proximity to the unit. We observed two exterior house lights, located at the main entry and rear porch, and a GRU-managed street light, located approximately 30 yards from the main entrance to the residence. A cobra head street light fixture was mounted to a GRU lighting structure, at 24 feet above ground level. According to the GRU light fixture shapefile, the street light fixture was installed in December of 2006. Although we are unaware of the working condition of the light fixture at the time of incidence, we are aware that the lighting fixture was installed prior to the residence being victimized, knowing that victimization occurred in April of 2008.

We gathered light meter readings at two locations adjacent to unit C, the front of the house and the window furthest west on the south wall. Readings at the SW window measured at 0.06 at 5 feet above the ground and 0.02 at ground level, while readings in the area directly in front of the unit were .29 foot candles at 5 feet above the ground and .23 foot candles at ground level.

We did not observe an exterior house light on the rear of unit D, which was in proximity to the estimated point of entry. However, we observed a street light situated approximately 22 yards from the targeted entry. The street light is a mercury-vapor yard light mounted 24 feet above ground level, reaching 4 feet in a westerly direction. Again, we are unaware of the working status of the light fixture at the time of incidence; however when the researcher and law enforcement conducted their daytime site visit to Pine Meadows, they observed the head of the light fixture to be damaged, by what the researcher would assume to be vandalism. Due to the non-working condition, at the time of each site visit, light meter readings were only taken at ground level, which we determined to be 0.00 foot candles.

The last victimized unit of our study within the Pine Meadows development was unit E, which was victimized a total of two times within a month's span of 2007. The offender entered both times through the window located farthest NE in the unit. At the point of entry, we observed two light fixtures located within 30 yards. The exterior house light, located on the rear porch of the residence, was situated approximately 9 yards away from the point of entry and the street light fixture, mounted at 24 feet and extending 4 feet in a SW direction, was situated 19 yards away from the point of entry. Light measurement readings taken at the point of entry were 0.05 foot candles at 5 feet above the ground and 0.01 foot candles at ground level.

Due to the east side of the development being victimized more frequently than the west side, we chose to conduct light meter readings at three separate locations within each side of the development. Measurements at those locations were taken directly underneath light fixtures managed by GRU. Refer to Figure 4-12 to see the locations of the additional measurements taken. The three measurements taken on the east side of the development at 5 feet above the ground averaged at 2.73 foot candles and 2.06 foot candles at ground level. Measurements taken on the west side of the development averaged around 2.71 foot candles at 5 feet above the ground at 2.05 foot candles at ground level.

**Light Survey Findings and City Ordinances.** We found the lighting requirements, as dictated by the city's Code of Ordinances, to be minimal. The majority of the ordinances refer to the Illumination Engineering Society of North America's (IESNA) Lighting Handbook, and can be viewed in Table A-1.

The first applicable ordinance pertaining to lighting in our setting discussed the exterior lighting, particularly as needed to provide security to the area. Ordinances mandate that lighting's horizontal illuminance average between 0.5 foot candles and 2.5 foot candles.

Horizontal illuminance was measured at 5 feet. Readings in proximity to our points of entry, documented during the site visit, indicated that the horizontal illuminance measured at two of the units were below the minimum 0.5 foot candles, and three documented measurements were within the acceptable range.

Measurements taken at the selected points indicated in Figure 4-12 averaged at 2.06 foot candles at ground level and 2.72 foot candles at 5 feet within the Pine Meadows development. Therefore, we found the measurements documented at selected points directly beneath lighting fixtures managed by GRU at ground level were slightly above the maximum levels, while the horizontal illuminance was approximately .70 foot candles higher than what is accepted.

### **The Woodland Park Development**

**Development Profile.** Woodland Park, approximately 36.49 acres located at 1900 SE 4<sup>th</sup> Street, is a 170-unit development that is bound by SE Williston Road to the north, SE 4<sup>th</sup> Street to the east, patchy areas of trees to the south, and dense wood frontage to the west. As evident in Figure 4-13, SE 1<sup>st</sup> Terrace and SE 4<sup>th</sup> Street serve as entrances to the single and duplex-unit development from SE Williston Road. Interior roadways of the development include: SE 19<sup>th</sup> Place, SE 20<sup>th</sup> Place, SE 20<sup>th</sup> Lane, and SE 3<sup>rd</sup> Terrace. The Gainesville Housing Authority officer is situated at the entrance of Woodland Park, at SE 4<sup>th</sup> Street.

For analysis purposes, the researcher divided the site into three linear zones, spanning in a south-westerly to north-easterly direction. Within each zone, groups of housing units, between 7 and 16, create little communities. The different groups of housing units often share a communal backyard. We identify groups of victimized units based on their location within the property. Woodland Park originally was victimized a reported 19 times, according to the RMS data. After we examined the officer narratives and gained an understanding for what occurred in each reported incidence, we removed six cases, leaving a total of 13 remaining opportunities for

observation and analysis; however, due to requests from particular residents to not enter their property, we were unable to fully conduct both surveys.

**Location of Victimized Units.** Upon examination the site map of the Woodland Park development in comparison with the reported residential burglary data available from RMS, we understood that there was an erratic pattern to the location of the victimized units, spanning each of the researcher-created zones. The locations of the 13 selected reported incidences can be seen in Figure 4-14. Refer to Figure 4-15 to view the points of entry of the victimized units.

The researcher identified three victimized units, or four selected case reports, within what we established as zone one of the Woodland Park development. Unit A, sited on the western part of the property and approximately 35 yards from Williston Road, was victimized in the evening of 2006 when an offender entered the residence via the north-west bedroom window. An offender gained entry to Unit B, also situated adjacent to Williston Road, during daytime hours in 2006 via the rear door. Similar to the units in Pine Meadows, the rear door is located off of a porch located in the rear of the residence. The rear of the residence, in this case, faces a north-easterly direction towards several other units. Unit C, victimized twice within 14 months, was entered via the same eastern bedroom window in both incidences. In 2007, the incidence took place in the evening hours; however the time of occurrence for the second incidences is unknown.

A total of five victimized units and their points of entry were examined within zone two of the development. Unit H, victimized during the daytime hours in 2006, was entered through an unknown point of entry. In 2008, an offender gained entry into unit I by crawling through a window on the eastern side of the residence. It is unknown whether entry was gained during day or evening hours. Entry was gained into unit J during the evening hours by entering through a

south-westerly window, facing the communal space for the group of units. Unit K was victimized twice in 2007. We gathered reports that occurred in April and June. One of the incidences occurred during the day, while the other occurred during evening hours. In both cases, the offender entered the residence via the south-west bedroom window.

While zone three saw no repeat victimizations, 75% of the occurrences within the south portion of the development occurred during evening hours. Units D and G, victimized in 2007, were entered when an offender removed the window AC unit on a south-west window. Items were removed from the rear porches of unit E and G.

**Landscape Survey.** A landscape survey was conducted within Woodland Park at the locations of victimized units. As we previously discussed, the survey conducted pertains to the current nature of the landscaping. We are unable to fully understand the exact state of the area at time of victimization; however, we are able to somewhat understand how the vegetation might have appeared at the time of incidence based on other examples of vegetative growth. Refer to Table 4-7 to view the landscape features observed and documented within the Woodland Park development.

As we previously discussed within the section regarding the location of each victimized unit, unit A was victimized when the offender gained entry to the NW bedroom window. Within proximity to the point of entry, we observed three instances of landscaping that might obstruct the view to the point of entry from areas within the development, as well as the adjacent Williston Road. A bush, approximately 5' tall, is situated directly adjacent to the point of entry creating a moderate obstruction of the view. There are also several types of trees, ranging between 8 feet in height and 12 feet, located within 5 yards of the point of entry. The majority of these trees minimally obstruct views; however, a tree sited directly adjacent to the north side of

the residence could potentially pose problems by providing cover for an offender to enter the residence at two separate entry points without being visibly detected. The most problematic landscaping adjacent to unit A is the trees that separate the unit from Williston Road. The tree line, along with the wire fencing, moderately obstructs the view to the point of entry. Figure 4-16, a map we obtained from Google Maps Street View, depicts the difficulty for surveillance to occur from the roadway towards the victimized unit.

Landscaping adjacent to victimized unit B include a very dense and large bush located 6 feet away from the rear door and the fence lined with trees, separating the development from Williston Road. The large bush, approximately 6 feet tall, covers several windows and obstructs the view of the rear door from the northern most part of the unit almost entirely, allowing perpetrators adequate cover and minimized surveillability. While the tree line is an adequate distance from the point of entry, any opportunities for surveillance to occur is minimized due to the height of the lower branches and the density of the foliage. Even more importantly, we observed an opening in the fence, separating the development from Williston Road, within proximity to the unit's northern wall, allowing easy access to the development and unit, as seen in Figure 4-17.

Unit C, victimized in 2007 and 2008, had no landscaping within proximity to the point of entry. Because entry was gained at the rear of the residence, facing toward the communal greenscape, there was no legal ability for automobiles to obstruct the view to the window at which the offender gained entry. And although the fence and tree line are a far distance from the victimized unit, the density of vegetation minimizes the opportunity to observe the area from the roadway.

The offender gained entry to unit D by removing the AC unit in the south west bedroom window during the evening hours of 2007. Within proximity to the point of entry is a tree-line running along the fence line that divides Woodland Park with the adjacent parcel of land and a row of bushes dividing unit D and a unit directly to the east. The view to the point of entry is severely obstructed from the south side of the fenced area due to dense foliage spanning the entire height of the fence, which can be seen in Figure 4-18. The bushes, approximately 6 yards away from the point of entry, separating unit D and the adjacent unit to the east minimizes the ability to observe the victimized unit from the interior and exterior of the adjacent unit. The un-structural wall, which was previously discussed in the landscaping findings for the Pine Meadows development, that enclose the main entrance to the residence provides maximum coverage of the property directly in rear of the victimized unit from the roadway.

Due to residents' requests for us not to enter the property surrounding their units, we were unable to conduct a complete landscaping survey on victimized units E and F. However, we were able to conduct a minimal survey on both units from within the escorting law enforcement's patrol car and by examining the 2005 orthogonal image layer acquired from GPD's "Tracking Map." We were unable to determine landscaping within proximity to the points of entry for units E and F, due to it being victimized by offenders removing items from the rear porches. We did however, observe vegetation within the front of each residential unit that might potentially obstruct the view of select windows on the front of the residence, running along SE 20<sup>th</sup> Lane. Vegetation was moderately dense and between 5 feet and 7 feet tall in some locations.

The offender gained entry into victimized unit G by removing the AC window unit on the south-west bedroom window. The point of entry faces the rear communal space shared by 16 units. Our landscaping survey observed one instance of landscaping that could potentially

obstruct the view of an offender gaining entry of the victimized unit at the point of entry. Similar to instances observed in both Pine Meadows and Woodland Park, the non-structural wall employed to create a private entrance to the main entry may potentially obstruct the potential opportunities for surveillance due to its height and solidity.

As we previously discussed, we were unable to estimate a point of entry to victimized unit H from the officer narratives or visible signs of force entry during the site visits. Therefore we noted several areas where opportunities for surveillance to occur might be compromised. Approximately 6 yards separates unit H with the unit directly west. Both units have the 8 foot non-structural wall, used to create private entries, which both extend approximately 10' from the roofline of each unit, leaving approximately 8' for surveillance to occur from SE 19<sup>th</sup> place. There are also a few trees and bushes surrounding unit H, all of which minimally contribute to the obstructed view of numerous areas that might have served as the point of entry when the unit was victimized.

The east window served as the point of entry within victimized unit I, which faces inwards to a communal yard shared by 14 units. The trees within the communal greenspace are all very tall oak trees that do not obstruct the cone of vision because the branches are, at minimum, 40 feet above the ground. Therefore, these trees would provide minimal cover to an offender gaining entry at the east window of the victimized unit. While we were unable to locate any landscaping that might have moderately or greatly contributed to an offender gaining entry by providing an obstruction and creating cover, we did take note of extremely dense bushes on the west side of the residence reaching up to the roofline.

The only landscaping within proximity to the point of entry at unit J was a bush approximately 18" tall, situated directly underneath the north-western windows of the unit. It is

possible that the jog in the building, created due to the porch extending out may have contributed to entry gained within the unit. The vegetation situated at the north-western windows currently provides minimal opportunities for cover to an offender.

The last victimized unit within the Woodland Park development was unit K, which was victimized twice in 2007. Entry was gained, both times, when the offender broke in through a window located near the northern part of the unit. Because there were two windows in the general area, we were unable to completely gain knowledge of the exact point of entry; however, we estimated the POE to be the southern of the two windows due to the obstruction of view created by an extremely dense and tall bush situated directly adjacent to the window. An image shown in Figure 4-19 depicts the state of the unit and surrounding vegetation during the daytime site visit, conducted September 18, 2009.

**Lighting Survey.** The researcher conducted a lighting survey in Woodland Park at the locations of victimized units. Light readings were taken at all but two units, which was due to the residents' requests to not enter their property. Although certain reported residential burglaries occurred during the daytime hours, we chose to conduct light readings at their points of entry to further gain an understanding of how lighting could potentially play a role in future acts of victimization. Refer to Figure 4-20 and Table 4-7 to review the lighting fixture locations, observations made, and measurements documented within the Woodland Park development.

Adjacent to unit A's north-west bedroom window, which was the point of entry in the evening of 2006, we observed two GRU-managed street lights within close proximity. We obtained light measurement readings at the point of entry, from the adjacent street lighting fixtures. The first fixture, a cobra head type fixture mounted at 30' high and situated adjacent to Williston Road, extends approximately 10' in the north-west direction. According to the GRU

light fixture shapefile, the fixture, located 29 yards from the POE, was installed one month prior to victimization. The second fixture, located approximately 20 yards from the point of entry, is also a cobra head street lighting fixture mounted in a south-easterly direction. The light meter measured the lighting levels to be 0.38 foot candles at 5 feet high and 0.31 foot candles at ground level.

We observed a cobra head street light approximately 17 yards east of unit B's point of entry, victimized during the daytime hours of 2007, which is depicted in Figure 4-21. As we previously mentioned, the point of entry was the rear door at the rear porch, located on the east side. Light measure readings indicated light levels to be 0.05 foot candles at 5 feet off the ground and 0.01 foot candles at ground level. We also observed an exterior house light located next to the door on the rear porch; however, it was inoperable at the time of our evening site visit.

Unit C became a victim to residential burglaries in October of 2007 and December of 2008. In at least one occurrence, the offender gained entry during the evening hours; and in both incidences, the offender gained entry into the house through the north-east window. Lighting from the exterior house light on the rear porch, located approximately 4 yards away was the only light that affected the light measurements of 0.05 foot candles at 5 feet and 0.01 foot candles at ground level. Similar to all of the exterior house lights, the fixture had a dome cover and an incandescent light bulb. We also observed a street light in the communal rear greenspace; however, it was located 41 yards away from the point of entry for both incidences and therefore we did not include it within our survey.

We documented two light fixtures with proximity of unit D, which was entered by removing the AC window unit from the SW bedroom window, possibly during evening hours. We observed a street light, positioned approximately 28 yards from the point of entry; however

after examining the attribute table for the GRU light fixture shapefile, we found that the light fixture was installed seven months after the reported burglary occurred. We also documented the characteristic exterior house light located at the rear porch. Light measure readings indicated levels to be 0.31 foot candles at 5 feet and 0.24 foot candles at ground level.

Residents from units E and F requested that we not conduct our surveys by entering their yard. Therefore, we were unable to collect light quantity measurements for these units. Still, with the use of the GRU light fixture shapefile, we determined that unit E has two street lights, located between 25 and 30 yards from the rear open porch. The fixture to the south is mounted in a south-east direction, pointing away from the point of entry, while the fixture to the north is positioned in an easterly direction. Both fixtures are mounted at 24' above the ground. We are unable to determine the date of installation for either fixture because there is a null value within the attribute table.

The GRU shapefile indicates that there are no fixtures in direct proximity with the open rear porch of unit F. There is, however, a street light within 15 yards of the main entrance, but records show that it was installed in December of 2006, approximately one month after victimization. Based on previous observations at the rear side of the residences, we would assume that both units' rear porches have porch lights on the exterior of the house, which became characteristic of the developments we studied throughout our research process.

We observed one street light within proximity of unit G's point of entry, victimized during evening hours in 2007. We documented one street light within 27.5 yards, mounted at 24' and facing an easterly direction, and the typical exterior porch light. The two light sources combined, measured at 0.29 foot candles at 5 feet above ground and 0.23 foot candles at ground level.

We conducted our lighting survey on unit H, although we were unable to determine an estimated point of entry. We documented two street lights within close proximity to the unit and two exterior house lights, one located at the main entrance to the residence and the other at the rear porch. Although we are unable to determine the point of entry, we do know that the incident occurring during daytime hours. Therefore, we have the reason to assume that entry was gained at the rear of the house, where maximum cover would have been provided. Because of this reason, we took light measurements at the rear of the house, near the porch. The light meter showed that the lighting levels were 0.19 foot candles at 5 feet above the ground at 0.13 foot candles at ground level.

In proximity to the next victimized unit we surveyed, unit I, we found no street lighting within close proximity. Although there was an exterior house light located just over 6 yards away from the east point of entry. We did observe a lighting fixture managed by GRU within the center of the communal backyard, shared by 14 units; however it was sited almost 37 yards away from the point of entry. We collected and documented the amount of light levels at 0.21 foot candles at 5 feet and 0.17 foot candles at ground level.

Unit J was victimized during an evening in 2006 when an offender entered the south-west window. Within proximity to the estimated point of entry, we observed one street light, located 27 yards to the north-west and the characteristic rear porch light. The street light, a cobra head fixture, was mounted at 24' facing in the direction of the unit. We measured the light levels to be 0.31 foot candles at 5 feet and 0.23 foot candles at ground level. We also observed a mercury-vapor lighting fixture on the opposite side of the unit, which can be seen in Figure 4-22; however, we understand that the light emitted from the fixture did not contribute to any light quantity readings.

