Linking Crime Prevention Through Environmental Design (CPTED) and Trails' Planning in the Dallas/Ft. Worth Region

Professional Report

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Contents

I. Abstract

The purpose of this report is to present different Crime Prevention Through Environmental Design (CPTED) strategies to trails' planning in the Dallas/Ft. Worth region. Currently no in-depth study is available for the Dallas/Ft. Worth region regarding CPTED and the design and planning of community trails. This study can help act as a guide for planners and design architects to incorporate CPTED principles into the planning and design of regional trails to help create a safer environment for those that use them.

CPTED is a design concept that incorporates different crime prevention techniques through effective planning and design. Techniques such as natural access control, natural surveillance, and territorial reinforcement can be used in CPTED, and are often called CPTED principles. These CPTED principles have previously been incorporated into the design and planning of schools, residential areas, city downtown areas, parking garages, and the landscapes that surround those areas; however, no study has been found integrating CPTED into the design and planning of trails. By implementing these CPTED principles, criminal activity can potentially be lessened, thus creating a safer, more livable, environment for people to work, live and play.

Trails are developed for many reasons, from improving the quality of life in cities and towns, to providing avenues for transportation for people to exercise and interact with nature and others in the community. The purpose of trails allows people to leave the hustle of everyday life and escape into the serene atmosphere of a local park or secluded area. They are often off the beaten path, which is one of the primary reasons people want to use them. That is why it becomes even more imperative that trail designs consider CPTED principles so that the users can feel safer, and be safer when using trails.

The more crime that occurs in a park the less the park may be used, which can ultimately reflect on the community itself. Parks are developed for the enjoyment of everyone that uses them. That enjoyment can rapidly diminish with increased criminal activity. That is why this study can help municipalities, regional planning organizations, planners, urban designers, architects, and anyone else working with designing trails to develop a safer, more usable trail system. This study does not propose to answer all of the questions that may come up when designing a trail system; however, its contents may present ideas that may not have been considered during the normal design process.

Invariably there are safety concerns that may stop someone from utilizing a trail. For instance, darkness or other lighting concerns, transients or vagrants lingering in the area, graffiti, trash or litter in the area, and whether the trail's landscaping has been neglected can all portray and unsafe environment. These are merely examples of what safety concerns people may consider when deciding whether or not to use a trail system. This study will address these concerns, along with others, by giving examples and ideas of how to implement CPTED principles into the design concept of a trail system. Through

effective planning and the implementation of CPTED principles, communities can ultimately begin constructing safer trail systems for all to use.

Introduction: Crime Prevention Through Environmental Design

People expect to be safe when visiting an area park or local trail. That is why a further study addressing people's safety when using hike and bike trails, sidewalks, paths, and other nodes of personal travel is an important matter for municipalities to consider. This report will investigate those problems and opportunities with safety and will address ways in which communities can help increase people's safety when using trail systems. Although this report will provide helpful ideas in implementing crime prevention techniques into trail designs, it is not intended to ensure people's safety by implementing these techniques. Applying crime prevention techniques can merely help decrease the opportunity of someone becoming a victim of crime and this report is intended to help local communities implement design concepts to do that.

Crime Prevention Through Environmental Design, or CPTED, is a design concept that incorporates different crime prevention techniques into the design of open space and large-scale open space systems. The concept of CPTED, like defensible space, which is often used in housing development projects, and safescape design, which takes more of a planner's perspective to safe design, can help to limit crime and increase the safety of those using the developed space. This study will concentrate on integrating these techniques into the design, development, and redevelopment of existing and proposed trail systems in the Dallas/Ft. Worth region. As a result of this investigation and research both planners and architects can become more aware of how to use these techniques to help limit criminal activity in trail systems, thus creating a safer environment for its users.

To augment CPTED, obtaining information from local police departments can also be very helpful when designing trails systems. It is important to utilize the police department when integrating CPTED into your planning designs because police departments have a wide variety of data that can be used in determining how best to implement crime prevention techniques into planning. Data such as crime statistics, demographics, and trends in criminal activity can be determined through your local police department and can help in implementing CPTED into any project.

CPTED integrates three basic principles into the design process to try and lessen criminal activity in the planned space. The three principles are: 1) natural access control, 2) natural surveillance, and 3) territorial reinforcement. Natural access control entails the physical design of the space, or rather how do the entrances, exits, lighting, and landscaping interact together to create a semblance of order to the space. Natural surveillance encompasses the same physical design aspects as natural access, but is geared more toward how they are designed and placed to maximize the visibility of the user. Territorial enforcement uses design techniques to identify space as private, semi-private or public. The use of art, landscaping, and signs can help in identifying the space.

These principles, along with related but different techniques, will be presented in this study along with examples of each that can be used to help facilitate planning trails.

The purpose of this study is to aid planners in identifying existing and new pedestrian safety techniques and how to incorporate them early on in the planning process. CPTED is best used during the design process, before the trail is actually built, so that the physical features of the trail system can be considered and changed if needed. During the design process, certified CPTED specialists or crime prevention officers from your local police department should perform the CPTED reviews. This study, however, will provide planners with the basic knowledge needed, and will identify the important aspects of designing safe trails. Additionally, implementing CPTED early on in the planning process can help lower the cost of any changes. A CPTED review can still be done after the trail has been built, it just may cost more to rebuild sections of the trail system. Additional design techniques, aside from the three basic principles of CPTED mentioned earlier, will also be identified in this study and will help local planners and architects design trails that can help ensure the safety of all its users.

Chapter 1: Background

What is CPTED?

CPTED is a crime prevention technique that takes a proactive approach to limiting crime in our everyday environment. Timothy Crowe, criminologist and well known author on the subject of CPTED, writes in the National Crime Prevention Institute's CPTED Basic Training Manual that CPTED is "an understanding of the direct relationship of the environment – its design and management – to human behavior is a prerequisite to increasing the success of citizen's efforts in crime prevention". Crowe goes on to write that other community problems will exist and that CPTED is not the only answer, but that "it does provide the community with the means to eliminate or reduce environmental obstacles to social, cultural or managerial control"[1].

CPTED, when implemented properly, can limit the opportunities of criminals to act without being seen, which creates a safer environment for everyone. CPTED is merely design techniques that can be used by planners, designers and police officers alike to help prevent crime in our communities. CPTED, for the purpose of this study, will be implemented in trail's planning, but it also can be implemented in the development of schools, parking garages, neighborhoods, and any other parts of our built environment.

In the book *SafeScape,* it states that '"crime prevention" is often carried out as "crime reaction"', which presents the real premise of CPTED[2]. Why be reactive to criminal acts happening in our communities, why not take a proactive approach to keeping our communities, and our citizens safe from harms way? CPTED is not intended to be a time-consuming aspect to any plan. It is intended to provide planners with a new way of thinking, thus giving the planner the ability to look at and consider certain aspects of a plan as potential opportunities where someone may fall victim to a criminal act.

When CPTED principles are implemented, citizens can have a greater opportunity to police themselves by noticing and reacting to their surroundings. Trail users should not depend on the police to patrol areas and react to a crime in progress or react to someone else's reaction to a crime. Trail users can empower themselves by surveying their own area and paying attention to their own surroundings to ensure their own safety. Integrating CPTED principles into the design and development of a trail system, can help people feel safer and be safer.

CPTED History

CPTED is not entirely new to the design world and its concepts linking crime and the environment have long been considered. CPTED has been identified as a prominent design technique planner's can use during the design phase of a plan. Its basis of thought, however, comes from the criminological and sociological theory known as the Chicago School theory. C. Ray Jeffery, a criminologist, "suggested in 1969 that crime prevention should focus on changing the environment rather than focus directly on the offender"[3]. The book *Criminological Theory* states that the concept of environmental design helped establish modern-day crime prevention programs and "served as the impetus for the neighborhood watch program"[4].

C. Ray Jeffery, however, was the first to coin the term "crime prevention through environmental design" with his book entitled the same[5]. After Jeffery published this book, others caught on to the idea of preventing crime through the built environment, which helped shed new light on the concept. The premiere authorities on the subject of CPTED today though are probably Timothy D. Crowe, a criminologist, and Diane Zahm, a professor of planning at Virginia Tech[6]. Both have helped establish CPTED as a viable tool in planning as has Art Hushen, a Certified CPTED Specialist with the Tampa Florida's Police Department, member of the Board of Directors for the International CPTED Association, and member of the National Institute of Crime Prevention.

Oscar Newman, architect and author of the book *Defensible Space* published in 1972, and author of the more recent publication *Creating Defensible Space*, published by the U.S. Department of Housing and Urban Development in 1996, may be one of the more well known architects linking crime and the built environment[7]. Another person that has also linked safety to the physical environment was Jane Jacobs who in the 1960's wrote the book *The Death and Life of Great American Cities.* Here she identified five basic elements that were essential to the urban neighborhood; clearly defined public and private spaces, twenty-four hour activity, eyes on the streets, short blocks, and adequate lighting[8]. By using these principles, and not necessarily all of them in one design plan, planners can ultimately create a safer environment for everyone.

Linking CPTED to Trails

Trails are developed for many reasons. For instance trails improve the quality of life in cities and towns, they provide avenues for transportation, and they create an area for

people to exercise and interact with nature and others in the community[9]. The purpose of trails allows people to leave the hustle of everyday life and escape into the serene atmosphere of a local park or secluded area. Trails are often off the beaten path, which is one of the main reasons people want to use them. That is why it becomes even more imperative that trail designs consider CPTED strategies so that the users can feel safe, and be safe when using trails.

