THE ACCESSIBILITY OF DINNER:
A STUDY OF FOOD ACCESSIBILITY IN BETHEL, EUGENE, OREGON

By

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TERMINAL PROJECT

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"THE ACCESSIBILITY OF DINNER: A STUDY OF FOOD ACCESSIBILITY IN BETHEL, EUGENE, OREGON," a terminal project prepared by Sara Schooley in partial fulfillment of the requirements for the Master of Community and Regional Planning degree in the Department of Planning, Public Policy and Management. This project has been approved and accepted by:

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Abstract

Food system planning has recently emerged as a component of the city planner's portfolio as the country faces an unprecedented obesity epidemic caused partly by poor access to high quality, affordable, and healthy foods. Through the use of a Geographic Information System and a built environmental assessment, this research analyzed food accessibility in the Bethel neighborhood in Eugene, Oregon.

The findings of this research suggest that although the individual developments within Bethel have the right characteristics for connectivity, the distribution of and connections between these developments negate opportunities for food accessibility, especially if residents desire to use active transportation such as walking or biking. Findings and recommendations from this project can be used to inform food system planning and accessible neighborhood design as well as suggest opportunities to use existing infrastructure to increase food accessibility within residential neighborhoods.

Acknowledgements

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I could not have completed this project as enjoyably without the tight network of support from my PPPM classmates for needed distractions, dear food friends in the area for introducing me to the topic of food planning, and family for actually volunteering to read this paper.

And last but not least, thanks to Jonathan Heyl for allowing me to live in my fantasy world of planning for the last two years without complaining too much.

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Chapter 1. Introduction

Ideally, every neighborhood would have a high-quality, economically-priced grocery store. But, even with the fortitude of concerned planners, this task may be daunting. First, planners often are faced with already existing communities that have strict segregation between residential and commercial zoning which results in the separation between people and their food. Secondly, planning for food is often an afterthought and issues of the residents reaching food is often not considered until transportation infrastructure and residential developments are already in place, if at all.

Planning for food has become an emerging topic in the planning profession. Much of the popularity is result of communities wanting to encourage healthier lifestyles among their residents and food is an important component of this goal. Therefore, planners are starting to take on the responsibility of making sure that residents can easily reach healthy food.

The goal of this project is to evaluate how easily residents can reach food in Bethel, a neighborhood in northwest Eugene, Oregon, and propose recommendations that could help the residents reach healthy food. In particular, this project will attempt to map the food environment, which is the relationship between food resources (grocery stores and minimarkets) and built environment characteristics (street design, land use, etc.).

The Community

As stated above, this project intends to measure food accessibility in the Bethel neighborhood in Eugene, Oregon (Figure 1-1). For the purpose of this study, Bethel is defined per the City of Eugene's neighborhood boundaries (City of Eugene, n.d.).

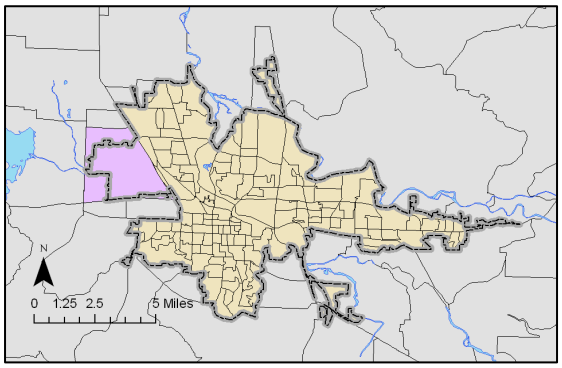


Figure 1-1. Bethel in northwest Eugene, Oregon

Food accessibility in Bethel is of concern for a variety of reasons, but the driving issue for this particular assessment is children's health, which is a growing concern nationwide. Nutritious food is an important component of keeping children healthy and since Bethel has higher percentage of families than Eugene as a whole, it is an interesting neighborhood to research in terms of children's health.

According to 2000 census data, Bethel has a higher percentage of families than the rest of Eugene, 28.5% versus 23.3% respectively, which means that food accessibility in Bethel has a high chance of affecting families and children (Zillow Local Info, 2009).

	Bethel	Eugene	National
Median household income	$36,778	$35,850	$44,512
Households with kids	28.5%	23.3%	31.4%
Average household size	2.519	2.27	2.589
Average commute time to work	20.027	18.353	26.376

Table 1-2. Demographics in Bethel (Source: zillow.com)

In addition to demographic makeup, Bethel is also structurally different from much of Eugene. The Bethel neighborhood has seen much of its land converted to residential housing in the relatively recent past and most of this housing has been low-density single-family housing. This single-family housing has taken the typical design of suburban developments of cul-de-sacs with emphasis on collector arterial roads that empty onto principal arterial roads (Figure 1-2). Therefore, Bethel is an interesting locale to study food accessibility in a typical "suburban" landscape.

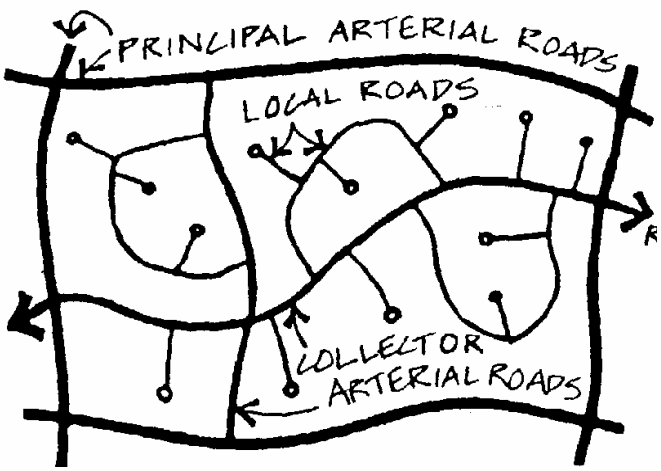


Figure 1-2. Visual of suburban street networks (Source: National Transportation Library)

Problem Definition and Project Purpose

The high presence of families in Bethel along with the suburban design of the neighborhood makes Bethel and interesting case study for food accessibility. This project aims to examine the food environment in the Bethel neighborhood by objectifying various characteristics of the neighborhood that may be linked to food accessibility. Also, because of the layout of Bethel and its commercial areas, food accessibility can be used as an indicator of accessibility for most services in Bethel (banks, drugstores, etc.) since all of these services are in a concentrated location within the neighborhood.

This project will analyze the food accessibility in Bethel through two steps: (1) mapping the accessibility of food resources in the Bethel neighborhood of Eugene, Oregon, using a GIS and (2) completing an environmental audit of a family-dense area within Bethel to gain a finer –scaled understanding of accessibility.

Organization of This Report

Following this introduction chapter, this report is organized into four chapters and three appendices that present past literature, research methods, findings and analysis and recommendations on food resource accessibility and preferences in Eugene, Oregon:

- **Chapter 2: Literature Review** provides a summary of research related to the interaction of the food, health, transportation and accessibility planning fields.
- **Chapter 3: Methodology** includes a detailed discussion of the techniques used to obtain and analyze the data used for this project.
- **Chapter 4: Findings and Analysis** provides the results of the data gathering and analyzes the results in relation to food accessibility.
- **Chapter 5: Recommendations** discusses planning and policy recommendations that could ameliorate food accessibility issues in Bethel as well as suggests further research that could be completed as follow-up to this project.

Literature Review

Introduction

Food security is a topic that has been getting increasing attention on a national scale and especially in Eugene, which in 2008 formed a Food Security Council in order to better plan for current and future food issues in the community. Food security has many different facets, but the one most important to this research project is the accessibility of food resources in a community. Hamm and Bellows (2003, in Pothukuchi, 2004, p 357) define the concept of food security as a circumstance in which the entire community can achieve "a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice."

The practice of obtaining food security constantly changes as the food environment of communities changes. The local market has all but disappeared; grocery stores serve as a weekly source of food for 99% of households and are continually consolidating to create larger and larger supermarkets (Dunkley et al, 2004). Further, the largest five grocery stores chains are accountable for 42% of all grocery sales nationwide (Pothukuchi, 2004). This trend toward larger and fewer grocery stores set the stage for location of the stores to become a primary issue the attempt to achieve food-security.

The consolidation of smaller markets into supermarkets and the resulting distance between food resources has the potential to leave residents of certain neighborhoods without adequate food resources. In many communities, the limited supply of grocery stores are located near higher-income communities. This leaves lower-income residents, who place more weight on residence cost than proximity to shopping facilities (Weisbrod, 1980), in areas where supermarkets choose not to invest. Often, this results in a travel burden on families to reach adequate food.

The distance to grocery stores along with limited transportation options (limited bicycle and pedestrian infrastructure, infrequent bus schedules, etc.) can be a burden on residents of underserved neighborhoods. If these situations are sufficiently present, residents may choose less healthy options that require "more reasonable" effort to satisfy their food needs.

This reasonable effort is where some less-desirable food resources factor into the food security equation. Fast-food restaurants are known for locating in lower-income neighborhoods and often serve as a quick and convienent food resource for busy families. It is not that the families necessarily want to eat fast food rather than nutritious food that they could obtain at a supermarket, but the burdens (travel time and cost, cost of purchasing food, time to prepare food, etc.) can seem too overwhelming to choose otherwise. Additional burdens may include having limited or no access to private vehicles, riding transit during peak hours, or shopping with children. These burdens affect time constraints and the amount that the resident can easily carry (Clifton, 2004).

This issue of residents' accessibility to food seems to be exactly the sort of issue that community planners would work toward fixing, given their charge of making their communities more sustainable

and livable, and making connections between various components of a community such as land use, transportation, and economy, among others (Pothukuchi and Kaufman, 2000). Yet a research study that interviewed 22 city planners not only concluded that planners are at best minimally involved with food planning but specified that planners were not convinced of the connections between the food system and their primary focus, the built environment (Pothukuchi and Kaufman, 2000).

Definition of Accessibility

Although there has been some research completed about food deserts in communities (Smith, 2003), little research has been done to understand the residents' actual perceptions of accessibility. When measuring food deserts, most studies measure accessibility via the distance people live from a grocery store. This study will use tools such as a Geographic Information System (GIS) analysis of the built environment in relation to food resources and an on-the-ground environmental audit of the Bethel neighborhood to gauge food accessibility.

At the core of this study is an examination of accessibility as it pertains to residents' ability to get to appropriate food resources. But before a community decides how to achieve accessibility, the community must define accessibility.

Ferreira and Baley (2007) see accessibility as an interaction of two layers: (1) technical and objective features and (2) social and subjective features. It is their contention that traditional planning often focuses on the first layer without adequate consideration of the second; in their opinion, accessibility does not simply mean "closeness." They describe accessibility as a combination of spatial and temporal features. Figure 1 further explains the concept (Hanson and Schwab, 1987; Weber, 2003).

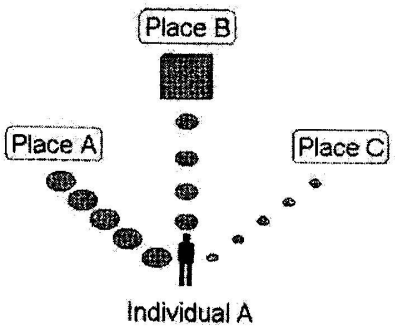


Figure 2-1. People accessibility (Source: Ferreira and Baley, 2007)

In Figure 2-1, all three destinations are equidistant from the individual. Therefore, purely by distance, all the destinations are equally accessible. But, using the size of the "stones" between the individuals and the destinations to represent the ease of taking each path, Place A is the most accessible; larger stones are easier to walk on than tiny pebbles. In addition, the route to Place B has a blockade, whether it be an environmental block (river, hill, etc.) or a social hindrance (cost, discrimination, etc.) that makes

destination B difficult to reach. Although a rather simple figure, this drawing gets at the heart of defining accessibility.

Locations that are "accessible" are perceived as "nearer" than those that are not because of how time to a location affects the perceived distance to the location. Ingram (1971, p 101) defines this view of accessibility as "the inherent characteristic (or advantage) of a place with respect to overcoming some form of spatially operating source of friction (for example, time and/or distance)."

The predominant investigation of travel is based on mobility, however, not accessibility. Mobility is the ability to move quickly (usually by car); accessibility is the ease of getting to a destination. The difference, however slight it seems, is extremely important to this project and future planning work. Mobility is simply the ability to move; accessibility is the ability to get to desired activities.

Transportation planners often focus on the availability of transportation systems and the speed (mobility) of them versus focusing on whether the infrastructure is the right infrastructure for the task at hand (accessibility) (Straatemeier, 2008). In addition, accessibility also has a land use component; certain land uses have the ability to promote accessibility because of the destinations available. If planners hope to promote healthy food, they must be aware that while mobility to those food resources might exist, the accessibility that residents have per transportation infrastructure and land use might persuade the residents to choose the desired food resources.

Past Studies

Accessibility has been studied extensively in the planning field because increased accessibility is often seen as a method to improve quality of life and make more sustainable communities, some of the main objectives of the planning profession (Dalvi and Martin, 1976; Wachs and Kumagai, 1973; Horner, 2004). As a result, accessibility studies have been completed on a variety of topics including employment (Banister and Callent, 1999; Cervero, 1989; Ferreira et al, 2006; Giuliano and Small, 1993; Hamilton, 1982; Kain, 1968; Kawabata and Shen, 2006; Rouwendal and Nijkamp, 2004; Sato, 2004; Wheaton, 1979), food resources (Smoyer-Tomic et al, 2006), health care services (Lee and McNally, 2002), economic development (Vickerman et al, 1999), decision to walk (Alfonzo, 2005), school attendance (SEU, 2003), and housing development (Gutierrez et al, 1998). Yet these studies remain focused on pure distance to the desired activity, not the ability to get to the desired activity.

Many studies have included explicit spatial components to measure some aspect of the origin-destination journey. In past studies, researchers have used the FlowMap program which has embedded accessibility features but lacks the data management and mapping features of a GIS. ArcView's "Network Analyst" has also been used to operationalize accessibility, although it relies simply on distances of lines to determine its accessibility measurements.