Our final unit that we selected to gather information through conducted surveys was unit K, victimized twice within two months of 2007. In both occurrences, the offender gained entry through the south-west bedroom window. The only light we documented within 30 yards of the point of entry was the rear porch light. There were two street light fixtures visible from the point of entry, one to the north and one to the south-west; however, both of the fixtures were more than 30 yards away from the point of entry. The porch light, located 5 yards away, emitted light to produce 0.03 foot candles at 5 feet and 0.01 foot candles at ground level.

During the evening site visit, we attempted to photograph the lighting quality; however due to low lighting it became extremely difficult. Therefore, we were only able to include one evening site visit photograph, which can be seen in Figure 4-23.

We also documented light measurements at select locations throughout the development, directly underneath street lighting fixtures. Refer to Figure 4-24 to see the locations where we documented additional light measurements. We averaged the measurements at 5 feet and ground level. We found that light measurements averaged 2.73 foot candles at 5 feet and 2.06 foot candles at ground level within what we established as zone 1, or the northern portion of the development. Light measurements in zone 2, or the middle of the development, averaged 2.70 foot candles at 5 feet and 2.04 foot candles at ground level. The southern part of the development also deemed zone 3, averaged 2.71 foot candles at 5 feet and 2.06 foot candles at ground level.

**Light Survey Findings and City Ordinances.** We also made a comparison of the light measurements that we documented in Woodland Park with the city's lighting ordinances. Similar to Pine Meadows, the lighting measurements we collected were mostly influenced by exterior house lights; however we did observe a few street lights within proximity to our points of entry. The majority of the light intensity measurements taken ranged between low and acceptable.

Measurements gathered ranged between 0.04 foot candles and 0.38 foot candles at 5 feet, the horizontal illuminance. We also documented measurements as low as 0.01 at ground level in the Woodland Park development. Two of the units did not meet the mandated minimum 0.05 foot candles measurement, while the rest of the measurements fell into the allowable range. While the majority of the measurements fell within the acceptable range, vision during the evening hours at the victimized units was often difficult.

As we did in Pine Meadows, we conducted light measurements at various points, indicated in Figure 4-24, directly beneath selected street light fixtures. Our average measurement that we found between the three analysis zones was 2.71 at 5 feet and 2.06 at ground level. Therefore, we concluded that the average lighting level throughout the Woodland Park were slightly higher than what is recommended by the governing ordinances.

We also determined that all fixtures, both GRU-managed street lights and exterior house lights, were conforming to the city's Code of Ordinances regarding the mounted heights of fixtures. Section 30-345.b.8 part d of the city's ordinance states that the "maximum height of light fixtures, except as otherwise regulated by this section, shall not exceed 30 feet." All light fixtures within the development were documented at 30 feet, 24 feet, and 6 feet.

### **The Caroline Manor Development**

**Development Profile. Profile.** Caroline Manor, 14 duplex buildings or 28 units, is located at SE 25<sup>th</sup> Terrace. The 4.49 acres are sited directly adjacent to East University Avenue and across the street from our study development, Pine Meadows. Refer to Figure 4-5 to see Caroline Manor's location, as positioned southwest of Pine Meadows. The development is bounded by Lake Terrace, another GHA development, to the east, dense woods to the west and south, and East University to the north. The development is divided by SE 25<sup>th</sup> Terrace into two equal sections.

We observed that the development was comprised of duplex units, making it fairly similar to our other selected study developments; however groups of units did not share a communal backyard as we saw in Pine Meadows and Woodland Park.

Records Management System (RMS) indicated that Caroline Manor was victimized a total of six times between January 2006 and December 2008; however after reviewing the officer narratives from the case reports, we selected a total of three reports to compare with the selected burglaries within our other selected study developments.

**Location of Victimized Units.** We examined and compared Caroline Manor to the records we extracted from RMS. We immediately identified that each of the selected cases we were analyzing occurred on the west side of the development, directly adjacent to the dense woods. Refer to Figures 4-25 and 4-26 to view the locations of the victimized units and their points of entry. We also noticed that one of our analysis units was victimized twice during the time frame. Victimized unit A, the furthest north of our two selected units, was victimized in November or December of 2006 and again in April of 2007. RMS data suggested that one of the incidences occurred during the evening hours, while an approximate time of day was not able to be determined for the other occurrence. In both instances, the offender gained entry by means of the rear door. Unit B, victimized three days before unit A's second victimization, occurred during the day. Similar to unit A, the offender entered the residence through the rear door. The rear doors of both units are situated approximately 20 yards from the wood line at the west side of the property.

**Landscape Survey.** We conducted our landscaping survey at the points of entry on our two victimized units. As previously mentioned, both units were approximately 20 yards from the wood line on the west side of the development. Due to the density and height of the wood line

directly behind unit A, the opportunity for observation to occur from the interior woods or from the point of entry towards the woods was extremely difficult. Within proximity to unit A, we also documented several trees, between 11 and 20 yards. All of the trees, other than the woods, were moderately dense and therefore moderately obstructed the views towards the point of entry from the west side of the units within a reasonable distance. There were a few bushes located around the rear porch area; however due to their minimal height and density, they provided minimal obstruction the point of entry.

The wood line located 20 yards away from unit B is less dense than the area directly behind unit A. Using our orthogonal image layer in our GIS map, we observed, what appeared to be, a retention pond approximately 43 yards away from the rear door. Due to the location of the small body of water, the wood line is less dense than the area a few yards north. Nevertheless, the wood line continued to contribute to an obstructed view of the rear porch from within the woods.

We also documented a 40 foot tree within seven yards of the point of entry and several bushes around the porch area. However, we feel that neither of these landscaping elements contributed to a significant obstructed view at the time of incidence.

Other landscaping elements we observed throughout the Caroline Manor units were half-walls. The brick placements were staggered in pattern, creating more of a screen, rather than an actual wall. The front of the residence also contained the same sort of design; however it continued the height of the house. While we documented the half-walls within our landscaping survey, we feel that they did not contribute to the occurrence of residential burglaries due to their locations on the sides of the house, at the north and south ends. Figure 4-27 helps to illustrate the characteristic of the half-wall, located on each unit.

**Lighting Survey.** We conducted our lighting survey at the points of entry, documenting all of the lighting within proximity. The only lighting fixtures observed within proximity to the points of entry on both victimized units were the exterior house lights, which we found to be characteristic of the Gainesville Housing Authority developments. The closest GRU-managed street light was located one building south from unit B, approximately 40 yards away. There was a street light in front of unit B; however there is no evidence to suggest that the lighting from the fixture contributed to any of our obtained light measurements. Review Figure 4-28 to observe the location of the street light fixtures within Caroline Manor.

At the rear door of unit A, we collected lighting measurements at 5 feet above the ground and at ground level. We found that light levels were 0.13 foot candles at 5 feet and 0.08 foot candles at ground level. At unit B, our measurements collected included 0.15 foot candles at 5 feet and 0.11 foot candles at ground level. Therefore, measurements fell within acceptable standards; however visibility was extremely difficult.

**Light Survey Findings and City Ordinances.** As we did in the other developments, we measured the intensity of the street lights, as we stood beneath the fixtures. Figure 4-29 indicates the locations where we gathered the additional light intensity measurement. Lighting in the Caroline Manor development was adequate around light fixtures located adjacent to SE 25<sup>th</sup> Terrace, as defined by the city's ordinances. We collected the light intensity measurements at three separate locations and averaged the measurements to gain a better understanding of the standard lighting levels. We calculated the average light intensity measurement, directly beneath street light fixtures, to be 2.69 foot candles at 5 feet and 2.01 foot candles at ground level, and 2.01 foot candles at ground level. Similar to the measurements collected from the other developments, we determined that the measurements were slightly above the maximum allowed

illumination, and therefore did not comply with the lighting standards mandated by the Code of Ordinances.

Secondly, the mounted heights of all of the observed light fixtures within the development were below the maximum allowed height of 30'. While the GRU GIS shapefile did not include the height that the fixtures were mounted within the Caroline Manor development, we were able to determine the heights of all of the fixtures, based on previous observations of lighting fixtures in the other developments.

### **Comparing the Residential Burglaries**

As previously mentioned, employing GIS, we created a buffer around each development, approximately two blocks, creating a boundary in which we studied the locations of residential burglaries and the land uses at those locations. Our purpose behind this analysis was to determine if there were any similarities between the incidences compared to the reported incidences within our developments, and if the rates were higher within the buffers and another low-income high-crime housing developments.

#### **The Pine Meadows Buffer**

**Reported Residential Burglaries.** We created a two-block buffer around the Pine Meadows development as a means to compare the incidences within our development to the incidences within proximity. The two-block buffer created around the development established 175 acres for which we were responsible for examining the occurrence of reported residential burglaries and the land uses of the victimized properties. After clipping the city-wide burglaries to the buffer around Pine Meadows, we established that there were 17<sup>1</sup> residential burglaries that occurred between January 1, 2006 and December 31, 2008, which can be seen in Figure 4-30.

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<sup>1</sup> The calculated number of reported residential burglaries within the two-block buffer does not include the 16 reported incidences at Pine Meadows.

The map depicts all of the residential burglaries within the buffer, including all of the reported incidences within Pine Meadows.

The first thing we noticed after extracting the residential burglaries in our Pine Meadows' buffer was that all of the reported incidences occurred to the west and to the south, directly across the street in the other GHA developments. There were a total of three reported incidences to the west of the study development. All of the victimized units were easily accessible from Pine Meadows by way of NE 3<sup>rd</sup> Place, which extends from the interior of our development directly into the adjacent neighborhood in which the reported incidences occurred. Referring to the attribute table from the data extracted from RMS, we knew that the residential burglaries to the west of our study development occurred during 2007 and 2008, two of which transpired during the evening hours.

Eight other incidences occurred within the Lake Terrace development, which is located directly south of Pine Meadows and adjacent to Caroline Manor, our low-crime comparison development. There were three incidences in 2006, between May and November; two incidences, January and November, occurred during 2007; and three incidences between February and November of 2008. Approximately half of the reported incidences occurred during the evening hours.

We also observed the six residential burglaries within the Caroline Manor, the low-incident development we examined. We identified that four of the reported incidences occurred during the evening hours.

**Land Uses of the Pine Meadows Buffer.** We identified seven different types of land uses within our extracted two-block buffer around Pine Meadows, including: conservation, education, public facilities, recreation, residential-low density, residential-medium density, and single

family housing, as seen in Figure 4-31. Between January 2006 and December 2008, Pine Meadows' land use was residential- medium density with a small amount of recreational land use at the southwest portion of the parcel, according to the 2000-2010 Future Land Use. The land use for Caroline Manor was single family.

The remainder of our residential burglaries occurred within two different land uses. The three occurrences to the west of Pine Meadows were single family land use. Lake Terrace, the GHA development adjacent to Caroline Manor and across the street from Pine Meadows, was designated residential- medium density land use.

### **The Woodland Park Buffer**

**Reported Residential Burglaries.** Using GIS, we created a buffer around the Woodland Park development, approximately two street blocks. The buffer established 294.7 acres for which we examined the reported residential burglaries occurring between 2006 and 2008. We found that there were a total of 15 residential burglaries that occurred within proximal distance to our development, not including the 19 total reported incidences within Woodland Park, which can be seen in Figure 4-32.

All of the reported incidences occurred to the west of Woodland Park. We also noted cases of repeat victimization. To the northwest, we examined seven burglaries that occurred during the study time frame. Two of the incidences occurred during the evening hours. We also found that the majority of the occurrences to the northwest of our study development to be directly accessible from Williston Road.

Directly west of our development, GPD's Records Management System (RMS) indicated a total of four residential burglaries between 2006 and 2008. While we were unable to determine a precise date and time of incidence for one of the occurrences, we did understand that two of the

four incidences occurred during the daytime hours. The victimized houses are all sited within one acre of land.

To the southwest of Woodland Park, we found four reported residential burglaries, according to RMS. In the Pines, one of the apartment complexes in the area was victimized three times, once in 2007 and twice in 2008. The fourth incidence occurred at Tree House Village, another apartment community in the area.

**Land Uses of the Woodland Park Buffer.** After examining the 2000-2010 Future Land Use Map of the buffered area around Woodland Park, we identified eight different types of land uses, including: commercial, industrial, mixed used-low, public facilities, recreation, residential-low density, residential-medium density, and single family housing. We determined the land use for Woodland Park to be residential-medium density, and can be seen in Figure 4-33.

The remainder of our residential burglaries occurred within three different land uses. We identified the land use of the victimized residences to the northwest of our study development to be single family. The land use for the four incidences directly west was residential-medium density. Similar to Woodland Park, the apartment complexes that were victimized to the southwest of our development were residential- medium density.

### **Residential Burglaries of Tree Trail Low-Income Housing Development**

We analyzed the reported residential burglaries within Tree Trail apartments, which is a notoriously high-crime low-income community situated at the northwest corner of NE 23<sup>rd</sup> Avenue and NW 9<sup>th</sup> Street. Refer to Figure 4-35 to view the location of the Tree Trail complex. Similar to our analysis of the burglaries and land uses within the developments' buffers, our intention was to compare the occurrence of residential burglaries to our selected victimized developments. By examining the reported incidences in Tree Trail apartments, we were able to determine the rates of residential burglaries, in comparison to the rates within our developments.

The Tree Trail development is comprised of 108 units, in 8 separate apartment buildings. The 2000 US Census estimated the average housing size in Gainesville to be 2.25 persons per household. Therefore, we estimated Tree Trail to have 270 individuals living within the development.

GPD's RMS indicated that 21 residential burglaries occurred in the Tree Trail development between January 1, 2006 and December 31, 2008. There were also three units that became victims of repeat burglaries. We provided the rate of residential burglary change in Table 4-1 for the three years. In 2006, there were six reported burglaries, half of which occurred during the daytime hours. The Gainesville Police Department responded to four Tree Trail residential burglary calls in 2007. 2008 was the most active year for residential burglaries, accounting for eleven of the total reports. Seven of the 2008 burglaries occurred during the evening hours.

### **Discussion of Findings**

#### **Lighting and Landscaping Cues Pertaining to Residential Burglaries**

The purpose of properly maintaining the landscaping and lighting within any environment, particularly in public housing developments, where studies previously suggested that crime rates tend to be higher, is to increase the act of surveillance, thereby decreasing the opportunity and occurrences of criminal activity, in our case, residential burglaries.

Our physical surveys were unable to fully suggest correlations between lighting and landscaping, as they relate to the likelihood of residential burglaries. Due to our study population size, we felt there was not enough numerical data to statistically corroborate our hypothesis, suggesting that lighting and landscaping cues are directly related to the occurrence of residential burglaries. Our observations of Pine Meadows and Woodland Park, and the comparison of our low-incident development, Caroline Manor, however did deduce that the majority of the victimized units had problematic elements to their lighting and landscaping within close

proximity, contributing to a lack of surveillability at the point of entry, and possibly contributing to victimization of the units. However, we also observed problematic landscaping and lighting elements within proximal distance to non-victimized units, as is evident in Figure 4-9. This made us curious as to why our study units were selected by offenders to victimize, rather than other locations within the developments that would have potentially obstructed the view more at the point of entry. During the daytime site visits to Pine Meadows and Woodland Park, we observed and documented the lighting and landscaping within proximal distance to the majority of our points of entry. Earlier in the chapter, we discussed those elements we found to be problematic to the ability for surveillance to occur, thereby reducing the number of burglaries. Table 4-11 summarizes our findings for the Gainesville Housing Authority Developments observed.

The majority of the victimized units we surveyed had some sort of landscaping element, such as vegetation or non-structural walls that created secluded entryways, which highly obstructed the view to and from the points of entry. However, we also found that specific examples of landscaping that contributed to the beautification of the unit, rather than obstructing the view of the entry points. For example, on the west side of Woodland Park's unit J, we documented partially maintained Alligator Plants near the two northwestern windows, depicted in Figure 4-34. Their density and height were minimal. We felt that these plants did not excessively obstruct the view of either window, which could have served as a point of entry to the offender.

While we examined the automobile parking policy distributed to the residents by the Gainesville Housing Authority, we felt that, due to the location of the points of entry on the victimized units, there was a low probability that automobiles were parked in the general vicinity, obstructing the views of the victimized units.

We feel that the lack of surveillability at the victimized units' points of entry played a large role in the reported occurrences. Each of the victimized units was entered through a specific location in which the predator could not be observed from the street. Most of the entries occurred within proximity to the communal back yards. The other reported incidences took place where the victimized units were located adjacent to moderately and heavily dense wood lines, contributing to maximum obstruction of surveillability at the points of entry.

We were not able to determine the exact amount of lighting cast on each victimized unit during the daytime site visits; however we were able to determine that there were three types of lighting fixtures within the developments: exterior house lights, cobra head street light fixtures, and the mercury-vapor outdoor security lights. The majority of the victimized units had exterior house lights near the points of entry, in the rear of the residences. However, we observed there to be a lack of street lighting fixtures within proximity to all of the estimated points of entry.

Evening site visits confirmed our observations of the density and heights of the surrounding landscaping elements contributing to minimal amounts of surveillability at the majority of the points of entry. Most vegetation needed to be trimmed back and thinned out. Several trees also needed to have their lower branches cut to a minimum of 7 feet above the ground to increase the opportunities for surveillance.

Although we were pleased with the light measurements, taken in each development, beneath the street light fixtures, which were in the range of 2.69 to 2.75 foot candles at 5 feet above the ground and between 2.01 and 2.06 foot candles at ground level, we were disturbed with the remainder of our measurements. The majority of our light intensity readings, taken at the points of entry within our developments, were significantly below lighting standards, as suggested by the Illumination Engineering Society of North America's (IESNA) RP-20-98.

“Intrinsically dark areas” are recommended to average 1.00 foot candle, with a maximum of 4.00 foot candles, at ground level, according to IESNA. Because the Code of Ordinances does not mandate the minimum acceptable levels of lighting illumination and intensity, the current lighting appears to be acceptable, both to the City and the Gainesville Housing Authority. Although acceptable to the minimum lighting standards as mandated by the Code of Ordinances, we found the amount of lighting provided by the only light fixtures within proximal distance to the points of entry to be minimal and inadequate, at best.

Without studying a larger victimized population, it would be difficult to infer an exact relationship, based strictly on the light measurements gathered and landscaping elements observed within proximity to the victimized units. Although we are unable to infer an exact relationship between our cues and the victims, we do agree that it is highly unlikely that the studied occurrences were just random criminal acts.

