

HEALTH IMPACT ASSESSMENT:

WESTERLY CREEK CONNECTION

Conducted for: Denver Healthy People Program 2010

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Nathan White

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Executive Summary

The Westerly Creek is a slow meandering waterway that flows along the border of Denver and Aurora, Colorado. The creek runs through areas of Stapleton, the western edge of Aurora, East Colfax, and Lowry. The creek poses a danger to all the residents that live nearby as it has flooded and inundated the surrounding areas in the past. The city of Denver has been working on a canal renovation project for the past few years in order to protect residents and infrastructure in the area from flooding. The Westerly Creek Connection is a citizen advocacy group created by a group of individuals who saw the canal renovation as an opportunity to create open green space, attract developers and establish a walking and biking path along the creek.

The Westerly Creek Connection asked the city of Denver for assistance with the project and the city recognized it as an opportunity to conduct a Health Impact Assessment (HIA). This report makes up the HIA that the city of Denver identified as an opportunity that could benefit the citizens of Denver. This HIA has been conducted in order to provide planners with information on the general level of health of the affected population, identify the project's potential effects on the area's residents and provide recommendations to planners that will help them improve the health of the residents.

This HIA has found that the Westerly Creek Connection plans have the potential to increase the general level of health of the affected communities. The canal renovation will drastically increase the level of flood protection. The redevelopment could improve the living conditions and living environment of the area. The proposed establishment of the walking and biking path and open green space have the potential to increase the level of physical activity and general health of the residents.

The project faces many challenges to ensure the optimal community health benefits. Redevelopment raises real concerns regarding gentrification and controls will need to be put into place to prevent the ousting of current populations. The high level of crime in the area will be a great hindrance to increasing the level of physical activity and the built environment should be designed to decrease crime. Moreover, the future redevelopment of the area should include mixed zoning. This should be done in order to establish desirable social gathering locations and job opportunities that could increase the level of utilitarian exercise.

Westerly Creek Connection

The Westerly Creek, is a slow meandering waterway that runs through the areas of Stapleton, the western edge of Aurora, East Colfax, and Lowry. The creek is guided by an alternating system of above ground canals and sub-terrestrial culverts (Johansen & Proctor, 2005).

The Danger of flooding is well known due to past historical events. In 1965 large amounts of precipitation caused the Westerly Creek to flood its banks and inundate the surrounding area. A flood today would eliminate critical transportation routes, destroy dozens of structures, leave hundreds of people homeless, and threaten the lives of all who live in the area (Sprenghelmeyer, 1999).

The Solution that has been developed by the city of Denver is a renovation of the canal system. Over the past few years plans have been created to upgrade the standing system in order to make it capable of safely containing a 100-year flood (Matrix Design Group, Inc., 2007).

The Westerly Creek Connection (WCC), is a citizen advocacy group, headed by Councilwoman Marcia Johnson, formed by Denver residents who believe that the renovation of the canal system can be used as a medium to improve the local community. The group wants to use the canal renovation project as an opportunity to establish a walking and biking path along the creek, create open riparian green space, build a soccer field and attract developers to revitalize the area (Westerly Creek Corridor, 2008).

The Westerly Creek Connection Goals;

- Creating green space in increasingly urban areas;
- Enhancing public safety with flood protection; and
- Encouraging economic redevelopment along Colfax Avenue (Westerly Creek Connection Home page, 2009).

The Westerly Creek Connection Project Components;

- The canal renovation;
- The creation of a walking and biking path;
- The development of green space; and
- The area's long-term redevelopment.

The Westerly Creek Connection Guiding Principles;

- Providing neighbors with a choice and a voice in changes; and
- Collaborating with Urban Drainage & other government agencies. (Westerly Creek Connection Home page, 2009).

Health Impact Assessment (HIA)

Why conduct an HIA? This HIA has been conducted in order to better inform the WCC planners of how their decisions could affect the health of the people living in the study area. This HIA will answer the following questions:

- What is the current health status of the community?
- What are the potential health effects of the WCC plans?
- How can the different facets of the WCC project be conducted to improve the health of the affected community?
- What are the long-term and short-term factors that need to be taken into consideration by WCC planners?

What is the purpose? HIA's provide planners and policy makers with information that will help them make better and more informed decisions that affect the health of the community. The ultimate goal of an HIA is to promote thoughtful decision making that will positively benefit the health of the affected population. This is achieved by providing credible data and specific project recommendations to decision makers (Health Development Agency, 2001).

Who conducts HIA's? HIA's have been primarily conducted and used by European and Australian planners to better inform planning and policy decisions. By comparison, only a handful of cities in the United States have employed HIA's. The city of San Francisco has been the country's leading pioneer in promoting the use of HIA's (North American HIA Practice Standards Work Group, April 7, 2009).

How have HIA's been used in Practice? A wide array of institutions have conducted and used HIA's throughout the world. In 2006 the city of Sydney, Australia conducted an HIA focused on urban regeneration. The HIA report identified how planners could increase the health of residents who lived in an underprivileged poor suburban area of the city through urban redevelopment planning (Sydney West Area Health Service, 2006). The London Healthy Urban Development Unit recently developed and employed a Geographical Information Systems model in order to accurately determine a community's level of health and the location of cultural/social facilities. The information this model provides has since been used with HIA's to ensure equal distribution and community access in London to facilities that promote better community health (State Health Publication, 2007).

Health Impact Assessment (HIA) (continued)

What is the size and scope? The size of an HIA can vary greatly depending on, the amount of funding, time available, and the specific project characteristics. A rapid HIA provides decision makers with a basic level of evaluation and can be conducted in several weeks. An intermediate HIA takes place over a series of months. It provides policy makers with a more thorough analysis of the situation, more accurate predictions of potential effects, and sound recommendations. A comprehensive HIA gathers an extensive amount of data for evaluation over a period of years. A comprehensive HIA supplies the most accurate evaluation, predictions, and recommendations but is inherently the most costly and timely (London's Health, 2000).

What is evaluated? An HIA first evaluates the general level of health of a specified population. The evaluation can be based on many or several factors that are not limited to, but can include; education, income, housing conditions, quality of life, social support networks, ethnicity, obesity level, pedestrian/bike/automobile connectivity, access to food, safety and public transportation (Cave & Curtis, 2001). After the base level of health of the community has been evaluated the HIA practitioner then focuses on the potential effects of the respective project or plans. The HIA will identify how the proposed plans will affect the population both negatively and positively. An HIA can also determine whether specific demographic groups will be affected in distinctly different ways from the general population (Berenson & Forbundet, 2003).

What is the process? The first element of an HIA is the screening process. A preliminary study estimates the degree to which a project will affect the public's health. If the screening process indicates that the public's health will be significantly affected then the second step, scoping, needs to be undertaken. During the scoping phase practitioners determine what relevant factors (see above "What is evaluated") will be incorporated into the study. The next stage, which comprises the bulk of the work, is the appraisal stage. HIA practitioners gather evidence and evaluate the potential effects the project may have on the affected populations. After the extent, size, and nature of the effects have been determined the practitioners enter the last stage and write their final report and recommendations (Kemmm, 2008).*

*See Appendix B: Literature Review for more information on HIA's.

Methodology

Screening: The Westerly Creek Connection project proposes drastic changes to the built environment that could potentially positively or negatively affect the health of the surrounding populations. The residents living in the surrounding areas have an interest in protecting and enhancing their local living environment. This HIA will identify how the project can be used to promote the health of the residents and isolate any potentially negative health effects associated with the project.

Scoping: Previously conducted HIA reports and formal HIA guides have been used as guiding references. Medical, sociological and other journal articles were used to identify and predict potential health benefits or problems associated with the WCC plans. These sources were used to identify the two largest factors (walkability and safety) that can potentially hinder the health benefits of the WCC's plans.

Assessment: The Study is primarily focused on the East Colfax neighborhood with a secondary focus on the bordering neighborhood of Aurora. The HIA used statistical data from the Piton Foundation and the US Census Bureau. There was only partial statistical information available for the bordering Aurora neighborhood. However, East Colfax and the neighboring communities share similar demographic and neighborhood features. Therefore this study assumed that the neighborhoods were comparable and the data from East Colfax is relevant and transferable to the adjacent Aurora neighborhood.*

The HIA used demographic data to identify the average socio-economic status (income, education, poverty, family characteristics, etc.) of the affected populations. Crime data was used to identify the average level of crime in the area. A first person walk-through was conducted to survey the current physical status of the area (state of sidewalks, graffiti, pollution, litter, etc. The previous qualitative and quantitative factors were analyzed in order to determine the area's level of walkability and safety. Together these elements were analyzed to assess the extent, degree and manner that the WCC project could potentially affect the area's residents.

Reporting: The HIA makes recommendations regarding the implementation of the WCC project's components (canal renovation, walking and biking path, green space, and redevelopment) . It proposes alternative ideas that will better benefit the health of the community. Lastly, it recommends long-term policies to guide planning decisions in the future. These recommendations are based on medical literature, academic literature, qualitative data, and quantitative data gathered during the screening, scoping and assessment phases.

* The study accepts the data limitations as a weakness in both its conclusions and recommendations.

Phase One: Screening

The screening phase identifies how changes to the built environment can significantly change a neighborhood's level of safety, activity patterns, level of exercise, and level of health. This is important to recognize as the WCC plans have the potential to make a substantial impact on the health of the community.