The more crime that occurs in a park the less the park may be used, which can ultimately reflect on the community itself. Parks are developed for the enjoyment of everyone that uses them. That enjoyment can rapidly diminish with increased criminal activity. So the purpose of this study is to help municipalities, regional planning organizations, planners, urban designers, architects, and anyone else that works with trails to design and develop a safer trail system. This study will present ideas and strategies that can be implemented to increase people's safety when using trail systems by limiting the opportunity of criminals to commit crimes. This study does not propose to answer every question that comes up while designing a trail system; however, the contents of this study may help present ideas that may not have been considered during the normal design process.

Invariably there are safety concerns that may stop someone from using any given trail. For instance, darkness or lighting concerns, transients or vagrants lingering in the area, un-kept landscaping, trash or litter in the area, and location of the trail, in other words, whether or not the trail is too secluded from any other activity. These are merely examples of what safety concerns people may consider when deciding whether or not to use a trail system. This study will address these concerns, along with others, by giving examples and ideas on how to implement CPTED principles into the design concept of a trail system. By doing so, trails can then be designed with the safety of the user in mind.

Goals of Applying CPTED in Trails Planning

There are many reasons for implementing CPTED into trail's planning, such as increasing the user's perception of safety, decreasing the opportunities for criminals to take advantage of their surroundings and commit a criminal act against someone, or to increase the number of users in the space, which can also help to increase the user's perception of safety and the number of times that person will want to come back to use that space. These end results can be attained by applying CPTED design principles into the design and development of trail systems to help ensure the safety of its users. By implementing these design principles, planners and design architects can then limit the opportunities for someone to commit a criminal act there.

In a report written for the National Institute of Justice entitled "Physical Environment and Crime", the authors Ralph Taylor and Adele Harrell address the rational perspective of crime and how "physical features influence behavior". They go on to say that "offenders often operate in a rational fashion; they prefer to commit crimes that require the least effort, provide the highest benefits, and pose the lowest risks"[10]. This perspective can be applied to any design plan but most importantly with trail designs since trails are of-

ten developed in secluded areas. So considering the rational perspective regarding trails, planners and designers must consider where the opportunities are significant for criminals to act and how to diminish that opportunity by implementing CPTED techniques.

The National Crime Prevention Council defines crime prevention as "a pattern of attitudes and behaviors directed both at reducing the threat of crimes and enhancing the sense of safety and security, to positively influence the quality of life in our society and to help develop environments where crime cannot flourish"[11]. That is the goal that CPTED tries to reach, improving the quality of life for everyone by making a safer environment for everyone. Timothy D. Crowe, in his book *Crime Prevention Through Environmental Design,* states that "CPTED is a process for improving planning decisions"[12]. CPTED is merely good planning, tweaking what is probably already a good design plan by increasing the safety of all its users.

To better implement CPTED strategies, a certified CPTED specialist should review the site plans prior to development of the site. This can help minimize the cost of potential changes needed to increase the safety of the people using the space. If perhaps the site was already developed that does not mean a CPTED review can't still take place. CPTED can still be used and implemented into the space, however it may cost more and may take more time to do but the benefits can be significant.

Art Hushen, with the Tampa Florida's Police Department, integrated CPTED into the development of the local City of Tampa's trail system in 2000. He used a 5-step process during his CPTED review of the trail design before the trails were actually built. The 5-step process, which consisted of a crime analysis review of the area, demographics of the area in question, land use of the immediate and surrounding areas, observations of the physical environment, and interviews with the community and potential users of the trails system, all helped to convince the City of Tampa officials that the space would not encourage criminal activity. This ultimately increased the usage of the trail system by the community, creating an important open space with economic importance to the community[13].

CPTED is not only crime prevention, but in a sense "target hardening". In this case, however, the target is often mobile, which is the user of the trail itself. So to make a hard target of the user they need to feel safe and be educated on their surroundings so to ensure their safety when using trails. The goal with trails planning and CPTED though is to ensure the safety and welfare of the user and to limit the availability of criminals to take advantage of the user. The result then would be the increased safety for everyone in the community, which ultimately can increase the community's perception to surrounding communities.

Why Planners Should Use CPTED

Planners are trained to design space so that others will use that space, and want to come back more often to use that space. Integrating urban design techniques into de-

sign plans can help planners create an area that is actively used by the community, integrates a relationship of the space with its surroundings, provides for economic benefit to the community, and ensures the safety of its users. By implementing CPTED principles, planners can ensure the safety of its users, which in-turn can increase the use of the space by the community thus increasing the economic value of the space as well.

In the book *SafeScape: Creating Safer More Livable Communities Through Planning and Design*, the author writes "crime and the fear of crime are inextricably linked with the livability of communities"[14]. The author goes on to state "we must think about the micro and macro environments in a manner that seeks to facilitate the productive and discourage the destructive behavior of humans"[15]. A sense of community means many things to many people; invariably parks though play a role in what people consider their community. Trails are often a part or parks and trails often link parks to parks and communities with communities. Trails play a large role in what makes a community a community and the safer the trails, the safer the users feel about using the trails, which can ultimately carry over into how the citizens feel about their community as a whole.

In the book Trails for the Twenty-First Century the author's identify safety considerations as the top priority when planning trail corridors. Not only safety from criminal acts but environmental hazards, busy intersections, and steep grades[16]. An unsafe environment is an unused environment. So by ensuring people's safety when using the trail communities not only invest in the person's safety and well being but in the viability of the community itself.

There are three variables described in the book *SafeScape* that are necessary for a crime to occur. Those three variables are what are known as: "The crime triangle". The triangle consists of: an offender, a victim, and an opportunity[17]. Implementing CPTED principles can actually limit the opportunity for a crime to take place, effectively stripping the triangle of one side and making the other side, the side of the victim, stronger by empowering them with the ability to protect themselves.

This report is not intended to address everything that should be considered when planning a trail system but rather guide you by providing important safety points to consider during the design process of trails. CPTED becomes a part and the design's vision, goals and objectives. An analysis of the proposed trail site, identifying the sites strengths, weaknesses, opportunities, and threats (SWOT) can help ensure the user's safety is considered and ultimately increased. Safety is only one aspect of the trail design process, but it is an important part of the process. Incorporating safety into the design ensures a proactive approach to limiting crime and not a reactive one.

Planners can't do much about why criminal acts occur, or even solve the social and economic problems often associated with crime; however, planners can mitigate the opportunity for criminal acts to occur through effective urban design. This study is not intended to be the answer to stop all criminal activity in this region's parks or trails. This study however can shed new light on designing trails while offering ideas that have been previously incorporated into other design plans to help limit criminal activity.

Chapter 2: Applications

CPTED Principles

CPTED principles are techniques that can be integrated into the design or development of a space to help increase people's safety in that space. In Timothy Crowe's CPTED basic training manual he identifies the premise of CPTED as: "the proper design and effective use of the built environment can lead to a reduction in the incidence and fear of crime – and to increase the quality of life". Additionally he points out that special attention should be made to two key CPTED descriptors in the premise: design, and use[18]. The planner should recognize from the two descriptors that the design of the trail can help make it a safe place to be, and use is important because merely identifying CPTED strategies in the design and not integrating them into the development of the trail will not increase the safety of the user. The three basic principles of natural access, natural surveillance and territorial enforcement are important principles and can be viewed as the larger, more encompassing principles of CPTED. Under these three basic principles lie additional strategies that should be used when designing safer trails.

For instance, planners can integrate the use of lighting, signs, and different types of vegetation into the design plan to help create a safer environment. Each of these points are addressed more in-depth under each of the three basic CPTED principles. Once the trail is built, however, special attention should be directed to the upkeep of the area so that vandalism, litter, trash, and poor maintenance do not contribute to the blight of the trail system and ultimately discourage people from using the trail or feel unsafe when using the trail.

CPTED principles are the core components in designing a safe environment for people, however, planners should also consider other important factors when designing trails. For example, Art Hushen, a CPTED specialist with the Tampa Florida Police Department and CPTED instructor with the National Institute of Crime Prevention, identifies five factors when he conducts a CPTED survey[19]. Those factors are crime analysis, demographics, land use, observations, and resident or user interviews. One of the most important of those factors, however, may be the resident interview because a trail planned for use by the community must involve the community. Understanding the community's safety concerns, and needs for the trail system should be considered to ensure their voice is heard since it will be the community ultimately using the trail anyway. A CPTED survey helps to better understand the fabric of the community and how the trail system will become a more integral part of that fabric. Al Zelinka writes in his book SafeScape that a "program which carefully evaluates the space under consideration and involves all stakeholders in a collaborative, community-building fashion is far superior and more successful than a rote application of standard, physical design features"[20].

Conducting a CPTED survey helps identify those who will potentially be using the built environment, which ultimately helps planners identify how to better design and build the trail. Art Hushen identifies this as the "CPTED actors". CPTED actors consist of normal

users, or those that desire to be in the space; abnormal users, people not desired to be there; and observers, those who have to be in the space and that can observe any ongoing activity[21]. In the context of this study the normal user would be the person that physically is walking, running or biking on the trail. The abnormal user would be the offender committing criminal acts in the space, and the observer could be a park worker, landscaper, or city employee designated to work in the area.

Natural Access Control

One of the three main CPTED principles is known as natural access control. Natural access control describes the entrances, exits, landscaping, lighting, signs and anything else that can help guide the path of the user. The Virginia CPTED Committee defines access control as something that "guides people entering and leaving a space through the placement of entrances, exits, fences, landscaping and lighting. Access control can decrease opportunities for criminal activity by denying criminals access to potential targets and creating a perception of risk for would-be offenders"[22]. Natural access controls work together to bring definition to a space and provide a sense of place to everything there. Trails in disarray, poorly maintained, and poorly planned and constructed can bring a sense of disorder and confusion to the space. This tends to push people away from using or spending time at a park or trail system. This detracts from a trail's intended purpose, which is to draw people to the space and encourage them to actively use it.