### **Victimized Residences within Buffers**

The purpose for comparing the victimized residences within the buffers surrounding the study developments was to determine whether there was a similarity in the rate of occurrence. We extracted 29 residential burglaries within the buffer created around the Pine Meadows development. Pine Meadows was victimized a total of 12 times, six incidences of which we examined. We examined three of the six reported incidences that occurred in Caroline Manor. Lake Terrace, the third GHA development in the immediate vicinity of our selected study development, was victimized a total of eight time between January 2006 and December 2008. The remaining three reported incidences occurred in the single family land use area directly west of Pine Meadows.

There were a total of 34 residential burglaries that occurred between 2006 and 2008, within the buffer surrounding Woodland Park. Although we examined thirteen incidences within the

development, 19 of the reported residential burglaries, or 55.9% of the total burglaries within the buffer, occurred in the Woodland Park development. Our findings for both developments and buffer areas suggest that victimization was just as likely to occur within the public housing development as the proximal surrounding areas.

### **The Tree Trail Complex**

We compared the reported residential burglaries within our selected GHA developments to Tree Trail Apartments, a low-income high-crime development on the northeast side of town. Our intention was to determine whether the rate of occurrence within our development was similar to other low-income housing developments, not managed by the Gainesville Housing Authority.

Eighteen different units were victimized in Tree Trail Apartment between 2006 and 2008, three of which were victimized multiple times. We calculated the victimization rate, as discussed within the methodology section, for the three years ranged between 2,469 and 4,527 per 100,000 inhabitants. Our findings suggested that the Tree Trail Apartments was more likely to be victimized as a low-income development.

### **Comparing Gainesville Housing Authority Developments**

Although the development was significantly smaller than study developments and there were only a total of 6 reported residential burglaries during our time frame, the victimization rates within Caroline Manor were typically higher than the rates occurring in Pine Meadows and Woodland Park. The escorting law enforcement contributed the lower number of occurrences to the proximal distance of the surrounding public housing developments that were much larger in size. His belief was that criminals lived in one development while committing criminal activities in the adjacent developments<sup>2</sup>.

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<sup>2</sup> Information from a conversation held with Officer. Ernest Graham, GPD Crime Prevention Officer, September 23, 2009.

We found the lighting situation to be similar to, both, Pine Meadows and Woodland Park. We found minimal amounts of lighting fixtures contributing to acceptable illuminance levels, although visibility was difficult. We feel that extreme amounts of darkness potentially played a role in the majority of reported victimizations.

Vegetative landscaping in close proximity to the two points of entry, we found, not to be as overgrown as the vegetation in our study developments. However, we do feel that, similar to the victimized units on the east side of Pine Meadows, the adjacency of the woods to the point of entry potentially provided the dense cover needed to victimize those selected units.

### **Summary of the Discussion**

We understand that there are other potential variables, such as demographics, economics, and education, which might have played a role in the occurrence of the residential burglaries within our selected developments. However, we felt that lighting and landscaping would directly affect the occurrence rate by physically altering the characteristics of the area, thereby making the offender aware of higher risk factors.

In summary, while we were unable to adequately infer a direct statistical relationship between lighting and landscaping cues influencing the reported residential burglaries between 2006 and 2008, within the selected GHA developments, our findings suggest that the inadequate lighting and minimally-maintained landscaping contributed indirectly to the residential burglaries by diminishing the opportunities for surveillance to occur. The exterior house lights provided inadequate amounts of light to distinguish potential predators. The minimal amount of GRU-managed fixtures, both street lights and security yard lights, such as the mercury-vapor lamps seen in Pine Meadows and Woodland Park, need to provide higher illumination measurements to protect the safety of the residents and their guests. Street light measurements, directly beneath the fixture, suggest that closer positioning to points of entry might have warded

off offenders during evening occurrences. We also felt that the landscaping in the immediate vicinity of the points of entry, for the majority, was overgrown and under maintained. It was evident that landscaping, such as the grass, was maintained often; however, time and energy needs to be increased by the Gainesville Housing Authority to ensure that their landscaping does not provide cover for perpetrators to commit criminal acts.

Table 4-1. Calculated Burglary Crime Rates between January 1, 2006 and December 31, 2008

Year	# Of Incidences	Total Incidences	Estimated Population*	Population / 100,000	Crime Rate	Rate of Change
<b>USA</b>						
2006	2,183,746	6,585,082	299,397,484	2993.98484	729.4	
2007	2,179,140		301,621,157	3016.21157	722.5	- 0.95%
2008	2,222,196		304,059,724	3040.59724	730.8	+ 1.16%
<b>Florida</b>						
2006	170,873	541,173	18,089,888	180.89888	944.6	
2007	181,833		18,251,243	182.51243	996.3	+ 5.47%
2008	188,467		18,328,340	173.28340	1028.3	+ 3.21%
<b>Gainesville</b>						
2006	1420	4,324	110,009	1.10009	1298.8	
2007	1522		108,289	1.08289	1405.5	+ 8.89%
2008	1382		133,286	1.33286	1036.9	- 6.23%
<b>GHA**</b>						
2006	22	64	1972.5	0.019725	1115.3	
2007	24		1972.5	0.019725	1216.7	+ 9.09%
2008	18		1972.5	0.019725	912.5	- 5.00%
<b>Pine Meadows**</b>						
2006	3	9	180	0.0018	1666.7	
2007	6		180	0.0018	3333.3	+ 100.00%
2008	3		180	0.0018	1666.7	- 50.00%
<b>Woodland Park**</b>						
2006	7	19	382.5	0.003825	1830.1	
2007	6		382.5	0.003825	1568.6	- 14.29%
2008	6		382.5	0.003825	1568.6	- 0.00%
<b>Caroline Manor**</b>						
2006	2	6	63	0.00063	3174.6	
2007	3		63	0.00063	4761.9	+ 50.00%
2008	1		63	0.00063	1587.3	- 66.67%
<b>Tree Trail**</b>						
2006	6	21	243	0.00243	2469.1	
2007	4		243	0.00243	1646.0	- 33.34%
2008	11		243	0.00243	4526.7	+ 175.01%

Source: FBI UCR, 2006, 2007, 2008, and GPD RMS

\*The populations for the United States, Florida, and Gainesville were derived from the UCR Burglary Tables, available from the FBI. The populations for the GHA, Pine Meadows, Woodland Park, Caroline Manor, and Tree Trail Apartments were calculated by multiplying the total number of units within each development by 2.25, the estimated population per household according to the 2000 US Census

\*\*Gainesville Housing Authority Developments and Tree Trail Apartment burglary numbers only include residential burglary due to being housing

Table 4-2. Reported Residential Burglaries by Year and Development

<b>Housing Development</b>	<b>Address</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Totals</b>
<b>Lake Terrace</b>	SE 26 <sup>th</sup> Terrace & Street	3	2	3	8
<b>Caroline Manor</b>	Se 25 <sup>th</sup> Terrace	2	3	1	6
<b>Pinewood Meadows</b>	2626 East University Avenue	3	6	3	12
<b>Woodland Park</b>	1900 Se 4 <sup>th</sup> Street	7	6	6	19
<b>Forest Pines</b>	NE 25 <sup>th</sup> Street & Terrace & NE 26 <sup>th</sup> Terrace	3	3	2	8
<b>Eastwood Meadows</b>	925 SE 43 <sup>rd</sup> Street	No Data	No Data	No Data	No Data
<b>Oak Park</b>	100 NE 8 <sup>th</sup> Avenue	1	1	1	3
<b>Sunshine Park</b>	1901 NW 2 <sup>nd</sup> Street	1	0	0	1
<b>The 400</b>	400 NW 1 <sup>st</sup> Avenue	0	0	1	1
<b>Seminary Lane</b>	1019 NW 5 <sup>th</sup> Avenue	2	3	1	6
<b>Totals</b>		22	24	18	64

Source: GPD RMS

Table 4-3. Selected Residential Burglaries Incidences in Study Developments

From	To	#	Point of Entry
<b>Pine Meadows</b>			
12/12/06 0000 hours	12/27/06 0930 hours	A	Living Room Window (NE)
05/16/07 1300 hours	05/16/07 1500 hours	D	Window (S)
07/06/07 0615 hours	07/06/07 1600 hours	E	Bedroom Window
08/22/07 0730 hours	08/22/07 0740 hours	E	Bedroom Window
08/24/07 0930 hours	08/27/07 0930 hours	B	Back Door
04/21/08 1500 hours	04/21/08 2200 hours	C	Unknown
<b>Woodland Park</b>			
1/27/06 1030 hours	01/28/06 1000 hours	E	Open porch
04/21/06 2100 hours	04/02/06 0900 hours	J	Window (SW)
08/26/06 1230 hours	08/26/06 1800 hours	H	Unknown
09/02/06 1745 hours	09/02/06 1800 hours	A	Bedroom Window
11/16/06 1900 hours	11/16/06 2000 hours	F	Open porch
12/11/06 0630 hours	12/11/06 1515 hours	B	Back Door
04/17/07 0800 hours	04/17/07 1400 hours	K	Bedroom Window (SW)
05/08/07 1720 hours	05/08/07 2250 hours	G	Window (SW)
05/26/07 1400 hours	05/27/07 0200 hours	D	Window (SW)
06/20/07 2100 hours	06/21/07 0100 hours	K	Bedroom Window (SW)
10/11/07 1430 hours	10/12/07 0125 hours	C	Bedroom Window (E)
02/02/08 1700 hours	02/03/08 1600 hours	I	Window (E)
12/06/08 1200 hours	12/06/08 2240 hours	C	Bedroom Window (E)
<b>Caroline Manor</b>			
11/26/06 1400 hours	12/2/06 1200 hours	A	Back Door
04/13/07 0450 hours	04/13/07 0450 hours	B	Back Door (Occupied)
04/16/07 Unknown	04/16/07 2030 hours	A	Back Door

Source: GPD RMS

Table 4-4. Landscape Survey Completed in Pine Meadows

Case No. <sup>1</sup>	DOI	TOI	# <sup>2</sup>	POE	LANDSCAPE TYPE	HGHT	DNSTY (L, M, H)	DIST TO POE	OBSTRUCT OF VIEW (L, M, H)
026631	12/12/06	0000	A	Living Room Window (NE)	Bush	4.5'	L	2 feet	M
	-	-			Tree	45'	L	6 feet	M
	12/27/06	0930			Wall	8'	H	15 yds	M
013357	7/6/07	0615	E	Bedroom Window	Wood line (to E)	40'	M	10 yds	M
		-			1600	Wood line (to N)	40'+	M	15 yds
016775	8/22/07	0730	E	Bedroom Window	Wood line (to E)	40'	M	10 yds	M
		-			0740	Wood line (to N)	40'+	M	15 yds
017154	8/24/07	0930	B	Back Door	Tree	20'	L	4 feet	L
	-	-			Wall	8'	H	15 yds.	H
007603	4/21/08	1500	C	Unknown (Est. AC Removal)	Tree	20'	L	10 feet	L
		-			2200	Wall	8'	H	20 feet
009840	5/16/08	1300	D	Window (S)	Wood line (to E)	40'	H	18 yds	H
		-			1500	Tree	40'+	L	20 yds

Source: Site Visits (Pine Meadows, September 18 and 23, 2009)

Key: DOI = Day of Incident, TOI = Time of Incidence, # = Unit Number, POE = Point of Entry, HGHT = Height, DNSTY = Density, L = Low, M = Moderate, H= High, Dist. = Distance, Yds = Yards

Note: Survey conducted in order of unit numbers

<sup>1</sup> Due to confidentiality issues, we removed a portion of the case numbers.

<sup>2</sup> To protect the victim, we supplemented the original unit number with surrogate unit numbers.

Table 4-5. Lighting Survey Completed in Pine Meadows

#	POE	# OF FIXT	TYPE OF FIXT	DIST TO POE	FIXT HGT	MSR AT 5'	MSR AT 0'	TYPE OF LIGHT	TYPE OF HEAD
A	Living Room Window (NE)	1	Ext. House Light	11 yds	6'	0.04	0.01	Incandescent Bulb	Dome Light
E	Bedroom Window	1	Ext. House Light	15 yds	6'	0.05	0.01	Incandescent Bulb	Dome Light
		1	Street Light	19 yds	24'				
E	Bedroom Window	1	Ext. House Light	15 yds	6'	0.05	0.01	Incandescent Bulb	Dome Light
		1	Street Light	19 yds	24'				
B	Back Door	1	Ext. House Light	16 yds	6'	0.04	0.01	Incandescent Bulb	Dome Light
		1	Ext. House Light	19 yds	6'			Incandescent Bulb	Dome Light
C	Unknown	1	Ext. House Light	Taken at Rear Door	6'	0.09	0.07	Incandescent Bulb	Dome Light
		1	Street Light	20.4 yds	24'				Cobra Head
D	Window (S)	1	Street Light	22 yds.	24'	-	0.00	Mercury-Vapor	

Source: Site Visits (Pine Meadows, September 18 and 23, 2009)

Key: DOI = Day of Incident, TOI = Time of Incidence, # = Unit Number, POE = Point of Entry, FIXT = Fixtures, Dist. = Distance, HGT = Height, MSR = Measure, Ext. = Exterior

Note: Survey conducted in order of unit numbers

\* Measurements in foot candles

Table 4-6. Landscape Survey Completed in Woodland Park

Case No. <sup>9</sup>	DOI	TOI # <sup>10</sup>	POE	LANDSCAPE TYPE	HGHT	DNSTY (L, M, H)	DIST TO POE	OBSTRUCT OF VIEW (L, M, H)
002021	1/27/06 - 1/28/06	1030 - 1000	E	Open Porch	Trees	30'+	L	25 yds L
006672	4/1/06 - 4/2/06	2100 - 0900	J	Window (SW)	Bushes	18"	M	19 yds L
017139	8/26/06	1230 - 1800	H	Unknown	Wall Bushes/Trees	8' 2'-30'	H M	UNKWN H M
017759	9/2/06	1745 - 1945	A	Bedroom Window	Bushes Tree Tree	5' 12' 50'+	M L M	18" 5 yds 30 yds M L M
023875	11/16/06	1900 - 2000	F	Open Porch	Bushes	10'	L	20 yds L
025608	12/11/06	0630 - 1515	B	Back Door	Bush Wood line	6' 25'+	H H	8 yds 23 yds H H
007660	4/17/07	0800 - 1400	K	Bedroom Window (SW)	Bush	8'+	H	Adjacent H

<sup>9</sup> Due to confidentiality issues, we removed a portion of the case numbers.

<sup>10</sup> To protect the victim, we supplemented the original unit number with surrogate unit numbers.

Table 4-6. Continued

009188	5/8/07	1720 - 2250	G	Window (SW) (AC Removed)	N/M	N/M	N/M	N/M	N/M
010653	5/26/07 - 5/27/07	1400 - 0200	D	Window (SW) (AC Removed)	Bushes Wood line Wall	8' 10' 8'	H H H	12 yds 6 yds 6 yds	M H H
012281	6/20/07 - 6/21/07	2100 - 0100	K	Bedroom Window (SW)	Bush	8'+	H	Adjacent	H
021347	10/11/07 - 10/12/07	1340 - 0125	C	Bedroom Window (E)	N/A	N/A	N/A	N/A	L
002312	2/2/08 - 2/3/08	1700 - 1600	I	Window (E)	N/A	N/A	N/A	N/A	L
024197	12/6/08	1200 - 2240	C	Bedroom Window (E)	N/A	N/A	N/A	N/A	L

Source: Site Visits (Pine Meadows, September 18 and 23, 2009)

Key: DOI = Day of Incident, TOI = Time of Incidence, # = Unit Number, POE = Point of Entry, HGHT = Height, DNSTY = Density, Dist. = Distance, N/M = Not Measured, N/A = Not Applicable (No Elements within Proximity)

Note: Survey conducted in order of unit numbers

Table 4-7. Lighting Survey Completed in Woodland Park

#	POE	# OF FIXT	TYPE OF FIXT	DIST TO POE	FIXT HGT	MSR AT 5'	MSR AT 0'	TYPE OF LIGHT	TYPE OF HEAD
E	Open Porch	2	Street Light	25 yds	24'	N/M	N/M		Cobra Head
J	Window (SW)	1	Street Light	27.3 yds	24'	0.31	0.23	Incandescent Bulb	Cobra Head
		1	Ext. House Light	8 yds	6'				Dome Light
H	Unknown	2	Street Light	UNKWN	24'	0.19	0.13	Incandescent Bulb	Cobra Head
		2	Ext. House Light		24'				6'
A	Bedroom Window	2	Street Light	29 yds 20 yds	30' 23'	0.38	0.31		Cobra Head
F	Open Porch	-	N/M	N/M	N/M	N/M	N/M	N/M	N/M
B	Back Door	1	Street Light	17.3 yds	24'	0.05	0.01	Incandescent Bulb	Cobra Head
		1	Ext. House Light (not work)	10'	6'				Dome Light
K	Bedroom Window (SW)	1	Ext. House Light	5 yds	6'	0.04	0.01	Incandescent Bulb	Dome Light

Table 4-7. Continued

G	Window (SW) (AC Removed)	1	Street Light	27.4 yds	24'	0.29	0.23	Incandescent Bulb	Cobra Head
		1	Ext. House Light	8 yds	6'				Dome Light
D	Window (SW) (AC Removed)	1	Street Light	28 yds	24'	0.31	0.24	Incandescent Bulb	Cobra Head
		1	Ext. House Light	3 yds	6'				Dome Light
K	Bedroom Window (SW)	1	Ext. House Light	5 yds	6'	0.04	0.01	Incandescent Bulb	Dome Light
C	Bedroom Window (E)	1	Ext. House Light	4 yds	6'	0.05	0.01	Incandescent Bulb	Dome Light
I	Window (E)	1	Ext. House Light	6.2 yds	6'	0.21	0.17	Incandescent Bulb	Dome Light
C	Bedroom Window (E)	1	Ext. House Light	4 yds	6'	0.05	0.01	Incandescent Bulb	Dome Light

Source: Site Visits (Pine Meadows, September 18 and 23, 2009)

Key: DOI = Day of Incident, TOI = Time of Incidence, # = Unit Number, POE = Point of Entry, FIXT = Fixtures, Dist. = Distance, HGT = Height, MSR = Measure, Ext. = Exterior

Note: Survey conducted in order of unit numbers

\* Measurements in foot candles

Table 4-8. Landscape Survey Completed in Caroline Manor

Case No. <sup>1</sup>	DOI	TOI	# <sup>2</sup>	POE	LANDSCAPE TYPE	HGHT	DNSTY (L, M, H)	DIST TO POE	OBSTRUCT OF VIEW (L, M, H)
024963	11/26/06	1400	A	Rear Door	Wood Line	45'+	H	20 yds	H
	-	-			Tree	40'	M	11.7 yds	M
	12/02/06	1200			Tree	40'	M	13.6 yds	M
					Bushes	2.5'	M	1 yds	L
007331	04/13/07	0450	B	Rear Door (Occupied)	Wood Line	30'+	M	20 yds	E
					Tree	40'+	M	7 yds	M
					Bushes	3'	L	1.5 yds	L
007604	04/16/07	Unkn	A	Rear Door	Wood Line	45'+	H	20 yds	H
		-			Tree	40'	M	11.7 yds	M
		2030			Tree	40'	M	13.6 yds	M
					Bushes	2.5'	M	1 yds	L

Source: Site Visits (Caroline Manor, September 23, 2009)

Key: DOI = Day of Incident, TOI = Time of Incidence, # = Unit Number, POE = Point of Entry, HGT = Height, DNSTY = Density, L = Low, M = Moderate, H= High, Dist. = Distance, Unkn= Unknown, Yds = Yards

Note: Survey conducted in order of unit numbers

<sup>1</sup> Due to confidentiality issues, we removed a portion of the case numbers.

