

WALKABILITY IN SUBURBIA

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A REPORT

submitted in partial fulfillment of the requirements for the degree

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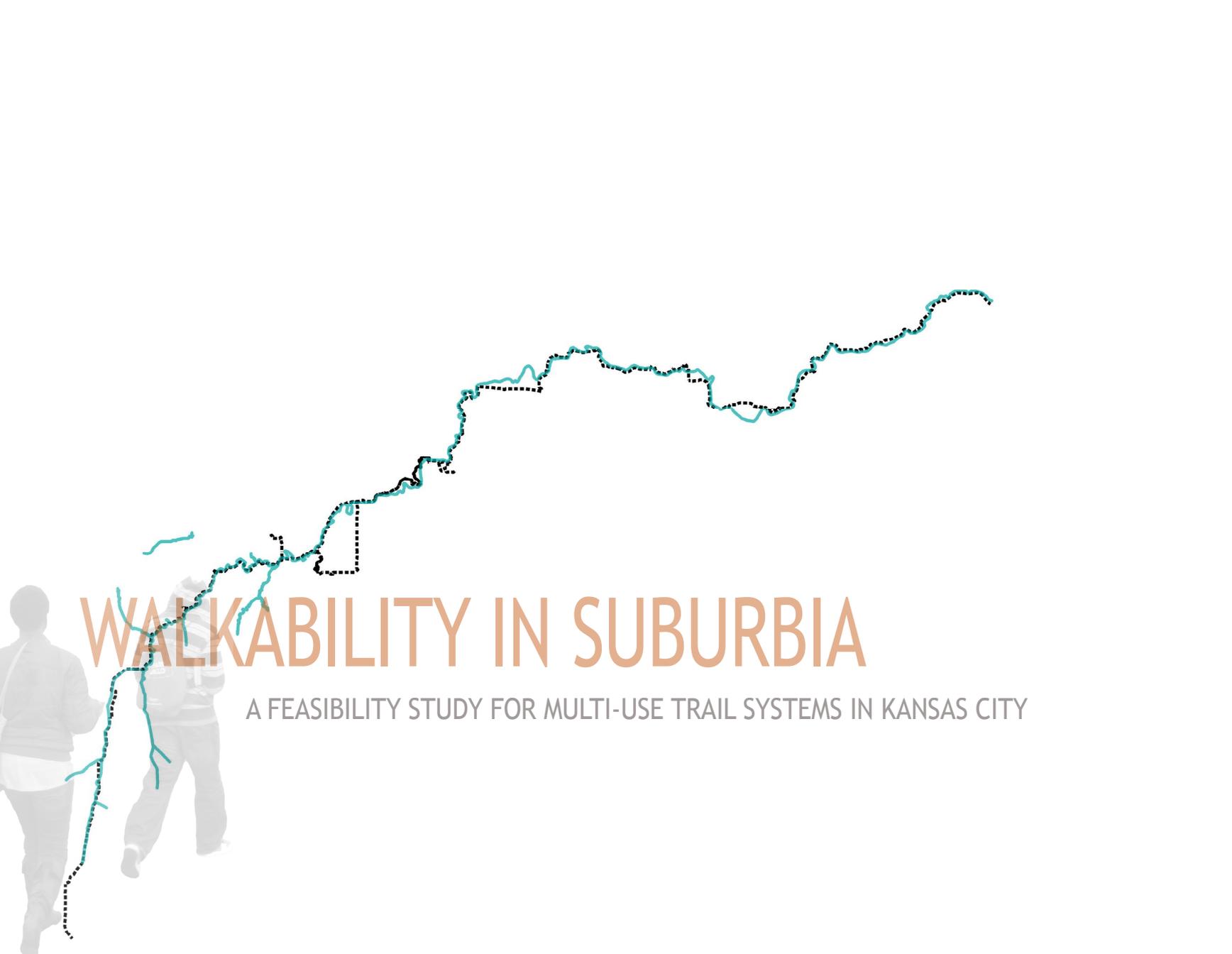
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## ABSTRACT

Walkability is a challenge for most suburban metropolitan areas. Specifically, the Kansas City suburban cities of Overland Park, Olathe, Leawood, and South KCMO have sprawled and disconnected urban patterns and a low average walkability score of 37 out of 100 (Walk Score, 2013). The Indian Creek Trail, an existing recreational trail that extends throughout the southern Kansas City neighborhoods, has the potential to improve walkability. It connects major destinations, including residential communities, businesses, and commercial districts throughout the suburban neighborhoods. Many studies have analyzed suburban sprawl and walkability, but few studies have identified the possibility of enhancing existing trail systems to provide for greater mobility, connectivity, and activity. The study examines the feasibility of reusing an existing trail system to act as a catalyst to promote walkability in the Kansas City suburbs. The goal of the project to create a paradigm shift in the way people think about transport and development. The purpose is to identify how centering walkable strategies around an active transportation network can promote walkability in sprawled suburban areas.

The question: How can focusing improvement around existing trail infrastructure enhance walkability in suburban areas? has guided the project and helped define strategies for improvement. This project identifies the Indian Creek Trail's current and potential uses from an in depth community and spatial analysis. Surveys, interviews, and observations were conducted within 13 major destination areas along the Indian Creek Trail. The results were then analyzed to create an evidence-based design framework that will address walkable concerns.

The project results showed there were three primary causes for walkable limitations along the trail network: current transportation trends, suburban development patterns, and social perceptions. Understanding these important aspects of walkability helped identify a framework for improvement. The findings from the analysis determined the site restrictions and prospects of creating a walkable environment along the Indian Creek Trail. The results identified primary locations of needed intervention and revealed major opportunities for connection. The design then applied walkable components based on analysis findings to create nodes of complete communities. Design decisions were tailored to amend community needs and alter traditional transport perceptions. The objective of the designs was to address specific walkable limitations to create reasonable solutions in suburban areas. The project identifies 5 primary components of walkability that can be used to create a walkable plan. Future studies would revolve around implementing the designs and analyzing the effectiveness to create a model that can be applied to enhance walkability for other suburban areas. Ultimately, the results could establish how improved walkability can promote multi-modal transportation opportunities where population, density, diversity, and funding do not allow for typical transportation or development enhancements.



# WALKABILITY IN SUBURBIA

A FEASIBILITY STUDY FOR MULTI-USE TRAIL SYSTEMS IN KANSAS CITY

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SPRING 2014

A report by Lauren Patterson

Submitted in partial fulfillment of the requirements for the degree:

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## ABSTRACT

### BACKGROUND AND SIGNIFICANCE:

Walkability is a challenge for most suburban metropolitan areas. Specifically, the Kansas City suburban cities of Overland Park, Olathe, Leawood, and South KCMO have sprawled and disconnected urban patterns and a low average walkability score of 37 out of 100 (*Walk Score, 2013*)

The Indian Creek Trail, an existing recreational trail that extends throughout the southern Kansas City neighborhoods, has the potential to improve walkability. It connects major destinations, including residential communities, businesses, and commercial districts throughout the

suburban neighborhoods. Many studies have analyzed suburban sprawl and walkability, but few studies have identified the possibility of enhancing existing trail systems to provide for greater mobility, connectivity, and activity.

### PURPOSE:

The study examines the feasibility of reusing an existing trail system to act as a catalyst to promote walkability in the Kansas City suburbs.

The goal of the project to create a paradigm shift in the way people think about transport and development.

The purpose is to identify how centering walkable strategies

around an active transportation network can promote walkability in sprawled suburban areas.

The question:

*How can focusing improvement around existing trail infrastructure enhance walkability in suburban areas?*

has guided the project and helped define strategies for improvement.

### METHODOLOGY:

This project identifies the Indian Creek Trail's current and potential uses from an in depth community and spatial analysis. Surveys, interviews, and observations were conducted within 13 major destination areas along the

Indian Creek Trail. The results were then analyzed to create an evidence-based design framework that will address walkable concerns.

### RESULTS:

The project results showed there were three primary causes for walkable limitations along the trail network: **current transportation trends, suburban development patterns, and social perceptions.** Understanding these important aspects of walkability helped identify a framework for improvement.

The findings from the analysis determined the site restrictions and prospects of creating a walkable

environment along the Indian Creek Trail. The results identified primary locations of needed intervention and revealed major opportunities for connection.

The design then applied walkable components based on analysis findings to create nodes of complete communities.

### CONCLUSION:

Design decisions were tailored to amend community needs and alter traditional transport perceptions.

The objective of the designs was to address specific walkable

limitations to create reasonable solutions in suburban areas.

The project identifies 5 primary components of walkability that can be used to create a walkable plan.

Future studies would revolve around implementing the designs and analyzing the effectiveness to create a model that can be applied to enhance walkability for other suburban areas. Ultimately, the results could establish how improved walkability can promote multi-modal transportation opportunities where population, density, diversity, and funding do not allow for typical transportation or development enhancements.

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# INTRODUCTION

- 3 | Background and Significance
- 7 | Study Area
- 9 | Project Focus
- 11 | Project Process

## BACKGROUND AND SIGNIFICANCE

Walkability in suburbia is a complex matter. The primary concern stems from vehicle oriented planning that has segregated the suburban landscape.

Walkability is defined by the proximity of amenities, and the pattern of suburban form is characterized by remote, inaccessible places (Cox, 2010). The sprawled, leap-frog development has created many barriers to

pedestrian travel, and made the car the most efficient form of transport in the majority of suburban cities (Untermann, 1984).

The unsustainable practices and poor walkable conditions of suburban places have been well documented within the past decade. Books such as *Retrofitting Suburbia*, and organizations such as *The Smart Growth Network*, have developed countless approaches to mend

suburban harms. However, the typical types of strategies within many walkability resources leave out some important conditions of the suburban lifestyle that cannot be easily measured. Peter Cox (2010), in his book *Moving People*, states that the failure of development has been historically articulated but the underlying assumptions on which actions are constructed are ignored (19). Illustrating the need to examine

how suburban patterns are evaluated to create conditions welcoming to all forms of travel.

Through an analysis of current walkability resources and community concerns, restrictions have been identified that make many suburban retrofitting techniques implausible or inefficient. Various

retrofitting strategies are large, costly models that come with community resistance (Tumlin 2012, 71). So, can a new approach be formed to implement strategies in a more efficient manner?

Can redirecting retrofitting plans and strategies to fit the suburban lifestyle, change how development tactics are perceived?

Can centering transport models back on the human scale, enhance walkable conditions and change how suburban areas are planned?

Can focusing strategies on an existing network, instead of trying to create a whole new system, change transport models today?

All elements of transport include the pedestrian. Current transport and development standards are focused on vehicles and create hazards to pedestrian travel. This project looks to identify alternative opportunities to mend the disconnect between pedestrians and the built environment today. In suburbia, pedestrian transportation is constrained by a lack of connectivity so there is rarely a continuous network to allow for multiple choices of movement (*Galina 2010, 10*). An existing trail system

however, promotes connectivity and provides an already connected network set up for success.

*So, how can trail systems facilitate walkability throughout suburbia?*

Trail networks are separate systems already integrated into the suburban fabric. This study examines how to focus strategies around existing trail networks to provide the opportunity to create walkable environments without completely transforming the suburban form.

There are many variables that influence a walkable environment. Trail networks are not constrained by many of the barriers that limit walkable conditions because they are already designed as pedestrian networks. This project looks expand the benefits of trail systems outside the physical trail boundary to enhance walkable conditions throughout the surrounding community.

The focus of research is centered on establishing the feasibility of utilizing trail systems for walkability. The project examines the complexities of suburban walkability and proposes a solution that will integrate people into the built environment. By identifying opportunities and constraints of walkability along a trail network, a design can be created to integrate trail networks into the suburban form through different walkability strategies.

### STUDY AREA

Walkable environments will vary based on different site conditions; therefore the Kansas City region has been chosen to explore how trail systems can affect walkability in suburbia.

The Kansas City metropolitan region makes development difficult due to the need to cross many political, social, and physical barriers. It is characterized by sprawled, segregated land use patterns, with limited

pedestrian infrastructure. The region also contains a unified and connected system of trails (MetroGreen Network) already built into the established environment. Due to the sprawled nature and car culture of

KC, as well as the interconnected trail network, this area was chosen for the study. The Kansas City suburbs help

define what elements affect walkability in suburbia and the Indian Creek Trail will identify how a trail system can enhance walkable conditions. Figures 1-1, 1-2, and 1-3 illustrate the focus area location.



Figure 1-1 | Focus Area Orientation State-wide Map (Patterson, 2013)

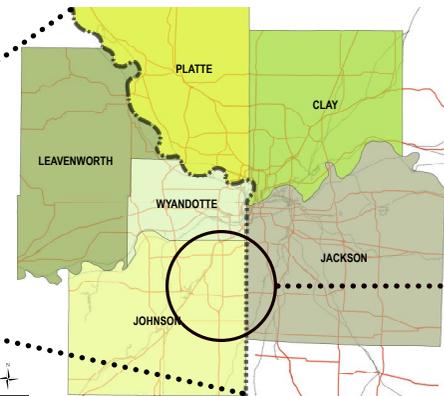


Figure 1-2 | Focus Area Orientation County-Wide Map (Patterson, 2013)

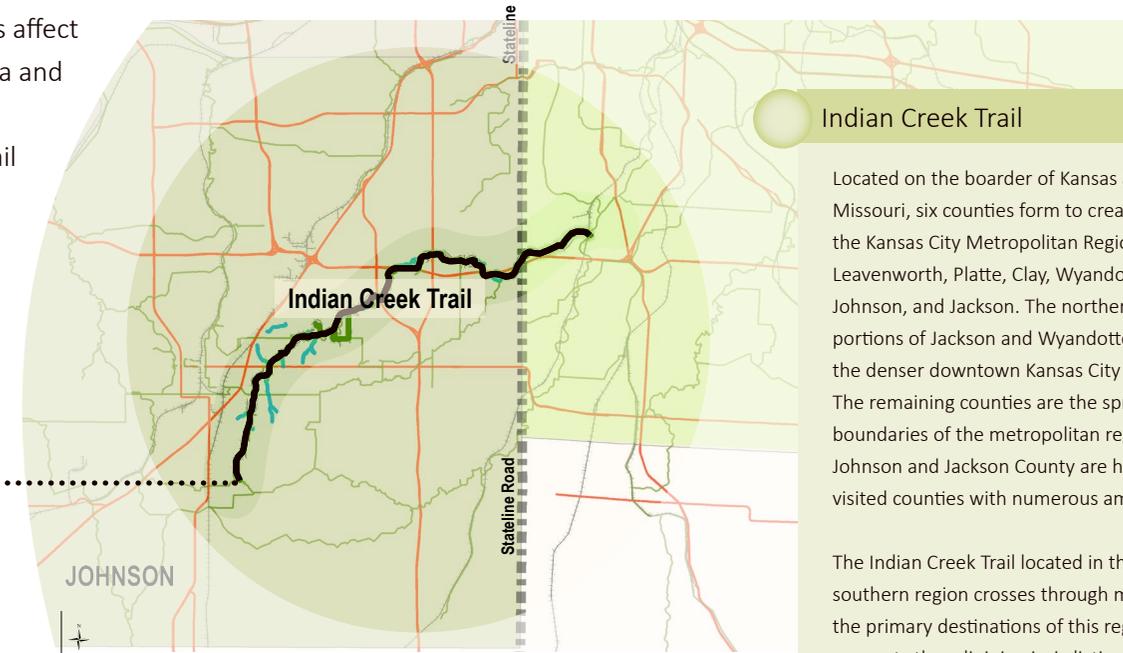


Figure 1-3 | Map of Indian Creek Trail Focus Area (Patterson 2013)

#### Indian Creek Trail

Located on the boarder of Kansas and Missouri, six counties form to create the Kansas City Metropolitan Region: Leavenworth, Platte, Clay, Wyandotte, Johnson, and Jackson. The northern portions of Jackson and Wyandotte form the denser downtown Kansas City district. The remaining counties are the sprawled boundaries of the metropolitan region. Johnson and Jackson County are highly visited counties with numerous amenities.

The Indian Creek Trail located in the southern region crosses through many of the primary destinations of this region and connects the adjoining jurisdictions.

## PROJECT FOCUS

In order to have a walkable community you need elements of: *people, mixed income/use, parks/public spaces, pedestrian design, schools/workplaces, and complete streets* which aren't typically seen in most suburban conditions (*Walk Score 2014*). Trail networks provide many of the elements needed for walkable conditions such as: people, public space, and pedestrian design, but aren't set up to promote walkability outside the trail boundaries. Specifically, the Indian Creek Trail is

designed for recreation, connecting only residences to the trail.

Conditions of walkability such as: safety, comfort, attractiveness, and sociability are also not present in many suburban conditions but are seen along trail networks (*MARC 1998, 4*). The Indian Creek Trail is separated from main roads and designed to accommodate groups of pedestrians and cyclists; creating a safe, welcoming area for walking and biking.

This project will look to expand the benefits of the Indian Creek Trail to promote walkable conditions throughout the larger community. This will be accomplished by adding elements that do not currently exist, connecting to elements that are just out of reach, and expanding current opportunities.

## PROJECT PROCESSES

The products of the project include a simplified walkability strategy that can be tailored to different types of urban conditions. Founded through literature, walkability components were constructed to allow for different strategies that can be introduced around trail networks in suburban environments.

The opportunities and constraints of introducing walkability components along the Indian Creek Trail were then identified from a walkability

analysis and a diagrammatic design was formed from the findings. The designs are proposals that simplify current walkability strategies today and can amend suburban walkability constraints one step at a time.

The proposal centers on facilitating a shift in retrofitting strategies to focus on the pedestrian to counteract current walkability harms in suburbia. The project timeline only allows for theoretical solutions, and only touches on the ideas of utilizing trail

systems to enhance walkability. It sets the stage for future research to evaluate the walkability components and establish the effectiveness of design implementations along trail networks.

### METHODOLOGY

Figure 1-4 illustrates the project framework for understanding how the environment around the Indian Creek Trail can be transformed to enhance walkable conditions throughout the Kansas City Suburbs.

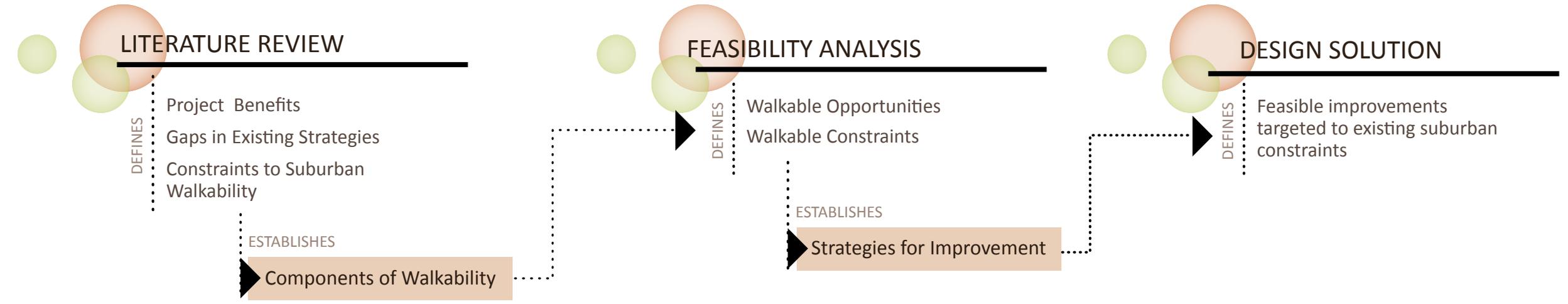


Figure 1-4 | Methodology Diagram (Patterson, 2014)

## A REVIEW OF LITERATURE

The review of literature is separated into three parts: *Walkability Benefits, Current Walkability Resources, and Suburban Walkability.*

### Benefits of Walkability

The benefits of walkability help illustrate the purpose for the project and the importance of establishing walkable communities.

### Current Walkability Resources

Current walkability resources were examined to understand the gaps

in existing strategies to define a simplified method for evaluating suburban walkability around trail networks. This evaluation helped define 5 components of walkability: connectivity, urban form, social aspects, pedestrian infrastructure, and pedestrian experiences, which have been identified as needed components for walkable conditions through the literature review. The components of walkability simplify current walkability checklists and strategies to create a cohesive tool

to evaluate and focus walkability strategies. It directs the strategy for the project and creates a framework for the evaluation and design around the Indian Creek Trail.

### Suburban Walkability

Suburban walkability illustrates the project concerns and reveals how the trail walkability strategy can enhance current conditions.

## FEASIBILITY ANALYSIS

The evaluation of the Indian Creek Trail takes the components walkability and evaluates specific conditions of the site. The analysis identifies the primary walkability constraints and opportunities around the trail to influence strategies for improvement.

## DESIGN SOLUTION

The design was formed through an evidence based design framework. It proposes walkability improvements based on the walkability analysis findings. The proposal is a basic example of how particular elements can be introduced to a site based on specific site conditions.

# PROJECT UNDERSTANDING

- 17 | Literature Review
- 51 | Project Strategy
- 55 | Project Goals



## LITERATURE REVIEW

The review of literature examines many current walkability studies and standards to define a strategy that can be tailored to trail networks in suburban areas.

## BENEFITS OF WALKABILITY

Walkability is an important part of everyday

travel. “We are all pedestrians...”<sup>(xi)</sup> and all forms of transport rely on our ability to walk from one place to another (Untermann,

1984). Walkability also defines much of a community’s success or failure in terms of health, social capital, transportation options, vitality, and economic and environmental sustainability (USEPA 2012).

Greater attention to enhanced walkability has come about due to recent research that reveals the benefits of walkable neighborhoods. Figure 2-1 illustrates the many resources and research that has been conducted about the benefits of walkability.



Figure 2-1 | Literature Map about the Benefits of Walkability (Patterson, 2013)

### High to Low Ranking of Bicycling and Walking Levels

STATES	CITIES
1. Alaska	1. Boston
2. Vermont	2. Washington, DC
3. New York	3. San Francisco
4. Montana	4. Seattle
5. Oregon	5. New York
6. Hawaii	6. Portland, OR
7. Massachusetts	7. Minneapolis
8. South Dakota	8. Philadelphia
9. Wyoming	9. Honolulu
10. Maine	10. New Orleans
11. North Dakota	11. Baltimore
12. Pennsylvania	12. Chicago
13. Idaho	13. Oakland
14. Iowa	14. Denver
15. Washington	15. Sacramento
16. Colorado	16. Tucson
17. Wisconsin	17. Milwaukee
18. Minnesota	18. Atlanta
19. California	19. Cleveland
20. Illinois	20. Los Angeles
21. Nebraska	21. Miami
22. Utah	22. Long Beach
23. New Jersey	23. San Diego
24. New Hampshire	24. Detroit
25. Rhode Island	25. Columbus
26. Connecticut	26. Albuquerque
27. Kansas	27. Austin
28. New Mexico	28. Raleigh
29. Arizona	29. Colorado Springs
30. West Virginia	30. Mesa
31. Nevada	31. Omaha
32. Maryland	32. San Jose
33. Delaware	33. Louisville
34. Michigan	34. Fresno
35. Indiana	35. Virginia Beach
36. Virginia	36. Tulsa
37. Kentucky	37. Houston
38. Ohio	38. Phoenix
39. Louisiana	39. Indianapolis
40. Missouri	40. Las Vegas
41. Oklahoma	41. Kansas City, MO
42. Florida	42. El Paso
43. North Carolina	43. Memphis
44. South Carolina	44. Charlotte
45. Texas	45. San Antonio
46. Mississippi	46. Arlington, TX
47. Arkansas	47. Nashville
48. Georgia	48. Jacksonville
49. Tennessee	49. Dallas
50. Alabama	50. Oklahoma City
	51. Fort Worth

Appendix A1 also summarizes the complete findings on the Kansas City area in more detail.

Understanding how trail systems can promote walkability is established through this project by connecting active transportation, with components of walkability, through the Indian Creek Trail. Defining the components of walkability has been established by simplifying current walkability resources.

constantly directed toward vehicular means even though it segregates the urban fabric (*Alliance, 2012*).

Kansas and Missouri have an average number of bikers and walkers and recently attention has been given to walkable strategies. Figure 2-2 shows the results found from the *2012 Benchmark Report*, that promote the need for enhanced bike and pedestrian conditions.

Alliance for Biking and Walking (BWA), summarizes active transportation patterns throughout the US. “Twelve percent of trips in the US are by bike or foot, yet cyclists and pedestrians make up fourteen percent of traffic fatalities and receive just 1.6 percent of federal transportation dollars (*Alliance, 2012, 9*). Ironically, transportation enhancements for active transportation infrastructure are significantly less than enhancements for vehicular infrastructure. Yet funding is

The Indian Creek Trail is the tool for redirecting transit focus towards pedestrians for this project. By utilizing the existing pedestrian pathway, other components of walkability can be addressed without having to focus on vehicles.

In the past, planning and funding for active transportation modes have been very insignificant. *The Bicycling and Walking in the U.S. 2012 Benchmarking Report*, by the

As shown in figure 2-1, walkability is affected by many different factors. However, walkability is about transport, and walking is the natural form of transit. Therefore any form of efficient, sustainable transportation starts with people. Today transportation is centered around cars, by redirecting focus to active or non-motorized forms of transit (NMT), the scale of vehicular dominance can be reduced and create a more welcoming environment for pedestrians (*Tumlin, 2012, 37.*)

Figure 2-2 | Policy Statistics from 2012 Benchmark Report (*Alliance, 2012*)

## DEFINING WALKABILITY

The amount of definitions and resources about walkability make defining the term a difficult task. The report, *What Defines Walkability: Walking Behavior Correlates*, by Steven Spoon discusses the confusion with the term walkability. It reviews much of the literature that makes walkability such an ambiguous term. As stated in the report, “A major research dilemma concerning the literature in this field is that it does not adequately provide a clear answer

to what is the true definition of walkability” (Spoon, 2005, 7).

The main issue with defining walkability is the amount of definitions that exist. There are now so many resources that provide walkability definitions and guidelines, that finding a true definition is difficult.

Some of the resources today that provide descriptions of walkability are:

- WalkScore
- America Walks
- Walk Steps
- Alliance for Biking and Walking (BWA)
- Smart Growth Network (SGN)
- Partnership for Sustainable Communities
- Project For Public Spaces (PPS)
- International Making Cities Livable (IMCL)
- Walkable Communities, Inc.
- Pedestrian and Bicycle Information Center (PBIC)
- Walkable and Livable Communities Institute (WALC)
- Partnership for a Walkable America (PWA)
- Walkshed
- Federal Highway Administration (FHWA)
- Active Living Research
- International Federation of Pedestrians (IFP)
- Walk 21

**Walk Score:** Walk Score, a primary resource for understanding the current walkability of any city, establishes 7 components that make a neighborhood walkable: A center, people (residential density), mixed income/use, parks and public space, pedestrian design, schools and workplaces, and complete streets (Walk Score, 2013).

**FHWA:** The FHWA defines a walkable community as one where it is easy and safe to

walk to goods and services but also defines many components and strategies of walkable neighborhoods (Sandt, 2008, v).

**Walksteps:** And another resource, walksteps, defines 6 walkability tactic categories for creating walkable communities which are: advocacy, policy, land use, design and engineering, encouragement and education, and enforcement.

As shown through the definitions above, resources today define walkability with components, separating out elements that make a place walkable. One issue with this process is the discrepancy between different elements. While the numerous components have similar themes, research found that many checklists neglect the complexities of the social environment and community behavior (*Adams et al. 2013, 2*). Various walkability definitions also separate components of walkability

that are not applicable to every site. Several elements that are described as components of walkability, can be described as subcategories that relate to a larger characteristic. Examples of these current walkability gaps are described through current walkability studies. Further information on these resources is described in Appendix 2-2.

**Social Restrictions:** A study from Columbia University focuses strictly on physical components

of walkability, utilizing a Principal Components Analysis to estimate the effects of walkability on neighborhoods. It identifies ten neighborhood walkability items: Population Density, Subway stops, Bus stops, Land-use mix, Retail floor area ratio, Intersection Density, Residential units / building area, Residential units / land area, and Percent commercial land use, to measure the walkability of neighborhoods (*Michael D.M. Bader et al. 2009*)

**Urban Limitations:** Another interesting study from Columbia University evaluated the feasibility of using Google Street View to measure walkability. While the results showed that walkability audits could be performed from google street view, it also noted that google street view has limitations when dealing with temporal visibility and can be unstable. Google street view is also not available for many small collector or

local streets, especially in rural and suburban areas. Which means the street view applicability is limited to more urban and developed zones. (*Andrew et.al. 2011*).

**Narrow Scope:** The Walkability Index from UBC lists four walkability components: residential density, commercial density, land use mix, and street connectivity, which all deal with different land

use characteristics (*University of British Columbia, 2013*). This leaves out all other factors that can affect walkability and is not tailored for suburban conditions.

Each of the strategies described leave out an element or two that are considered vital in measuring the overall walkability of an area within other resources.

Resources such as the WALC walkability workbook, Walksteps Steps to a walkable community online tool, the Walkability Checklist, and the CDC Walkability Audit Tool, each have different factors and measures to identify and measure walkability. Through an analysis of

these walkability standards and checklists, three gaps of current resources have been revealed:

- Audits only pertaining to physical characteristics of walkability.
- Checklists and strategies that focus on urban conditions.
- Incomplete checklists leaving out community/social concerns.

The report, *A Proposed Walkability Strategy for Edmonton*, illustrates a more complete understanding of walkability segregated into four primary parts: quality of journey, pedestrian infrastructure, urban form, and policies and programs (Stantec Consulting Ltd. 2010). Those four elements are then broken down into subcategories that can be measured. This model creates an overarching theme that can be applied for many definitions but still segregates approaches into 47 strategies

as shown in the report which is attached in Appendix A2.3.

Learning from the previous models, the three gaps of current resources need to be filled in order fully comprehend walkability and identify strategies for improvement. The proposed walkability strategy for Edmonton, Alberta illustrates how walkability components can be objective yet tailor to a specific communities needs. Due to the different social and

physical environments of different communities, walkability variables can be modified to fit each environment. As stated in the *Creating Walkable Communities Handbook*, “There are various ways to define what we mean by ‘walkable’. Each local community should consider a definition that is appropriate for itself” (BFA 1998, 2).

While tailoring walkable components, to specific communities is important for understanding specific site conditions, an overall definition

and model should be applied for consistency across larger jurisdictions. Understanding the need for a comprehensive strategy that can be flexible for multiple locations this project has identified five common components of walkability:

- **Connectivity**
- **Urban Form**
- **Social Aspects**
- **Pedestrian Infrastructure**
- **Pedestrian Experience**

These five common components are needed elements of walkability for every site. They are simplified variables from established checklists that fill the gaps in current strategies today. The main/

overlapping variables of established checklists were narrowed down important elements to these five components. Each variable relates to one another and can influence

the walkable environment for better or worse. This project analyzes how these components affect current walkable conditions along the Indian Creek Trail to identify

opportunities for improvement. Figure 2-3 illustrates the five components of walkability and the subcategories included in each element.

**COMPONENTS OF WALKABILITY**

Walkability is simply a measure of how welcoming an area is for walking and walkability is established by the five components of walkability that affect walkable

conditions. This project takes the five components along the Indian Creek Trail to analyze current conditions and identify opportunities and constraints for improvement.

Components of Walkability																			
Connectivity					Urban Form- LandUse				Social Views		Pedestrian Infrastructure			Pedestrian Environment					
Physical	Perceived	Material	Transport	Visibility	Density	Variety	Connectivity	Environment	Perceptions	Patterns	Sidewalks	Signage	Site Amenities	Aesthetics	Safety	Comfort	Scale	Orientation	
Sidewalks	Viewshed	Consistency	Mutli-Modal	Screening	Residential	Mixed Use	Proximity	Human Scale	Individual	Transport	Length	Amount	Furniture	Pleasant	Security	Scale	Buildings	To Sidewalks	
Slope	Direct Pathway	Transition	Bike Lanes	Vegetation	Commercial	Diversity	Infrastructure	Parking Lot	Community	Habits	Width	Frequency	Amount	Maintained	Lighting	Amenities	Sidewalks	To Roads	
Direct Pathway	Obstacles	Appropriate	Bike Amenities	Perceived	Mixed Use	Demographics	Barriers	Bldg Orientation	Visual	Physical Activity	Connectivity	Location	Frequency	Bright	Separation	Location	Vegetation	Parking Lots	
Access			Infrastructure		Segregation	Popularity		Entrances				Content	Location	Open	Visibility		Combination		
Continuity			Transit Stops			Activity		Activity					Content	Clean	Location				

Figure 2-3 | Components of Walkability (Patterson, 2014)

## SUBURBAN WALKABILITY

There are many elements that make creating a walkable environment in suburbia difficult to accomplish. In suburbia, alternative forms of transportation are made difficult due to leap frog development which has created an overabundance of personal vehicle use and hazardous pedestrian environments (*Untermann 1984, 173*). Leap frog development is characterized by segregated land use patterns that are located far from neighborhood centers (*Holcombe, Randall 1999*). These suburban patterns

affect all components of walkability and limit the opportunities of creating a walkable environment. The issue of ***sprawled development, transportation patterns, and suburban car culture*** hinder typical redevelopment/walkability solutions. Each issue affects the other and makes many retrofitting techniques implausible.

### Sprawled Land Use Patterns

The layout of each suburban community differs as does the magnitude of each unsustainable issue. Below is a list of many constraints within sprawled suburban communities that prohibit walkability.

- Isolated Development
- Strip Retail Centers
- Abundance of Highways
- Vehicle Oriented Planning
- Intricate/Expansive Road Network
- Single-Use Zoning Laws

- Development Codes
- Land Use Segregation
- Office Parks, Residential Subdivisions, Big Box centers
- Open Space Management
- Edge Cities
- Vacant, Underutilized Lots
- Absence of Neighborhood Structure
- Limited Pedestrian Infrastructure
- Limited Transportation Alternatives

*Combined conditions from Sprawl Repair Manual, Suburban Gridlock, Retrofitting Suburbia, and Suburban Transformations.*

Patterns of development due to zoning and development practices have created segregated office parks, big box centers, strip retail malls, and other places that characterize the suburban form. Measures need to be made to change these patterns and

“Remaking our sprawled suburbs, with their enormous footprints, shoddy construction, hastily put up infrastructure, and dying malls is shaping up to be the biggest urban revitalization challenge of modern times”  
*(Dunham Jones, 2011, vi.)*

allow for suburban change, otherwise a connected, walkable community is implausible *(Schiller, Bruun, & Kenworthy, 2010, 237-253).* The Smart Growth Network recently studied 221 cities throughout the US and established sprawl index ratings that rank cities from the least sprawled area to the most sprawled area. The Kansas City metropolitan area ranked 178th out

of 221, leaving it the bottom fourth of all cities studied. Particularly low scores were found in the activity centering and density categories *(Smart Growth Network, 2014).* Specifically, the suburban cities of Overland Park, Olathe, Leawood, and South KCMO, illustrate those sprawled and disconnected urban patterns as shown through figures 2-4, 2-5 and 2-6. The land use map of figure 2-4 clearly depicts the low dense residential and segregated land uses that create unwalkable conditions.

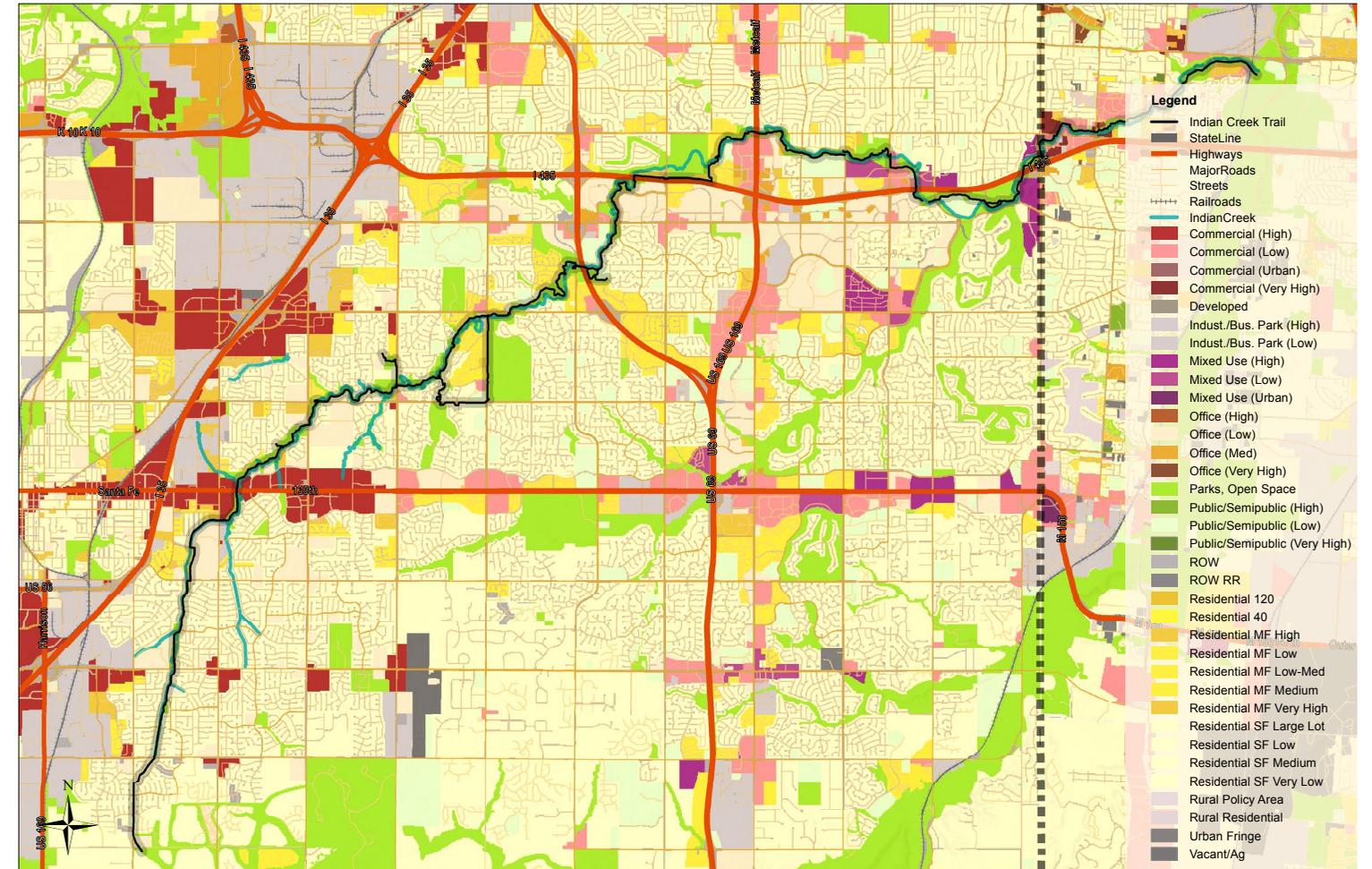


Figure 2-4 | Land Use Map Illustrating Sprawled, Segregated Land Use *(Patterson, 2013)*

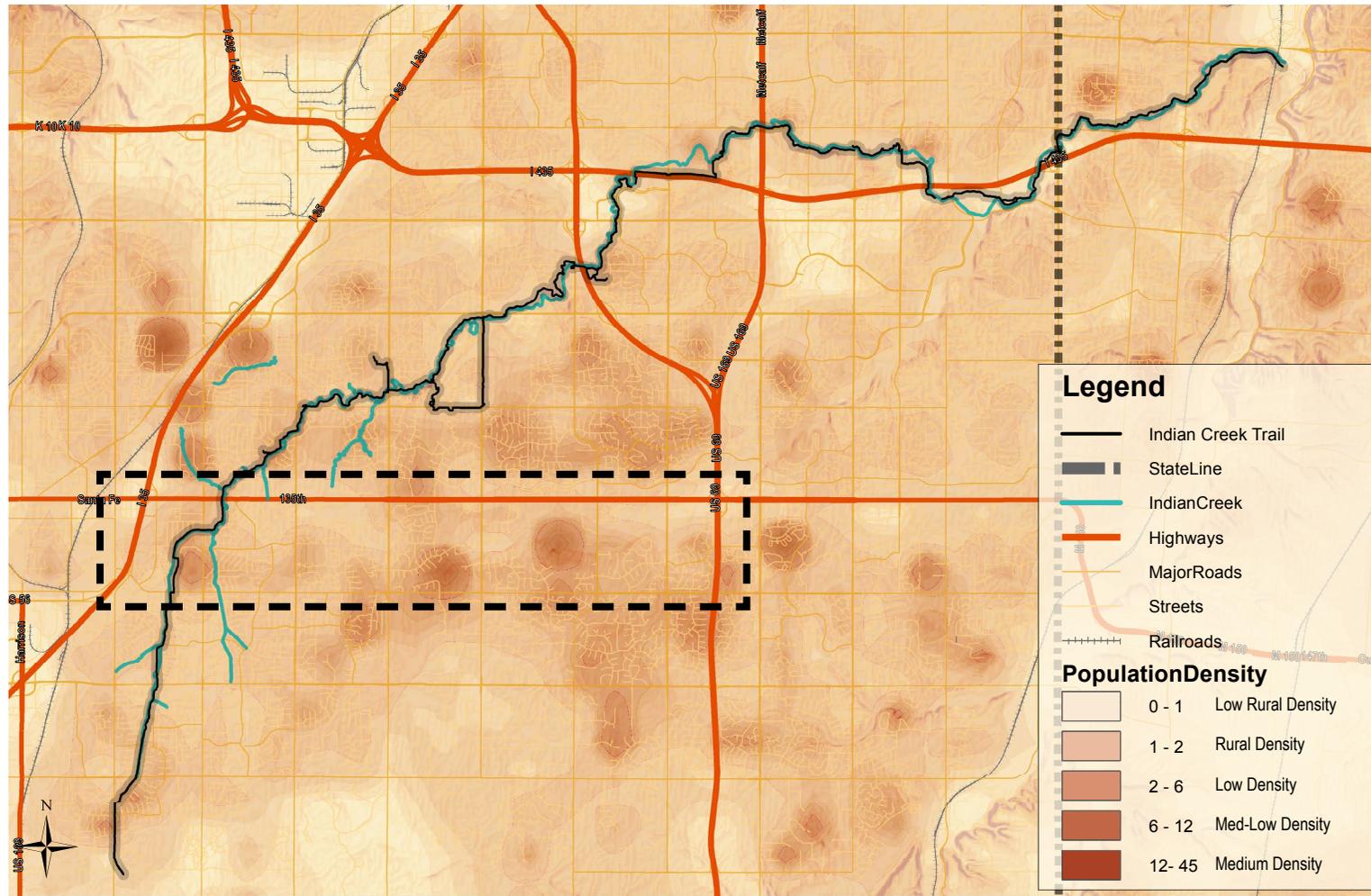


Figure 2-5 | Residential Density Map (Patterson, 2013)



Figure 2-7 | Image of Low Dense Land Use Separated by Large Roads (Patterson, 2013)

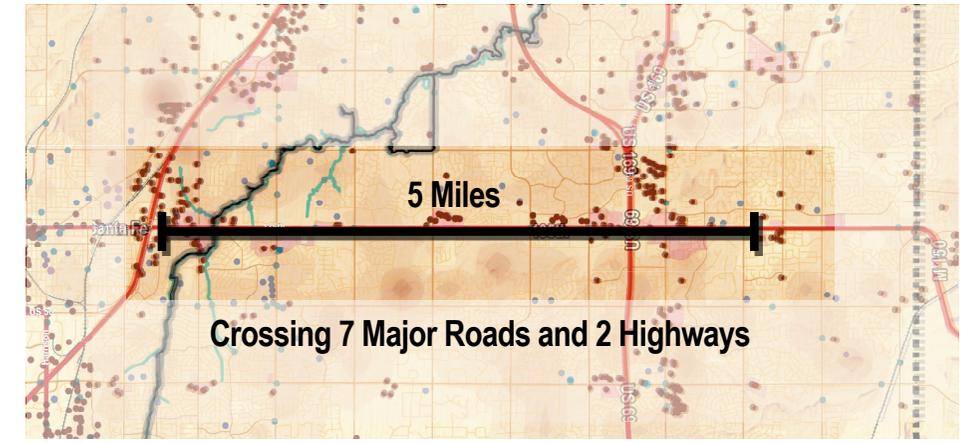


Figure 2-6 | Distribution of Density Map (Patterson, 2013)

The distribution of uses and the intensities of activities taking place, determine how mobile a place really is, showing that all types of transport are reliant on patterns of development (Cox 2010, 19.) (Cuervo, 1986, 49.)

Current trends discourage dense, mixed use communities within suburbia, which creates an unsafe pedestrian environment. Along the Indian Creek Trail densities are low which do not allow for a variety of activities to take place. Figures 2-5 and 2-6 illustrates the low dense conditions.

“The marginalization of transport studies to a subset of planners and engineers is invisible to the field of development studies...” (Cox 2010, 19.) Especially in suburbia, vehicle oriented development is prevalent and ignores the pedestrian environment as shown in figures 2-8 and 2-9. Better connections need to be made with transport planning and development to allow for greater connectivity. The suburban cities surrounding the Indian Creek Trail are car oriented. The primary reason for the segregated land use

network is due to current travel and development patterns. The massive expanse of road networks, create large distances between destinations that make it very difficult for walking. The vehicle oriented development also creates environments without pedestrian infrastructure. Large expansive parking lots separate sidewalks from buildings and create an unfriendly environment for pedestrians. Figure 2-10 illustrates how development is centered around major intersections and neglects the pedestrian environment.



Figure 2-8 | Image of Sprawled Land Use and Parking Lots (Patterson, 2013)



Figure 2-9 | Image of Parking Lot and Road Barriers (Patterson, 2013)

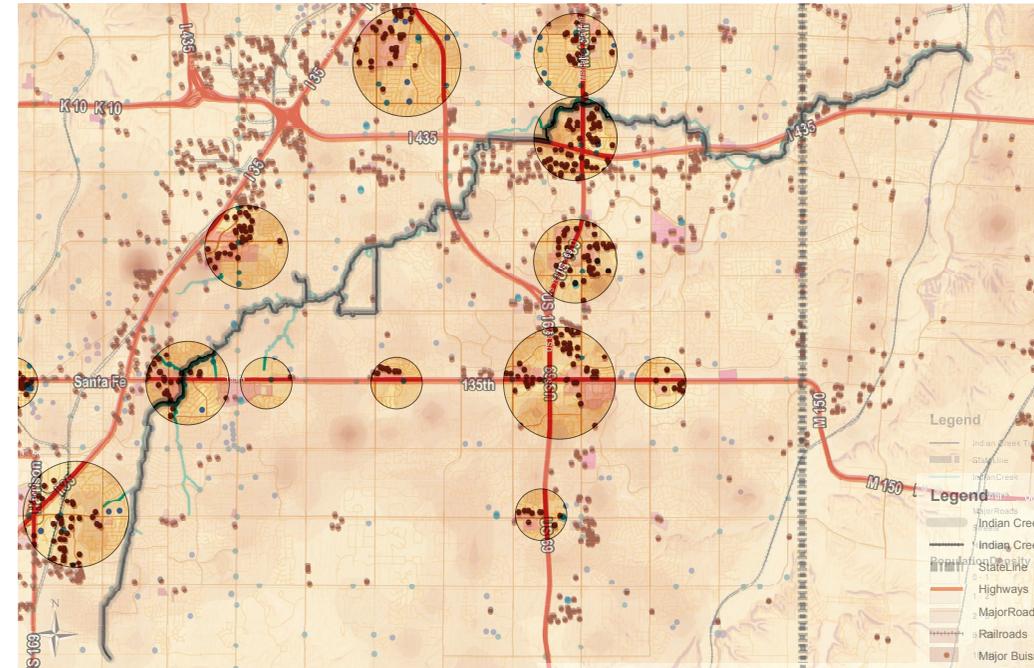


Figure 2-10 | Map of Land Use Densities Centered Around Intersections (Patterson, 2013)

While transport is dependent on development, current transport habits have influenced development patterns. As stated in *Skinny Streets and Green Neighborhoods*, “Traffic oriented street designs coupled with widely dispersed land uses have reduced pedestrian travel capabilities and increased car traffic mileage” (Girling, 2005, 74-75), illustrating how current transport trends have decreased walkability and magnified the sprawl issue.