Timothy Crowe describes access control as a design concept directed at decreasing the opportunity of crime. He goes on to classify access control into three categories: organized, mechanical, and natural[23]. An example of organized access control is using guards or patrol officers to actively monitor an area. This helps to increase the eyes on the area or someone actively observing the area's activities, which helps to present a greater perception of safety for those using the trail. Mechanical access controls can consist of gates, lights or other similar devices that help control or prevent access to other spaces, and finally natural access controls consist of using the area's vegetation and manipulating it to help define the space around the trail system while still maintaining natural surveillance for the user.

The intent of natural access control is to increase the perception of risk on the criminal. Criminal acts for the most part are acts of opportunity, thus by limiting the opportunity criminal activity can potentially be limited, which ultimately meats the goal of crime prevention of lessening criminal activity by preventing the opportunity to commit a criminal act. This later helps to increase people's perception of safety.

To determine what access controls best fit the circumstances, or best fit into the design of the trail, planners must first determine their objective with using access controls. For instance, if an area has limited lighting the goal may be to increase the area's visibility by installing overhead lights and possibly ground lights. By doing so the objective to increase the user's visibility has been met, which helps meet the ultimate goal of crime prevention.

Consider then if the trail had already been developed and it was later determined that the area's lighting needed to be increased for the user's safety. Additional time and money would need to be spent towards installing the lights, which may have to be delayed until funding and other resources become available. If, however, the trail design called for lighting during the design phase that money and time could be allocated at the onset of the trail development and could possibly prevent any potential criminal activity due to the proactive crime prevention approach by the planners, architects and others.

Another area of consideration when using access controls is through landscaping. Blue Ridge Community College's website identifies some general guidelines to follow when applying access controls through landscaping[24]. Not all the points identified on the website are included in this study. Some of the points that were identified are:

- Design, select (plant material), install, and prune to create a row of vegetation to guide visitors to a formal entrance, or area that has natural surveillance.
- Avoid trees or shrubs that may become climbing aids
- Hedges can serve as a physical barrier but keep in mind that they can grow to block natural surveillance and provide opportunities for concealment
- Hedges don't always have to be obvious and massive in order to indicate to the public how to enter and exit a space. Even a bed of flowers can help serve as a symbolic barrier.
- Cement planters and other hardscaping materials make excellent access control devices.
- Planting painful plant material (i.e. plants with thorns, sharp points on foliage, etc.) in prominent hiding areas can be effective deterrents to potential criminals.
- Traffic calming devices, including planting trees along the sides of a street, aid in access control by slowing down traffic. (other examples of traffic calming techniques include road bumps, and narrower roads adjacent to parks and trail systems)

Natural Surveillance

Another important CPTED principle is natural surveillance, which can be thought of as the fields of view trail users have while using the trail system. Using the same features of natural access control, i.e. entrances, exits, landscaping, and lighting, natural surveillance can be increased, which ultimately helps protect the people using the trail. Landscaping a trail system can improve the visibility of everyone in the space but planners should be mindful that the people often using the trail system are there to be closer with nature and are there to experience that closeness. Stripping an area of its vegetation merely to increase the natural surveillance of the area is not recommended.

The Project for Public Spaces website addresses this even further by stating that "naturalized parks can be visually and aurally isolated places yet one study found that a diverse landscape of tall grass meadows, shrub thickets and woodlands was not only the most feared but also the most valued"[25]. The Virginia CPTED Committee defines natu-

ral surveillance as a technique that "guides the placement of physical features such as windows, lighting and landscaping which affect how much can be seen. A potential criminal is less likely to attempt a crime if he or she is at risk of being observed. At the same time, we are likely to feel safer when we can see or be seen"[26].

Planning trails for safety and for everyone's enjoyment of the natural environment may pose a difficult task. In fact, there may be some CPTED strategies that would not be implemented into the design of a trail. Certain strategies may not reflect the true desires of the community for the trail or could adversely affect the natural environment of the trail. Concerns like these will most often be addressed during the planning stages, which would allow for alternatives to be addressed and implemented.

In an article from Blue Ridge Community College relating the effects of CPTED on community greenways and greenbelts, the author states that pruning can help create a safer area by removing some of the dense foliage that potential criminals could use to hide in. This article states that "excessive pruning and removals in a natural area is a form of target hardening and may unintentionally become less attractive to the public" [27]. To safeguard this, the author suggests creating "windows through vegetation" or "vista pruning", which is a balance between the need for natural surveillance and excessively removing too much vegetation.

Finding a balance between removing and leaving too much vegetation may prove difficult however. Depending upon the site, the landscape, and the overhead canopy, the amount of vegetation removed from one area may not be the same removed from an adjacent area. The amount of vegetation pruned at each location should be determined based on the site's current amount of vegetation, the amount and height of the overhead canopy, ambient and artificial lighting available, and the topography of the landscape. Effectively creating windows through the vegetation will allow for greater surveillance for the people using the trail and can ultimately increase their safety.

Studies have shown that dense vegetation can contribute to the fear of crime, however a couple of professors with the University of Illinois' Human-Environmental Research Laboratory take that a step further and studied how the increased amount of vegetation may actually promote less aggressive, violent behavior[28]. Professors Kuo and Sullivan with the university theorize that high-canopy trees, grass and other more dense vegetation may actually help to deter crime as opposed to promote crime. Dense vegetation can provide concealment for criminals, however, as previously mentioned effective pruning can help open the fields of view and promote a sense of safety.

Additionally, the professors state that a well manicured area, whether in a park, along a trail, or in an inner city neighborhood, can help deter criminal activity via their "environmental cues". These cues, they say, help to promote surveillance, or suggest "that surveillance is likely even when no observers are present"[29]. Examples of cues mentioned by the professors were territorial markers, such as signs and well manicured areas that help to personalize space. Care is the cue emphasized most. An area well kept and

maintained enhances the spaces territorial reinforcement, the third CPTED principle, but ties directly into the second CPTED principle, surveillance.

Some general guidelines addressed on Blue Ridge Community College's CPTED web-site that can be used to enhance surveillance are[30]:

- Plan and plant for clear lines of sight for the following: street-to-site, site-to-site, around the site.
- Attract eyes. Create something spectacular! Give pedestrians and neighbors something to look at, like bulbs in spring, annuals and perennials during the summer, plants that change colors in the fall and plants that provide food and shelter for birds in the winter.
- Install swings, benches, and other furniture to create an outdoor living area that will allow for natural surveillance.

The authors also discuss plant selection and how certain plants can help increase surveillance but still enhance the aesthetics of the site. For example, trees are important to a trail's natural setting but plays a vital role with the types of trees planted and where. For example, excurrent trees, such as pine and spruce trees, actually interfere with surveillance since the tree's canopy can grow closer to the ground compared to other trees. The tree's low limbs tend to block people's ability to see their surroundings clearly. Decurrent trees on the other hand help facilitate natural surveillance since they tend to have an elevated canopy. Decurrent trees provide good shade and include such trees as red oaks, elms and maples.

Territorial Reinforcement

The third and final CPTED principle is territorial reinforcement, which describes how the perceived space is owned. Examples of territorial reinforcement include how the space is landscaped or fenced, whether natural barriers are incorporated into the area, and whether there are signs mapping the area. The concept of territorial reinforcement is to help define public and private space. For example, private spaces help to show ownership of the space by placing items such as artwork and furniture in the area[31].

A well manicured space is perceived as being owned by someone, probably the city if that space is alongside a trail. Although trails are for the enjoyment of everyone, most often people can determine the difference between a couple enjoying the open space for pleasure and a possible criminal using the space to initiate a criminal act. Most people have felt whether their safety was in jeopardy at one time or another. Circumstances such as this can present the same type of feeling.

Poorly maintained areas can present feelings opposite to how well manicured areas make people feel. Again most people walking along a trail where trash, graffiti, and broken windows are evident may feel their safety is in jeopardy. There may not be anyone in the immediate area, or at least in plain site, but merely the fact that the site isn't well kept can create unsafe feelings. To mitigate this, planners can incorporate sugges-

tions under territorial reinforcement to establish ownership to an area while at the same time ensuring the area is well kept to help prevent the feelings of disorganization.

For instance, to help create the perception of ownership principles that landscape architects use can be incorporated into plans to help define the space. People flock to areas that are visually stimulus. Fountains, gardens, art, open space, all are examples of visual stimuli that can help define the space near trails and present the perception that the space is owned and safe.

As mentioned in the previous section, Professors Kuo and Williams of the University of Illinois stated that increased vegetation can actually help decrease criminal activity. The professors state that the "environmental cues" used to promote surveillance can also be strong indicators of territorial personalization[32]. For instance, maintaining space near or around a trail and incorporating vegetation into the design plan of the space can go a long way in indicating it is used, and cared for, which promotes a sense of place. Promoting that sense of place helps to define the space and can ultimately help to deter crime and increase people's safe feelings in that space.

Using CPTED in Trails Planning

CPTED has often been used to aid the development of schools, parking garages and downtown areas; however, linking CPTED to trail's planning is not as common. Often trail plans will not address CPTED and if they do at all it usually encompasses only small portions of the plan. Additionally, CPTED may play a large role in the design of trails, however, may only need to be addressed in one or two sections of the plan itself. Implementing CPTED into a trail plan is important, however, addressing each safety concern and how it was determined may not need to be added to the final plan.

That is how this study can play a role in the design process of a trail. By implementing the points provided here in this study, planners can take a proactive approach to studying the needs and concerns of the citizen when it comes to the design plan of their own local trail system. Concerns presented by CPTED specialists, city planners and the community should be addressed and integrated into the trail plan itself to ensure all measures have been taken to ensure the safety of everyone using the trail.