<sup>2</sup> To protect the victim, we supplemented the original unit number with surrogate unit numbers.

Table 4-9. Lighting Survey Completed in Caroline Manor

#	POE	# OF FIXT	TYPE OF FIXT	DIST TO POE	FIXT HGT	MSR AT 5'*	MSR AT 0'*	TYPE OF LIGHT	TYPE OF HEAD
A	Rear Door	1	Ext. House Light	1.5 yards	6'	0.13	0.08	Incandescent Bulb	Dome Light
A	Rear Door	1	Ext. House Light	1.5 yards	6'	0.13	0.08	Incandescent Bulb	Dome Light
B	Rear Door	1	Ext. House Light	1.5 yards	6'	0.15	0.11	Incandescent Bulb	Dome Light

Source: Site Visits (Pine Meadows, September 18 and 23, 2009)

Key: DOI = Day of Incident, TOI = Time of Incidence, # = Unit Number, POE = Point of Entry, FIXT = Fixtures, Dist. = Distance, HGT = Height, MSR = Measure, Ext. = Exterior

Note: Survey conducted in order of unit numbers

\* Measurements in foot candles

Table 4-10. Additional Light Measurements Taken in Each Development

	<b>Location 1</b>	<b>Location 2</b>	<b>Location 3</b>	<b>Average</b>
<b>Pine Meadows</b>				
<b>East</b>				
At 5 feet	2.70	2.75	2.73	2.73
At Ground	2.05	2.08	2.06	2.06
<b>West</b>				
At 5 feet	2.72	2.71	2.70	2.71
At Ground	2.06	2.05	2.03	2.05
<b>Woodland Park</b>				
<b>Zone 1</b>				
At 5 Feet	2.74	2.72		2.73
At Ground	2.08	2.04		2.06
<b>Zone 2</b>				
At 5 Feet	2.69	2.71		2.70
At Ground	2.02	2.06		2.04
<b>Zone 3</b>				
At 5 Feet	2.71	2.70		2.71
At Ground	2.08	2.04		2.06
<b>Caroline Manor</b>				
At 5 Feet	2.68	2.71	2.69	2.69
At Ground	2.01	2.02	2.01	2.01

Source: Measurements taken by Officer Ernest Graham

Table 4-11. Summary of Study Development Lighting and Landscaping Findings

Development	# of Studied Incidences	Light Msrmts* >0.05 ; 2.5<	Light Msrmts* 0.05< ; > 2.5	Aver. Low Landscaping	Moderate Landscaping	High Landscaping	Day Surveil (L,M,H)	Evening Surveil (L,M,H)
Pine Meadows	6	2	3	1	5	0	M	M
Woodland Park	13	4	9	2	3	4	M	L
Caroline Manor	3	0	3	0	3	0	M	L

Source: Summary of findings

Key: Msrmts = Measurements, Aver. = Average, Surveil = Surveillability Opportunities, L = Low, M = Moderate, H = High

\* Measurements in foot candles

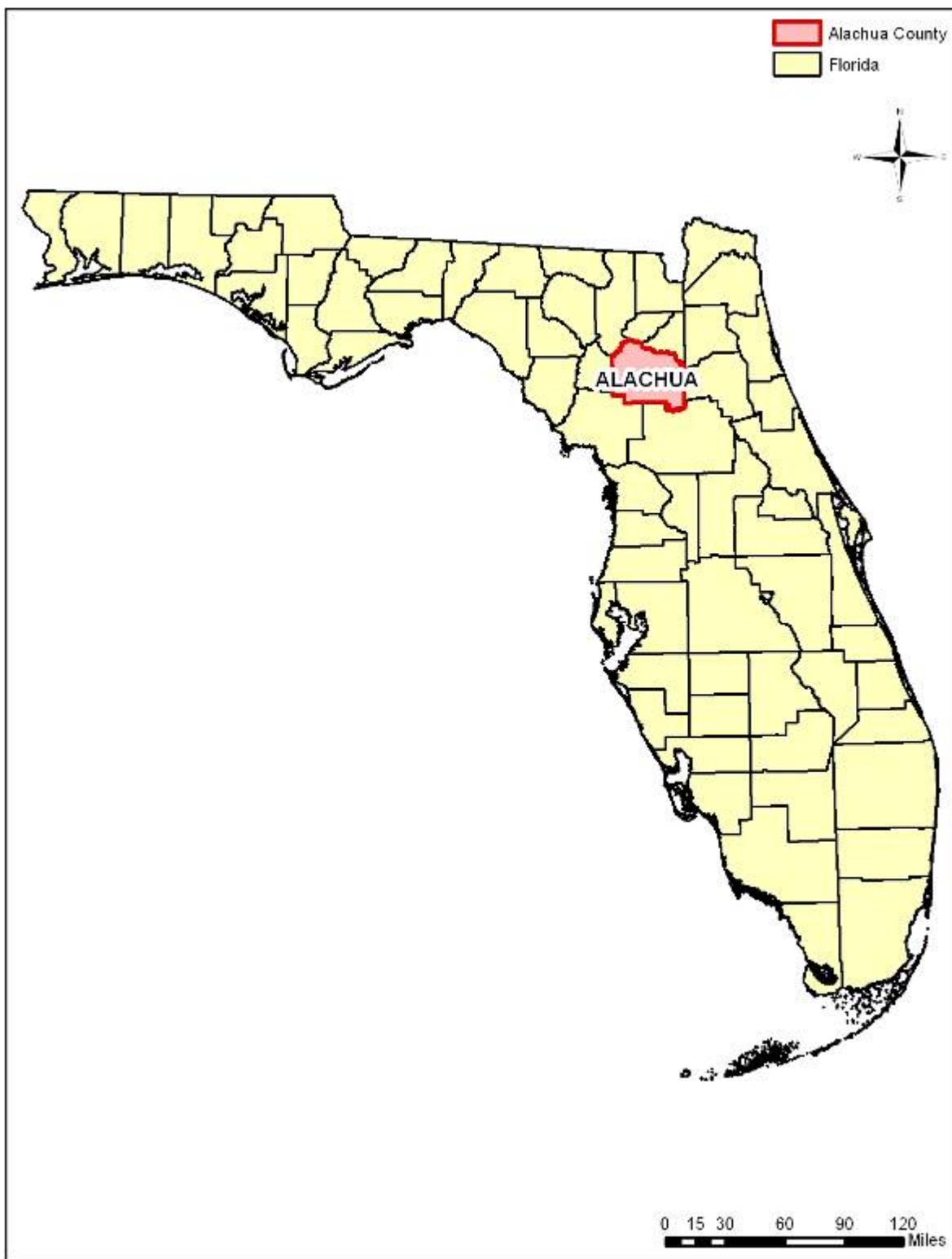


Figure 4-1 Alachua County, Florida

Source: Florida Geographic Database Library (FGDL)

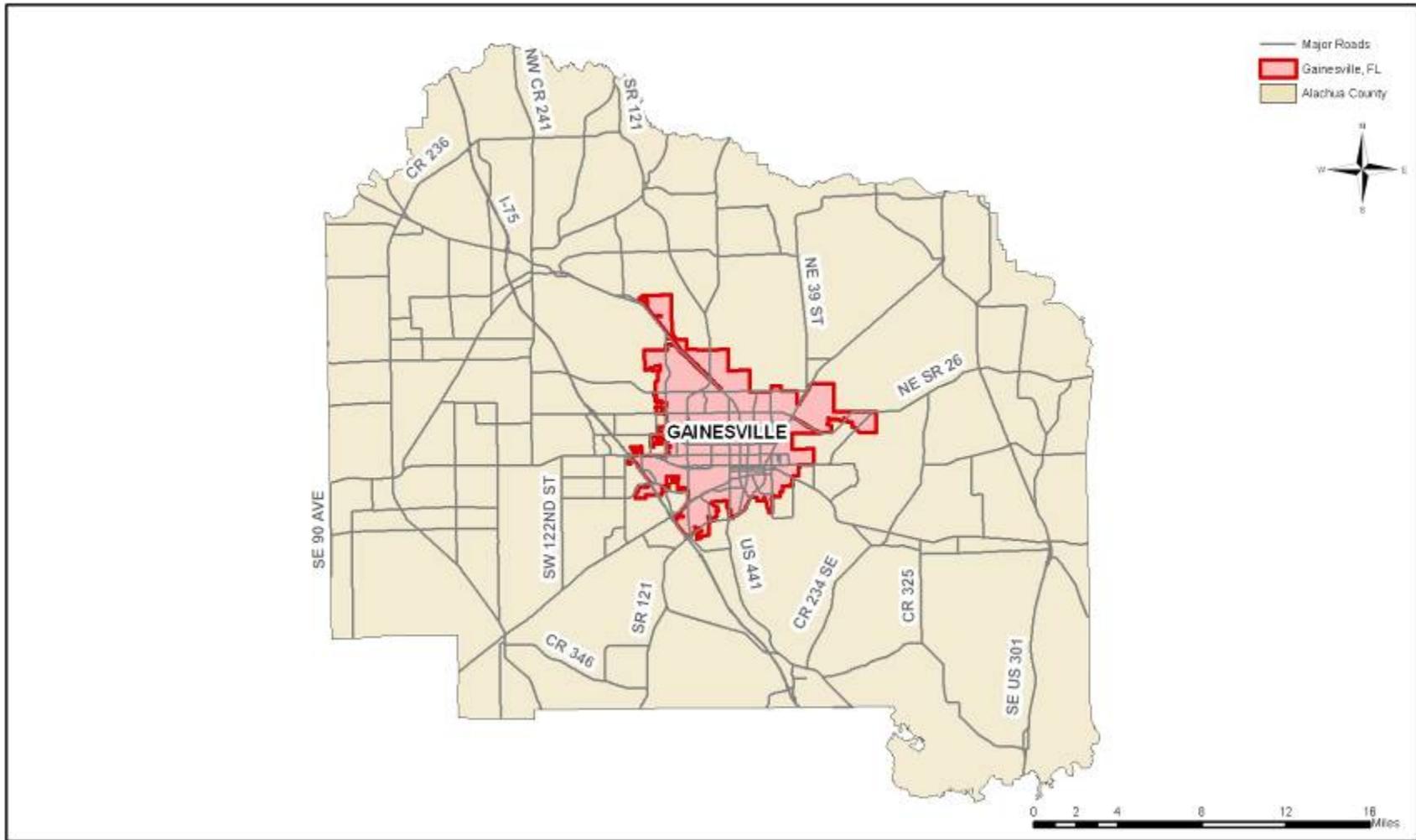


Figure 4-2. Gainesville, Florida

Source: FGDL

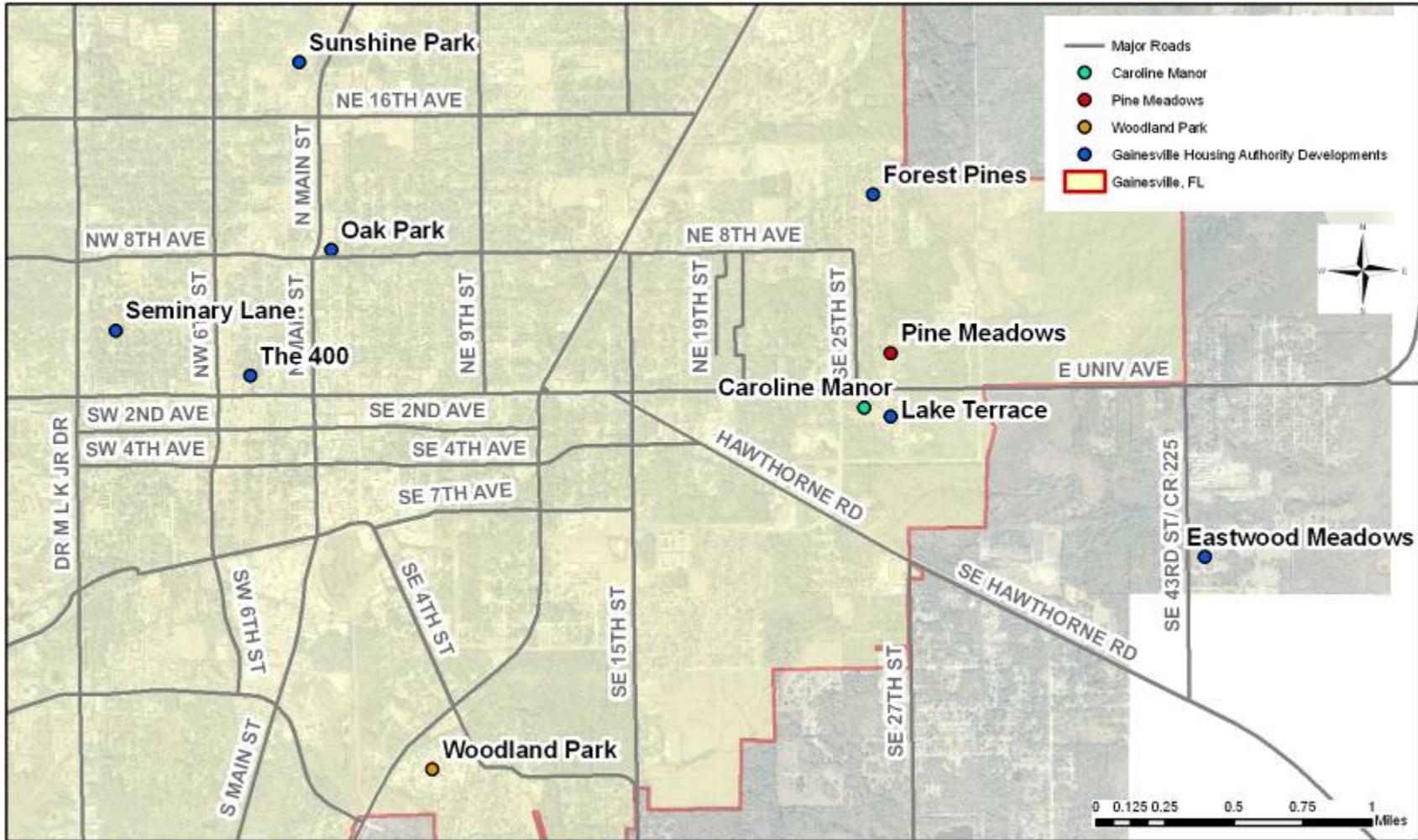


Figure 4-3. Properties managed by the Gainesville Housing Authority

Sources: FGDL, and GPD.

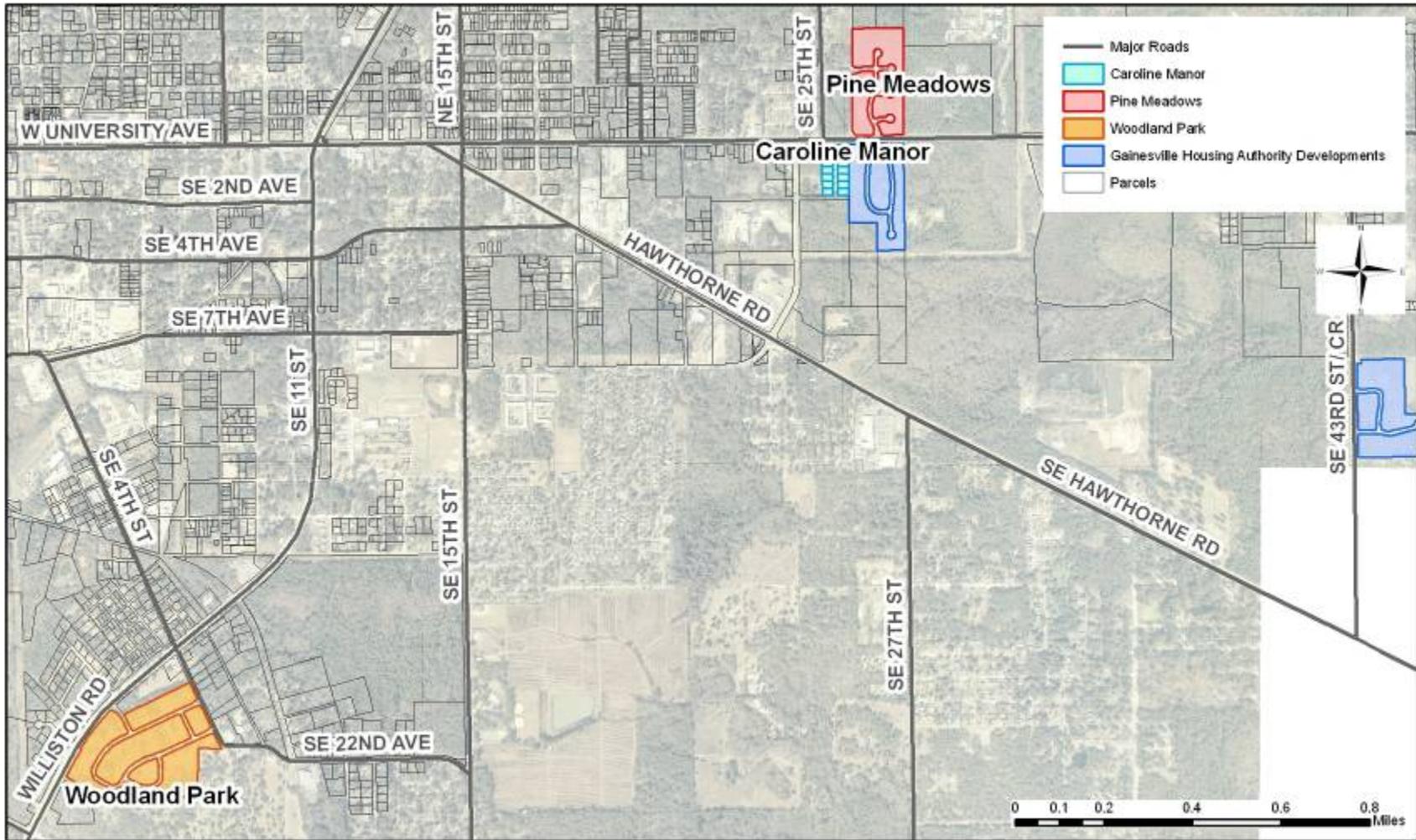


Figure 4-4. Selected Gainesville Housing Authority Study Developments

Sources: Alachua County Property Appraiser, FGDL, and GPD.