Lui and Zhu (2004) looked to build on researchers' past measures of accessibility and determined that they have been mostly based on the following key assumptions: (1) Accessibility between the origin and destination is directly proportional to the demand of the attraction, and (2) Accessibility is inversely proportional to the distance, time or cost needed to travel from origin to destination (Morris et al, 1979; Jones, 1981; and Miller, 1999, as cited in Lui and Zhu, 2004).

They then identified a four-step accessibility process that is shown in Figure 1-2. Step one, Concept Formulation, allows researchers to define accessibility given the actual environment they are working in by considering factors such as transportation, land use data or socio-economic data.

Step two, Measure Selection and Specification, consists of selecting and specifying the appropriate accessibility measures given the origin, destination, and context that the research considers. Step three, Accessibility Measurement, uses the measurements established in step two to calculate travel impedance, measure accessibility and calibrate the accessibility measures. For this project, the last step, Interpretation and Evaluation, takes the entire process and translate into applicable information that can be used in acknowledging and bettering food accessibility in the Bethel Neighborhood.

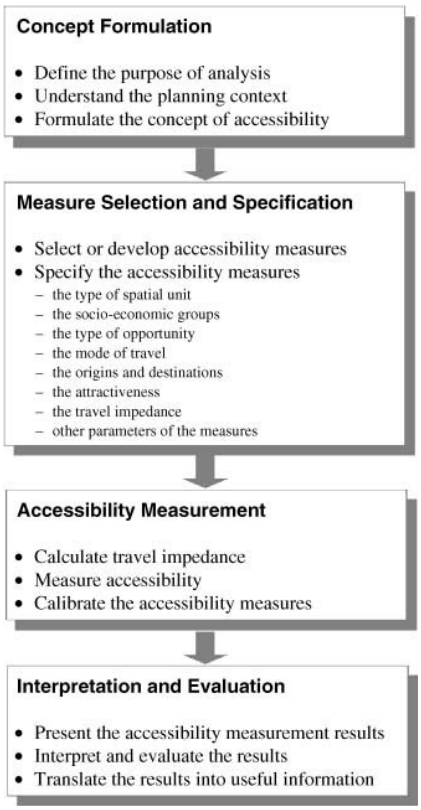


Figure 2-2 Accessibility analysis (Source: Liu and Zhu, 2004)

Figure 2-3 shows a spatial representation of housing accessibility determined by using the framework presented above. Zhu et al (2005) began by defining the purpose, context and concept of accessibility by analyzing housing accessibility and housing planning in a space-constrained area of Singapore. Next, the researchers measured accessibility as the distance between the origin (housing) and destination (public transportation, shopping centers, etc.) by splitting up the land area into hexagonal units. Each unit was rated based on its accessibility to a destination, measured purely by distance.

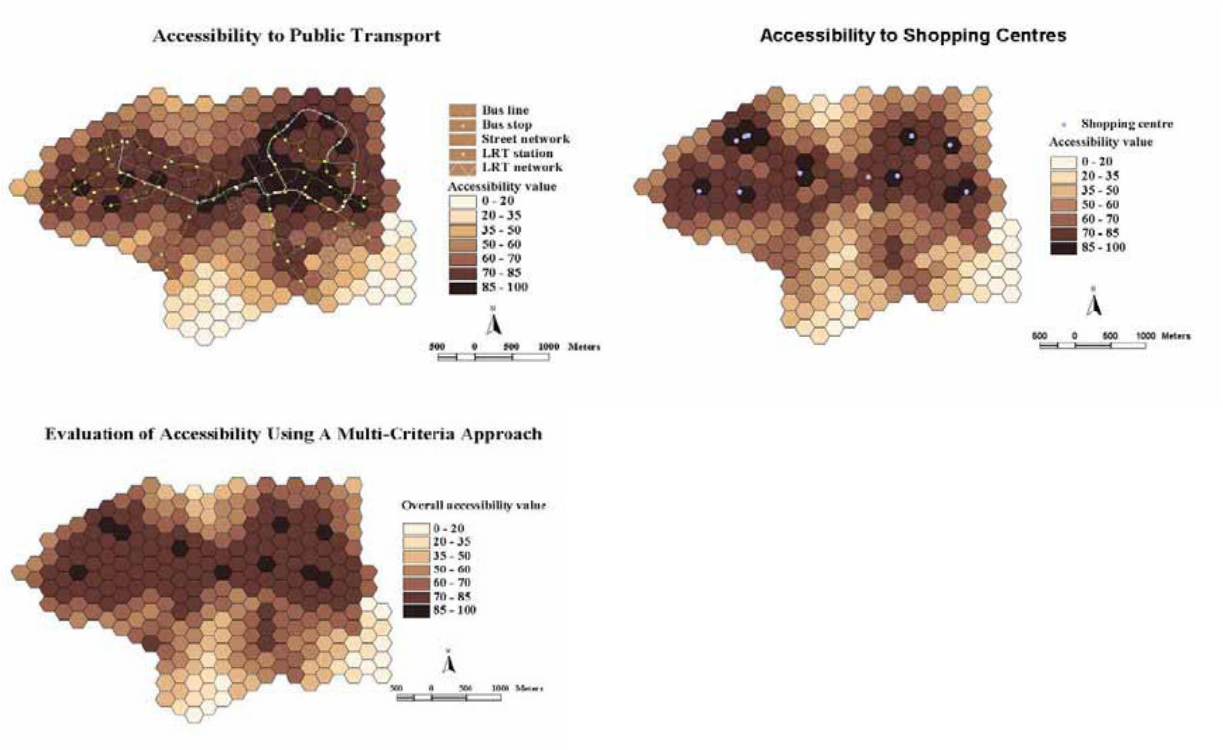


Figure 2-3 Hexagonal accessibility analysis for transportation and shopping centers (Source: Zhu et al, 2005)

Once the accessibility was determined between the origin and the destination, the researchers conducted a survey to determine what destinations residents wanted access to. From this, the researchers moved to step three, accessibility measurements, and weighted each destination and compiled a total accessibility map. This map can then be used by housing authorities to determine where to build in the future given examples for a few specific destinations and the compiled accessibility map as shown in Figure 2-3.

Like many other studies, this study measures accessibility solely by the distance from a resource (e.g., transportation, shopping) and does not account for environmental or personal choices of people when they decide to use a resource. For example, even if a shopping center is located within the same hexagonal area as a resident's housing, it might not be the type of shopping center the resident needs. Therefore, he or she might choose to travel to another, less"accessible" shopping center instead. This lack of personal choice accounting is common in accessibility analyses (Liu and Zhu, 2004).

But this study does take a step forward by compiling residents' desires for accessibility of one destination relative to others (e.g., residents preferred to be closer to public transportation than banks) and points out the importance of prioritizing accessibility by the attractiveness of the destination. In a study of Bethel's food resource accessibility, it will remain important to consider how and why people are using the food resources in order to avoid grouping all the food resources into a single category.

The desirability of these food resources, whether the supermarket, fast food restaurant or mini-market, is an invaluable factor when considering the accessibility of food resources since the perceived value of a destination is what makes residents travel to that locale (Banister, 2008). This research has the potential to bring up deeper issues in Bethel if the supermarkets are found to be more accessible than other food resources although residents are still traveling to these other food resources.

Food Choices

In 2003, the World Health Organization (WHO) completed a study on factors that influence food choices, including planning and retail (public policies), food grown and imported (food availability), access to shops and time and ability to go shopping (food access), household food distribution (family practices), and personal beliefs and convictions (needs and tastes) (see Figure 2-4 for the entire concept map). The WHO's study concluded that food choices rely on a multitude of factors that must all be considered when planning for a community's food.

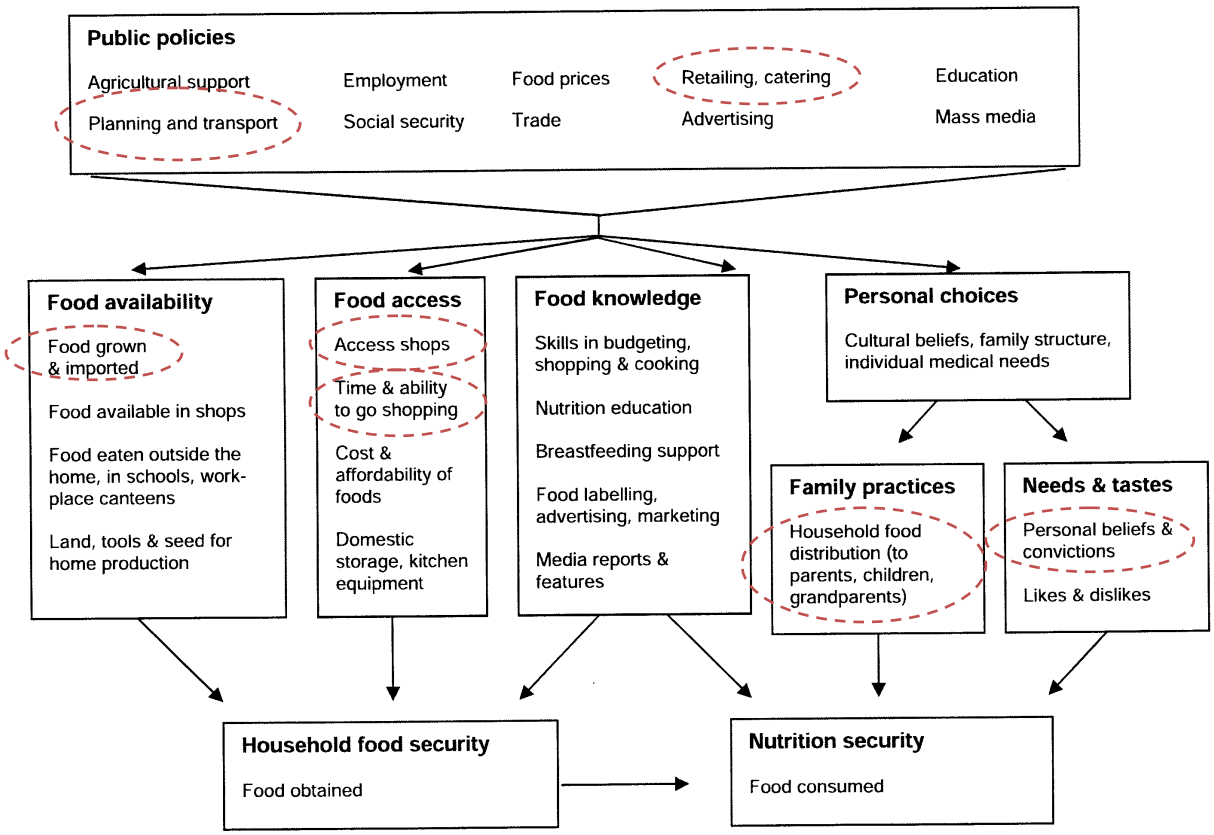


Figure 2-4 Influences on food choices (Source: WHO, 2003; circles imposed)

Yet it is important to not get overwhelmed with the number of factors that determine food choice but instead to focus on which of the factors are most influential given the context of the study. Inglis et al (2008) attempted just this in their study to determine what factors are most important to food choice

behavior for people with various different socioeconomic positions. An initial finding was that individuals with lower socioeconomic positions were found to have poorer diets with fewer fruits, vegetables and other healthy foods when compared with those of higher socioeconomic positions (Martikainen et al, 2003).

But, upon further evaluation, Inglis et al (2008) found that when environmental factors such as perceptions of food accessibility, availability and affordability were accounted for, socioeconomic inequalities between populations were insignificant when looking at diets. The study concluded that poorer diets are not necessarily tied to lower socioeconomic status; instead it was actually the perceptions, especially of burdens, described above that were linked to socioeconomic status.

The identification of perceived burdens is a key issue in evaluating food accessibility and decreasing or eliminating them has the potential to change the public that needs access. For example, in the United Kingdom, the government organized a Committee on Medical Aspects (COMA) of food policy in an attempt to better educate citizens on food choices to remove an "educational" burden (Foster and Lunn, 2007).

Neighborhood Accessibility

A core measure of this research will be calculating the neighborhood accessibility around major food outlets and fast food restaurants in Bethel. Neighborhood accessibility (NA) can be measured in a variety of ways depending on the researcher's purpose for studying accessibility. As shown in Figure 5, Krizek (2003) has delineated neighborhood accessibility into four major concepts: density, land use mix, streets/design, and composite indices.

Although Krizek then attempts to operationalize these concepts, he argues that even all these NA cannot be objectively defined because of the inconsistencies with units of analysis, data availability, research approaches, and subjectiveness in accessibility studies. As a result, Krizek created the "NA Index" which relies on three elements: housing density, number of employees in neighborhood retail services, and street design (Krizek, 2003).

Krizek's theories are formed to compare two obviously different locales (inner city Seattle and a Seattle suburb). This study focuses on looking at smaller areas within one fairly consistent locale (Bethel) in comparing the accessibility of the food-related "retail services." So although Krizek's theory is not duplicated in this study, the concepts of how housing density, size of retail services, and street design all need to be considered.

Criteria used to measure neighborhood accessibility.