Screening - Understanding Public Health & Planning

Planning & Health Disconnect: Since WWII there has been a significant disconnect between the built environment, transportation planning and the public's health in the United States. Automobile driven agendas have consistently dominated transportation budgets. This disproportionate focus on automobile transportation has inadvertently caused many built environments to not be pedestrian or biker friendly (Chanam & Moudon, 2004).

Built Environment: Studies have proved that planning decisions can create built environments that either promote or deter physical activity (Frank & Engelke, 2001). The layout of roadways, structure of sidewalks, design of open space and zoning schemes can deeply affect the activity patterns of people and the amount of exercise they regularly engage in. Typical features include wide roadways designed for speed much higher than the posted speed limits, small sidewalks, roadways that are uncrossable for pedestrians, and physical barriers that impede pedestrian movement. These features have unintentionally reduced the likelihood that people will engage in alternative means of transportation such as walking or biking (Robert Woods Foundation, 2007).

Health and Planning: Health officials in the United States have traditionally addressed only the symptoms of poor public health and not the causes. A majority of health studies have historically been conducted in an aspatial manner and without significant regard to the built environment. However, there has recently been a surge of studies that integrate knowledge from the health and planning fields in an attempt to bridge the long-standing disconnect. This has led to a better understanding of the relationship between the built environment, activity patterns and the physical and mental health of people (Frank & Engelke, 2001).*

Exercise and Health: Multiple studies have established a clear relationship between an individual's level of exercise and their likelihood to be obese or have a higher Body Mass Index (BMI). The more exercise an individual performs the lower their BMI will statistically be. Furthermore, there is a direct link between between an individual's level of health and their BMI level (Frank & Engelke, 2001.)

*See Appendix D: Health and the Built Environment.

Screening - Health & Obesity

Unhealthy Lifestyles: Health professionals have established a clear link between the amount of exercise an individual performs on a regular basis and the likelihood of a high Body Mass Index (BMI). Regular exercise can lower an individual's BMI and reduce the risk of a number of potentially deadly conditions caused by obesity:

- Heart Disease
- Stroke
- Hypertension
- Breast Cancer
- Diabetes
- High Blood Pressure
- High Cholesterol (Ernst & McCann, 2002).

Obesity Attributed to Death: A recent health study concluded that obesity would soon overtake smoking as the number one factor directly related to preventable deaths in the United States. The study estimated that in 2004 obesity caused 400,000 deaths in the United States (Mokdad et al, 2004).

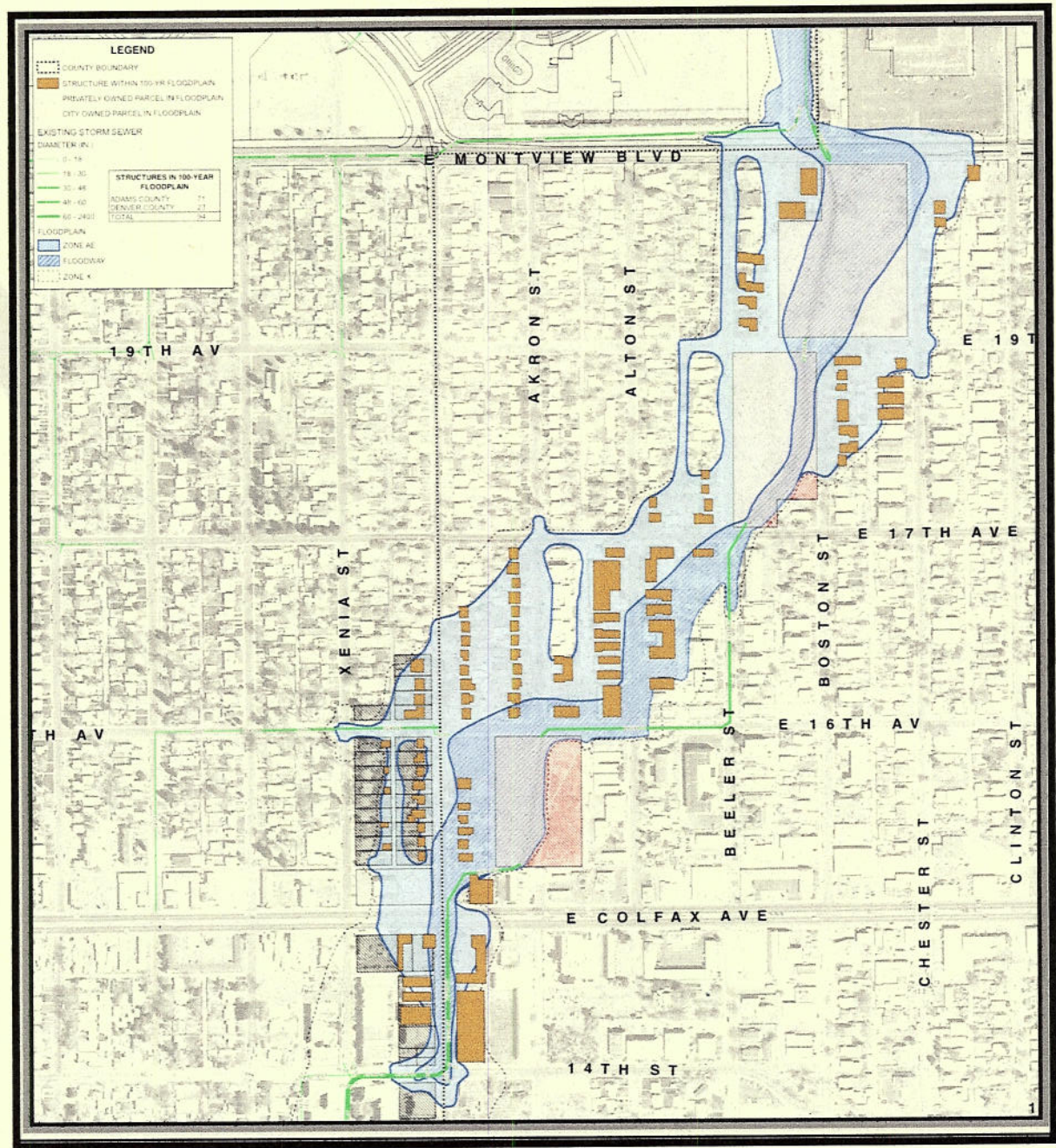
Childhood Obesity: The office of the Office Surgeon General (OSG) recently identified obesity as a serious health concern for children and adolescents. Obesity rates among children and adolescents ages six to nineteen have tripled since 1980. The OSG also reports that 17.1 percent of children between the ages of two to nineteen are overweight with 16.5 percent at risk to become overweight. In response to this information the OSG launched the HHS Childhood Overweight and Obesity Prevention Initiative at the end of 2007 in an attempt to curb these dangerous health trends (Office of the Surgeon General, 2009).

Fewer Americans Walking to Work: Recent trends indicate that fewer Americans are walking to work while a increasing number are becoming obese (Ernest & McCann, 2002).

Need for Healthy Urban Environments: Rising obesity rates in the United States emphasize the need for planners and health professionals to work together to create urban environments that promote exercise (Frank et al, 2005).

Westerly Creek Flood Plain Map: Denver/Aurora, CO

The map below illustrates the flooding danger that the area's residents are currently exposed to. Dozens of structures and hundreds of people reside within the flood plain of the Westerly Creek. This is a serious concern because a major flood would endanger the health and safety of the residents. (Sprengelmeyer, 1999).



Phase Two: Scoping

The scoping phase identifies the two largest factors that can potentially reduce and hinder the health benefits of the WCC plans. The first factor, safety, identifies elements that affect an individual's safety. The second factor, walkability, identifies elements that affect an individual's ability to move freely through their environment.

Scoping - Safety Factors Affecting Health

Safety

The measure of how likely it is that an individual's personal safety will be threatened. Perceived safety levels can significantly hinder the likelihood that an individual will engage in regular exercise (Pikora et al, 2002).

Pedestrian Safety: Safe street design can have substantial effects on public health. Safety features include clearly marked or raised crosswalks, maintained and wide sidewalks, benches for sitting, narrowed car lanes, automobile traffic diversion, fewer parking spaces to increase visibility, mixed vegetation and diverse sidewalk design (Lusher, Seaman, & Tsay, 2008).

Lighting: Proper Lighting design can lead to a reduction in specific types of crime and improve perceived levels of safety which can increase activity levels (Boyce et al, 2000).

Crime Levels: High levels of crime (vandalism, larceny, assaults, etc.) reduce the level of physical activity in a community. High levels of physical activity can inversely reduce crime (Loukaitou-Sideris & Eck, 2007).

Broken Windows Theory: As a neighborhood physically deteriorates it increases the chances for a rise in crime (Wilson & Kelling, 1982).