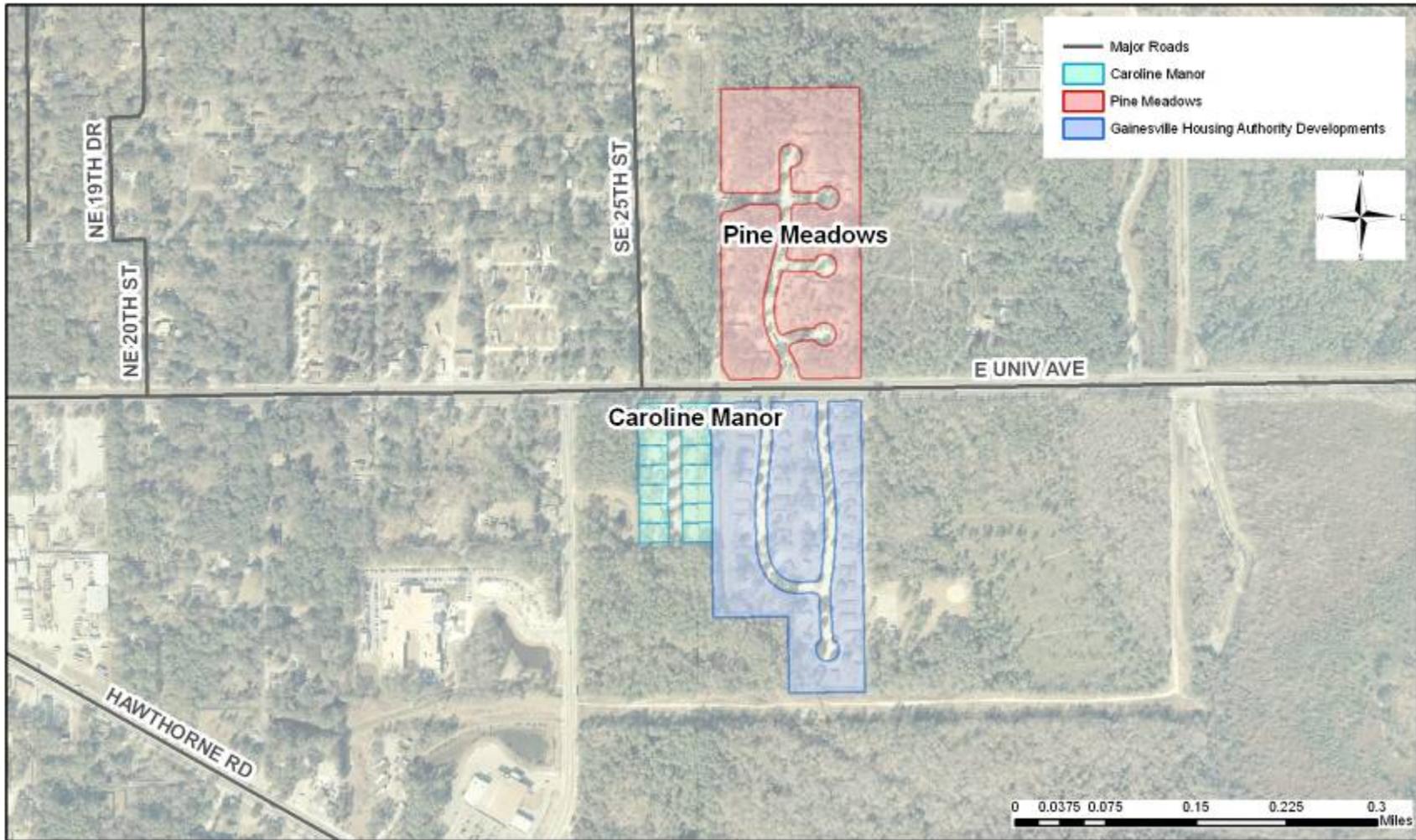


Figure 4-5. Location of the Pine Meadows Development

Sources: Alachua County Property Appraiser, FGDL, and GPD.

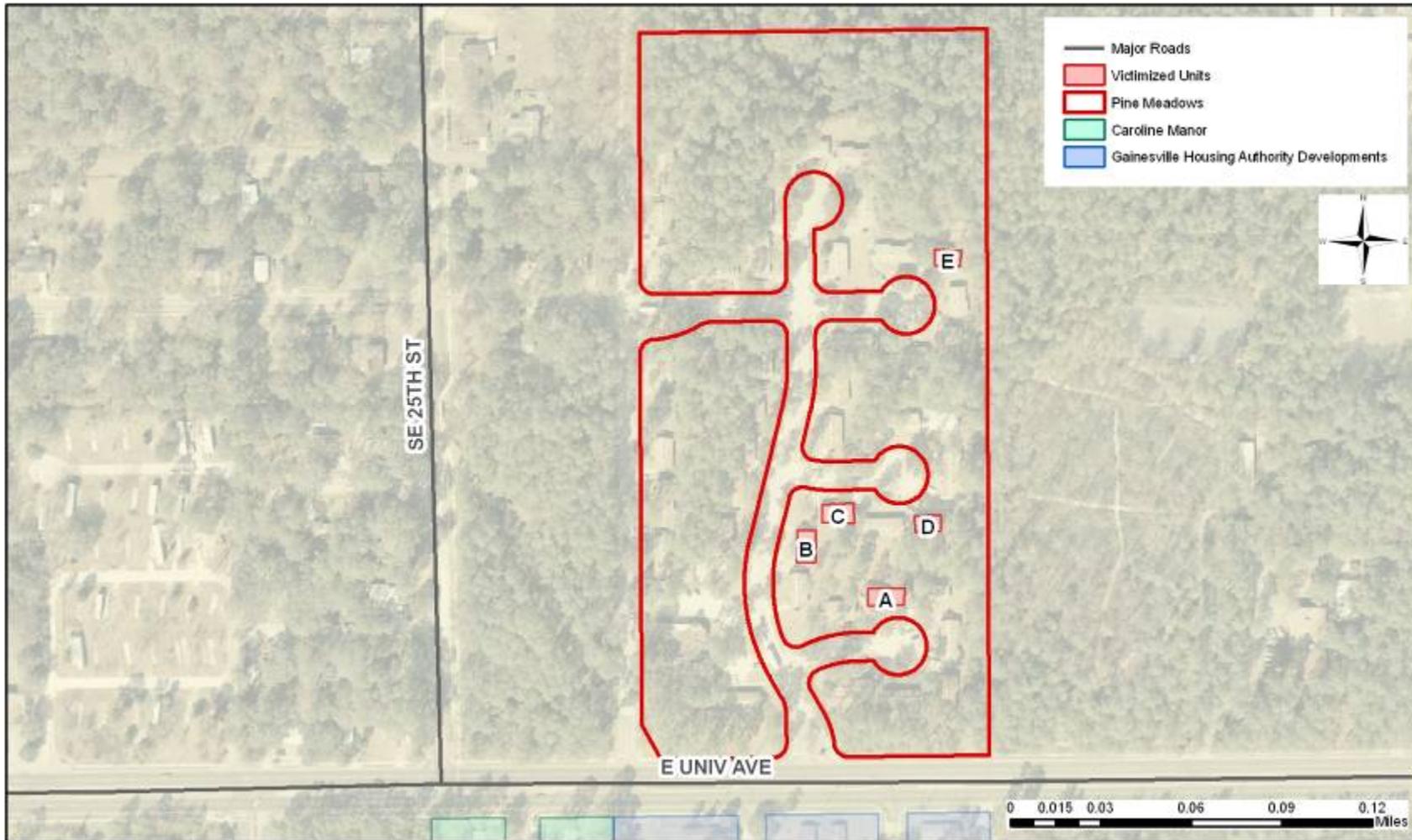


Figure 4-6. Pine Meadows Victimized Units

Source: Alachua County Property Appraiser, FGDL, and Gainesville Police Department

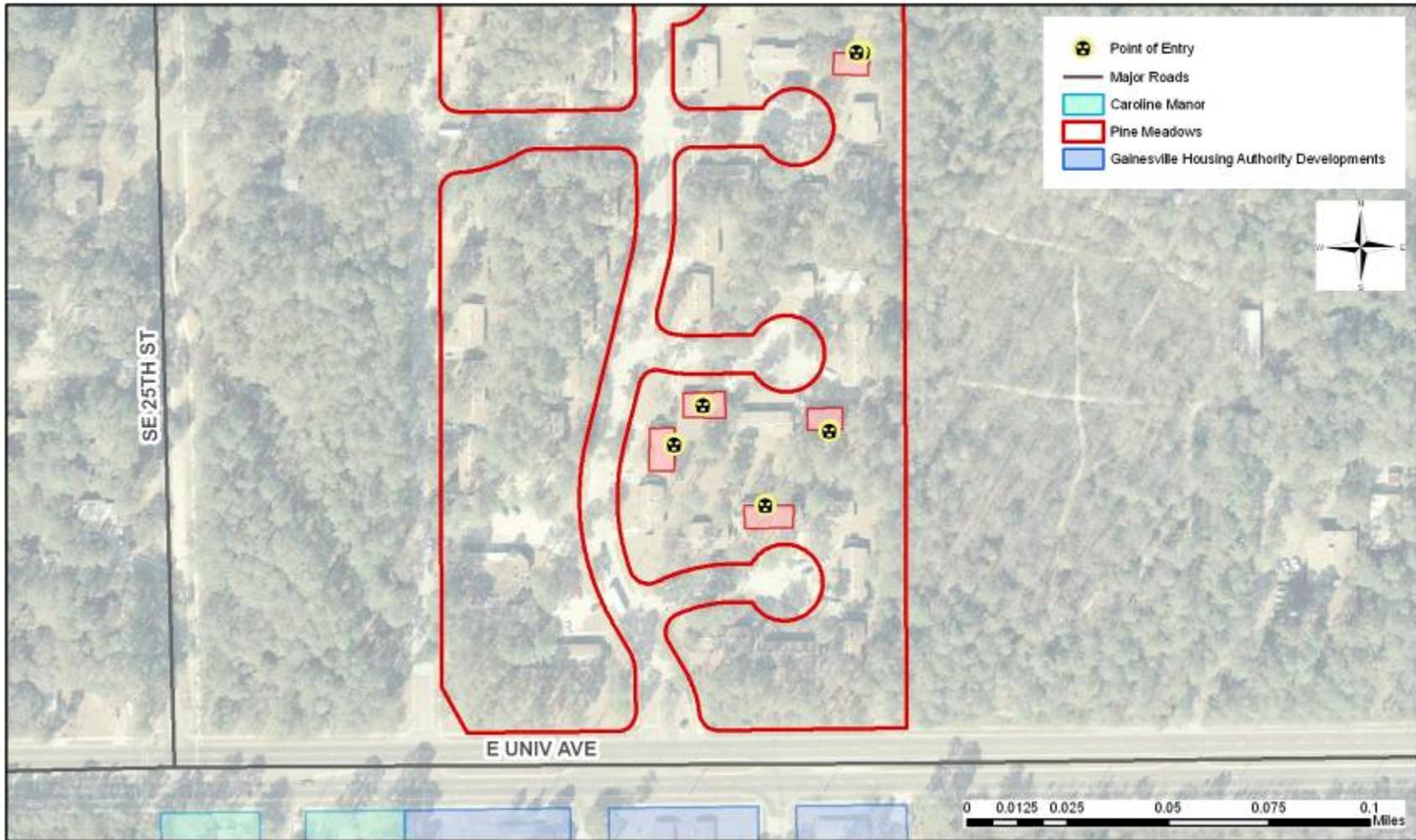


Figure 4-7. Points of Entry in Pine Meadows Victimized Units

Source: Alachua County Property Appraiser, FGDL, and Gainesville Police Department



Figure 4-8. Non-Structural Wall at the Main Entry of the Residences

Source: Photo by author



Figure 4-9. Example of Landscaping Observed in Pine Meadows

Source: Photo by author



Figure 4-10. Fencing In Proximity to Unit E

Source: Photo by author

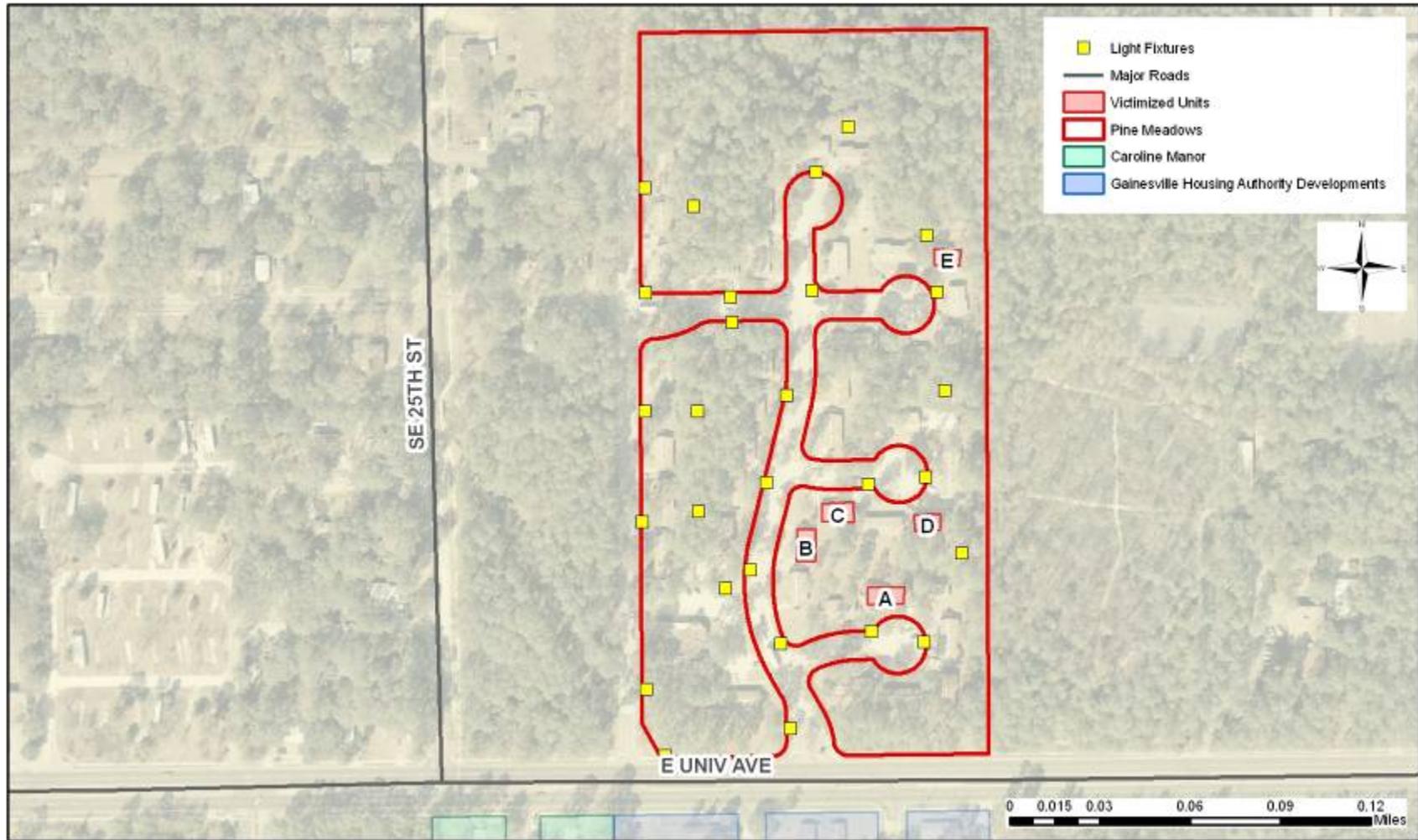


Figure 4-11. Location of Light Fixtures within the Pine Meadows Development

Sources: Alachua County Property Appraiser, GPD, and Public Works.