Local governments should establish CPTED as a priority to be considered in design projects and ensure it is integrated into the local planning process. Not only is CPTED important when developing trails but it is just as important when developing schools, parking garages, and other projects. Timothy Crowe goes on to say that local governments have a "fundamental responsibility for public safety"[33]. This makes sense due to the fact that law enforcement is a government run entity. If local governments do not actively protect the community who will and if the local governments do not ensure that the public's safety is considered when developing trails, or any other project for that matter, who will?

Crowe cites that CPTED is an integral part of comprehensive plans, zoning ordinances, subdivision regulations, landscape ordinances, architectural guidelines, and other established regulations or requirements[34]. To ensure that local governments consider CPTED a public safety requirement, cities can mandate its use through city ordinances. This can help ensure that CPTED and other safety considerations are considered in all design projects, not just in designing trails. So how then do planners integrate CPTED into trail designs and make an impact on the safety of its users?

On the Project for Public Spaces website, nine characteristics that park users associate with high-risk environments were: poor lighting, confusing layout, physical and aural isolation, poor visibility, no access to help, areas of concealment, poor maintenance, vandalism, and the presence of "undesirables"[35]. These should all be considered in the planning of parks or trail systems, and all fall within one of the three basic principles of CPTED. Addressing each of these characteristics may not create a risk free trail, however by not addressing them planners may be contributing to an unsafe environment.

The Project for Public Spaces website goes on to list several key factors that should be integrated into the planning, design, and maintenance of parks and trails. One particular key factor includes a person's perception of the trail or park system, and whether it presents itself as an unsafe area to play. Other key factors include involving the users into the design plan, creating a legible design plan that users can follow, improving lighting, providing clear sightlines for people to view other people, maximizing physical access with legible entrance and exit points, posting signs that list trail access and exit points, as well as signs that map the trail system for the users, and state that the area is under surveillance, which can help to discourage inappropriate activity[36].

When integrating CPTED into the design of trails, planners should first consider what groups play roles in meeting the goal of crime prevention. One of the most important groups that first should be considered is the community itself. The people living near where the trail will be built, or concerned citizens that plan to use the trail regularly know best what their concerns are and how they can be made to feel safer when using the trail. Public meetings should be coordinated so that people can formally address their concerns and so that planners and designers can later consolidate those concerns into groups to better answer and implement them into the design.

Another group for consideration should be law enforcement officials, which can comprise of CPTED specialists, crime prevention or community policing specialists, local police departments, sheriff's departments, and anyone else working in the law enforcement field. This group will help provide statistical data regarding crime trends throughout the area where the trail will be built, as well as suggest different crime prevention techniques that can help limit criminal activity.

Local planning officials, design architects, landscape architects, and other public service people should be grouped for their expertise in planning and design. This group can help provide a quality design plan that can implement the concerns of the community and law enforcement officials into one comprehensive plan. Trail advocates also have

an expertise in trail design and can work hand-in-hand with local planners and others to ensure a quality trail plan is design and constructed, and one that addresses both safety concerns design concerns.

Finally, the backing of local elected officials helps ensure that the plan will be implemented and sustained for the life of the trail. Citizen groups may have a better chance of bringing elected officials in on implementing CPTED to a trail plan since most elected officials are in place to represent the needs of those that elected them. The local design and planning group, however, will be able to work more closely with the elected by offering designs plans for approval, and recommendations on implementing CPTED principles cost effectively.

To better understand how to implement CPTED into the design and construction of a trail, considering hot spots of potential criminal activity may be the first task at hand. Examples of different hot spots are trailheads, where people enter and exit the trail and will usually park their vehicles to gain access to the trail. Another example is restrooms. Criminals can easily hide behind doors in bathroom stalls and even behind the entrance door of the restroom waiting for their victim. Other hot spots can include areas where there is limited pedestrian movement, or portions of the trail that is or can be densely wooded, and dark low-light areas easy for concealment.

Even though densely wooded, low-light areas help to promote concealment, this does not dispute the study that Professors Kuo and Williams with the University of Illinois did. In their study they promote the use of vegetation as a key factor in helping to deter crime. They state that increased vegetation not only promotes a sense of place but creates a sense of comfort to those using the area. The professors, in summary, propose that vegetation can deter crime in poor urban neighborhoods, and which can also be relevant here in this study, by increasing the resident's informal surveillance of space, increase their implied surveillance of space, and can help them to mitigate their mental fatigue by promoting comfort[37]. For the purpose of this study, dense vegetation is merely a factor that should be considered when identifying hot spots of potential criminal activity and one not overlooked.

The National Crime Prevention Council presents a "3-D" approach to involving CPTED principles into community development. The 3-D approach consists of Designation, Definition, and Design. Designation takes into consideration what the intended use of the property is or what behavior is allowed in the space. Definition involves the physical limits of the space, the borders between that space and adjoining spaces, and what risks can be anticipated and planned for. Finally, design identifies how the physical environment supports the space and whether it can do so safely and efficiently[38].

CPTED and Premises Liability

The question often surfaces as to whether local counties or municipalities can be held liable for criminal acts occurring on public property. This study is not intended to answer this question but the subject should be mentioned so that local planners consider this

when planning trails. For legal clarification, planners should consult their local city attorney or county attorney's office.

The National Institute of Justice released a research in brief in 1996 entitled *The Expanding Role of Crime Prevention Through Environmental Design in Premises Liability*, which helps to answer some of the premises liability questions regarding CPTED[39]. The brief states that the courts have begun examining a "totality of the circumstances" test in determining premises liability. The test considers prior similar incidents occurring in the area, the nature of the business if it happens to be one, the surrounding area itself, any security precautions taken on the property, and the previous experience of the landowner at other locations[40]. What is determined through the test is whether the lack of precautions contributed significantly to the criminal incident.

CPTED, on the other hand, can be used as a proactive approach by local planners, and architects to limit criminal activity and create a safer environment for everyone. CPTED shouldn't be used merely as a defense against premises liability though, because that is not the goal of CPTED. Most often the goal of planning is to develop space in a smart, usable, and safe manner. CPTED plays into that role by developing space safely and not as a countermeasure to any future potential legal action.

Timothy Crowe cites 4 elements that are often used when determining liability; duty, breach of duty, injury, and casual link[41]. He goes on to state that making decisions regarding CPTED should not be to avoid liability by establishing a defense but to act proactively through crime prevention, increasing "peace of mind" and making for a safer community. Liability should not be the determining factor with CPTED but rather the desire to implement positive planning techniques to improve aesthetics, improve safety, and improve the quality of the space in general. CPTED not only can improve safety concerns but implementing it can help make for effective community design plans.

If questions or concerns still surface regarding liability and whether local governments can be considered liable for unsafe developments, seek legal clarification from you city attorney's office, or county or district attorney's office. No case law could be found regarding CPTED and trail's planning while writing this report.

Chapter 3: Methods

Common Methods of Conducting a CPTED Review

Planning a trail system is similar to the planning process of any project. Goals and objectives must be identified, as well as identifying any potential problems and how to correct them. In the strategic planning process this is known as SWOT (strengths, weaknesses, opportunities, and threats). The same can be said for conducting a CPTED assessment of trails. Before developing a trail system planners must first determine the goals and objectives of the plan and later collect data to better meet those goals and objectives. This can be done through an assessment of the planned area.

Conducting an assessment of an area is the first step when developing appropriate crime prevention strategies. The assessment should include determining what risk people may encounter by using the trail. These risks can be determined by studying what past local criminal behavior has occurred in the area, which helps in determining peoples' fear, or their perception of fear associated with the area. Another factor is to identify the nature of any previous problems associated with the space, as well as to identify the use of the area and the hours of operation and whether any current crime prevention efforts have been implemented in the area, to include adjacent land areas near the trail system[42].

Carter & Carter Associates, a consulting firm from Florida, has identified four basic ways of incorporating CPTED into the local planning process. First, CPTED should be included into planning documents that regulate land. This could include changing local comprehensive plans or zoning codes. Second, trained CPTED staff should be included in reviewing project development plans incorporating CPTED. Third, trained CPTED staff should participate in local community planning activities such as neighborhood revitalization efforts, and local community studies. Finally, CPTED criteria should be included in any planning and design contracts awarded through a local government[43]. This helps to ensure that every consideration is given towards protecting the local community when planning a project.

The National Crime Prevention Council also identifies using codes and ordinances as an effective strategy for crime prevention, which Carter and Carter Associates also mentioned[44]. Local governments can prove to their citizens that crime prevention is a priority in their community by mandating through codes and ordinances that crime prevention be addressed it in future planning documents and implemented throughout the community. For the purpose of this study it isn't required that crime prevention codes and ordinances be enacted to conduct a CPTED assessment. It merely is a suggestion that helps ensure future planned projects in local communities benefit from having crime prevention techniques included in the plan.

When conducting a CPTED assessment of a planned trail site one of the first tasks should be to identify what strengths are associated with the site. Strengths could include whether the site is adjacent to a well used park system, whether it has easy access and exit points, whether the trail will be used as a transportation route or throughway, or whether it has a positive projected acceptance by the local community, which could later mean that more people would be using the trail, increasing the eyes in the area.

Using SWOT, weaknesses also need to be identified so that they may be overcome. Some weaknesses that may be associated with a planned trail development could be not having input from all parties with a vested interest in the trail, to include local businesses, area residents, and crime prevention specialists. Identifying a limited number of available entrance and access points may prove to be a weakness, as well as, not having sufficient resources available to ensure a well maintained and functional trail system once the construction is complete.