### Transport Patterns

American traffic planning is catered almost exclusively to the automobile, and has neglected the pedestrian environment (*Untermann 1984, 4.*) Today, 'more efficient transit' is defined by standards that carry people at higher speeds and across greater distances, instead of focusing on the degree of which transport aids in access for basic needs (*Cox 2010, 10.*)

Vehicles extend our range of movement and separate people from their destinations (*Cox 2010, 13.*)

Transport planning is advancing the issue and creating greater disconnect within the suburban form. Cox states, "Typical transportation enhancements can create greater comfort or safety, but do not alter the fundamental problem of urban commuting traffic. They instead isolate the individual user from the reality of space in which we move"

(*Cox 2010, 25.*)  
Change in how

"Studies of transit are oriented largely around the static destination and starting points... Rather than being structured around the processes and experiences of motion..."  
(*Cox 2010, 8.*)

transportation is planned and perceived is needed.  
Current transportation standards cause the underlying issues of suburban walkability and continue to allow the personal vehicle to dominate the landscape and make all other forms of transit obsolete.

Multi-modal transport is a major factor of walkability that increases connectivity and opportunity for

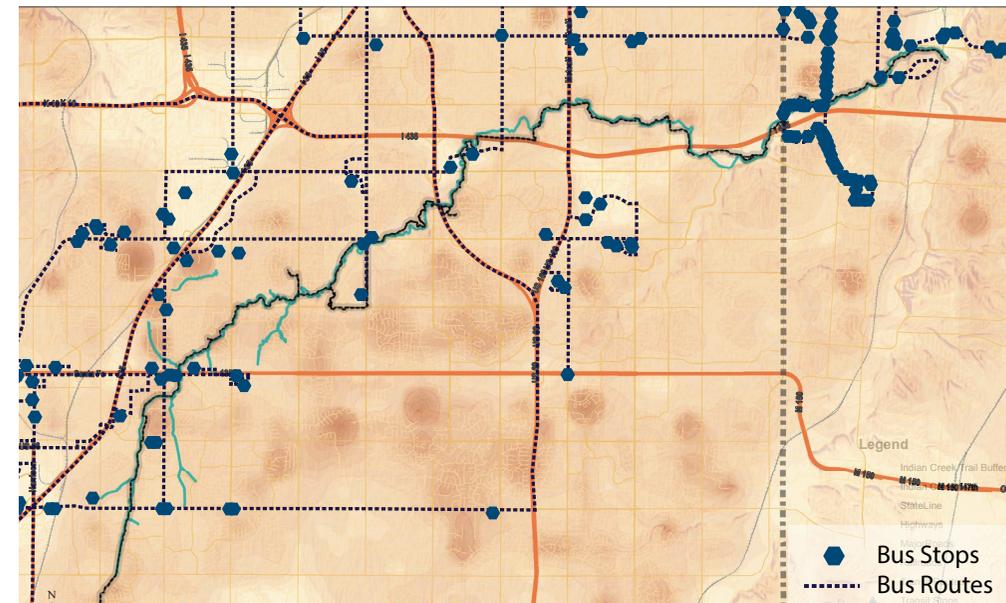


Figure 2-11 | Map of Bus Stop and Route Locations (*Patterson, 2013*)



Figure 2-12 | Image of Poor Bus Stop Conditions (*Patterson, 2013*)



Figure 2-13 | Image of Large Expansive Roadways with Limited Destination Accessibility (Patterson 2014)

communities. Figure 2-11 shows the limited about of alternative transportation options that exist in the Kansas City area. Figure 2-12 and also illustrates the poor conditions of



Figure 2-14 | Image of Vehicle Oriented Big Box Development (Patterson, 2013)

transportation amenities and roadway conditions that make other forms of transit unwelcoming. Current planning methods for multi-modal transport do not relate to suburban areas, which is the reason why typical alternative transit methods are inefficient in suburbia.

The transportation industry has failed to adapt to the changing suburban needs and continues to utilize existing urban practices, expecting to see a different outcome (Cervero, 1986, 104) (Lukez 2007, 93.)

The personal vehicle has restructured the economic, geographic, and social relations of the urban fabric (Cox 2010, 24.) Creating a network of people that only transpire from one place to the next without experiencing the places in-between. (Cox 2010, 24.) The urban form has since been planned around this auto transport society and created a great walkability disconnect. The vehicular scale of elements, as shown in figure 2-13 and 2-14 creates a great barrier to pedestrian travel that infrastructure

issues even further hinder walkability. These conditions are shown by pedestrians in figure 2-18.

The auto oriented landscape has since created the reliance on personal vehicles which is coupled with habitual patterns of use and expectations (Cox 2010, 25). People are conditioned to drive for almost every trip and have forgotten that some trips are easier by foot or bike (Untermann 1984, 23).

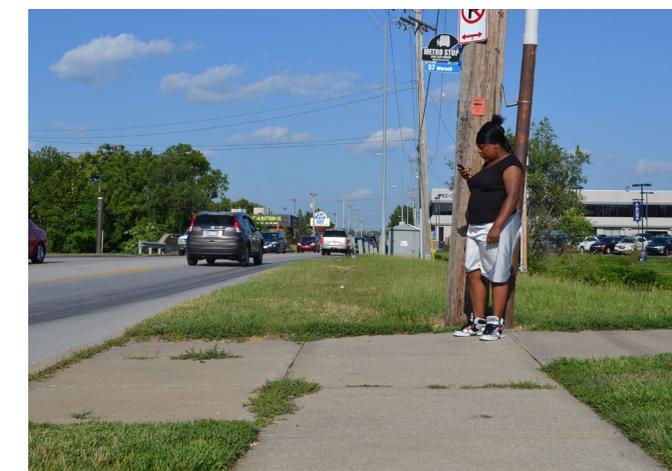


Figure 2-18 | Image of Pedestrians Waiting at Bus Stops (Patterson, 2014)

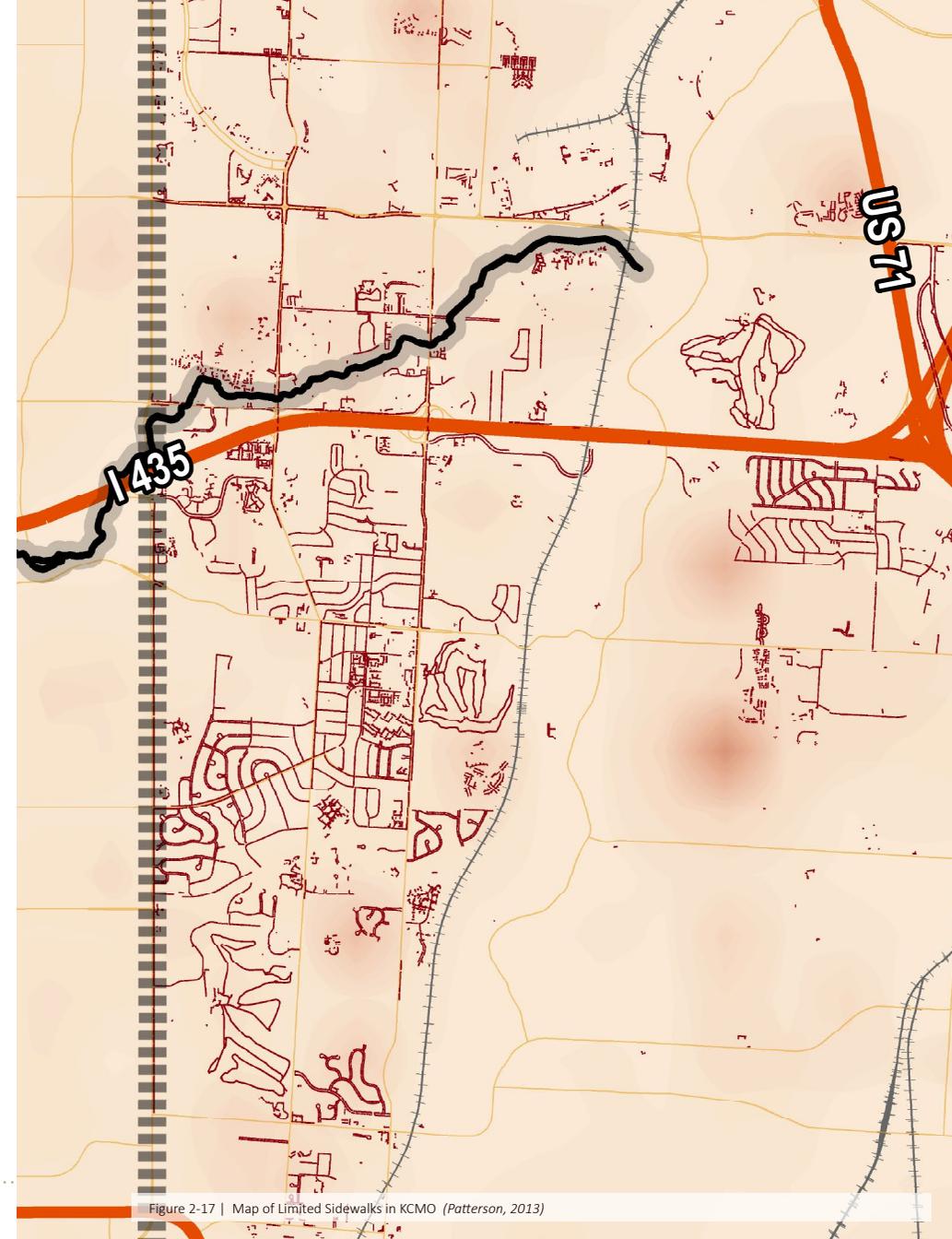


Figure 2-17 | Map of Limited Sidewalks in KCMO (Patterson, 2013)



Figure 2-15 | Image of Typical Dead End Sidewalk (Patterson, 2014)



Figure 2-16 | Image of Cow Path Connecting Sidewalks near Road (Patterson, 2014)

the limited amount of sidewalks that exist in the KCMO region.

Other forms of infrastructure such as benches, bus stops, trash cans, and more do not exist in this area. Where some infrastructure does exist, there are no design standards or cohesiveness to attract pedestrian activity. There are no areas for pedestrians to rest, take shelter, or connect to other forms of transit. With the segregated land use pattern and expansive road network, these

alone cannot fix. Many sidewalks throughout the study area are also in poor condition, disconnected, or non-existent. If sidewalks are present they are generally alongside major roads, end at the edge of parking lots, and do not connect to other pathways. This limitation creates a dangerous environment for pedestrian connectivity as shown in figures 2-15 and 2-16. In some cases sidewalks are only even present along 30% of roadways. Figure 2-17 shows

**Car Culture**

Comfort, price, perception of time, and safety are primary reasons people choose to drive. Many don't even consider that other forms of transit are feasible (Springer 2005, 225.) People get in their car and drive everywhere, even just across the street. This is due to development patterns,

“The typical standards of fast movement and ability to travel far distances creates a perceived notion of flexibility and efficiency” (Cox 2010, 17).

zoning regulations, car dependency, and sprawl. In suburbia people are dependent on cars because they rarely have any other option (Schiller, Brunn, & Kenworthy, 2010, 26). Because of the suburban layout, automobile dependency cannot change under current conditions, so measures need to be made to alter these habits and allow for change.

The habit of suburban transport has turned into a mindset that can be very difficult to modify. People like their

cars. Cars provide the freedom other transit methods do not, and if it is affordable people will choose to drive (Lukez, 2007, 14.) Figure 2-19 illustrates the current travel preferences surrounding the Indian Creek Trail.

Transport Statistics of Focus Area Population	
20 min	Average Travel Time To Work
90.8%	Primary Mode Of Transport = Car
84.3%	Drove Alone
0.2%	Biked
1%	Walked

Figure 2-19 | Focus Area Statistics Combined from the U.S. Census Bureau City Data (U.S. Census Bureau, 2014)

The complexities of the social environment and community behavior alter the perception of a walkable place. The report, *Objective Versus Perceived Walking Distances to Destinations*, concludes a study on how different attributes influence walking behavior. As stated in the report,

“Perceived and objective distances to certain types of destinations are differentially associated with walking behavior. Perceived

environmental attributes do not consistently reflect objectively assessed attributes, and both appear to have differential effects on physical activity behavior” (McCormack, 2008, 401).

There are many different reasons why people will not walk and different patterns can have different affects on different people. Additionally, even if the physical environment promotes walkable habits, social habits and

perceptions of walkability may remain the same. Over 90% of the Kansas City population drives to work everyday (Alliance 2012.) That is 10% greater than the overall population in the US. Showing that there are potentially more issues with the social and physical environment of this area than many throughout the country.

**CAR CULTURE TO PEDESTRIAN CULTURE**

A trail network is an existing, separate pedestrian pathway that is accepted by the community for walking. By introducing ideas of walkability and active transport to a trail network, community perceptions of walking may be able to change.

“Real successes in sustainable transport development have been brought about only through comprehensive and connected strategies...”  
*(Cox 2010, 66)*

Strategies to change cultural habits include:

- Creating active, healthy community designs.
- Utilize development incentives to change development patterns.
- Promoting and educating neighborhoods about sustainable practices.
- Adding necessary pedestrian oriented infrastructure.
- Improve public participation in traffic infrastructure decisions
- Provide incentives for strategic nodal development and Transit Oriented Development (TOD)

*(Schiller, Brunn, & Kenworthy, 2010, 227)*  
*(Tachieva, 2010, 13).*

By creating designs to enhance walkable conditions along a trail network, the community can be engaged and educated so that development and transport standards can begin to focus on the pedestrian scale environment .

**AMENDING THE CONSTRAINTS**

Trail networks provide an opportunity to change the perceptions of transport patterns, suburban

development, and car cultures today. Typical retrofitting solutions have a negative connotation to the American public. “Large new urbanist projects are often described as instant cities, which are looked down upon by community zones” *(Dunham-Jones 2011, 1)*. Understanding the reasoning behind typical retrofitting solutions can help reveal opportunities for new strategies.

Improving walkability in a sprawled network will mean different things to different communities. Basic improvements to improve walkability however are not always appropriate for all suburban areas.

## TYPICAL RETROFITTING SOLUTIONS

Richard K. Untermann in *Accommodating the Pedestrian* describes 7 approaches to correcting poor pedestrian conditions:

- Reducing travel distances
- Increasing land use flexibility
- Eliminating pedestrian barriers
- Leveling walking routes
- Assuring continuity of travel
- Providing protection/ shelter from external elements
- Enhancing aesthetics & comfort

Many of these strategies can greatly improve the walkable environment of an area but can be very difficult to implement. Strategies to reduce travel distances can entail relocation of destinations or addition of more efficient networks. Increased land use flexibility and assuring continuity of travel can mean costly development or reconstruction of existing networks. The 7 approaches define valued ways to improve walkable conditions that are seen through many walkability strategies today.

How those conditions are amended however can have a variety of implications. Suburban plans are not always accepted by the community; they are weary of any alterations and fear urban strategies that might transform their town. Through much research, patterns have evolved that make many suburban retrofitting techniques implausible or inefficient. A full description of many important resources are described in Appendix B1.

The issue of re-planning and relocating in many retrofitting and walkability strategies is their focus on completely transforming a place, which can be very costly and can create controversy.

A complete transformation of the suburban form might amend the sprawled network or repair the walkability issue, but might not be an appropriate solution for that place. The strategies and goals of many walkability and suburban sprawl plans

do not adequately respond to the constraints of suburban walkability and may overlook existing community concerns. In many retrofitting strategies the goal of creating a more urbanized area neglects the community's desires.

This project stems from the fact that suburban communities like their towns and many strategies that exist today are attempting to urbanize and change the suburban way of life. Zinna Clark in the article *Retrofitting Suburbia- Transforming Car Dependant Subdivisions into Transit and Pedestrian Friendly Neighborhoods*, explains that many cities are struggling with the question of how to increase densities and build

more sustainable environments in suburban areas without stomping on local sensibilities (*Zinna, 2000, 19.*)

The Indian Creek Trail study is designed to redirect retrofitting plans and strategies to fit the suburban lifestyle. Suburban residents are not against sustainable practices that can increase the quality of life in their community; they are against transforming their suburban town into a dense urbanized place.

## PROJECT STRATEGY: TRAIL NETWORKS

In the book, *Accommodating the Pedestrian*, Richard K Unterman describes three strategies for improvements that have been used to formulate the strategy for the design of the Indian Creek Trail.

In order for strategies to have the greatest opportunity for success Unterman suggests to:

- focus strategies on facilities that already serve large groups of pedestrians
- focus on improvements that can change most hazardous conditions
- focus strategies on busiest locations

This study identifies the Indian Creek Trail as a network that already serves large groups of pedestrians and segregates pedestrians from

some of the biggest pedestrian hazards in the focus area. It also identifies the busiest nodes along the trail to determine the best opportunities for improvement.

Trail networks allow for pedestrian focused strategies to amend the transport, development, and cultural concerns that are the underlining causes of poor suburban walkability. Traditional transit solutions are no longer appropriate for many of today's suburban concerns. Current transportation planning methods are

focused on vehicular and inner city travel and do not correspond to many suburban travel problems. Peter Cox in the book, *Moving People* strives to amend transportation standards, to focus on the evaluation of transport improvements by the degree to which they aid access for basic needs, rather than mobility gains. The key point of striving to achieve access for people, rather than increase accessibility lengths, defines how walkability can become reintegrated into the transportation planning and suburban development process (Cox, 2010, 10).

The focus on trail networks is the foundation for this project. Bringing back transport, development, and social cultures to a human scale and allowing for all types of movement. Trail systems and more specifically the Indian Creek Trail, becomes a new baseline for directing walkability enhancements, making the trail network a new pathway for transport.

The strategy for Kansas City is focused on creating units of complete communities to enhance walkability,

centering on 13 destination zones surrounding the Indian Creek Trail.

The sprawled disconnected nature of suburbia makes complete communities difficult to accomplish and primary tactics for improvement can be very costly (Tachieva, 2010, 5.) Focusing simplified strategies on an existing network instead of trying to create a whole new system can decrease many potential implications.

Benefits of an existing system include:

- Cost of improvements being significantly less than building an entirely new network.
- The ability to adapt to the needs and wants of different political and community interests.
- Testing the success will be much simpler and cost effective.

Currently the Indian Creek Trail has three components that make it a perfect target for walkability enhancements:

- It currently connects many destinations of the south suburban suburbs.

- It is separated from major roads and contains many under-bridge crossings, which provide a safe connected pathway throughout the region.
- It already runs through the major cities and counties of the region. Almost adjoining to other trail networks that connect the larger Kansas City Region.

Figure 2-20 and 2-21 illustrate the existing benefits of the Indian Creek Trail.

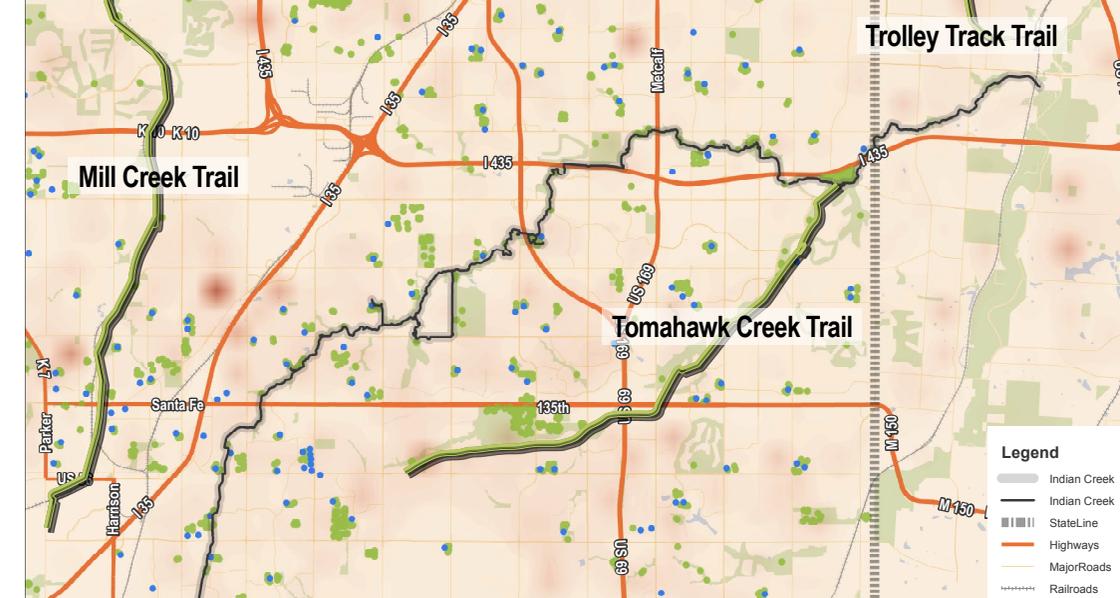


Figure 2-20 | Map of Nearby Trail Networks (Patterson, 2013)

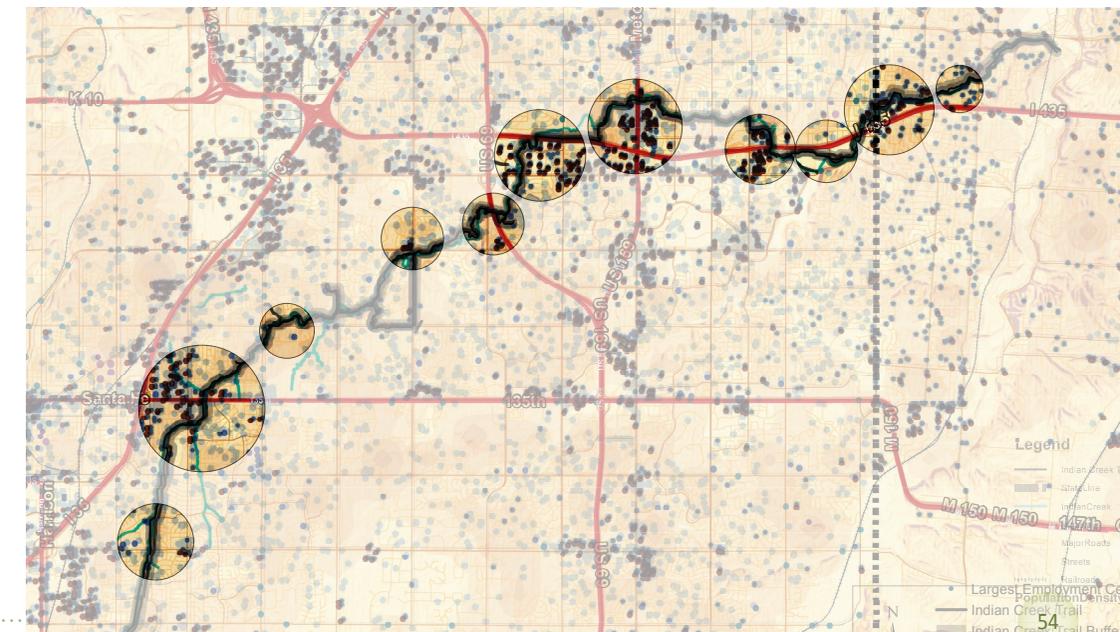


Figure 2-21 | Map Activity near the Indian Creek Trail (Patterson, 2013)

## PROJECT GOALS

The Indian Creek Trail is already located near the majority of major destinations in the south Kansas City suburbs. The need for adding destinations, rerouting networks, and amending policies are unnecessary since the existing system is already in place. Retrofitting the trail will still require a lot of transformation but it will be significantly less than redevelopment of the entire area. And by utilizing the components of walkability, a strategy can be

implemented in more cost effective phases that respond to a variety of different conditions and communities.



Figure 2-22 | Section of the Indian Creek Trail Conditions (Patterson, 2013)

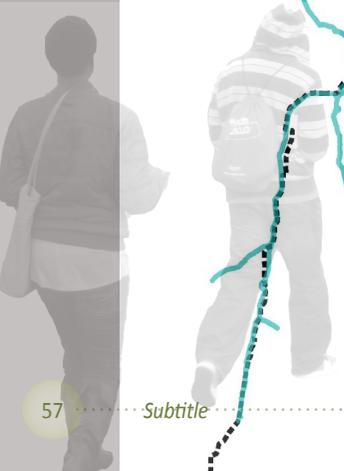
The goal of the project is to create a paradigm shift in the way people think about transport and development. The theory revolves around reversing the stereotype that exists now: where development is centered around vehicles and roads and the pedestrian environment is forgotten. The project will look to center development/ access towards an existing pedestrian/ cyclist network (Indian Creek Trail) separated from conventional vehicular transport.

So can focusing walkability strategies on an existing network, instead of through traditional means, increase walkable conditions and change how suburbia is planned?

This question is understood by examining the opportunities and constraints of the existing trail network. The components of walkability are then identified along the Indian Creek Trail to determine appropriate design enhancements.

# METHODOLOGY

- 59 | Overview
- 61 | Indian Creek Trail Evaluation
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## OVERVIEW

The methodology for the Indian Creek Trail study is a two part process separated by two research inquiries.

The first research question – *What are the opportunities and constraints of utilizing trail systems for walkability?* – identifies a framework to evaluate trail networks potential to address underlying issues of suburban walkability. It also determines the feasibility of utilizing trail networks for walkability enhancement.

The strategies for answering this research question are dependent on understanding current site conditions in relation to walkability. The methodology is primarily focused on different components of a site analysis and evaluation of community needs.

The second research question – *How can a design be formed to implement walkable components along trail networks?* – establishes a design strategy to overcome suburban walkability constraints and maximize

the opportunities of trail networks. The methodology for understanding this question is focused on combining literature and site findings to create an evidence based design.

What are the opportunities and constraints of utilizing trail systems for walkability?

### INDIAN CREEK TRAIL EVALUATION SITE SELECTION STRATEGY

The analysis for the Indian Creek Trail is based on the five components of walkability. Understanding the opportunities and constraints of each walkability category

was identified through two primary methods:

- A site selection strategy
- In-depth analysis.

The Indian Creek Trail is a massive site area; in order to understand all the components of the trail network, a sampling strategy was formed to identify segments of the trail that can help infer characteristics along the entire site.

The Indian Creek Trail is approximately twenty miles long and spans through four cities and two states. In order to understand the complex relationships and patterns along the entire trail a representative sampling strategy was

chosen to identify smaller areas for analysis. The representative method was chosen so that the sample could be sure to symbolize the patterns and activity along every section of the trail. As stated by Demming in *Landscape Architecture Research*,

“Representative techniques involve careful proportional and categorical selections of respondents sites, objects, etc., that depend very much on the conceptual constructs guiding the study” (131).

The Indian Creek Trail has many unique characteristics along different sections throughout the metropolitan area. Different segments have different patterns of use, design standards, and environments. Surrounding the Indian Creek Trail, three major differences were identified to make sure the sample sites represented the entire population. The trail is located in: **1) different cities, 2) within different land use settings, and 3) with a variety of activity levels.**

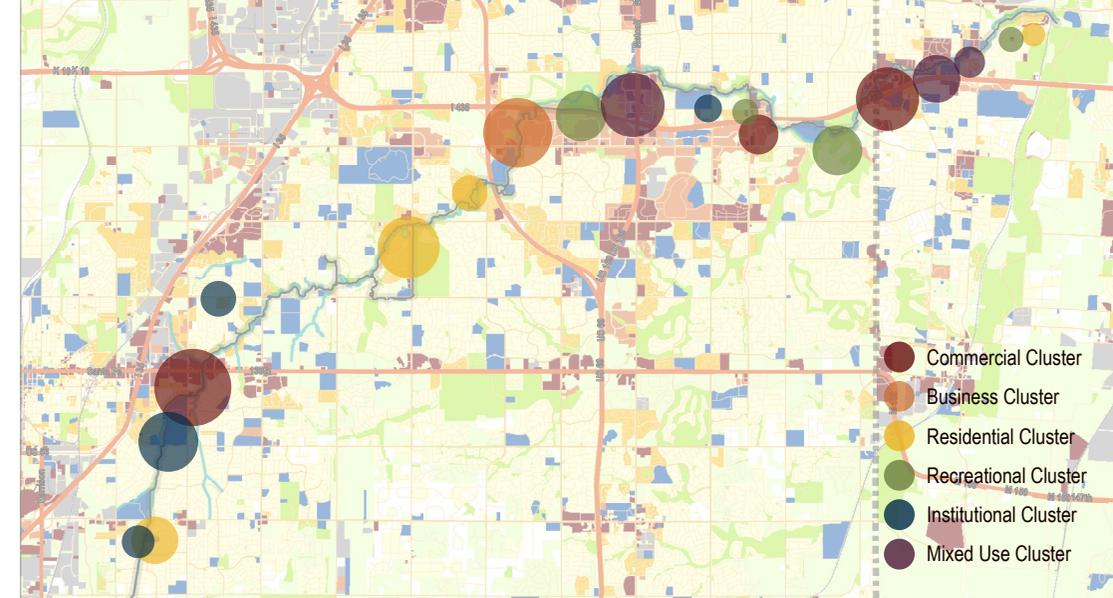


Figure 3-1 | Land Use Patterns Near the Trail (Patterson, 2013)

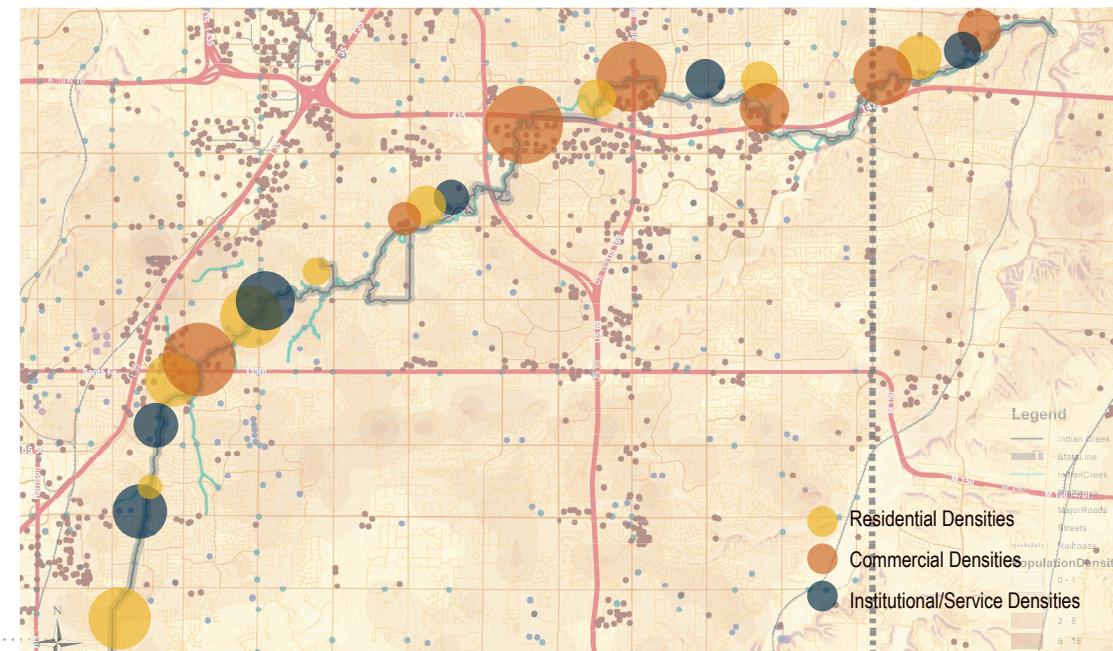


Figure 3-2 | Density Patterns Near the Trail (Patterson, 2013)

By analyzing land use maps, patterns of residential, commercial, recreational, business, and institutional uses near the trail were noted as shown in figure 3-1. A GIS spatial analysis was then completed which showed the concentration of employee, residential, and student population densities as shown in figure 3-2. These maps were then overlaid with city boundaries to

determine what sample locations would be used for the study. These overlays show nodes that include high density and diversity that occur in each city. To compile an accurate representation of the study area, a sample of all those differences combined need to be studied.

The defining properties to define each difference are:

- The trail near each type of land use.
- Locations with high dense activity - with more than 5,000 people that travel to the location weekly.
- A minimum of one location within each city.

Figure 3-3 illustrates the nodes that include all three primary properties.

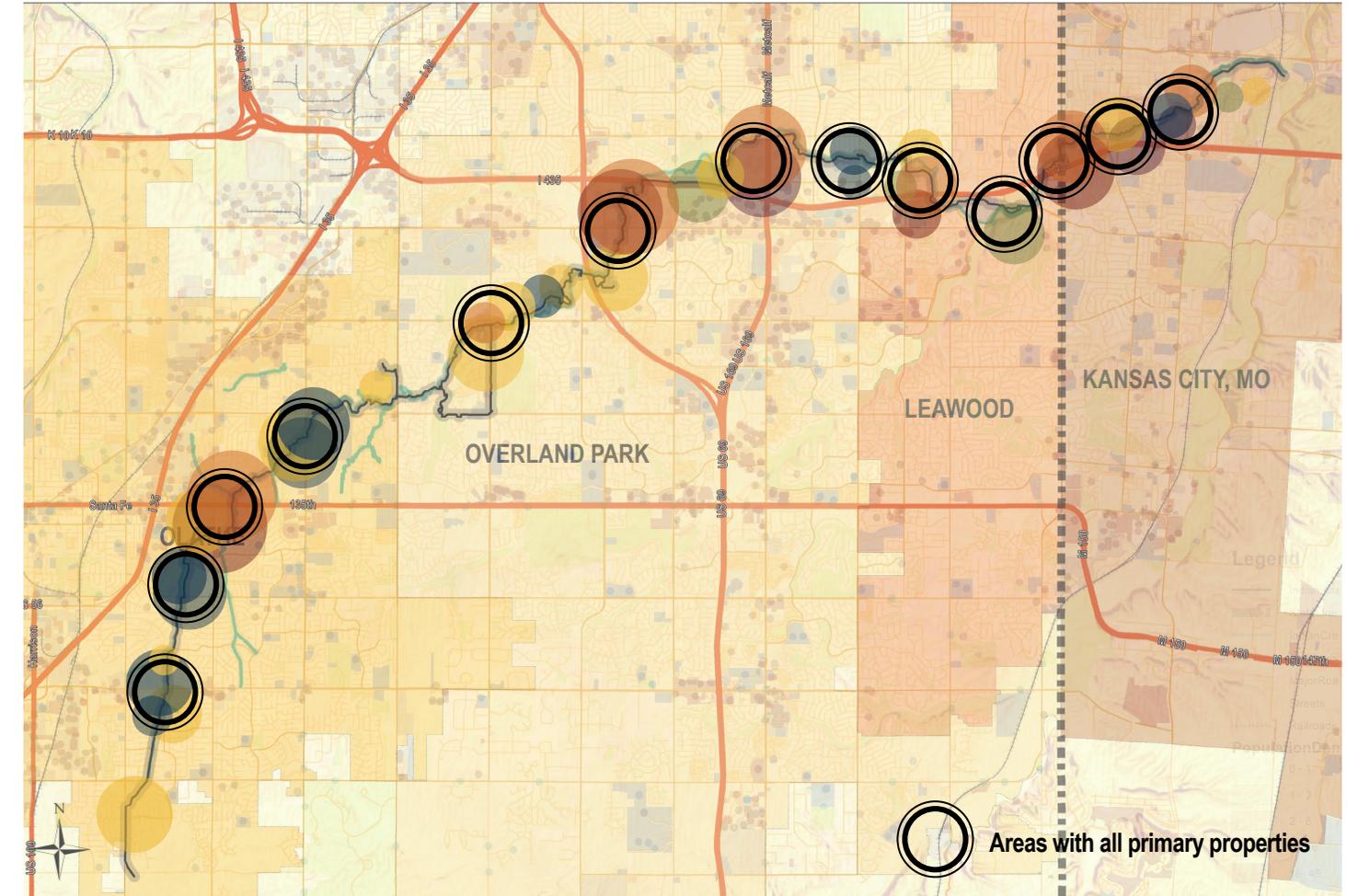


Figure 3-3 | Mapping Overlay of Differences Along the Trail (Patterson, 2013)

Each destination zone acts as a sample location to understand the use, quality, and connectivity throughout the Indian Creek Trail from end to end. Figure 3-4 illustrates the 13 destination nodes that were chosen for in-depth study. The area surrounding each node is determined by typical walkability standards. The focus area within each destination zone is within a quarter mile radius of each intersection. While walkability

lengths vary based on different site conditions, a quarter mile is the typical standardized length people are willing to walk as defined by many resources (FHWA). The extended walkability area is within a half mile and mile radius. The half mile radius is an average transit accessible walkable length that will have great impact on the destination nodes. The mile radius is an extended buffer that will influence the activity

within each node and provide more opportunities for improvement. Once the destination zones were identified, they were analyzed to understand the current and potential uses of the trail. Elements of the analysis are based on the components of walkability and include: trail use, physical features, travel patterns, surrounding environment, and community desires.

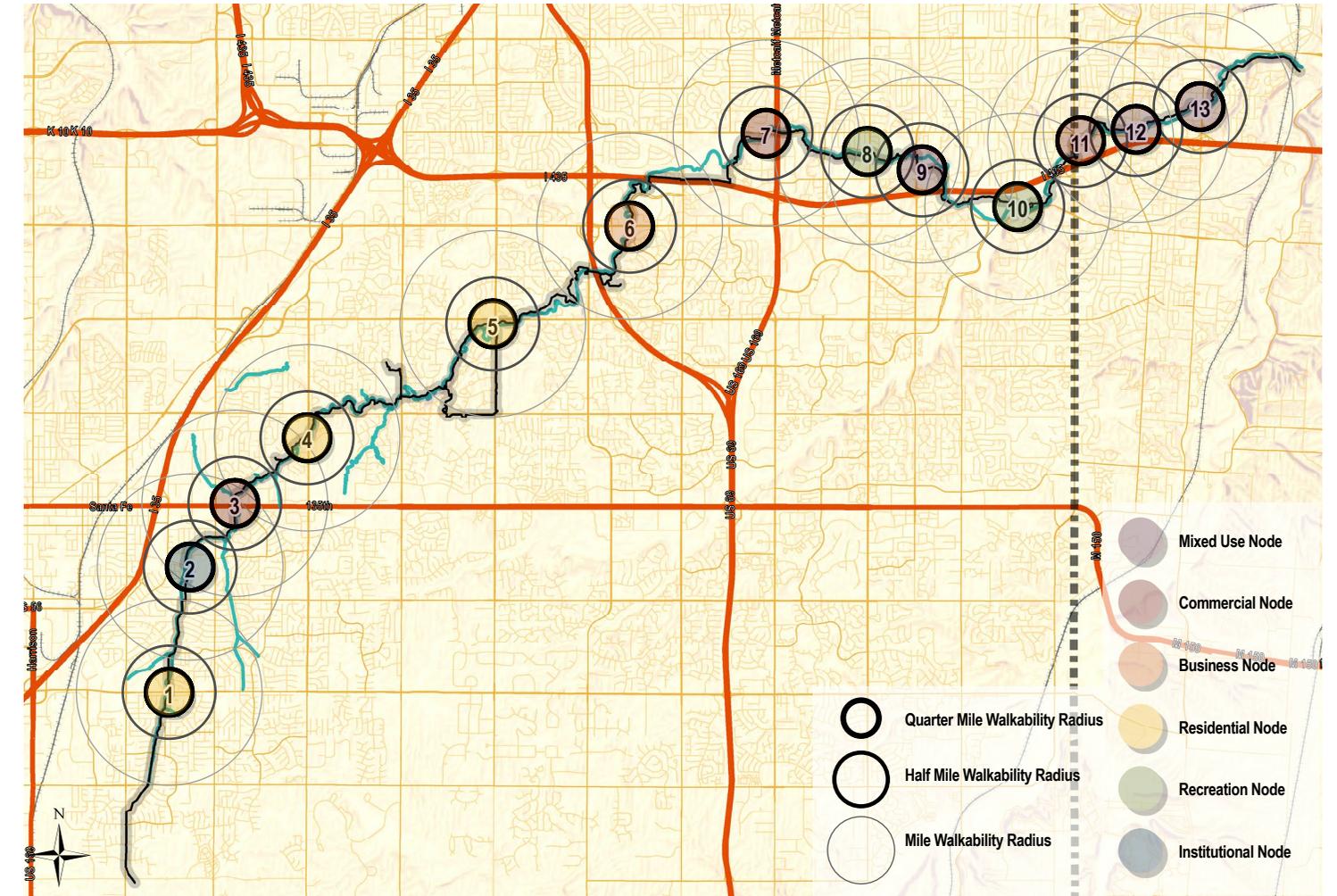


Figure 3-4 | Destination Zone Map (Patterson, 2013)

### SITE ANALYSIS

The site analysis is defined by the components of walkability and was completed in two parts: analysis of observable features and analysis of community concerns. The inventory and analysis of observable features is defined by elements along the trail that can be readily observed, such as: physical constraints and opportunities, patterns of use and activity, and surrounding relationships. The site analysis is the primary influence for the design and establishes where walkability

elements should be implemented. The analysis of community patterns reveals the underlying constraints of the trail and identifies the wants of the community. These findings have mainly defined the potential uses of the trail and helped direct strategies for improvement.

The site inventory and analysis collected data from the 13 destination nodes established through the sampling strategy, and has revealed patterns of opportunity and constraint.

This section is broken down into three primary sections:

- Inventory of Physical Trail Features.
- Inventory of Trail Use.
- Collection of Community Data.

This process identified the fundamental building blocks for the design. The physical site features were categorized and valuable social and environmental data was identified.

The site analysis consists of documented observations combined with spatial analyses to determine the limitations of the trail, patterns of use, and opportunities for improvement. The analysis provides a road map that dictates the design decisions. The five components of walkability were

identified in each destination zone to determine what components were aiding a walkable environment and what elements were hazardous for pedestrian scale travel.

### Inventory of Physical Trail Features

Two methods were used to gain understanding of the physical environment around the Indian Creek Trail: Direct observation and mapping.

#### *Direct Observation*

As stated by Deming in Landscape Architecture Research: Inquiry, Strategy, Design “observation can be a very efficient way to gain insight into the character, use, and performance of places already designed” (Deming, 2011, 66). The physical features were

examined through the components of walkability to understand the conditions along the Indian Creek Trail. The type, location, and amount of notable trail amenities were also identified and important characteristics pertaining to walkability were noted.

The conditions were analyzed based on typical standards laid out by walkability documents, city code, best management guidelines, and ADA standards. Characteristics of

notable amenities and trail features included the quality, proximity to destinations, frequency, continuity, and usability. The connections, access, quality, density, and variety of uses surrounding the trail were also documented and evaluated to understand opportunities. Chapter 5, Analysis, summarizes the complete findings.

#### *Mapping*

Documenting trail data through mapping helped determine the

major areas of interest within the project. The maps are a combination of important site features such as an inventory of trail widths, land use patterns, transit stop locations, and other valuable information.

The site inventory maps were compared and an overlay method used to create a suitability analysis for different site interventions (Steiner, 2008, 200-206.) The suitability maps focused on the components

of walkability and identified: suitability for different types of development, suitability for added trail connections, and suitability for needed trail improvements. The overlay revealed possible connections and relationships that have influenced the design of Indian Creek Trail. The findings then determined how different components of walkability can be implemented on each site which is shown in chapter 5: analysis.

### Trail Use Observation

To understand the current use of the trail a pedestrian count form was filled out at destination areas through direct observation.

#### Direct Observation

Direct observation was used to analyze the behaviors of the trail users. Observations were completed at the 13 destination zones at a variety of times and during different conditions to get an accurate look of how the trail is used at all occasions.

A minimum of two observation periods, at different times of the day, and with different weather conditions were documented at each location. Observations were conducted in half hour time frames as close to the primary center of each destination node as possible. Located a few feet from the trail, the gender, age, group dynamics, and distinctive patterns of users were counted and documented in excel.

Pedestrian counts primarily established the number of people that passed through an area in each destination zone. Notes were also taken to determine whether users were traveling in groups, as a couple, or solo as well as if they were biking, walking, running, or doing any other activity. The pedestrian count form is shown in figure 3-5 and a full copy of the 33 observation results are attached in appendix D1.

Direct Observation Pedestrian Count Form													Destination ID: 5				
DATE:			Thursday, November 14, 2013				LOCATION:			Jimmy Johns			Observation: 10				
TIME:			5:30 pm - 6:15 pm				CONDITIONS:			52   Windy & Dark							
#	Gender		Activity				Age			Trail Use			ID	Characteristics			
	Male	Female	Walking	Running	Biking	Other	K	T	YA	MA	E	Solo		Pair	Group		
1	Male				Biking				MA			Solo			1		
1	Male				Biking				MA			Solo			2		
1	Male				Biking				MA			Solo			3		
1		Female	Walking						YA			Solo			4	Walking Dog	
1	Male			Running					MA			Solo			5		
1	Male			Running					MA			Solo			6		
1	Male					Biking			MA			Solo			7		
1	Male					Biking			MA			Solo			8		
8	Total Number of People Along Trail																

Figure 3-5 | Pedestrian Count Observation Form Example (Patterson, 2013)

### Community Analysis

A combination of social surveys and open ended interviews were used to gather data on the use of the Indian Creek Trail. Gathering community data helped answer questions that could not be observed such as community feelings, hidden concerns, and wanted improvements. It provided a greater variety of data about the characteristics of trail users and surrounding neighborhoods.

#### Surveys

Surveys were framed using the ideas formed in Landscape Architecture Research (Deming, 2011, 72-76.) The surveys were written to analyze the general characteristics of all trail users and community members. A copy of the survey is attached in Appendix D and a full summary of the results are identified in appendix D2.

**Sampling Strategy:** The site spans a very large area within in

varying settings. Questions were tailored to fit multiple types of trail users and changing community demographics. In order to understand characteristics of the surrounding population a sampling method was chosen to determine the accuracy of responses.

Using the residential and employment densities of Overland Park, Olathe, Leawood, and KCMO the survey sample size was determined. Due to the large

geographic area, responses were assumed to contain differing opinions. Therefore a large 10% margin of error was chosen to account for greater responses due to diversity. In order to accurately understand the surrounding community's needs a random sample calculator was used. It took the population of each city area and combined it with a 10% confidence interval/margin of error. It determined that 68 responses were needed to be 90% confident

that the entire survey sample would accurately represent the entire population. A total of 114 people were surveyed with similar demographic characteristics compared to the population which illustrated an accurate sample of the surrounding community. Figure 3-6 illustrates the population statistics of the area that represent the majority of survey respondents.

**Distribution Method:** The survey was handed out at the

Focus Area Statistics	
104,412	Population
43,161	Housing Units
18.8%	Multi-Unit Structures
3	Person Per Household
86.8%	Living In House Longer Than 1 Year
83,702	Median Household Income
38	Median Age
20	Average Travel Time To Work
90.8%	Primary Mode Of Transport = Car
84.3%	Drove Alone
0.2%	Biked
1%	Walked
11,278	Total Number Of Firms
51,211	Total Number Of Jobs
2,167	Land Area In Square Miles
2126.9	Persons Per Square Mile

Figure 3-6 | Focus Area Population Statistics (U.S. Census Bureau, 2014)

13 destination areas along the trail during observation times and to surrounding businesses and communities. Surveys were also available online. They were emailed to community members and businesses, posted on social media sites, and accessible on fliers that were posted at businesses around the trail. Fliers contained QR codes so the survey could easily be scanned and taken from any device. Multiple distribution methods were

used to gather responses from a wide range of community members.

Qualtrics survey software was used to complete survey collection and distribution. A copy of the full survey is attached in appendix D and survey results are synthesized in chapter 5.

#### *Interviews*

The interview process consisted of sets of 3-5 questions that could be answered quickly. Target questions

were based on the location of interviews but common inquiries were asked for every interview session. Interviews were taken from a random sample of trail users and community members. Whoever was around during observation times were interviewed on site.