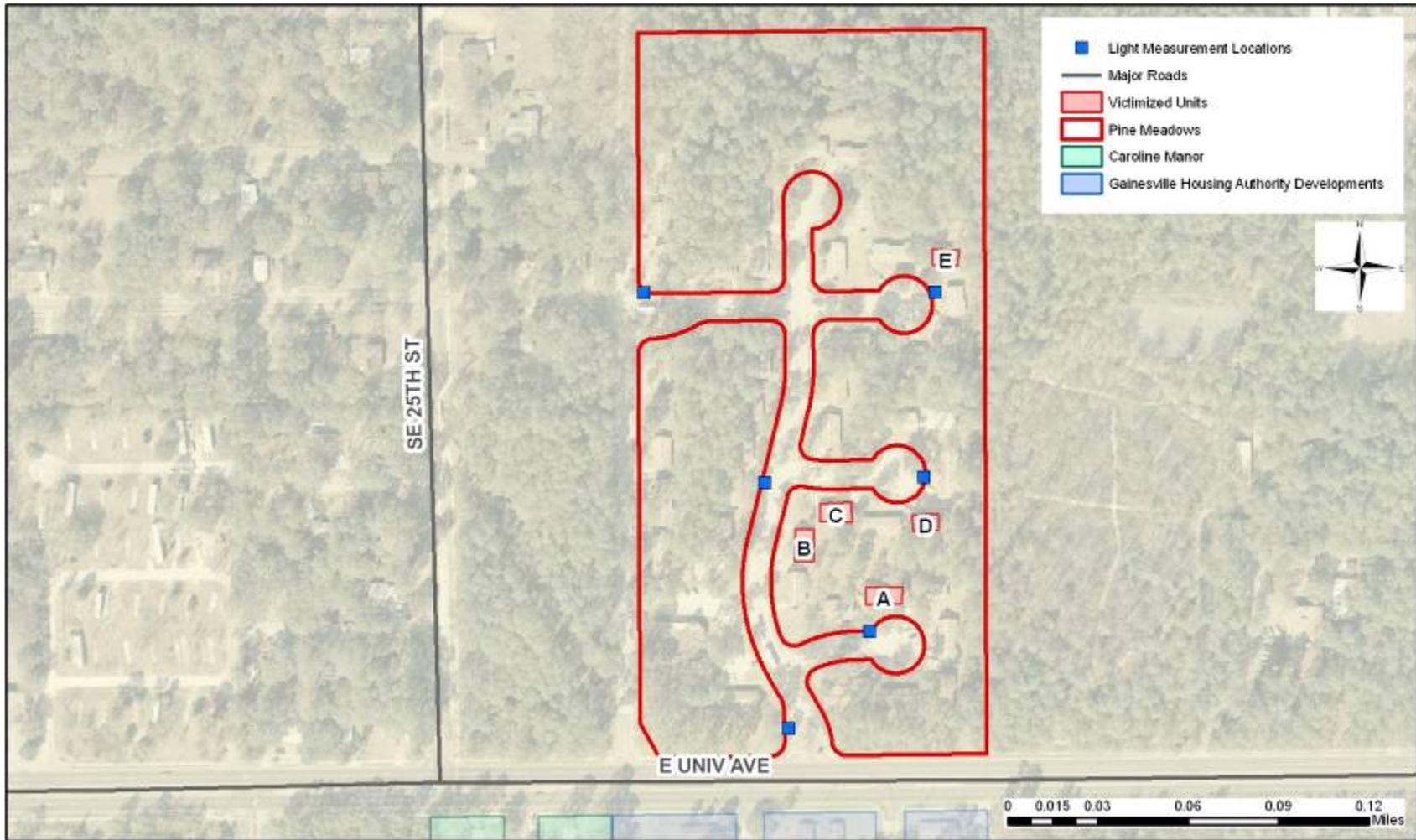


Figure 4-12. Locations where Additional Light Measurements were taken at Pine Meadows

Sources: Alachua County Property Appraiser, GPD, and Public Works.



Figure 4-13. Location of the Woodland Park Development

Sources: Alachua County Property Appraiser, FGDL, and GPD.

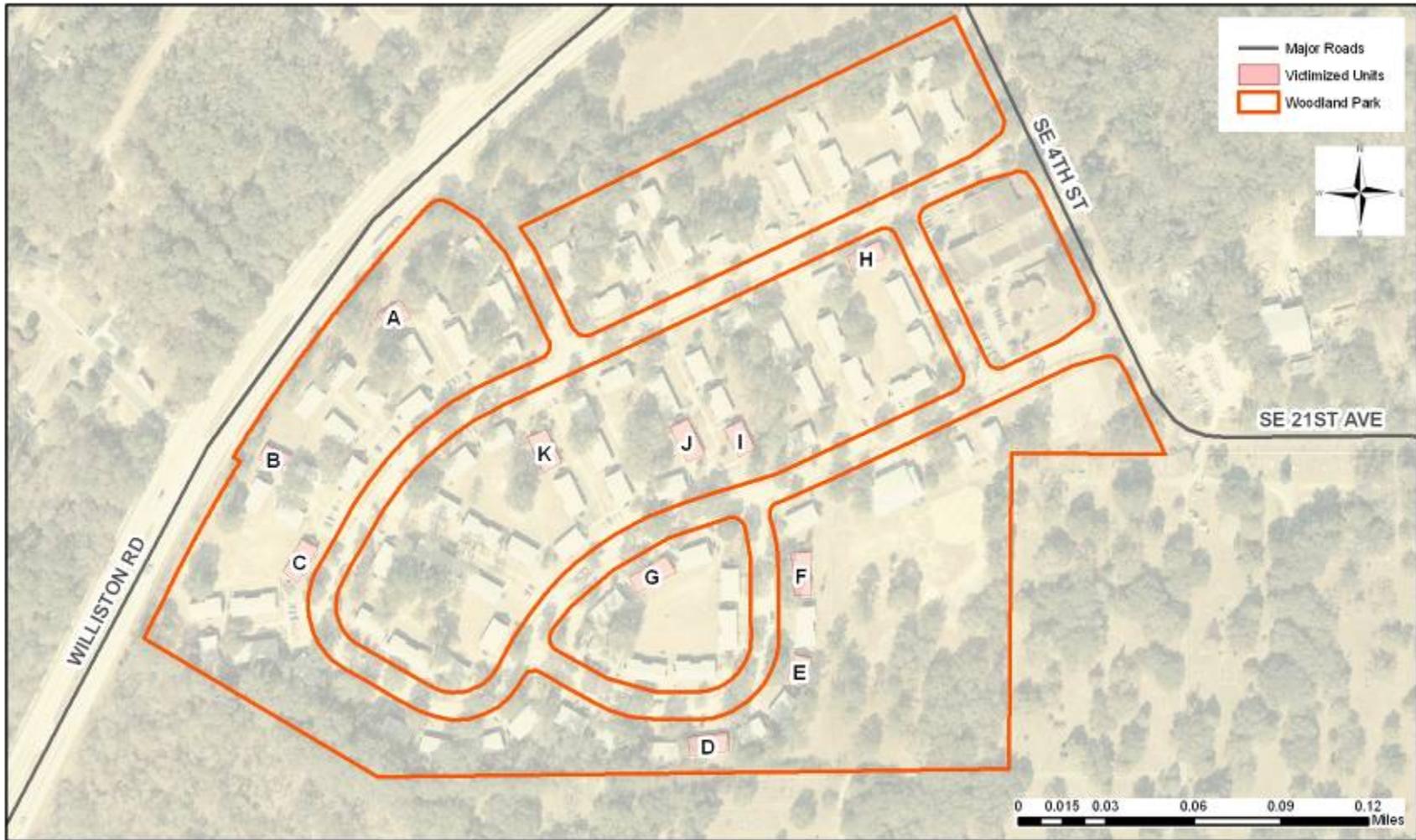


Figure 4-14. Woodland Park Victimized Units

Source: Alachua County Property Appraiser, FGDL, and Gainesville Police Department

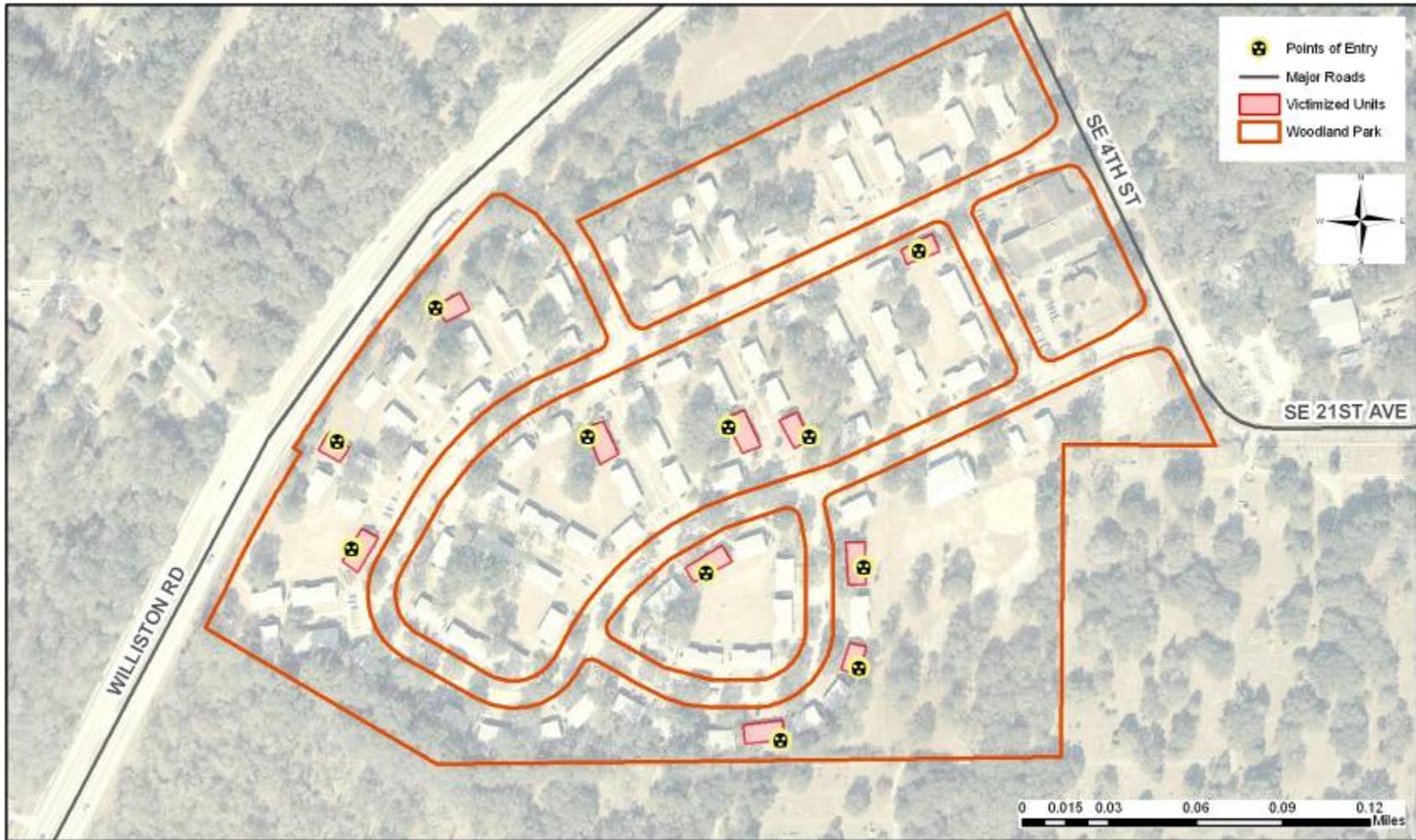


Figure 4-15. Points of Entry in Woodland Park Victimized Units

Source: Alachua County Property Appraiser, FGDL, and Gainesville Police Department



Figure 4-16. Landscaping between Unit A and Williston Road [Image provided by Google Maps, © 2009.]



Figure 4-17. Opening in Fence Separating Victimized Unit B and Williston Road

Source: Photo by author



Figure 4-18. Landscaping in the Vicinity of Unit D

Source: Photo by author



Figure 4-19. Landscaping in the Vicinity of Unit K

Source: Photo by author

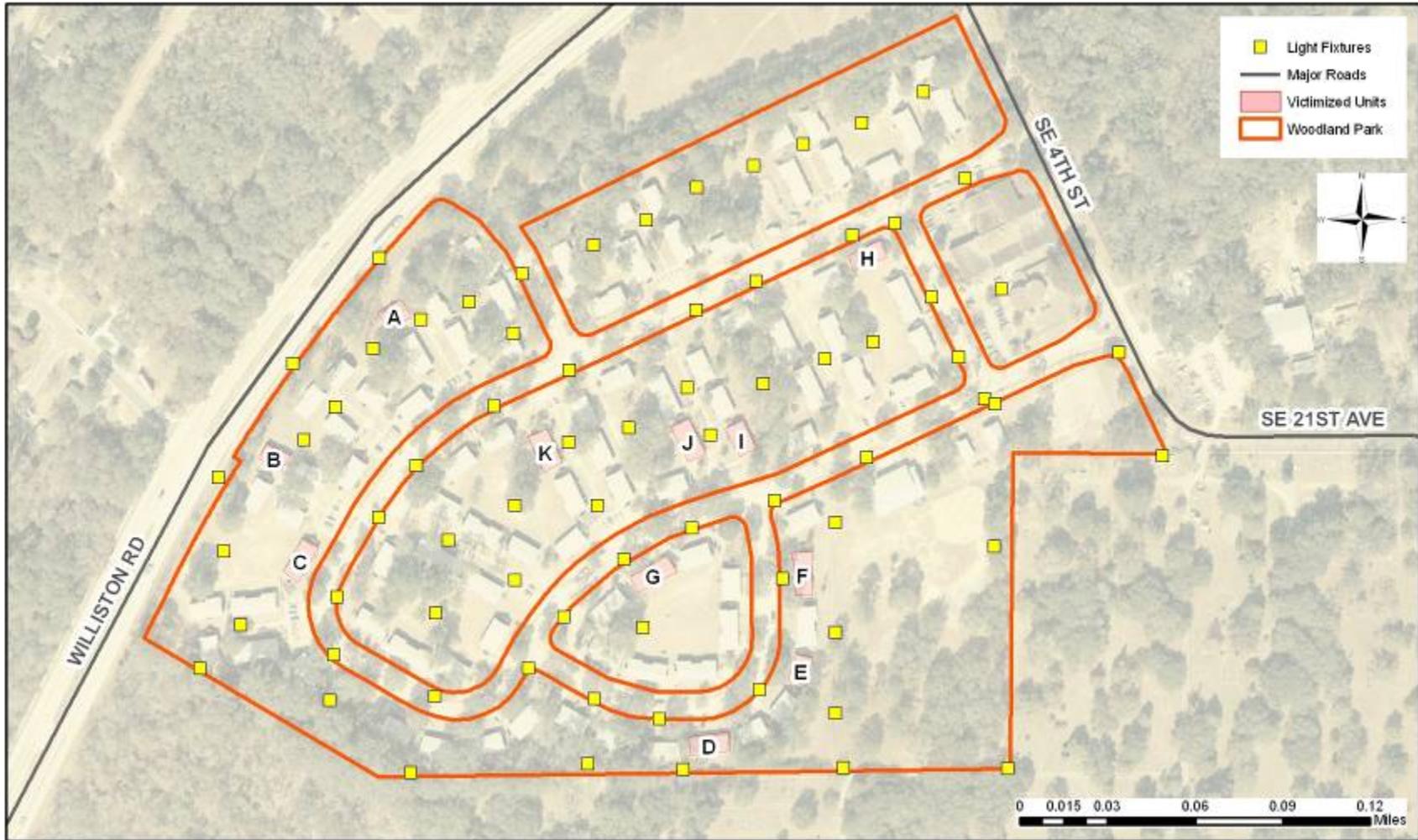


Figure 4-20. Location of Light Fixtures within the Woodland Park Development

Sources: Alachua County Property Appraiser, GPD, and Public Works.



Figure 4-21. Cobra Head Light Fixture  
Source: Photo by author



Figure 4-22. Mercury-Vapor Fixture  
Source: Photo by author



Figure 4-23. Lighting Quality Directly Beneath a Street Light Fixture in Evening Hours

Source: Photo by author

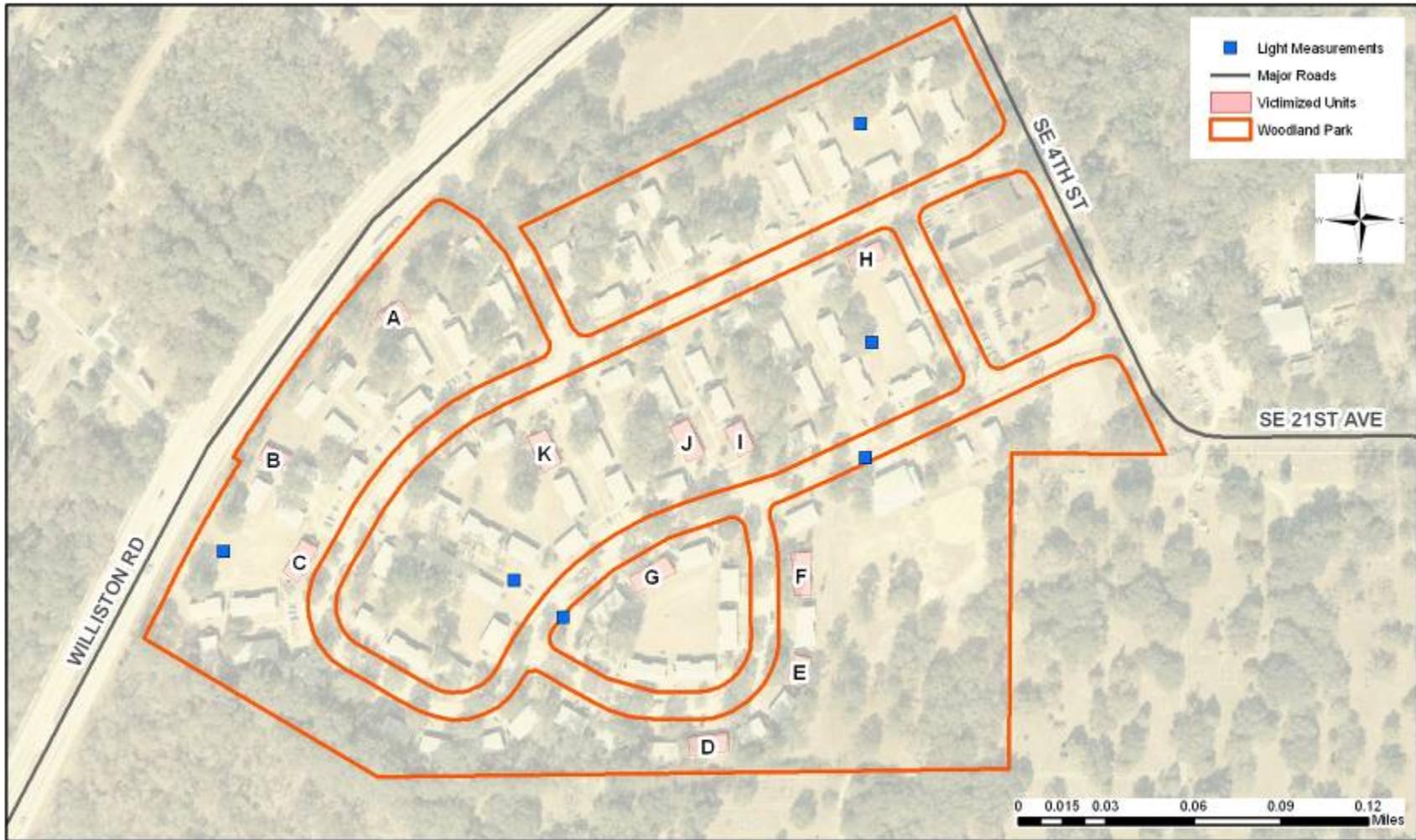


Figure 4-24. Locations where Additional Light Measurements were taken at Woodland Park

Sources: Alachua County Property Appraiser, GPD, and Public Works.