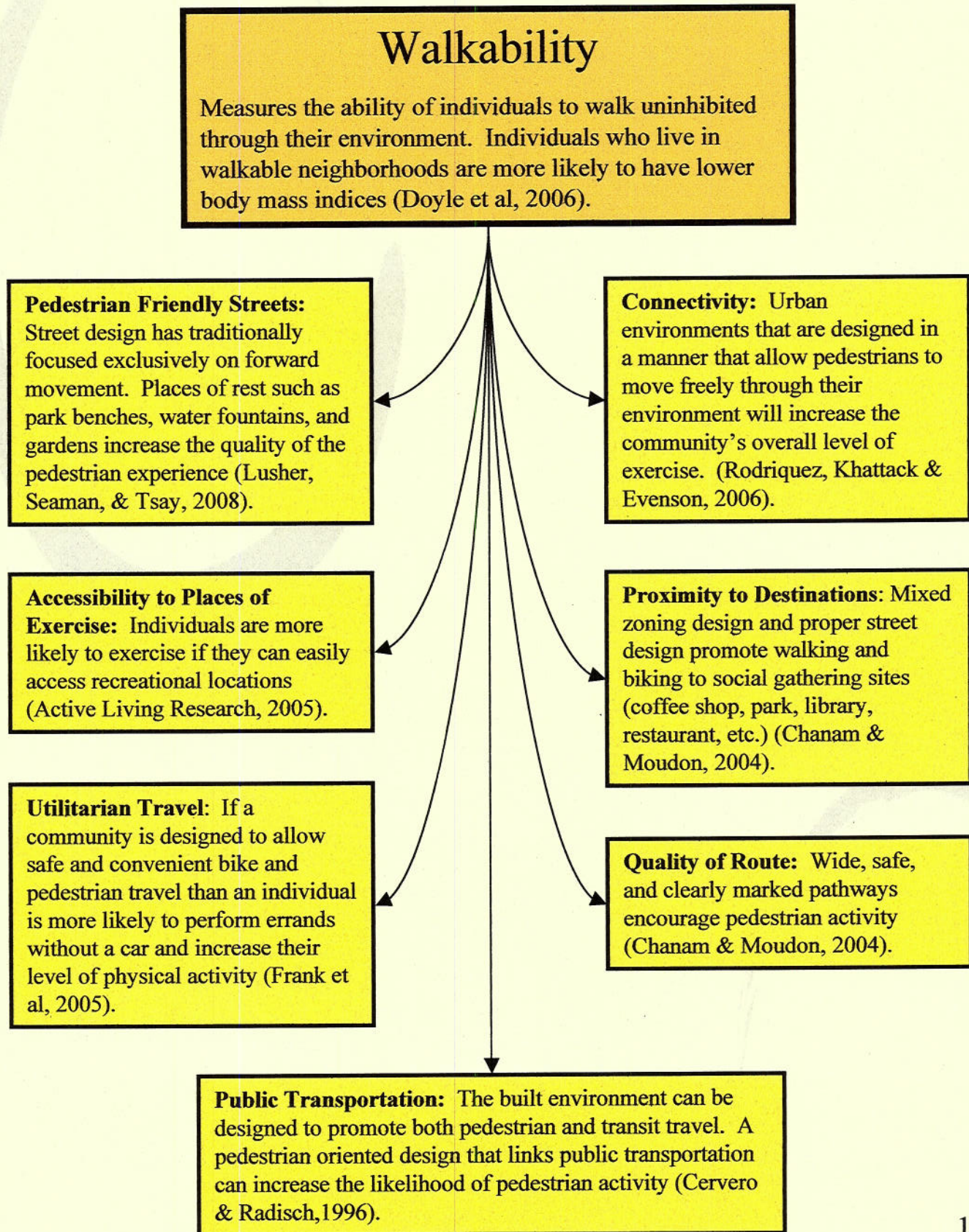
Eyes on the Street: An urban environment that promotes physical activity will place more "eyes on the street." An increased level of neighborhood surveillance will deter would-be offenders from committing illegal acts (Eck, 1995).

Level of Social Fear: High levels of fear cause individuals to lead more sedentary lifestyles (Loukaitou-Sideris, 2006).

Transportation Design: Built environments that are designed to encourage high speed and high volumes of automobiles will inevitably discourage physical activity (Frank & Engelke, 2005).

Vegetation: Properly maintained trees and grass can decrease actual levels of crime and fear of crime. ((Kuo & Sullivan, 2001) & (Kuo, Bacaicoa & Sullivan, 1998)).

Scoping - Walkability Factors Affecting Health



Phase Three: Assessment

The assessment phase identifies the current health disadvantages of the affected communities compared to the city of Denver, the state of Colorado and the United States. Key factors that affect the study area's level of health are:

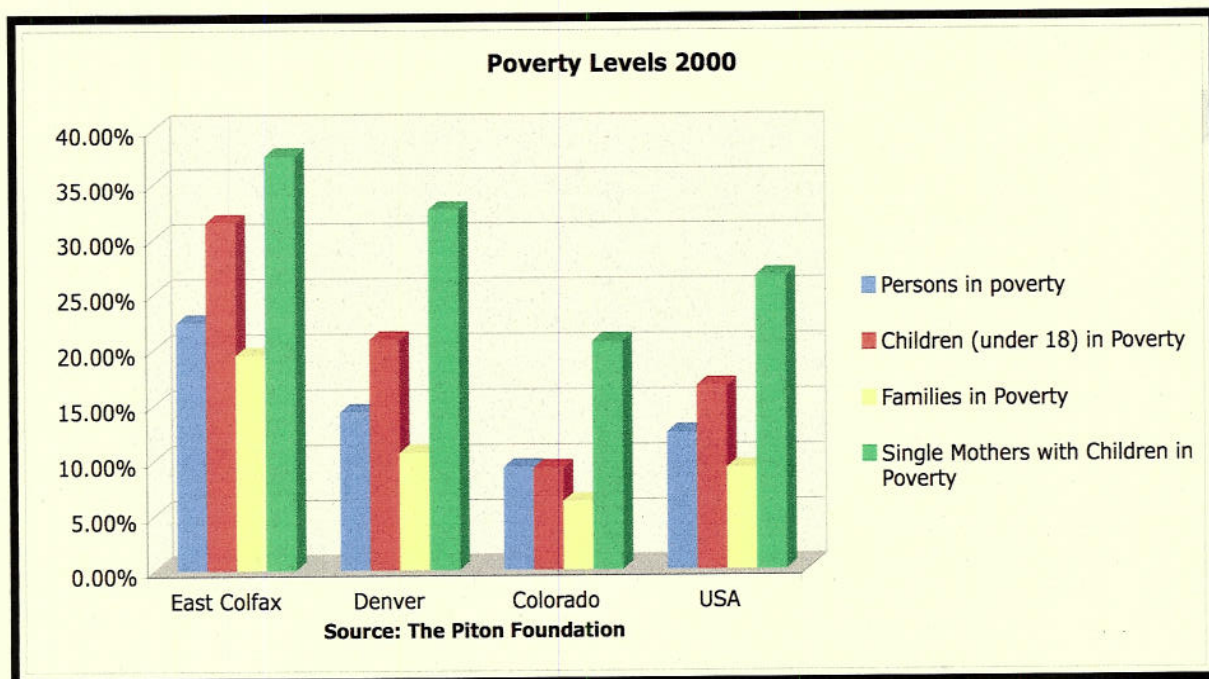
- Average Household Income
- Race/Ethnicity
- Poverty
- Level of Education
- Crime Levels

Assessment - Community Health Factors

Who lives in Poverty: The average percent of children, families and single mothers with children living in poverty is significantly higher in East Colfax than Denver, Colorado and the United States (The Piton Foundation, 2009). This is significant for the study area as research in this field indicates that social disadvantages negatively impact an individual's level of health (Wallerstein, 2002).

Groups in Poverty: The average percentage of African Americans, Latinos and Native Americans is significantly higher in East Colfax than in Denver and the United States (The Piton Foundation, 2009). These minority populations are statistically more likely to have poor health in comparison to white/caucasian populations (Thomas et al, 2006). These groups also have higher rates of morbidity and mortality (Villarruel, 2007).*

Housing Characteristics: Almost half of all renters in East Colfax spend 30% of their annual income on housing (The Piton Foundation, 2009). It is important to note that several low income immigrant housing complexes are located in the study area. Studies have shown that living in a socially and physically disadvantaged environment negatively affects an individual's level of health. The greater the polarization of wealth in an area the greater the probability that the socially disadvantaged will have higher mortality rates and lower life expectancies (Wallerstein, 2002).