The full set of interview questions are shown in Appendix D. Results are summarized in chapter 5.

### ANALYSIS TO DESIGN

How can a design be formed to implement walkable components along trail networks?

To define an appropriate design for the Indian Creek Trail A comparison of all previous findings was done to determine where walkability components are most needed and what areas have the greatest potential for walkability enhancement.

**Data Findings**  
In order to determine correlations between all data collected, the results were synthesized through mapping techniques and descriptive statistics. The analysis compiled the physical and social data to create an assessment based off of BMP and walkability standards. From the community results, literature review findings, and site analysis a metrics

has been formed to categorize the results. This compilation of materials overlaid the variety of information and helped rank the importance of each walkability entity to introduce components to the focus area.

# ANALYSIS

81 | Overview

82 | Site Group Analysis

101 | Components Analysis

# 4



## OVERVIEW

The area was first analyzed by each destination zone. An inventory of different features were documented and overlapped to understand different patterns and traits. Suitability maps were then created to understand the primary opportunities and constraints of different trail sections. Appendix D contains the full analysis of each node with constraint and opportunity maps.

**Appendix F-1:** contains the complete constraint maps. The

floodplain, steep topography, and naturalized conservation zones were overlapped to create areas of constraint. These areas establish do not build zones. These zones are preserved and proposed designs occur outside those locations.

**Appendix F-2:** contains each opportunity analysis. Each destination zone contains a comparison of trail features and trail activity. Elements based on the components of walkability are illustrated to influence the design

strategy. The primary opportunities for creating a walkable environment are established by overlapping inventory data.

The full analysis along the Indian Creek Trail was then summarized in groups based on locational area and typical land use pattern. The components of walkability were then analyzed in greater depth by each destination zone. Five destination zones were chosen to analyze each component of walkability in greater detail based on findings from the

group analysis. The full destination zone analysis is located in Appendix C. This chapter contains a summary of each analysis group and their primary walkability strengths and weaknesses. Strengths are highlighted in green and weaknesses are highlighted in orange. Four groups were formed based on location and land use. Figure 5-1 illustrates the location of each group.

**Group 1:** contains destination ID 1-5. The first four are located in Olathe and destination zone

5 is located on the edge of Overland Park. Each zone is placed in a residential setting nearby education centers.

**Group 2:** contains destination ID 6 and 7. These zones, located in Overland Park, are placed within major business and commercial centers.

**Group 3:** contains destination ID 8-10. These zones are split between Overland Park and Leawood. Each

one of these nodes are located within a park and contains different surrounding land uses.

**Group 4:** contains destination ID 11-13. Each of these zones are located in KCMO and adjacent to low dense, mixed use environments.

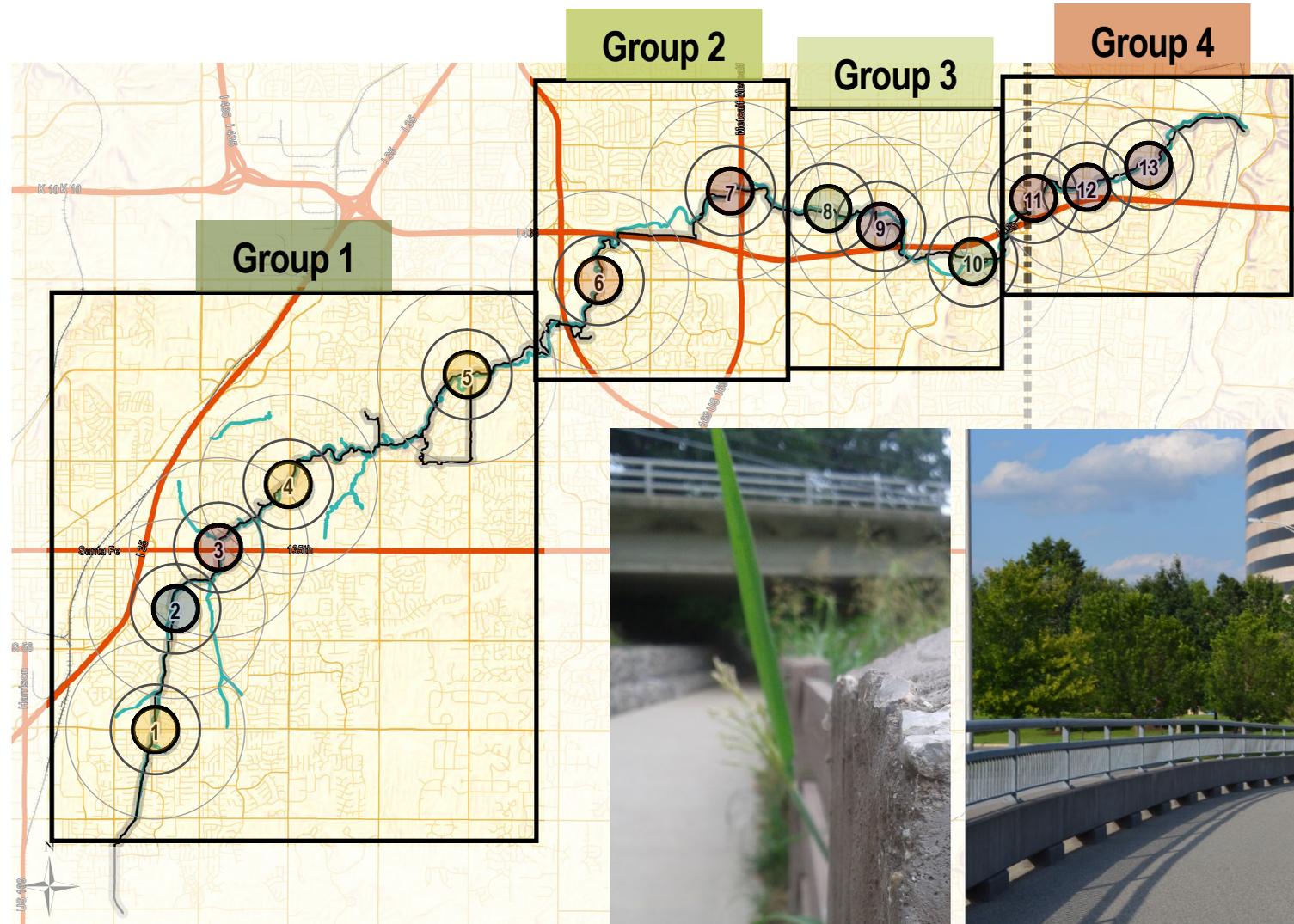


Figure 4-1 | Destination Zone Analysis Groups (Patterson, 2014)



Figure 4-2 | Destination Zone 13 Detail (Patterson, 2013)

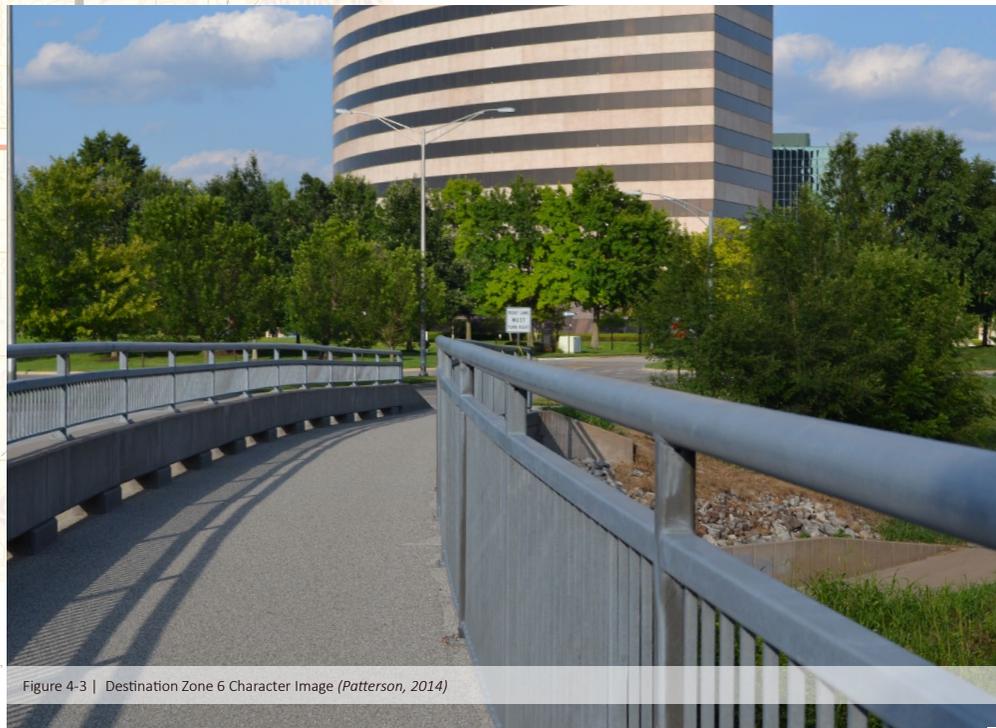


Figure 4-3 | Destination Zone 6 Character Image (Patterson, 2014)



Figure 4-4 | Destination Zone 13 Character Image (Patterson, 2014)

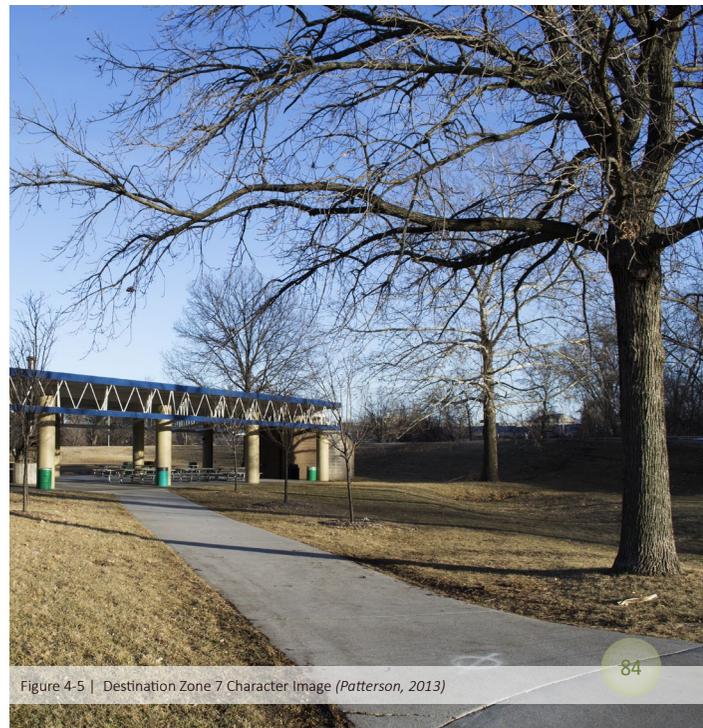


Figure 4-5 | Destination Zone 7 Character Image (Patterson, 2013)

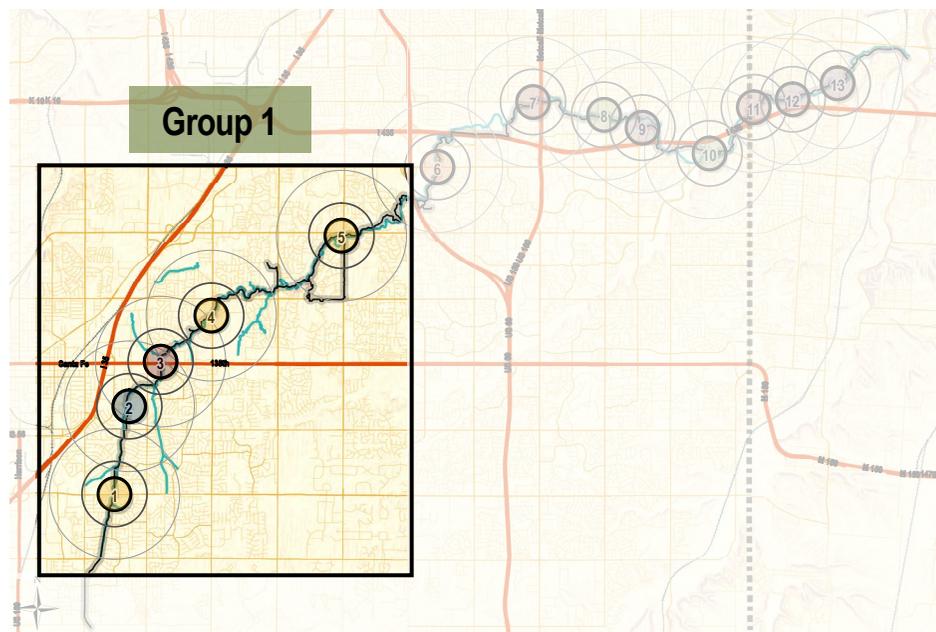


Figure 4-6 | Map of Analysis Group 1 (Patterson, 2014)

#### Walkability Strengths

Visibility  
Access  
Signage

#### Walkability Weaknesses

Segregated Land Use Patterns  
Connectivity to Destinations

### GROUP 1 ANALYSIS

Group 1 consists of five destination zones. All zones are located in sprawled suburban neighborhoods in Olathe and Overland Park.

Each destination zone in group 1 is located in a residential setting, near major education centers. Schools such as MidAmerica Nazarene University (MNU), Olathe East High School (OE), Pleasant Ridge Elementary School (PRES), and Olathe South High School (OS) are located directly along the trail. Other schools such as Johnson

County Community College (JCCC) and Saint Thomas Aquinas High School (STA) are located within a block of the trail.

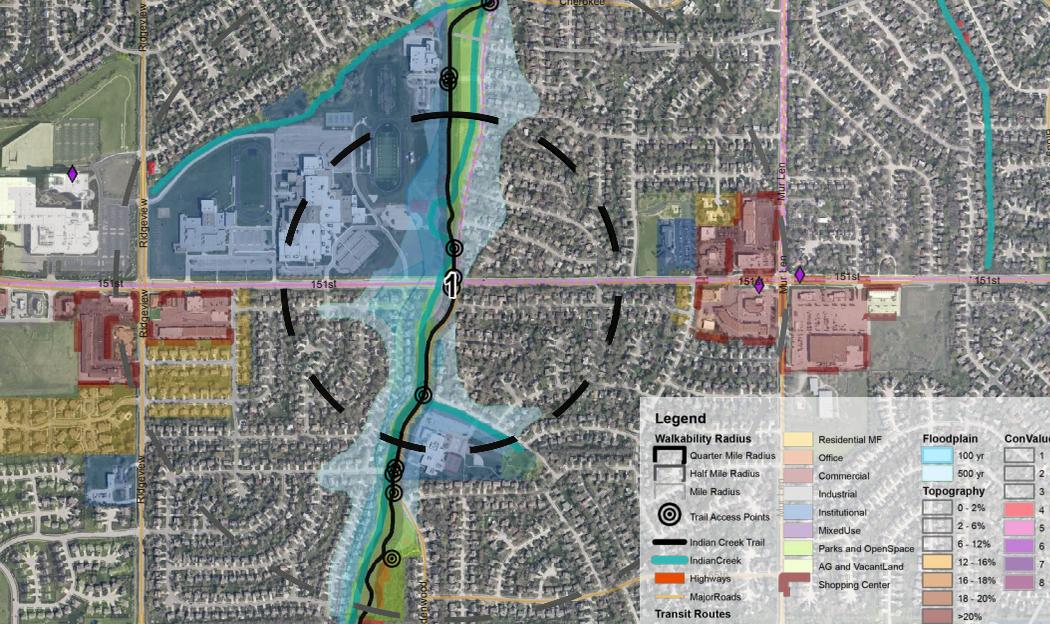
Destination zones 1, 4, and 5 are classified as residential nodes due to residential access to the trail and dominant residential land use patterns. An aerial analysis of destination zone 1 is shown in figure 4-7. This base map illustrates the typical residential land use pattern of each node in analysis group 1. As

the image shows, residential land use is sprawled in low dense clusters that segregate residences from surrounding destinations.

Destination zone 2 is identified as an institutional node because the majority of the trail runs directly alongside MNU. Destination zone 3 is classified as a commercial node because it is located nearby a major commercial corridor (135th st). Each of these zones however contains a large amount of residential units

nearby. Clusters of multi-family housing units are also prevalent within this region and establish greater density and activity along this segment of the Indian Creek Trail.

Observations and surveys revealed that this group contains the two highest visited destination zones: group 1 and group 5. This area was also noted to have great aesthetics, safety, and comfort due to maintenance. Since each city is responsible for their portion of the



trail, the Olathe standards seem to have a positive impact of trail appearance and use. Destination zones 1 & 2 are also newer sections of the trail that illustrate continuity of appearance and material.

Many physical elements along this section of the trail were also noted to contain many characteristics of walkability. The trail is typically easily visible from the road, connected to adjoining sidewalks, with some signage. Figure 4-8 represents a typical section that illustrates these elements.

Figure 4-7 | Analysis of Destination Zone 1.ai (Patterson, 2013)



Figure 4-8 | Typical Section of Group 1 (Patterson, 2014)

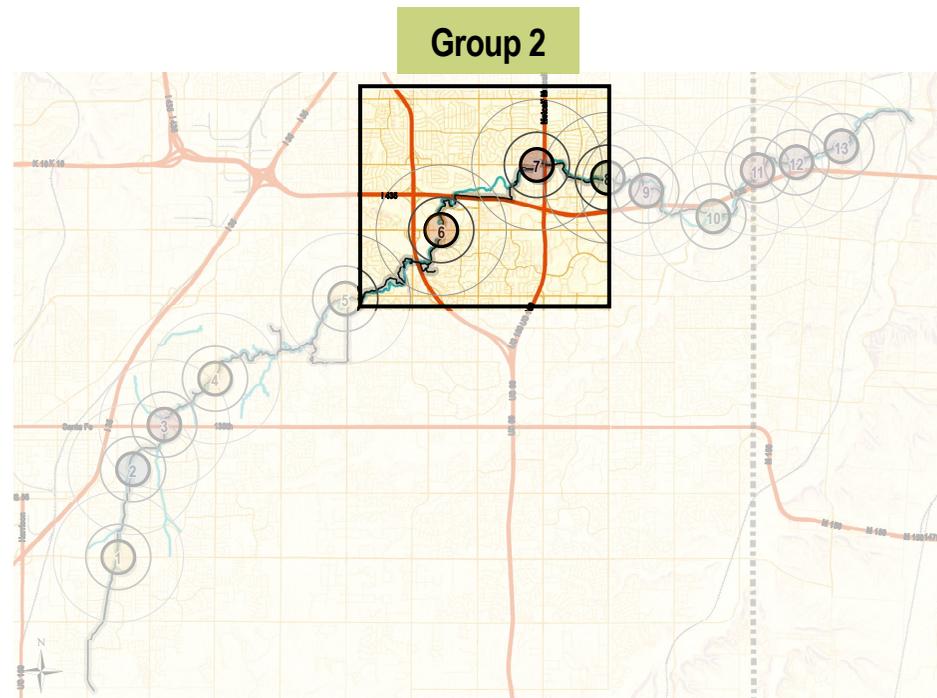


Figure 4-9 | Map of Analysis Group 2 (Patterson, 2014)

#### Walkability Strengths

Connected, Safe Pathways  
Active Commercial Zone

#### Walkability Weaknesses

Limited Safe, Pedestrian Access  
Major Vehicular Traffic  
Not Human Scale

### GROUP 2 ANALYSIS

Group 2 is a highly trafficked region. This group is made up of 2 destination zones set in business and commercial districts.

This group is different from the rest of the destination zones. Destination Zone 6 is identified as a business node, centered in Corporate Woods Business Park. Destination zone 7 is classified as a commercial node, located along the intersection of Metcalf and 103rd street. Each of these zones are segregated in single

use areas, disconnected from many residential neighborhoods. Major roads and the Indian Creek are primary barriers to the trails limited connectivity. Figure 4-10 is an aerial analysis of destination zone 6 that illustrates the typical land use pattern of these sections. As shown in the image, the sprawling business district makes up the majority of this region and makes pedestrian travel difficult.

These nodes are intertwined along some of the most trafficked roads

in the southern metropolitan area. The major roads have created these big box districts that do not contain pedestrian friendly environments. Infilling to decrease the massive expanse of surface parking can bring back human scale elements and add connectivity.

Group 2 also contains a few parks, which observations showed had a high traffic count. The Corporate Woods Park is filled daily by employees and nearby residences.

The Metcalf Park contains tennis courts, playgrounds, and an outdoor theater/gathering place that can be rented out for large assemblies. The trail was noted to be used for both recreation and transport purposes in this region. The combination of recreation and daily activity in these zones shows even greater potential for utilitarian trail use.

Along Metcalf is also the newly established bus route with nice bus stop amenities. This opportunity for

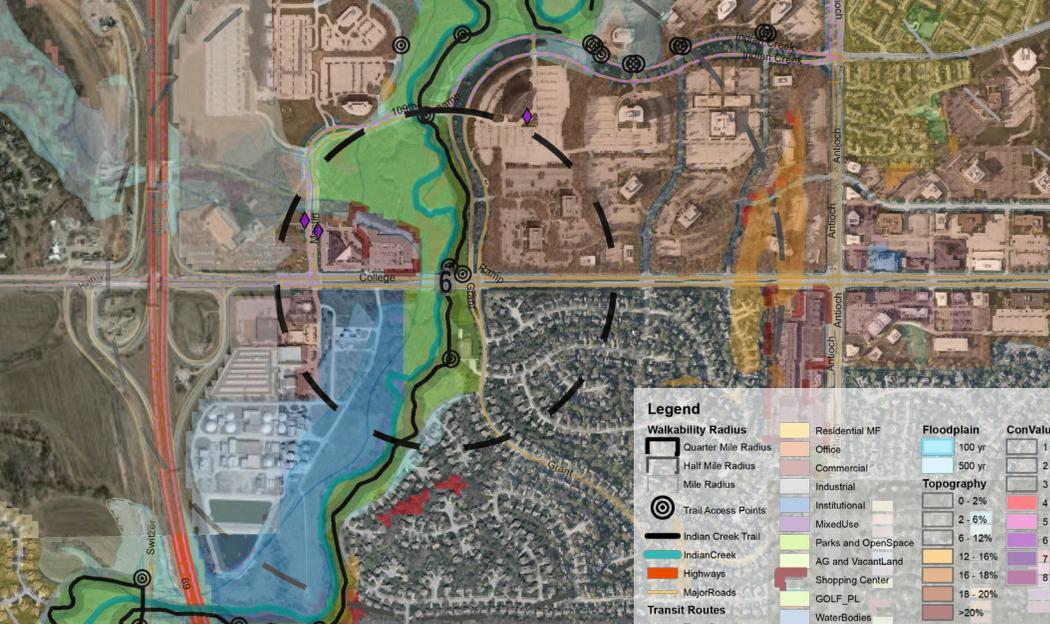


Figure 4-10 | Analysis of Destination Zone 6.ai (Patterson, 2013)

connection can help connect larger districts of the metropolitan area. The new sidewalk and bus stop amenities can also help reduce the vehicular scale of this big box, business park district, which can potentially increase pedestrian safety and comfort.

Figure 4-11 illustrates a typical section of the trail in this group. The trail is located at grade, but hidden from main roads throughout the majority of group 2. The creek and major roads segregate the trail from surrounding amenities, and large open spaces and parking lots diminish the pedestrian scale environment.

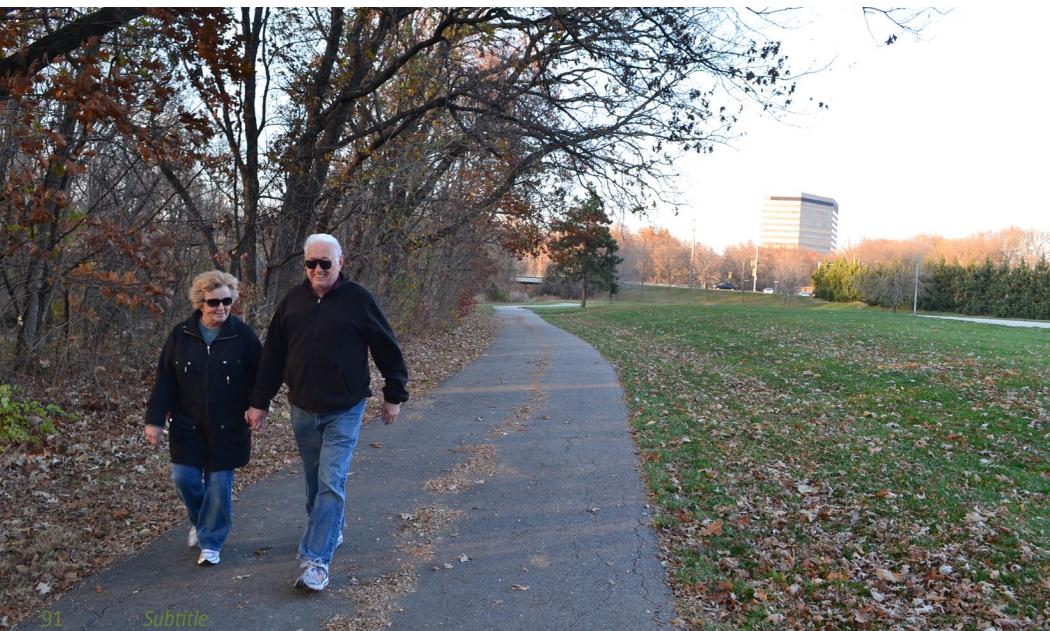


Figure 4-11 | Typical Section of Group 2 (Patterson, 2014)

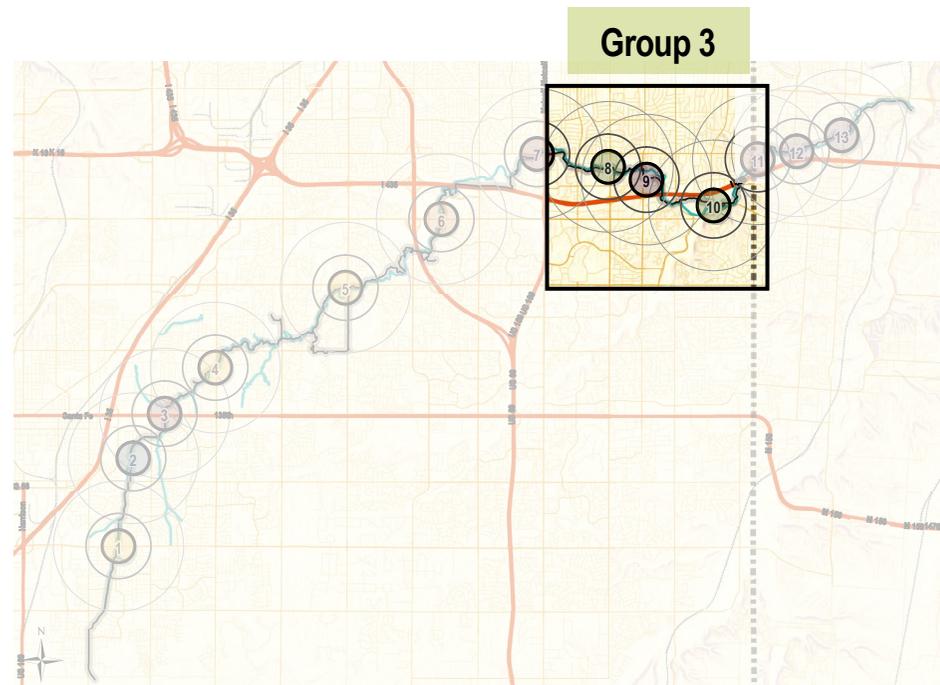


Figure 4-12 | Map of Analysis Group 3 (Patterson, 2014)

#### Walkability Strengths

Accessible Pathways  
Residential Connections

#### Walkability Weaknesses

Low dense, limited diversity land form  
Disconnected Pathways  
Limited Signage

### GROUP 3 ANALYSIS

Each destination zone in group 3 is centered around major recreation areas. These nodes are centered in park environments with limited connections to surrounding residential neighborhoods. An aerial analysis of destination zone 8 is shown in figure 4-13 to illustrate the typical surrounding environment.

Group 3 is comprised of three destination zones. Destination zones 8 and 9 are located along smaller residential parks in Overland Park. Destination zone

10 is completely located within Leawood Park and intersects with the Tomahawk Creek Trail.

The Indian Creek Trail in destination zone 8 and destination zone 10 have confusing disjointed layouts. While they are at grade and easily visible, they are comprised of multiple segments or join with other trails so that users can become disoriented easily. In destination zone 8 the trail splits and is completely disconnected. The northern portion of the trail

stops a couple hundred feet in and there are no signs directing users to the continuous southern portion. Destination zone 10 runs throughout Leawood Park and joins with the Leawood Park trails and the Tomahawk Creek Trail. Limited signs are available to direct users to the right path to get them where they need to go.

Destination zone 9 is slightly different than the other nodes in group 3. Within destination zone 9 the trail is

fairly continuous and is connected to businesses. While the majority of this zone is centered in a major park and residential neighborhood, across Roe the trail connects to a major business and retail center off the highway. There is great potential for added connectivity and infill to enhance the walkability of this environment.

Within group 3 the trail is at grade, visible from main roads, and in good condition. It shows many characteristics of a pedestrian

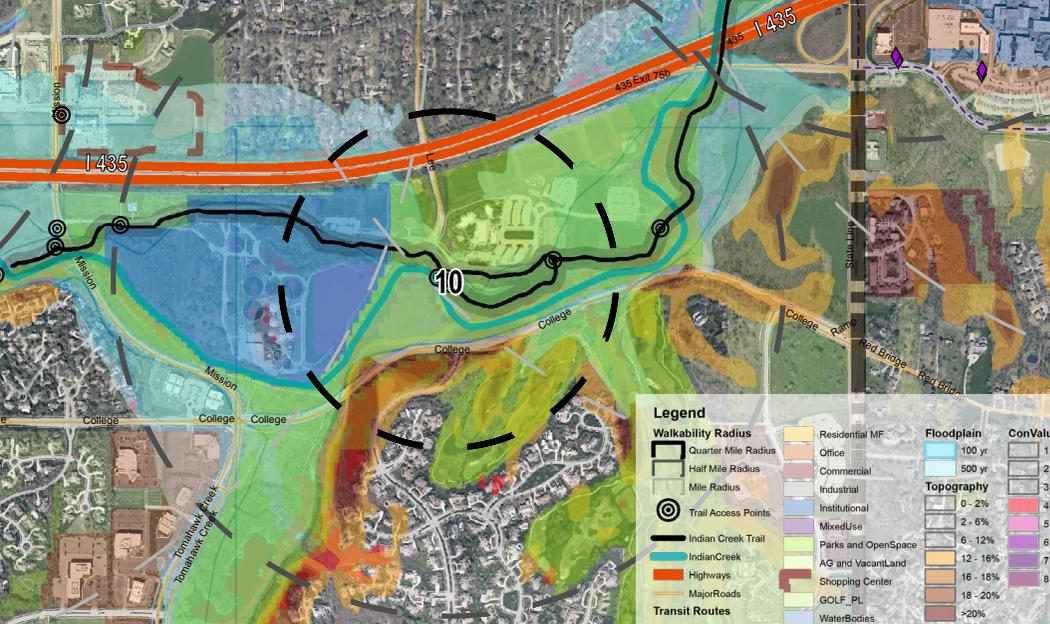


Figure 4-13 | Analysis of Destination Zone 10.ai (Patterson, 2013)

recreational environment. Figure 4-14 illustrates the typical section of the trail.

Observations also showed high levels of activity within these nodes. Primarily the activity was noted at parks and on weekends which illustrated high recreational use. The primary restrictions of group 3 deal with connectivity and urban form. While the area promotes a recreational environment, the disconnected pathways and low, single use density does not provide an atmosphere for walkability.



Figure 4-14 | Typical Section of Group 3 (Patterson, 2013)

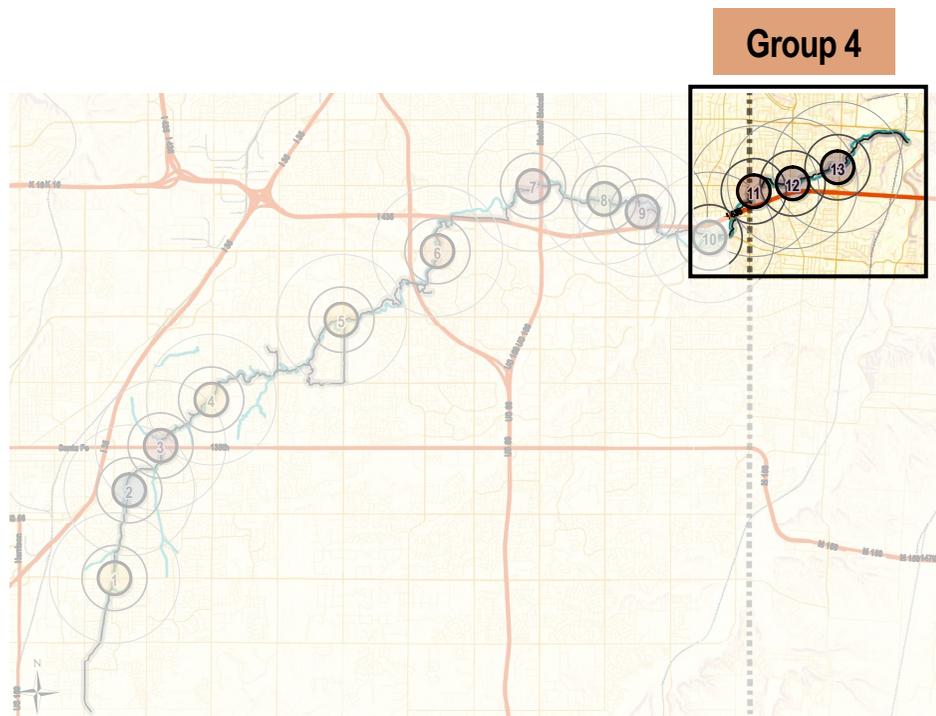


Figure 4-15 | Map of Analysis Group 4 (Patterson, 2014)

#### Walkability Strengths

Mixed Use Environment  
Near Transit Routes

#### Walkability Weaknesses

Limited Pedestrian Infrastructure  
Poor Connectivity

### Group 4

#### GROUP 4 ANALYSIS

Each destination zone in group 4 is located in Missouri, primarily in low dense, mixed use environments.

Destination zone 11 is primarily located in a large commercial district, nearby residential and institutional services. Destination zone 12 and destination zone 13 are located in residential environments nearby neighborhood commercial, business, and retail centers. Figure 4-16 is an aerial image analysis of destination

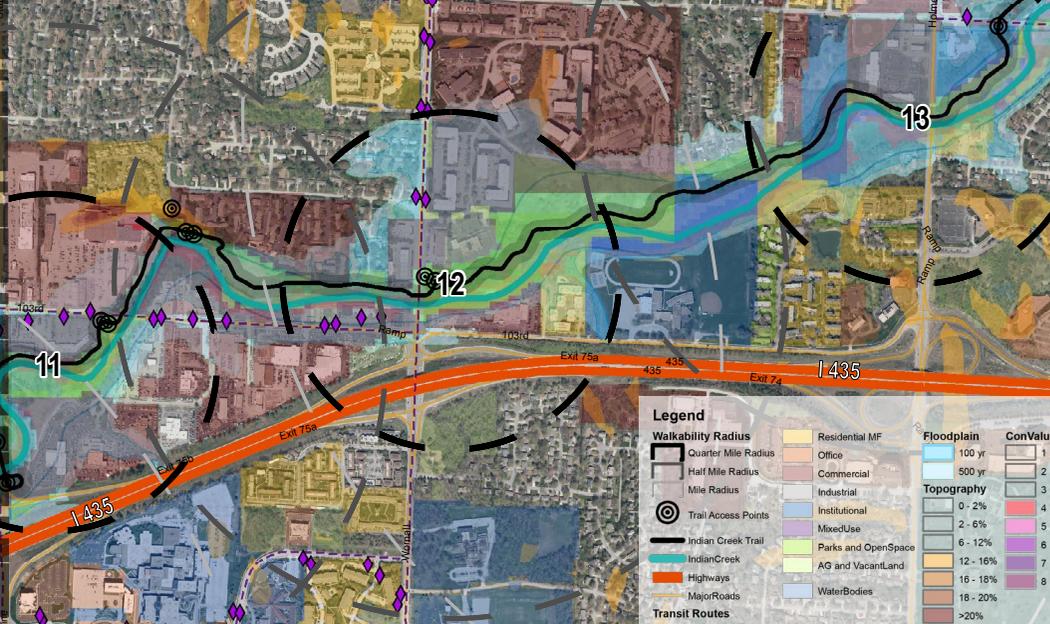
zone 12 which illustrates the typical environment of these nodes.

Group 4 contains the highest multi-modal transportation routes out of all the groups. The end of the trail is also approximately a mile away from the end of the Trolley Track Trail. Both of these amenities together provide the best opportunity for connection throughout the overall metropolitan area. Bus stops and sidewalks however are in poor condition but each issue can easily be fixed with added infrastructure.

Many businesses back up directly to the trail providing for easy access to amenities within this group. Group 4, while well connected to the trail, is not well connected to surrounding uses. The creek, roadways, and lack of infrastructure provides a major barrier to overall connection. Figure 4-17 illustrates a typical section of the trail in this area. The image illustrates the trails proximity to neighborhood business centers but shows the lack of connectivity and pedestrian scale to adjoining uses.

Observations showed that these nodes were some of the lowest trafficked nodes along the trail. This area has the greatest density and direct connectivity to the trail yet is the least used. Flooding, maintenance, and safety were three primary reasons noted from observation and survey data for the lack of use.

The trail in group 4 has a major flooding issue. Drainage from the bridges and roads filter directly onto



the trail causing many hazards. The trail also contains the least up-kept environment with little snow/ice removal, cracked pavement, and overgrown vegetation. Combined with trash, homelessness, and limited lighting each of these issues aggregate an unsafe environment.

Figure 4-16 | Analysis of Destination Zone 12.ai (Patterson, 2013)



Figure 4-17 | Typical Section of Group 3 (Patterson, 2013)

## COMPONENTS OF WALKABILITY

The analysis showed that the Indian Creek Trail can be broken into 4 groups with similar characteristics. It revealed that the location within each city also made a notable impact on use and perception. The population demographics and characteristics were notably different within each city and showed that there are many different needs along each section of the trail. The analysis also illustrated that nodes with different land use patterns had different patterns of activity and needed

different components of walkability. This revealed major elements that influenced the walkable environment around the Indian Creek Trail.

The findings established specific components of walkability that are needed in each destination zone. Five destination zones were chosen for in depth analysis to evaluate potential strategies for improvement. The five zones are categorized by the components of walkability:

- 10 – Social Views
- 5 – Connectivity
- 11 – Urban Form
- 13 – Pedestrian Infrastructure
- 7 – Pedestrian Experience

The following pages describe the 5 components of walkability and analyze the destination zones by specific characteristics. The detailed analysis of each destination zone is located in appendix \_. The analysis helped establish what components of walkability were needed in each

destination zone and helped define how the components could be implemented on site.

A summary of the findings are synthesized through the design metrics that is described in chapter 6. The design metrics establishes where each walkability component is needed for each destination zone. This provides a road map for how the different destination zones can be designed.

## ANALYZING SOCIAL VIEWS

The social aspects of walkability deal with the community's willingness to walk and their views on transport and development. An average of 90% of the focus area population uses a personal vehicle on a regular basis and 97% of survey respondents

stated they own or utilize a car regularly. These statistics show the dominance of the personal vehicle and the population's travel preferences. The survey also revealed that 50% of the population would not walk to destinations no matter

what improvements were made to the pedestrian environment. This mindset reveals the negative community perception of active transportation. Three elements that have a direct affect on the social mindset in this area are: *policies/*

*incentives, education/advertising, and neighborhood design implementation.* These strategies are evaluated along the Indian Creek Trail to identify opportunities to promote greater walkability success.

### Policies/Incentives

Policies and incentives to limit driving and promote walkability can slowly make a change to the overall environment. Events such as, walk/bike to work days, 'live where you work' programs, partnerships with

school boards, tax incentives, parking fees and traffic safety initiatives can all influence how the community travels and start to change the perceptions of active transportation.

### Education/Advertising

Programs to promote walkability can create awareness of the negative health, economic, and environmental impacts of unwalkable neighborhoods. Educational signage and interaction techniques can

also be used to promote walking in specific areas such as along the Indian Creek Trail where groups of pedestrians already walk.

### Design Implementation

The mere presence of sidewalks, signage, benches, bike lanes, etc. allow people to walk and demonstrates the possibility of walking to a community. By implementing more pedestrian assets the mindset of active transportation can change.

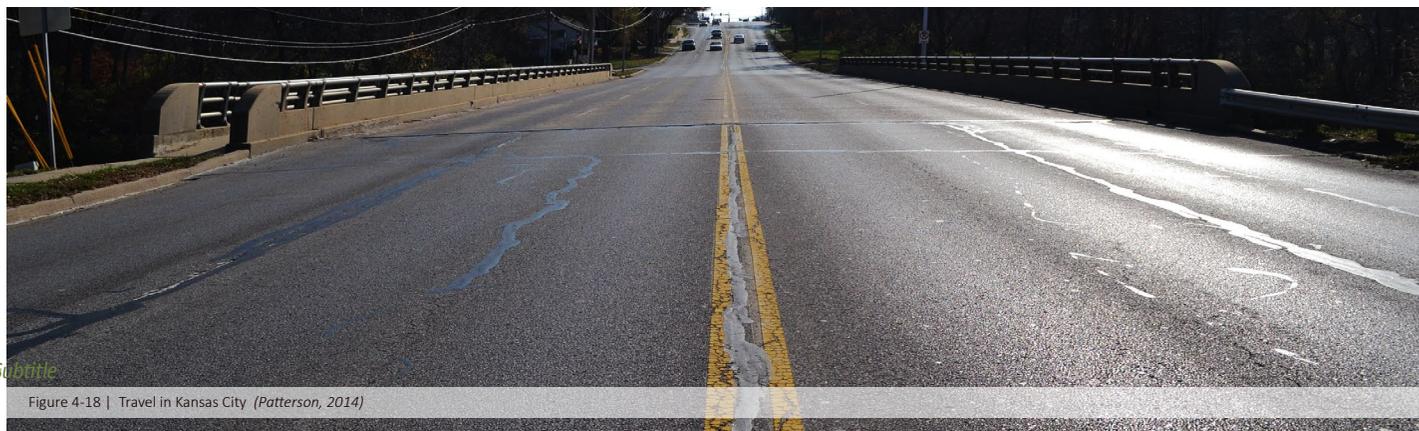


Figure 4-18 | Travel in Kansas City (Patterson, 2014)

Many studies/strategies today leave out the important social culture of transportation in suburbia. Current strategies focus on amending the suburban form and forget that the population is cultured to drive. This project focuses on the social element of walkability to help encourage more sustainable practices.

As shown through current population statistics, the majority of people in Kansas City drive, and even if enhancements to pedestrian

infrastructure was made, many would not walk. Currently people walk for recreational purposes. The survey showed that 78% of trail users used the Indian Creek Trail strictly for recreation. By understanding how the focus area population travels, tactics to improve pedestrian travel can be tailored to the existing community patterns.

While the majority of the population drives, the survey revealed that 33% of the population walk or

bike to specific destinations on occasion. This illustrates the population's willingness to utilize active transportation and not always drive. However, the car culture has segregated the suburban landscape and creates an unwelcoming environment for pedestrians.

Many population statistics inquire about the most used form of transport, but they don't account for alternative methods. By understanding that 33% of the

population utilizes active transport occasionally, strategies can be put in place to increase their walking/biking habits to create a greater pedestrian friendly environment.

*"Walkers are attracted to mixed-use Urban districts where there is activity involving people..." (Untermann 1984, 23). More pedestrians creates a safer and more welcoming environment for pedestrian travel. This is evaluated by understanding current levels of pedestrian activity. Pedestrian counts*

and survey results have identified the highest and lowest concentrations of pedestrian activity. Highest areas of activity can act as a catalyst for specific improvements. Lowest concentrations of activity can reveal underlining issues that are creating the unwelcoming environment.

The evaluation of current social views is primarily based off of survey responses and current transportation trends. The strategy for improvement is centered on implementing

educational features near highest concentrations of activity tailored to current community habits.

Destination zone 10 is analyzed in greater detail to understand the specific social aspects that influence the population's travel preferences and thoughts about active transportation. Destination zone 10 is completely centered in Leawood Park and reveals insight about the potential to transform recreational activities to health conscious travel choices through design.

## DESTINATION ZONE 10

Destination Zone 10 is unique because it is completely segregated within Leawood Park. The location within a park makes many retrofitting techniques implausible. The park is made for recreation and should

remain a recreational asset. Many members of the community would also be against many land use and reconfiguring strategies that would transform the park's identity. While the survey was taken by a large group

of trail users open to transit, over 50% said they would not be happy if apartments, shops, or restaurants were added near the trail. This response stems from the fear of how those buildings would affect

the surrounding areas. Strategies to improve the walkable conditions should then be focused on education and connectivity to bring greater awareness of walkable opportunities.

### Constraints

The floodplain, topography, and highway completely segregate Leawood Park as shown in figure 4-21. The trail and park are also not visible from main roads and have little signage to direct users to appropriate locations. The lack of

visibility and sense of direction not only hinders greater use of the park but makes travel within the park difficult. Multiple intersecting trails and pathways increase the confusion within the park as shown in figure 4-20. With little signage and many potential routes, pedestrians can get lost very easily. The segregated park only further hinders the social perception of separate land use functions and walking only for recreation. Walking and biking is seen by many in the area as simply

a recreational activity. As shown in figures 4-23 and 4-24 the park is used by individuals and groups for exercise and other leisure activities. This mindset makes active transportation difficult to convey. Observations noted that approximately 70% of trail users in destination zone 10 drove to the park to run, bike, walk, and exercise. This illustrates the lack of connectivity and convenience of the park as well as the car culture of the region where people drive for every small task. Added educational



Figure 4-19 | Leawood Park Entrance (Patterson, 2014)



Figure 4-20 | Multiple Confusing Pathways (Patterson, 2014)

8 Different Pathways Joining in 1 Location

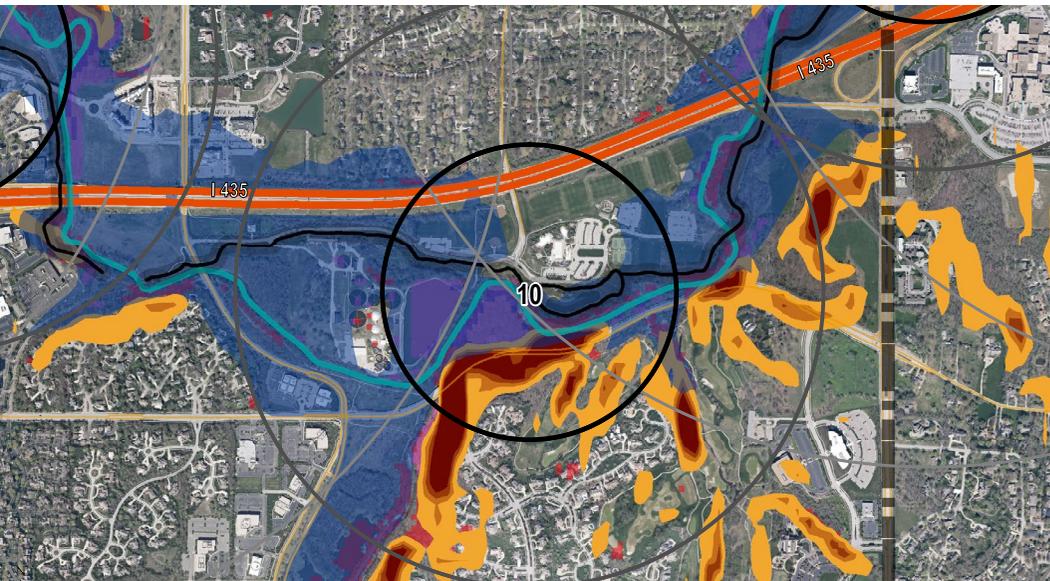


Figure 4-21 | Constraint Map of Destination Zone 10 (Patterson, 2013)



Figure 4-22 | Opportunity Map of Destination Zone 10 (Patterson, 2013)

elements and signage could help reveal the connectivity and potential for walkability in this area. Changing policies and regulations can also help change the way travel is perceived. Many policies and regulations within different parks can restrict the use of the Indian Creek Trail. As shown in figure 4-25 there are many regulations such as time, that would not allow many to use the trail after specific hours.