Opportunities to consider when conducting a CPTED assessment could be identifying what players will play a role in the trails development, how the access and entrance points mentioned under strengths can enhance gateways to the trail system, what native vegetation is currently growing in the area, or how the trail system can be integrated into a space that links other spaces together, ultimately bringing more people to the area to enjoy the space.

Examples of players that could play significant roles in the trail's development are landscape architects, who are trained in the art of designing and linking spaces to the natural environment, CPTED trained specialists, urban designers and city planners, area trail organizations, which can provide significant input into the planning and design of trail systems, and local businesses near where the trail system will be built.

Finally, threats should also be identified when conducting a CPTED assessment. Examples of some threats include increased criminal activity occurring in the area, large numbers of homeless or transients attracted to the site, environmental health and safety concerns associated with the site, and whether urban decay is evident in adjacent areas near the trail system.

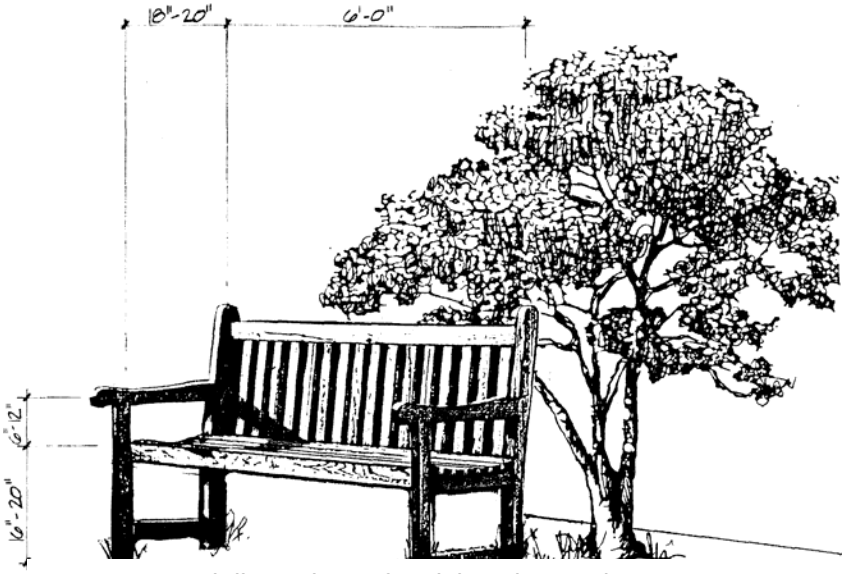
One statement by Timothy Crowe tends to sum up how CPTED may be assessed when planning a trail system, or integrated into any planning process. He states, "CPTED concepts require the user to question everything. CPTED concepts require the user to relate design and use decisions to the objectives of space. But the CPTED planner must seek to achieve a balance between the necessity to meet requirements of human functions and the need to fulfill the aesthetic demands. Otherwise, the human function may not meet its objectives"[45].

He further states that CPTED is an important role in planning and design but that role shouldn't become a cumbersome task to implement. A balance between using CPTED and effective planning and design techniques should be established so that the two can

work concurrently and not offset each other. Implementing CPTED should not take additional manpower and time away from the project at-hand. CPTED instead should be looked at as applying good planning techniques that can be considered during the planning process and implemented during construction with results that later benefit the community with increased safety.

Ideas for Designing Safe Trails

Mentioned in this report are many different ways CPTED can be implemented into the planning and design of trail systems. This section will cover a few of those ideas to help visualize desired outcomes when integrating CPTED principles to trail's planning. This section is not intended to cover every conceivable way of integrating CPTED into the design and development trail systems. Instead, this section will merely identify a few techniques and discuss those techniques more in-depth to help improve the design of safer trails.



3.1 Suggested dimensions of park benches and surrounding vegetation

One important aspect to trails and open space recreation areas is its available seating. Seating areas are important to all trail systems and their strategic placement is important to ensure a safe environment for everyone utilizing the trail and the seating areas. For instance figure 3.1 shows how a standard park bench looks along with its measurements and its proximity to the surrounding vegetation. When considering where to place park benches and other seating areas keep in mind the space behind the seating. Ensure that the area around the seating helps prevent someone from being surprised by a would-be criminal, effectively increasing the criminal's risk and limiting their opportunity. For example, ensure enough space behind the bench or seating area is open and free of vegetation or that any vegetation near the backside of the bench is a deterrent to anyone wanting to initiate an attack from there. Later in this chapter will be examples of some deterrent types of vegetation.

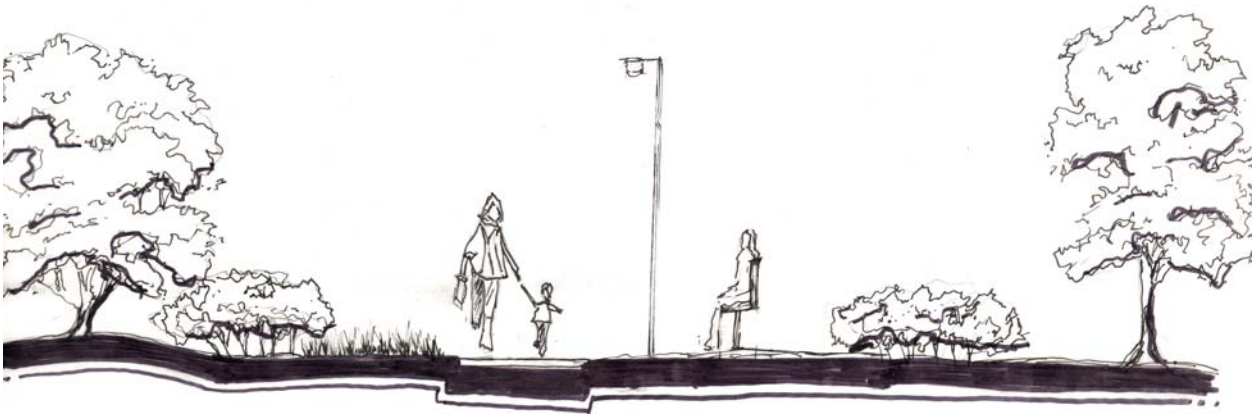
Using deterrent types of vegetation can also help discourage anyone from walking behind the seating area, creating a space devoid of vegetation, which could later be used by would be criminals as a "crawl space" to initiate an attack. Also when arranging park

benches near and along the trail system, consider placing them in areas that offer the best field of view for people sitting their, as well as allowing them to be able to see other people using the trail system. This also promotes Jane Jacobs' concept of eyes on the street.

Also important to the security of any trail system is how the trail's curves are designed so not to limit visibility. Later in Chapter 4 are the acceptable sight distances, or view sheds, for trail users depending upon their mode of travel and their speed. To help augment the acceptable sight distances, landscape architects can consider planting different types of vegetation near the curve and setting back taller, more dense vegetation to increase visibility. It is important to consider the types of vegetation used, their height, and whether the vegetation will deter anyone from wanting to hide in that space.

Figure 3.2 is an example of a standard trail curve view shed. The park bench shown in the figure is placed along the outer edge of the trail facing back towards the gradual curve. This allows for anyone sitting on the bench to see those coming towards them, increasing their field of view. Anyone using the trail would also be able to see someone sitting on the park bench, allowing them to avoid any possible surprise, as well as allowing them to see others coming towards them on the trail.

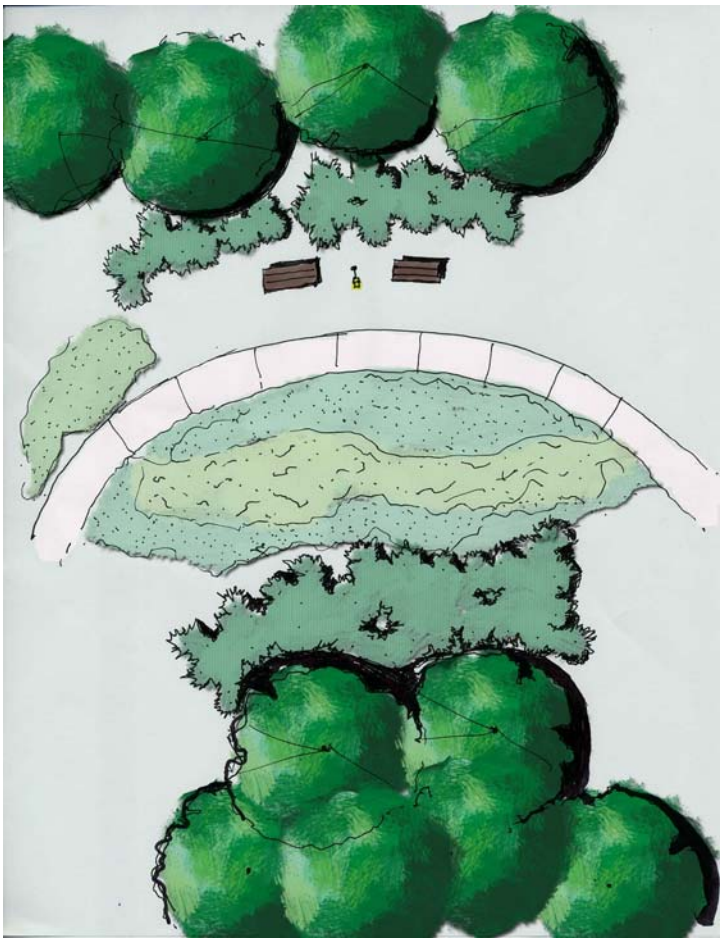
The vegetation in figure 3.2 is setback inside of the curve of the trail to increase the fields of view for both the person or persons seated, and the trail user. To create a view shed through selective vegetation, the landscape architect could use six to ten inch grasses, flowers, or other ground covering just inside the curve of the trail (in this figure to the left of the trail). The further inside the trail's curve taller vegetation is planted, gradually increasing the height to large canopy trees. For example, inside of the six to ten inch ground cover larger bushes could be planted up to a height of three feet. Be-



3.2 View shed along the curve of a trail.

hind the bushes trees and other shrubs could be planted, ensuring that a higher canopy and "vista pruning" mentioned early in the study are used to maximize surveillance.