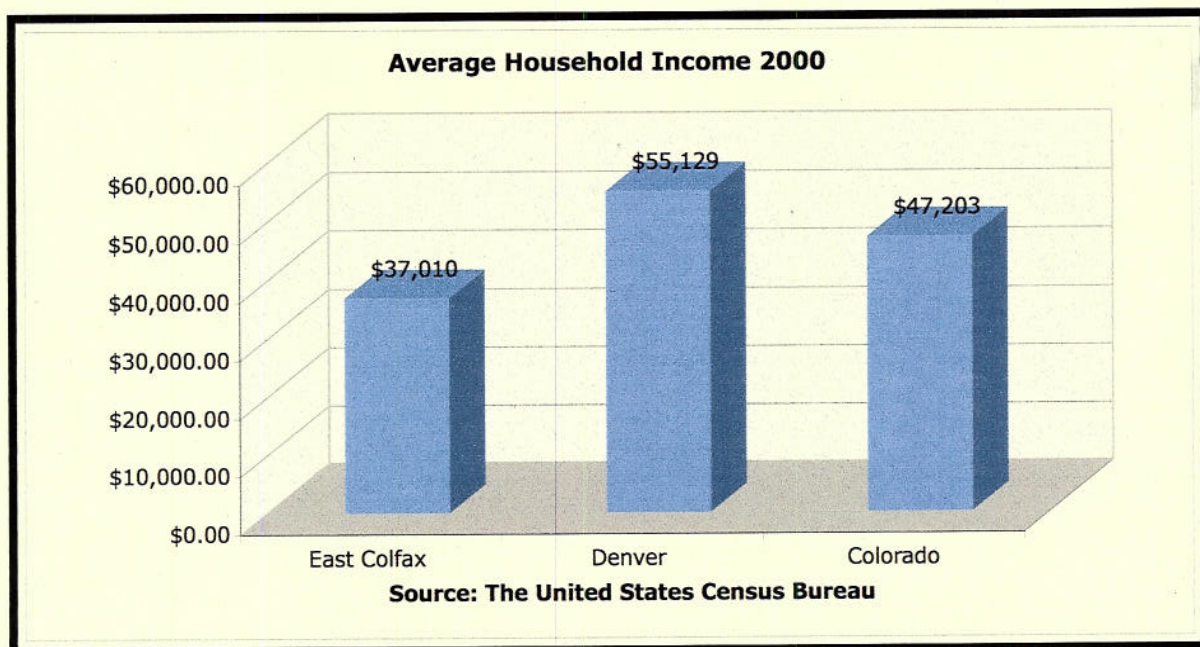
*See Appendix F: Bar Graphs & Pie Charts

Assessment - Community Health Factors (continued)

Health & Socioeconomic Status: The residents of East Colfax have statistically lower levels of education than the surrounding area. Residents of Denver are almost twice as likely to possess two year college degrees. Moreover, East Colfax residents are more likely than Denver residents to have less than a high school education and a high school education (The Piton Foundation, 2009). This is significant as multiple studies have revealed that the socio-economic status of an individual has a clear positive relationship to their level of health. If one has a higher socio-economic standing they will in all probability have a higher level of health. Moreover, if one has a low socio-economic standing they will be more likely to have a comparatively lower level of health (Wilson, 2009).

Income Disparity: The neighborhood of East Colfax has a significantly lower average household income (\$18,119 less) than the city of Denver. East Colfax also has a lower average household income than Colorado and the United States ((The Piton Foundation, 2009) & (The United States Census Bureau, 2009)).

Lack of Employment Opportunities: Job opportunities in the East Colfax area are extremely limited. The total number of jobs found in the area do not amount to one half of a percent of the total jobs in the city of Denver. This forces most individuals to commute either by public transit or personal vehicle and thereby reduces the probability of utilitarian commuting exercise which can increase the average level of health of the community (Cervero & Radisch, 1996).*



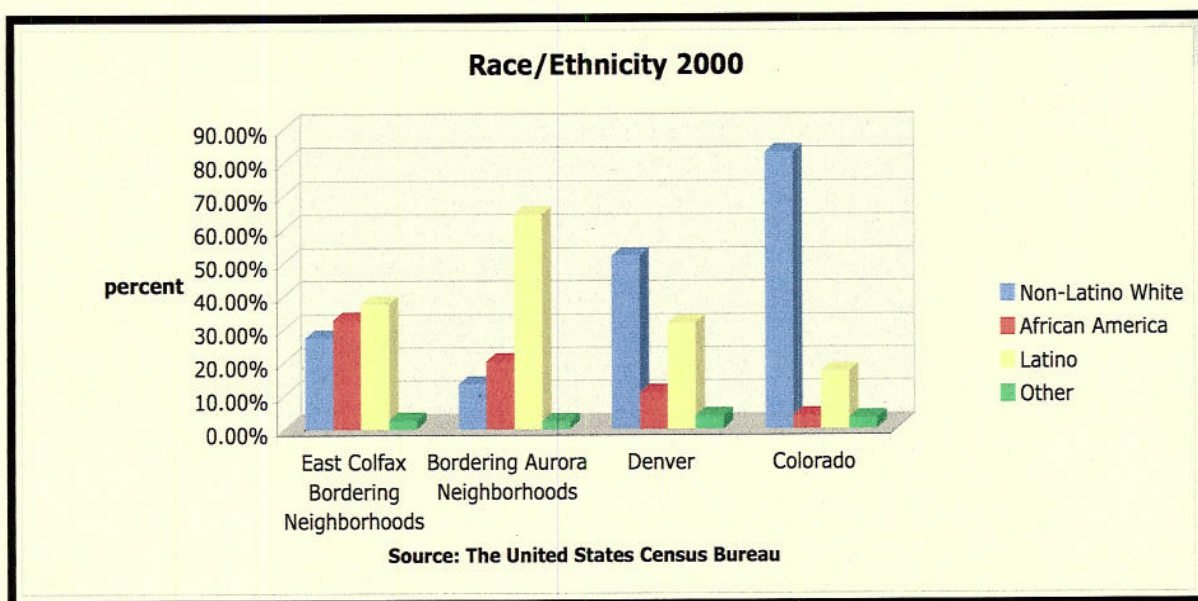
*See Appendix F: Bar Graphs & Pie Charts

Assessment - Community Health Factors (continued)

Higher Rate of Crime: The area of East Colfax has a significantly higher crime rate per 1,000 persons than the city of Denver (38% higher) (The Piton Foundation, 2009). Studies have shown that higher crime rates will lead to decreased rates of walking. This consequently causes populations to have higher BMI's. However, crime rates more strongly affect a women's BMI than a man's. Women in the study area are therefore more likely to lead sedentary lifestyles as a result of high crime rates (Doyle et al, 2006).

Type of Crime: The East Colfax neighborhood has a statistically higher percentage of violent crimes (75% higher than Denver) (The Piton Foundation, 2009). More violent crimes can lead to higher levels of fear among residents. Studies have shown that an individual's desire and ability to walk through their neighborhood is directly associated with fear (Loukaitou-Sideris, 2006). This is significant as the people in the study area are more likely to victims of violent crimes.

Diversity: The neighborhoods that border the Westerly Creek have significantly higher levels of minority populations when compared to Aurora, Denver, Colorado and the United States. This is important to consider as a number of studies indicate that minority groups in the United States have higher mortality and disease incidence rates (Waidmann & Rajan, 2000). African Americans have high rates of mortality caused by heart disease, cancer & cerebrovascular disease while Hispanics have high rates of mortality caused by diabetes (Sue & Dhindsa, 2006).*



*See Appendix F: Bar Graphs & Pie Charts

Phase Four: Reporting

The reporting phase identifies potential health benefits, concerns, and planning recommendations.

Benefits, Concerns & Recommendations (continued)

The WCC plans have the potential to positively affect the health of the residents of East Colfax and the bordering Aurora neighborhoods. The creation of developed open green space and the biking and walking paths should positively change the built environment and help promote more healthy lifestyles (Frank et al, 2005). The addition of developed green space will provide adults and children with space to exercise and play (Active Living Research, 2005). The close proximity of walking and biking paths should promote higher levels of physical activity in the neighborhood (Krizek & Johnson, 2006). Therefore, these developments could potentially decrease the likelihood of sedentary lifestyles, increase the amount of physical activity in the community, and improve the physical and mental health of the residents (Rodriquez, Khattack & Evenson, 2006).

The establishment of walking and biking paths will increase the number of healthy transportation options available in the area. Denver has developed an extensive multi-modal transportation system that consists of miles of designated walking and biking paths throughout the city (Moving People: Strategic Transportation Plan, 2008). The creation of a walking and biking path through the study area will connect the existing biking and walking paths located in Lowry and Stapleton. This will greatly increase the regional multi-modal transportation network and should promote more foot and bike travel. The path will also offer residents a non-exclusive alternative means of sustainable transportation. (Frank, Andresen & Schmid, 2004).

After the canal renovation is completed, the local residents will be protected from floods that could devastate the area. The renovation will protect the nearly one hundred homes, and infrastructure currently located in the Westerly Creek's flood plain. The canal renovation will protect the critical transportation routes, used by first responders, from inundation in the event of severe weather. The changes could also improve the quality of water that currently flows through the creek (Matrix Design Group, 2007).

The evidence presented in this HIA indicates that the WCC plans have the potential to positively change the built environment and the health of the residents. However, the HIA identified a number of concerns that could inhibit the potential benefits. Moreover, the proposed WCC plans also have the potential to negatively impact the area's residents.

Benefits, Concerns & Recommendations (continued)

The WCC group plans to attract developers to the area to slowly redevelop and improve the area's built environment and living conditions. This could have a negative impact on the area's poorer residents for a number of reasons. First, the new buildings could be too expensive for the current residents. Second, open green and redeveloped riparian space will in all probability increase the value of the surrounding housing units and real estate. Any rise in home or property value will ultimately raise property taxes. This could eventually raise rent prices in an area where a significant portion of the population already spends a considerable amount of their income on rent. Any increase to the cost of living could eventually displace the populations living in the community because they would no longer be able to afford to live there. However, any changes to property values and rent prices would not be immediate but rather take place over a period of years (Brown, Brown & Perkins, 2004).

Safety is a major concern that will need to be addressed by WCC planners. Crime levels and pedestrian safety will affect the amount of use the new green space and walking and biking path will receive. Both the high level of crime and proportionately high level of violent crime, will greatly reduce the likelihood of a significant increase in any amount of exercise seen in the study area (Loukaitou-Sideris & Eck, 2007). The planned path will cross both Montview avenue and Colfax Avenue. These crossings will pose the greatest pedestrian risk as they are barriers that reduce the connectivity and increase the danger of the proposed route (Ernst & McCann, 2002).