### Opportunities

The park contains many recreational fields, courts, gathering spaces,

and a pool that brings an active environment to this area. Observations noted high levels of activity in the park, on weekends that illustrated this highly active environment. Due to the high levels

of activity, this node is perfect for manipulating the social views of active transportation. Strategies to educate the population about alternative transit methods can be

directed to the parks and trails that are already used for walking.

Interviews and surveys showed that many within the Kansas City region do not walk because it is not convenient.



Figure 4-23 | Bikers on the Trail (Patterson, 2014)



Figure 4-24 | Image of Fishing Activities (Patterson, 2014)



Figure 4-25 | Image of Park Regulations and Signage (Patterson, 2014)

Many also feel that walking and biking are just for recreation. By incorporating walkable elements along an already used recreational area, walking can become a more

convenient and viable transportation option. It can also show the rest of the population how active transportation works and how it can benefit each person.

Leawood park is mainly a system of road networks and parking lots that connect fields and playgrounds. The configuration creates a lot of underutilized space that is only used

at specific times throughout the year. This provides many opportunities to capitalize on this vacant space to enhance the walkable environment. Due to the recreational use, floodplain restrictions, and community desires traditional infill and development strategies are not appropriate. Temporary infill strategies and re-purposing of vacant spaces are simple solutions that can have a major effect on this region.

The Indian Creek Trail and the Tomahawk Creek Trail merge within Leawood Park and provide connections to the surrounding residential developments. This infrastructure already in place creates walkable opportunities set up for success. By adding destinations or directing the population to destinations, many could understand how walkable this area can be. The primary opportunities for connection are illustrated in figure 4-22.

Many businesses and commercial centers are located within a mile of Leawood Park. Many however do not think that these areas are walkable. The survey revealed that 25% of survey respondents stated they live, work, or go to school within a mile of the trail. When comparing responses to where people actually travel however, over 50% of respondents live, work, or go to school within a mile of the trail. This reveals how



Figure 4-26 | Leawood Park Public Pool (Patterson, 2014)

the population's perception of distances is skewed.

By incorporating walking and biking amenities to the trail, active transport options can be revealed to the surrounding community.

After analyzing the opportunities and constraints of destination node 10, 3 primary needs to amend the social

views of walkability were assessed:

- The need to make pathways and trail networks visible and easy to follow.
- To create a more active mixed use environment through appropriate land use strategies.
- To incorporate active transportation amenities to make walking and biking more visible and convenient for nearby residences.



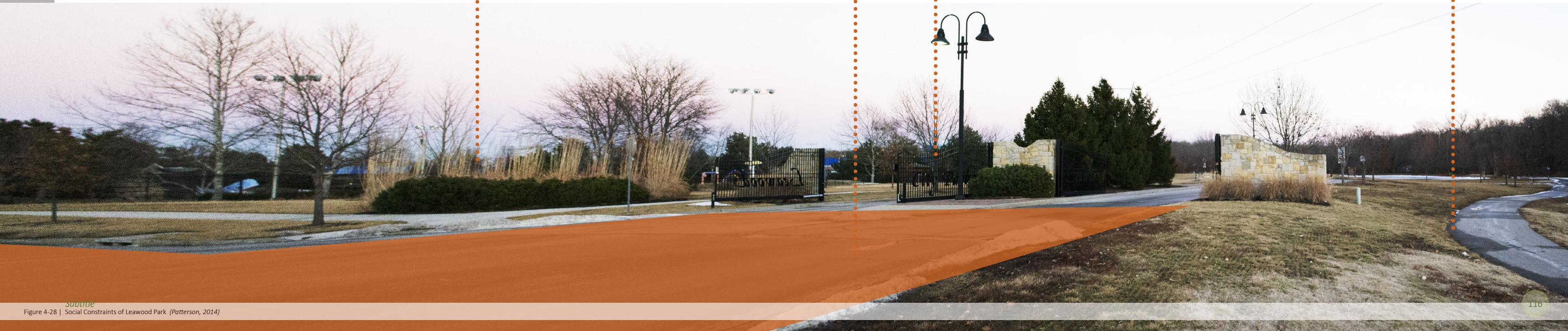
Figure 4-27 | Child Playing in Open Field (Patterson, 2014)

Trail Connection  
Set up for recreation

Gated Entrance Restricting Access to Park and Creating unwelcoming pedestrian environment

Expansive Roadway Separating Pedestrians from Space

Recreation Elements That Bring in lots of Activity



## ANALYZING CONNECTIVITY

Connectivity determines whether it is physically possible to walk to a destination but also deals with the perceptions of connectivity.

“A walkable neighborhood isn’t walkable unless it has a well-connected thoroughfare network.”  
(Aurbach 2007)

The primary characteristics evaluated for connectivity are: physical barriers, visibility, perceived connectivity, and connectivity infrastructure.

### Physical Barriers

In order to walk, one must be able to get from one place to another. Physical barriers are a primary concern of connectivity when dealing with retrofitting existing neighborhoods. Barriers observed and evaluated along the Indian Creek Trail, such as topography, rivers, roads, buildings, vegetation, and other existing facilities, can pose a great challenge when trying to connect destinations.

### Visibility

Visibility is another major proponent of connectivity. A visible, connecting pathway to a destination is extremely important in allowing people to get from one place to the other. Primary factors of visibility evaluated include physical barriers such as vegetation and buildings, but also lack of wayfinding elements to direct people to destinations. Visibility can also affect levels of safety and comfort; if a pathway is completely covered it can create a sense of insecurity,

Areas of insecurity and invisibility are identified in the destination zones along the trail.

### Perceived Connectivity

Perceived connectivity deals with the social aspects of walkability and understanding the most direct and efficient route to a destination. If pedestrians believe that pathways are too far or too inconvenient than they will not walk. Inconsistent paving, mis-matched pathways, limited infrastructure, and great distances

can all create a perception of disconnect even if there is an existing connection. Perceptions are identified through physical observations and community data.

### Connectivity Infrastructure

Infrastructure that allows people to walk from one place to another determines the level of connectivity between destinations. “A well-connected network, composed of direct, convenient routes, is one of the key ingredients of

walkability.” (Aurbach 2007).

The quality and type of sidewalk/pathway/bridge is very important but also the location, design, and accessibility is vital for a connected environment.

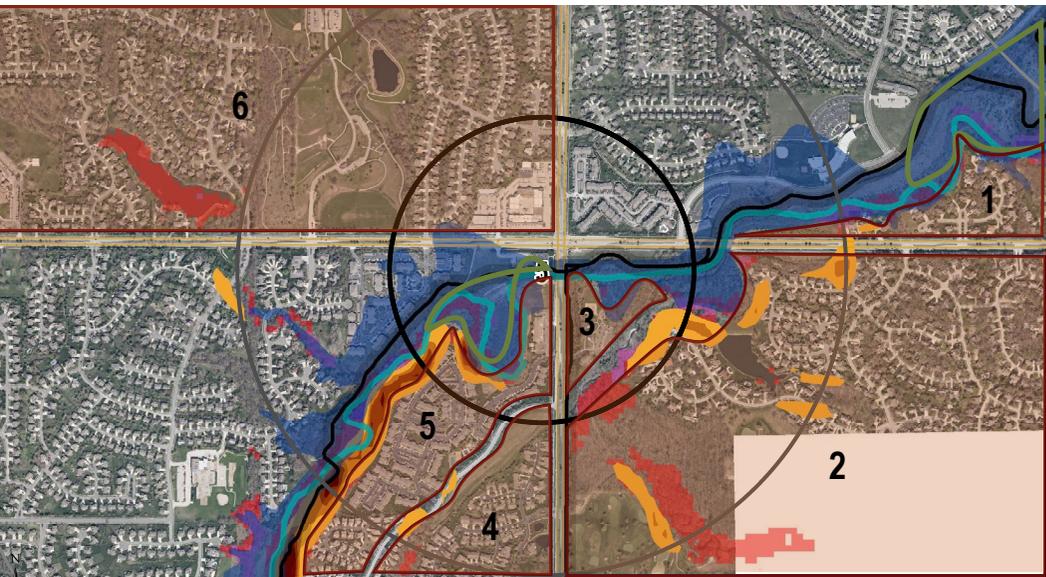


Figure 4-29 | Constraint Map of Destination Zone 5 (Patterson, 2013)



Figure 4-30 | Opportunity Map of Destination Zone 5 (Patterson, 2013)

### DESTINATION ZONE 5

Destination Zone 5 is a great example of neighborhood retail centers convenient for walking. This zone also contains clusters of multi-family housing and major business and education centers that provide higher densities and greater activity than most areas throughout the KC metro region.

The infrastructure and design of the area contains many aspects of walkability but are hindered by barriers that segregate different land uses.

### Constraints

Figure 4-29 illustrates the segregated landscape where pedestrian connectivity is difficult. The topography, creek, and road has segregated 6 portions of land that

are not directly accessible to the trail or any other land area. The primary constraint is the creek that completely segregates the northern and southern development as shown in figure

4-38. 119th street also segregates this region which aggravates the connectivity issue. Signage and wayfinding elements could easily help enhance the accessibility, visibility,



Figure 4-31 | Connectivity Restrictions of StripMall Retail (Patterson, 2014)



Figure 4-32 | Cows Paths Created because of Limited Access (Patterson, 2014)



Figure 4-33 | Narrow Buffer (Patterson, 2014)



Figure 4-34 | Patchwork of Pavement (Patterson, 2014)



Figure 4-35 | Sidewalk Disconnect (Patterson, 2014)



Figure 4-36 | Sidewalks Break (Patterson, 2014)



Figure 4-36 | Sidewalk Hazards (Patterson, 2014)

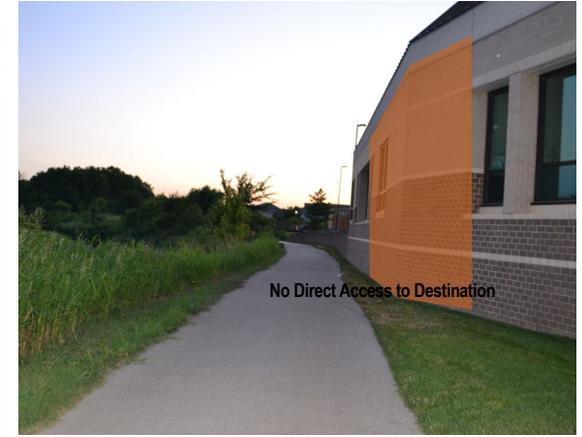


Figure 4-37 | Business Proximity to Trail with no entrances/Infrastructure (Patterson, 2014)

and perceptions within this area but additional pathways would be needed for greater connectivity.

Although sufficient infrastructure such as sidewalks and signage exist in this node, the design and placement does not make pedestrian travel easy. As shown in figures 4-32 to 4-37 pathways dead end or do not connect to destinations, signage is scaled for vehicles, materials are not consistent, and cracks/slopes/potholes caused by flooding make portions of the trail unusable at times.

As seen in typical suburban strip mall development, sidewalks also dead end at parking lots leaving no direct pathways to building entrances.

Figure 5-31 illustrates this common theme that needs to be addressed for a walkable environment.

**Opportunities**

The Indian Creek Trail helps alleviate the lack of connectivity due to the road but does not cross over the creek in this zone. Added signage and direction can help pedestrians utilize

the existing pathways and travel in a more safe and efficient manner.

The need for infill, redevelopment, or reconfiguration is minimal in this zone because of the existing land use patterns. Current variety and densities are good for a walkable environment and many buildings are located directly along the trail or sidewalks. Figures 4-37 illustrate the current development connections and reveal the primary connectivity needs.

The primary need in this zone is to

connect existing uses and enhance existing pathways to create a more welcoming pedestrian environment. Minimal strategies are difficult because the existing barriers require added infrastructure that is costly.

The greatest opportunity for simplistic connectivity exists along Quivera road. This opportunity can create an environment that would connect the KU campus, Quivera Park, Stoll Park, the neighborhood commercial centers and JCCC. Added buffers,

site amenities, mid block crossings, enhanced crosswalks, and sidewalk connections can all enhance the street scape Quivera and lessen the vehicular dominance of the road.

After analyzing the opportunities and constraints of destination node 5, 4 primary needs were assessed:

- Quivera needs to become a pedestrian friendly environment better connected to the trail.
- The segregated areas within

this node need added pathways for connectivity.

- The Indian Creek Trail needs to be more accessible and visible from destinations and roads.
- The adjacent development needs to have greater pedestrian access and more amenities.

- 1
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Disconnected Apartments Across 119th Street

Indian Creek Trail

The expanding Indian Creek due to erosion

Overgrown Vegetation hiding residences

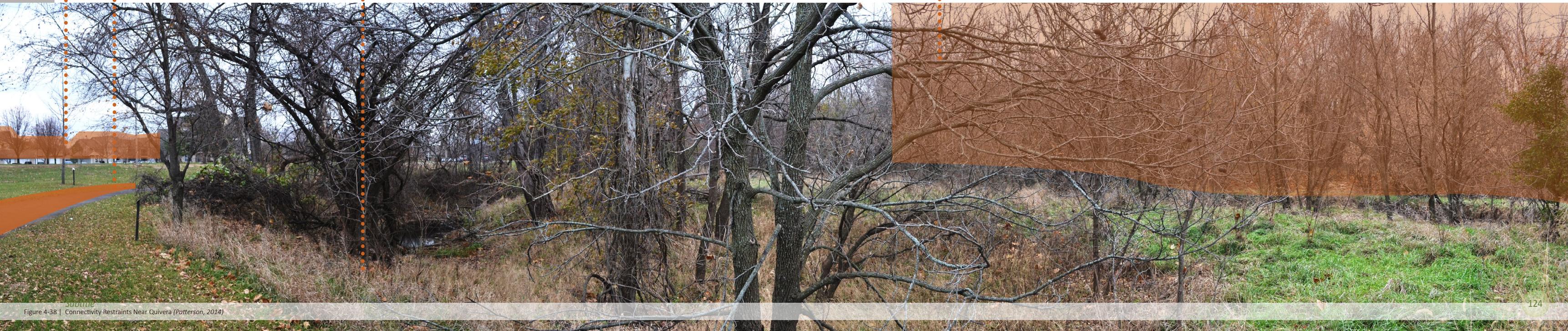


Figure 4-38 | Connectivity Restraints Near Quivera (Patterson, 2014)

## URBAN FORM

Levels of walkability are determined by how a person can walk from one place to another; therefore urban form is the primary element of walkability. The primary characteristics of the urban form are: **distance, density, diversity, and design**. Below is a summary of how each category is measured and evaluated.

*(Rattan, Campese, & Eden 2012)*

*("Neighborhood Walkability" 2014)*

### Distance

A quarter-mile is the standard accepted walking distance people are willing to walk, therefore a variety of residences and businesses must be within a quarter mile radius in order for people to choose to walk rather than drive. Utilizing Walk Score and USGBC standard principles, each destination node was evaluated to see if multiple types of land uses are located in clusters within the quarter mile radius distance. At least 10 basic services must be located

within a half mile radius in order to have a walkable place *(USGBC 2014)*. As found through survey and interview data, buildings must also be located directly along a pedestrian pathway in order for people to even think about walking; therefore some destinations must be located within feet of the trail or sidewalks. This theory is also shown through research studies; Walkability-Sidewalk Density has been noted as a major factor in determining overall walkability.

### Density & Diversity

Due to the quarter-mile radius walkability standard, the density and diversity of an area is very important. Walkability is about getting from one place to another in a fast and efficient manner. An area must be fairly dense so that a variety of activities and errands can take place without too much effort. Traditional medium-high density standards

are not completely appropriate for the sprawled KC suburbs. Surveys and interviews showed the population would be very against high dense, multi story buildings; therefore a combination of lower standards

and current land use types are used to formulate appropriate building standards. Figure \_\_\_ illustrates the type of development appropriate for along the trail. Following standards set out by the USGBC, within a half

"Higher densities ensure that there are sufficient people on the streets to create a safe and vibrant environment."  
*(CLS, 2014)*

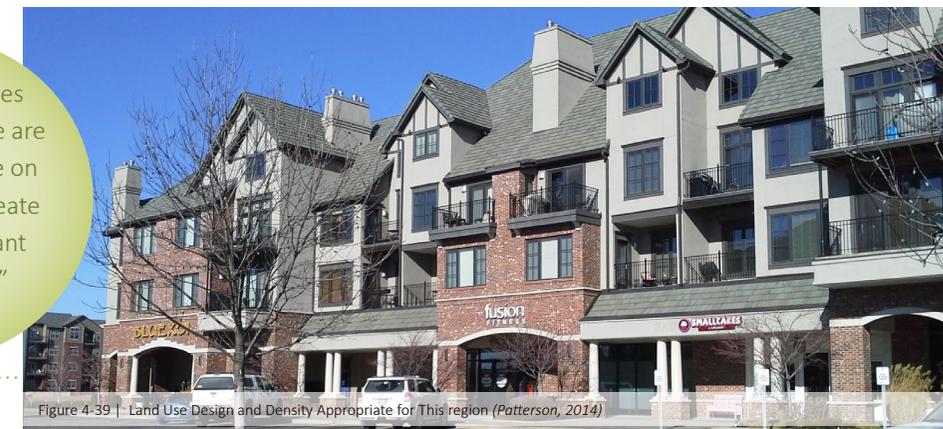


Figure 4-39 | Land Use Design and Density Appropriate for This region *(Patterson, 2014)*

mile radius all building types must have a minimum Floor Area Ratio (FAR) of .5 and the average residential density of 8-10 dwelling units per acre. An illustration of typical FAR

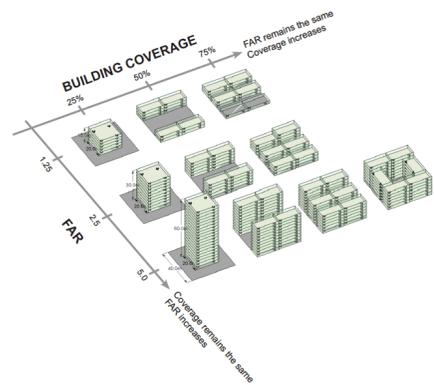


Figure 4-40 | FAR Density Diagram from the Density Atlas ("FAR Coverage" 2011)

densities are shown in figure 4-40. More detailed requirements on the density and diversity from USGBC can be found in Appendix E.

### Design

The design of buildings must also be taken into consideration when evaluating and designing a walkable place. Buildings must be located and

oriented in convenient locations for pedestrians, and focus on creating a welcoming environment for people. Primary evaluation looks at pedestrian oriented entrances, safe and convenient pathways to entrances, and building scale. These elements define how a place is perceived.

## DESTINATION ZONE 11

The development in destination zone 11 mimics characteristics that are dominant throughout the metropolitan region. Described as big box retail or strip malls, the

segregated land use pattern has created the unwalkable environment of the area. Figure 4-41 is an image of the current segregated big box development. Separated by major

roadways with expansive parking lots, large underutilized stores are designed for vehicular traffic that hinder pedestrian activity. Zone 11 also contains limited pedestrian

infrastructure which makes destinations only accessible by car.

### Constraints

The major issues of the urban form in this node is the distance, density, and connectivity between businesses. Similar to destination zone 5 the creek, roads, and topography segregate many land uses in this region. Figure 4-43 illustrates the segregated zones created by these barriers. Major employment centers located south of the highway are

completely disconnected from everything north of I-435. Other businesses are compressed between the highway and Indian Creek, set between the creek and 103rd street, or segregated west of Stateline Road.

Not only are the different development zones segregated by large barriers but the buildings also built far away from each other within each development. Massive parking lots separate stores and expand the distances pedestrians and cars must



Figure 4-41 | Limited Connectivity from sidewalk to building (Patterson, 2014)



Figure 4-42 | Building Distances Conducive to Vehicles (Patterson, 2014)

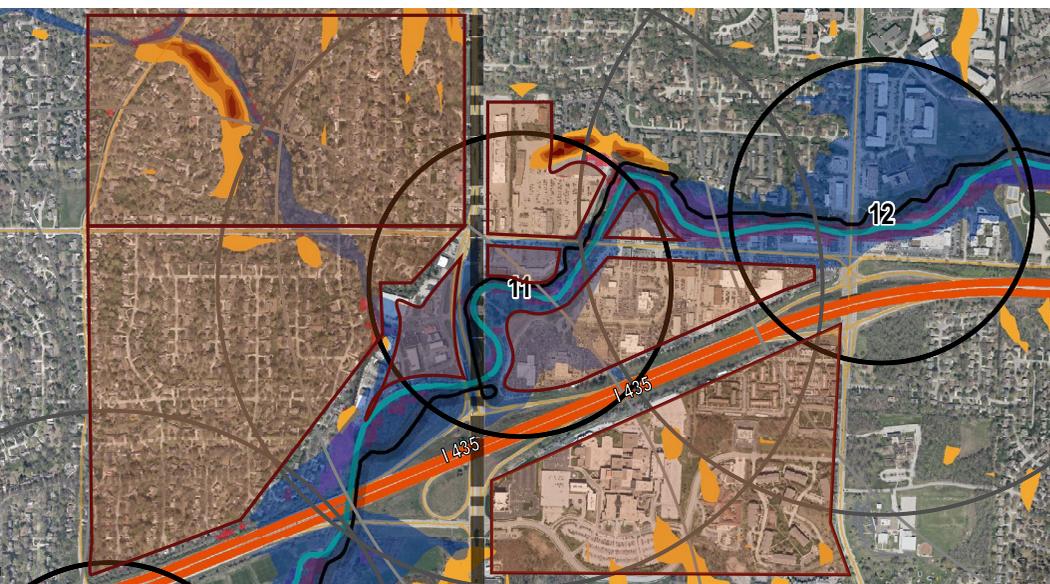


Figure 4-43 | IndianCreekTrail\_DoNotBuildMAP 11.pdf- (Patterson, 2013)

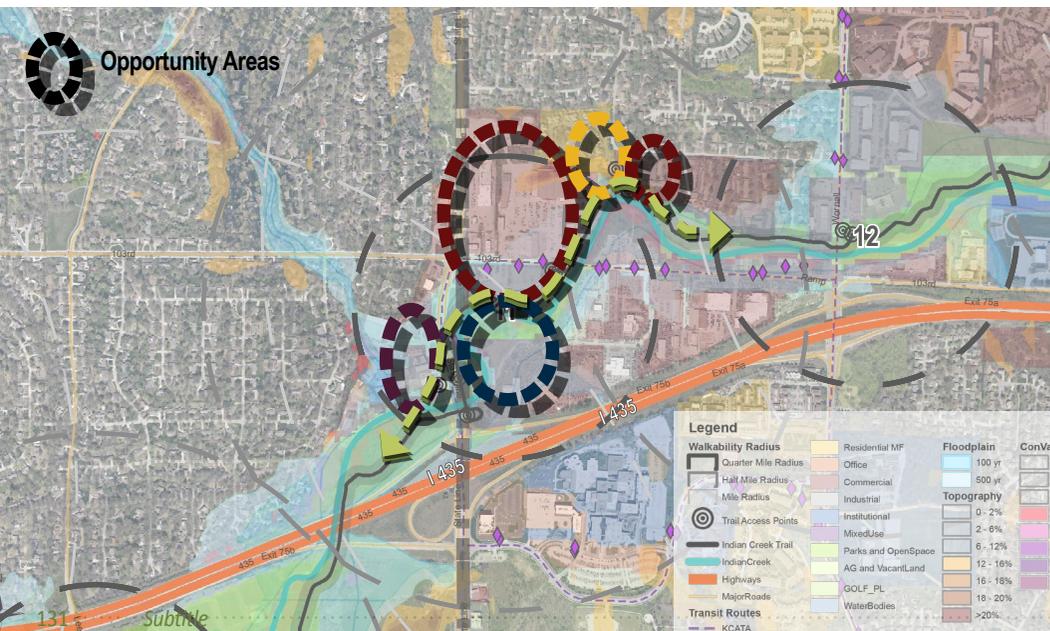


Figure 4-44 | Analysis of Destination Zone 11.ai- (Patterson, 2013)

travel. Figures 4-42 illustrates the great distances between buildings in this zone that make walking very inconvenient and dangerous. Figures 4-41 and 4-46 also illustrate the lack of infrastructure that creates an unwelcoming pedestrian experience.

Each land area is not only separated by barriers and distances, but completely disconnected from other uses. The segregated zoning in this area diminishes the amount of activity that can take place and does not allow for a walkable environment. While

many highly trafficked destinations are located in this region their separation limits their walkability potential. Change in zoning policy and added infrastructure is needed to overcome the many barriers that are hindering walkability.

**Opportunities**

The large parking lots that separate stores is a major opportunity to enhance walkability. As shown in figure 4-42, the distance between the strip mall development to the south of Stateline Road and the big box stores

North of Stateline Road is almost a quarter of a mile in length or more, depending on the path pedestrians must take with parked cars in the way. The vehicular space in-between the buildings, not only creates large



Figure 4-45 | Expansive Parking Lot Connection Creating Great Distances Between Buildings (Patterson, 2014)



Figure 4-46 | Access to Nowhere with no pedestrian Infrastructure (Patterson, 2014)

distances between buildings but also does not provide pathways for pedestrians or create a welcoming environment for walking. Access along Stateline Road is dangerous and there are no amenities that could make the pedestrian environment safer. The density in this region is also too low compared to typical walkability standards, but the parking lots that are causing many of these issues can easily be infilled to fix the problem. Infilling the large parking lot spaces can reduce travel distances, increase density and diversity, and create a

more welcoming pedestrian zone. Many of the businesses in this zone are also connected by the Indian Creek Trail as shown in figure 4-47. Due to its location, the trail provides great connectivity to the majority of segregated land uses without having to cross the major roads or parking

lots. However, the Indian Creek Trail is hidden behind businesses and vegetation which creates an unsafe and inaccessible feeling to the trail. Figure 4-47 is a section of the trail hidden behind buildings. Major opportunities to redirect development towards the trail and

infill the expansive parking lots can help the trail become a pedestrian network to access businesses throughout the area. As shown in figures 4-48 some infill strategies have already been used in the parking lots. There is even a sign to direct pedestrians to the temporary tents.

By expanding upon this idea and creating more permanent spaces, this region can become a more walkable place. Figure 4-49 illustrates the infill development that has revitalized this area. This type of design is appropriate for the remaining areas that are in need help. The

accessibility to the sidewalk and scale of the entrance creates a welcoming environment for pedestrians.

Another opportunity of this region is the existing bus routes that connect the greater Kansas City region. The bus stops are dangerously located



Figure (Patterson, 2014)-47 | Buildings Adjacent to Trail Blocking Access and Visibility (Patterson, 2014)



Figure 4-48 | Temporary Infill Development Strategy (Patterson, 2014)



Figure 4-49 | Infill Development Oriented towards the road (Patterson, 2014)

along highly trafficked roads with little to no pedestrian infrastructure as shown in figure 4-51. The bus stops however already provide a lot of activity in this zone. By enhancing the pedestrian design, this area can transform into a multi-modal hub and bring greater walkability to the region.

After analyzing the opportunities and constraints of destination node 11, primary needs were assessed:

- Greater access and visibility are needed from the trail to surrounding businesses.
- Distances between businesses need to be reduced.
- Density and diversity of land uses need to increase to match walkability standards.
- The vehicular planned development needs to become more pedestrian friendly.



Figure 4-50 | Signage for Destination Directed towards Trail (Patterson, 2014)



Figure 4-51 | Limited Bus Stop Infrastructure (Patterson, 2014)

● Massive Parking Lot creating Large Distances Between Destinations

● Big Box Retail Encouraging Driving

● Indian Creek Trail  
● Providing safe route under 103rd Street



Figure 4-52 | Constraints of the Sprawled Urban Form (Patterson, 2014)

## PEDESTRIAN INFRASTRUCTURE

Pedestrian infrastructure deals with all the physical components that make it possible for people to walk. While pedestrian infrastructure is a vital proponent within all of the components of walkability, it is also its own entity that defines a walkable place. The primary elements of infrastructure needed for a walkable environment include: **pathways, wayfinding signage, and site amenities.**

### Pathways

Pathways allow people to walk from one place to the other. The quality, material, transition, location, design, and accessibility are vital to infrastructure success in promoting a walkable environment.

### Wayfinding

Wayfinding and other signage elements direct people to destinations in an efficient manner. Especially when visibility is an

issue, adequate signage can allow people to walk with ease.

As stated in the report “Municipal wayfinding systems serve an important and crucial role well beyond responding to the need for basic navigation, identification and information. Wayfinding elements – such as monuments, directional systems, directories, interpretive and even regulatory signs – can enrich and enhance our experiences with urban environments” (6) Wayfinding programs seek to bring awareness

of the museums, retail districts, historical areas and landmarks that visitors may not know about and that may not be included in modern navigation technologies” (*Signage 2013*).

Wayfinding signage not only enhances connectivity, but can create a welcoming place for all people. Identifying where signage is needed will help determine the level of connectivity within each destination zone.

### Site Amenities

Site Amenities define the comfort, safety, and ease of pedestrian travel. This includes the amount, quality, and design of site furniture, vegetation, transit stops, bike facilities, etc.

## DESTINATION ZONE 11

The infrastructure within destination zone 13 is minimal at best. If pedestrian pathways exist they are in poor condition and do little to enhance walkable conditions. There are also little to no site amenities anywhere, especially near destinations.

### Constraints

One of the main infrastructure issues in this region are the sidewalks. As shown in figures 4-53 and 4-54 sidewalks dead end, are cracked

and narrow, and are located in inconvenient locations. The sidewalks are characterized by inconsistent paving, cracked/littered trip hazards, and do not comply with ADA standards. So, even where there are sidewalks, their condition does not support pedestrian travel. Access and connectivity is the main cause of the poor sidewalk conditions; making traveling to the trail and surrounding locations very difficult. With only one direct connection from the trail to the main roads, this region is very inaccessible to pedestrians.

Wayfinding elements and site amenities are almost non-existent in this region as well, which is a main cause to the

unwelcoming environment.

Improvements needed in this area are great, but there are underlining issues that might make certain improvements difficult. As shown in

figures 4-56 and 4-57, limited ROW, buried power/cable lines, overgrown vegetation, private property, and more, block many locations where sidewalks and buffers are

needed. By focusing improvements closer to the trail, some of these issues can be overlooked.



Figure 4-53 | No Sidewalk (Patterson, 2014)



Figure 4-54 | Narrow Sidewalk (Patterson, 2014)



Figure 4-55 | Deadend Sidewalk (Patterson, 2014)



Figure 4-56 | Narrow Confining Bridge (Patterson, 2014)



Figure 4-57 | No Sidewalk (Patterson, 2014)

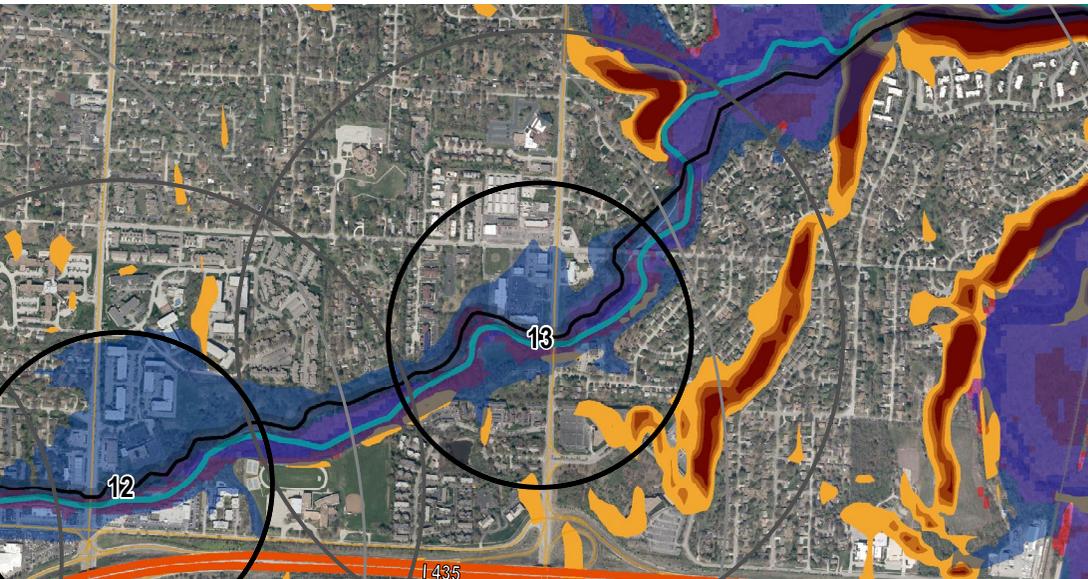


Figure 4-58 | Constraint Map of Destination Zone 13 (Patterson, 2013)

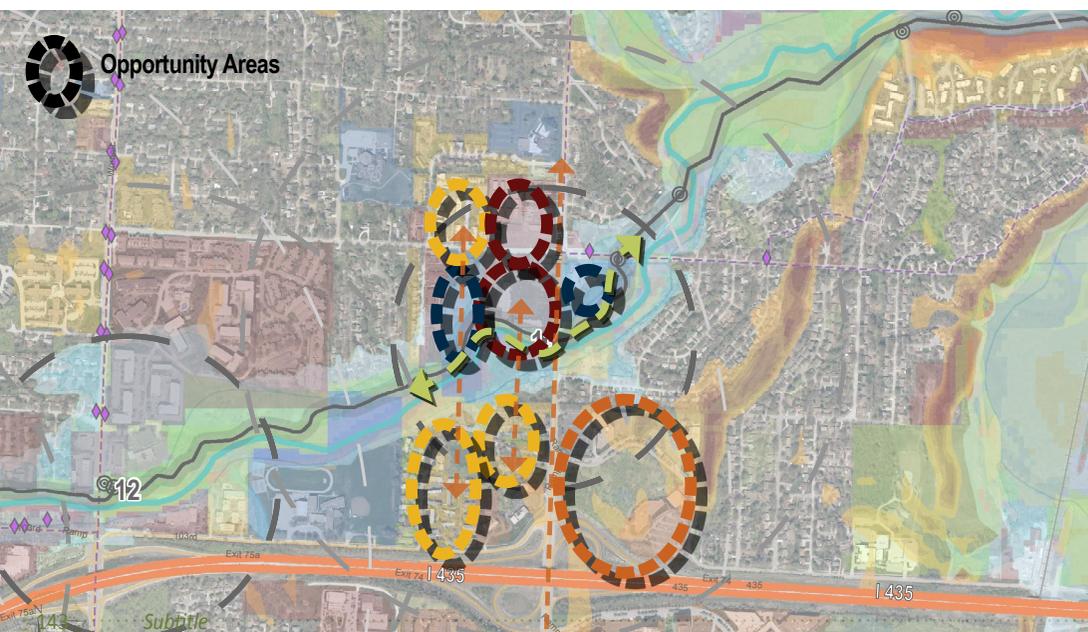


Figure 4-59 | Opportunity Map of Destination Zone 13 (Patterson, 2014)

### Opportunities

Observations/Interviews showed that this area is most popular before and after work hours and during lunch times. Many were noted to utilize this area for transit and to work out on lunch breaks; revealing the high activity levels for many different purposes. This provides an opportunity to direct improvements to an area that is already used for active transportation and enhance what the community wants. As

shown in figure 4-60 cow paths have been created along many segments near the trail. Figure 4-61 shows the amount of activity this region gets even when the trail is snow packed. These figures illustrate the amount of foot traffic this area receives and the need for greater connectivity.

Interviews noted that this zone has one of the highest percentages of people who don't own a car or drive on a regular basis. Observations also showed this portion of the trail to have one of the highest percentages of use when it comes to walking/ biking for transport purposes. There

are also a few bus stops nearby that are utilized by many employees within the area. Holmes also contains bus stops that connect to the Troost and Troost Max lines which have some of the highest ridership rates in the Kansas City area, making this area well connected for multi-

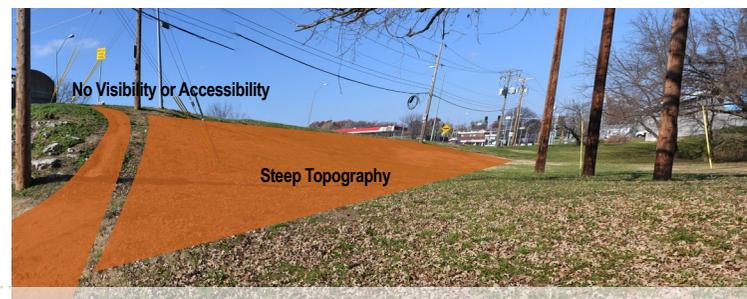


Figure 4-60 | Cow Path created to get up hill due to lack of infrastructure (Patterson, 2014)



Figure 4-61 | Signs of Use during bad weather (Patterson, 2014)

modal transit. However the poor conditions of bus stops and other amenities, create an unwelcoming pedestrian environment. There is a great opportunity to enhance the pedestrian experience in this region and capitalize on the existing activity.

The small retail center along Holmes is located directly along the trail allowing for great connectivity to destinations. Existing structures are already set up to allow for easy access to the trail, but lack of infrastructure

and pedestrian orientation prohibits pedestrian connectivity. Figure 4-63 illustrates the disconnected buildings.

**Primary Walkability Opportunities:**

- Commercial environment directly connected to trail.
- Access to bus routes.

**Primary Walkability Constraints:**

- Limited connectivity and pedestrian infrastructure.
- Inadequate access and signage.



Figure 4-62 | Buildings Adjacent to Trail with Limited Access

- Indian Creek Trail  
Providing safe route under Holmes and Direct Connection to Buisnesses
- No Accessibility to Trail because of Steep Hill
- Narrow Dead End Sidewalk  
Not Connecting to Businesses near Highway
- Narrow Buffer - Dangerous Environment
- No Sidewalk or Room for Sidewalk Expansion
- No Road Crossing for Miles
- No Connectivity to Buisnesses



Figure 4-63 | Constraints of the Poor Infrastructure (Patterson, 2014)

## PEDESTRIAN EXPERIENCE

The pedestrian experience is defined by the relative comfort and safety of pedestrians. It is determined by the scale, aesthetics, safety/comfort, and design of the surrounding environment.

### Scale

Current development patterns within the focus area are centered around vehicles and contain

large big box buildings with expansive parking lots. The scale of these elements are designed for vehicles and are not welcoming to pedestrians. Signs are meant to be seen from roads, entrances are designed for loading and unloading merchandise, and parking lots are planning to

hold the maximum capacity of stores. These designs require a lot of costly infrastructure that diminish the pedestrian experience. Evaluation of scale along the Indian Creek Trail is focused on distance, size, and quantity of destinations, pedestrian facilities, and adjoining roads.

### Aesthetics

The aesthetics and design of an environment can have a great affect on the population's desire to walk.

Traditional design aesthetics for walkability deal with different building designs and streetscape designs.

One element not always included in today's walkability/retrofitting standards is trail design. A trail is already designed for pedestrians. By directing focus to a trail, many streetscape and traditional building enhancements do not need to be addressed. The primary concern is now directed to access points,

transition periods, and destination nodes. The evaluation looks at the entire pedestrian experience from trail to door, identifying levels of attractiveness and opportunities for improvement.

### Safety/Comfort

Safety and Comfort is a top priority for a walkable environment. If people do not feel safe they will choose a more comfortable mode of transportation. Survey results showed safety was

a primary factor in determining overall trail use. Evaluation of safety and comfort is determined through observations and survey data. Elements of lighting, visibility, presence of infrastructure, and proximity to the road were main factors in identifying the safety and comfort of each destination zone.

"All transit systems and land use patterns and public systems need to be oriented to human scale needs, inclusive of all citizens, not just those with cars."  
(Cox, 2010 71).

"Building facades are human scale, with frequent doorways and windows, and attractive details and ornament."  
( ).

## DESTINATION ZONE 7

The Metcalf Node is characterized by the vast amount of space allotted to vehicles. The entire commercial center is defined by big box stores with expansive, underutilized parking

lots. The vast scale of the road and big box development establishes the vehicular environment in this area. Metcalf is one of the busiest and largest roads throughout the

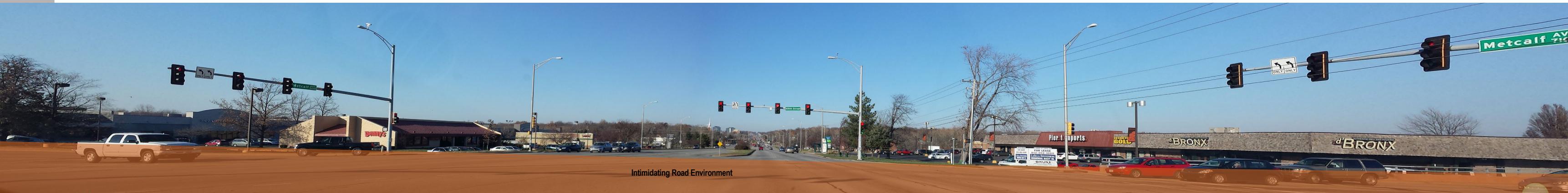
southern metropolitan region. It is approximately 135' wide and spans across 9 lanes and a median. Figure 4-64 illustrates this expansive vehicular environment.

## Constraints

The overall design and scale of Metcalf is centered around vehicles. The layout of development, the scale of the environment, and the lack of amenities creates an unsafe

pedestrian experience. The scale of each commercial building is designed to be visible from the road and neglects the environment once people get out of their cars. The large

parking lots and buildings separate people from their destinations and create large distances between stores. This does not allow for people to walk to multiple destinations easily. As



Intimidating Road Environment

Subtitle

Figure 4-64 | Vehicular Scale of Road (Patterson, 2014)

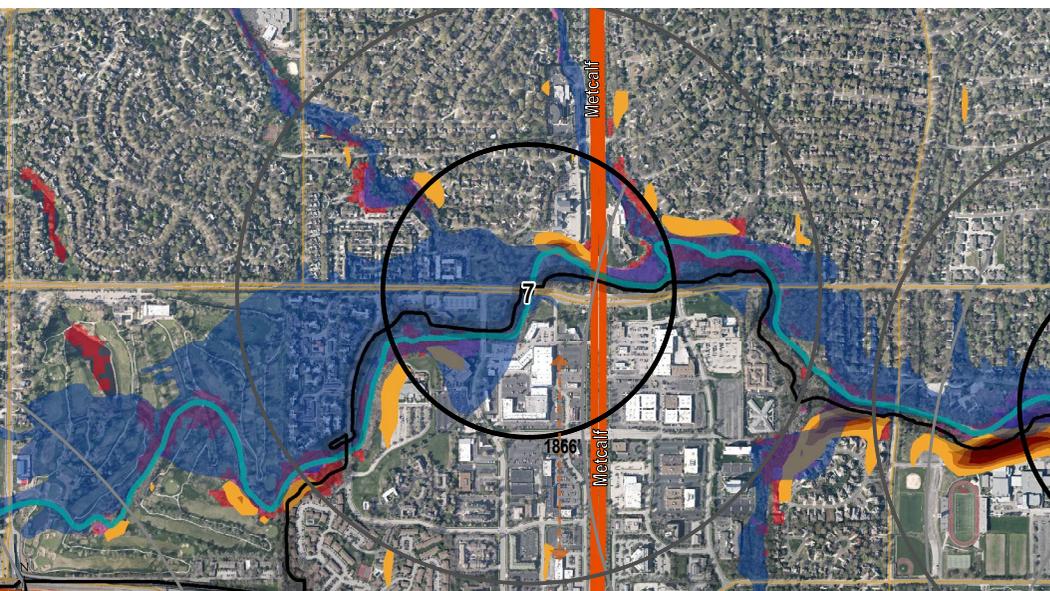


Figure 4-65 | Constraint Map of Destination Zone 7 (Patterson, 2013)

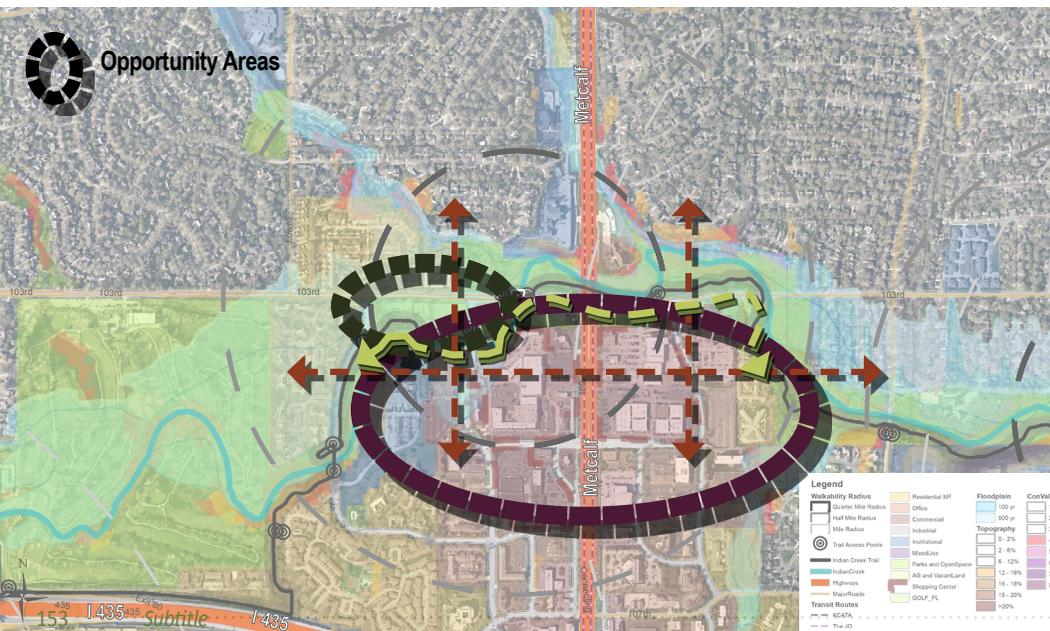


Figure 4-66 | Opportunity Map of Destination Zone 7 (Patterson, 2013)

shown in figure 4-75 hundreds of feet separate different buildings and forces people to drive rather than walk to multiple locations. The parking lots and vehicles also create barriers to pedestrians and establishes inefficient routes that can be very dangerous. Figures 4-67 illustrate the pathways people are forced to walk.

The lack of pedestrian amenities greatly increases the dangers and inconvenience of pedestrian travel. Figures 4-68 to 4-70 illustrate

how the lack of amenities creates problems due to the layout of different businesses.

The entire commercial center along Metcalf takes up over 2000 square feet of land. With an approximate average FAR value of .2, there are limited destinations within that

space and no amenities that could enhance pedestrians ability to travel. The development in figure 4-75 shows how approximately 80% of the commercial development is designated to vehicles.

While some pedestrian infrastructure exists throughout the region,

they are not designed for efficient use. Sidewalks for example are located directly along roadways and sometimes end over 600' from building entrances as shown in figure 4-71. Sidewalk standards are designed around roadways. These requirements do not benefit pedestrians in suburban development because

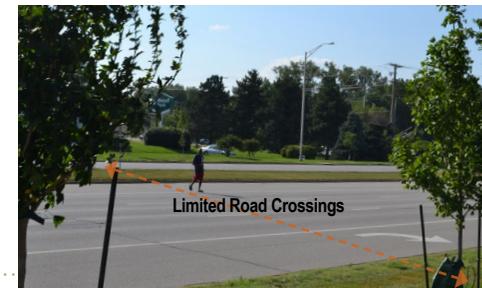


Figure 4-67 | No Safe/Direct Crossing (Patterson, 2014)



Figure 4-68 | DeadEnd Sidewalk



Figure 4-69 | Dangerous Crossing Due to Scale of Road (Patterson, 2014)



Figure 4-70 | Inefficient Infrastructure (Patterson, 2014)

buildings are located hundreds of feet from where pedestrians travel and separated by many barriers. Pathways from building to building are needed to increase walkability potential.