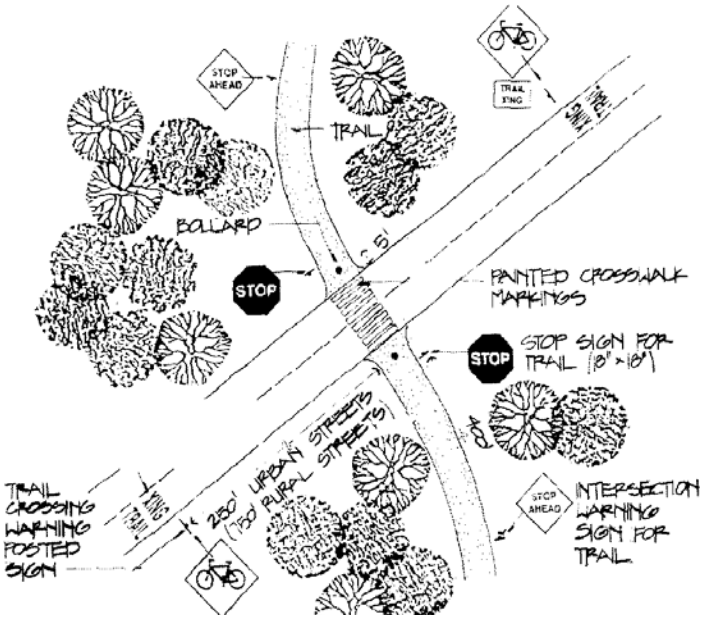
Figure 3.3 is an aerial view of a similar curved trail and can help relate the placement of vegetation along the trail and how that can enhance the view shed.



3.3 Aerial view along the curve of a trail.

Plant selection is important to the landscape of any design project including trail designs. Every effort should be made to include the natural vegetation existing in the space; however, additional plants and trees sometimes must be added to enhance the space's environment. Two things should be considered when determining plant selection, a compact form and an aspect of deterrence to ensure pedestrian compliance with staying on the intended path[46]. Different types of vegetation that could be used as deterrents and that grow in the north central Texas region are pampas grass, which has saw-tooth leaf blades; different types of holly with spiny leaves; Lantana shrubs, which have long spines along their stems; and Pyracantha shrubs, which have thorny stems. These are only a few examples; however, to best determine what types of vegetation to plant along a trail system, considering planting vegetation with characteristics such as thorns, and sharp or prickly leaves. For additional help in identify which plants would be best suited for your project consult your local parks department or a certified arborist or botanist.

Another important consideration when planning trails is how the trail intersects with other trails or crosses major or minor thoroughfares. Figure 3.4 provides a visual of how trails can be designed to intersect these areas with as little danger as possible to the user. For instance the diagram shows a gradual curve in the trail before bisecting the two-lane road. The gradual curve helps control the speed of the user, along with any warning signs posted identifying an intersection or danger area ahead. The figure also shows that no vegetation is planted at the four corners of the intersection, which helps increase the surveillance of the area and limits any element of surprise.



3.4 Suggested makeup of intersections

Speed has also been mentioned numerous times and should be considered when designing intersections, curves, and straight-away sections of a trail system. There are formulas available to help determine speeds from miles per hour (MPH) to feet per second (ft/s) and vice versa. Knowing the standard speed of bicyclists, which is normally 10 MPH to 20 MPH, helps to determine how to best design an intersection or curve along a trail system. The formula to convert MPH to ft/s is: MPH x 1.467 = ft/s[47]. For example, if a bicyclist travels 10 MPH, multiply 10 times 1.467, which equals 14.67 feet per second. If the feet per second traveled is already known, the formula to convert that to MPH is: ft/s x .682 = MPH. For example, perhaps the topography of the open space limits how the curve of a trail can be designed, affecting the safety of the trail user. Knowing the limits of the space, and its view shed, it may be determined that an 18 feet per second limit is the maximum feet per second allowable to maintain safety on the trail. Knowing that 18ft/s is the maximum traveling speed, use the formula to determine the maximum MPH, which is 18 ft/s multiplied by .682, which equals 12.28 MPH. This can be an effective tool when designing trail systems by not only factoring in the persons speed, and allowable view shed of the space, but accounting for their reaction time as well. This may later help limit people from being surprised along these sections of a trail system.

The points mentioned in this section are not intended to stand alone as techniques to prevent crime in the design and planning of a trail system. These points are intended to supplement other techniques that were already identified throughout this study. Important factors such as lighting, art, signs, and landscaping should all be considered in a well designed trail plan considering crime prevention. All of these points fall within one of the standard CPTED principles of access control, natural surveillance, and territorial reinforcement. These three principles should continuously work together to limit the opportunities of criminal acts by helping increase the risk of criminal acts from occurring.

Chapter 4: Cases studies of trails that have and have not applied CPTED

Tampa Florida Case Study

The City of Tampa Florida, through the effort of city officials, the City of Tampa Parks Department, a citizen's advisory committee, and input from local citizens, developed a comprehensive master plan for its greenways and trails. The *Tampa Greenways & Trails Master Plan* was completed in November 2000 with one of its main goals to improve how the city was being viewed as a non-pedestrian or bicycle friendly community. Some important benefits the city was striving to gain from the trail's development were to enhance economic development and environmental protection, to expand recreational facilities, and to improve the city's quality of life[48].

The objective of the greenways and trails plan was to connect neighborhoods, parks, historic sites, and other special city places, while supporting smart growth and new urbanism initiatives. The trail system totals 75 miles and was developed to integrate and link local, regional, and statewide greenway systems. With the creation of the trail system, the city sought to enhance alternative, non-motorized transportation, improving air quality, reducing traffic congestion, reducing the need for more parking lots, and enhancing economic development along the trail system. Linking natural areas, open spaces, and cultural amenities helped the city develop a comprehensive master plan, one that also addresses CPTED and integrates its techniques into the design and development of the city's expanding trail system.

The master plan was created to be a dynamic planning document for the City Council, City Parks Department, Department of Public Works, and the Department of Planning to use. A Citizen Advisory Council was established to provide recommendations in three separate areas; 1) governmental action and coordination, 2) segment implementation, 3) and public education and awareness. Governmental action and coordination identified how the city and its departments will manage efforts and provide support to meet the goals of the project. Segment implementation recommendations involve coordinating specific ideas and needs to ensure all concerns and needs are addressed and integrated into the project. Finally, the educational and awareness focus addresses needs for programs concerning distributing maps and fliers, improving community input, involvement and awareness, and coordinating public notification, hearings and forums. CPTED, and other policing efforts, was addressed under both governmental action and segment implementation; however, could also be integrated under the education focus to ensure the community knows the city's desire to design and develop a safe trail system for all to use.

The City of Tampa created a vision statement to ensure the community knew what the city wanted to accomplish with its greenway and trails master plan.

What the city came up with was:

> *The City of Tampa, in the 21st century will offer an enhanced quality of life by developing a system of greenways and multi-purpose trails. This network of trails will provide natural resource protection, recreational opportunities, open space, environmental and historical education, and a means of alternative transportation.*
>
> *Connections to existing trails and greenways beyond the city limits extend the benefits of the Tampa system to all residents of the Bay area.*
>
> *Working in partnership with residents and the community, the city greenway system links parks and open space by safe, well maintained recreational corridors compatible with surrounding neighborhoods*[49]*.*

The Citizen Advisory Committee established goals to reach the vision established in the vision statement. Those goals were; Public Participation and Education, Connectivity, Multi-Use Trails, Transportation, Access, Greenways, and Safety, which is the goal that addresses CPTED.

Anyone, local government or citizen, seeing how the City of Tampa integrated CPTED into their trails plan may now have a better understanding that CPTED is not intended to be an overbearing, or burdensome aspect of a trail design. CPTED is intended to enhance the overall outcome of the trail plan and can do so only when incorporated into a plan as a part of its overall vision, and not as a stand alone concern. As previously stated, CPTED is merely integrating good planning techniques into the design and development of a trail system.

Additionally, CPTED should not be addressed and integrated into the trail plan and then never reviewed again or enhanced over the life of the trail system. To ensure that future CPTED reviews are conducted, Tampa's Citizen Advisory Council addressed in the master plan under the section "Future Routes" that continual citizen reviews would take place, as well as, each new trail segment having a CPTED review with CPTED techniques integrated into the design. The actual portion of the master plan addressing CPTED, however, covered only one page and focused on the three prinicples discussed throughout this study; natural access control, natural surveillance, and territorial reinforcement. Conducting an actual CPTED review may take some time but addressing it in the plan may not need to be as in-depth. Addressing the important points of how the review was conducted and what was determined by the review may be all that needs to be covered in the plan.

During the Tampa Police Department's CPTED review the standard five steps used in most CPTED reviews was conducted; a crime analysis review, a demographics review, a land use study, conducting site observations, and conducting resident or user inter-

views. During their review, recommendations covering lighting, location of benches and rest stops, access to trails from roadways, and landscaping were all addressed[50]. Sections such as "Trail Heads or Greenway Access Points" referenced public art and focused on how art should be integrated into the trail system, which is a CPTED strategy under territorial reinforcement, and although not specifically mentioned under the CPTED section, are important strategies of CPTED.