Concept	*Strategy for Operationalizing/Comments*	*Citation*
Density		
Population, housing units, or employees per unit area	The most readily accessible urban form variable to operationalize and therefore more commonly used than any other measure	
Intensity of land uses	Density measures of retail, activity centers, public parks, population	Cervero and Kockelman (1997)
Land use mix		
Nonresidential activities in the immediate vicinity	Presence or absence of a retail shop within three hundred feet; any type of nonresidential activity classified as mixed use	Cervero (1996)
Presence of food/drug store	Grocery or drug store between three hundred feet and one mile	Cervero (1996)
Household distance to grocery, gas station, or park	Estimated in tenths of miles by respondent	Kitamura, Mokhtarian, and Laidet (1997)
Walking distance to retail	Percentage of households within walking distance to retail district	Handy (1996b)
Retail employment data	Retail workers within one mile of residence	Lawton (1997)
	Number of establishments summed over one-half-kilometer increments	Hanson and Schwab (1987)
	Number of establishments using Standard Industrial Code data	Clifton and Handy (1998)
	Retail and service employment density per census tract	Boarnet and Sarmiento (1998)
	Averaged the shortest distance need to travel to buy each of twelve "convenience" goods and services	Guy (1983)
Entropy	Evenness of the distribution of built square footage between several land use categories	Cervero and Kockelman (1997); Frank and Pivo (1994a); Sun and Wilmot (1998)
Dissimilarity Index	Mean point accumulation for a tract where each developed hectare is evaluated on the dissimilarity from surrounding hectares	Cervero and Kockelman (1997)
Streets/design		
"X" intersections	Counted manually using aerial photographs and maps	Handy (1992); Cervero and Gorham (1995); Cervero and Radisch (1996)
	Inspected the transportation network within one-half mile of a household to judge streets as either connected, cul-de-sac, or a mix	Crane and Crepeau (1998)
	Randomly sampled twenty block faces within each neighborhood site to derive proportions and averages	Cervero and Kockelman (1997)
	Marked the area around individual households that contained four-way intersections and measured the area with a digital planimeter	Boarnet and Sarmiento (1998)
	Assuming census blocks as the smallest polygons that were fully enclosed, they measured census block density within each tract	Frank, Stone, and Bachman (2000)
	Intersection density per transportation analysis zone (TAZ) (also used street length density)	Levine, Inam, and Torng (2000)
	Number of "X" intersections within one-half mile of household	Lawton (1997)
	Mean block size, manually counted for each study site	Hess et al. (1999)
Miles of streets	Used centerline geographic information system information	Handy (1996b); Levine, Inam, and Torng (2000)
Provision of sidewalks	Ratio of the length of the sidewalk system to the length of all public street frontage	Hess et al. (1999)
	Proportion of blocks with sidewalks	Cervero and Kockelman (1997)
	Full, partial, or no sidewalks on each side of the road	Handy (1996b)
	Mean age of development	
Traffic volumes	Measured for a single street and applied to entire study area	Moudon et al. (1997); Handy (1996b)
Factor: design dimension	Sidewalk and street lights, planted strips, block lengths, flat terrain, walking accessibility	Cervero and Kockelman (1997)
Composite indices		
Pedestrian Environment Factor	Based on the ease of street crossings, sidewalk continuity, topography, and "fineness" of the street grid for local streets	LUTRAQ (1993)
Urban Vitality Index	Same as above, plus a measure of "urban vitality"	Cambridge Systematics
Pedestrian and Bicycle Friendliness	Based on amount of sidewalks, land use mix, building setbacks, transit stop conditions, bicycle infrastructure	Replogle (1995)

Figure 2-5 Criteria used to measure neighborhood accessibility (Source: Krizek, 2003)

Summary

In summary, planning for food resources is a fairly new idea in the planning profession although many planning professionals from the local to federal levels identify food planning as a necessity for healthy communities. This study will use past studies and methodologies on food deserts, social and policy implications of food access, transportation, and neighborhood accessibility to analyze the Bethel neighborhood and its residents' access to food.

Chapter 3. Methods

This research project uses two methods to analyze the accessibility of food resources in the Bethel neighborhood of Eugene: (1) GIS analysis and (2) street-scale built environment assessment. These two analyses are discussed in separate sections below.

Defining the Area

Two analysis methods were completed for different geographic scales within Bethel. The GIS analysis was done for the entire Bethel neighborhood (as defined by the City of Eugene) to gain a comprehensive understanding of the area [Figure 3-1 (A)]. The built environmental audit focused on one area of Bethel that was shown to have a high density of families per census data and the surrounding developments [Figure 3-1(B)].

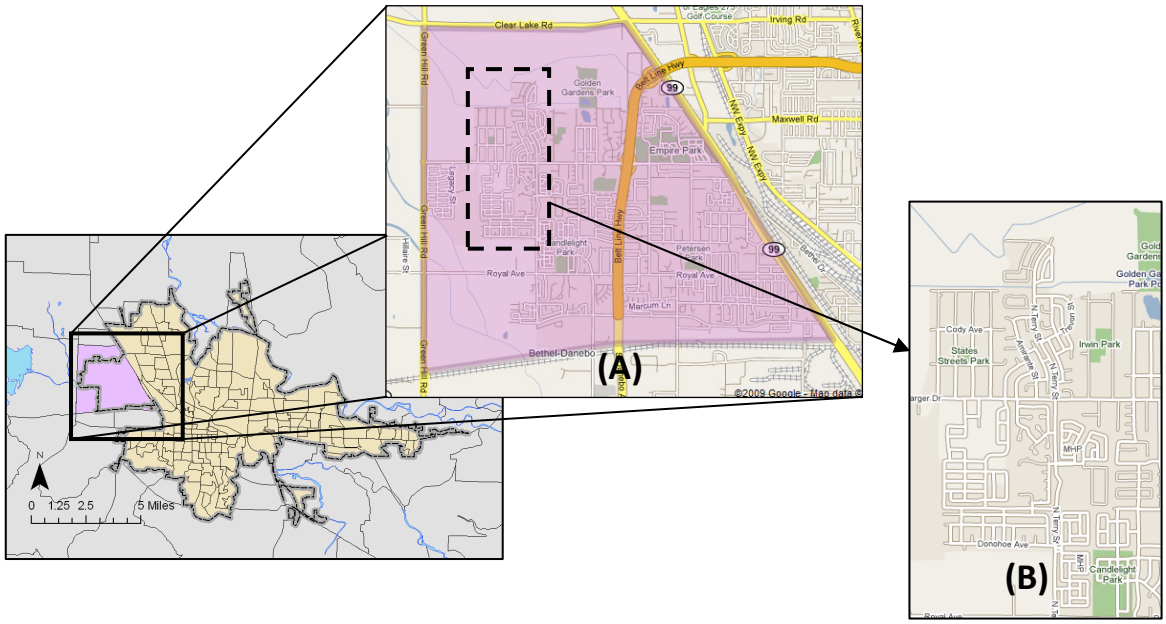


Figure 3-1. Analysis areas in Bethel. (A) is the area used for the GIS analysis, and (B) is the area audited. The City of Eugene defines the Bethel neighborhood as the area bounded to the west by Greenhill Road, the east by Highway 99, the north by Clear Lake Road and the south by railroad tracks.

Data

The data for the mapping and audit sections of this project was gathered separately. For the GIS analysis section, data layers of existing grocery stores, land uses, and transportation infrastructure were obtained from the Lane Council of Government's (LCOG) GIS database. The data for the environmental audit was gathered by a team of volunteer data gatherers trained to ensure consistency in data collection.

The independent variables in this study are available food resources and the built environment. Available food resources were measured by locations and types of food in Bethel. The built environment data was measured by land use, residential design, transportation infrastructure and

subjective opinions of the environment. The dependent variable is the accessibility between the food and built environment based on characteristics such as distance, design and usability.

Analytic Approach

GIS Analysis Methodology

The first step of the GIS analysis was to objectively measure Bethel's physical environment. These standards were analyzed using street data obtained through LCOG and determined various factors of "walkability" – densities of "good" and "bad" intersections, pedestrian service areas (PCA) and percentages of the population within a various distances ($^1/_4$ mile, ½ mile, etc.) of the food resources (Schlossberg and Brown, 2004).

Intersection Analysis – Good vs. Bad Intersections

Intersections help define the accessibility of a city, whether they be for vehicles or pedestrians. A vehicle, bicycle or pedestrian has difficulty changing directions without intersections. From an urban form perspective, more intersections equal more accessibility. These factors can be measured with GIS and street data.

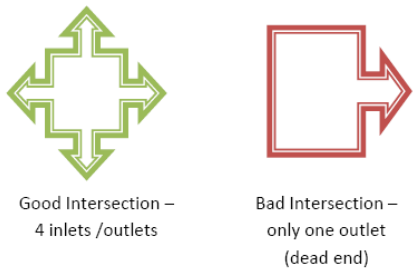


Figure 3-2. Visual depictions of a good intersection and a dead end

"Good" intersections are defined as intersections that have three to four inlets. A comparison of a "good" versus a "dead end" intersection is shown in Figure 3-2. The three to four inlets in a "good" intersection allow vehicles, bikers and pedestrians to cross and change direction if necessary. Intersections with more than four inlets are not considered "good" because the additional inlets can cause traffic safety issues and prohibit a grid road system (preferred in walkable areas) to work efficiently.

The number of dead ends, or "bad intersections," near a location influences the "walkability" in the area for many reasons. The first, and possibly most obvious, reason is that dead ends stop connectivity. Once a driver, biker or pedestrian reaches a dead end, he or she is faced with no more direct options to reach the desired location(s). In some situations, the desired destination may be close spatially to the dead end, but because there is no connection, the traveler must turn around and try another route. This situation is especially important for pedestrians since walking is a slower form of transportation and connectivity would result in relatively large travel-time decreases compared to bicyclists and drivers.

Pedestrian Service Areas

A Pedestrian Service Area (PSA) is a spatial representation of walking distances using the ratio between the distance one can walk using the street network versus traveling in a straight line. Figure 3-3 shows the difference in areas "as the crow flies," (A), versus those that one can access from a central point using the street network, (B).

Using Figure 3-3 to illustrate, Part (A) shows a ½-mile buffer around the place of interest, in this case an ice cream cone. Part (B) also shows an area around the ice cream cone, but this area is only accessible by traveling ½ mile on the existing road network. The Network Defined Pedestrian Service Area is formed by calculating the outside boundaries of ½-mile walks from the ice cream on existing roads.

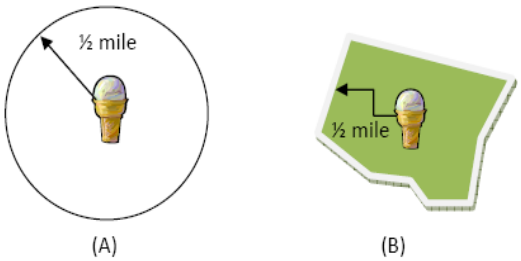


Figure 3-3. Illustration of (A) ½-mile radius and (B) Network Defined Pedestrian Service Area

The Pedestrian Service Area Ratio (PSAR) is calculated by dividing (A) by (B). The PSAR represents the amount of land within the ½-mile buffer of the location that is actually within a ½-mile walk of the location using the existing street networks. The higher the PSAR, the more "walkable" the area is, with areas above 0.50 indicating generally walkable environments.

An additional modification is the Impeded Pedestrian Service Area Ratio (IPSAR), which utilizes only neighborhood roads as pedestrian friendly. While not every neighborhood road is pedestrian friendly, this approach has been used to represent the overall pedestrian quality of the area (Schlossberg and Brown, 2004).

Vicinity of Bus Routes and Bike Paths

There are two bus routes that run through Bethel, and GIS was used to show the residential areas within ¼ mile and ½ mile of the stops. The resulting service areas are an indicator of the accessibility of residents to bus routes as well as an indicator of whether the food resources are accessible by bus.

ArcPad Built Environment Audit and Analysis Methodology

ArcPad is a GIS software that works on a handheld computer in which the user can enter information about the location in the fielf and can link back in to a GIS in order to analyze the environment. For this project, ArcPad was used to gather street level data, such as sidewalk availability, perceived bike safety and tree shade. The entire set of assessment variables were derived from the "Active Neighborhood Checklist," a series of questions that seeks to identify a locale's "activity friendliness" (Hoehner et al, 2007). For this project, the checklist was programmed into ArcPad for use in the field. A paper version of the Checklist is available as Appendix A and the screen shots for ArcPad can be seen in Appendix B.

Data Gathering

For this study, two rounds of data gathering were conducted using ArcPad. The first gathering was done in a "mock public workshop" style. The second data gathering was done individually over the two weeks following the workshop.

"Public Workshop"

Ten volunteers gathered data on April 4, 2009. The volunteers were given training on built environment characteristics and the use of ArcPad to ensure consistency of knowledge and approach in data gathering (see Appendix C). After the in-class training, the group conducted a sample test outdoors to help improve inter-rater reliability of the built environment audit and address any questions or concerns about the audit.

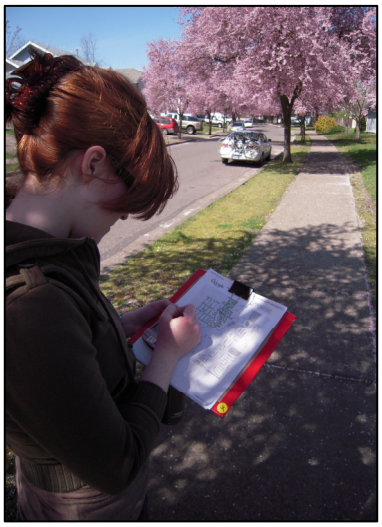


Figure 3-4. Student gathering data during the "public workshop."

After the training was completed, the volunteers were each assigned a specific area in Bethel to audit. Each pair received a clipboard with the following items:

1. An inclusive map of Bethel with their assigned streets highlighted
2. A zoomed-in map of their particular neighborhood with the assigned streets highlighted
3. A paper copy of the Checklist
4. A paper copy of the Checklist Protocol
5. A pre-programmed ArcPad device

An example of the clipboard items can be seen in Appendix D. The volunteers gathered data for a three-hour period. Incomplete or missing data was rectified on subsequent field data gathering trips.

Once the field data was gathered, it was downloaded into an existing GIS of Bethel and linked to the street layer network for analysis. Finally, maps were developed to display accessibility characteristics of the audited neighborhood such as sidewalk quality and street safety.

Conclusion

In summary, the methodology of this project served to collect and analyze both quantitative and qualitative accessibility data from the Bethel neighborhood through the GIS analysis and the Environmental Audit, respectively. Results of the analysis can be found in the next section.