Figure 4-25. Location of the Caroline Manor development

Source: Alachua County Property Appraiser, GPD.



Figure 4-26. Points of Entry in Caroline Manor Victimized Units

Source: Alachua County Property Appraiser, FGDL, and Gainesville Police Department



Figure 4-27. Half-Wall located at the North and South Ends of Each Unit in the Caroline Manor Development [Image provided by Google Maps, © 2009.]

Note: Due to our only visit to Caroline Manor, we were unable to document the site with our camera. Therefore, we used a map from Google Maps Street View.



Figure 4-28. Location of Light Fixtures within the Caroline Manor Development

Sources: Alachua County Property Appraiser, GPD, and Public Works.



Figure 4-29. Locations where Additional Light Measurements were taken at Caroline Manor

Sources: Alachua County Property Appraiser, GPD, and Public Works.

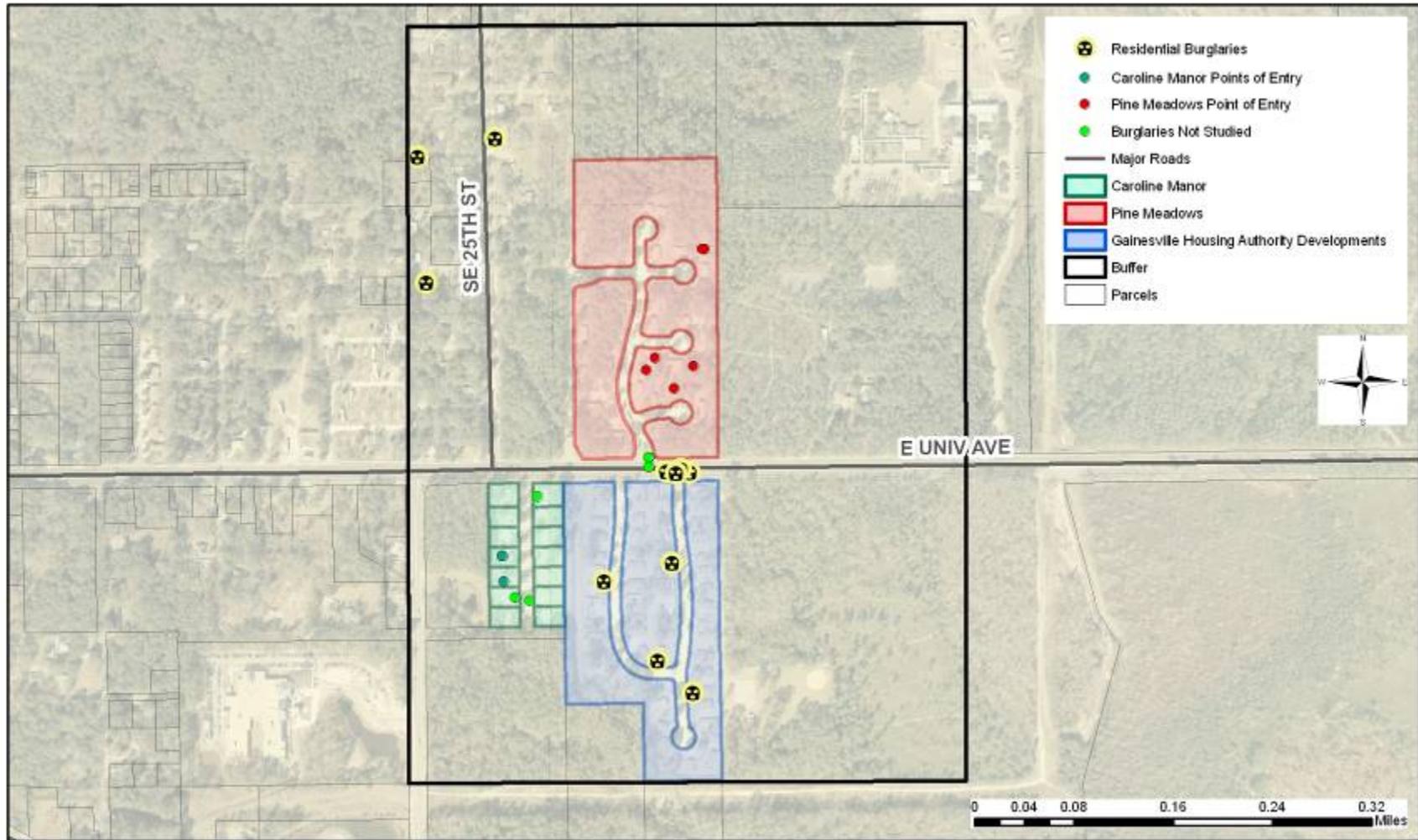


Figure 4-30. Residential Burglaries that Occurred within the Two-Block Buffer around Caroline Manor and Pine Meadows

Sources: Alachua County Property Appraiser, and GPD.

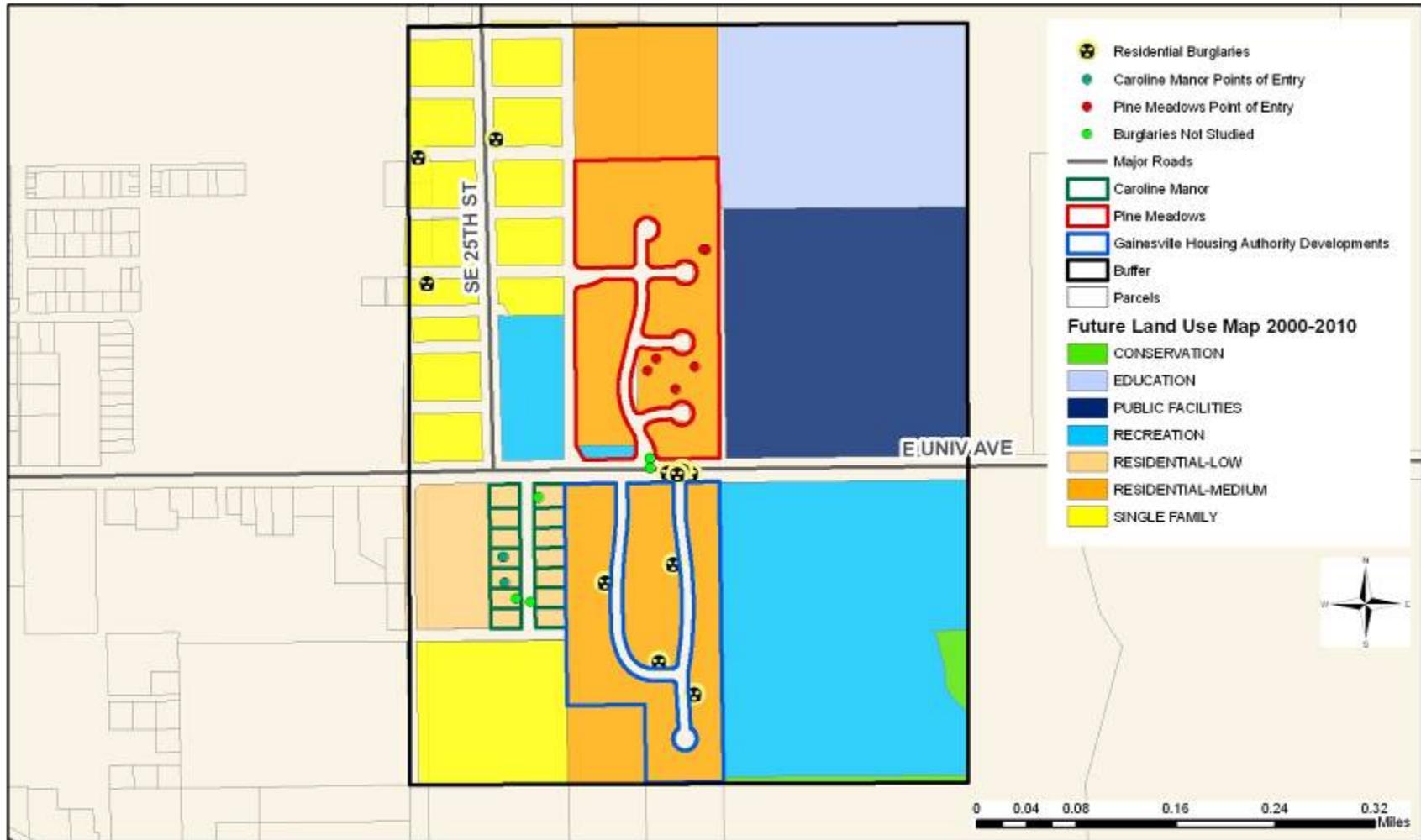


Figure 4-31. Land Uses within the Two-Block Buffer around Caroline Manor and Pine Meadows

Sources: Alachua County Property Appraiser, and GPD.

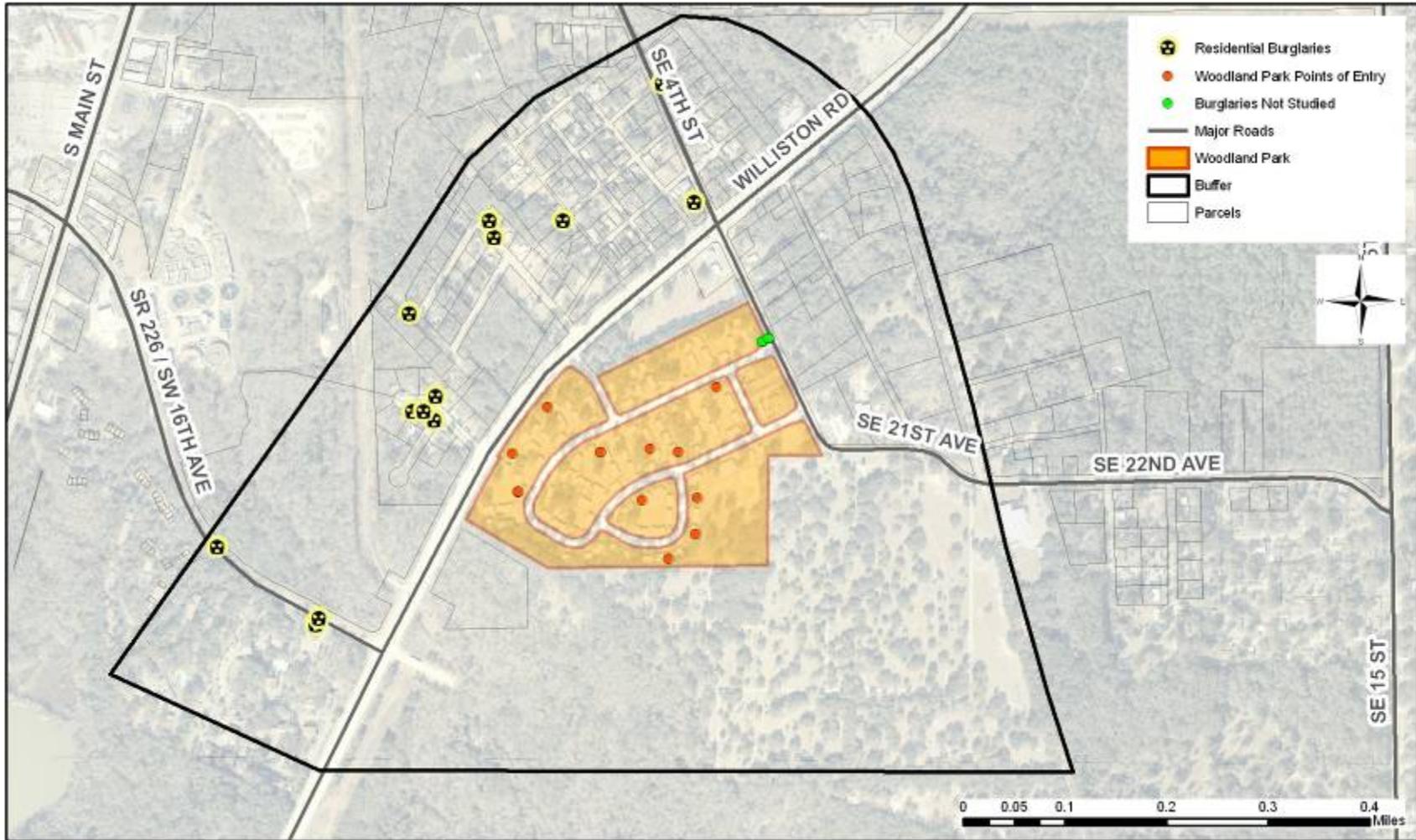


Figure 4-32. Residential Burglaries that Occurred within the Two-Block Buffer around Woodland Park

Sources: Alachua County Property Appraiser, and GPD.

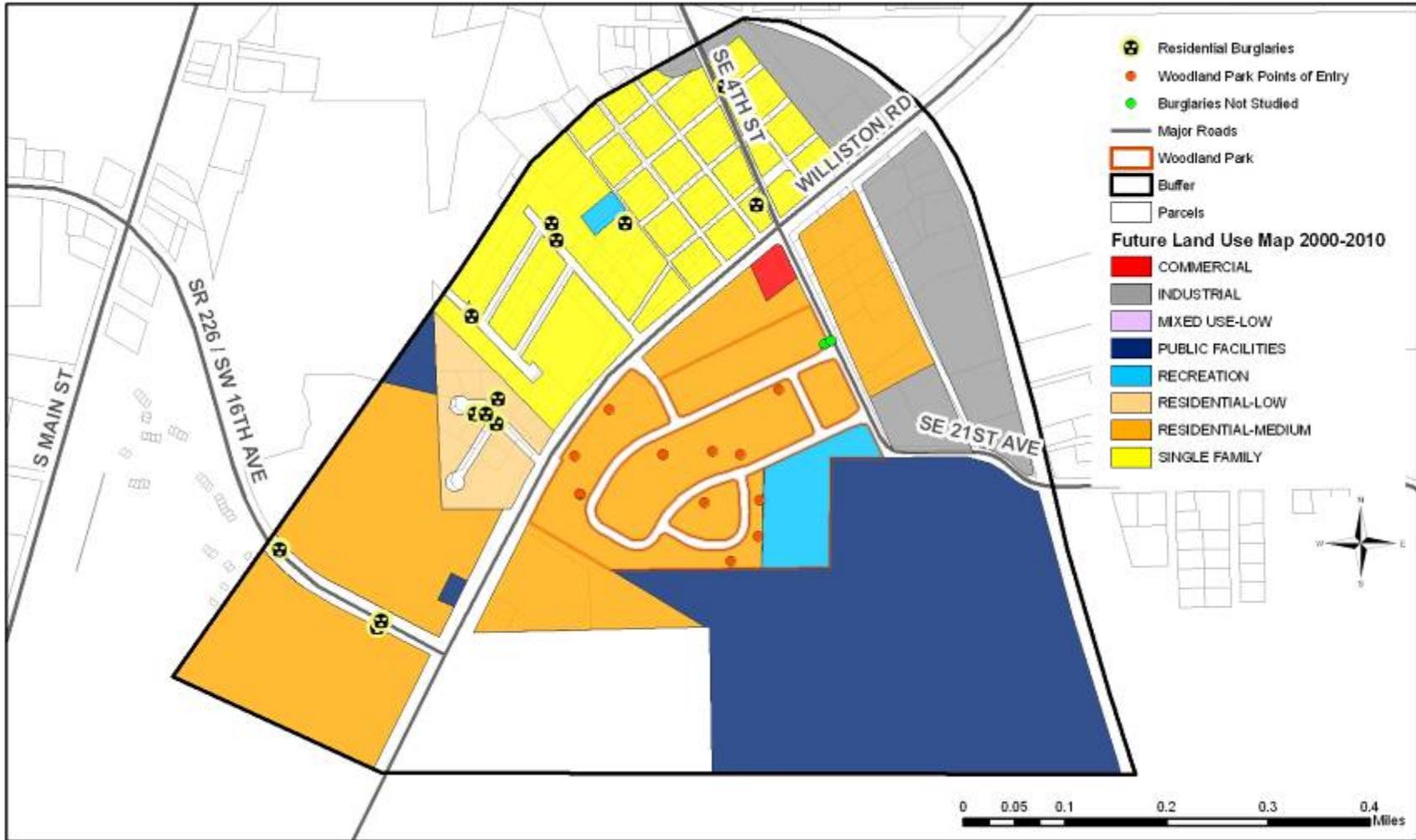


Figure 4-33. Land Uses within the Two-Block Buffer around Woodland Park

Sources: Alachua County Property Appraiser, and GPD.



Figure 4-34. Example of Landscaping for Beautification Purposes

Source: Photo by author



Figure 4-35. Tree Trail Apartments & Burglaries

Source: Alachua County Property Appraiser, FGDL, and GPD.

## CHAPTER 5 CONCLUSIONS & RECOMMENDATIONS

Our Conclusion section provides information about the literature related to the physical environment and crime and our research process, the limitations of our research, suggested future research, and recommendations directly related to lighting and landscaping, as they relate to safety. We understand there are reasons for our inability to conclusively infer a direct relationship between the lighting and landscaping as they related to the residential burglaries in Pine Meadows, Woodland Park, and Caroline Manor, the Gainesville Housing Authority (GHA) developments we observed.