Many of the destinations along the Indian Creek Trail are directly connected to businesses and provides a safe route for pedestrians. In this node, the trail is completely disconnected from businesses because of the vehicle oriented development. While it provides a safe

underpass across Metcalf and 103rd street, it is located north of 103rd and separates from the commercial center. This Indian Creek Trail however shows the potential for a walkable environment if the scale of vehicular dominance is reduced.

The floodplain and the Indian Creek provide additional restrictions for destination zone 7. These restrictions mainly cut off residences and businesses from the major commercial center; making this



Figure 4-71 | Limited Buffer creating unsafe environment (Patterson, 2014)



Figure 4-72 | Long/Narrow Crosswalk (Patterson, 2014)

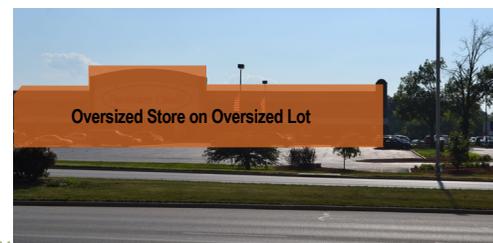


Figure 4-73 | Big Box Retail (Patterson, 2014)



Figure 4-74 | Sidewalk to Nowhere (Patterson, 2014)

region a single use commercial zone unwelcoming to pedestrians. Not only does the creek prohibit accessibility, but it also screens the trail and sidewalks from surrounding businesses. This lack of visibility and little signage restricts the potential of pedestrian travel and limits pedestrian comfort.

#### Opportunities

While the large expanse of roads and parking lots create the unwelcoming environment for pedestrians, it makes potential improvements simpler

because there is a lot of space available for improvement.

Infill development strategies can easily be implemented within any of the parking lots, which would help reduce distances people need to travel and bring back a human scale to the area. This also allows for more welcoming design elements that can influence the populations travel preferences.

The over abundance of roads and

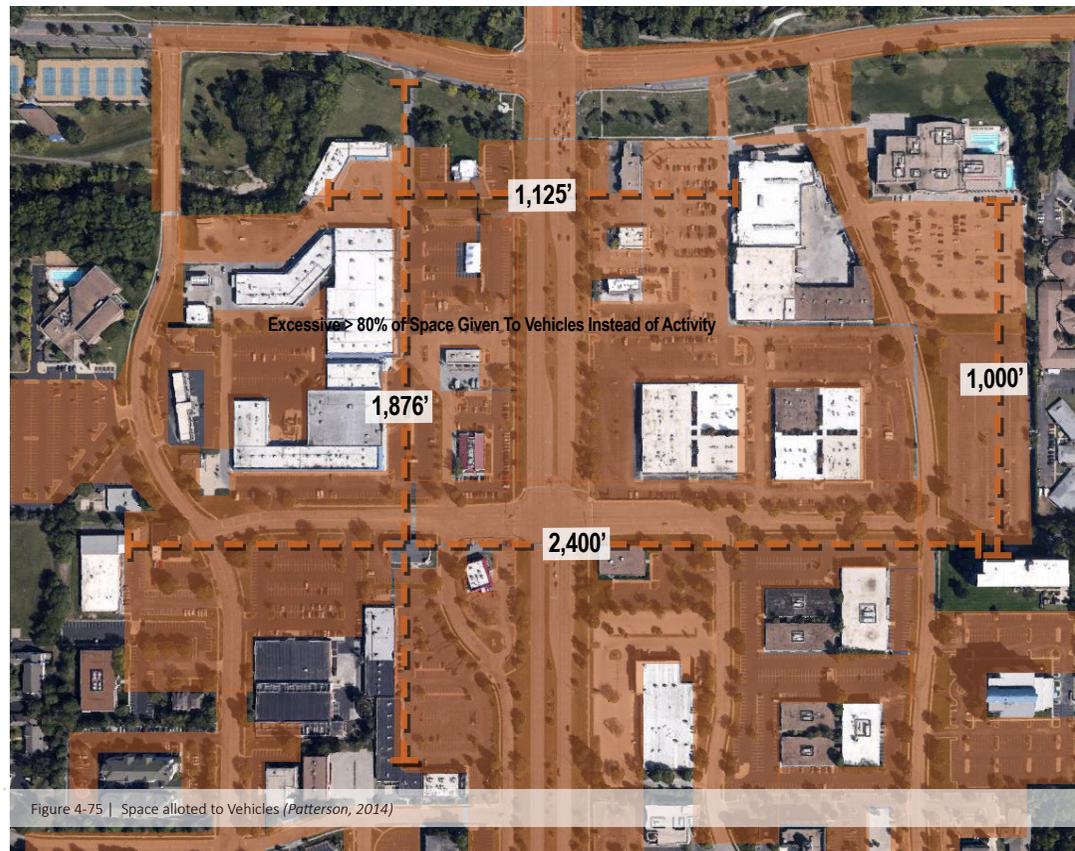


Figure 4-75 | Space allotted to Vehicles (Patterson, 2014)

lanes could easily be reduced to allow for greater buffers between the roadways and sidewalks. Figure 4-76 illustrates the limited separation pedestrians currently have from vehicular traffic. Newly developed bus routes along Metcalf can also help

the argument for lane reduction. The bus lines provide the opportunity for greater transit use and less vehicular traffic. By improving bike and pedestrian travel capabilities, multiple forms of transit can become convenient and reduce the vehicular

dominance of this region.



Figure 4-76 | Scale of Road = Unwelcoming Pedestrian Environment (Patterson, 2014)

No Connectivity to Roadway

Buildings With Limited Activity

No Pathways to Destinations

Drive Through Businesses

Wasted Space Between Buildings



Figure 4-77 | *Subtle* Restrictions to Pedestrian Experience (Patterson, 2014)

# DESIGN

163 | Strategy

165 | Design Metrics

167 | Design Framework

169 | Design Components

## STRATEGY

The analysis findings filled the gaps from current walkability standards and helped tailor strategies toward specific community needs. As shown within the detailed analysis, specific strategies are appropriate for specific areas, the design framework can now implement components as needed.

This strategy for development can also tailor to a changing environment. Strategies can be implemented in phases, by destination node, by city, near specific land uses, or wherever

the community desires. This allows for small changes to be implemented incrementally that can create a major impact over time.

Certain nodes or strategies can act as test subjects or catalysts for improvement as well. Small improvements along sections of the trail can be implemented and analyzed to test the effectiveness before creating large scale plans to change the entire environment.

Understanding how these elements should be implemented within each zone is illustrated through the design metrics. The metrics simply identified the primary needed components of walkability for each destination zone. The metrics is a summary of the most important analysis findings.

DESIGN METRICS

Components of Walkability- NEEDS OF DESTINATION ZONES																				
	Connectivity					Urban Form- LandUse				Social		Pedestrian Infrastructure			Pedestrian Environment					
	Physical	Perceived	Infrastructure	Transport	Visibility	Density	Diversity	Distance	Design	Perceptions	Patterns	Sidewalks	Signage	Site Amenities	Aesthetics	Safety	Comfort	Scale	Design	
Destination Zones	1																			
	2																			
	3																			
	4																			
	5																			
	6																			
	7																			
	8																			
	9																			
	10																			
	11																			
	12																			
	13																			

Figure 5-1 | Design Metrics (Patterson, 2014)

The design metrics illustrates the most needed walkability components for each destination node. It identifies what is currently making each destination zone un-walkable so that improvements can be made.

Table Legend	
	Walkable Component NOT Essential
	Walkable Component Needed
	Walkable Component ESSENTIAL

### DESIGN FRAMEWORK

The evidence based design framework is centered around identifying where components of walkability should be placed along the Indian Creek Trail. The design metrics identified what components of walkability were needed within each destination zone and the design illustrates how the components can be phased along the site.

### DIAGRAMMATIC DESIGN

- Social Views
- Connectivity
- Urban Form
- Pedestrian Infrastructure
- Pedestrian Environment

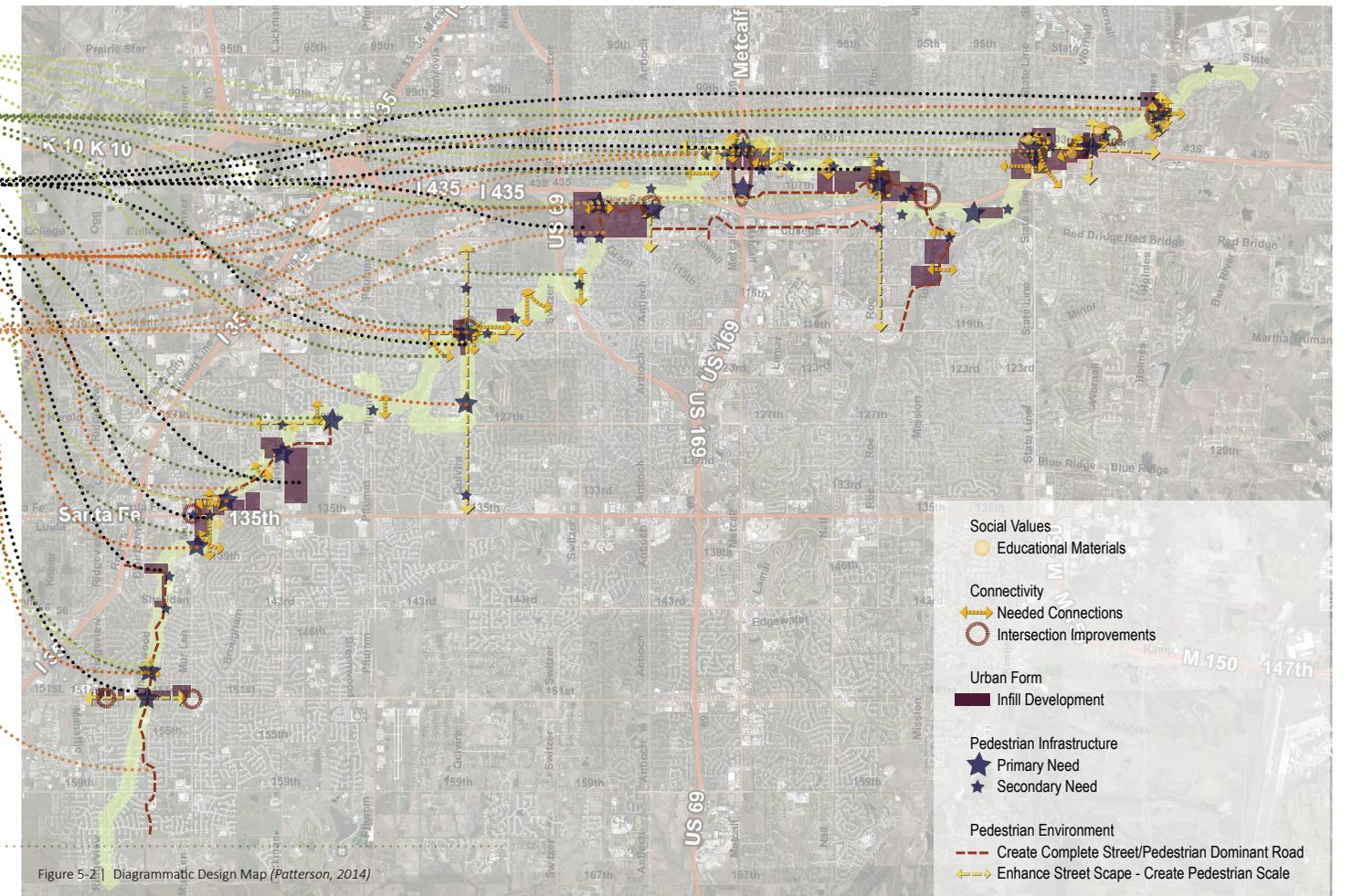


Figure 5-2 | Diagrammatic Design Map (Patterson, 2014)

## SOCIAL VIEWS

Throughout all the components of walkability the social environment is addressed. Other techniques to improve the social views

of walkability deal with policies and incentives that can open the community's mind to different active transportation methods. To physically change

views of the community, different education/advertising techniques are introduced through the design. The design to amend the social culture of walkability is centered on making the Indian Creek Trail an active transportation highway, connecting the surrounding community to destinations. The focus of design techniques is based off of survey and interview responses. This strategy is tailored to the 33% of trail users that occasionally travel by active transportation means and the 50% of

the population that states they would not use active transport means to travel to destinations.

As stated by Untermann in *Accommodating the Pedestrian* Improvements to change suburbia should be focused on facilities that already serve large groups of existing pedestrians, facilities / improvements that correct most dangerous or frequently used places, and facilities at busiest locations (Untermann 1984). By enhancing locations where

pedestrians already walk, the 33% can see walking as a more feasible and attractive transportation alternative. By enhancing the activity and design along an existing recreational area, the 50% can start to understand the benefits of a walkable environment. Since the 50% already use the Indian Creek Trail for recreation, they can start to see how it can be used for transportation.

Comparing survey results to current statistics, further ideas for strategies are revealed. The average travel time

to work for residents within the focus area is twenty minutes. Two separate interviews conducted in destination node 5 and destination node 13 found that the average driving time to work is longer than the average walking time. Employees within those nodes found that if they used the trail to bike or walk to work it would most likely be faster than driving due to the traffic and stoplights. This could also provide them with exercise, fresh air, and decrease pollution from their personal vehicle. By educating the community about these realities of

active transportation, the transport mindset can be mended and the transport culture can start to change.

The physical design to enhance the social views of the community is based on incorporating educational features and signage along the Indian Creek Trail. Increasing activity and transportation options is another strategy to illustrate to the community the benefits of a walkable environment.

"At both ends of the social and economic spectrum we need to be able to change perceptions... perceptions of what constitutes a successful city and rural transport system."

(Cox, 2010, 215)

## DESTINATION ZONE 10

One major element in changing the social perceptions is specific policies and incentives. The time restrictions for the trail and parks need to be addressed so that people could use the trail at night. Incorporating elements of lighting are also needed to create a safe environment after the sun goes down.

Leawood park is defined by massive fields/parking lots that are underutilized and wasted space the majority of the year. Infilling

certain parking lots and fields that are underutilized will help increase the activity throughout the region and create a greater diversity of activities within the park.

Park and Ride incentives could also be a valuable option for this region that could make use of the expansive parking lots. By adding a transit stop at the edge of the park, many could bike, walk, or drive here and then be taken to their destinations. This would provide more transit opportunities

in this area and well as make use of the expansive space that is hardly used. Creating designated bike routes along the existing trail/roads, as well as increased signage is another strategy to capitalize the existing transportation opportunities in this area. Greater transit opportunities and more infrastructure will not only allow for a more connected place but also educate park users about the opportunities.

A few other infill development strategies will help increase levels of diversity and activity that can draw in park users to new destinations. This strategy focuses on recreational park users that strictly see segregated land use zones for only one purpose.

Figure 5-4 illustrates how educational features and signage can increase the ease and allure of pedestrian travel. This figure also illustrates how some temporary and permanent

infill strategies can increase the activity and productivity of the park, and create a more pleasant environment to be in.



Figure 5-3 | Existing View from Trail within Leewood Park (Patterson, 2014)



## CONNECTIVITY

Many walkability resources state that “Connectivity of the road system matters” (Goldberg et al. 2007, 45).

The large expansive road network of the focus area cannot easily be changed. Patterns of transport and existing development would make narrowing and reconfiguring roads for pedestrians a difficult task. By changing transport focus to an existing trail network, the road network wouldn’t need to be completely reconfigured. Instead focus can be directed to the trail

and adjacent infrastructure would just need to be enhanced through simple additions of crosswalks, site furniture, vegetation, and buffers near major destinations.

Analysis results showed that primary concerns with connectivity deal with connecting infrastructure. As shown through the analysis, if sidewalks exist, they connect to ends of parking lots, strip malls, or dead end. They do not connect pedestrians to the building entrance. As stated

by Laurence Aurbach in a post on PedShed “It’s about the routes and connections from building to building, from lot to lot, and from block to block” (Aurbach 2007). Connectivity deals with a lot more than just adding sidewalks and cross walks. Survey respondents stated that signage and connections to destinations needed the most improvement along the trail. Therefore this project focuses of the full pedestrian experience from trail to the building entrance. This strategy will ensure a fully connected

environment that will enhance visibility, connectivity perceptions, and physical limitations.

Specific strategies to enhance connectivity are defined by survey and interview responses.

The physical components were evaluated and are amended through the addition of infrastructure and continuity of the design.

## DESTINATION ZONE 5

Connectivity in destination zone 5 is focused on enhancing the streetscape around Quivera and 119th street. Creating better visibility and access to the trail from the road and surrounding businesses.

One of the most important aspects of the design is the connection from sidewalks/trail/street to building entrances. These simple solutions allow for expanded use of existing infrastructure. Connecting sidewalks

through additions of crosswalks, bridges, and pedestrian amenities will make multiple forms of transit possible. The addition of these elements will also increase awareness of bike and pedestrian opportunities to everyone in the community.

Other elements of connectivity in this zone such as access and visibility are in need of great improvement. Buildings have limited accessibility to pedestrians, the trail is hidden from

view, and sidewalks are inefficiently connected to buildings and the trail. To improve these conditions the design is focused on increased signage and creating view sheds to the trail by cutting back foliage and opening up spaces. These small improvements should enhance the visibility of transportation opportunities and create a more welcoming environment for pedestrians.

Figure 5-6 illustrates how simple infrastructure additions can create a more welcoming environment for pedestrians. Figure 5-8 illustrates how many connecting elements can transform the appearance and functionality of this zone.



Figure 5-5 | Destination Zone 5 Before Image (Patterson, 2013)



Figure 5-6 | Design Rendering to Illustrate Connectivity Strategies in Destination Node 5 (Patterson, 2014)



Figure 5-7 | Existing Image of Destination Zone 5 (Patterson, 2014)



179 Figure 5-8 | Design Rendering to Illustrate Connectivity Enhancements for Destination Node 5 (Patterson, 2014)

## URBAN FORM

Urban form is the primary element of walkability. “Land Use strategies however require locating residences, retail establishments, and employment opportunities close to one another so that interaction can take place with

minimal transport effort” (71). Land use solutions however cannot be as effective in areas that are well developed,

illustrating a need to change how land use strategies are performed in suburbia (*Cox 2010, 71*).

For this project, land use strategies are simple and are based off of existing retrofitting strategies.

Retrofitting in this instance means remodeling existing buildings to fit the pedestrian, and capitalizing on open space, wasted space, and expansive parking lots through infill development. Utilizing infill development strategies can help

reduce travel distances, increase density and diversity, and be designed for the pedestrian. These strategies also do not require relocating services or reconfiguring roads. This keeps the designs within the community’s desires and helps improve the quality of the environment in a cost effective manner. By directing land use strategies to the Indian Creek Trail as well, the urban form can change to fit the pedestrian environment and influence transport culture. Land Use incentives such as density

targets, zoning laws, sprawl mitigation techniques, and development guidelines can help guide these infill strategies. The City of Seattle created land use guidelines from the *Seattle Climate Action Plan* that provide detailed descriptions of land use incentives that can facilitate change the urban form (*Land Use 2013*).

Types of infill development is based off of current conditions and community input. Following USGBC standards, ten different types of

services should be located within a half mile radius of the trail and there must be an average of 8-10 DU per acre or a minimum average FAR value of .5 (*USGBC 2014*). This standard will influence the target of development options along each section of the trail. The site analysis also illustrates what types of land uses are needed for each area. The community also noted different types of development they would be willing and not willing to walk to through the survey. By infilling with land use types that the

population is more willing to walk to, a greater amount of people could be convinced to walk more often. School, home, work and recreation facilities are the locations the population is most willing to walk. Restaurants/food industries, service commercial uses such as convenient stores, banks, and pharmacies, and small shopping centers are the next level of locations people are willing to walk. For the design, these types of development are the highest priority if it is considered a needed land use type based off of the analysis.

“If people are going to walk, there have to be places to walk to”

(“Ped Shed” 2014)

### DESTINATION ZONE 11

The strategy to fix the density, diversity, and distance between buildings in this node is focused on using infill development strategies in the open underutilized parking lots. By infilling the existing parking lots, the gaps between buildings can be reduced and the needed diversity and density can be increased to match walkability requirements.

By adding much needed land use the design of the environment can

also be addressed. This can focus on creating pedestrian directed pathways and buildings to create a welcoming environment for walking.

Destination zone 11 is strictly a commercial area that is focused on nearby businesses with lunch time land uses. By adding more business and service opportunities this area can be a more active environment with more amenities.

The Indian Creek Trail is also located directly alongside the businesses and parking lots. By infilling buildings with pedestrian oriented entrances focused towards the trail, the trail can become a more active transport route that makes walking to destinations much simpler.

Figure 5-9 illustrates the infill development plan that can make this zone more welcoming to pedestrians. Figure 5-11 illustrates how the infill development will look in this zone.

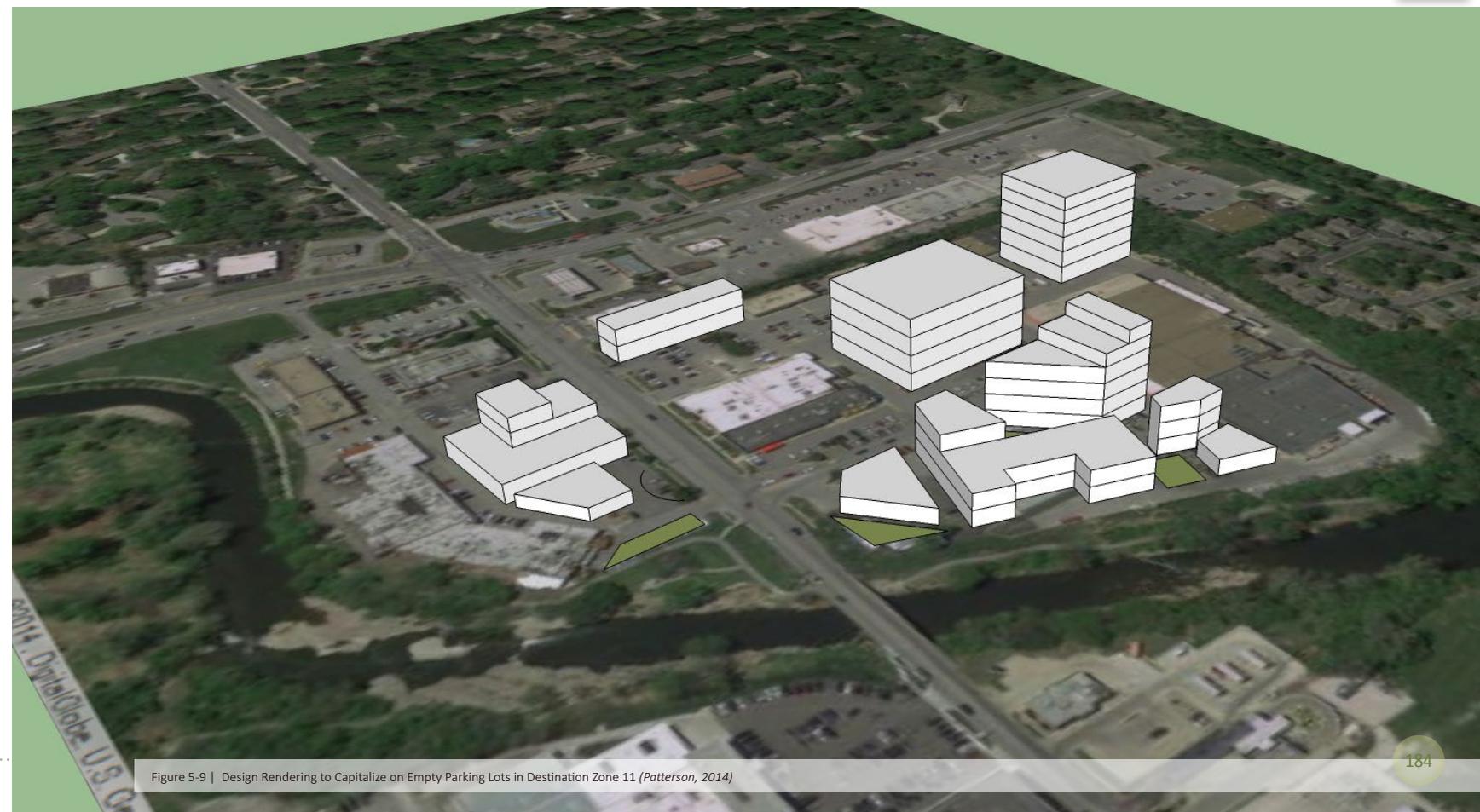


Figure 5-9 | Design Rendering to Capitalize on Empty Parking Lots in Destination Zone 11 (Patterson, 2014)



Figure 5-10 | Existing View of Land Use in Destination Zone 11 (Patterson, 2014)



185 Figure 5-11 | Design Rendering to Illustrate Urban Form Strategies of Destination Zone 11 (Patterson, 2014)

## PEDESTRIAN INFRASTRUCTURE

The infrastructure required for a walkable environment is pathways, wayfinding, and site amenities. Pathways are the connectivity infrastructure that establishes physical connections between destinations. Wayfinding elements and site amenities are other forms of pedestrian infrastructure that help define the ease and comfort of pedestrian travel.

1000 Friends of Wisconsin discusses walk appeal and what makes good pedestrian infrastructure (*Walk Appeal 2014*). These standards of connectivity and consistency are used to define the standard of infrastructure for the design.

The San Antonio Area Foundation makes suggestions to establish a more walkable place. They discuss that by simply adding trees, streetlights, sidewalks, or seating to neighborhoods can make an area

more walkable (*Walkable Neighborhoods 2014*). These are the main forms of infrastructure that are focused for improvement on this project.

The project is focused on enhancing two types of infrastructure: needed and experiential. Adding sidewalks, crosswalks, and bridges are the main forms of needed infrastructure that enable the physical possibility of walking. By increasing buffers from sidewalks to the road, lighting, vegetation and

shade elements, and other forms of site furniture such as benches, trash cans, etc. will make the pedestrian experience more pleasant. By adding infrastructure needed for pedestrian and bike travel and infrastructure that will make pedestrian and bike travel more desirable, all elements of walkability can be enhanced.

### DESTINATION NODE 13

Destination Node 13 has little to no elements that accommodate the pedestrian. Many of the roads do not have sidewalks and there is little accessibility to nearby businesses.

Addition and expansion of sidewalks and pathways are the main focus for the design. By connecting sidewalks to destinations the area can become much more accessible.

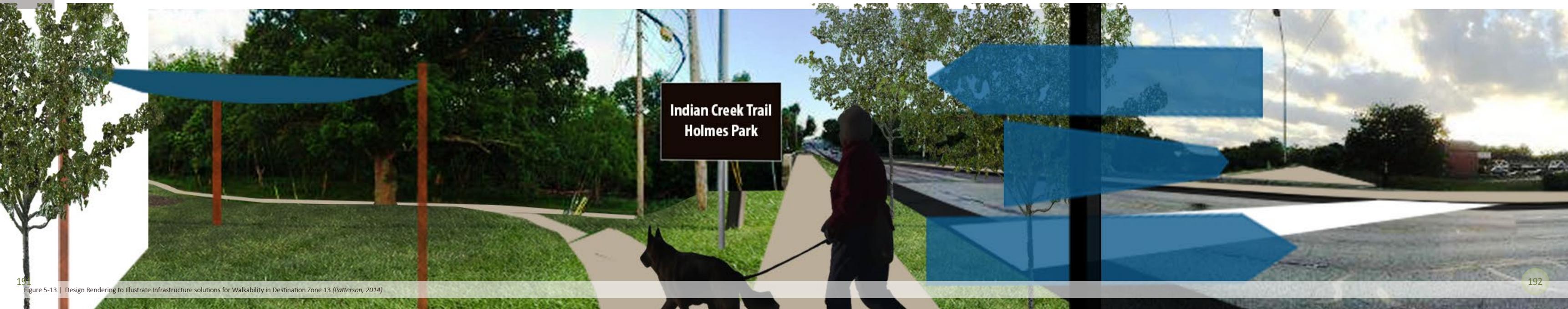
The Indian Creek Trail in this zone provides a safe route underneath Holmes that allows for direct pedestrian travel. The trail even directly connects to the neighborhood commercial center along the intersection. By focusing improvement on infrastructure that will connect the trail to destinations, the environment can be enhanced without too much effort.

Bus stops in this region are also fairly frequent. By enhancing bus stop facilities, the connectivity of the region can also be greatly improved. The design strategy is then focused on expanding and connecting existing sidewalks to destinations and the trail. Connecting elements such as mid-block crossings, ramps/stairs, and bus stops/bike lanes will be introduced along needed areas. Other forms

of infrastructure such as signage, benches, public spaces, roadway buffers, and vegetation will be proposed to make pedestrian travel more desirable. Figure 5-13 illustrate how these elements can enhance destination zone 13.



Figure 5-12 | Existing Pedestrian Experience within Destination Node 13 (Patterson, 2014)



## PEDESTRIAN EXPERIENCE

The pedestrian experience is mainly focused on the design elements of the area. To create a pedestrian experience within the region requires adding

different types of infrastructure and reconfiguring the urban form. Just doing those things however will not establish a walkable environment.

By focusing on the design of these elements pedestrians can become the focus for travel and create a more enjoyable place. As stated by William H. Whyte, “While streets were once a place where we stopped for conversation and children played, they are now the exclusive domain of cars.” (*Whyte 2014*). The entire focus on cars has created the many barriers to pedestrian travel, by redirecting focus to pedestrian networks that focus can slowly be reversed.

By incorporating public parks, destinations, and transit stops along the Indian Creek Trail the pedestrian experience can be improved and create a sense of place along every node where people travel.

The design to enhance the pedestrian experience is focused on incorporating public spaces within the infill development strategies and along the added infrastructure to create a more vibrant environment for pedestrians. The design of how

all elements are introduced is the other focus for the pedestrian experience design. Incorporating pedestrian oriented elements, adequate buffers, shaded pathways, legible signage, and accessibility are examples of the requirements for the design of pedestrian elements. Figure 5-15 illustrates how the current vehicular scale of Metcalf can be transforms into a pedestrian friendly environment.

“The pedestrian experience is enhanced if the place is pleasant, relatively quiet, landscaped, well maintained, well lit, and provided for street furniture”

(*Untermann 1984, 19*)

### DESTINATION NODE 7

The scale of Metcalf and all the big box businesses in this region will be the focus of the pedestrian experience design.

By infilling the expansive parking lots with public spaces and businesses, the distance between buildings and environment of this region can be reduced to a more human scale.

By designing new development to connect to existing businesses and pedestrian pathways,

connectivity and comfort for pedestrians can be enhanced.

Another major component of the pedestrian experience, is the addition of public spaces. By adding more areas where people want to go, the environment can become a more lively place.

Figure 5-15 illustrates how the pedestrian experience can be enhanced through different design elements and additions of public spaces.



Figure 5-14 | Existing Experience of Destination Zone 7 (Patterson, 2014)



197 Figure 5-15 | Design Rendering to Illustrate Pedestrian Experience Enhancements in Destination Zone 7 (Patterson, 2014)



# CONCLUSION

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- 205 | Project Relevance



## SUMMARY

Walkability is a complex issue in suburbia. The many existing barriers that exist due to the unsustainable urban form, make many redevelopment plans inefficient due to the need to reconfigure existing roads and neighborhoods.

The mindset of walkability in suburbia is another major barrier that defines how suburban areas are planned and developed. The car culture has expanded the unsustainable

practices and made walking a dangerous practice.

The components of walkability determine the level of walkability within an area. The Kansas City suburbs of Olathe, Overland Park, Leawood, and KCMO have

few of the components that make a walkable place.

The analysis of this region illustrates how these components exist in some form near the Indian Creek

Trail but do not expand to the surrounding development. The design capitalizes on these elements and suggests improvements along the 13 destination nodes along the Indian Creek Trail.

This strategy enables the analysis and design to be tailored to different regions and forms. All areas along the Indian Creek Trail have different demographics, land use patterns, and levels of activity that require different retrofitting strategies. By utilizing

the components of walkability, this project defined how each component can be analyzed and introduced to different sites in a efficient manner. It also allows strategies to be tailored to the most pressing barriers of different regions.

The focus along the Trail network is the primary element that makes this strategy different from most. One of the main barriers to suburban walkability is the existing car culture. By introducing elements

to an area where the population already walks, strategies can start to change the ideas and habits of the population. At the least it can educate the community about the benefits of walkability and make walking a viable option.

An existing trail network is also an existing safe and connected pedestrian network. This provides the main elements needed for a walkable place and allows new strategies to bypass costly and inefficient

recommendations for traditional models. Instead of having to create a connected system focused on pedestrians, the strategies will focus on bringing activity to the trail and connecting trails to destinations.

The project centered development/ access towards an existing pedestrian/ cyclist network separated from conventional vehicular transport. This creates a shift in the way transport and development are perceived.

## DISCUSSION

The study was done within a limited time frame and if more time allowed designs could be analyzed to test their effectiveness.

The study was also completed primarily within the fall and winter months when trail activity was less than what it could've potentially been during periods of nicer weather. Future study could analyze the activity

and use of a trail network throughout all seasons to better understand how different climate affect use to establish strategies tailored to weather/climate concerns.

To test the design's effectiveness components can be implemented and examined to understand how they have affected the place.

Initial approaches can be impermanent strategies that can test the effectiveness of components at specific times and places. Impermanent tactics such as chalking in crosswalks and making signs out of

cardboard can help illustrate certain improvements and understand how they affect the walkable environment.

Community focus groups can establish the reaction of design strategies within the city. They can also reveal how community members would utilize the walkable components. This can help understand more of what the community wants and establish how effective certain design decisions might be.

Build A Better Block strategies can help a community visualize different designs and can evaluate different strategies without making costly permanent changes. Within Build A Better Block strategies sidewalks are chalked in, pots of vegetation brought on site, bike racks and benches are placed, and bike lanes are taped on roads. These elements are temporary for a day or two but can help designers and community members

establish what works with specific components and what doesn't work. Imputing design statistics into walkability models can also help evaluate the potential of these design strategies. Creating a new Walk Score for example, based on new densities and infrastructure, can identify the potential walkability of different walkability components.

## PROJECT RELEVANCE

The relevance of this project could be extensive. At the least, this research has helped clearly define the dilemmas of walkability and transport in suburbia. It has identified the components needed to enhance walkability and proposed solutions that are not currently practiced.

By simply identifying an existing trail network for walkable elements the social perceptions of active transportation can be amended.

If time allowed this project could be able to illustrate how walkability can greatly affect changes in sprawl and transportation to create more sustainable places. Proving that walkability can act as a catalyst for change in suburban conditions. Right now there is little hope for walkability and transit in KC with the current population trends, political boundaries, and social dynamics. This research could provide a means to

enhance transportation options even when the money, politics, population, etc. do not support traditional transportation alternatives.



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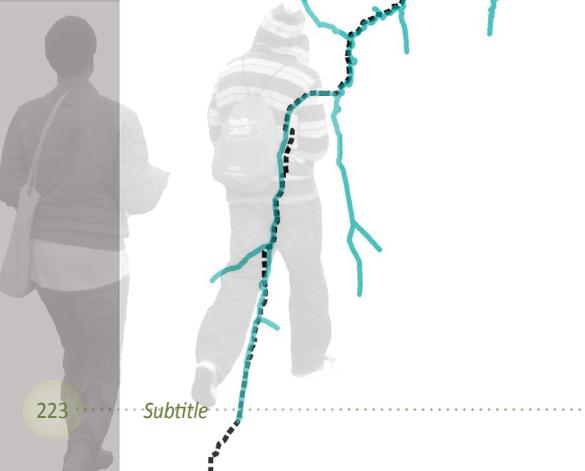
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# APPENDIX

# A

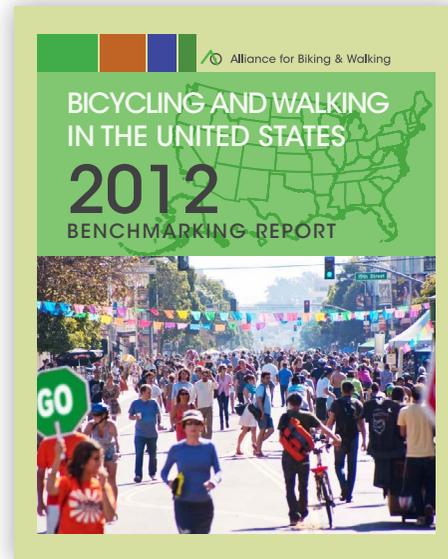
## APPENDIX A

### 2012 BENCHMARK REPORT

Kansas and Missouri are analyzed throughout the report and the bike and pedestrian data is compared to all 50 states. The state of Kansas ranks 28th and 29th out of 50 for the amount of people that bike and walk to work. The state of Missouri ranks 40th and 44th out of 50. Kansas City, Missouri is also analyzed as one of the 51 cities being compared. Categories being compared include the number of bike and pedestrian trips, bike and pedestrian safety, policies for bike and pedestrian travel, education and

encouragement, and public advocacy of biking and walking.

As shown in the report 12% of all trips made to work in America are by bike (1.0%) or foot (10.5%) and the number of commuters who bike to work in the past 10 years has increased by 57%. The report has specific information about where the states of Kansas and Missouri and the city of Kansas City rank in terms of pedestrian and bike travel.



# B

## APPENDIX B

### WALKABILITY RESOURCES

#### WALK SCORE

<http://www.walkscore.com/>

Walk Score is one of the primary resources for evaluating walkability throughout America. Walk Score measures walkability on a scale of 0-100 based on walk routes to destinations.

As stated by Walk Score, “Walk Score’s mission is to promote walkable neighborhoods. We want to make it easy for people to evaluate

walkability and transportation when choosing where to live” (Walk Score, 2013). Walk Score has a variety of data available for larger regions and detailed statistics in small scale neighborhoods. Data includes a Walk Score and analysis, a Transit Score, a Bike Score, Travel Time Analysis, Pedestrian Friendliness, Public Transit Data, Points of Interest/Destinations, and Car and Bike Shares.

Walk Score data is not only used by residents but also by analysts and

researchers in a variety of fields to evaluate and study walkability. Research includes studies that validate different walkability indexes, estimate access to amenities, determine health benefits, predict walkable patterns, and define economic benefits have all been conducted using a variety of Walk Score data.

Walk Score data is utilized in the project to determine the existing walkable patterns around the Indian Creek Trail. This data helps establish

areas in need of improvement and opportunity areas that are already set up for success.

#### AMERICA WALKS

<http://americawalks.org/>

“America Walks is a national resource which fosters walkable communities by engaging, educating, and connecting walking advocates” (.) America Walks is a non-profit organization that provides coordination/consulting expertise,

resources, and a variety of data that can be used to help advance walkable ventures. It hopes to advance walkable projects by influencing policies, support campaigns, and generate knowledge to improve walkable conditions.

*Steps to a Walkable Community: A Guide for Citizens, Planners, and Engineers* by America Walks outlines how investing in walking and pedestrian infrastructure can improve health, safety, transportation,

social equity, and economic success within a community. This publication and other resources provide design solutions and arguments that can help transform the area around the Indian Creek Trail.

#### WALKSTEPS – STEPS TO A WALKABLE COMMUNITY

<http://walksteps.org/>

Walksteps is an online resource that can be used to develop walkable

strategies. It was created through a Sam Schwartz Engineering and America Walks partnership to provide a resource guide to creating walkable communities.

Figure \_\_\_ shows the online tool that can be used to compile different walkable tactics that can be used to create a walkability plan for a specific area. The 6 walkability tactics categories are advocacy, policy, land use, design and engineering, encouragement and education, and

enforcement. There are also a series of case studies that can be used to show the success of different categories and how each strategy can be implemented.

Retrofit Connectivity is a tactic used for the design of the Indian Creek Trail. It establishes ways to retrofit street, pedestrian, and bicycle connections into existing suburbs. This resource also provides a case study and examples that show how these improvements can be built.

#### ALLIANCE FOR BIKING AND WALKING

<http://www.peoplepoweredmovement.org/site/>

The mission of the BWA is about creating, strengthening, and uniting state and local bicycle and pedestrian advocacy organizations.

The Bike & Ped Advocacy Resource Library by the BWA provides many studies and reports that will help influence the design strategies for the project. The Advocacy Advance-

tools to increase biking and walking is also a part of a partnership with the Alliance for Biking and Walking that is very helpful in navigating MAP-21 and finding resources for funding bike and pedestrian improvements.

*Bicycling and Walking in the U.S.: 2012 Benchmarking Report* is a collection and analysis of data on biking and walking in all 50 states and the 51 largest U.S. cities. While this resource is focused on more urbanized areas, it still provides

data and statistics to support the case for increasing safe bike and pedestrian infrastructure.

#### SMART GROWTH NETWORK

<http://www.smartgrowth.org/>

“Smart Growth America advocates for people who want to live and work in great neighborhoods” (SGN 2014). Smart Growth America is the only national coalition of state and local organizations working for smart growth across the country. The

Smart Growth Network provides a variety of guides, programs, technical assistance, and research that is moving Smart Growth forward to combat sprawl.

One of the Smart Growth Principles is creating walkable neighborhoods and contains many resources and strategies to enhance walkability. The Complete Streets Coalition, Transportation for America, and Measuring Sprawl and its Impact are all references that will help define the

project. The Smart Growth Network has also involved with many media and other reach out programs.

#### PARTNERSHIP FOR SUSTAINABLE COMMUNITIES

<http://www.sustainablecommunities.gov/>

The Partnership for Sustainable Communities is an inter-agency partnership between the U.S. Department of Housing and Urban Development (HUD), U.S.

Department of Transportation (DOT), and the U.S. Environmental Protection Agency (EPA).

As defined by the Partnership for Sustainable Communities “Sustainable communities are places that have a variety of housing and transportation choices, with destinations close to home.”

One of the most important aspect when implementing sustainable strategies is the context of an

area. “Rural, suburban, and urban communities can all use sustainable communities strategies and techniques to invest in healthy, safe and walkable neighborhoods, but these strategies will look different in each place depending on the community’s character, context, and needs.”

To enhance their mission and guide its work, the Partnership developed six livability principles:

- Provide more transportation choices.
- Promote equitable, affordable housing.
- Enhance economic competitiveness.
- Support existing communities.
- Coordinate and leverage federal policies and investment.
- Value communities and neighborhoods.

These livability principles are incorporated into federal funding programs, policies, and future legislative proposals.

#### PPS PROJECT FOR PUBLIC SPACES

<http://www.pps.org/>

“Project for Public Spaces is a nonprofit planning, design and educational organization dedicated to helping people create and sustain public spaces that build stronger communities” (PPS 2013).

PPS focuses on their Placemaking Approach to transform communities. “In its broadest application, Placemaking is a catalyst for building

healthy, sustainable and economically viable cities of the future.”

By showing how Placemaking can act as a catalyst to support sustainable initiatives, this acts as a tool to improve walkability. While placemaking is not a primary strategy in the project it combines other techniques that direct the design of the Indian Creek Trail.

Resources such as: The Building Community through Transportation

agenda runs a biannual ProWalk/ ProBike conference through our National Center for Bicycling & Walking (NCBW) and a joint conference series, called the Future of Places, are great resources on how different techniques can be implemented into the project.

**IMCL – INTERNATIONAL MAKING CITIES LIVABLE**  
<http://www.livablecities.org/>

One of the main goals of IMCL is Rebuild community by replacing sprawl with compact, human scale

urban fabric. Its goal is to create livable places by reshaping the built environment of our cities, suburbs and towns. Its unique value in international policies and strategies give insight to procedures that can be used in a variety of locations.

An issue of this movement which has become the perception of many sustainable movements throughout the country is its values in TRUE URBANISM. As stated by IMCL “the Making Cities Livable movement

promotes True Urbanism the time-tested principles of appropriate human scale architecture, mixed use shop/houses, and a compact urban fabric of blocks, streets and squares, outdoor cafes and restaurants, farmers’ markets and community festivals also enliven the public realm.”

The scary part about True Urbanism in which many suburban areas are against is its seemingly compact, high dense development strategy.

While many trends are changing for more dense walkable urban areas, many people still want their suburban neighborhood. Even a little density and development is not appropriate for all areas. Surveys and interviews revealed that the Kansas City suburbs are an example of communities that fear the words density and development.

As IMCL states, “True Urbanism respects each city’s unique identity, its “DNA” and considers the city as a

work of art.” While the policy respects much of an areas identity, many true urbanism strategies are made to urbanize an area.

The principles of True Urbanism such as: to create a “city of short distances” where balanced transportation planning makes possible commuting via pedestrian networks, bicycle networks, traffic quietened streets and public transportation, will be a primary strategy for the project. Other IMCL Conferences and Publications

will be used as references for the design of Indian Creek Trail.

**WALKABLE COMMUNITIES, INC.**  
<http://www.walkable.org/>

“Walkable Communities are designed around the human foot” “Walkable communities are thriving, livable, sustainable places that give their residents safe transportation choices and improved quality of life.”

Walkable Communities has created

a 12 step checklist for defining, achieving, or strengthening a walkable community which are values that will be compared to other resources to determine the walkability of the Kansas City Area and help define preliminary solutions that would be affective in this area. Figure \_\_\_ is the checklist created by Walkable Communities.

#### FHWA

<http://www.fhwa.dot.gov/>

The FHWA defines a walkable community as one where it is easy and safe to walk to goods and services (Sandt, 2008, v). The Resident's Guide for Creating Safe and Walkable Communities, by the FHWA defines many components and strategies of walkable neighborhoods. The guide is designed to be used by anyone looking to improve walkability and is one of the primary guidelines for establishing walkable places.

#### PEDESTRIAN AND BICYCLE

#### INFORMATION CENTER

[www.walkinginfo.org](http://www.walkinginfo.org)

"The Pedestrian and Bicycle Information Center (PBIC) is a national clearinghouse for information about health and safety, engineering, advocacy, education, enforcement, access, and mobility for pedestrians (including transit users) and bicyclists."

PBIC has 8 walking Solution Categories that has much data

on walkability strategies. The 8 Walking Solutions are: Implement Solutions, Develop Plans and Policies, Engineer Pedestrian Facilities, Educate Pedestrian Facilities, Enforce Laws, Improve Access to Transit, Promote Walking and Health, Seek Funding and Build Support.

These 8 Solutions provide a road map that have influenced how the project will be defined. Ideas such as the 9 Engineered Pedestrian Facilities ideas are different options that will

be evaluated for the improvement of the Indian Creek Trail. The PBIC Case Study Compendium also provides a variety of data that will be studied to show how different strategies can be implemented.

#### WALKABLE AND LIVABLE COMMUNITIES INSTITUTE

<http://www.walklive.org/>

The WALC Institute is to create healthy, connected communities that support livable cities and better

built environments. They strive to inspire, teach, connect and support communities to help them reach their sustainable goals.

As stated by the WALC Institute: "The Institute was formed for charitable, educational and scientific purposes to help communities address the negative effects of the built environment on health, safety, social welfare, economic vitality, environmental sustainability, and overall quality of life."

Tactics they use for education and outreach has helped form the public outreach strategy for the Indian Creek Trail Study. The Walkability Workbook and The community guidance document, From Inspiration to Action: Implementing Projects to Support Active Living are 2 of the guidance documents also used influence the Indian Creek Trail design strategies to improve walkability.

#### PARTNERSHIP FOR A WALKABLE AMERICA (PWA)

<http://www.walkableamerica.org/>

The PWA is a national coalition working to improve the conditions for walking in America and influence a greater number of walkers throughout the country. It is a partnership between Centers for Disease Control and Prevention, Federal Highway Administration, Institute of Transportation Engineers, National Highway Traffic Safety Administration, Pedestrian and Bicycle Information Center, and The Robert Wood Johnson Foundation.