Chapter 4: Findings and Analysis

As mentioned in the previous section, this project will focuses on various criteria to determine the accessibility of the food resources in Bethel. This section will discuss these criteria in three major parts:

- **Setting the Stage:** This section will describe the current food resources, family locations and land uses in Bethel. This information will be used to frame the analysis.
- **GIS Findings and Analysis:** This section will explain the purely GIS-related findings, including the location of the food resources in respect to children and their families, intersection density and type, Pedestrian Service Areas (PSAs), and transportation infrastructure available.
- **ArcPad Findings and Analysis:** This section will use the data obtained from the street-scape scaleenvironmental audit using ArcPad to evaluate the characteristics of the chosen area within the Bethel neighborhood. The analysis of this data will show differences between the area's built environment and how these differences may affect the residents' accessibility to access food resources.

Setting the Stage

Where are the kids in relation to their food?

There are currently two supermarkets within the Bethel neighborhood, a WinCo Foods on Barger Drive and Albertson's on Royal Avenue (Figure 4-1). Other food resources in Bethel include fast-food restaurants and minimarkets. Since most fast-food restaurants are located adjacent to the grocery store developments, there is not much difference between the accessibility of grocery stores and fast-food restaurants. But since mini-markets are not always located near grocery stores, it is interesting to compare the accessibility to that of mini-markets to grocery stores.

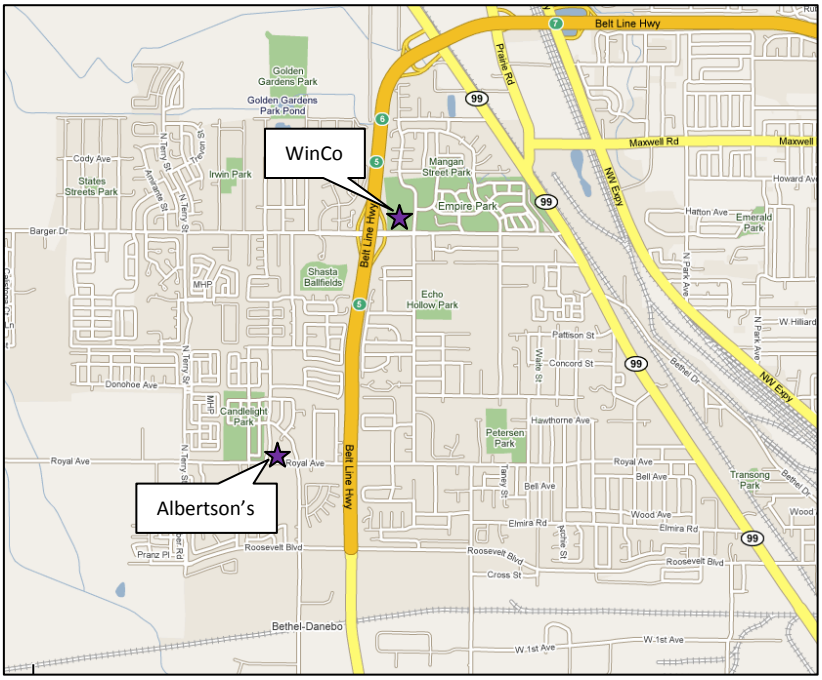


Figure 4-1. Grocery stores located in Bethel

As seen in Figure 4-2, most of the Bethel residents live where the higher-density housing is buily – the northeast and southwest. Fewer residents live in the lower-density residential developments. This comes as no surprise.

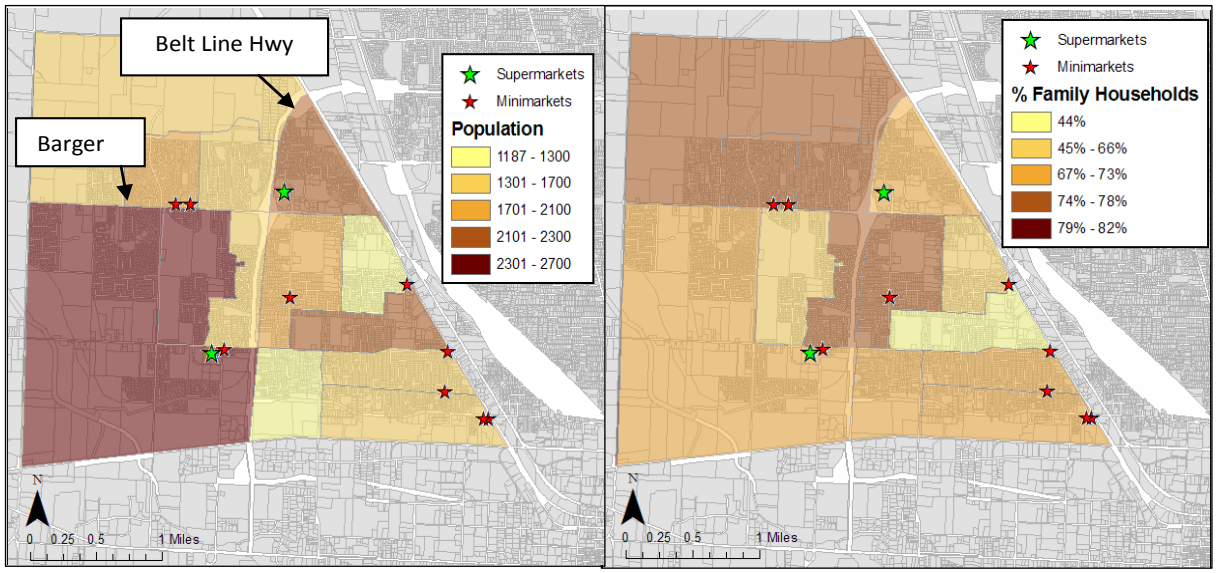


Figure 4-2. Population and family density in Bethel in relation to food resources

What also might be expected is where families in Bethel are located. Most families live in the lower-density residential areas in the northwest and central portions of Bethel. It is important to keep the areas where the families reside in mind when evaluating the built food environment in Bethel and considering the effects that residential and land use patterns can have on accessibility.

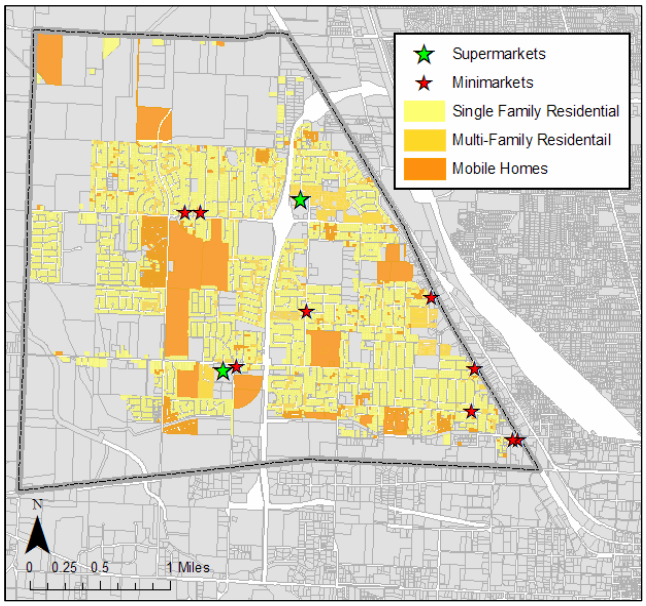


Figure 4-3. Residential land use in Bethel

Bethel is made up of a combination of low- to medium-density residential developments, with industrial and warehouse usage on the outer areas. Figure 4-3 shows the residential land-use patterns in Bethel and highlights the supermarkets (green stars) and mini-markets (red stars). Figure 4-3 also displays an obvious development pattern of suburbia – the predominance of low-density residential development.

GIS Findings and Analysis

Intersection Density and Type

Presence of Good and Bad Intersections

Figure 4-4 (A) shows the presence of good (three to four inlets) and bad (dead ends) intersections in Bethel. Simply looking at the overwhelming majority presence of green dots, it seems that using intersections as an indicator, Bethel would be fairly walkable.

Figure 4-4 (B) shows a different situation – the impeded intersection analysis. The impeded intersection analysis removes roads that are considered major arterials and collectors from the intersectionequation; in Bethel, these roads are Highway 99, Barger Drive, North Terry Street and Royal Avenue. These roads are removed on the assumption that a major road, with its high speeds and traffic, would inhibit walking and/or biking because of perceived or real danger. By taking these roads out, the number of "virtual dead ends" increases. Even more interesting, is that it is nearly impossible to travel from a family-dense neighborhood to a grocery store without needing to pass one of the "virtual" dead ends.

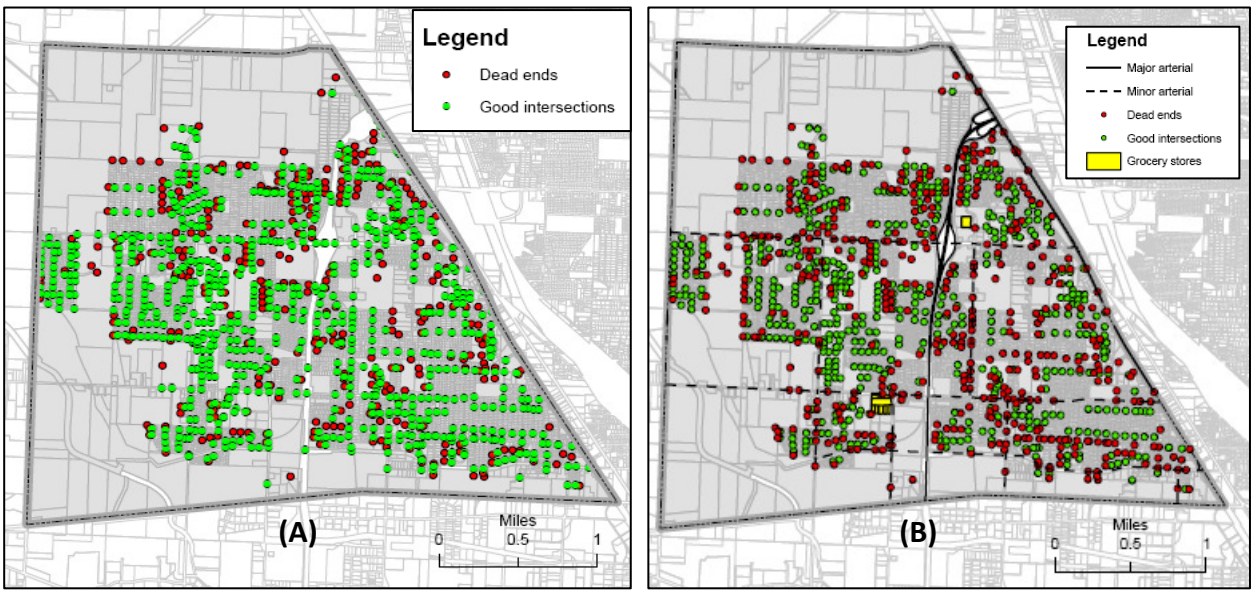


Figure 4-4. Unimpeded (A) and impeded (B) intersection analysis

Network-Defined Pedestrian Service Areas

Pedestrian Service Areas (PSAs) were determined to model the built environment around the supermarkets and minimarkets. Figure 4-5 (next page) shows the ¼-mile and ½-mile PSAs for the supermarkets.

As shown, these PSAs cover a very small percentage of Bethel and have ½-mile Pedestrian Service Area Ratios (PSARs) of 0.37 (Alberton's) and 0.39 (WinCo), a bit below a "walkable" PSAR of 0.5. Even more telling is the areas that they do cover. From comparison with Figure 4-2 above that showed where most

of the families and children lived (in northwest and central sections of Bethel), it is clear that the PSAs for the grocery stores do not cover this territory. Instead, the PSAs cover the highest population areas with the lowest percentage of families.

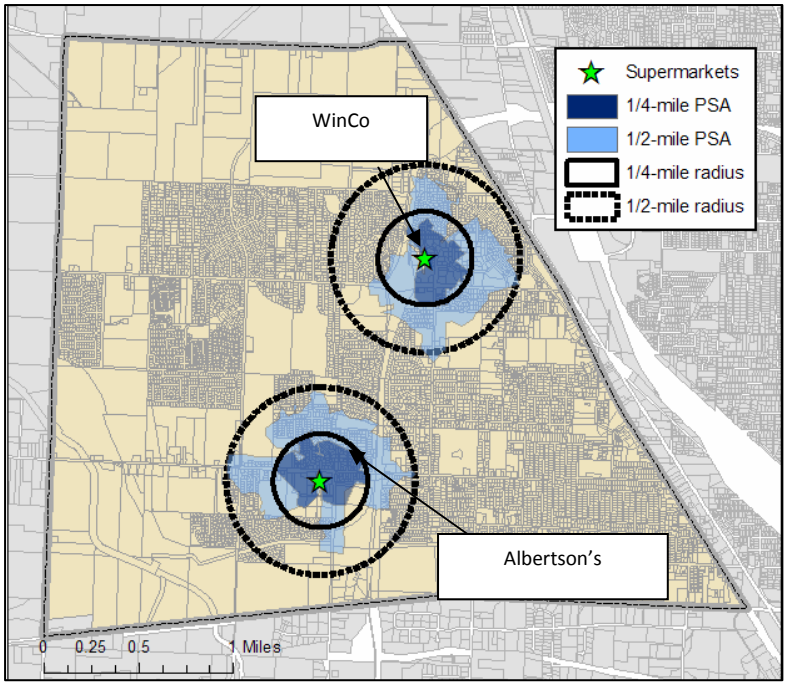


Figure 4-5. Buffers and pedestrian service areas for Bethel grocery stores.

It is also interesting to look at the distinctive shapes of the PSAs. For example, the PSA for Winco looks fairly walkable to the east, but dramatically disappears in the western direction. This occurrence is directly related to the transportation infrastructure to the west of WinCo. Beltline Highway becomes a physical barrier to walkability; residents for any area West of Beltline would have to walk down to Barger Drive (often more than ½ mile) in order to cross under Beltline Highway and reach WinCo. It also interesting to note that the area within WinCo's PSA includes a lot of multi-family housing whereas the area to the west, outside of the PSA but inside the buffer, is single-family. Albertson's PSA looks slightly better than WinCo's, although it is definitely biased in one direction – north, which also happens to be one of the areas within Bethel with the most families.