### **Crime and the Physical Environment**

Studies suggest that offenders rely on various types of environmental cues when selecting a target for victimization. Demographics, economics, education, and physical environmental elements are all suggested to contribute to the offender's selection process. Attempting to prevent the possibility for victimization to occur should be a key responsibility. This thesis examined whether lighting and landscaping, which are physical environmental cues, contributed to the occurrence of residential burglary victimization within select GHA developments.

Our literature review examined research suggesting that the physical environment contributes to the occurrence of crime. Studies suggest that criminal activity can be prevented, or at least reduced, by designing an environment with specific criteria, primarily focused on the safety of the site and its inhabitants. While previous research has studied the relationship between lighting and landscaping as they pertain to residential burglaries, little conclusive evidence has been produced.

We also found that many law enforcement departments are employing Geographic Information Systems (GIS), a data-mapping program, to track criminal acts, establish criminal

patterns, and “forecast” future occurrences. We employed GIS to examine the locations of the reported residential burglaries within our developments, and complete analysis related to the location of points of entry and the distance of the light fixtures in proximity, managed by Gainesville Regional Utilities (GRU).

### **Limitations of our Research**

We found limitations to our research that resulted in the inability to fully conclude a relationship between lighting and landscaping cues with residential burglaries. The first limitation we found with our research was selecting public housing developments within Gainesville, Florida. A study that we examined during our literature review process indicated that crime within public housing is often ten times higher than the national average. While we found the residential burglary rates per 100,000 persons to generally be higher in the GHA developments, specifically within our selected developments, we felt that the low number of incidences made it difficult to conclude our hypothesis as valid. Therefore, we felt that we should have chosen to examine the reported incidences of at least half of the GHA developments.

Another limitation to our research was relying on the narratives within the case reports provided by Gainesville Police Department. We examined the narratives within each reported incidence within our study developments and deduced specific incidences to examine. We removed several of the reported incidences from our analysis due to their nature of domesticity, which left us with a minute study population. We also relied on the officer narratives to locate the exact point of entry, some of which were unable to do so, due to lack of visible signs of forced entry. Although we included these reports within our study analysis, we were unable to conduct analysis at the exact point of entry. While we feel that the additional information would not have made a significant adjustment to our findings, they would have contributed to a more exact set of measurements, in which could be statistically analyzed.

Our final limitation to our research was the inability to obtain specific documentation about the lighting fixtures and state of the landscaping at time of incidence. Our intentions were to analyze these documents, specifically the requested work orders for lighting to determine if there were any light fixtures that were non-functioning at the time of incidence and whether fixtures have been installed or replaced since the time of incidence. We also hoped to obtain documentation about the landscaping, to determine if the current vegetation existed at the time of incidence and whether vegetation, other than the grass, was being maintained. If we had been able to obtain the mentioned documents, we feel that we would have been able to better understand the approximate state of the lighting and vegetation in proximity to the points of entry, estimated through the officer narratives and visible signs of forced entry.

### **Recommendation for Future Research**

Our present research focused on lighting and landscaping cues related to the occurrence of residential burglaries within the Gainesville Housing Developments. Our intention was to examine how lighting and landscaping relate to residential burglary in general, however we chose to look at the incidences since we assumed, prior to receiving our residential burglary data from GPD, that the developments would have more incidences of victimization. However, as we previously mentioned in the limitation to our research, we feel that we had too small of a study population. Therefore, we recommend that future research include larger study populations within the Gainesville Housing Authority development. We would like to see future research include an analysis of at least half of the GHA developments, so that a more definitive conclusion could be inferred regarding the effects of lighting and landscaping on the occurrence of residential burglaries.

Because our purpose was to analyze the relationship of lighting and landscaping, as related to residential burglaries, we would recommend that future research also include an observation

and analysis of other areas within the Gainesville or Alachua County area that have higher victimization rates. In both recommendations for future research, the researcher would use the same survey conducted at the selected sites to retain consistency in the analysis.

### **Recommendations Gathered from our Research**

Through our research and analysis, we have observed promising and disturbing elements within proximity to the victimized units we chose to study. Derived from our observations, we have developed recommendations for the City as well as the Gainesville Housing Authority. While we understand that some suggestions might be infeasible at this time, we hope that they will be beneficial to them in their future as they examine, and hopefully implement, our recommendations.

Ordinances directly defining acceptable lighting and landscaping elements, as they relate to the safety of inhabitants and reduction of criminal activity, need to be constructed and implemented within the City's governing Code of Ordinances. While we did observe minimal lighting measurements, the majority of the lighting fell within the acceptable standard suggested by the city's ordinances. We found minimal ordinances pertaining to lighting, and therefore we recommend evaluating examples of other communities that have implemented such policies. Communities like Tucson and Tempe, Arizona have found benefits to the implementation of lighting and landscaping ordinances. We feel that implemented ordinances related specifically to housing developments would be beneficial to the city, such as promoting routine maintenance of properties, which would aid in surveillance and policing conducted by the Gainesville Police Department, and aid in tax revenue, as they could be imposed by code enforcements.

We further recommend that the Gainesville Housing Authority examine the landscaping situation within their developments. We feel that the use of non-structural, solid brick walls for privatizing entryways into residences, such as in place at Pine Meadows and Woodland Park, are

a hindrance on the ability for observation to occur from the streets. We feel that deconstructing the 8 foot walls to 4 foot knee walls and removing portions of the brick to create a screen rather than a wall would benefit the communities by allowing easier opportunities for observation to occur. We recommend using the knee walls at Caroline Manor as examples of ways to create privatized entries without fully obscuring the view to the rear sides of the units or to the communal backyards that we found in our study developments.

Furthermore, we recommend that the Gainesville Housing Authority evaluate the inventory of vegetation on the properties, specifically in proximity to the each unit. Routine yard maintenance, such as trimming bushes around windows so that they are no higher than the bottom sill and removing limbs on trees that are less than 7 feet high, would be not only be beneficial by attempting to remove opportunities for predatory cover, but they would also beautify each development. Yard beautification implies that residents care about their community and care about the other residents. Research has suggested that predators are less likely to target a victim when they get the feeling of community cohesiveness.

Other landscaping recommendations include the use of vegetative landscaping near windows that might deter predators, such as the use of prickly bushes or “defensive shrubbery.” Plants such as the Hawthorne and the Holly are hedges typically installed for security purposes. Other attractive plants such as the Berberis, Mahonia, and Pyrocanthus offer various qualities of security. If vegetative landscaping is not ideal, we also recommend placing beds of pebbles, or other such elements, underneath window sills. The purpose of the pebbles is to make noise when they are being walked on. Predators potentially will view the added noise as enough of a risk to deter their criminal activities.

Our final recommendation to the Gainesville Housing Authority is in regards to lighting. Where lighting was installed and measurements were taken directly beneath fixtures, we found that we were able to observe various elements within our proximity. We also found that light measurements were within requirements, as imposed by the Code of Ordinances. However, when we traveled farther into the developments, to the rear sides of the various units, we found low amounts of lighting that made it difficult for the researcher and the escorting law enforcement officer to see anything. (See Figure 4-23 in the Findings section). Most of the interior backyards had street lighting in place; however they were so far away from any of the proximal units that lighting really did not impact the areas around the rear side of the units. We recommend that the Gainesville Housing Authority conduct a lighting survey, to determine which light fixtures are unnecessary due to location. After our observation of the sites, we observed lighting fixtures that were not beneficial to any proximal element within the site, and therefore should be removed. We believe that a lighting survey would allow the GHA to determine which lighting fixtures should be removed, where fixtures should be installed, or possibly just relocated to increase levels of illumination throughout the sites, thereby increasing opportunities for surveillance.

Finally, we feel that the majority of the exterior house lights, at the rear doors of the units did not provide significant levels of illumination. We feel that it would be beneficial for the housing authority to research the Illumination Engineering Society of North America's suggest lighting standards for security, and research different types of vandal-resistant exterior house lighting that would provide higher, and more acceptable, lighting measurements as recommended by the IESNA.

### **Conclusions**

We understand that the study of lighting and landscaping cues, and their relationship to residential burglaries, particularly in public housing developments, is in its beginning stages.

Although we were unable to infer a direct relationship between lighting and landscaping and residential burglaries, we find it highly unlikely that the incidences we studied were randomly selected by various perpetrators. Perpetrators rely on signals to evaluate the associated risks with the potential gain of committing an offense. Ultimately, based on various conducted studies of research, including the study conducted by Kuo and Sullivan (2001), and our understanding of the need for crime-reducing techniques employed in community governing ordinances, we feel that installing context-sensitive landscaping materials and performing routine landscaping maintenance is crucial to minimizing residential burglaries. We feel that lighting and landscaping, when properly maintained, can promote opportunities for surveillability, thereby increasing the risks for the perceived gains, resulting in a decreased amount of any sort of criminal activity, particularly residential burglaries.

Through our research our findings imply that landscaping and lighting do not only play a role in residential burglaries occurring within public housing developments. We speculate that a lack of surveillability could be an important element of residential burglaries within other low-income housing developments, as well as middle and upper class neighborhoods, although we understand the contexts are different.

Through our informal interviews with people at the Gainesville Police Department, we believed that residential burglary rates would be high in the GHA public housing developments. While we found the residential burglary rates to be higher in our selected developments, we were under the assumption that the overall raw numbers would have been significantly higher than what they were.

Although we were unable to determine the exact state of the lighting and landscaping at the time of incidence, we were able to conduct a survey of the current nature of both cues. We found

good and bad examples of both cues within the developments, and it appears, for the most part that the housing authority attempts to take pride in their properties by keeping the grass mowed and the debris removed from the main roadways. Lighting at the street is significant to produce acceptable measurements of lighting intensity.

Currently, there are a lack of substantial studies examining the selected environmental cues and their relation to residential burglaries. Current studies, similar to our findings, suggest that criminal activity, in general, are less likely to occur with an increase in opportunities for surveillance; however this relies too much on the legitimate user of the space's willingness to become involved in the situation. Our study addressed the relationship between residential burglaries and lighting and landscaping cue within select Gainesville Housing Authority developments and provides recommendations to the management, to the city, as well as recommendations for future research related to the topic.

APPENDIX A

Table A-1. City of Gainesville Code of Ordinances Pertaining to Lighting

Sec. 30-160.d 33      b. *Exterior Lighting.* Lighting which is provided for the security of areas such as, but not limited to, building entrances, stairways, ramps and main walkways or for a permitted outdoor use of land (such as ball parks) shall not under any circumstances exceed a maximum average maintained illumination of 25 foot candles at ground level, and uniformity ratio of 6:1. Exterior wall-mounted lighting shall be full cut-off fixtures (as defined by IESNA). The maximum lighting intensity permitted for the security of the areas described above, for permitted outdoor land uses, or pole heights, other than those located in off-street parking facilities, may be increased by the appropriate reviewing board through site plan review, or the board of adjustment by obtaining a special exception if site plan review is not required, provided that the applicant establishes that such an increase meets the following standards: a. the increase in intensity is reasonably required for security purposes for the use or for conducting the permitted outdoor use; b. the increase in intensity will not result in a nuisance to adjoining properties and does not interfere with the lawful use and enjoyment of adjoining properties; and c. necessary screening will be erected or exists and maintained to reduce the impact of the increase in intensity on adjoining properties.

*Height.* The maximum height of light fixtures, except as otherwise regulated by this section, shall not exceed 30 feet.

Sec. 30-330.a 4      *Lighting.* (excerpt) All off-street parking facilities shall be continuously lighted after dark throughout the hours that they are in use by the public. Such lighting shall be designed to maintain an average horizontal illuminance not to exceed 2.5 foot candles, and a minimum horizontal illuminance of 0.5 foot candles. The uniformity ratio (ratio of average to minimum illuminance) shall be no greater than 5:1, and the maximum to minimum uniformity ratio shall be no greater than 15:1.

(excerpt) All other uses s for Open and Covered Parking Facilities, Latest Edition (hereinafter IESNA) for pedestrian safety.

(excerpt) A photometric plan shall be provided in compliance with section 30-160(d). Parking lot lighting locations shall not be in conflict with required trees or any existing trees required to remain on the property. The maximum height of fixtures shall not exceed 30 feet, except as regulated by an adopted special area plan or other applicable regulations.

Table A-1. Continued

Sec. 30-345.b.8

a. *Light trespass and glare.* Any development adjacent to a residential use shall not create light trespass of more than 0.5 foot candles measured perpendicularly from the light source at a distance of 25 feet from the property line. Any light trespass onto adjacent non-residential properties shall not exceed 1.0 foot candles measured perpendicularly from the light source at a distance of 25 feet from the property line. Roadway lighting is exempt from light trespass requirements. Directional luminaries such as floodlights, spotlights, sign lights and area lights shall be so installed and aimed that they illuminate only the task or roadways. Building façade lighting, sports lighting and other applications using floodlights shall have glare shielding (external or internal shields) to prevent light trespass and light pollution. All lighting shall be designed, hooded or shielded to direct light so that no illumination source or glare creates a nuisance to any adjoining property or unreasonably interferes with the lawful use and enjoyment of any adjoining property.

b. *Exterior lighting.* Lighting which is provided for the security of areas such as, but not limited to, building entrances, stairways, ramps and main walkways or for a permitted outdoor use of land (such as ball parks) shall not under any circumstances exceed a maximum average maintained illumination of 25 foot candles at ground level, and uniformity ratio of 6:1. Exterior wall-mounted lighting shall be full cut-off fixtures (as defined by IESNA). The maximum lighting intensity permitted for the security of the areas described above, for permitted outdoor land uses, or pole heights, other than those located in off-street parking facilities, may be increased by the appropriate reviewing board through site plan review, or the board of adjustment by obtaining a special exception if site plan review is not required, provided that the applicant establishes that such an increase meets the following standards: a. the increase in intensity is reasonably required for security purposes for the use or for conducting the permitted outdoor use; b. the increase in intensity will not result in a nuisance to adjoining properties and does not interfere with the lawful use and enjoyment of adjoining properties; and c. necessary screening will be erected or exists and maintained to reduce the impact of the increase in intensity on adjoining properties.

d. *Height.* The maximum height of light fixtures, except as otherwise regulated by this section, shall not exceed 30 feet.

Table A-1. Continued

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Sec. 30-345.1     *Nonconforming luminaires.* All lamps, light fixtures and lighting systems (hereinafter "luminaires") lawfully in place prior to February 11, 2002, shall be deemed legally nonconforming. However, if cumulatively at any time, 50 percent or more of the existing outdoor light fixtures are replaced, or number of outdoor light fixtures is increased by 50 percent or more, then all outdoor light fixtures shall conform to the provisions of section 30-160, section 30-330, and section 30-345. A development plan amendment shall be certified by a registered engineer or architect, or lighting professional holding a current L.C. (lighting certificate) from the National Council on Qualifications for the Lighting Profession (NCQLP). Additionally, nonconforming luminaires that direct light toward streets or parking areas that cause glare so as to cause a public nuisance should be either shielded or re-directed within 30 days of notification.

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Source: City of Gainesville, 2009

APPENDIX B

Table B-1. U.S. Department of Housing and Urban Development Public Housing Modernization Standards Handbook

Chapter 7-5.

*Outdoor Lighting.* Outdoor lighting shall be provided for save and convenient site access, circulation, and building entry.

- a. *Site Lighting.* Site lighting shall not case uncomfortable light directly into dwelling units. Tall trees or shrubbery that cast shadows, preventing lighting of entrance doors or other vulnerable areas, shall be trimmed. Lighting fixtures shall provide light for intended use, be supported and anchored, be vandal-resistant and be safely and soundly wired. Globes and fixtures shall not be broken and wires or internal mechanisms shall not be exposed. Controls shall be operable and protected from misuse. Outdoor lighting shall be retrofitted with energy conservation devises that are cost-effective, such as:
- Sodium vapor conversion;
  - Photo-cell or time clock control; or
  - Other.

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Chapter 7-5.B

a. *Site Lighting.* In areas where lighting systems have been vandalized and abused, the following should be considered:

- Provision of high intensity lighting such as mercury vapor, metal halide and high or low pressure sodium in outdoor areas requiring high visibility;
- Use of keyed switches to prevent unauthorized manipulation; and
- Use of building mounted outdoor lighting.

c. *Lighting Levels.* Lighting levels for areas requiring security and surveillance generally should be a maximum of 5 to 10 foot candles.

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Source: US Department of Housing and Urban Development, 1985

## LIST OF REFERENCES

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## BIOGRAPHICAL SKETCH

Misty M.J. Martin was born in 1982, in Gainesville, Florida, where she grew up. She attended public schools within the Alachua County school system and graduated from Buchholz High School in 2001, where she was actively involved in Aviance (dance team), concert band, including wind ensemble, and symphonic band, and numerous honor societies. Upon completion of high school, she attended Santa Fe Community College (SFCC) and graduated with her A.A. in 2003. Further pursuing her education, she attended the University of Florida. In 2007, she graduated from the University of Florida (UF) with a Bachelor of Design, majoring in architecture. While at SFCC and during her first two years at UF, she was involved in the Florida Visual Ensemble (color guard) and performed halftime with Gator Band on Florida Field.

During her summer hiatus from school, Misty married her high-school sweetheart, Thaddeus Martin. Mrs. Martin immediately commenced graduate studies in Fall 2007 at the University of Florida towards a Master of Arts in Urban and Regional Planning. Throughout graduate studies, she participated in numerous class research projects, including CPTED studies in Tree Trail Apartments and the Tacachale Center and assisted in revising the Community Redevelopment Area Plan for the City of Hawthorne, Florida. She also completed an internship with the Gainesville Police Department's Crime Analysis Unit, working directly with the crime analysts, crime prevention officers, and sworn officers. Due to her internship opportunity, she gained an enthusiasm for crime mapping and analysis and would like to have the opportunity to work in a law enforcement setting. Mrs. Martin will receive a Master of Arts in Urban and Regional Planning in December 2009, and looks forward to putting her education to full use.

In addition to pursuing knowledge through education, Misty enjoys spending time with her family and pets, and traveling.