The walkability checklist, as shown in Appendix \_\_\_ is one of the resources used to determine and compare the walkability of the Kansas City suburbs around the Indian Creek Trail.

#### WALKSHED

<http://walkshed.org/>

As stated by walkshed, “Walkability is the first step to urban sustainability.” Walkshed is a web application that

uses an advanced methodology to calculate and map walkability.

Walkshed is unique and different from resources like walk score because it uses an advanced methodology to calculate and map walkability. “Walk Score is trying to provide a basic walkability metric to as many people as possible to aid in the home-buying process. Walkshed, on the other hand, seeks to be the gold-standard walkability calculation engine by combining accurate walking

paths with numerous data sets and customizable priorities.

The two main themes that make walkshed different are the ample decision factors and preference calculations that go into determining walkability.

- Walkshed works by using “friction-based” distance calculations that calculates actual walk length by factoring in barriers and disconnected street networks.

- Walkshed is a unique tool that determines walkability based on preference.

“Walkability means different things to different people. Empty nesters may enjoy being near a wide variety of restaurants and theaters. Runners and families might prefer easy access to parks and playgrounds. Young professionals and students may like the nightlife in certain neighborhoods. All of these people love and value walkability, but they all have different preferences that shape it.”

The only cities analyzed by walkshed now are New York City and Philadelphia. It is useful for the Kansas City area by showing different factors that go into determining walkability. These factors are going to be analyzed by a GIS network analysis and GIS social analysis based off of survey data.

The DecisionTree software that makes Walkshed possible will also be used to determine what walkability strategies are appropriate for each

destination area. "It is the engine that enables users of Walkshed.org to understand which neighborhoods are most walkable based on their individual priorities. Its core value is to enable you to weight and prioritize multiple geographic decision factors to identify the best locations for specific activities."

#### THE DECISIONTREE SOFTWARE

#### GEOTRELLIS

<http://www.azavea.com/>

[products/geotrellis/](http://products/geotrellis/)

"GeoTrellis is an open source geographic data processing engine for high performance applications."

This application will help determine the spatial operations that will be conducted in GIS as well as create models that will help determine development strategies.

#### ACTIVE LIVING RESEARCH

<http://activelivingresearch.org/>

Active Living Research is focused on the Health aspects of walkability but provides many tools and resources that will be helpful for the design of the Indian Creek Trail. Active Living Research provides credible and action-oriented research results that can influence walkability strategies.

The Active Living Research has shown many active research and findings about walkability, these statistics are used to create the argument for

enhanced walkability in the Kansas City area. Main points include:

- Research shows that residents of neighborhoods with more social disorder are less active.
- Crime and neighborhood disorder are more predominant in less walkable places.
- Investing transportation funds in sidewalks, traffic-calming devices, greenways, trails and public transit make it easier for people to walk and bike within their own neighborhoods and to other places they need to go.
- 29% of public transit users achieve the Surgeon General's

- recommendation of 30 minutes or more of physical activity a day while walking to and from transit.
- A survey of 1,148 adults living in the southeastern US found that the number of adults who met physical activity guidelines was 15% higher in neighborhoods with sidewalks.
- those living in counties with the highest "Active Community Environment" (ACE) scores\* were more than twice as likely to walk and bike for transportation than residents in counties with the lowest ACE scores.
- Data collected in 2001-2002 from 3,161 Atlanta children show 5 to 18

year olds were more likely to walk for transportation if they lived in mixed-used neighborhoods with parks, schools, and commercial destinations nearby.

- Walking for transportation is most strongly related to living in neighborhoods with high residential density, mixed land use, and short distances to destinations. FIGURE\_
- time spent walking per week was significantly associated with the amount of automobile traffic and number of commercial establishments in their neighborhood.

There are 4 active living topics, Transportation will be the primary topic used in this study. The Communities, Parks & Rec, and Schools topics also have valuable information that will be utilized for different strategies.

#### INTERNATIONAL FEDERATION OF PEDESTRIANS

<http://www.pedestrians-int.org/>

“The goals of IFP are to promote and

to defend the pedestrian’s right to full access and mobility.” Its international take on strategies provides a unique aspect that can be applicable to many different site.

The IFP has created the International Charter for Walking that provides 8 principals that can help improve the walking environment. It’s goal is to help facilitate healthy, efficient and sustainable communities where people choose to walk. It has many resources and links on how to improve

walkability in all communities.

Walk21 is concentrated on organizing one big conference a year, the IFP on the other hand wants to be a network for all pedestrian specialists,

#### WALK 21

<http://www.walk21.com/>

“Walk21 exists to champion the development of healthy sustainable and efficient communities where people choose to walk.”

The Walk21 Conference series and the International Charter discuss 8 topics of walkability: Inclusive mobility, spaces for people, integrated networks, spatial planning, reducing road danger, less crime, supported authorities, and promotion of walking. They have a set methodology and actions that can be used to enhance walkability based on those factors.

Evolving Best Practices is a primary resource being used for the design of Indian Creek Trail. By adapting

standard practices to fit current patterns will help make different strategies more successful.

### WALKABILITY CHECKLISTS

#### Walkability Checklist

##### How walkable is your community?

###### Take a walk with a child and decide for yourselves.

Everyone benefits from walking. These benefits include: improved fitness, cleaner air, reduced risks of certain health problems, and a greater sense of community. But walking needs to be safe and easy. Take a walk with your child and use this checklist to decide if your neighborhood is a friendly place to walk. Take heart if you find problems, there are ways you can make things better.

###### Getting started:

First, you'll need to pick a place to walk, like the route to school, a friend's house or just somewhere fun to go. The second step involves the checklist. Read over the checklist before you go, and as you walk, note the locations of things you would like to change. At the end of your walk, give each question a rating. Then add up the numbers to see how you rated your walk overall. After you've rated your walk and identified any problem areas, the next step is to figure out what you can do to improve your community's score. You'll find both immediate actions and long-term solutions under "Improving Your Community's Score..." on the third page.



#### Active Neighborhood Checklist

Date: \_\_\_\_\_ Segment ID: \_\_\_\_\_  
 Auditor ID: \_\_\_\_\_  
 Street Name: \_\_\_\_\_  
 Start Time: \_\_\_\_\_

How were the data collected?  
 Foot  Photo, provide reason: \_\_\_\_\_

Is any building or section of the sidewalk or roadway under construction or being repaired?  
 Yes, specify: \_\_\_\_\_  
 No

**A. What land uses are present?**

1. Are residential and non-residential land uses present?  
 All residential  
 Both residential and non-residential  
 All non-residential

2. What is the predominant land use?  
 Check one or two that apply:  
 Residential buildings/yards  
 Commercial, institutional, office or industrial building(s)  
 School(s)/school yard(s) (elementary, middle, high school)  
 Parking lots or garages  
 Park with exercise/sport facilities or playground equipment  
 Abandoned building or vacant lot  
 Undeveloped land  
 Designated green space (includes park with no exercise/sport facilities)  
 Other non-residential, specify: \_\_\_\_\_

3. What types of residential uses are present?  
 Select all that apply:  
 None  
 Abandoned homes  
 Single family homes  
 Multi-unit homes (2-4 units)  
 Apartments or condominiums (>4 units, 1-4 stories)  
 Apartments or condominiums (>4 stories)  
 Apartment over retail  
 Other (retirement home, mobile home, dorms)

4. What landscaping/parking facilities are present?  
 Select all that apply:  
 None (no parking allowed on street most or all of the time)  
 On-street, including angled parking  
 Small lot or garage (<50 spaces)  
 Medium to large lot  
 Garage

5. What public recreational facilities and equipment are present (including in the schoolyard if publicly accessible)?  
 Select all that apply:  
 None  
 Park with exercise/sport facilities or playground equipment  
 Off-road walking/biking trail  
 Sports/playground field  
 Basketball/tennis/volleyball court  
 Playground  
 Outdoor pool  
 Other: \_\_\_\_\_

6. (OPTIONAL) What types of non-residential uses are present?  
 Select all that apply:  
 None  
 Small grocery, convenience store (including in gas station), or pharmacy  
 Supermarket  
 Food establishment (restaurant, bakery, cafe, coffee shop, bar)  
 Entertainment (e.g., movie theatre, arcade)  
 Library or post office  
 Bank  
 Laundry/dry cleaner  
 Indoor fitness facility

Educational facilities:  
 School (elementary, middle, high school)  
 College, technical school, or university

Large buildings housing 1+ businesses/services:  
 High-rise building (>5 stories)  
 Big box store (e.g., Walmart, Office Depot, Best Buy)  
 Mail  
 Ship mall  
 Large office building, warehouse, factory, or industrial building

Land use notes:  
 \_\_\_\_\_

Active Neighborhood Checklist Version 2.0 (February 2011)



#### Walkability Audit Tool

This tool will help you assess the walkability of your workplace. Directions and the tool follow.

##### Directions:

1. Obtain (or create, if necessary) a map of the campus or area around your place of work that you wish to audit, including likely pedestrian destinations, such as parking lots, nearby restaurants, shops, parks, etc.
2. Decide, either by observation or inference, the most useful or likely pedestrian route between each location of interest on your map, eventually assembling a network of walking segments (link to glossary) that make up your most common walking routes. Label these segments 'A', 'B', 'C' or 1,2,3 to identify one from the other. See Sample Audit Report Map (link) for an example.
3. Take the attached audit tool to the location under study. Take as many copies as you have identified segments on your map—for example, if you have 10 segments on your map, take 10 copies. You will use a copy of the audit tool to assess each segment individually. The tool assesses factors related to safety, aesthetics, and recreational potential, (link to glossary) with safety being the most important.
4. Begin with your first segment, and use the attached audit to rank each feature, using the description provided on the audit. There are no right or wrong answers, just pick the number that most accurately represents your understanding of the segment. Also answer the questions at the bottom of the audit tool, noting potential dangers and improvements.
5. Repeat step 4 for each segment of your map. Some segments may be very different from each other, and some may be very similar.
6. Once you have completed the audit form for all the segments on your map, use the formula in the box halfway through the audit form to create a numerical score for each segment. This score makes safety considerations the most important, followed by things like accessibility and aesthetics (medium importance) and finally shade (least important), and should range from 0-100. Calculate scores for all segments of your map.
7. Now you can input the scores from each segment on your map, and generate a report. If you like, you can follow the format of our sample report. (link) We designated segments with scores of 0-39 points as high-risk and unattractive (red), scores of 40-69 as medium-risk and average or non-descript looking (yellow) and 70 and above as low-risk and pleasant. The questions you answered at the bottom of the audit tool can help you prioritize your needs and wants for improving the walking routes

Email us if you have questions or comments about using the Worksite Walkability Tool.



#### How walkable is your community?

Take a 15 minute walk along a road. Walk on the sidewalk or path to visit a store, business, school or person. Then fill out this checklist.

**Step 1: Write about your walk**

City: \_\_\_\_\_  
 Postal Code: \_\_\_\_\_  
 Where did you walk? I walked from \_\_\_\_\_ to \_\_\_\_\_ along \_\_\_\_\_  
 When was your walk? The date was \_\_\_\_/\_\_\_\_/\_\_\_\_  AM  PM  
 What were the conditions during your walk?  
 Daylight  Rain  Snow  Extreme cold or heat

**Step 2: Think about your walk**

Now, please think about your walk. Please put a check in each box that you agree with.

**How easy was your walk?**

I could use sidewalks, trails or paths to get where I was going  
 There were sidewalks on both sides of the street  
 Nothing blocked the sidewalks, like bushes or garbage  
 The sidewalks were wide enough so I could walk beside another person  
 I could easily use the sidewalks if I was in a wheelchair or pushing a stroller  
 The sidewalks were well maintained  
 If the sidewalks need to be fixed, please tell us what is wrong, and where to find the problem:  
 \_\_\_\_\_  
 If you did not check any of these boxes, please explain why:  
 \_\_\_\_\_

#### What people and places did you see?

- I saw a mix of homes, businesses, stores and schools  
 I passed a mix of apartments, attached houses and single detached houses  
 I passed windows, not just walls and fences  
 I met people on the street  
 If you did not check any of these boxes, please explain why:  
 \_\_\_\_\_

#### Was your walk enjoyable?

- The route I took was pleasant and inviting  
 I saw plants, trees and gardens on my walk  
 If I needed to stop, there were benches or other places to rest  
 I enjoyed the walk because there were interesting things to see  
 It was easy to get to the shops and businesses  
 The shops and businesses were neat and tidy, and worth a visit  
 If you did not check any of these boxes, please explain why:  
 \_\_\_\_\_

#### How safe did you feel?

- It was very clear where I could walk and where cars or bikes were supposed to be  
 It was easy to read the signs  
 Crosswalks were well marked  
 At crosswalks, I had enough time to cross the street  
 Cars stopped at crosswalks and signal lights  
 Cars were driving at a safe speed  
 At night, the sidewalks, trails and paths were well lit  Not Applicable  
 If you did not check any of these boxes, please explain why:  
 \_\_\_\_\_



#### Step 3: Rate your walk

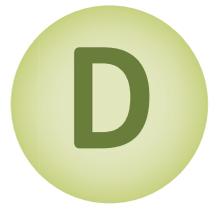
How many boxes did you mark with a check?  
 \_\_\_\_\_  
 What the number of check marks represents:  
 19 or more Celebrate! Your community makes it easy to walk for all your daily needs.  
 16-18 Your community is doing well!  
 11-15 Your community could do more.  
 10 or less Let's work hard to make your community more walkable.  
 Do you have any other ideas about what could make your community more walkable? Please share them here:  
 \_\_\_\_\_

### Pedestrian Road Safety Audit Guidelines and Prompt Lists

FHWA-SA-07-007  
 July 2007

U.S. Department of Transportation  
 Federal Highway Administration

RSAA  
 Making Your Roads Safer



# APPENDIX D

## RETROFITTING RESOURCES

### RETROFITTING SUBURBIA

*Retrofitting Suburbia* is one of the most well known resources for amending sprawl. It provides many strategies for different types of suburban development and offers solutions for better, walkable communities. The case studies depicted also show how the different strategies can be implemented.

Figure \_\_\_ describes the urban tactics for retrofitting that are described in throughout the book.

### SPRAWL REPAIR MANUAL

The *Sprawl Repair Manual* provides a complete physical planning model for handling many suburban transformation techniques.

One of the most influential strategies the book lays out is the repair strategies appropriate at many scales. The book breaks up tactics into the community scale, the street/thoroughfare scale, the block scale, and the building scale. Each one of those scales also includes physical

typologies/case studies on how to amend each specific concern.

The goal of creating complete communities is a unique aspect that makes this book one of the major resources used for the project. While many strategies appear to have this focus, the language and explanation of techniques in the *Sprawl Repair Manual* are different than many existing plans.

### SUBURBAN TRANSFORMATIONS

*Suburban Transformations* by Paul Lukez focuses on identity and adaptive design processes to change suburban forms. The adaptive design process is an integral part that links time and circumstance to identify appropriate actions to be implemented in phases over time.

He describes mapping techniques that will be used for the analysis of Indian Creek Trail.. As stated by Lukez, "The mapping process

generates facts, information, and documented phenomena of a site." The mapping and cross mapping defines patterns and relationships that can then define appropriate strategies for improvement.

### SMART GROWTH NETWORK

<http://www.smartgrowth.org/principles/walkable.php>

"Smart Growth means building urban, suburban and rural communities with housing and transportation choices

near jobs, shops and schools. This approach supports local economies and protects the environment."

### Smart Growth Principles

- Mix Land Uses
- Take Advantage of Compact Building Design
- Create a Range of Housing Opportunities and Choices
- Create Walkable Neighborhoods
- Foster Distinctive, Attractive Communities with a Strong Sense of Place
- Preserve Open Space, Farmland,

Natural Beauty and Critical Environmental Areas

- Strengthen and Direct Development Towards Existing Communities
- Provide a Variety of Transportation Choices
- Make Development Decisions Predictable, Fair and Cost Effective
- Encourage Community and Stakeholder Collaboration in Development Decisions

A primary theme of smart growth is walkability. It consists of compact

mix of uses with safe and inviting pedestrian corridors.

“Their desirability comes from two factors. First, goods (such as housing, offices, and retail) and services (such as transportation, schools, libraries) are located within an easy and safe walk. Second, walkable communities make pedestrian activity possible, thus expanding transportation options, and creating a streetscape for a range of users – pedestrians, bicyclists, transit riders, and drivers.”

A helpful focus of the Smart Growth America Network is the categorization for different land uses such as housing, business, jobs, economic prosperity, transportation, environment, healthy communities and people, and revitalization. When different elements of the trail need specific design implementations, the Smart Growth America Network will be helpful for finding an appropriate solution.

#### URBAN LAND INSTITUTE

<http://www.uli.org/>

Urban Land Institute (ULI) is a nonprofit research and education organization whose mission is to provide leadership in the responsible use of land and guidance for creating and sustaining thriving communities.

It provides a plethora of research data on a variety of land issues. The magazine, books, and programs are continually publishing relevant

information that can be used for many different design strategies.

One of the most relevant reports for this project, *Shifting Suburbs Reinventing Infrastructure for Compact Development*, describes components that can enhance suburban communities and examines case studies that utilize the different strategies. One of the primary techniques described: *Infrastructure for a More Compact, Walkable Future in the Suburbs* is an extremely

relevant resource for the Indian Creek Trail.

#### THE CONGRESS FOR NEW URBANISM

<http://www.sustainablecommunities.gov/>

CNU is an organization working to promote walkable, mixed-use neighborhood developments, sustainable communities and healthier living conditions.

As stated by the CNU charter:

the four principals of new urbanism techniques are:

- Livable streets arranged in compact, walkable blocks.
- A range of housing choices to serve people of diverse ages and income levels.
- Schools, stores and other nearby destinations reachable by walking, bicycling or transit service.
- An affirming, human-scaled public realm where appropriately designed buildings define and enliven streets and other public spaces.

#### USGBC – UNITED STATES GREEN BUILDING COUNCIL

<http://www.pps.org/>

The LEED for Neighborhood Development is a primary standard for creating overall sustainable places. It integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design.

The rating system provided by LEED-ND will be one of the

primary resources to examine the sustainability of the proposed designs. The rating system it suggests creates a standard throughout the design professions. One of the greatest components of LEED-ND is its ability to prove the design performance. This helps create a high standard of design and promotes similar language and techniques for all projects.

#### HUD-DOT-EPA PARTNERSHIP FOR SUSTAINABLE COMMUNITIES

<http://www.epa.gov/smartgrowth/>

<http://www.sustainablecommunities.gov/partnership/index.html>

The US Department for Housing and Urban Development (HUD), Department of Transportation (USDOT), and the Environmental Protection Agency (EPA) formed a partnership for sustainable communities in 2009.

These government entities provide integrated planning and investment

as well as funding, programs, and research that will aid in the advancement of sustainable initiatives. The resources and guides will help guide the development along the Indian Creek Trail.

As defined by the Partnership for Sustainable Communities “Sustainable communities are places that have a variety of housing and transportation choices, with destinations close to home.”

One of the most important aspects when implementing sustainable strategies is the context of an area. “Rural, suburban, and urban communities can all use sustainable communities strategies and techniques to invest in healthy, safe and walkable neighborhoods, but these strategies will look different in each place depending on the community’s character, context, and needs.”

**BUILD A BETTER BURB**

<http://buildabetterburb.org/>

Build a Better Burb is an online publication dedicated to improving suburban design and planning.

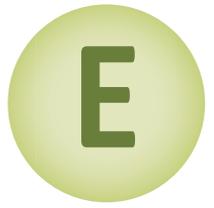
Build a Better Burb is sponsored by the Long Island Index that is ran by an advisory and technical committee of professionals and educators.

The ideas of thinking regionally is extremely relevant to the

Indian Creek Trail study.

**NATIONAL LEAGUE OF CITIES**

<http://www.nlc.org/>



# APPENDIX E

# PEDESTRIAN OBSERVATIONS

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## Ridgeview | Olathe South

**Observation #33**  
 347 Total Number of People Along Trail Saturday, September 21 10:00 am - 1:00 pm 75 & Sunny Destination ID # 1

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
210	132	119	106	111	0	25	14	95	139	69	154	49	24	27	4
60.5%	38.0%	34.3%	30.5%	32.0%	0.0%	7.2%	4.0%	27.4%	40.1%	19.9%	44.4%	14.0%	6.9%	7.8%	1.2%

**Observation #30**  
 26 Total Number of People Along Trail Tuesday, January 14 6:30 am - 8:30 am 36 & Sunny Destination ID # 1

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
13	13	11	8	6	0	3	2	5	8	8	15	4	1	2	2
50.0%	50.0%	42.3%	30.8%	23.1%	0.0%	11.5%	7.7%	19.2%	30.8%	30.8%	57.7%	15.4%	3.8%	7.7%	7.7%

**Observation #6**  
 13 Total Number of People Along Trail Monday, January 13 9:00 am - 10:00 am 36 & Sunny Destination ID # 1

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
6	7	8	1	4	0	0	0	0	7	6	7	3	0	2	1
46.2%	53.8%	61.5%	7.7%	30.8%	0.0%	0.0%	0.0%	0.0%	53.8%	46.2%	53.8%	23.1%	0.0%	15.4%	7.7%

## MidAmerica Nazarene University

**Observation #18**  
 23 Total Number of People Along Trail Thursday, January 2 12:30 pm - 2:30 pm 26 - 30 & Sunny | Snow & Ice on Trail Destination ID # 2

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
14	9	8	9	6	0	2	3	6	8	4	15	1	2	2	0
60.9%	39.1%	34.8%	39.1%	26.1%	0.0%	8.7%	13.0%	26.1%	34.8%	17.4%	65.2%	4.3%	8.7%	8.7%	0.0%

**Observation #4**  
 71 Total Number of People Along Trail Friday, September 20 4:00 pm - 5:30 pm 68 & Sunny Destination ID # 2

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
49	22	26	26	19	0	2	5	21	30	13	38	13	2	6	1
69.0%	31.0%	36.6%	36.6%	26.8%	0.0%	2.8%	7.0%	29.6%	42.3%	18.3%	53.5%	18.3%	3.3%	8.5%	1.4%

## Taco Bell

**Observation #23**  
 21 Total Number of People Along Trail Saturday, January 11 12:00 pm - 1:00 pm 40 & Sunny Destination ID # 3

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
16	5	7	6	8	0	1	5	4	7	4	14	2	1	3	1
76.2%	23.8%	33.3%	28.6%	38.1%	0.0%	4.8%	23.8%	19.0%	33.3%	19.0%	66.7%	9.5%	4.8%	14.3%	4.8%

**Observation #21**  
 4 Total Number of People Along Trail Tuesday, January 6 4:00 pm - 6:00 pm 20 & Sunny | Trail recently Plowed Destination ID # 3

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
3	1	1	3	0	0	0	0	1	3	0	4	0	0	0	0
75.0%	25.0%	25.0%	75.0%	0.0%	0.0%	0.0%	0.0%	25.0%	75.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%

**Observation #13**  
 46 Total Number of People Along Trail Sunday, November 17 12:00 pm - 1:00 pm 62 & Sunny/Windy Destination ID # 3

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
27	19	14	9	23	0	3	4	7	25	5	20	10	2	2	2
58.7%	41.3%	30.4%	19.6%	50.0%	0.0%	6.5%	8.7%	15.2%	54.3%	10.9%	43.5%	21.7%	4.3%	4.3%	4.3%

**Observation #3**  
 187 Total Number of People Along Trail Friday, September 20 11:00 am - 1:00 pm 68 & Sunny Destination ID # 3

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
113	74	63	69	55	0	2	0	67	88	30	84	27	12	8	2
60.4%	39.6%	33.7%	36.9%	29.4%	0.0%	1.1%	0.0%	35.8%	47.1%	16.0%	44.9%	14.4%	6.4%	4.3%	1.1%

## Olathe East Library

**Observation #29**  
 15 Total Number of People Along Trail Monday, January 13 6:30 am - 8:30 am 32 - 40 & Partly Cloudy Destination ID # 4

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
6	9	8	7	0	0	1	0	5	7	2	13	1	0	2	0
40.0%	60.0%	53.3%	46.7%	0.0%	0.0%	6.7%	0.0%	33.3%	46.7%	13.3%	86.7%	6.7%	0.0%	13.3%	0.0%

**Observation #17**  
 0 Total Number of People Along Trail Thursday, January 2 10:00 am - 12:30 pm 6 & Sunny | Snow & Ice on Trail | Will Chill Below Freezing Destination ID # 4

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

APPENDIX

**Jimmy Johns**

**Observation #10** After Jimmy Johns  
 8 Total Number of People Along Trail Thursday, November 14 5:30 pm - 6:15 pm 52 & Dark/Windy Destination ID # 5

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
7	1	1	2	5	0	0	0	1	7	0	8	0	0	1	0
87.5%	12.5%	12.5%	25.0%	62.5%	0.0%	0.0%	0.0%	12.5%	87.5%	0.0%	100.0%	0.0%	0.0%	12.5%	0.0%

**Observation #9**  
 30 Total Number of People Along Trail Sunday, October 13 12:00 pm - 1:00 pm 55 & Windy/Cloudy | Slightly Raining Destination ID # 5

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
19	11	5	9	16	0	0	0	6	18	6	20	5	0	2	0
63.3%	36.7%	16.7%	30.0%	53.3%	0.0%	0.0%	0.0%	20.0%	60.0%	20.0%	66.7%	16.7%	0.0%	6.7%	0.0%

**Observation #8**  
 79 Total Number of People Along Trail Thursday, October 10 5:00 pm - 6:30 pm 70 & Sunny Destination ID # 5

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
52	28	11	14	53	0	4	4	15	47	9	43	13	3	3	1
65.8%	35.4%	13.9%	17.7%	67.1%	0.0%	5.1%	5.1%	19.0%	59.5%	11.4%	54.4%	16.5%	4.2%	3.8%	1.3%

**Observation #5**  
 414 Total Number of People Along Trail Saturday, September 21 7:00 am - 10:00 am 55-75 & Sunny Destination ID # 5

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
218	186	142	94	167	3	22	11	108	157	105	176	76	19	24	1
52.7%	44.9%	34.3%	22.7%	40.3%	0.7%	5.3%	2.7%	26.1%	37.9%	25.4%	42.5%	18.4%	4.5%	5.8%	0.2%

**Corporate Woods**

**Observation #15**  
 6 Total Number of People Along Trail Thursday, December 26 8:30 am - 9:30 am 26 & Sunny | Wind Chill in Single Digits Destination ID # 6

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
3	3	4	1	1	0	0	0	1	3	2	6	0	0	0	0
50.0%	50.0%	66.7%	16.7%	16.7%	0.0%	0.0%	0.0%	16.7%	50.0%	33.3%	100.0%	0.0%	0.0%	0.0%	0.0%

**Observation #12**  
 95 Total Number of People Along Trail Friday, November 15 3:00 pm - 6:00 pm 50 & Sunny Destination ID # 6

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
70	25	40	20	36	0	6	7	11	35	5	56	13	4	9	6
73.7%	26.3%	42.1%	21.1%	37.9%	0.0%	6.3%	7.4%	11.6%	36.8%	36.8%	58.9%	13.7%	4.6%	9.5%	6.3%

**Metcalf & 435**

**Observation #28**  
 87 Total Number of People Along Trail Sunday, January 12 4:00 pm - 6:00 pm 45 - 50 & Sunny Destination ID # 7

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
52	35	38	26	23	0	5	4	31	35	12	44	17	3	15	1
59.8%	40.2%	43.7%	29.9%	26.4%	0.0%	5.7%	4.6%	35.6%	40.2%	13.8%	50.6%	19.5%	3.4%	17.2%	1.1%

**Observation #22**  
 3 Total Number of People Along Trail Wednesday, January 8 11:30 am - 12:30 pm 25 & Partly Cloudy/Windy | Little Snow & Ice on Trail Destination ID # 7

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
3	0	1	2	0	0	0	0	1	2	0	3	0	0	1	0
100.0%	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	66.7%	0.0%	100.0%	0.0%	0.0%	33.3%	0.0%

**Nall | Shawnee Mission South**

**Observation #27**  
 259 Total Number of People Along Trail Sunday, January 12 2:00 pm - 4:00 pm 55 & Sunny Destination ID # 8

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
129	130	144	43	72	0	16	24	66	103	50	104	47	12.2	25	4
49.8%	50.2%	55.6%	16.6%	27.8%	0.0%	6.2%	9.3%	25.5%	39.8%	19.3%	40.2%	18.1%	4.7%	9.7%	1.5%

**Observation #16**  
 38 Total Number of People Along Trail Thursday, December 26 4:00 pm - 5:15 pm 35 & Sunny Destination ID # 8

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
22	16	21	12	5	0	3	2	4	21	8	16	8	2	2	1
57.9%	42.1%	55.3%	31.6%	13.2%	0.0%	7.9%	5.3%	10.5%	55.3%	21.1%	42.1%	21.1%	5.3%	5.3%	2.6%

**Roe Shopping Center**

**Observation #26**  
 208 Total Number of People Along Trail Sunday, January 12 12:00 pm - 2:00 pm 55 & Sunny Destination ID # 9

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
106	102	90	55	60	0	20	7	70	79	33	97	39	8.25	33	0
51.0%	49.0%	43.3%	26.4%	28.8%	0.0%	9.6%	3.4%	33.7%	38.0%	15.9%	46.6%	18.8%	4.0%	15.9%	0.0%

**Observation #24**  
 78 Total Number of People Along Trail Saturday, January 11 3:30 pm - 5:30 pm 25 - 35 & Sunny Destination ID # 9

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
42	36	45	21	12	0	7	4	18	28	21	44	13	2	15	2
53.8%	46.2%	57.7%	26.9%	15.4%	0.0%	9.0%	5.1%	23.1%	35.9%	26.9%	56.4%	16.7%	2.6%	19.2%	2.6%

**Leawood Park**

**Observation #32**  
 61 Total Number of People Along Trail Monday, January 13 4:00 pm - 5:00 pm 35 - 48 & Sunny Destination ID # 10

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
39	22	36	20	5	0	1	0	19	26	15	34	12	1	12	2
63.9%	36.1%	59.0%	32.8%	8.2%	0.0%	1.6%	0.0%	31.1%	42.6%	24.6%	55.7%	19.7%	1.6%	19.7%	3.3%

**Observation #25**  
 48 Total Number of People Along Trail Sunday, January 12 12:00 pm - 1:00 pm 62 & Sunny/Windy Destination ID # 10

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
28	20	25	10	10	0	10	4	10	20	4	15	8	5	4	1
58.3%	41.7%	52.1%	20.8%	20.8%	0.0%	20.8%	8.3%	20.8%	41.7%	8.3%	31.3%	16.7%	10.9%	8.3%	2.1%

**Stataline Shopping Center**

**Observation #31**  
 9 Total Number of People Along Trail Monday, January 13 11:30 am - 1:30 pm 28 & Sunny Destination ID # 11

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
6	3	5	3	1	0	0	0	2	5	2	7	1	0	0	0
66.7%	33.3%	55.6%	33.3%	11.1%	0.0%	0.0%	0.0%	22.2%	55.6%	22.2%	77.8%	11.1%	0.0%	0.0%	0.0%

**Observation #14**  
 0 Total Number of People Along Trail Thursday, December 26 6:30 am - 8:30 am 26 & Sunny | Wind Chill in Single Digits Destination ID # 11

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

**Observation #7**  
 75 Total Number of People Along Trail Saturday, September 21 1:00 pm - 3:00 pm 70 - 75 & Sunny Destination ID # 11

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
47	28	27	17	31	0	1	4	18	40	13	40	14	2	12	0
62.7%	37.3%	36.0%	22.7%	41.3%	0.0%	1.3%	5.3%	24.0%	53.3%	17.3%	53.3%	18.7%	2.3%	16.0%	0.0%

**Wornall | Quik Trip**

**Observation #20**  
 7 Total Number of People Along Trail Friday, January 3 2:30 pm - 5:45 pm 26 - 35 & Sunny | Snow & Ice on Trail Destination ID # 12

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
5	2	3	0	4	0	0	0	3	4	0	7	0	0	0	0
71.4%	28.6%	42.9%	0.0%	57.1%	0.0%	0.0%	0.0%	42.9%	57.1%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%

**Observation #2**  
 114 Total Number of People Along Trail Friday, September 20 11:30 am - 1:30 pm 62 & Sunny Destination ID # 12

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
80	34	48	30	36	0	4	4	30	48	28	79	15	1	8	0
70.2%	29.8%	42.1%	26.3%	31.6%	0.0%	3.5%	3.5%	26.3%	42.1%	24.6%	69.3%	13.2%	0.7%	7.0%	0.0%

**Holmes Shopping Center**

**Observation #19**  
 9 Total Number of People Along Trail Friday, January 3 11:30 am - 1:30 pm 30 & Sunny | Snow & Ice on Trail Destination ID # 13

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
5	4	4	2	3	0	0	0	3	5	1	9	0	0	0	0
55.6%	44.4%	44.4%	22.2%	33.3%	0.0%	0.0%	0.0%	33.3%	55.6%	11.1%	100.0%	0.0%	0.0%	0.0%	0.0%

**Observation #11**  
 27 Total Number of People Along Trail Friday, November 15 12:00 pm - 2:00 pm 60 & Sunny Destination ID # 13

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
21	6	10	3	14	0	0	0	2	16	9	23	2	0	1	0
77.8%	22.2%	37.0%	11.1%	51.9%	0.0%	0.0%	0.0%	7.4%	59.3%	33.3%	85.2%	7.4%	0.0%	3.7%	0.0%

**Observation #1**  
 79 Total Number of People Along Trail Friday, September 20 6:30 am - 8:30 am 60 & Sunny Destination ID # 13

Males	Females	Walkers	Runners	Bikers	Others	K	T	YA	MA	E	Solos	Pairs	Groups	Dogs	Other
50	27	35	19	24	0	0	7	18	39	14	45	15	1	9	2
63.3%	34.2%	44.3%	24.1%	30.4%	0.0%	0.0%	8.9%	22.8%	49.4%	17.7%	57.0%	19.0%	1.3%	11.4%	2.5%

## PEDESTRIAN OBSERVATION SUMMARY

DESTINATION ID	
1	Ridgeview   Olathe South

386	Total number of users along trail during observation
69	Number of trail users per hour

DESTINATION ID	
2	MidAmerica Nazarene University

94	Total number of users along trail during observation
27	Number of trail users per hour

DESTINATION ID	
3	Taco Bell

258	Total number of users along trail during observation
43	Number of trail users per hour

DESTINATION ID	
4	Olathe East   Library

15	Total number of users along trail during observation
4	Number of trail users per hour

DESTINATION ID	
5	Jimmy Johns

531	Total number of users along trail during observation
79	Number of trail users per hour

DESTINATION ID	
6	Corporate Woods

101	Total number of users along trail during observation
25	Number of trail users per hour

DESTINATION ID	
7	Metcalfe & 435

90	Total number of users along trail during observation
30	Number of trail users per hour

DESTINATION ID	
8	Nall   Shawnee Mission South

297	Total number of users along trail during observation
15	Number of trail users per hour

DESTINATION ID	
9	Roe Shopping Center

286	Total number of users along trail during observation
72	Number of trail users per hour

DESTINATION ID	
10	Tomahawk Trail Connection

109	Total number of users along trail during observation
55	Number of trail users per hour

DESTINATION ID	
11	Stateline & 435

84	Total number of users along trail during observation
14	Number of trail users per hour

DESTINATION ID	
12	Wornall   Quik Trip

121	Total number of users along trail during observation
23	Number of trail users per hour

DESTINATION ID	
13	Holmes Shopping Center

115	Total number of users along trail during observation
19	Number of trail users per hour

SURVEY

**Indian Creek Trail Feasibility Study**

**INTRODUCTION**

The purpose of this research is to identify opportunities and constraints of the Indian Creek Trail to evaluate the potential for greater walkability in the Kansas City Metro area. The study is a part of a graduate research project being conducted by Lauren Patterson, a 5th year in the Master's of Landscape Architecture program at Kansas State University.

If you have any questions or comments please contact me at [lpatt12@ksu.edu](mailto:lpatt12@ksu.edu). Information about the project will also be updated on the facebook page which can be found through the following link:  
<https://www.facebook.com/pages/Indian-Creek-Trail-Feasibility-Study/602957716436330>

- Lauren Patterson  
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College of Architecture, Planning, and Design  
Kansas State University  
[lpatt12@ksu.edu](mailto:lpatt12@ksu.edu) | 913.787.3674

**Please read the following and indicate your understanding below:**  
I understand that this study is strictly for educational purposes and there are no risks involved in participating. All responses and information are completely confidential. Once the survey/interview is complete I understand that I have no further obligation to the research project. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, to which I may otherwise be entitled. **I also verify that I am at least 18 years of age OR have permission from a legal guardian to participate.**  
Please confirm your understanding of the project and consent to participation below.

By clicking here I understand the terms above and agree to participate in the project

**How often do you use the Indian Creek Trail?**

- Never
- Less than Once a Month
- Once a Month
- 2-3 Times a Month
- Once a Week
- 2-3 Times a Week
- Daily

**Do you think the Indian Creek Trail is difficult to use?**

- Very Difficult
- Difficult
- Neutral
- Not Too Difficult
- Not Difficult at All

**What elements affect the difficulty of the Indian Creek Trail?**

	Very Difficult	Difficult	Neutral	Not Too Difficult	Not Difficult at All
Hills/Slope (Too steep, Lots of hills...)	<input type="radio"/>				
Trail Material (Too rough or smooth...)	<input type="radio"/>				
Trail Accessibility (Hidden/Inconvenient entrances...)	<input type="radio"/>				
Signs/ Way-finding (Easy to get lost, Not enough signs..)	<input type="radio"/>				
Trail Design/ Connectivity (Sharp curves, Small pathway..)	<input type="radio"/>				
Visibility (Lighting, Line of sight...)	<input type="radio"/>				
Other	<input type="radio"/>				

**Rate your likes and dislikes of the following trail features.**

| Categories  | <input type="radio"/> | Indicate which of the following influenced your rating: |                  |             |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|------------------|-------------|
| Trail Amenities (Benches, Trash Cans...)                  | <input type="radio"/> | Location  | Frequency        | Quality     |
| Pedestrian Amenities (Connecting Sidewalks/Crosswalks...) | <input type="radio"/> | Location  | Frequency        | Quality     |
| Bike Facilities (Bike racks...)                           | <input type="radio"/> | Location  | Frequency        | Quality     |
| Signage (Trail Maps, Entry Signs...)                      | <input type="radio"/> | Location  | Frequency        | Readability |
| Access Points (Entrance Locations/Visibility...)          | <input type="radio"/> | Location  | Frequency        | Quality     |
| Safety of the Trail (Lighting, Line of Sight...)          | <input type="radio"/> | Location  | Lighting         | Quality     |
| Materials (Pavement, Vegetation...)                       | <input type="radio"/> | Location  | Consistency      | Quality     |
| Physical Trail Features (Length, Hills/Slopes...)         | <input type="radio"/> | Extent  | Difficulty Level | Quality     |
| Scenery, Aesthetic Views                                  | <input type="radio"/> | Location  | Variety          | Quality     |
| Rest/Sitting Areas  | <input type="radio"/> | Location  | Frequency        | Quality     |
| Connections to Recreation Areas (Parks, Fields...)        | <input type="radio"/> | Location  | Convenience      | Quality     |
| Connections to Destinations (Stores...)                   | <input type="radio"/> | Location  | Convenience      | Quality     |
| Other   | <input type="radio"/> | Location  | Frequency        | Quality     |

**What elements of the trail do you think need the most improvement?**  
(Select up to 3 answers)

- Trail Amenities (Benches, Trash Cans...)
- Pedestrian Amenities (Connecting Sidewalks/Crosswalks...)
- Bike Facilities (Bike racks...)
- Signage (Trail Maps, Entry Signs...)
- Access Points (Entrance Locations/Visibility...)
- Safety of the Trail (Lighting, Line of Sight...)
- Materials (Pavement, Vegetation...)
- Physical Trail Features (Length, Hills/Slopes...)
- Scenery, Aesthetic Views
- Rest/Sitting Areas
- Connections to Recreation Areas (Parks, Fields...)
- Connections to Destinations (Stores...)
- Other \_\_\_\_\_

**What elements of the Indian Creek Trail do you think make the trail great?**  
(Select all that apply)

- Trail Amenities (Benches, Trash Cans...)
- Pedestrian Amenities (Connecting Sidewalks/Crosswalks...)
- Bike Facilities (Bike racks...)
- Signage (Trail Maps, Entry Signs...)
- Access Points (Entrance Locations/Visibility...)
- Safety of the Trail (Lighting...)
- Materials (Pavement, Vegetation...)
- Physical Trail Features (Length, Hills/Slopes...)
- Scenery, Aesthetic Views
- Rest/Sitting Areas
- Connections to Recreation Areas (Parks, Fields...)
- Connections to Destinations (Stores...)
- Other \_\_\_\_\_

**What time of day do you typically use the Indian Creek Trail?**  
(Select all that apply)

- Early Morning } Before 7:00 am
- Mid-Morning } 7:00 - 11:00 am
- Afternoon } 11:00 - 1:00 pm
- Mid-Afternoon } 1:00 - 4:00 pm
- Early Evening } 4:00 - 7:00 pm
- Evening } After 7:00 pm

**What time of year do you typically visit the Indian Creek Trail?**  
(Select all that apply)

- Summer
- Fall
- Winter
- Spring
- Whenever it is nice out
- All year round
- Other \_\_\_\_\_

**How often do the following conditions affect your use of the Indian Creek Trail?**

	Never	Rarely	Sometimes	Most of the Time	Always
Weather	<input type="radio"/>				
Distance from home	<input type="radio"/>				
Time of day	<input type="radio"/>				
Daily Activities/Time Available	<input type="radio"/>				
Maintenance/Quality of Trail	<input type="radio"/>				
Trail Activity/Events	<input type="radio"/>				
Safety	<input type="radio"/>				
Trail Connections	<input type="radio"/>				
Other	<input type="radio"/>				

**What best describes how you use the Indian Creek Trail?**  
(Select all that apply)

- To go on a Walk
- Walk Pet
- Run
- Bike
- Travel to a Destination
- Train for a Race/Event
- Exercise
- Other

**Do you typically use the trail with others or by yourself?**

- By Myself
- With Others
- Both By Myself and With Others

**Why don't you use the Indian Creek Trail?**  
(Select all that apply)

- Trail is too far away
- Trail is not near places I tend to go
- I dislike the quality of the trail
- Trail is not easily accessible from my house
- Trail is unsafe
- Other \_\_\_\_\_

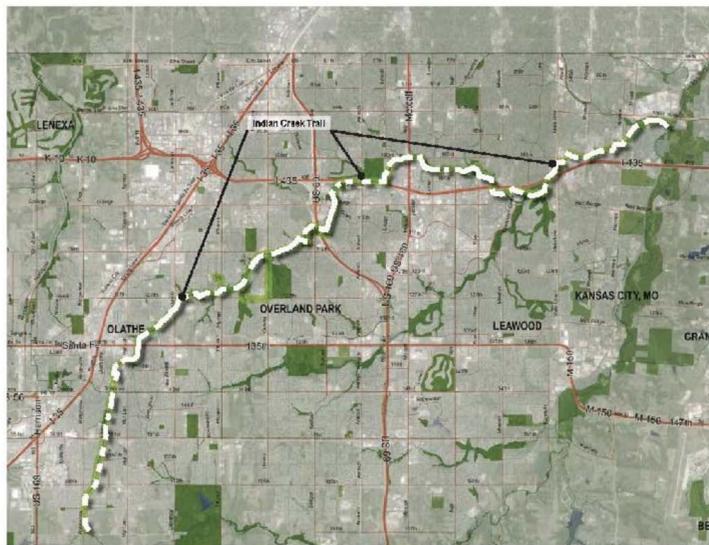
**LOCATIONAL AREA**

**Please indicate your approximate distance away from the Indian Creek Trail for the following locations.**

	How far away do you live from the trail?	How far away do you work from the trail?	How far away is your school from the trail?
<b>&lt; 1/4 Mile</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1/4 -1/2 Mile }1 Minute Drive</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1/2 -1 Mile }1 Minute Drive</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>1 - 2 Miles }2 Minute Drive</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2 - 5 Miles }5 Minute Drive</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>5-10 Miles }10 Minute Drive</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>10 - 20 Miles }20 Minute Drive</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>&gt; 20 Miles</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Not Applicable</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What sections of the trail do you use most??**

*(Trace the path used most often by placing a series of points along the applicable trail section)  
(Add at least 3 points along area of trail most relevant - Start/Middle/End of Section)*



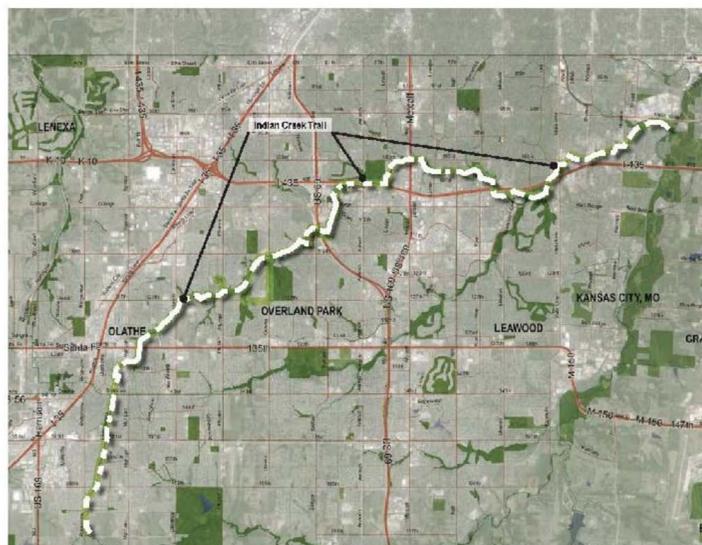
**How do you travel to the trail sections you listed above?**

*(Select mode you use the most)*

- By Car
- By Foot
- By Bike
- By Bus
- Other

**What locations nearby do you travel to regularly?**

*(Please select a minimum of 5 areas)  
(Locations could be a variety of stores, school, work, or any places within the map context)*



**How do you travel to the locations you listed above?**

*(Select mode you use the most)*

- By Car
- By Foot
- By Bike
- By Bus
- Other

**Describe the types of destinations that you travel to nearby, even ones you didn't choose in the map above.**

*(Select all that apply)*

*(Add name if applicable: ie. Hen House, Roe Park, Jimmy John's, etc.. )*

- Church
- School
- Home
- Convenient Store
- Dining out / Restaurants / Cafe
- Bank / Pharmacy
- Work / Office
- Bars
- Outdoor/Recreational Activities - Soccer Games, Parks...
- Shopping Centers - Leisure: Clothing store, Jewelry Store...
- Shopping Centers - Errands: Grocery Store, Pharmacy...
- Appointments - Doctor's Office, Dentist...
- Bus / Transit Stop
- Other

**Do you regularly use the trail for more than just recreation / leisure purposes?**

*(ie. Transit Purposes: Do you go to the grocery store, school, bank...)*

- Never
- Rarely
- Sometimes
- Often
- All of the Time

**Why don't you use the trail for transport purposes?**

*(Select all that apply)*

- Trail does not connect to destinations
- Trail is not easily accessible from my house
- Travel time would be too long
- Not enough amenities such as showers, bike racks, etc. are accessible at my destinations
- Car is more convenient
- Other

**If reasons why you don't use the trail for transport purposes were fixed would you travel by foot or bike?**

- Yes
- No

**Would you travel to the any of the previous destinations by bike or foot?**

	Answer	Why or Why Not??						Other
		Distance	Connectivity	Convenience	Weather	Time Available	Trail Features	
Yes	<input type="radio"/>	<input type="checkbox"/>						
No	<input type="radio"/>	<input type="checkbox"/>						

Indicate the probability you would travel to the following locations by any means other than by car.