Another concern that the HIA has identified is the lack of social or work related destinations in the area. Desirable destinations that are located in close proximity to walking and biking paths have been shown to increase levels of exercise (Lusher, Seaman & Tsay, 2008). The fact that there are few social gathering sites and a small number of jobs located in the area greatly reduces the likelihood that exercise will increase as a result of utilitarian travel (Rhodriquez, Khattack & Evenson, 2006).

This HIA has identified how the WCC plans can affect the population both negatively and positively. The following recommendations are made in an effort to maximize the potential health benefits of the WCC plans.

Benefits, Concerns & Recommendations (continued)

Efforts should be made to create a sense of community and empower local residents to assume responsibility over their neighborhood (Wallerstein, 2002). The establishment of community gardens, basketball courts, dog parks, pavilions, or bar-b-que sites along the canal could help foster a sense of communal investment among neighbors. This is important as it can deter crime by increasing neighborhood activity levels and improving social bonds (Eck, 1995). The introduction of a farmers' market could promote and foster community bonds and offer residents healthier food options and outside entertainment. This could be accomplished by engaging Denver Urban Gardens, local garden groups, homeowner associations, and other non-profits who could introduce community orientated approaches to institute these recommendations.

Proper maintenance of the walking and biking path and open space will be critical to prevent further deterioration of the neighborhood and deter would-be criminals (Taylor & Harrel, 1996). A trail adoption program could help local residents take a sense of responsibility and pride over the cleanliness and maintenance of the planned path and green space (Wallerstein, 2002). Simple features such as park benches or water fountains should also be installed along the path in an effort to promote use which will put more eyes on the street to potentially deter crime (Eck, 1995).

WCC planners should make efforts to improve the built environment design in order to positively affect the health of the residents. Proper vegetation design can positively affect factors that are associated with peoples' health. WCC planners should plant trees with high branches and low maintained grass along the path. These features should increase the amount of activity and attractiveness of the area (Lusher, Seaman & Tsay, 2008). However, the design should not only be aesthetically pleasing but also developed to preserve line of sight. Studies have shown that proper vegetation design can actually decrease the level of crime in an area (Kuo & Sullivan, 2001).

WCC planners should install lighting along the creek path. Studies have shown that proper lighting design can reduce both the level of crime and perception or fear of crime (Painter, 1996). However, in order to promote activity and decrease levels of fear, lighting should be placed in a manner that eliminates dark shadows. If the lighting is too bright it can create shadows along the path that offers would-be criminals locations of concealment. Efforts should be made to establish a system of diffuse lighting along the path to maximize the benefits of lighting (Nasar & Jones, 1997).

Benefits, Concerns & Recommendations (continued)

The crossings at East Colfax Avenue and Montview Boulevard pose a serious built environment risk to pedestrian and biker safety. WCC planners should seek to minimize the dangers at these locations. Raised or clearly marked crosswalks should be installed at these locations in order to increase the safety levels and increase the connectivity of the path (Pucher & Dijkstra, 2003).*

Planners should establish a method to ensure the preservation of low income and affordable housing in order to prevent the displacement of poor populations. They should help promote healthier food options in the area. They should also try to aid in the establishment of desirable social locations. Mixed zoning or tax breaks to future developers could help ensure these outcomes that would ultimately be beneficial for the health of the community.

The WCC planners and the City of Denver should consider developing a tool to track the level of health of the community. This will provide information to planners that can aid in both future WCC planning and other revitalization projects.

*See *Appendix A: Westerly Creek Map*

Conclusion

The Westerly Creek Connection project does hold great promise for the surrounding area and residents. The canal renovation will in all probability protect the residents, structures and critical transportation routes from potentially harmful floodwaters. The walking and biking paths will increase the level of multi-modal connectivity of the neighborhoods and concurrently promote more physical activity. The creation of the path and open green space should offer residents more opportunities and reasons to get outside and engage in physical activity. The future redevelopment plans could improve the quality of living and community appearance.

In order for the Westerly Creek Connection project plans to reach their full potential positive health effects on the community, planners should be aware of many of the barriers affecting health. The area is prone to statistically higher levels of total crime and higher levels of violent crime in comparison to the city of Denver. This will be the greatest impediment to increasing physical activity and health in the area.

Redevelopment of the area will undoubtedly increase home values, rent prices, and ultimately the cost of living. The area's population faces many social disadvantages that affect income, health, education, and ultimately their socio-economic status. The area also lacks desirable social locations to gather, places of exercise, and locations of employment that could promote utilitarian travel and exercise.

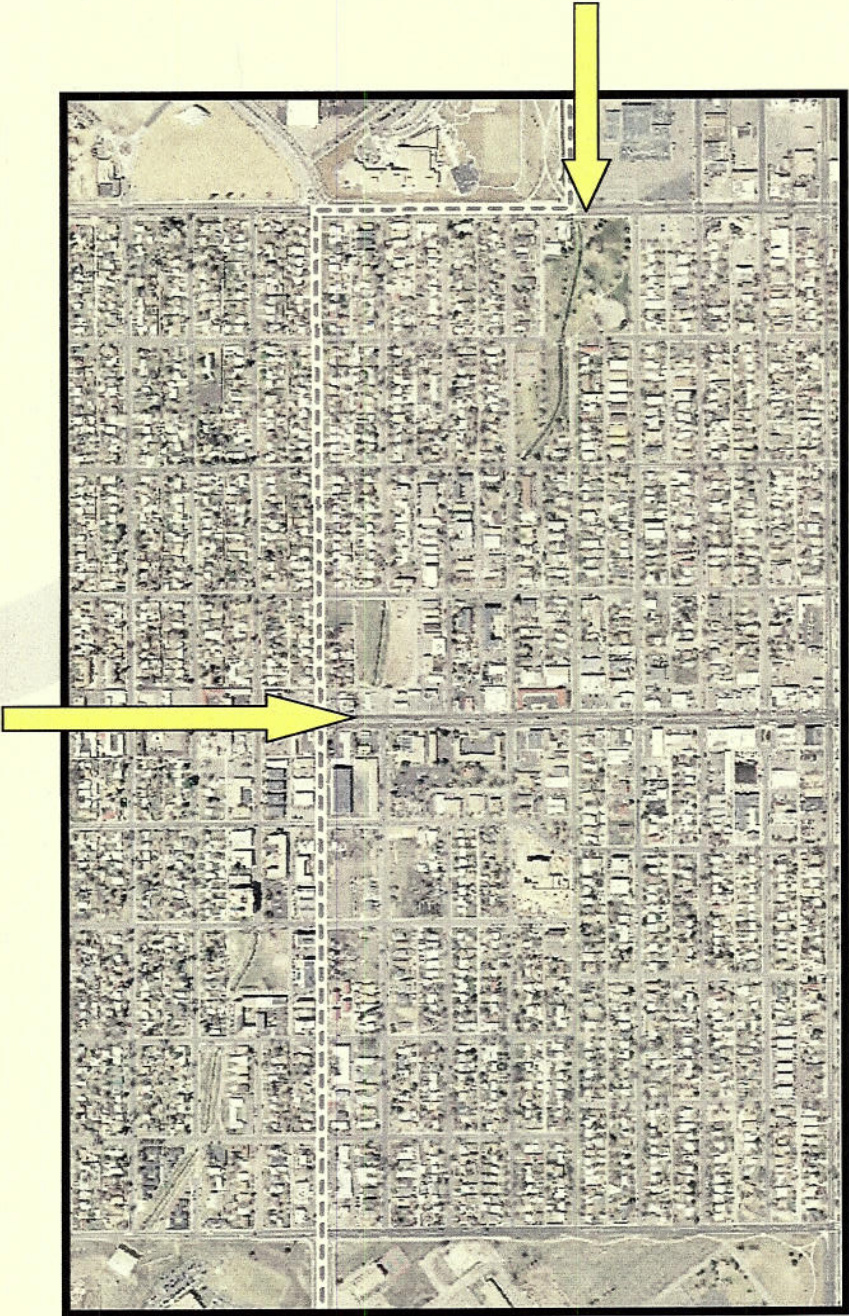
Planners need to establish methods and controls to ensure low income and affordable housing as the project will in all probability increase real estate values and increase the area's cost of living. Furthermore, planners need to promote mixed zoning to provide residents with commercial and social destinations to increase utilitarian travel. The built environment design needs to incorporate safety features such as raised cross walks, proper lightning design, proper vegetation design, and street design. Proper maintenance and upkeep should be secured from the outset to prevent the neighborhood's deterioration.

Appendix

The Appendix section includes a Westerly Creek Map, references cited, the HIA literature review, flows charts, bar graphs, pie charts, and a synopsis of applicable SPA courses.

Appendix A: Westerly Creek Map

Crossing at Montview
Boulevard



Crossing at
East Colfax
Avenue

Appendix B: HIA Literature Review

The purpose of a Health Impact Assessment (HIA) is to provide information to planners and policy makers so that they may make more informed decisions. An HIA assesses the current state of the health of the community, evaluates the potential affects of specific plans or policies, and offer recommendations to planners. The ultimate goal of an HIA is to promote thoughtful decision-making that will ultimately benefit the health of the population affected by public policy (Health Development Agency, 2001).