Same goes for the section titled "On-road Segments and Intersections" where parts of the trail was identified as needing a minimum of three to four feet width bicycle paths with native vegetation and high canopy trees. This addresses the need for increased natural surveillance for the trail user, which can also help increase safety. CPTED is important to enhancing the safety for all trail users, and although some of the techniques are identified as CPTED techniques, they can simply be thought of as good planning techniques that enhance the overall setting of the trail system.

Critical to all trail design plans is the input from local citizens and established committees. The City of Tampa recognized that need and established a Management/Maintenance Sub-committee with members made up of representatives from the city's parks department; Tampa Association of Neighborhoods; bicycle, hiking and other trail user associations; as well as, the local Tampa Police Department CPTED officers. Identifying safety issues by using CPTED and integrating them into the trail plan is not enough. Continuous management of the trail system is imperative to making a safe environment for all to use. Landscaping must be maintained, litter cleaned up, graffiti removed, and active patrols by local police officers or citizen groups are imperative to maintaining a well used and viable trail system.

To learn more about the City of Tampa's Greenways & Trails Master Plan, visit their website at: http://www.tampagov.net/dept_parks/trails/master_plan.asp. This site provides additional information of current projects, and public participation. It also provides links to trail and greenway maps, and to the actual master plan document.

CPTED Assessment of Katy Trail, Dallas, Texas

The Katy Trail, just north of downtown Dallas, Texas stretches from the northeast, near Highway 75 and Airline, to the southwest, near the American Airlines Center on Houston Street. The trail spans approximately 2.5 to 3 miles, and for the most part is a cement trail approximately 12 feet wide.

For the purpose of this study, an assessment of the Katy Trail system was conducted in place of a complete CPTED review. A complete CPTED review would entail researching criminal statistics for areas surrounding the trail, conducting a land use review of the space surrounding the trail, performing demographic research and analysis of the trail's surrounding space, coordinating public meetings to gain input from people that potentially would use the trail, which can also help to determine their safety concerns and needs for improved safety on the trail, complete a walk-through of the trail to help identify hot spots or points of concern, and finally bringing in certified CPTED specialists,

local police departments, trail experts, and urban planners together to discuss their concerns and how to improve the safety of everyone using the trail system. Completing an in-depth CPTED review, however, could result in a long-term comprehensive plan addressing and implementing crime prevention over a period of 10 to 15 years.

The assessment for this study is merely a few observations that were noted while using the trail system on a standard summer weekend. The observations are not intended to take the place of an actual CPTED review and were not made available for comment through public meetings or to CPTED certified specialists, trail experts, police departments, or urban planners. The assessment merely identified a few important safety points that are often considered when using CPTED and are not intended to be the only safety concerns when using the trail system. Points not identified through this assessment could be addressed through a complete CPTED review of the trail. This assessment is merely a starting point from which to build a safer trail for everyone to use.

4.1 Overhanging canopy on the Katy Trail system in Dallas.

To begin, probably the most prominent factor that the Katy Trail has regarding safety is that the trail is widely used. Large numbers of people use the trail daily, which contributes to Jane Jacob's theory of eyes on the street. The increased number of people using the space may contribute to limiting the opportunity of a criminal act potentially occurring, thus increasing people's perception of safety while using the trail.

One of the more noticeable factors potentially increasing people's fear of crime on the Katy Trail is that the trail is not well lit for use during limited lighting. Informational boards along the trail list its hours of operation from 5:00 AM up to 12:00 PM at night; however, during the summer months approximately 4 hours of the trail's hours of operation would be at night time, meaning that with no available lighting system trail user's sight would be limited. Lighting has been identified as a major factor of CPTED and is often mentioned as one of the more prominent ways to increase people's perception of

safety by increasing their area of surveillance. That is why the Friends of the Katy Trail organization plan to integrate lighting along the trail system for its users by early 2004.

4.2 Dense bamboo foliage along the Katy Trail.

4.3 Small Crawl space in the dense bamboo foliage along the trail.

Another observation made during the assessment was the high, dense, foliage overhanging the trail, shown in figure 4.1, and foliage growing approximately 2 to 3 feet off the side of the paved trail, shown in figure 4.2. As illustrated in figures 4.1, 4.2, and 4.3, the overhanging vegetation and dense foliage along side the trail would shade it nicely from the sun during the day but can contribute significantly to making the trail very dark with no sun or street lighting is available. From the Knox Road access to the Lemon Street overpass, there was high, dense vegetation along side the trail to the west. Here small pockets of space, shown in figure 4.3, were evident and anyone using the trail probably would not be able to see anyone hiding there until practically upon them. Deterrent types of vegetation mentioned in Chapter 3 could be planted along sections of the trail such as this to help prevent anyone wanting to hide their.

Other field observations are shown in figure 4.4, where the chain linked fence line blocks access to the trail near the trail's overpasses with Dallas streets. Although the fence line helps to limit access onto the trail it also limits any avenue of escape should someone be attacked while on the trail. An option to consider is placing controlled access gates along sections of the fence line that allow people to exit the trail, however, does not allow anyone to gain access to the trail from outside the fence. Additionally, phones could be placed along the trail for emergency use only. The phones could be linked directly to either 911 emergency response or the police department's dispatch. Cameras could also be located along the trail to film or take snaps shots of the area, linking the data back to a designated monitor. This option provides increased surveillance of the trail when no physical police presence is available.

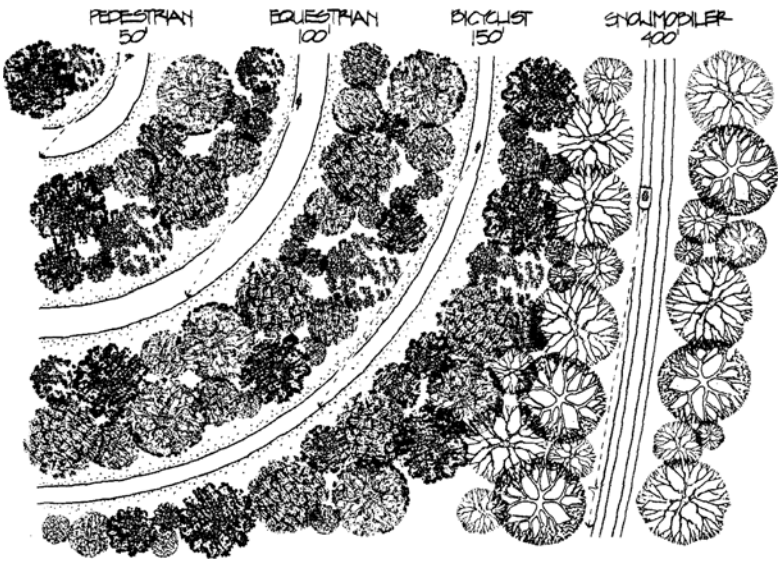
4.4 Fenced area along the trail system.

4.5 Gradual curve along the trail system.

Another observation was the trail's 12 foot width, which allows for free flow of its users. This helped increase the fields of view as the user's travel along the trail's straight-aways and gradual turns. Approximately 50 to 100 feet of space was still visible in front of the trail user when making a turn, however the dense

foliage along side of the trail significantly limited the user's side view. This is evident in figure 4.5 showing the gradual curve and the high dense foliage only 2 to 3 feet off the side of the trail. Considering the speed of the user, whether running, walking, or riding, their reaction time probably would not be affected thus maintaining the user's safety on the trail.

The book Trails for the 21st Century provides the following figure on the acceptable sight distances for trail users[51]. The figure identifies standard trail curves for pedestrian, equestrian, bicyclist and snow-mobiler; however, snowmobilers aren't often identified as a regular trail user in the Dallas/Ft. Worth area. The greater the speed of the trail user the greater the gradual curve of the trail. This ties into to Chapter 3 and the formula for determining feet/per second and MPH. To enhance the user's line of sight vegetation can also be offset, also mentioned in Chapter 3 approximately 3-5 feet from the side of the trail. Low grasses near the trail gradually increasing to shrubbery and then trees enhancing the trail user's line of sight without creating a 3-5 foot area along side of the trail devoid of vegetation.



4.6 Acceptable sight distances for trail users.

4.7 Unpaved area of the trail where homeless people were evident.

Another concern identi-identified along the trail system evident in figure 4.7 depicts an image near Harry Hines and the Goat Hill intersection. The trail here is unpaved and the high cliffs and thick vegetation was inviting to vagrants and the homeless. Evidence of the homeless was noticed along with litter and illegal dumping near the trail. Thirty minutes in the area,

during daylight hours, only one person was seen, creating an unsafe environment for anyone. The trail organization may want to complete the paved trail along this area and integrate CPTED principles to increase the user's safety.

Finally, the trail system is also regularly patrolled by Dallas Police bicycle officers, which helps increase peoples perception of safety on the trail. During the short time spent on the trail two police officers were visible riding and interacting with other trail users. This is a regular practice on the Katy Trail and is expected to continue in the future as more people learn about the trail and use it for recreation. A map of the Katy Trail is attached in Appendix C.[52]

Conclusion

While the concept of Crime Prevention Through Environmental Design is not new to planning, it has previously been integrated into effective design plans for schools, parking garages, shopping malls, and downtown areas by other design disciplines. This study has taken those principles and presented opportunities of how they may be integrated into public agency planning and the design of trail systems. Applying the techniques in this study does not assure that all crime will be prevented; it merely provides an opportunity to increase the safety of those using the trail system.