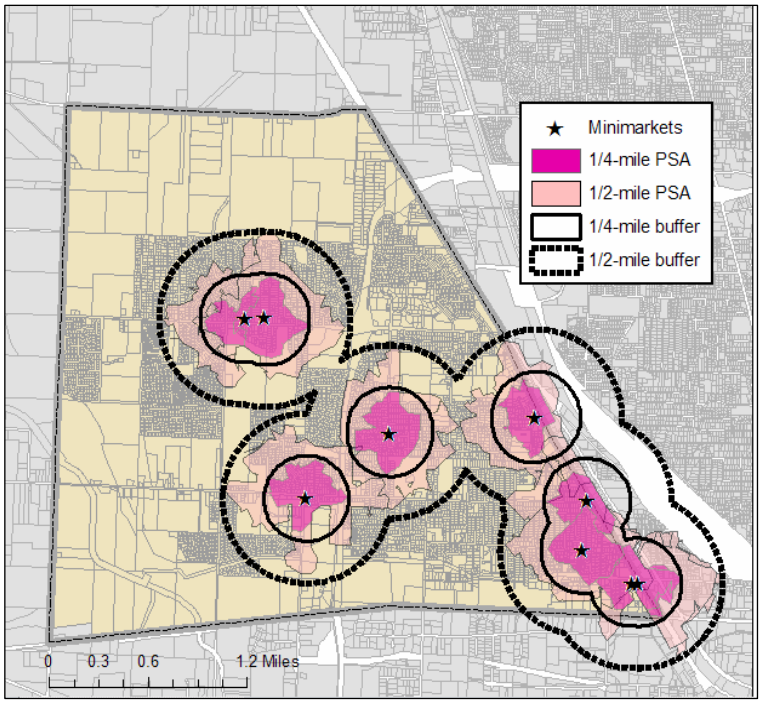


Figure 4-6. Buffers and pedestrian service areas for Bethel minimarkets.

In contrast, the PSAs for the minimarkets in Bethel cover a much larger area (Figure 4-6), extend well into the residential and family areas of Bethel, and have a better average PSAR than the

grocery stores at 0.49 [Figure 4-5(B)]. This finding highlights two situations, (1) There are more mini-markets than grocery stores in Bethel and (2) The minimarkets are embedded in more walkable areas than grocery stores.

For example, a child in a southeast Bethel neighborhood can easily walk to three different minimarkets but cannot walk (easily) to a supermarket. If the child wanted a carrot, the child would not be able to get it without a car ride, bus ride or a parent who trusts that child on a bike ride.

Figure 4-7 shows the combined PSAs for both grocery stores and minimarkets in relation to family-dense areas. This figure highlights how much more of Bethel is within the minimarkets' PSAs than the grocery stores' PSAs. It also shows that there are significant portions of Bethel, especially within the family-dense areas, that are not within a ½-mile walk to any food resource.

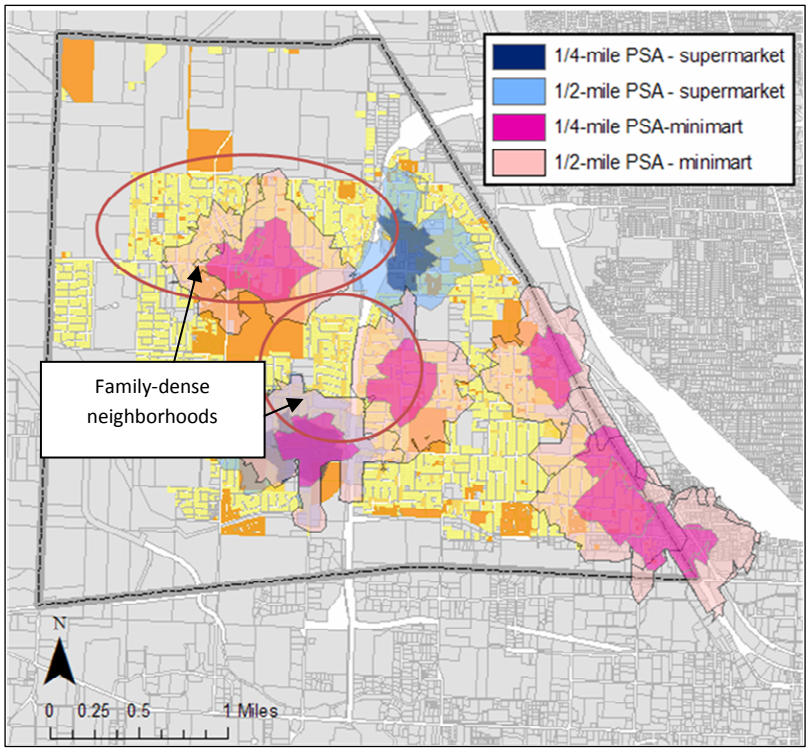


Figure 4-7. Residential land use overlaid by PSAs of grocery stores and mini-markets

Transportation Infrastructure

Available bus routes, bike routes, and sidewalks make up the "alternative transportation" infrastructure of Bethel. This section will touch on the available bus routes. Discussion of the bike routes and sidewalks will be discussed in the next section, Environmental Audit Findings and Analysis.

Vicinity to Bus Routes

When looking at the available bus routes in Bethel, one can see they follow the main arterials and pass every supermarket and minimarket within Bethel. In order to see if the residents of Bethel could use the bus to reach the stores, a network-defined PSA for all the bus stops was created. A distance of ¼ mile was used, as is assumed "walkable" by Lane Transit District.

The resulting PSA looks somewhat promising (Figure 4-8). Many of the previously ignored neighborhoods of northwest Bethel are within ¼ mile of a bus route that will take residents directly to a supermarket, although the central family-dense area does not have much access to the bus system.

Yet even with the buses available, taking the bus means being on a schedule other than one's own, which can often prove difficult for families (according to LTD's 2009 schedules, the buses run every 30 minutes during the week and every 20 minutes to one hour on the weekends).

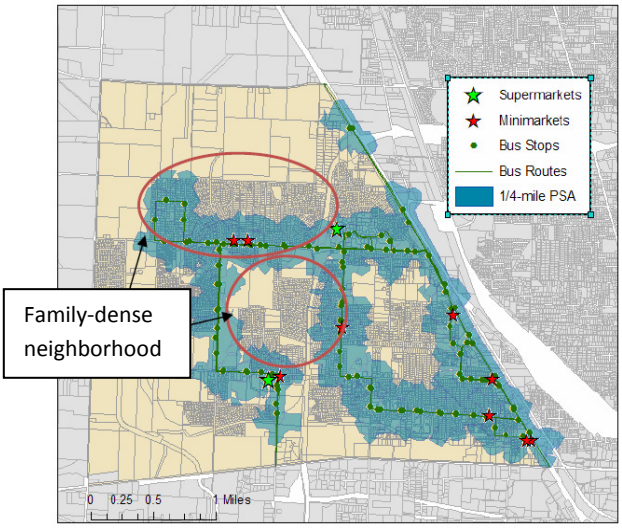


Figure 4-8. Bethel bus routes, stops and PSAs

Summary of GIS findings

The findings of the GIS analysis speak to at least four important points: (1) Much of the two areas with the highest number of families in Bethel (and therefore assumed children) lacks access to either food resource, (2) Minimarkets (the more "undesired" food sources for children) are the most available in the family neighborhoods, (3) Grocery stores in Bethel are only connected to the residents via major roads, thus inhibiting walkability, and (4) Buses run in predicable areas throughout Bethel (only on major arterials) and connect to the food resources.

Environmental Audit Findings and Analysis

Because the majority of Bethel's families are not near grocery stores, the analysis of environmental audit data gathered focuses on how the neighborhoods within Bethel, through their built environment accessibility characteristics, can facilitate or discourage active transportation to food resources. The GIS analysis above indicated that most families are over a mile from a grocery store. But there is always the possibility that if the built environment catered to active transportation, residents could choose to walk/bike or bus to their food resources instead of drive.

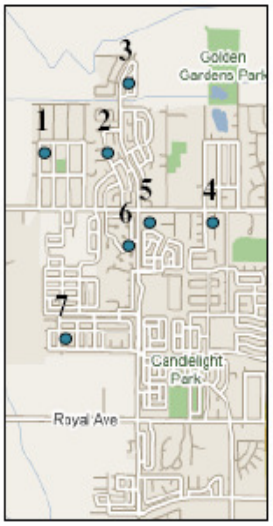
Reflections from the Streets

This section will focus on the on-the-ground environmental audit using the Checklist as well as reflections from walking around Bethel. Specifically, this section will address the variety of neighborhood design and audit findings in relation to availability of food destinations, sidewalks, and bike lanes.

Variety of Neighborhood Design

The first surprise from the gathered data was how remarkably different various neighborhoods are within a relatively small area of Bethel (Figure 4-8). Each individual development within the audited area was mostly homogeneous in the style, look and transportation infrastructure. Although most

of the audited area had a majority of single family homes, there were patches of duplexes in the northwestern sections of the audited area, mostly on corner lots so that each resident's entrance/exit faces a different street. Figure 4-9 shows various parts of the audited area and highlights environmental characteristics of specific development. The homogeneity of each part gave a "neighborhood identity" to each, although whether or not it contributed to a positive neighborhood identity could be debatable.



Location on Map	Photo	Environmental Characteristics
1		• No sidewalk buffer • Wide sidewalks • Prevalent street parking • Single family homes
2		• Narrow sidewalk • No sidewalk buffer • Cars parking on sidewalks • Manufactured homes
3		• Sidewalks with no buffer • Prevalent on-street parking • Mixture of single family homes and duplexes
4		• No sidewalk • Prevalent on-street parking • Single family homes
5		• Sidewalks on both sides with buffer • Street parking prohibited • Trailer home parking behind gate – no access to sidewalk except through gate with private code
6		• Sidewalk with buffer on major road • Street parking prohibited • Back fence cuts off residential access to adjacent road
7		• Sidewalk on both sides of the street • Buffers with trees • Minimal on-street parking • Large lots for single family homes

Figure 4-9. Environmental characteristics of audited areas

Environmental Audit Findings

Although the audit asked a variety of questions about land use, public transportation, street characteristics, environmental quality and sidewalk/shoulder characteristics, only a few questions really hit on the reasons why or why not residents would choose active forms of transportation (e.g., walking, biking) to their food resources. These questions were about availability of food resources, availability of sidewalks and/or bike lanes and the design of the alternative transportation infrastructure. The combination of the answers to these questions in combination with observational findings created a complete picture of the food environment in this sub-area of Bethel as well as led to some interesting conclusions about general accessibility of residents to services in Bethel.

Availability of Food Resources

The only food resources within the audited area are the Serv-U Market and the DariMart on Barger Drive (Figure 4-10). The Serv-U Market sells primarily beverages and pre-made food, and DariMart is a typical convenience store.

Availability of Sidewalks

Figure 4-11 shows the availability and types of sidewalks in the audited neighborhood. As shown, most of the neighborhoods do have sidewalks on both sides of the street. There are only a few streets (in red) that do not have any sidewalks, and besides the northernmost red section, all built environment auditors indicated that the street was a safe alternative for walking on the streets without sidewalks.

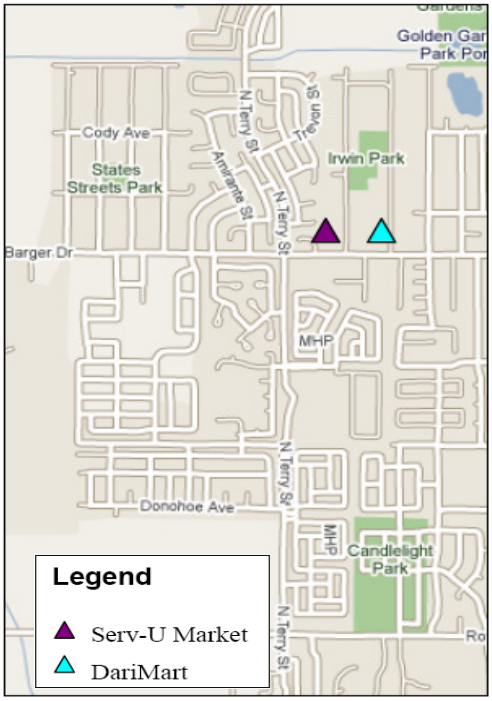


Figure 4-10. Location of food resources in the audited area

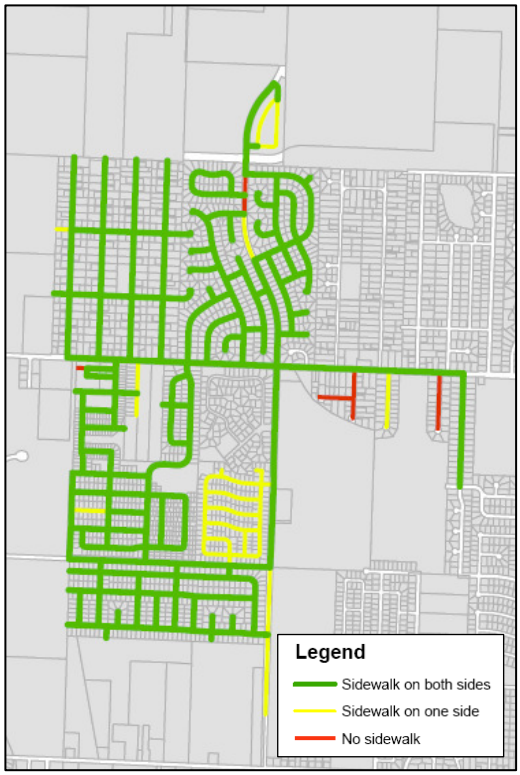


Figure 4-11. Sidewalks in the audited area

Availability of Bike Lanes

Bike lanes are a rarity in the audited neighborhood. The City of Eugene has only two roads in this area marked for bike traffic – Barger Drive and North Terry Street (Figure 4-12). Unfortunately, these roads also have the heaviest traffic in the area. Other neighborhoods in Eugene often will have marked bike lanes on the major collector streets as well as bike route signs on lower traffic streets. Unfortunately the layout of the street network in Bethel does not include any streets that are parallel or connect to major corridors.