	Very Unlikely	Unlikely	Undecided	Likely	Very Likely
Church	<input type="radio"/>				
School	<input type="radio"/>				
Home	<input type="radio"/>				
Convenient Store	<input type="radio"/>				
Dining out / Restaurants / Cafe	<input type="radio"/>				
Bank / Pharmacy	<input type="radio"/>				
Work / Office	<input type="radio"/>				
Bars	<input type="radio"/>				
Outdoor/Recreational Activities - Soccer Games, Parks...	<input type="radio"/>				
Shopping Centers - Leisure: Clothing store, Jewelry Store...	<input type="radio"/>				
Shopping Centers - Errands: Grocery Store, Pharmacy...	<input type="radio"/>				
Appointments - Doctor's Office, Dentist...	<input type="radio"/>				
Bus / Transit Stop	<input type="radio"/>				
Other _____	<input type="radio"/>				

How would you feel if any of the following amenities were added along the trail?  
(Please rank your feelings about different elements)

Categories	Tell Us Why				
				<input type="checkbox"/> Needed / Helpful	<input type="checkbox"/> Not Needed / Intrusive
Benches / Trash Cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>
Signage / Educational Features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apartments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restaurants / Diner / Cafe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shops / Salons / Market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>

**DEMOGRAPHIC INFORMATION**

Please provide the following information about yourself.

Please indicate your gender.

- Male
- Female

Please indicate your age.

- 12 years old or younger
- 13 - 18 years old
- 19 - 25 years old
- 26 - 40 years old
- 40 - 65 years old
- 65 years old or older

Please indicate your racial/ethnic origin.

- White/Caucasian
- Hawaiian/Pacific Islander
- African American
- Latino/Hispanic
- East Asian/Asian American
- South Asian/ Indian American
- Middle Eastern/Arab American
- Native American/Alaskan Native
- Mixed Race
- Other \_\_\_\_\_

Do you consider yourself physically active?

- Yes
- No

Do you own or use a car regularly?

- Yes
- No

What best describes your living environment?

- Adult Living Alone
- Adult Living with Adult
- Adult Living with Children
- Adults Living with Children

Including yourself, how many people live in your household?

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or More

What best describes your home?

- Single Family House
- Town House/Duplex
- Multi-Family Unit - Apartment

Do you own or rent your home?

- Own
- Rent

How long have you lived in your current home?

- 1 year or less
- 1 - 3 years
- 3 - 10 years
- 10 - 20 years
- 20 years or more

Please indicate your household income.

- < \$25,000
- \$25,000 - \$50,000
- \$50,000 - \$100,000
- > \$100,000

**Thank you so much for completing the survey!**  
**Do you have any additional comments or concerns about Indian Creek Trail Study?**

**Would you be willing to participate in a future study??**  
*Future study would include interviews/focus groups discussing ways to improve the Indian Creek Trail. If so, please provide your contact information below!*

- Yes, I am interested, please contact me at:
- No, I am not interested

## SURVEY SUMMARY

93% of respondents stated that the trail was not difficult to use. 20% of people noted elements that made the trail difficult to use. Hills/Slope/Trail Material did not have a major impact on the difficulty of the trail. Visibility was stated to have the most impact on difficulty of use. Signage/Wayfinding/Accessibility were right behind visibility on having a noticeable impact on difficulty of use.

4

When asked what elements people liked or disliked about the trail, many stated they were neutral on most elements. On average, trail users noted that they were slightly unhappy with connections and pedestrian amenities. There were concerns with the connections to recreation areas and pedestrian connection infrastructure such as connecting sidewalks, designated crosswalks, and crossing signage.

5

On average respondents stated they were most unhappy with the scenery, trail material, and physical trail features. As expanded on through the comments, the scenery concerns were mostly due to lack of maintenance. Debris, trash, and mud/water overflow from flooding caused much disappointment when it came to scenery and the sensory qualities of the trail. The trail was noted to be slippery during rain events, which is why some disliked the trail material.

6

When asked what, elements need the most improvement along the trail; respondents stated signage and connections to destinations should be the top priority. With 15 and 18% of the total vote, but triple the number of responses than any other category. Access points and safety of the trail were the second highest rating for this question. With 12 and 13% of the vote and about double the number of responses than the other categories. Responses were fairly spread out over all answers, with most categories

7

getting 6-8 votes each; showing that all of the elements listed need some type of improvement. When asked what elements make the trail great the greatest response was the scenery and natural setting. With 20% of respondents listing this as a great amenity. Scenery and Access Points were two elements ranked the highest and lowest. Stating that they both needed

work and were great amenities. Through comments, interviews, and observations it was revealed that the discrepancy for scenery is mostly dependent on the different locations of the trail and the maintenance in different sections. The scenery and natural setting is highly valued by all users. People had issues with trash and debris along the trail that ruined the scenery around the trail. Different portions of the trail have different aesthetics as well. Each individual also has different opinions

on what can make good scenery. By fixing maintenance issues and keeping the trail clean however many of those negative responses could be mended. Access points also are very dependent on what sections of the trail people are using. Some areas of the trail are very accessible while other sections are not. The high ranking of physical trail features, scenery, and materials shows that the trail itself is considered a quality amenity.

8

People utilize the trail the most in the early evening, after work hours. People also stated they used the trail within the early morning, afternoon, and mid afternoon hours as well. The wide range of responses shows that the trail is highly used during all times.

9

All responses for time of the year were fairly equal, with approximately

20% of people stating they typically used the trail during the fall, summer, spring, and whenever it is nice out. The survey noted that people utilized the trail the most during the summer, with 22% of the vote. 13% of people noted they use the trail all year around. Only 3% stated they use the trail during the winter.

These results show that weather has a major affect on when people utilize the trail.

10

When asked specifically asked what elements affected trail use the maintenance/quality of trail, trail activity/events, safety, and trail conditions had little effect on when people use the trail. Weather, distance from home, time of day, and time availability had the greatest affect on trail use.

92% of respondents stated weather had an effect on their trail use. 76% of respondents stated their time

available and daily activities had an effect on their trail use.

Only 10% said trail activity and events had an effect on their trail use. Meaning race events, training or lack of use did not deter many users from utilizing the trail.

11

To go on a walk, run, bike, and exercise each were 20% of the total responses.

The majority of respondents stated they utilize the trail to bike. 38 people or 24% of users stated they use the trail to bike. Since biking, running, and walking can all be used for exercise, the majority of people use the trail for exercise. 18% of users stated they utilize trail to travel to a destination. Meaning 18% of trail users utilize the trail for transport purposes.

12

43% of users typically use the trail by themselves  
40% of users typically use the trail with others and by themselves.  
10% of users typically use the trail with others.

and the trail not being easily accessible from their house. The greatest response with 35% of the vote was that the trail was not near the places they went. Other reasons stated they did not know where trail was, had just moved to the area, or had never heard of the trail.

114 respondents live, work, or go to school within a walkable distance from the trail. A total of 11% live, work, or go to school within the lowest quarter mile walkability radius.

13

30 people that took the survey and stated they never utilize the trail. Their main reasons varied from the trail being too far away, the trail not being located to their destinations,

14

The survey revealed that approximately 40%-50% of all

15

From the survey high activity of use occurs in group 2 and group 4. A total of 56 answers were recorded.

16

When traveling to the trail 80% of users travel by foot or bike. Leaving only 20% to travel by car. This is a surprisingly large amount considering how few people in this area utilize active transport. The majority of trail users utilize the trail for recreation and exercise which could influence their travel choices.

17

Results showed that highest concentrations of where the

community travels are located in clusters near the Indian Creek Trail. This provides more evidence that major destinations throughout this region are located near the trail. Places near destination zones 3, 5, 6, and 11 had the most clicks/visitors.

Primary locations people traveled to were: Major schools such as JCCC, KU, STA, SMW, OE, and Restaurants such as Barley's Brewhaus, Salty Iguana, Starbucks, Einstein Brothers, Fuzzy's, Never on

18

Sunday, Coaches Bar and Grill, Convenience stores/Shopping Centers Quik Trip (QT), CVS/Walgreens, Commerce Bank, Hyvee, Walmart, Hen House, And businesses such as Wilson & Company, Garmin International, and Corporate Woods locations.

When traveling to destinations 66% stated they travel by car. 21% of respondents stated the

bike and 12% stated they walk to many destinations.

The average percentage of people who drive to work in this area is 91%. The average survey respondent percentage for people who bike to destinations was 25%, which is much higher than the typical population average.

The unusual difference shows that the Indian Creek Trail is a major transportation corridor, more people bike/walk than what has been

recorded in the past.

0% of respondents utilize public transit to get to the trail or destinations.

19

Over 10% of respondents stated that they travel to Work, Restaurants, Home, and Shopping Centers nearby.

Only 1% of respondents stated they travel to bus stops.

At least 4% of the population travels to every other location listed. This response illustrates that there are a variety of uses nearby the trail.

20

When asked if they would travel to the locations above by active transportation methods, 50% of respondents said no.

Weather and convenience were the

main reasons why respondents would not travel by foot or bike.

Distance and time available were additional reasons many stated they would not use active transportation.

Expanded explanations from the survey showed that the trail is connected to many locations but access points and transit connections limited people from using the trail for transport.

23

26% of respondents that utilize the trail stated they regularly use the trail for transport purposes.

24

For those who don't use the trail for transport, their primary reason was that the car is more convenient.

Travel time and trail accessibility were other top responses for why people do not utilize the trail for transport.

One high response was that the trail did not connect to destinations. When comparing these responses with locations of the site map, this proved to not be true. It showed that accessibility and connectivity was simply inconvenient, inefficient, and invisible. When comparing these responses with interview data it shows that many people in the area do not know where the trail leads or goes. Showing that there is also a great lack of connection and direction showing

people where to go.

Some users also stated that bicycle infrastructure was limited beyond the trail. This discouraged a lot of users from traveling by bike. This shows a need to enhance the trail walkability to the surrounding environment.

25

Walkability and active transportation is a lifestyle that is not highly practiced in the Kansas City area.

26

When respondents were asked if reasons why they don't use the trail for transport purposes were fixed would they travel by foot or bike, 49% said No.

To find out what types of location people would be willing to walk to people were asked to rank the probability they would travel to different types of locations. Respondents were most likely to

travel to their home, to recreation locations, and to work. From 60%-70% of respondents were unlikely to travel to church, shopping centers, and appointments.

## INTERVIEWS

Walkability in Suburbia- a feasibility study for multi-use trail systems in Kansas City

### Interviews

Assuming these residents/groups either go to school/work/shop in the areas where I am traveling

The terms school/work/shop would be replaced by the place of business I am visiting.

Also the Interviews are separated into sections depending on the time the interviewees have to answer questions.

1.1) Have you ever been on the Indian Creek Trail??

- Yes
- No
- 

1.2) How often do you use the Indian Creek Trail??

- More than once a week
- Once a week
- A few times a month
- Every month
- A few times a year

1.3) What do you use the Indian Creek Trail for??

- Exercise
- Leisure
- Connect to parks
- Transport

1.4) Do you use the Indian Creek Trail to travel to school/work/shop?

- Yes
- No
- Why? \_\_\_\_\_

2.1) How far away do you live from the creek?

2.2) How far away do you live from the school/work/shop??

Draw distance/route from Neighborhood you live in to school/place/shop using the Indian Creek Trail.

Circle locations you visit regularly

2.3) Which one of those would you travel to using the Trail?

2.4) Which one of those would not travel to using the Trail?

2.5) What prohibits you from using the trail from traveling to these locations??

3.1) Do you like the Indian Creek Trail?? Why??

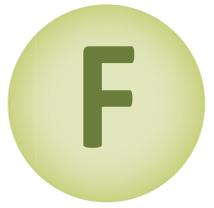
- Proximity to my house
- Recreation opportunities it provides
- Connections it creates
- Increases my property value
- Family friendly
- Safe

3.2) What do you not like about the trail??

- Trash everywhere
- Lack of pedestrian amenities
- Seating
- Trash cans
- Doggie Bags
- Water Fountains
- Unsafe
- Not enough lighting
- Lack of connections from my house
- Lack of connections to my destinations

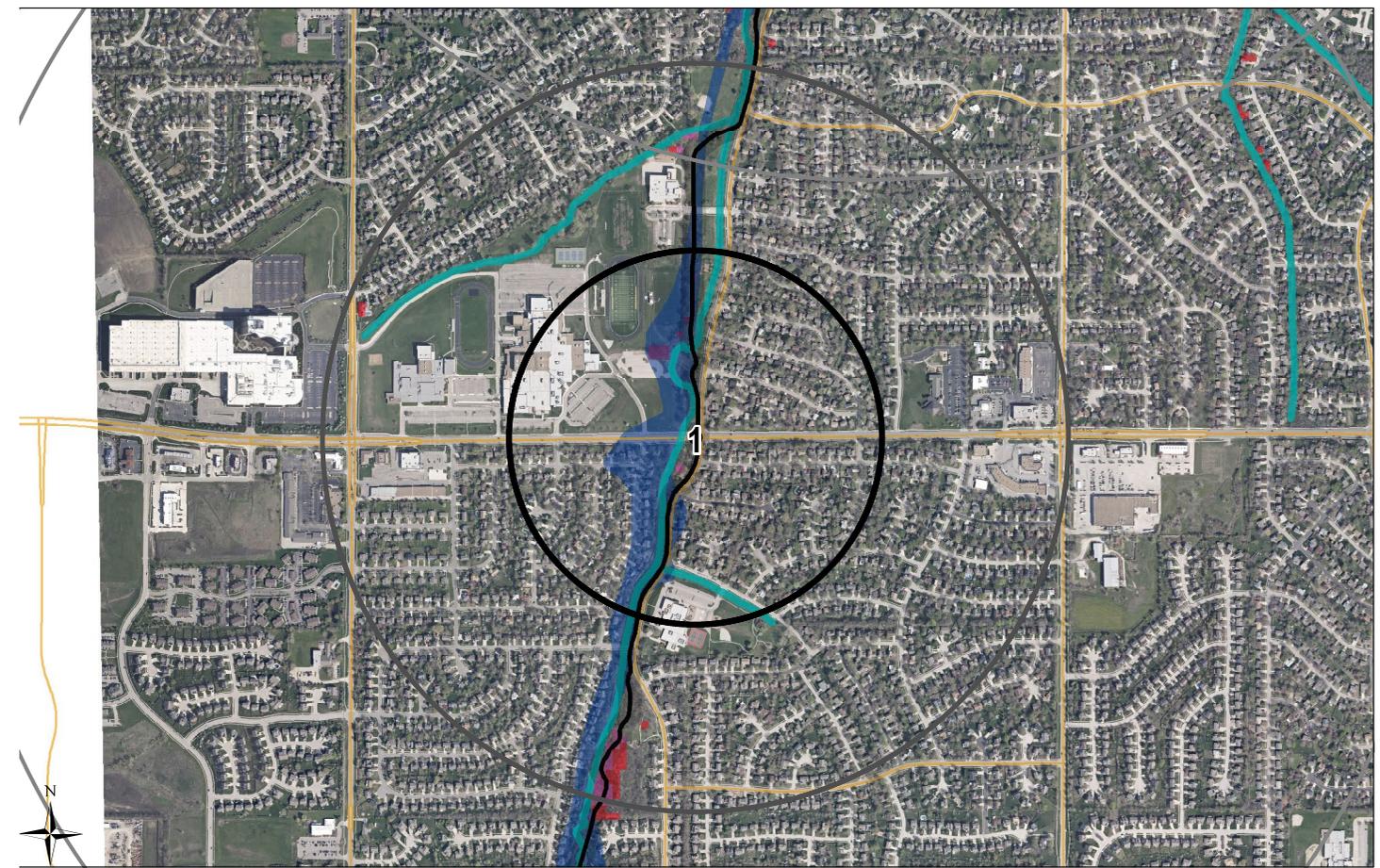
3.3) What improvements do you think should be made to the trail??