The three main CPTED principles of: 1) access control; 2) natural surveillance; and 3) territorial reinforcement can be broken down into effective planning techniques labeled within one of principles. For instance, territorial reinforcement can be reached by adding artwork to an area, keeping the space well manicured and clean, placing furniture and fountains to promote a sense of place by drawing others to the area. Natural surveillance can be increased by effectively landscaping the area to increase its fields of view, pruning overgrown vegetation, installing lights in a dark area, and creating areas of space that draw others to mingle there. Finally access control identifies how the spaces entrances and exits are designed, where they are placed, the types of vegetation used to identify the points of access, and installing lights in those areas.

To conduct an effective CPTED review there is a five-step process, which helps identify important points that should be considered when designing a trail system. First, conduct a crime analysis of the planned area. Second, research and identify the demographics of the area. Third, conduct a land use review of the space and its adjoining spaces. Fourth, observe the physical environment by conducting a walk-through of the area. Finally, conduct interviews and public meetings with those that will be affected by the trail and plan to use the trail. This five-step process will help identify some of the major issues recognized during the design phase, while the three CPTED principles mentioned earlier identifies ways to address those concerns.

Using CPTED techniques in the planning and design of a trail system will help create a safer environment for people to recreate. These techniques are not intended to create additional work or cost more by using them, instead they are effective planning techniques that can help create a prosperous, viable trail system to any local government.

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Appendix A

Trail and Park CPTED Assessment Form

Date:_____
Reviewer:_____

Natural Surveillance: NSU
Natural Access Control: NAC
Territorial Concern: TER

I. Demographics
- A. Name of Site _____
- B. Location _____
- C. Jurisdiction _____
- D. Age % under _____ _____ _____ _____ over 65 _____
- E. Customers/Riders/Visitors

Type/#	Repeat	Nonrepeat
Resident	_____	_____
Nonresident	_____	_____
Drive	_____	_____
Walk	_____	_____
Commuter	_____	_____
Visitor	_____	_____
Other	_____	_____

- F. Police Services _____
- G. Fire Services _____
- H. CPTED/Security

Advantages _____
_____
_____

Disadvantages _____
_____
_____

Precautions _____
_____
_____

Recommendations_____
_____
_____

Appendix A

II. Neighborhood/Area

A. Residential % _____
B. Commercial/Retail _____
C. Industrial _____
D. Streets by Type _____
_____

Private _____
Residential_____
Service _____
Sub collector_____
Collector _____
Major collector_____
Expressway_____
Interstate _____

E. Proximity to Expressways_____
_____
_____

F. Access to Transportation _____
_____
_____

G. Lighting _____
_____
_____

H. Demographics _____
_____
_____

I. Vehicle Approaches _____
_____
_____

J. Pedestrian Approaches _____
_____
_____

K. CPTED/Security
Advantages _____
_____
_____
Disadvantages _____
_____
_____
Precautions _____
_____
_____

Recommendations_____
_____
_____

III. Grounds

A. Acreage _____
B. Topographical features _____
_____
C. Green Areas
Public _____
Semi-public_____
Private _____
D. Recreation _____
_____
E. Landscape _____
F. Access to contiguous properties _____
_____
G. Fences/Walls/Natural barriers _____
_____
H. Border Definition _____
_____
I. Lighting (type, mounts, location) _____
_____
_____
J. Public Areas _____
_____
K. Sitting/Gathering Areas_____
_____
L. Pedestrian Approaches _____
_____
M. Vehicles Approaches _____
_____
N. CPTED/Security
Advantages _____
_____
_____
Disadvantages _____
_____
_____
Precautions _____
_____
_____
Recommendations_____
_____
_____

IV. Buildings/Exterior

A. Type _____

B. Scale (Number of buildings, size, volume) _____
_____

C. Use patterns/Users _____
_____

D. Sitting/Gathering Areas _____
_____

E. Vehicle Approaches _____
_____

F. Pedestrian Approaches_____
_____

G. Lighted areas _____
_____

H. Doors/Entrances/Exits _____
_____

I. Landscaping _____
_____

J. Other _____
_____

K. CPTED/Security
Advantages _____
_____
_____

Disadvantages _____
_____
_____

Precautions _____
_____
_____

Recommendations_____
_____
_____

V. Parking Characteristics

A. Type _____
_____

B. Ingress/Egress_____
_____
_____

C. Surface _____
_____
_____

D. Access to Public_____
_____

E. Pedestrian Access _____
_____

F. Access to contiguous properties _____
_____

G. Visual Access _____
_____
_____

H. Lighting _____
_____
_____

I. Landscaping _____
_____

J. CPTED/Security
Advantages _____
_____
_____

Disadvantages _____
_____
_____

Precautions _____
_____
_____

Recommendations _____
_____
_____

VI. Security

A. Systems _____
_____

B. Police _____
_____

C. Guards (proprietary, contract, etc.) _____
_____

D. Access Controls_____
_____

E. Surveillance _____
_____

F. CPTED/Security
Advantages _____
_____
_____

Disadvantages _____
_____
_____

Precautions _____
_____
_____
Recommendations _____
_____
_____

VII. Crime Patterns/Security Incidents (attach reports/maps to Section VII)

A. Crime Report_____
_____

B. Crime Map_____
_____

C. Fear Map (spot map of fear locations) _____
_____

D. Land Use Map (local area) _____
_____

E. Pedestrian Activity Map _____
_____

F. Vehicle Parking/Movement Map _____
_____

G. Other _____
_____

H. CPTED/Security
Advantages _____
_____
_____
Disadvantages _____
_____
_____
Precautions _____
_____
_____
Recommendations_____
_____
_____

VIII. Security Plan

A. Neighborhood _____
_____
_____

B. Perimeter _____
_____
_____

C. Grounds _____
_____

Appendix A

D. Parking _____
_____
_____

E. Building Access_____
_____
_____

F. Building Exterior_____
_____
_____

G. Building Interior _____
_____
_____

H. Protection of Persons _____
_____
_____

I. Special Events _____
_____
_____

J. Other _____
_____
_____

Crowe, Timothy D., Crime Prevention Through Environmental Design, 2nd Ed., Butterworth-Heinemann, 2000, Page 278-295.

Appendix B

Links to Websites with CPTED Resources

International CPTED Association: www.cpted.net
ICA is an international organization with information on CPTED certification, local CPTED ordinances, and other resources to help with applying CPTED at the local level.

National Crime Prevention Council: www.ncpc.org
The NCPC is a national educational nonprofit organization focusing on crime prevention information. NCPC is best known for their mascot McGruff the crime dog.

Oscar Newman's Defensible Space: http://www.defensiblespace.com/start.htm
This website provides information on creating safer neighborhoods using crime prevention techniques addressed in Oscar Newman's Creating Defensible Space.

The Florida CPTED Network: http://www.flcpted.org/
An organization that promotes implementing Crime Prevention Through Environmental Design (CPTED) concepts and principles to reduce crime and the perception of crime throughout Florida.

Municode.com: http://www.municode.com
Municode is a website containing more than 1,100 codes of local governments from across the United States. This website is helpful in providing examples of CPTED ordinances already established at the local level.

CPTED Workshops

National Institute of Crime Prevention: http://www.nicp.net/index.htm
NICP is a national training company with workshops available on CPTED and Domestic Violence.

National Crime Prevention Institute: http://www.louisville.edu/a-s/ja/ncpi/
NCPI is located at the University of Louisville in Kentucky. They provide training on CPTED and other crime prevention techniques.

CPTED Books

Designing Safer Communities: A Crime Prevention Through Environmental Design Handbook, Diane Zahm, Jean O'Neil, Judy Kirby (Ed.), Pub. National Crime prevention Council, 1997.

Crime Prevention Through Environmental Design, Timothy Crowe, 2nd Edition, Pub. Butterworth-Heinemann, 2000.

Crime Prevention Through Environmental Design, C.R. Jeffrey, Pub. SAGE Publications, 1971. (Revised 1977).

Safescape: Creating Safer, More Livable Communities through Planning and Design, Al Zelinka and Dean Brennan, Pub. Planners Press, 2001.

Appendix B

Trail Books

Trails for the Twenty-First Century: Planning, Design, and Management Manual for Multi-Use Trails, Charles A. Flink, Kristine Olka, Robert M. Searns, Pub. Island Press, 2nd Ed., 2001.

Rails Trails and Safe Communities, Pub. Rails-to-Trails Conservancy, 1988, http://safety.fhwa.dot.gov/fourthlevel/pdf/rt_safecomm.pdf.

Appendix C

Map of the Katy Trail available off of the Friends of the Katy Trail Organization located at http://www.katytraildallas.org/KATYmap.pdf.

SMU
MOCKINGBIRD
PRESTON
DALLAS NORTH TOLLWAY
HILLCREST
AIRLINE
GLENCOE PARK
MCCOMMAS
MONTICELLO
HIGHLAND PARK
ABBOTT
KNOX
Turtle Creek
TURTLE CREEK BOULEVARD
WYCLIFF
AVONDALE
TRAVIS
COLE
MCKINNEY
CENTRAL EXPRESSWAY
FITZHUGH
HENDERSON
COLE PARK
LEMMON
HALL
CEDAR SPRINGS
OAK LAWN
TURTLE CREEK PARK
BLACKBURN
OAK LAWN
LEE PARK
LEMMON EAST
MEDICAL/MARKET CENTER
BOWEN
HASKELL
CITYPLACE
REVERCHON PARK
MAPLE
CEDAR SPRINGS
UPTOWN
MCKINNON
ROUTH
HARRY HINES
STEMMONS FREEWAY
ARENA
HOUSTON
WOODALL ROGERS FREEWAY
ARTS DISTRICT
WEST END
DOWNTOWN
TRINITY RIVER
I-30
N
KATY TRAIL
On-Street Connection
Proposed Access Points
Street Level Crossings
DART Rail Stops