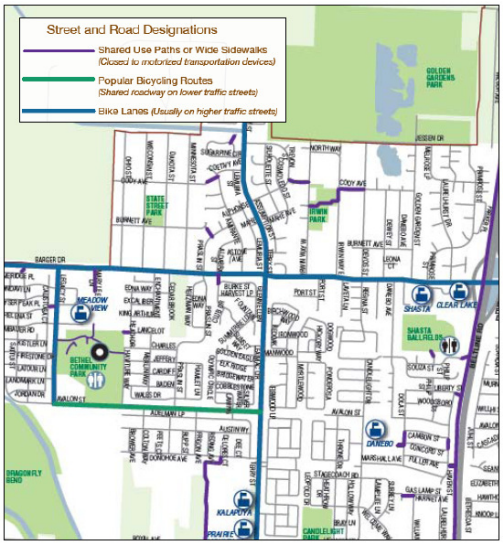


Figure 4-12. Designated bike lanes in the audited area (Source: City of Eugene)

Fortunately, no roads without bike lanes were said to be unsafe for bike riding per the audit. But because of the lack of connectivity, residents cannot bike from one neighborhood to the next without having to bike on the major roads of Barger Drive or North Terry Street. Thus, food is only accessible by alternative transportation along those two busy routes. While having marked bike lanes on these major streets is appreciated, many families would not feel comfortable traveling on such high-traffic streets with children.

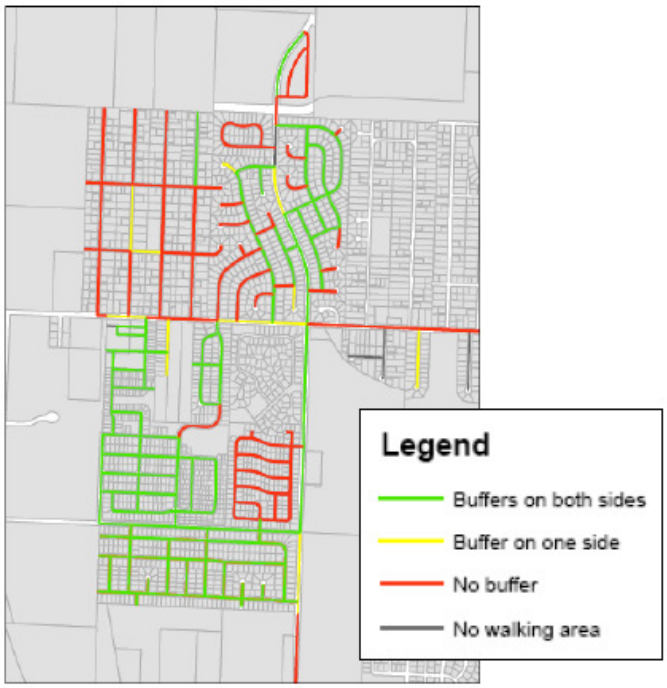


Figure 4-13. Sidewalk buffers in audited area

Transportation Design

Again, most of the transportation infrastructure is homogeneous within specific developments. The subsections below show the availability of sidewalk buffers, availability of parking, and trash or graffiti issues within the audited neighborhoods.

Availability of Sidewalk Buffers

The availability of sidewalk buffers is dependent on the area of the neighborhood. A visual representation of the sidewalk buffers, with an indication of whether there are buffers on both sides of the street, buffers on only one side of the street, no buffers or no walking area is shown in Figure 4-13.

There are few areas in the audited section without sidewalks, but there are many without buffers. Curiously, a large section without buffers (in the northwest part of the audited area) has a grid street pattern which is commonly thought of as the most "connective" and walkable street pattern. Yet the streets in this area have very low traffic, so walking next to the street might not seem like a threat to pedestrians.

It is also interesting to note the lack of buffers along Barger Drive. Since Barger Drive is the main connection to food resources for much of the sampled area, if residents choose to walk, they will be directly next to heavy and higher speed traffic. Barger also has a bike lane, yet many bicyclists were seen biking on the sidewalks during the audit.

Much of the audited area had buffers on both sides of the street. These areas seemed to have the perfect "design" for walkability but lacked the connectivity of a street grid or quick connections to bike/pedestrian collector streets.

Parking Availability

Parking availability is fairly consistent throughout the audited area (figure 4-14). Except along Barger Drive, North Terry Street, and Avalon Street, the only other area with no street parking was Burnett Street, between Dakota Street and Wisconsin Street. The Burnett Street segment was next to a park, which is probably the reason that parking is not allowed.

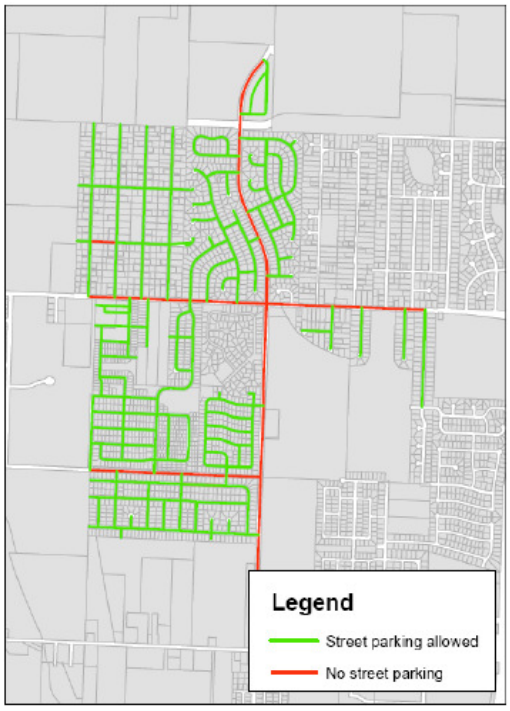


Figure 4-14. Street parking in the audited area

Few parking lots were located in the audited area. The existing lots are used for businesses along Barger Drive and churches within the audited area. None of the lots are intended to supplement street parking for residents.

The variety of parking styles was interesting to observe during the audit. Residents living in cul-de-sacs often had multiple large vehicles that would not only fill their driveways but also spill out onto the street. Additionally, it was not unusual to see cars parked up on the sidewalk in areas without sidewalk buffers. This usually happened in areas where there was a smooth slope from the street to the sidewalk, not a strict curb.

Most, if not all, of the residences in the audited area had garages and driveways, so streets were used as overflow parking for residents. As a result, there were many streets that had few cars parked on them (especially in the southwest neighborhoods) even though street parking is allowed.

Figure 4-15. Trash, graffiti and broken windows in audit area

Trash, Graffiti and Broken Windows

Trash, graffiti, and broken windows can be seen as a hindrance to active transportation since residents might perceive their presence as an indicator of decreased safety. Fortunately, there were very few incidents of trash, graffiti or broken windows during the audit. Figure 4-15 shows where these rarities were located. It should be noted that all of these occurrences were isolated and were not reflective of areas as a whole.

Barriers

The second surprise of the environmental audit was the amount of land that is either fenced off or prohibited for walking/jogging/etc. by non-residents. Most of these areas were mobile home or manufactured home parks to the south of Barger Drive (see Figure 4-17 for exact locations). The presence of these areas and their respective activity prohibition inhibit intra-neighborhood connections and limits the number of connections across these spaces for neighbors to use to get to a specific destination.

The location of these parks is especially interesting because many lie directly east of very "walkable" sections (e.g., those with sidewalk availability, pedestrian infrastructure, low traffic, aesthetically pleasing qualities, etc.), and child-heavy neighborhoods where residents need to go east to get to shopping and grocery stores. Therefore, the only option children and their families have is to travel on Barger Drive or North Terry Street, which, although there are sidewalks present and bike lanes available, are highly used traffic corridors and often very busy.

Once one cancels out larger streets as options for reaching food destination (therefore removing Barger Drive. and North Terry Street as options), each neighborhood is cut off from any possible food resources. This gives families little choice in how they can get to and from a grocery store except by auto or risking their safety walking or biking on major roads.

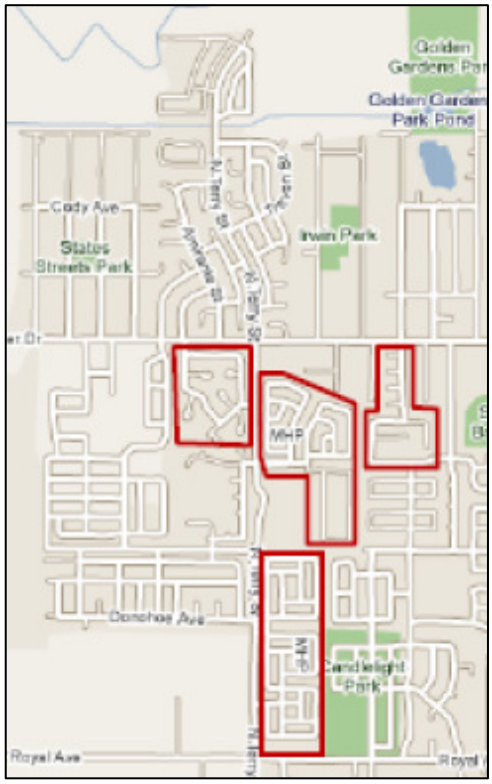


Figure 4-17. Mobile home parks

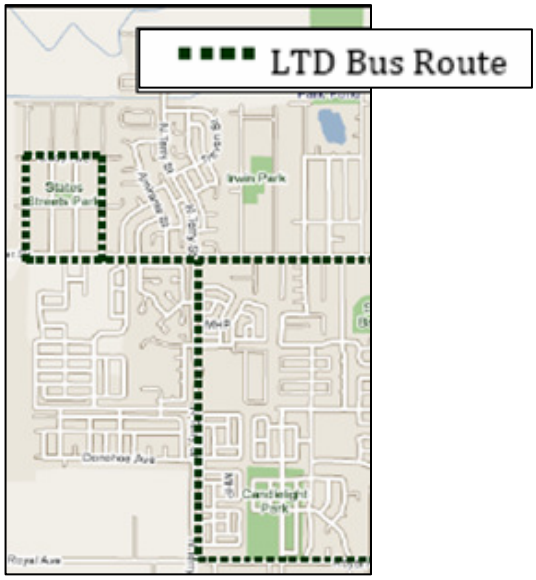


Figure 4-18. LTD bus routes

For those who would like to use public transport, the options are also slim. Public transportation only goes through one of the neighborhoods audited, as indicated in Figure 4-18. Residents in the rest of the neighborhoods have to travel to North Terry Street or Barger Drive for bus access.

Connectivity Features

But the design of collector streets is not necessarily the issue. The main issue that inhibits connectivity is that the neighborhoods in Bethel are designed for the automobile via a collector and arterial system. This design is used to reduce the number of intersections and thus, increase auto safety. Most traffic accidents happen at intersections, and by limiting the number of intersections of busy, higher-speed roads (such as Barger Drive), there are fewer possibilities for high-speed accidents.

The presence of cul-de-sacs in the neighborhood design reinforces the auto-dominated environment and limit pedestrian connectivity. However, just because there are cul-de-sacs does not mean that there cannot be modifications to promote pedestrian connectivity. Figure 4-19 shows cul-de-sacs that have cut-throughs and other non-motorized paths throughout the neighborhoods. These paths have the characteristics to make the area more cohesive although their rarity and lack of publicity (no signage until you reach the path) might keep residents from knowing about their existence. Also, the paths are fairly isolated and do not combine to make a single path, nor do they create an option for those who need to get through the mobile home parks indicated in a previous section.

Figure 4-19. Cul-de-sacs and cut-throughs in the audited area

But the existing infrastructure can be seen as a first step toward future active transportation infrastructure. As mentioned before, none of the audited area is within one mile from a grocery store, but most is within two miles. Given the popularity of biking and walking in Eugene, offering a walk/bike option might help families reach grocery stores

more often and in a more active way. Specific routes and design suggestions will be discussed in the following chapter.

Summary of Environmental Audit Findings

The findings of the environmental audit analysis speak to at least four important points: (1) The audited area has no grocery store accessible except via a major roadway, (2) The area lacks a consistent identity in residential structures and connectivity characteristics (sidewalk design, buffers, etc.), (3) Although each neighborhood could be thought of as walkable, the street patterns disallow connectivity from one development to another, and (4) Private property within the audited area creates physical barriers between residential developments and food resources.

Conclusion

Overall, Bethel is set up like many suburban developments where housing and services (of particular interest, food) are separated by distance and land use. Unfortunately for the children of Bethel, many of them live in the single family residential areas that are the furthest away from grocery stores and better served by smaller markets with limited food choices. Therefore, if distance were the only factor in how families chose their food resources, smaller and unhealthier food resources would be used more than fully-stocked grocery stores.

Upon a closer inspection of a specific section of western Bethel, it was found that areas of Bethel allow for active transportation within individual developments but lack connections to the greater neighborhood. From an on-the-ground audit, the two most inhibiting factors seemed to be the placement of private, non-accessible property (mobile home parks) and the lack of smaller, bike/pedestrian friendly collector streets.

Chapter 5. Recommendations

Findings Recap

As mentioned in the previous section, there were three major findings of this analysis:

- **Families don't live by food.** The areas in Bethel with the highest number of families (and therefore assumed children) lack adequate access to food resources, whether they be minimarkets or grocery stores.

- **Minimarkets are closer than grocery stores.** Of these two food resources, the minimarkets (the more "undesired" food sources for children's nutrition) are more available in the family neighborhoods than grocery stores.

- **The areas within Bethel lack neighborhood connectivity which results in neighborhood isolation.** The developments within the Bethel area have dramatically different designs and layouts from one another in all aspects including housing, street design, sidewalk characteristics, etc. The northwestern area of Bethel that was analyzed using ArcPad surveys had physical barriers to food. Because of the location of private and gated properties, residents from many of the sections can access food only by using the major roads of North Terry Street and Barger Drive. These roads are designed for heavy, higher speed traffic and inhibit the use of active transport.

Unfortunately, these findings are relatively bleak. But Bethel also has some characteristics that would lend themselves to the development of an active transportation-friendly community. These characteristics include:

- **High availability of sidewalk infrastructure and bicycle/pedestrian safety within individual developments.** Nearly all the neighborhoods audited had sidewalk infrastructure for pedestrians, and the adjacent roads were rated as "safe places to bike" by surveyors.