A handful of European countries, New Zealand, and Australia have been leaders in developing, designing, and implementing HIA's. The concept however is still in a relatively nascent phase in the United States. Following the examples of the mentioned countries, the city of San Francisco has acted a pioneer of sorts in the United States. The city has played a critical role in the promotion of HIA's throughout the country. It has achieved this by successfully implementing HIA's and sharing their skills and knowledge with other cities (North American HIA Practice Standards Work Group, April 7, 2009).

Most cities still lack knowledge, tools, and training. A thorough HIA is conducted by multi-disciplinary teams that draw from the fields of environmental science, epidemiology, economics, public administration and health. The input of specialists from these field is extremely valuable but expensive. Further complicating their implementation is the fact that HIA's do not have a quantifiable monetary return and their value is largely qualitative. This makes the implementation of an HIA by cities under tight budget constraints even less likely (Dannenberg et al, 2006).

The size of an HIA can greatly vary depending on, the amount of funding available, amount of time available to conduct the HIA, and the unique characteristics of the project. A rapid HIA provides decision makers with a basic level of evaluation and can be conducted in just a few weeks. An intermediate HIA takes place over a series of months. It provides policy makers with a more thorough analysis of the situation, more accurate predictions of potential effects, and sound recommendations. A comprehensive HIA gathers an extensive amount of data for evaluation over a period of years. The Comprehensive HIA supplies the most accurate evaluation, predictions, and recommendations but is inherently the most costly and timely (London's Health, 2000).

The size of the HIA however does not necessarily significantly change the process by which an HIA is conducted. The first element of an HIA is the screening process. This constitutes a preliminary study that determines whether the project raises questions regarding the public health. If it the screening process indicates that the public's health will be affected than the second step, scoping, needs to be undertaken. During the scoping phase practitioners will determine what are the relevant factors that should be incorporated into the study. The next stage, which comprises the bulk of the work, is the appraisal stage. Practitioners gather evidence and evaluate the potential effects the project may have on the affected populations. After the extent, size, and nature of the effects have been determined than the practitioners enter the last stage and write their final report and recommendations (Kemmm, 2008).

Appendix B: HIA Literature Review (continued)

HIA's vary greater in what they select as criterion upon which to base the evaluation. These factors can include but are not limited to; level of education, occupation, income, housing conditions, quality of life, social support networks, ethnicity, obesity level, geography, access to walking paths, access to food, safety, and public transportation. In any HIA practitioners must first deduce what are the appropriate factors to use to evaluate the general health of the affected population. After this information is collected and analyzed it will provide the foundation upon which the impacts of the respective project can be evaluated. Furthermore, it will identify the health factors that are of critical concern and supply grounds for recommendations (London's Health, 2000).

One widely known criticism of HIA's is the fact that funding for them is typically found after a public project has already been approved. Therefore, some argue that HIA's can be used as evidence to justify and rationalize a project after approval. If conducted appropriately an HIA should retain its neutrality and not be influenced by any existing political agenda. Regardless the question of whether an HIA that showed a project would acutely negative affect a community would have any real impact on public policy is real and tenable concern (Blau, Ernst, & Figueras, 2007).

A clear link has been established between the built environment and the health of the inhabitants. Studies on the design of neighborhoods have shown that they the urban environment can encourage walking, biking, or other physical activities associated with improved physical and mental health (Frank & Engelke, 2005). Access to open space, wide side walks, and pleasant surroundings, have proven to be factors linked to more active lifestyles (Active Living Research, 2005). This is becoming more important every year because American lifestyles are becoming increasingly sedentary and it appears that obesity will soon overtake smoking as the number one cause of death in the United States (Mokdad et al, 2004). Obesity is associated with high rates of morbidity because it drastically increases an individual's chances of developing diabetes, coronary heart disease, cardiovascular disease, chronic pulmonary disease, and other life threatening conditions (Frank & Engelke, 2001).

HIA's ideally will make city planners aware of the fact that the manner in which the urban environment is structured can encourage driving, increase crime, and reduce the over all health of the population. Increased levels of vegetation, when properly cared for, can reduce the number of crimes committed (Kuo & Sullivan, 2001). Proper lighting design, can improve the overall health of the community by increasing physical activity levels, reducing fear, and reducing crime (Painter, 1996). Improved street designs can encourage walkability, reduce traffic, cut noise levels, encourage social interaction, decrease air pollution, and increase safety. All of these factors can measurably increase the general health of population and should be incorporated into a thorough HIA (Lusher, Seaman, & Tsay, 2008).

Appendix B: HIA Literature Review (continued)

Every year, additional studies are being conducted that continue to reinforce the connection between the manner in which the built environment that humans inhabit and their health. The increased breadth of information and increasing level of obesity among Americans is creating a strong incentive for city planners and policy makers to pay heed to HIA's. Decision makers need to adopt a new approach to HIA's and not see them as hindrances to their political goals. Nor should they employ HIA's as an instrument to legitimate existing agendas. Instead HIA's should be used as tools to better inform their decisions and ultimately allow these leaders to better serve the general population (Cave & Curtis, 2001).

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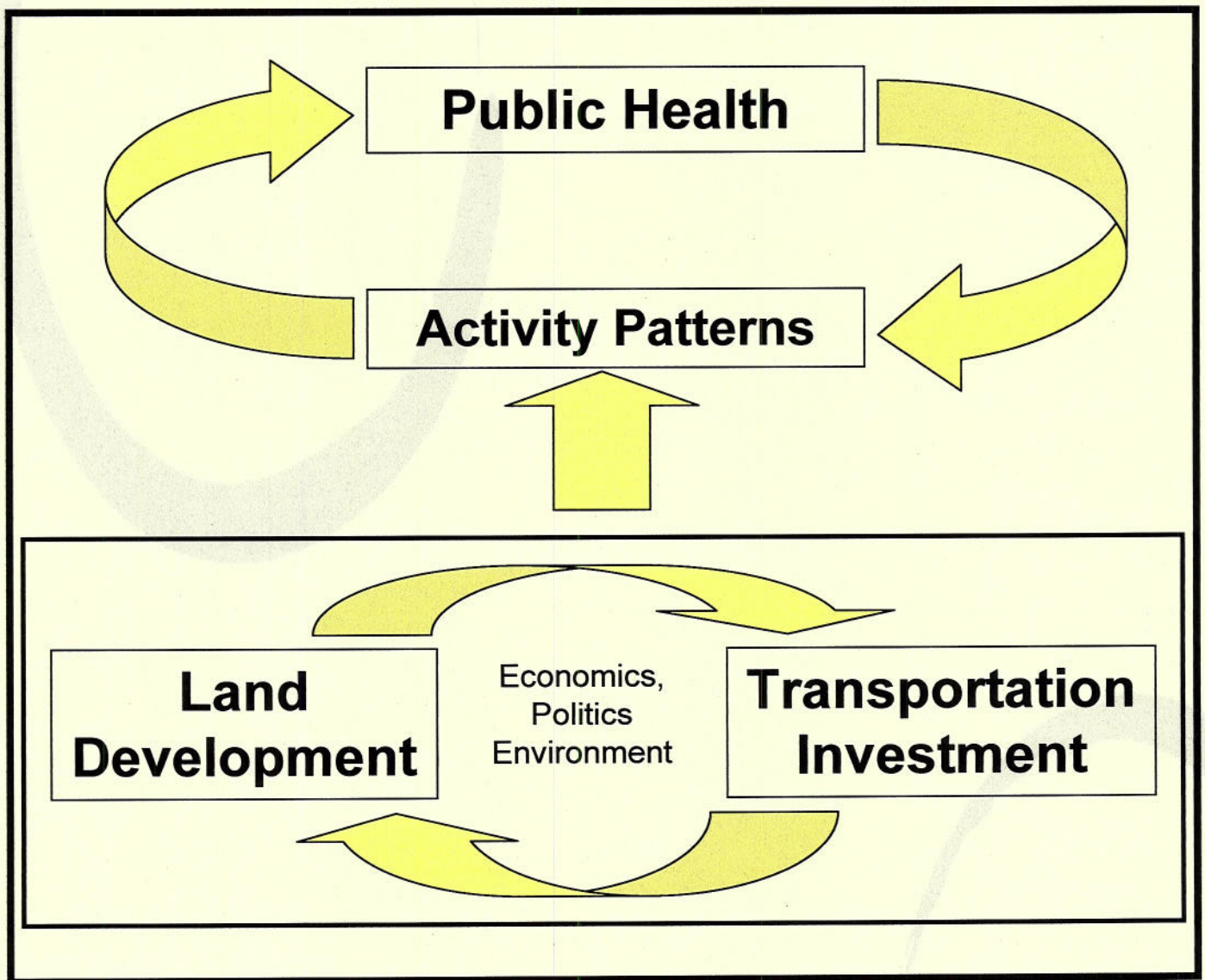
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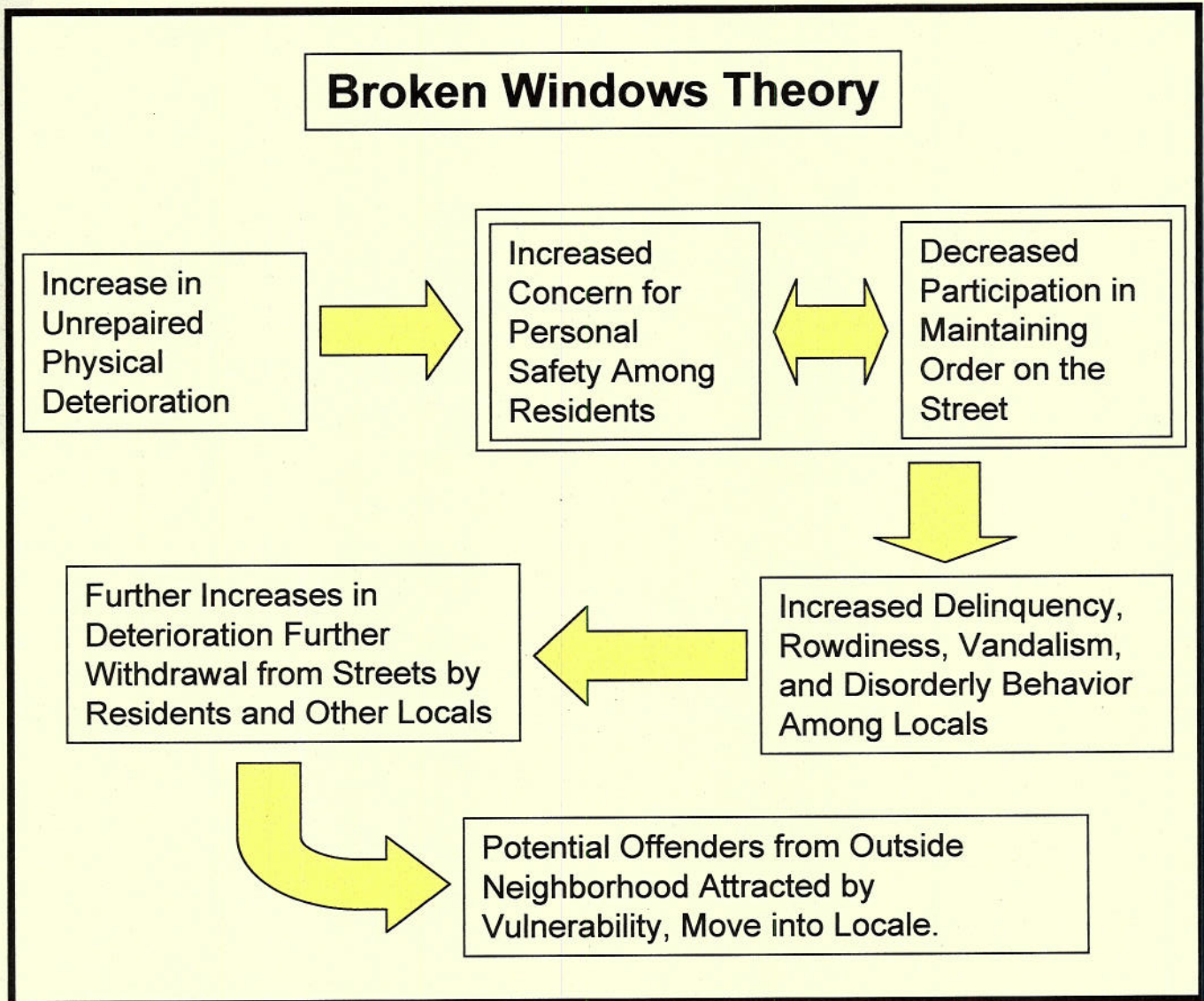
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Appendix D: Health & the Built Environment