- Consistency of paving
- More upkeep in maintenance
- More signage/wayfinding



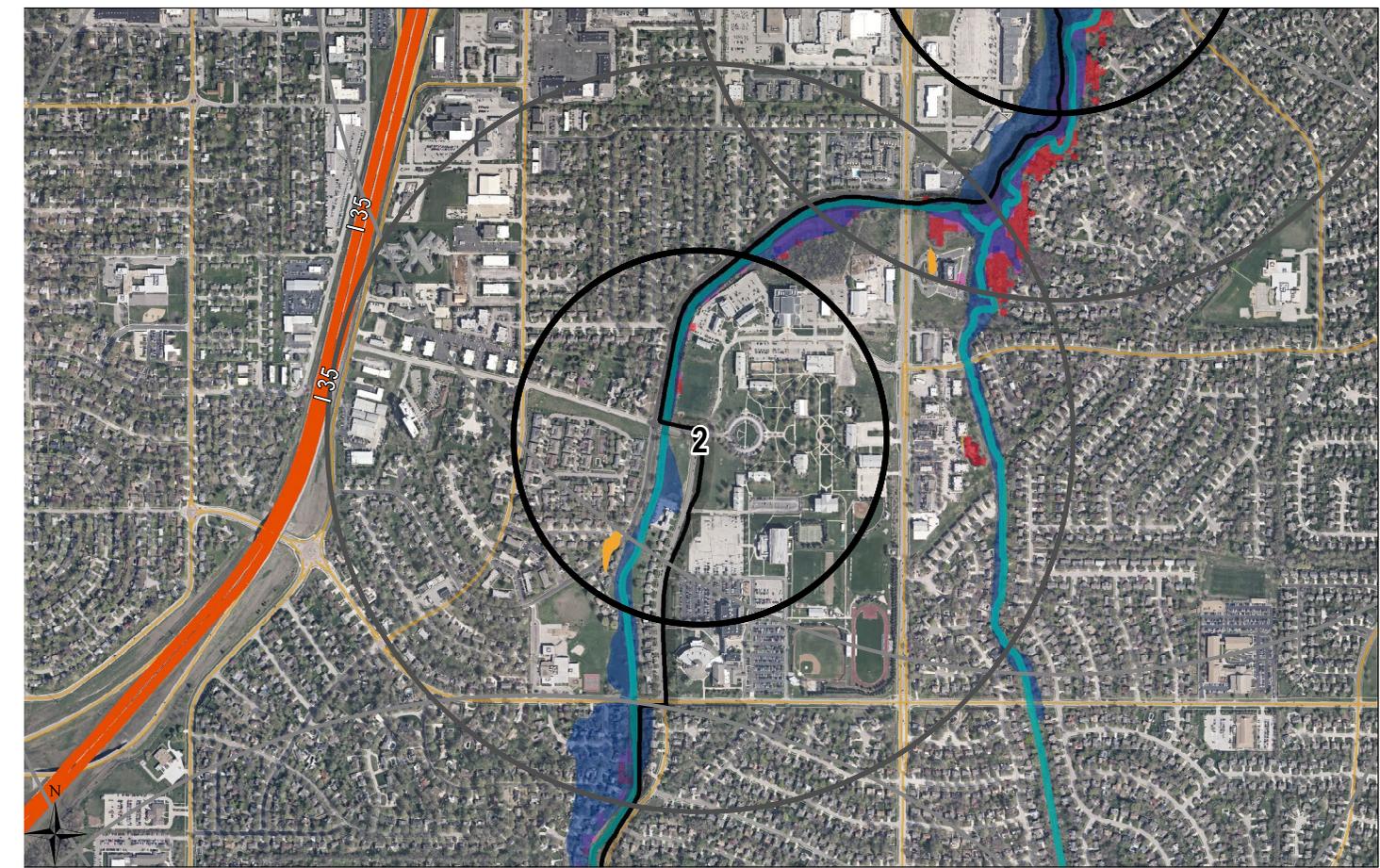
# APPENDIX F

### DESTINATION ZONE 1 CONSTRAINTS



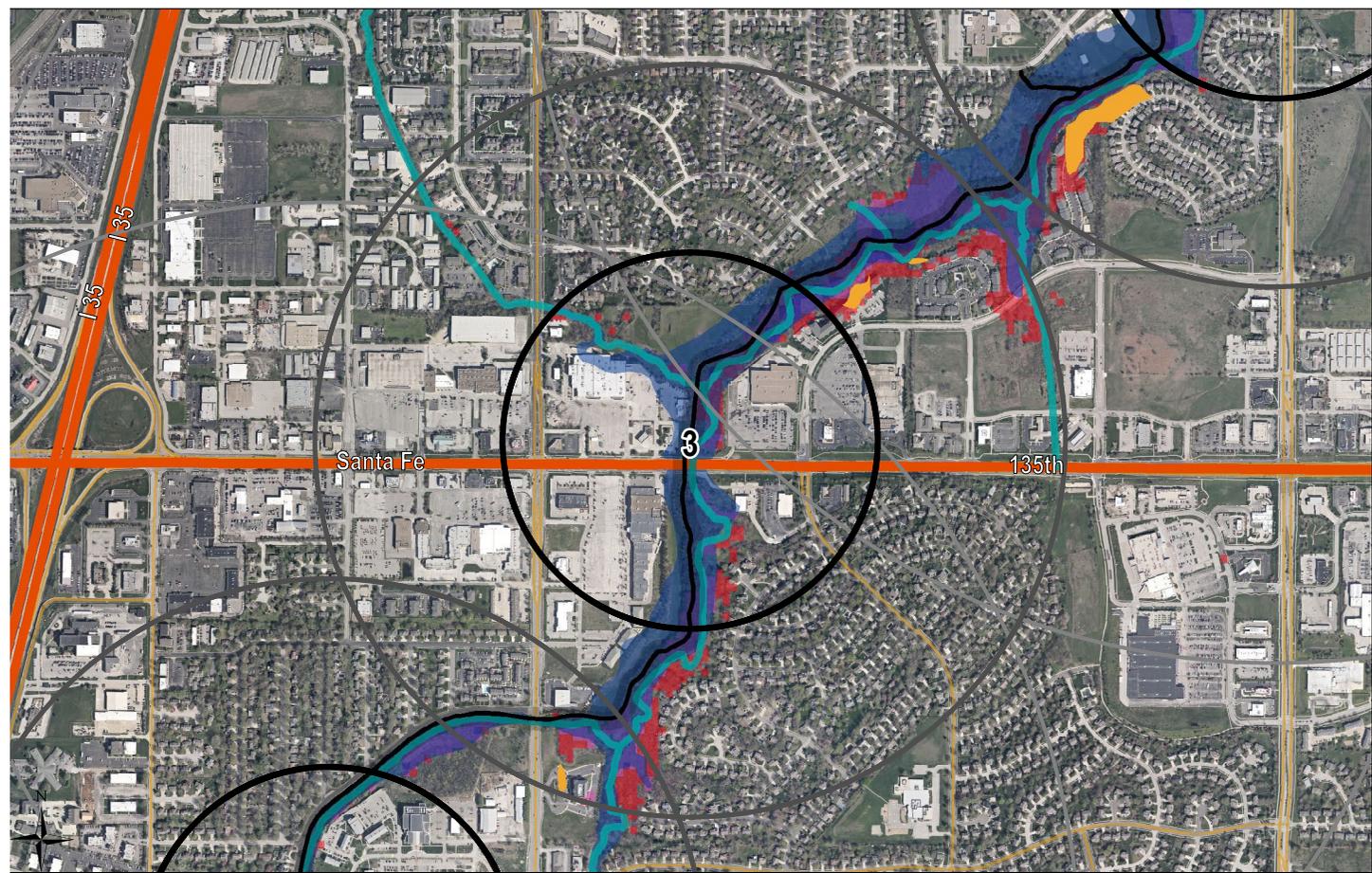
1 inch = 600 feet

### DESTINATION ZONE 2 CONSTRAINTS

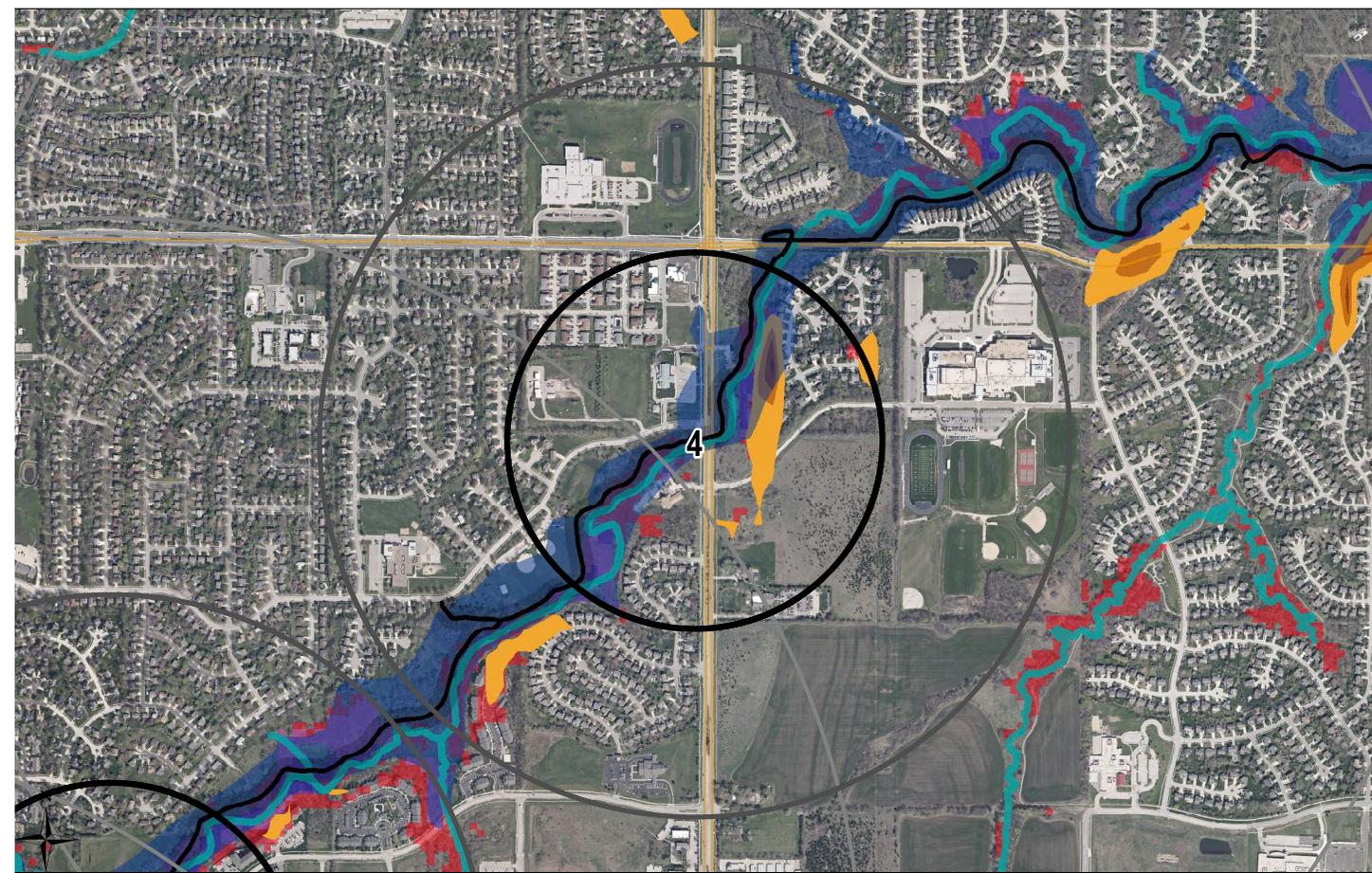


1 inch = 600 feet

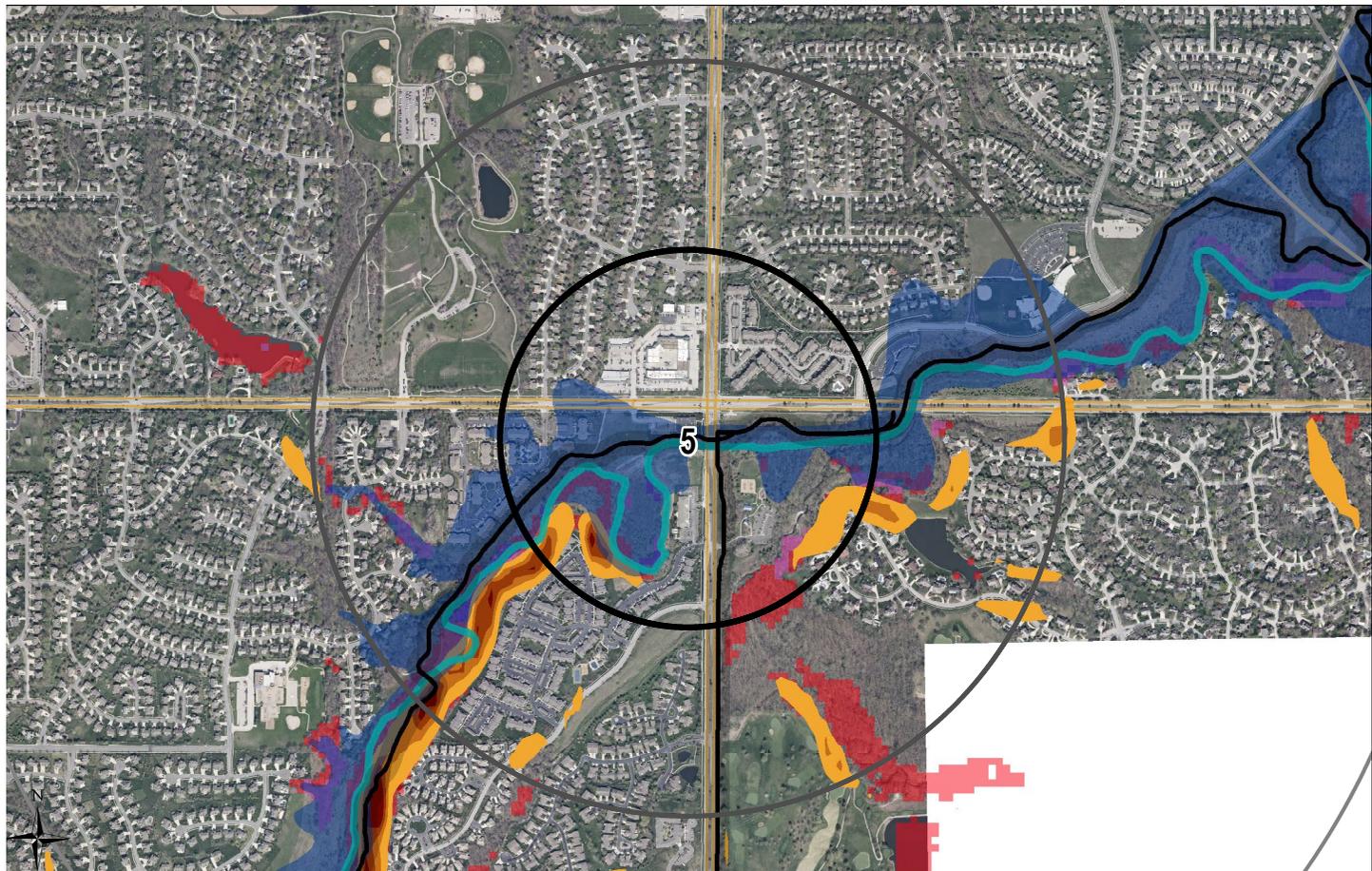
DESTINATION ZONE 3 CONSTRAINTS



DESTINATION ZONE 4 CONSTRAINTS

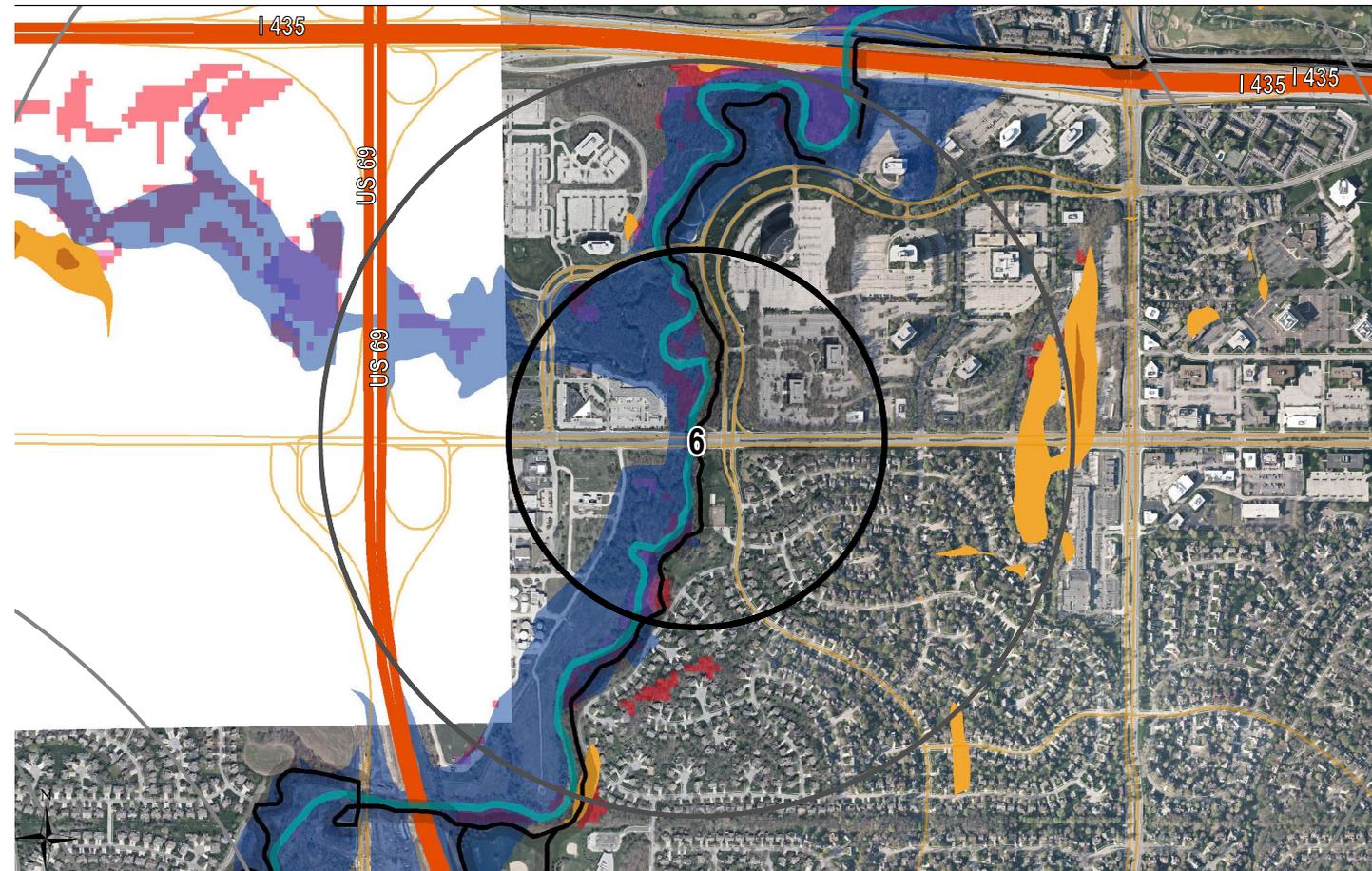


DESTINATION ZONE 5 CONSTRAINTS



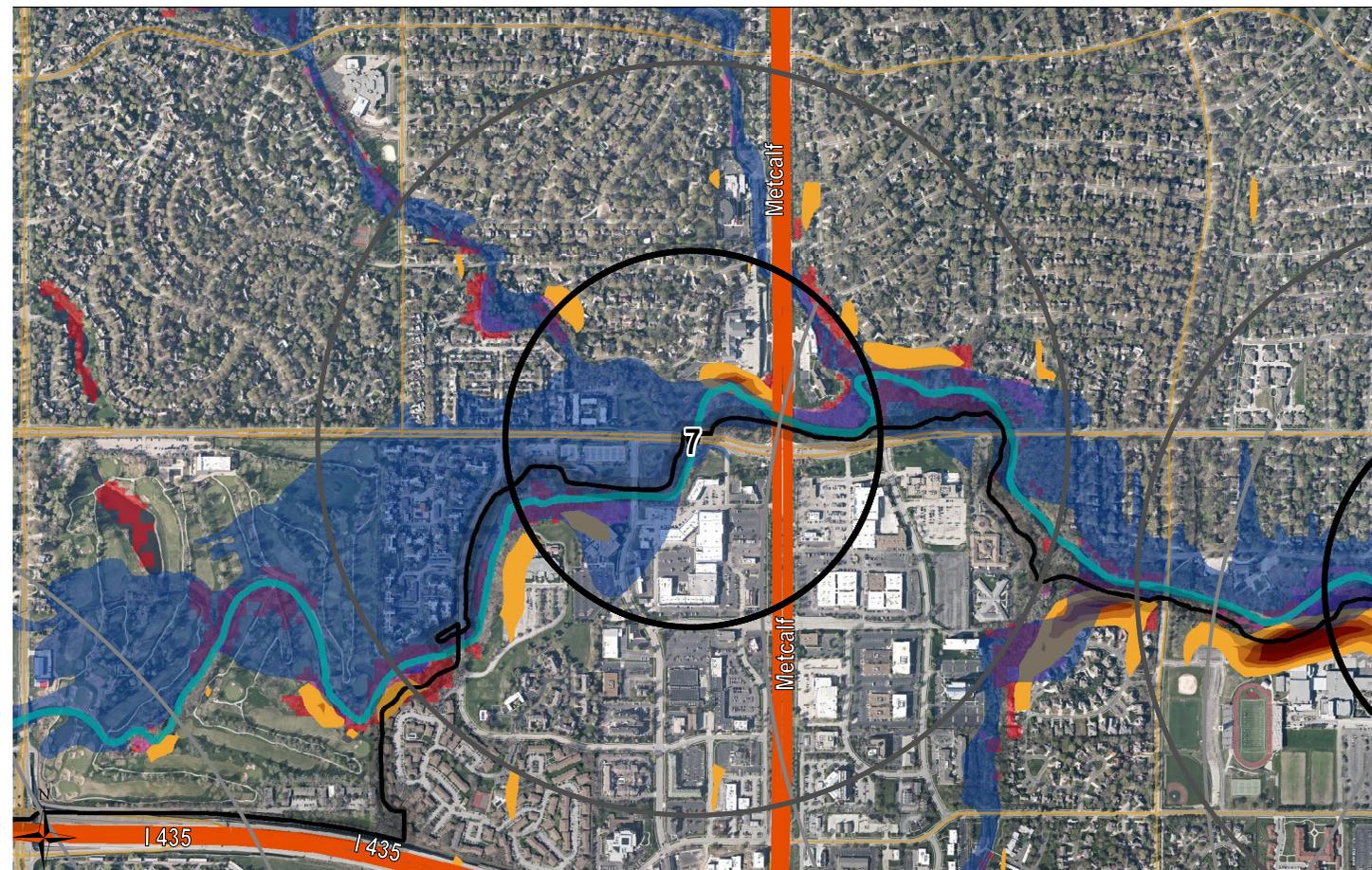
1 inch = 600 feet

DESTINATION ZONE 6 CONSTRAINTS

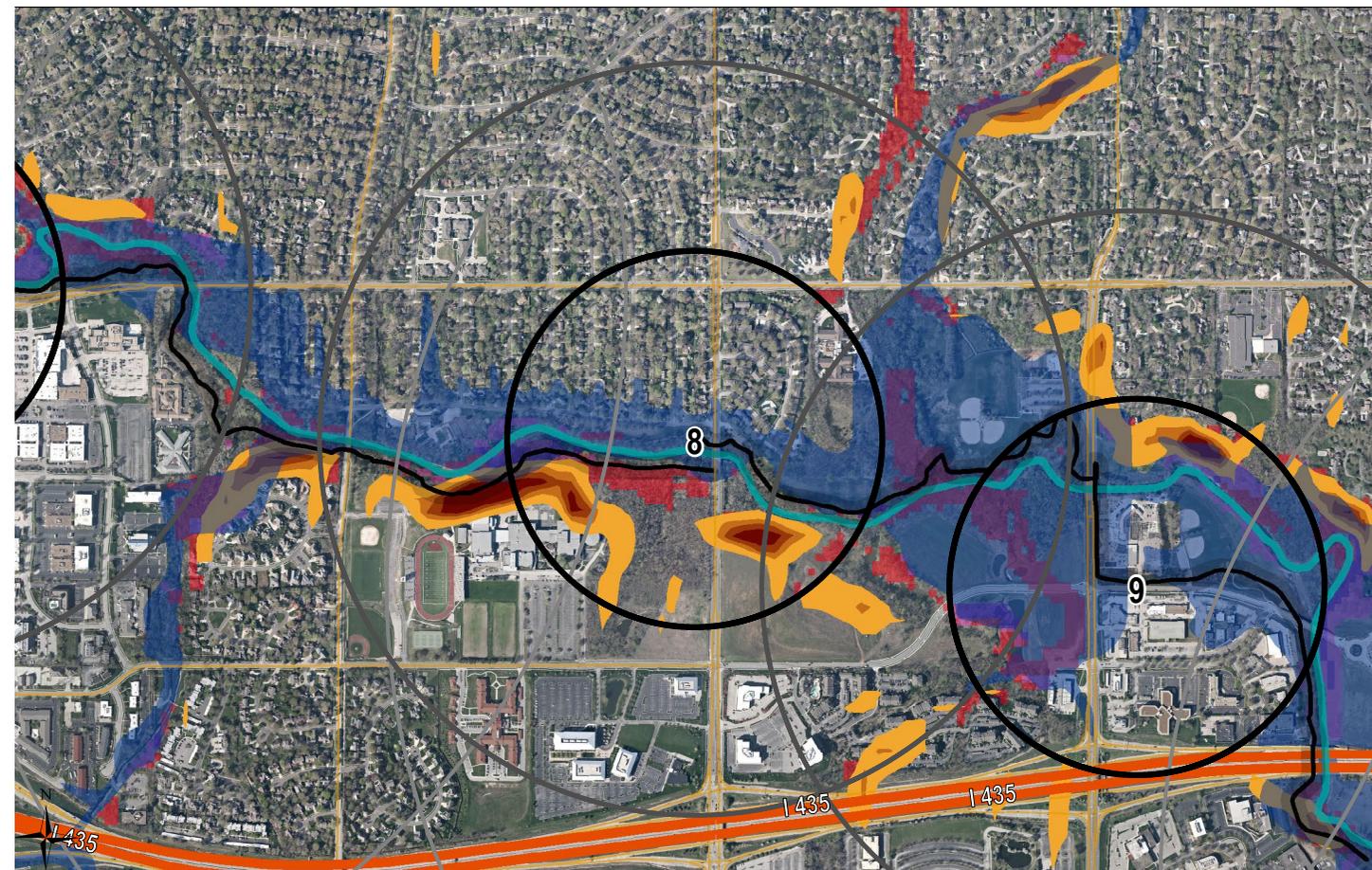


1 inch = 600 feet

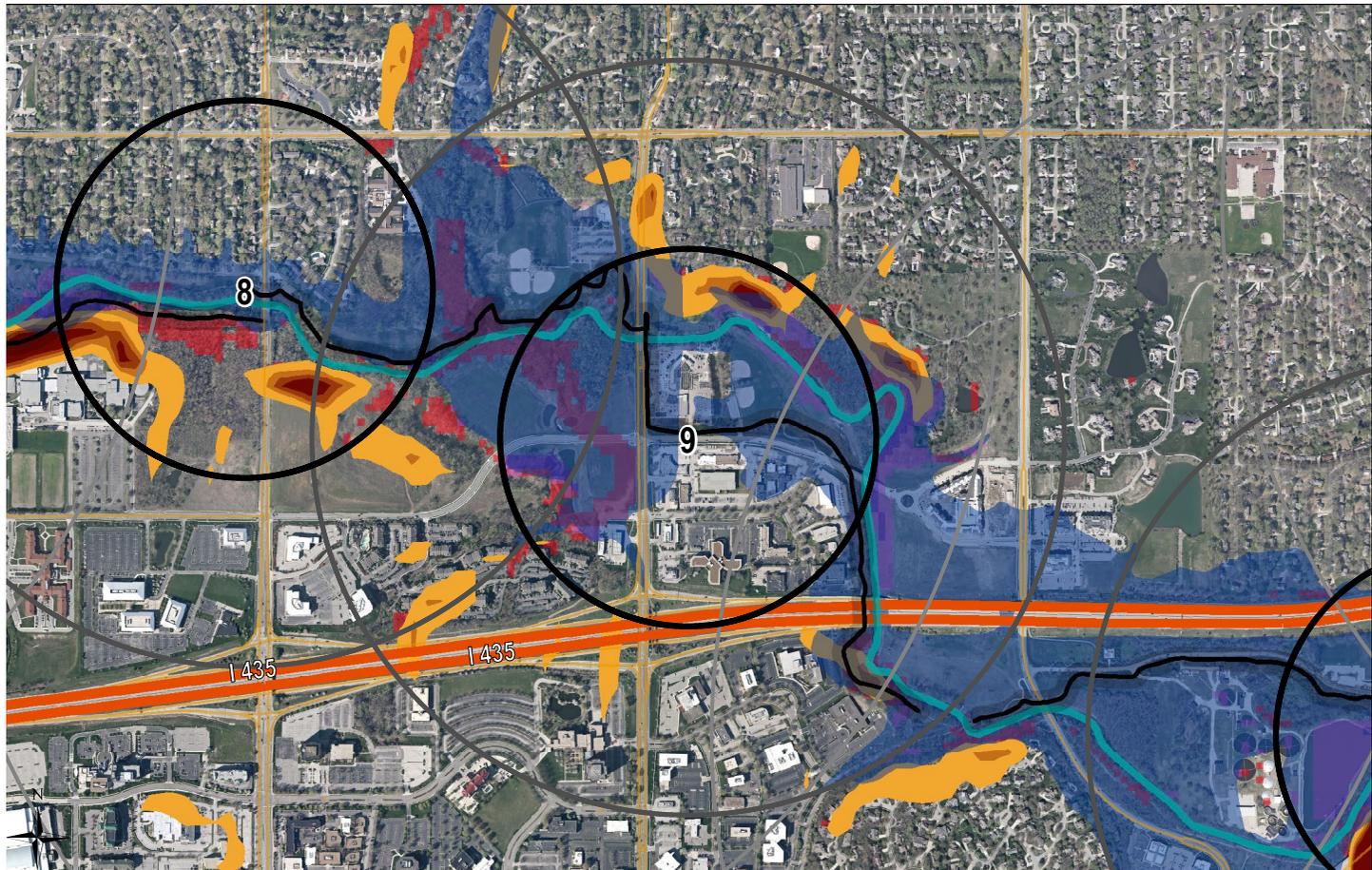
### DESTINATION ZONE 7 CONSTRAINTS



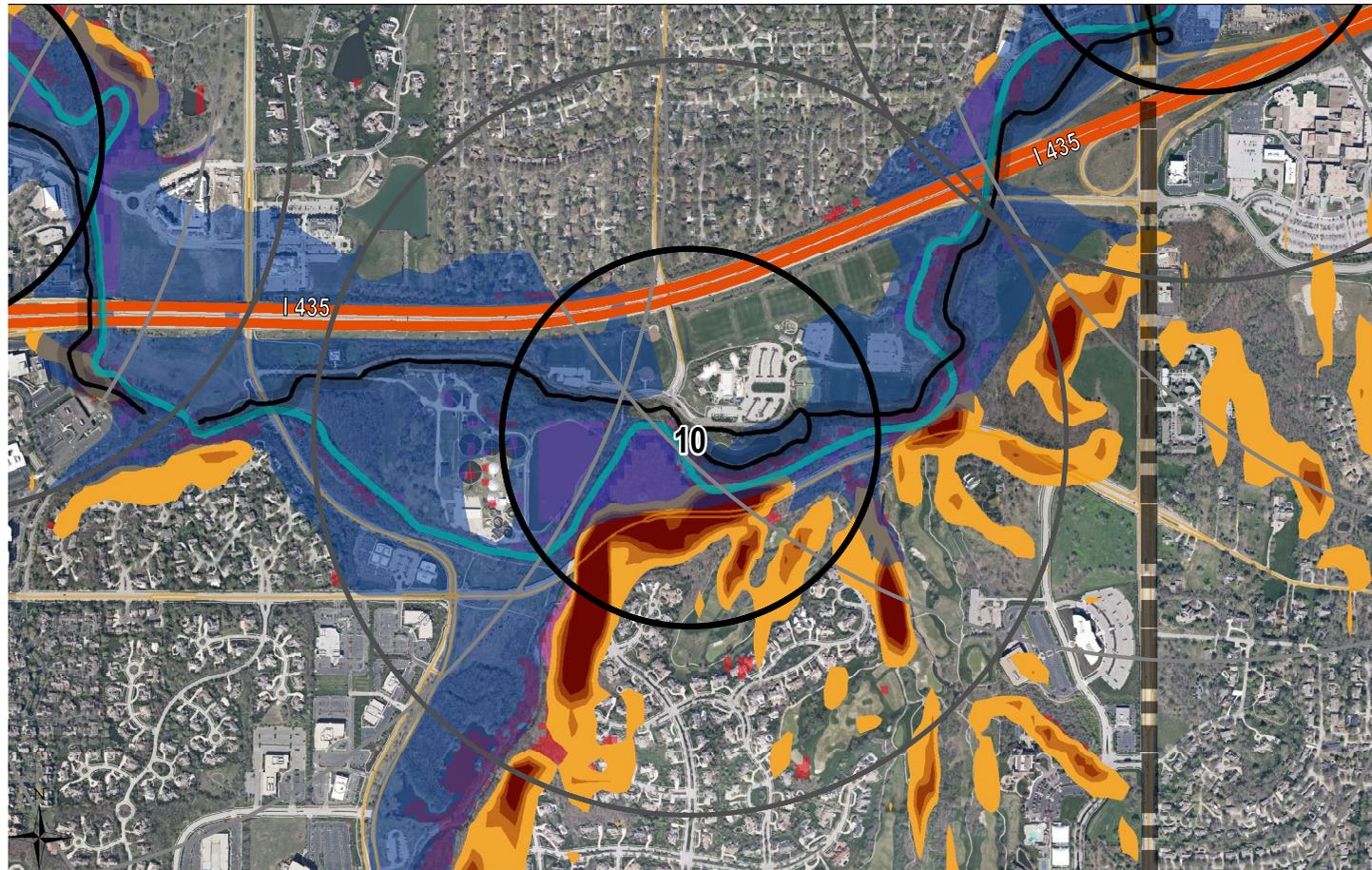
### DESTINATION ZONE 8 CONSTRAINTS



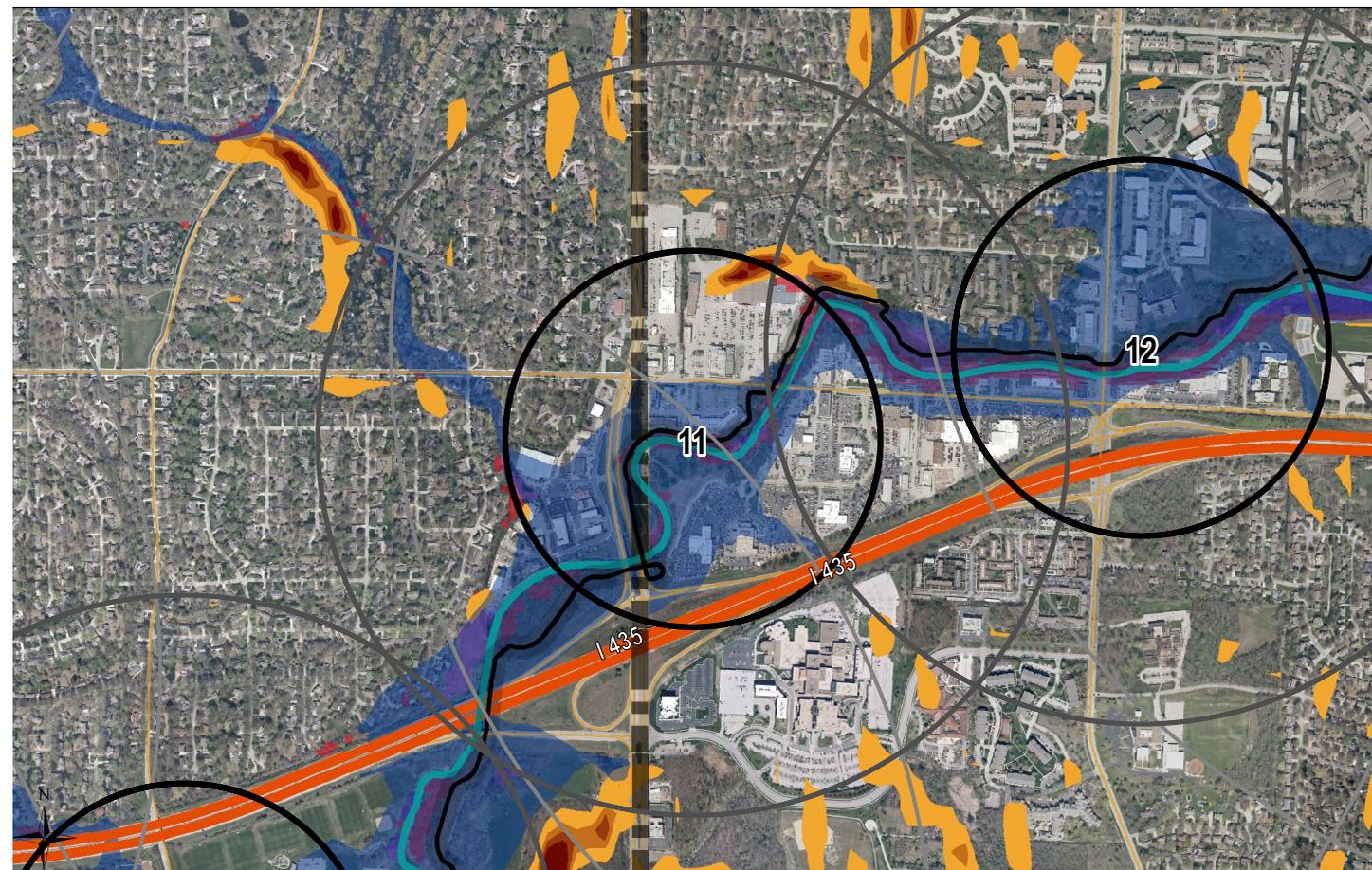
DESTINATION ZONE 9 CONSTRAINTS



DESTINATION ZONE 10 CONSTRAINTS

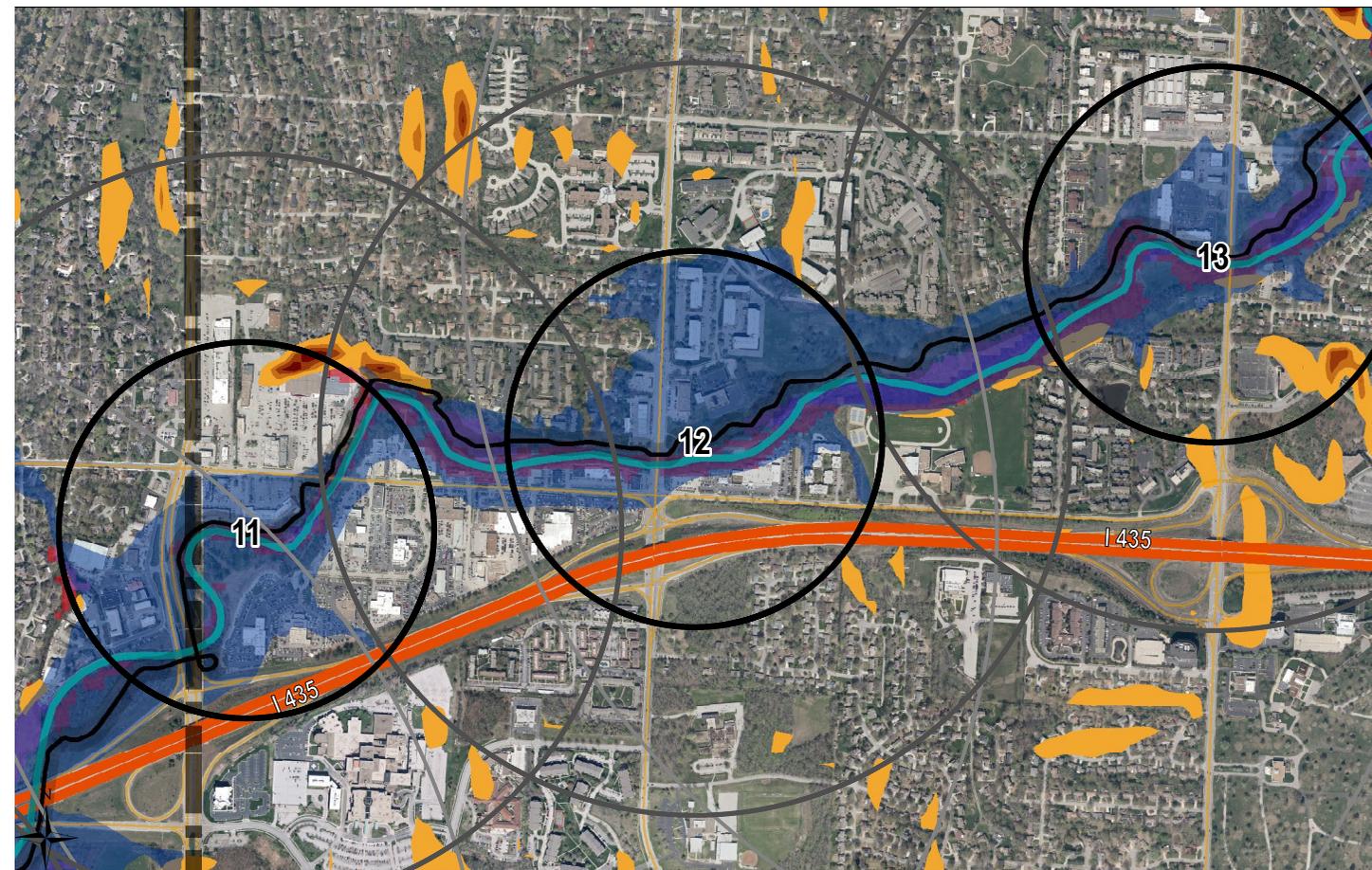


### DESTINATION ZONE 11 CONSTRAINTS



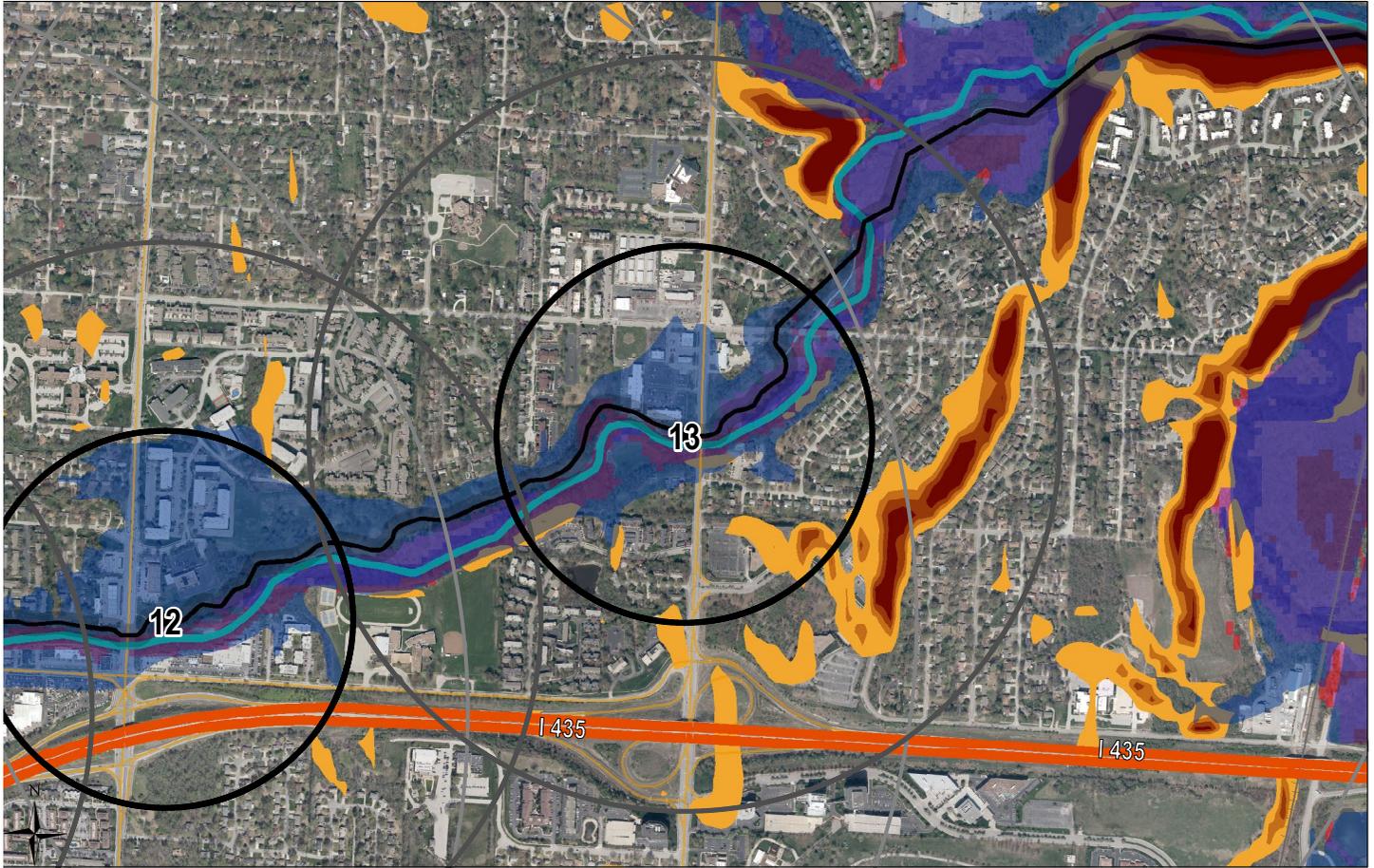
1 inch = 600 feet

### DESTINATION ZONE 12 CONSTRAINTS



1 inch = 600 feet

DESTINATION ZONE 13 CONSTRAINTS



1 inch = 600 feet



## DESTINATION ZONE 1 ANALYSIS

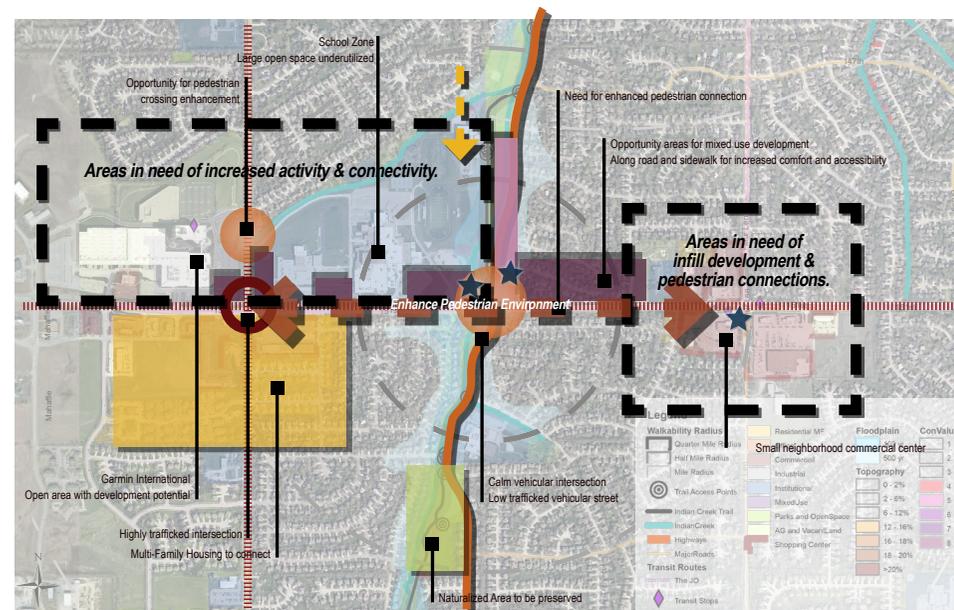


Figure 1 | Analysis of Destination Zone 1.ai

Destination Zone 1, the Ridgeview/Olathe South Node, is located east of the intersection of 151st Street and Ridgeview Road as shown in figure \_\_. The Indian Creek Trail in this zone is directly accessible from South Lindenwood Drive, which is a low trafficked residential street with the potential to become a pedestrian

corridor. Residents and businesses in this zone are segregated by use and major vehicular roads. The amount of open space surrounding the big box development, leaves opportunity for mixed use infill to increase activity and enhance the pedestrian environment.

Destination Zone 1 was observed

at three separate times, two during morning hours and one during a lunch hour. Two of the observation times were completed in below 40 degree temperatures and one was completed in above 60 degree weather.

Zone 1 had the third highest number of visitors, showing that it is one of the most used locations along the trail. The high use could be contributed to factors observed in the site analysis.

### Opportunity Factors that make this node opportunistic to walkability are:

- Trail is directly visible the road and easily accessible.
- Trail is in good condition for all modes of travel.

### Constraint Factors that hinder a walkable environment are:

- Large scale segregated land use
- Single use area

## DESTINATION ZONE 2 ANALYSIS

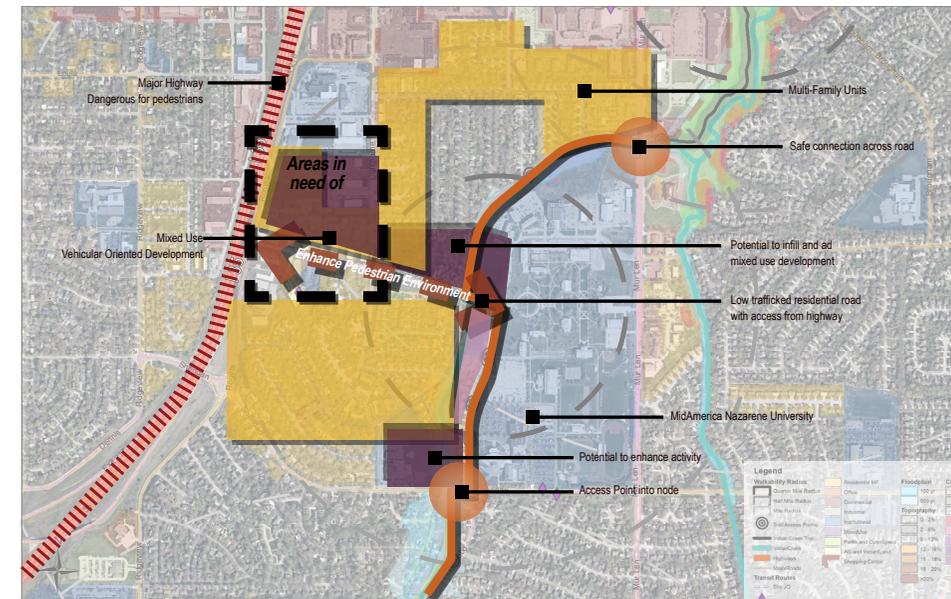


Figure 1 | Analysis of Destination Zone 2.ai

Destination Zone 2, adjacent to MidAmerica Nazarene University, is located right along the eastern edge of MNU as shown in figure \_\_. MNU has approximately 1,800 students and hundreds of employees that make this node an active place. Along with multi-family units and a low trafficked residential street, this

node has potential for a walkable environment. Major barriers include the segregation of land use and sprawled large scale buildings.

The condition and pattern of the trail in this zone is similar to the physical conditions in zone 1. The trail is easily accessible and visible from the road

and in good condition. The Indian Creek Trail in this area is currently under construction and is impassable for approximately 1,000 feet. Due to the trails proximity to the road, the construction seems to only have minor limitations on current trail use. Observations noted 27 users per hour, which is the average use found from all areas of the trail. Observations were noted near the intersection of Willow Drive and Mur-len Road due to the construction barrier.

### Opportunity Factors that make this node opportunistic to walkability are:

- Trail is directly visible the road and easily accessible.
- Trail's location next to education center near highway.
- Multi-family housing nearby.

### Constraint Factors that hinder a walkable environment are:

- Segregated land use

### DESTINATION ZONE 3 ANALYSIS

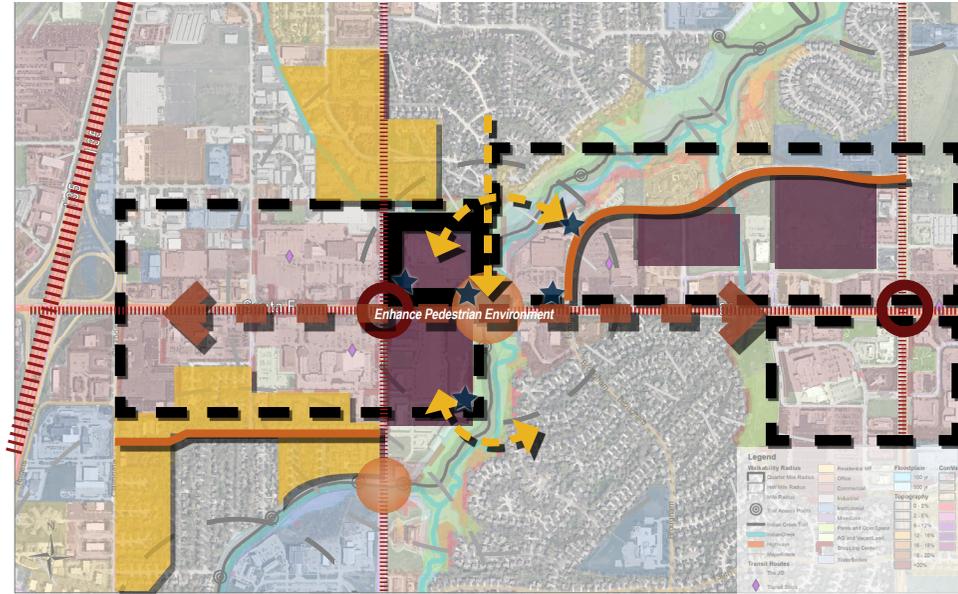


Figure 1 | Analysis of Destination Zone 3.ai

Destination Zone 3, the Taco Bell Node, is located just east of the Mur-len and 135th street intersection as shown in figure . The Indian Creek Trail in this area is separated from the road and businesses by steep topography.

The trail in this area is in decent condition; it was built earlier than the

sections of trail in destination 1 and 2. Due to its age there is a lot more wear and tear on the trail with a few cracks and patches. It is directly connected to businesses on the west side of the trail but completely segregated by the creek from businesses on the east. By adding infrastructure, the trail could easily connect to all areas of activity.

Observations noted an average of 43 users an hour, slightly higher than the overall trail average. It was observed during many periods of rain and sunshine and showed to have a very large average of solo users. Combined with characteristics of transport use, this section of the trail seemed to be used as a pass through space. Opportunities to connect the road to the trail can help increase use of the trail and surrounding businesses.

#### Primary Walkability Opportunities:

- Trail is adjacent to many commercial areas.
- Trail is a highly active environment.

#### Primary Walkability Constraints:

- Big Box stores with large parking lots
- Steep topography and disconnect.
- Limited accessibility.

### DESTINATION ZONE 4 ANALYSIS

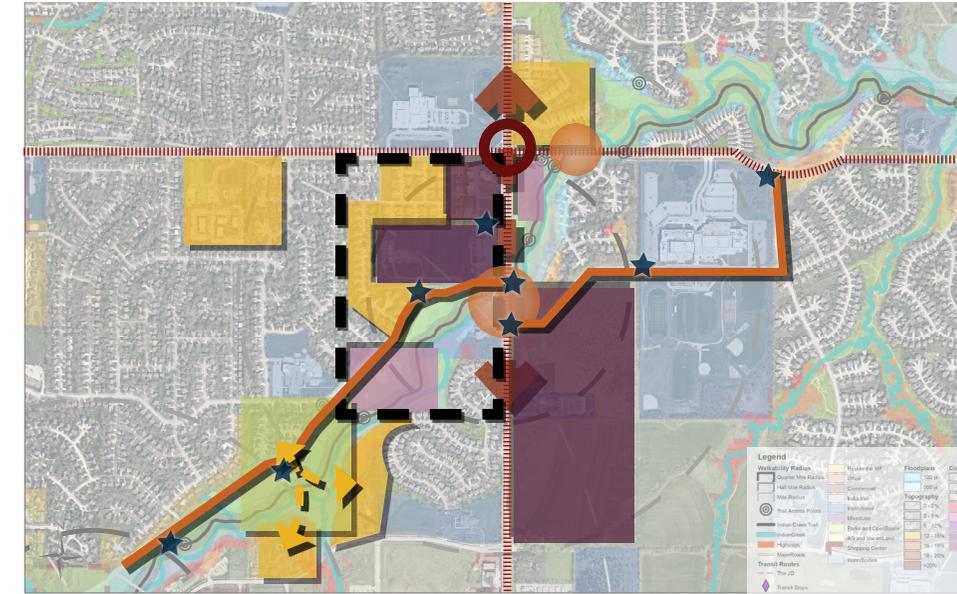


Figure 1 | Analysis of Destination Zone 4.ai

Destination Zone 4, located just south of the Olathe Public Library, is centered between the Olathe Public Library and Olathe East High School along Blackbob as shown in figure . The Indian Creek Trail in this area is easily accessible from the road and contains a designated trail head entrance.

Construction along 127th street has completely closed off the trail in this area and segregated the East and West side of Blackbob. Detours were limited and still ran along construction from the main road. The construction seemed to account for the low observation count. The trail averaged only 4 users per hour,

which contradicted findings in survey and interview data.

The trail in this section is in very good condition and easily accessible from the road. It connects a variety of uses and seems to have great potential.

#### Primary Walkability Opportunities:

- Trail is directly visible the road and easily accessible.
- Trail is located directly adjacent to many businesses and residences.

#### Primary Walkability Constraints:

- River segregates land use and creates limited access from some areas.
- Signage and direction are limited.

DESTINATION ZONE 5 ANALYSIS



Figure 1 | Analysis of Destination Zone 5.ai

Destination Zone 5, the Jimmy Johns node, is centered on the intersection of Quivera and 119th street as shown in figure \_. The Indian Creek Trail in this area is located directly adjacent to businesses and near Johnson County Community College.

This zone is unique due to the recent

development along the trail and connection to multi-family housing.

The new development in this zone was built at the end of October. The Jimmy Johns illustrates the type of infill development that can be proposed along the trail. Observations were recorded before and after the

Jimmy Johns was built. This node was the highest used node with an average of 79 trail users per hour, with slightly higher averages after the Jimmy Johns was built.

The trail is in good condition and contains signage directing people to the trail. Many areas however are segregated and do not have easy access to the trail or surrounding land.

**Primary Walkability Opportunities:**

- Multi-family housing directly connected to trail.
- Highly active environment.

**Primary Walkability Constraints:**

- Steep topography and disconnect.
- Limited accessibility and visibility from main roads.
- Single use residential and recreation environment.

DESTINATION ZONE 6 ANALYSIS

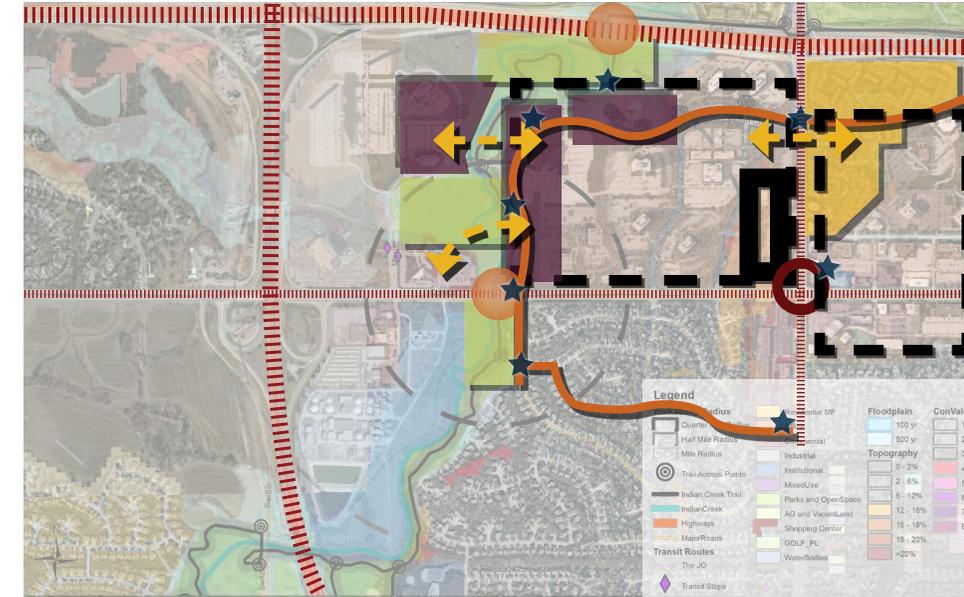


Figure 1 | Analysis of Destination Zone 6.ai

Destination Zone 6, located within the Corporate Woods Business Park, is located just east of the College and Antioch intersection as shown in figure \_. The Indian Creek Trail in this area is unique due to its location within Corporate Woods and its direct connectivity to businesses.

This node is surrounded by major roads and highways creating a great disconnect between the business district and surrounding environment.

The internal road of this business campus is set up like a parkway. It is massively over-scaled for its use, containing 4-5 lanes and a large

median. The businesses are then segregated from the main internal road my massive parking lots that take up the majority of the land area. The trail runs adjacent to this road and has enormous opportunity for connection.

Observations showed a great variety of users and an average of 25 users per hour.

**Primary Walkability Opportunities:**

- Location within a business park.
- Easily accessible and visible from internal road.

**Primary Walkability Constraints:**

- Single use environment.
- Large scale buildings and parking lots.

### DESTINATION ZONE 7 ANALYSIS



Figure 1 | Analysis of Destination Zone 7.ai

Destination Zone 7, the Metcalfe Node, is located along the intersection of Metcalfe and 103rd as shown in figure 1. The Indian Creek Trail in this area surrounds the major commercial environment but is not directly connected to the primary businesses.

vehicles is the primary issue that is creating a walkable environment. Over 80% of the commercial development in this node is parking lot or roadway space. It creates a very uninviting area for pedestrians and diminishes the amount of activities that can take place.

The vast expanse of space allotted to

#### Primary Walkability Opportunities:

- Vacant parking lots to infill and create public spaces.
- Major Businesses with lots of activity

#### Primary Walkability Constraints:

- Single use development and big box layout creates great distances between buildings.
- Massive parking lots that separate stores.
- Major roads that provide pedestrian hazards.

### DESTINATION ZONE 8 ANALYSIS

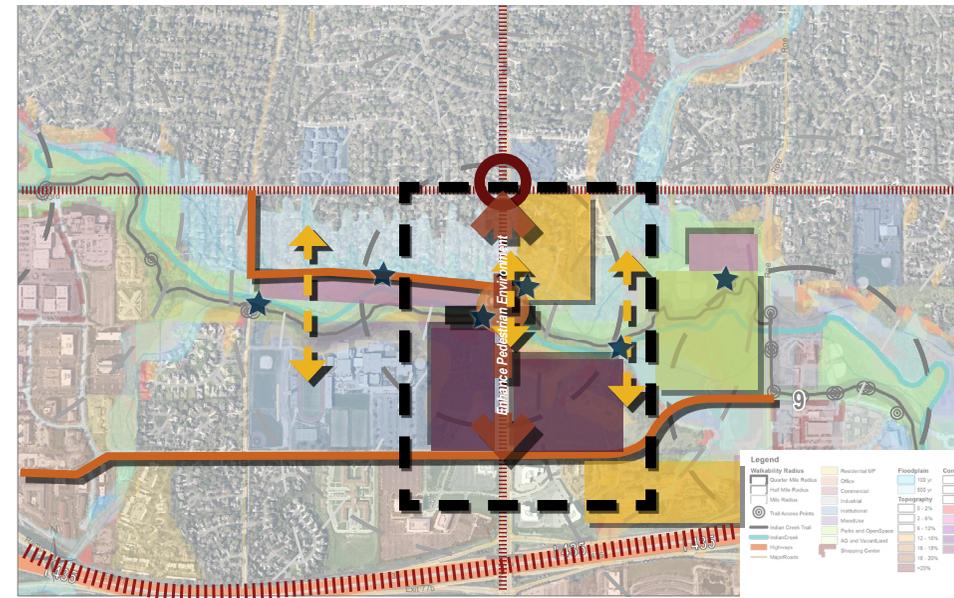


Figure 1 | Analysis of Destination Zone 8.ai

Destination Zone 8, centered just west of Nall road, is located just south of the Nall and 103rd intersection as shown in figure 2. The Indian Creek Trail in this area splits and creates a major disconnect between businesses and residences.

The Indian Creek Trail is disconnected for about half a mile. The trail runs under Nall road on the north side of Indian Creek and continues on the South side of Indian Creek. The limited signage and infrastructure further segregate the segments of

the trail and makes connectivity and access difficult.

The river is the major barrier within this node. Not only does it create a physical barrier but it creates a disconnect and flooding hazard.

#### Primary Walkability Opportunities:

- Close Proximity to residences.
- Numerous parks and recreational facilities that makes a highly active trail environment.

#### Primary Walkability Constraints:

- Limited Signage
- Disconnected and separated trail.

### DESTINATION ZONE 9 ANALYSIS

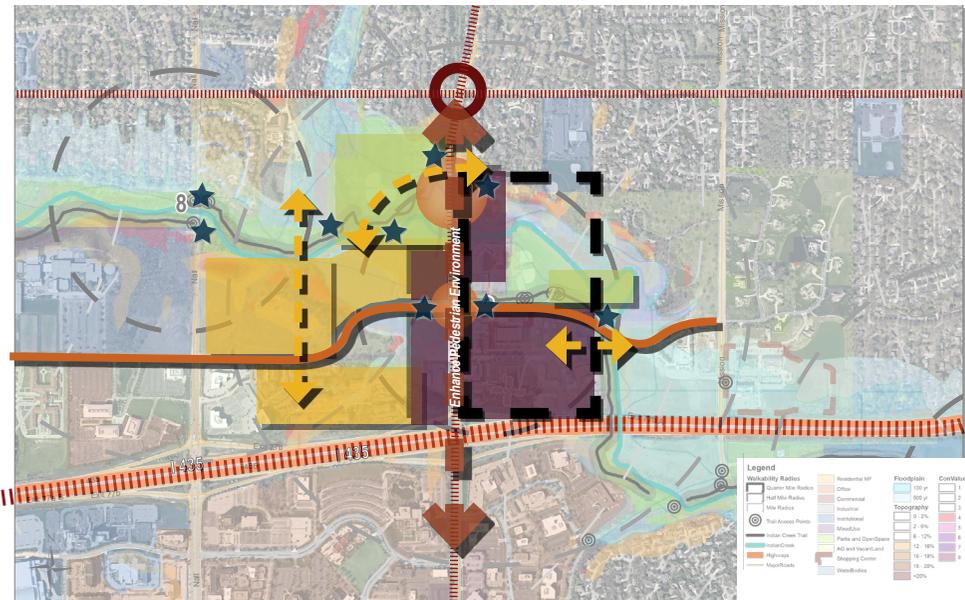


Figure 1 | Analysis of Destination Zone 9.ai

Destination Zone 9, the Roe Node, is located just south of the Roe and 103 street intersection, and just north of I-435 as shown in figure \_\_. The Indian Creek Trail in this area located within a park but also runs next to a mixed use environment.

This zone is surrounded by low dense residential units but near by small neighborhood shopping centers and large business and commercial districts. It provides a lot of diversity that isn't seen in many Kansas City regions. The small mixed use district is also very visible from the road, next to the trail, and has some

pedestrian entrances. Since the Indian Creek Trail in this area is highly used by recreational users, this is a perfect opportunity to connect to surrounding businesses.

#### Primary Walkability Opportunities:

- Nearby mixed use districts.
- Connected to residences.

#### Primary Walkability Constraints:

- Limited signage.
- Limited density.
- Limited access to nearby residences.

### DESTINATION ZONE 10 ANALYSIS

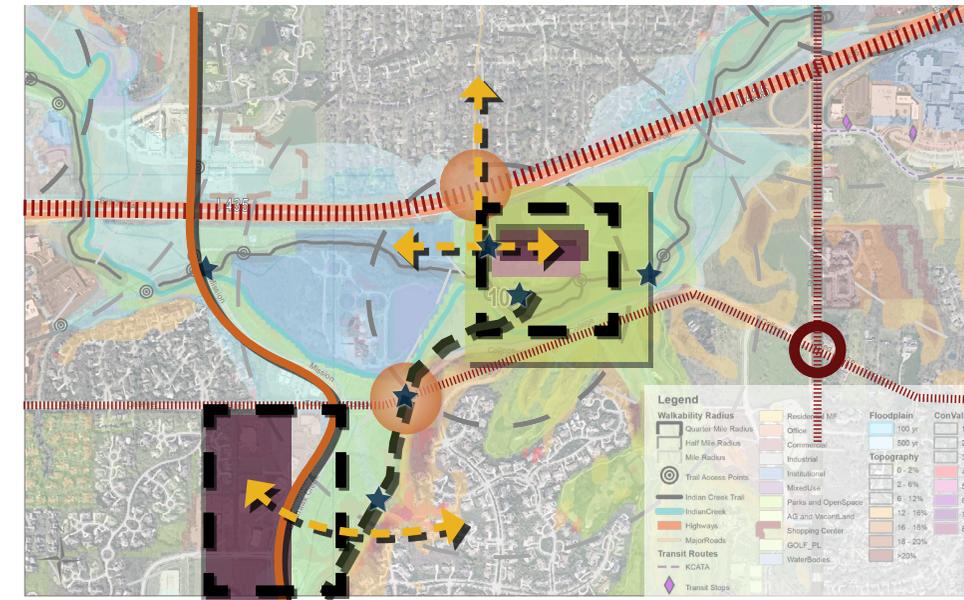


Figure 1 | Analysis of Destination Zone 10.ai

Destination Zone 10, centered completely within the Leawood Park, is located just east of the College and Mission intersection as shown in figure \_\_. The Indian Creek Trail in this area is unique due to its location within Leawood Park, completely surrounded by recreational use.

The trail in this node is very segregated and not visible from main roads. It joins with Tomahawk Creek Trail and Leawood Park Trails which causes great confusion and disorientation. Added signage and paving markings could improve readability and direction.

Observations showed an average of 55 users per hour. This node is primarily all used for recreation and contains limited infrastructure for transport use.

The trail in this node is in great condition with consistent paving, limited cracks, and easy access.

#### Primary Walkability Opportunities:

- Large open areas that can be used for development.
- Easily accessible and visible from internal road.

#### Primary Walkability Constraints:

- Single use environment.
- Large scale parking lots and segregated recreational use.
- Limited signage and wayfinding.
- Disconnected from surrounding uses.

DESTINATION ZONE 11 ANALYSIS

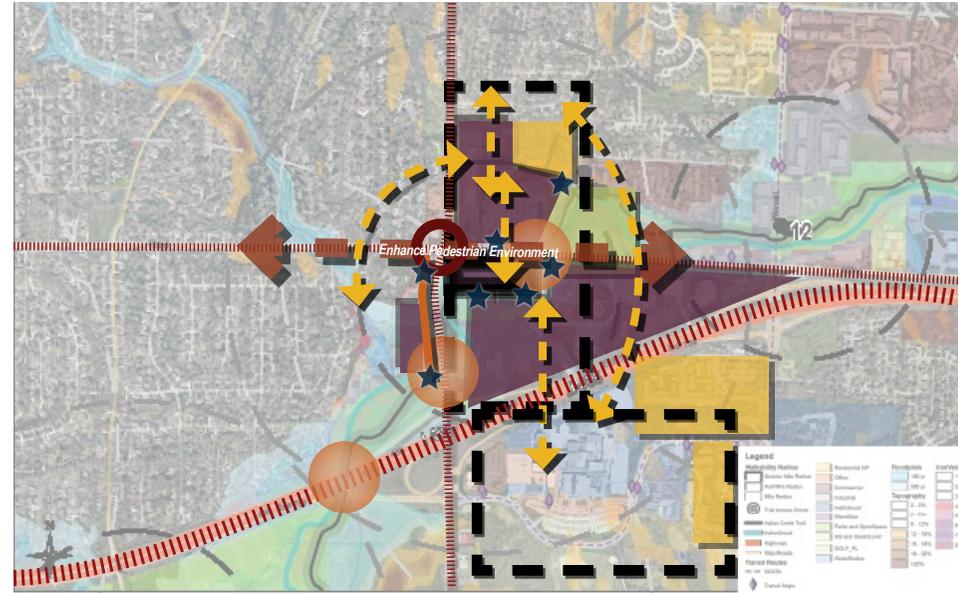


Figure 1 | Analysis of Destination Zone 11.ai

Destination Zone 11, bordering numerous businesses, is located directly along Indian Creek just North of I-435 as shown in figure \_\_. It is centered just south and west of the Stateline and 103rd intersection. The Indian Creek Trail in this area is directly connected to adjacent buildings and an historic park.

The area is already set up for a walkable environment, but due to vehicular oriented planning, the area is not very walkable. Large scale commercial buildings are segregated by large parking lots and roads making it difficult and dangerous to walk.

This area is directly served by major bus routes. However bus

stops are dangerously located along highly trafficked roads with little to no pedestrian infrastructure.

Observations recorded an average of 14 users per hour which is way below the average use of the overall trail. The trail is in good condition with consistent paving, signage, and quality, however it is not visible and screened by buildings and vegetation. Observations also showed that maintenance of this area is lacking. Trash, homeless, and snow/ice were observed multiple times and could be detracting trail users.

**Opportunity Factors that make this node opportunistic to walkability are:**

- Commercial environment directly connected to trail.

**Constraint Factors that hinder a walkable environment are:**

- Large scale businesses and roads
- Limited visibility and safety.

DESTINATION ZONE 12 ANALYSIS

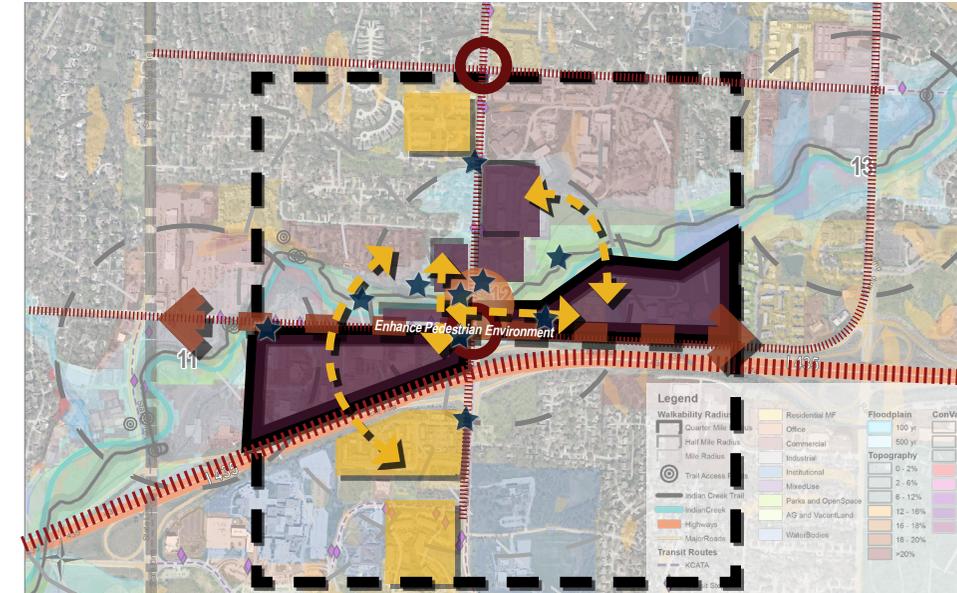


Figure 1 | Analysis of Destination Zone 12.ai

Destination Zone 12, adjacent to Quik Trip, apartments, and Center Junior High & Middle School, is located north of the intersection of Wornall and I-435 as shown in figure \_\_. The Indian Creek Trail in this zone floods often and has limited pedestrian connections. The Indian Creek runs just south of the trail. The creek

provides a major barrier to businesses located to the south. Sidewalks are narrow throughout this entire section and have little separation from the main road.

This portion of the trail is not as well maintained as other sections of the trail, but it is still in fairly good

condition. Consistent paving, minimal trip hazards, and updated signage give the trail a good appearance but trash litter and flooding debris show potential maintenance concerns.

Observations of 23 users per hour were recorded over two separate observation times. Very few pairs and groups were noted, 90% of all users were by themselves. This showed that many utilized this section for transport. With this knowledge and the presence of bus routes along Wornall, this node has a great opportunity for connection.

**Primary Walkability Opportunities:**

- Directly accessible to businesses and bus stops.

**Primary Walkability Constraints:**

- Vehicular oriented environment.
- Limited pedestrian infrastructure.

### DESTINATION ZONE 13 ANALYSIS

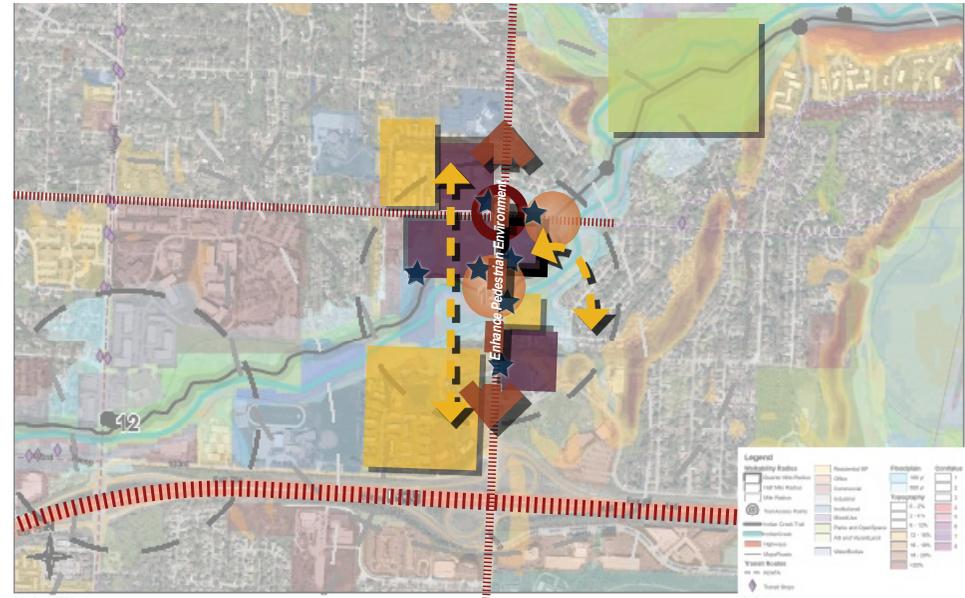


Figure 1 | Analysis of Destination Zone 13.ai

Destination zone 13, the Holmes Shopping Center, is centered near the intersection of Holmes and I-435 as shown in figure 1. The Indian Creek Trail in this zone has many businesses that run directly adjacent to the trail and has larger business centers within a one mile radius.

Access and connectivity in this area is poor, getting to the trail and surrounding locations is very difficult. There is only one direct connection from the trail to the main roads and it is located off the main pathway. The sidewalks are characterized by inconsistent paving, cracked/littered trip hazards, and narrow inadequate

ADA compliant standards.

Observations counted an average of 19 users per hour. Two of the observation periods were taken over lunch hours and one was taken before work/early morning hours. Observations/Interviews showed that this area is most popular before and after work hours and during lunch times. Many were noted to utilize this area for transit and to work out on lunch breaks.

**Primary Walkability Opportunities:**

- Commercial environment directly connected to trail.
- Access to bus routes.

**Primary Walkability Constraints:**

- Limited connectivity and pedestrian infrastructure.
- Inadequate access and signage.