- **Pleasant walking environments.** Nearly all of the audited areas were well-kept, were somewhat shaded and had implied safety (no graffiti, trash, etc.).

- **A start to connectivity.** As mentioned in Chapter 4. Analysis and Findings, there are some non-motorized paths within Bethel that are intended to increase accessibility. Although these paths are not currently a network, there is potential.

Specific Recommendations

Using the conclusions mentioned above as a reason for action, there are many opportunities for Bethel to become a community where food is accessible. This section will highlight and discuss three possibilities: increasing the number of healthy food destinations, implementing transportation infrastructure design and offering education.

Increasing the Number of Healthy Food Destinations

The initial analysis highlighted the lack of healthy food resources in the Bethel neighborhood and especially in the neighborhoods where children were located. It was also found that even if families considered the options of walking or biking, they still have a couple of miles between them and the grocery stores. One option may be to bring healthy food closer to where people live.

Given zoning restrictions and available land, building a grocery store within the residential developments is not a reasonable short-term option. But what might not be as difficult is locating a farmers' market within the neighborhoods. Currently, the closest farmers' market to the Bethel neighborhood is one in downtown Eugene, over four miles away on major roads. While this distance may not discourage all residents from frequenting the farmers' market, it surely is not helping.

Two locations could be possibilities for setting up a once-a-week farmers' market, States Street Park and existing schools.

States Street Park

States Street Park (Figure 5-1) could be used as a market option. There are two churches within two blocks of the park that could be negotiated with for market day parking. Additionally, the park is located in a grid street neighborhood, the perfect design for connectivity, and has a few existing (although poorly advertised) connections to the development to the east. States Street Park consists of an open field, a baseball diamond and a playground.

Figure 5-1. States Street Park and suggested parking locations

The Schools

La Jolla Elementary School in La Jolla, California, decided to host a farmers' market in its parking lot on weekends. The school uses the market as an opportunity for additional income (profits from renting

spaces funded some school programs), but also uses it as a way for families to interact in an informal environment. [1]

There is also an existing population that is familiar with the school – students and their families. By encouraging the students and their families to frequent the market, healthy food is available in an environment that families are familiar with and that might not have as many social barriers as larger farmers' markets outside of their neighborhood.

Having farmers' markets on non-school, and possibly more leisurely, days such as Saturday and Sunday might also give families the chance to attempt to walk or bike to the school – something that they might not do on weekdays. This could have at least two benefits: (1) families will become familiar with the actual "active" routes to school instead of what they might imagine the walking/biking environment to be, and (2) parents might feel comfortable allowing their children to walk/bike to school alone or with friends after "practicing" the route while going to the market.

Currently, there are nine schools in the Bethel neighborhood west of Highway 99, four of which are along the major transit routes of Barger Drive, Royal Avenue, and North Terry Street.

I would recommend setting up a market at a school within a neighborhood, as shown in Figure 5-2. At these selected schools, the auto might become a less dominant fixture of the market (especially if integrated with the design recommendations in the following section), and Bethel residents might get to explore a part of their neighborhood that they otherwise do not visit.

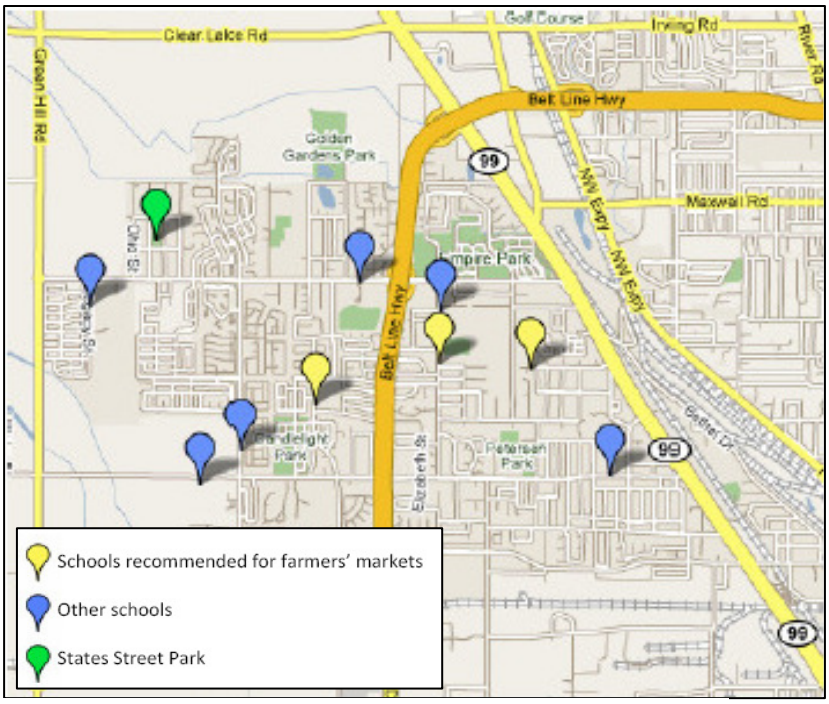


Figure 5-2. Proposed farmers' market locations in Bethel

[1] A farmer's market within the Bethel has the possibility of increasing social capital and connectivity within the neighborhood. It has been reported that people look to farmers' markets for social interactions as well as learning opportunities. This is not necessarily the case at conventional grocery stores (PolicyLink, 2009). The social interactions created by farmers' markets could lessen the isolating effects of the private neighborhoods and allow residents from all areas of Bethel to have equal access to a health-promoting resource.

Transportation Design Recommendations

I do not believe that redesigning Barger Drive or North Terry Street is the answer to food accessibility in Bethel. Instead, I think it is important to keep the active transportation on neighborhood roads and separated paths. This not only would make residents feel safer since they would be further away from vehicles, but could add a recreational component to Bethel that would not be possible on a major arterial. The map below offers a couple of suggestions for additional alternative transportation infrastructure in Bethel - one to the north of Barger Ave. (Northside Path) and one to the south (Apple Trail). Two trails are recommended to avoid safety concerns with crossing Barger for families as well as for drivers who are unfamiliar with bike/pedestrian/vehicle interactions. These paths also convienently bypass the suggested farmers' market locations mentioned above.

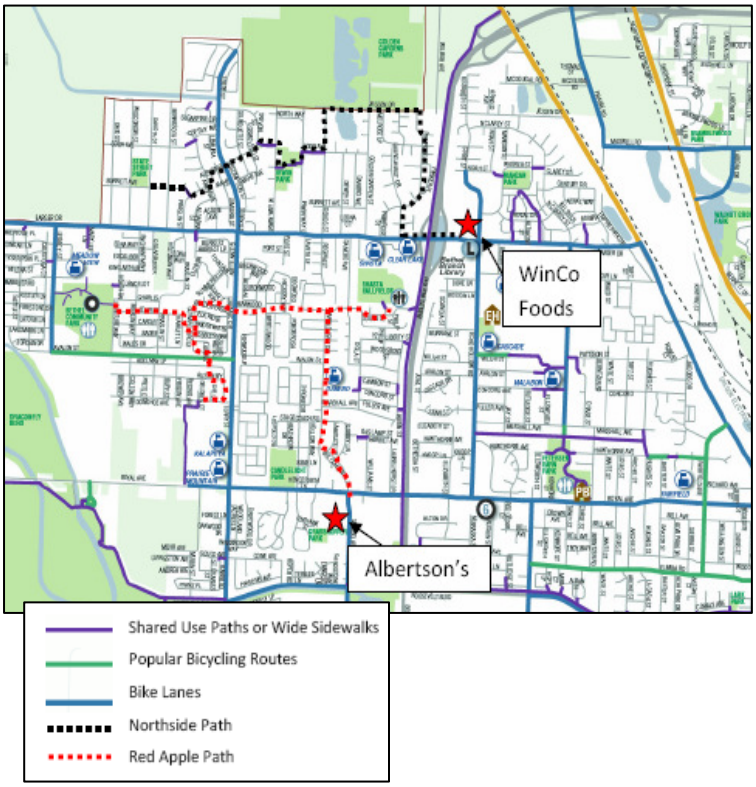


Figure 5-3. Proposed and existing alternative transportation paths

The Northside Path

The Northside Path would link the areas north of Barger Drive. It would begin at States Street Park and use existing low traffic streets and non-motorized segments to reach the WinCo Foods shopping center. This path could also be used as a parks connector and could facilitate bike/ped access to States Street Park, Irwin Park and Golden Gardens Park.

Only limited infrastructure improvements would be needed for this proposed path. Since the streets suggested are already low-traffic, no street marking would be necessary, although "Bike Path" sign postings could be beneficial. Essentially, this route would consist of minimal non-motorized paths and mostly "bicycle boulevards." Bicycle boulevards are smaller roads that allow both vehicular and non-vehicular transportation, but have been optimized for bikes. Because these routes reach destinations

that could be accessed easily using major roads (which might not be as bike/ped-friendly), vehicle use would remain low.

Currently, there is no way to get over Beltline Highway toward the WinCo Foods except by Barger Drive. The map below shows a the path using the sidewalk as the link between the west side of Beltline Highway to the WinCo shopping center.

Red Apple Path

The main goal of the Red Apple Path would be to connect the Bethel Neighborhood to Albertson's and schools by active transportation routes (for transportation both on school days and for the potential market scenarios).

This path would be much more difficult to implement since a few parts of the path would go through private developments. While not preferred, the accessibility gained from going through the private developments would greatly increase neighborhood connectivity and keep residents off major roads as they travel to their food resources.

Existing Plans

The City of Eugene has future plans for bicycle and pedestrian infrastructure in Bethel, but currently has no dedicated funds. Therefore, the budget only allows for signage on paths that correspond with new development.

Figures 5-4 and 5-5(next page) show the City of Eugene's current bike/pedestrian projects from the 2031 Regional Transportation Plan. Figure 5-4 shows "fiscally constrained" projects which the city believes can be funded over the next 20 years. The "illustrative projects" (figure 5-5) are planned for 20 years and beyond (Lee Shoemaker, personal communication, June 2, 2009).

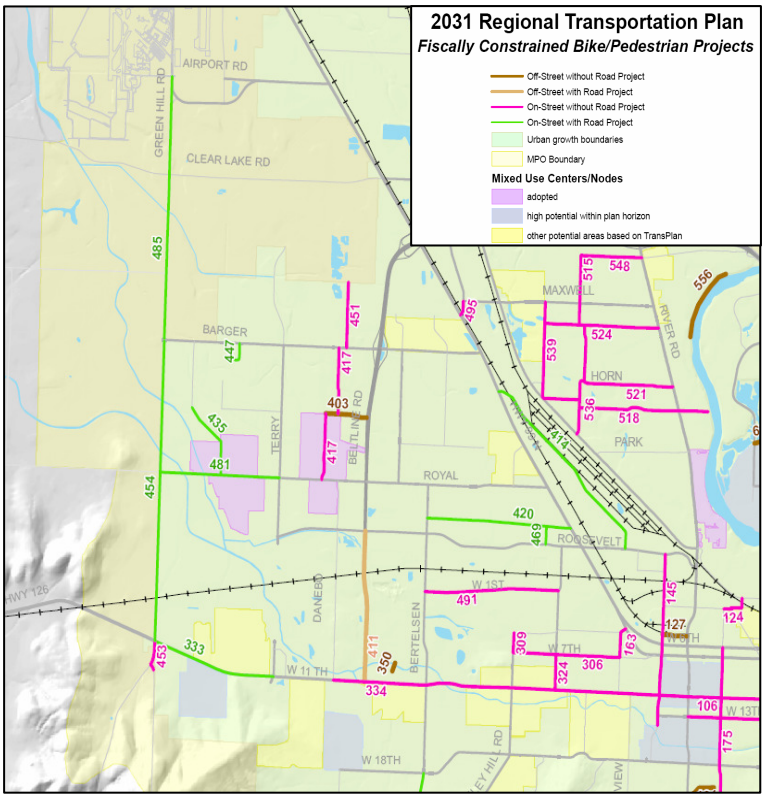


Figure 5-4. Fiscally constrained bike/pedestrian projects (Source: City of Eugene)

While some of these paths overlap with the paths proposed in the previous section (the Northside and Red Apple paths), the city's paths seem to focus on

areas of Bethel that are not yet developed. This is probably the case since the city can more easily install new paths as new construction occurs versus effecting existing roads and residents.

But I think the City of Eugene is missing out on the existing opportunities on current roads and pathways. By utilizing existing infrastructure, signage would be the only, and relatively small, cost. Figure 5-6 shows a variety of signage that the city has been considering using to designate paths which could be used to make Bethel more connective with minimal costs.