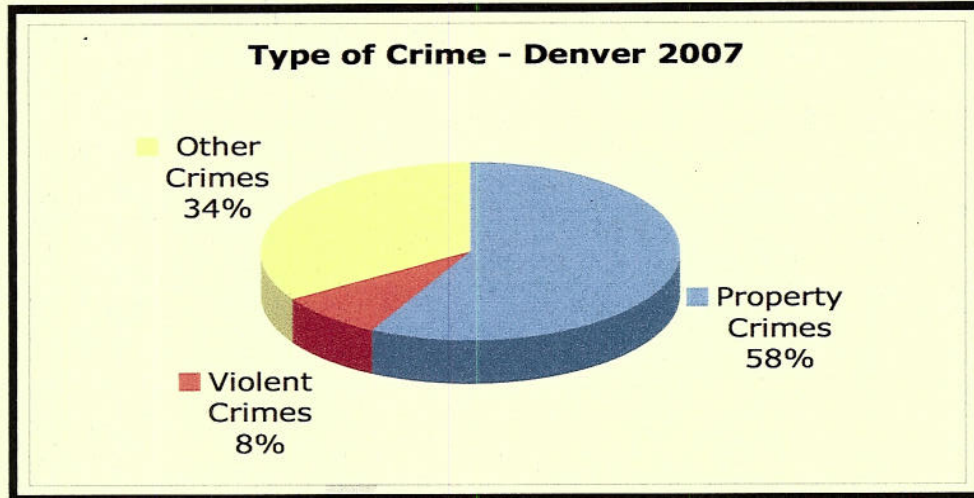
Adapted from: Frank & Engelke, 2001.

Appendix E: Crime & Environment

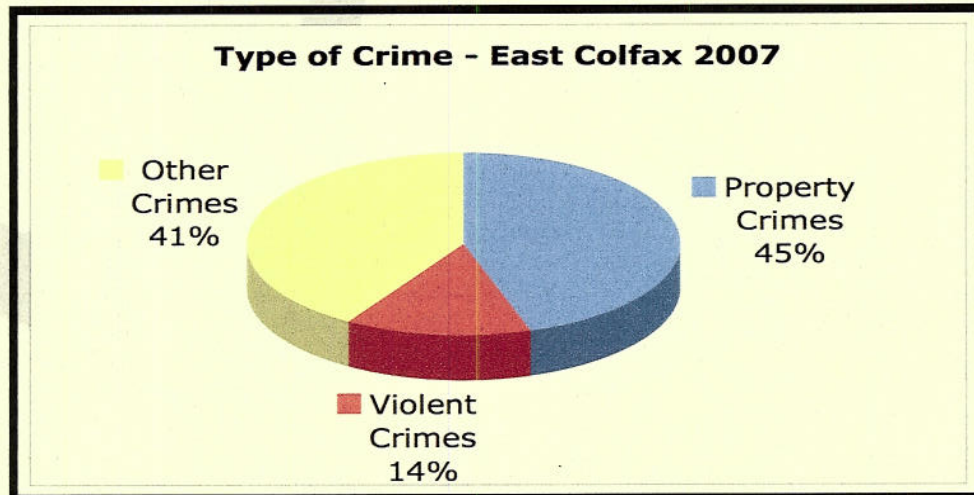


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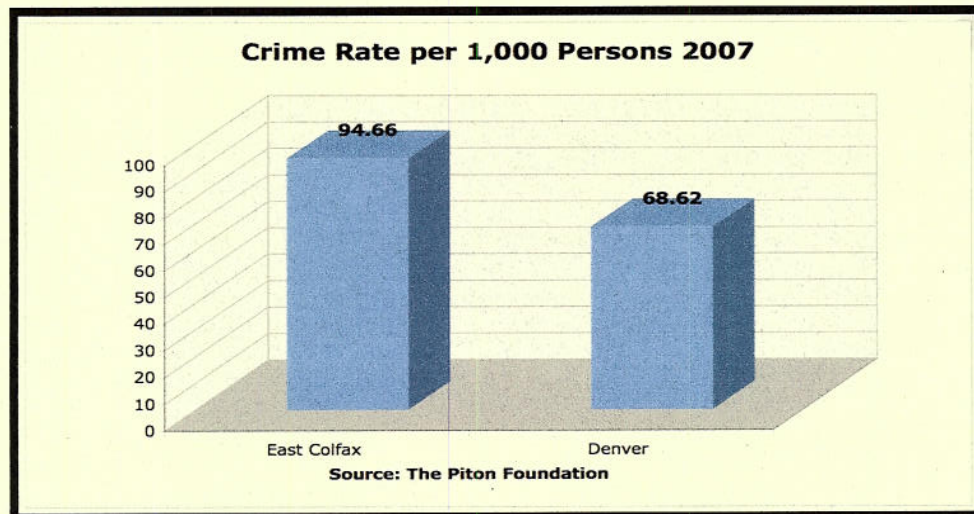
Appendix F: Bar Graphs & Pie Charts



Source: The Piton Foundation

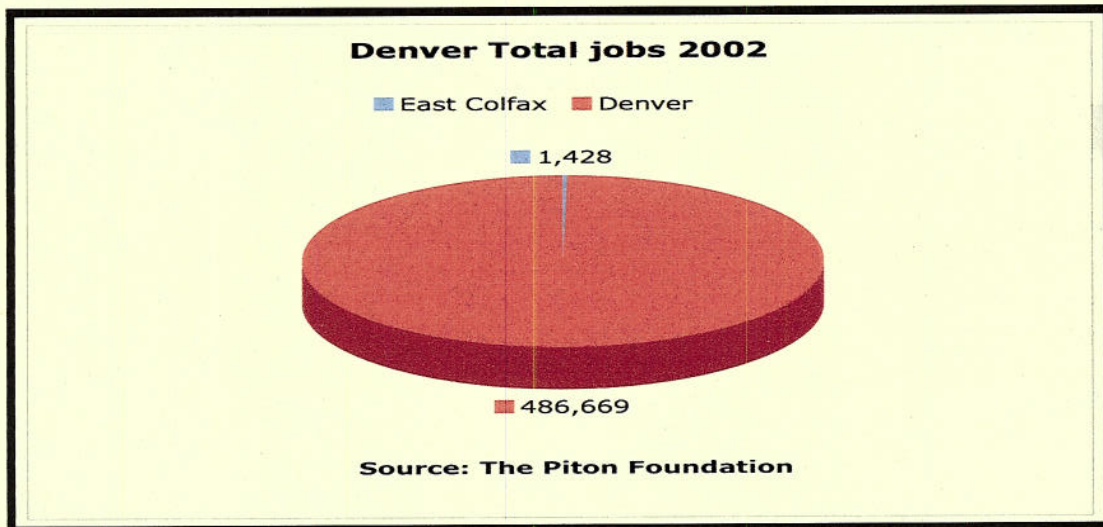
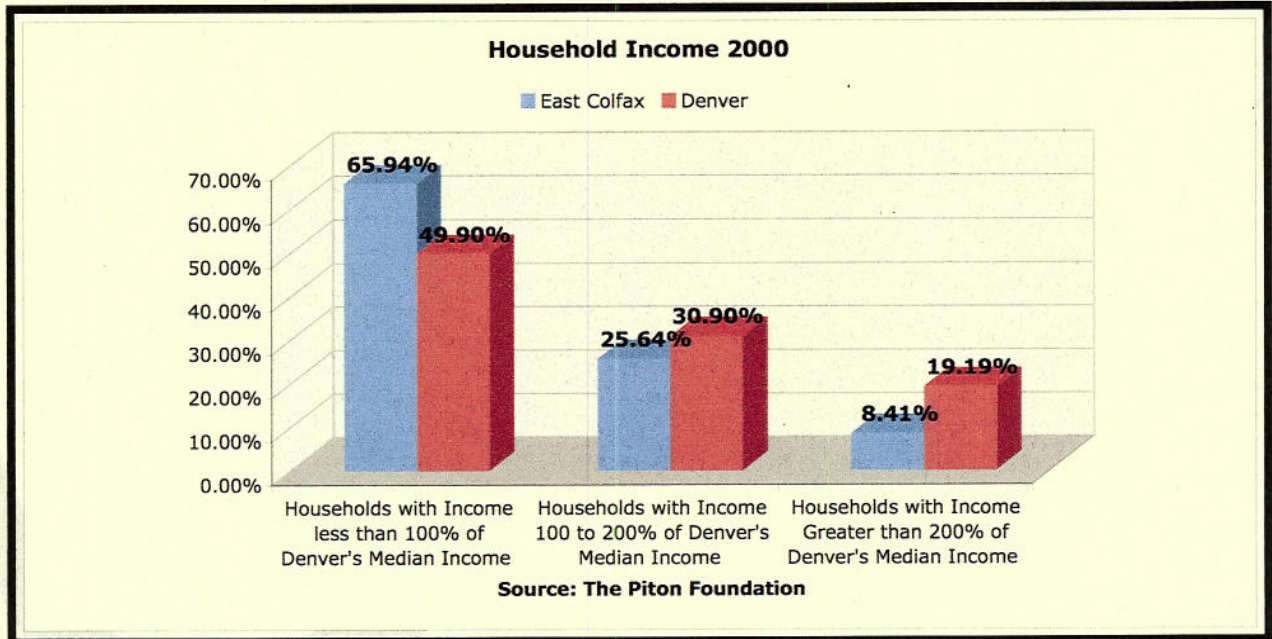


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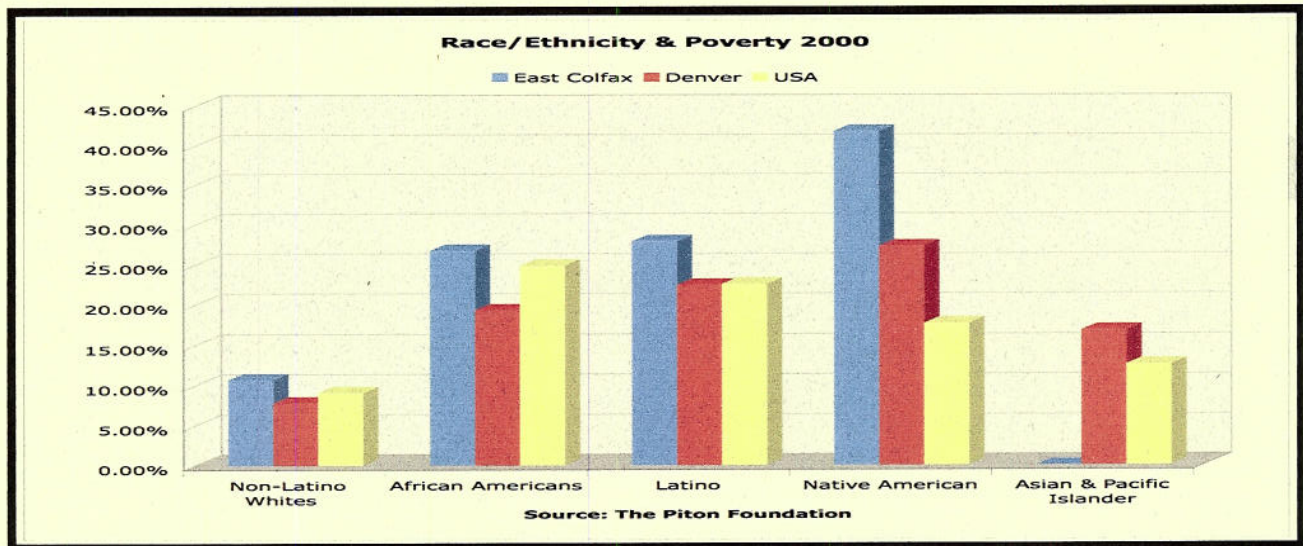
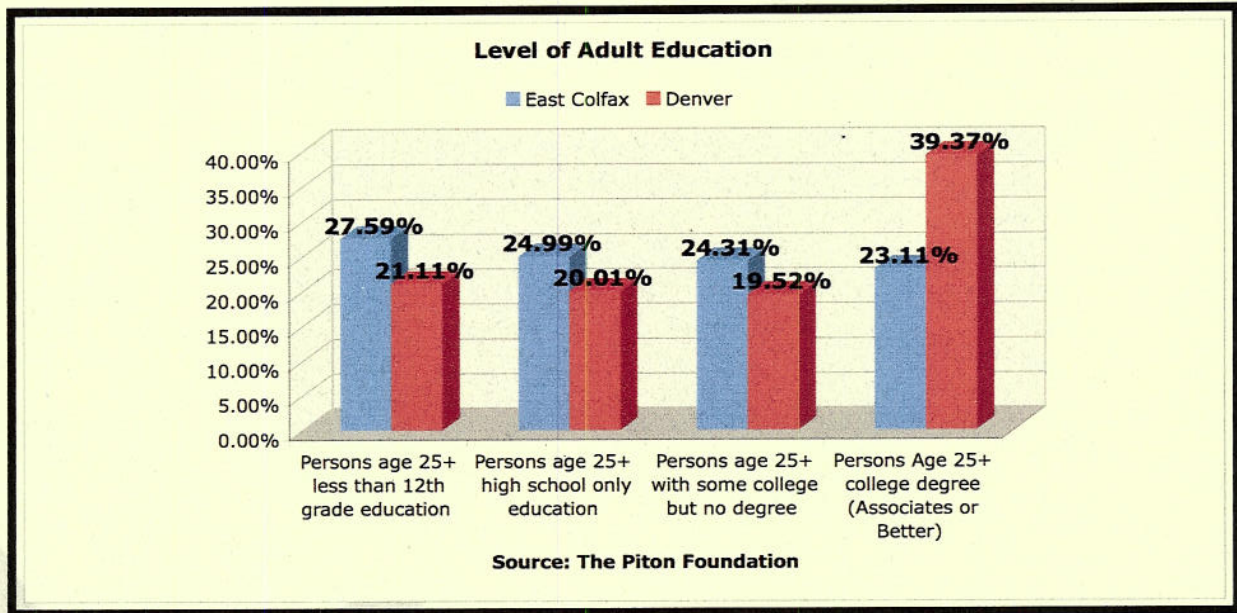


Source: The Piton Foundation

Appendix F: Bar Graphs & Pie Charts (continued)



Appendix F: Bar Graphs & Pie Charts (continued)



Appendix G: SPA Courses

PAD 5220: Managing People in the Public Sector and Non-Profit Organizations,

- Professor Mary Guy

In this course I learned proper research techniques, practices and citation. I learned research methods and strategies that have helped me through the capstone project. I have found that the methods I learned from the course have been particularly useful with this project because of the large amount of literature, data, charts and maps involved. Moreover, the course taught me the importance of taking detailed scrupulous notes. This has made the writing process significantly easier than it could have been if I had failed to properly develop an organized and thorough annotated bibliography.

PAD 5002: Organizational Management and Change,

- Professor Robert Gage

In this course I was involved in a project that required creative methods of research, thorough evaluation, visual presentation skills and oral communication skills. The project was presented in PowerPoint, as is this capstone, and the presentation skills that I acquired through that project have greatly helped with this undertaking. The oral communication skills will undoubtedly aid me with the final presentation in order to clearly and succinctly communicate the project's core ideas and arguments.