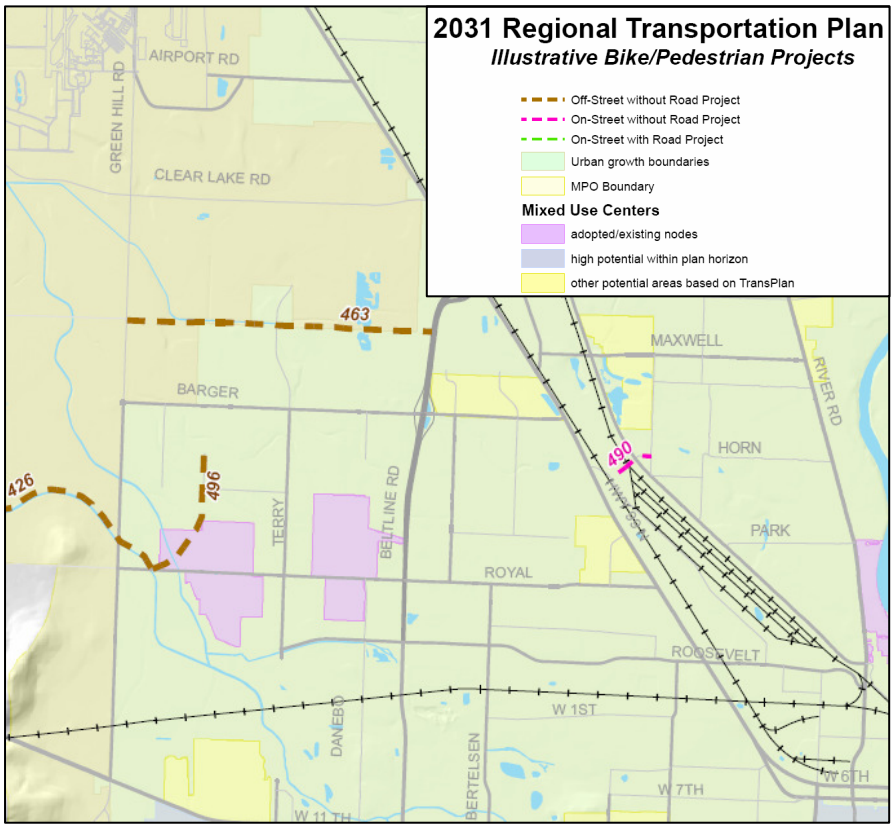


Figure 5-5. Illustrative bike/pedestrian projects (Source: City of Eugene)

Figure 5-6. Various bicycle/pedestrian path markings considered by the City of Eugene (Source: City of Eugene)

Figure 5-7 shows the proposed Northside and Red Apple paths again, but has delineated the sections of the paths that are existing roads (would only need signage), existing bicycle/pedestrian paths (no cost needed) and needed connections (would need infrastructure and signage). In comparison to the paths proposed by the City of Eugene (Figures 5-4 and 5-5), the proposed paths have a smaller new infrastructure need and offer connectivity for more residents throughout the Bethel neighborhood to food (and therefore other commercial services), schools and parks.

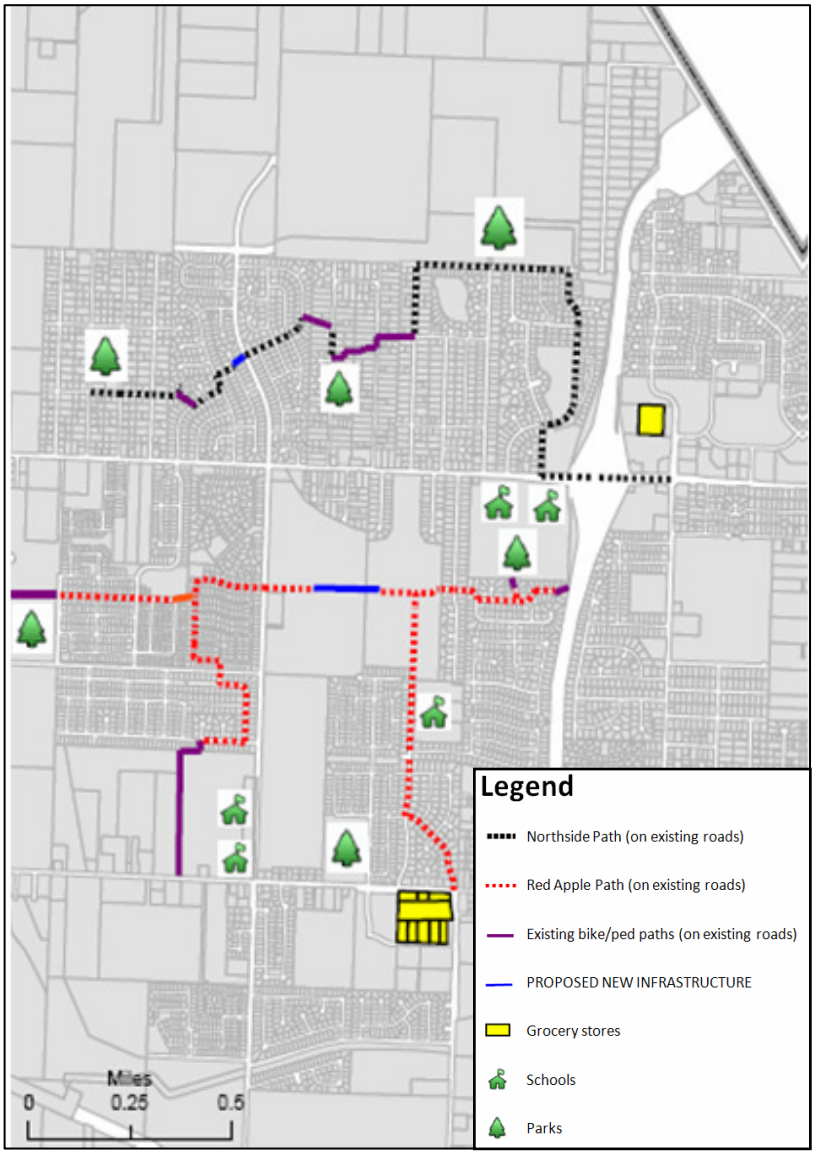


Figure 5-7. Proposed paths, existing infrastructure, needed infrastructure and destinations

Educational Supplement

The largest shock of the environmental audit analysis was the physical barrier that the private mobile home parks formed between families and food resources. Although some of these parks were gated, many simply posted a "No walking/jogging/biking except by residents" sign at the entrance. Postings such as these not only prohibit other neighbors from entering the area but also institute a social barrier between neighboring developments.

Lenore Skenazy created a concept known as "free range kids" (n.d.). This concept comes from the lives children lived 30-40 years ago when they were allowed to roam fairly freely around their neighborhoods with minimal parental supervision. There are many reasons why parents have limited the practice in recent years, although the top reason is undoubtedly perceived safety. But I think Bethel might be the neighborhood that can overcome this barrier.

The family heavy neighborhoods seem cohesive and an inter-area events or Bethel-wide communications/tours might give the residents from throughout the neighborhood the familiarity they need to feel welcome as they travel from one development to the next. Education and active transportation outreach would be necessary to get buy-in from the neighborhood, although it does not seem like a difficult sell.

Limitations

The research completed for this project was based on an objective GIS analysis and a subjective audit analysis. Yet the entire story of food accessibility in Bethel cannot be complete until the actual residents of Bethel are incorporated. This project was framed with the assumption that residents are looking for easier ways to reach grocery stores and would be interested in making the trip to grocery stores by foot or bike. This might be a false assumption and, therefore, a significant limitation to this project.

In addition to assumptions, the population that completed the subjective audit (University of Oregon planning students) was not the population that the built environment is affecting (families in Bethel). The values and perspectives of these groups are undoubtedly different and may result in different audit answers that have the potential to reach different conclusions about food accessibility in Bethel.

Lastly, time and resources were limiting factors of this project. All the data gathed from the environmental audit was done in March and April of 2009 and does not take into account the historical development of Bethel. It would be interesting to look into how Bethel has developed over time and how the development has encouraged or discouraged alternative transportation use to food resources by families.

Policy Recommendations

This research project highlighted the lack of policy in the field of food accessibility. The following policy recommendations were developed as options to increase accessibility in the Bethel neighborhood and similar communities.

- **Residential developments must be built to allow accessibility to necessary destinations, such as food, schools, and public transportation.** Currently, developers are not required to connect new neighborhoods to necessary destinations. By implementing policy that requires developers to identify these locales as well as build safe bicycle and pedestrian routes to allow residents to get to these destinations, residents will have transportation options when meeting their basic needs. City staff need to take the lead on promoting accessibilityand making sure that developments are connective because it is their role to look at land use at a larger scale; developers tend to work on smaller-scale, and possibly non-adjacent, properties. Cities also have the option of restricting developers from using un-connective street design, such as cul-de-sacs, as was recently done in the state of Virginia (Weiss, 2009).

- **Private neighborhoods should not restrict connectivity between non-private residential areas and food resources.** In Bethel, mobile home parks and other gated/private neighborhood lie between

residential neighborhoods and food resources. This layout severely limits accessibility to grocery stores and forces residents to use major roads to reach their destinations since the minor roads within the developments are off-limits to non-residents. City planners must recognize that neighborhood connectivity goes beyond individual developments and not allow private neighborhoods to negatively impact greater neighborhood connectivity.

- **Smaller food resources should have healthy food available.** Smaller food resources, such as mini-markets, will continue to be more prevalent and widely distributed within residential neighborhoods. They should not, however, stock only unhealthy and/or prepared foods. Often, stores stock products that have longer shelf lives than fresh food and do not have the refrigeration space needed to keep fresh food cold. These impediments could be overcome through education campaigns and building collaborations between stores to make buying and stocking healthy foods economically viable. Policymakers could aid in this transition through subsidies for stores that are attempting to stock healthier foods and promoting these stores in existiing or new "active" or "heatlthy" community campaigns.

Conclusion

This project identified the "food environment" in Bethel for children and their families. While the existing environment is not set up to facilitate children reaching healthy food, there are simple changes that could greatly increase the connectivity in the Bethel neighborhood such as marking bike paths, creating temporary farmers' markets, and allowing all residents to use street infrastructure within the private and gated areas. With small changes, there might be a very large effect on how families can reach healthy food and other necessary services in Bethel.

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Appendix A

Active Neighborhood Checklist

Active Neighborhood Checklist

Date: _____ Segment ID: _____
Auditor ID: _____ Neighborhood ID: _____
Street Name: _____
Start Time: _____

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 or public/government buildings
- ☐ School/school yards (elementary, middle, high school)
- ☐ Parking lots or garages
- ☐ Park with exercise/sport facilities or playground equipment
- ☐ Vacant lot/abandoned building
- ☐ Undeveloped land
- ☐ Designated green space
- ☐ 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 parking facilities are present?
Select all that apply.

- ☐ None (no parking allowed on street at any time)
- ☐ On-street, including angled parking
- ☐ Small lot or garage (<30 spaces)
- ☐ Medium to large lot or garage

5. What *public* recreational facilities and equipment are present (including in the schoolyard if publicly accessible)?
Select all that apply.

- ☐ Park with exercise/sport facilities or playground equipment
- ☐ Off-road walking/biking trail
- ☐ Sports/playing field
- ☐ Basketball/tennis/volleyball court
- ☐ Playground
- ☐ Outdoor pool
- ☐ Other: _____

6. (*OPTIONAL*) What types of non-residential uses are present?
Select all that apply.

- ☐ None
- ☐ Abandoned building

Specific types of destinations:

- ☐ Small grocery, convenience store (including in gas station), or pharmacy
- ☐ Food establishment (restaurant, bakery, café, 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)
- ☐ Mall
- ☐ Strip mall
- ☐ Supermarket
- ☐ Large office building, warehouse, factory, or industrial building

Land use notes:

Developed at Saint Louis University School of Public Health, 2006

B. Is public transportation available?

	No	Yes, one side	Yes, both sides
1. Any transit stop (bus, train, or other)?	go to C1		
1a. Bench or covered shelter at transit stop?			

Transit stop notes:

C. What street characteristics are visible?

	No	Yes
1. Enter posted speed limit (99 if none):		
2. Enter special speed zone (99 if none):		
3. Enter total # of lanes on street:		
4. Marked lanes?		
5. Median or pedestrian island?		
6. Turn lane?		
7. Crosswalk for crossing this segment?		
8. "Walk" / "Don't Walk" signal?		
9. Traffic calming device (roundabout, curb bulb-outs, speed bump, brick road, other)?		If yes, specify type(s):
10. Cul-de-sac (dead-end street)?	go to D1	
10a. Sidewalk cut-through in cul-de-sac?		

Street characteristic notes:

D. What is the quality of the environment?

	No	Yes
1. Any commercial buildings adjacent to the sidewalk?		
2. Any amenities?		
2a. Bench (excluding at transit stop)?		
2b. Drinking fountain?		
2c. Other? Specify: _____		
3. Public art (e.g., statues, sculptures)?		
4. Graffiti or broken/boarded windows?		

5. Litter or broken glass?		None or a little
		Some
		A lot
6. Tree shade on the walking area?		None or a little
		Some or a lot
7. Steepest slope along walking area?		Flat/gentle
		Moderate
		Steep

Pedestrian environment notes:

E. Do you have a place to walk or bicycle?

	No	Yes, one side	Yes, both sides
SIDEWALKS			
1. Sidewalk present?	go to E10		
2. Any grassy or other buffer between curb and sidewalk *along most of the segment*?	go to E3		
2a. Tree(s) in buffer?			
3. Sidewalk continuous within segment?			
4. Sidewalk continuous between segments at both ends?			
5. Width ≥5 ft for *most* of the sidewalk?			
6. Width <3 ft for *any part* of the sidewalk?			
7. Any missing curb cuts or ramps at intersections or driveways?			
8. Any major misalignments or cracks in the sidewalk?			
9. Any permanent obstructions (trees, signs, tables) blocking the 3-ft walk area?			
10. ***If a sidewalk is not present on any part of the segment***, do you have another safe place to walk, including:			
Street or shoulder (if safe)?			
Unpaved pathway?			
Other? Specify: _____			

Sidewalk notes:

	No	Yes, one side	Yes, both sides
SHOULDERS (*OPTIONAL*)			
11. Designated bike route sign or marking or "Share the Road" sign?			
12. On-street, paved, and marked shoulder?	go to E16		
13. Width of marked shoulder ≥ 4 ft?			
14. Shoulder continuous between segments at both ends?			
15. Any permanent obstructions in the shoulder (including drainage grates, parked cars)?			
16. ***If a paved, marked shoulder is not present on any part of the segment***, do you have another safe place to bicycle, including:			
Street?			
Wide outside lane (~15 ft)?			
Other? Specify: _____			

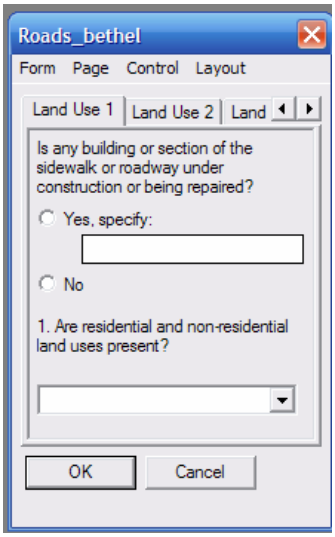
Shoulder notes:

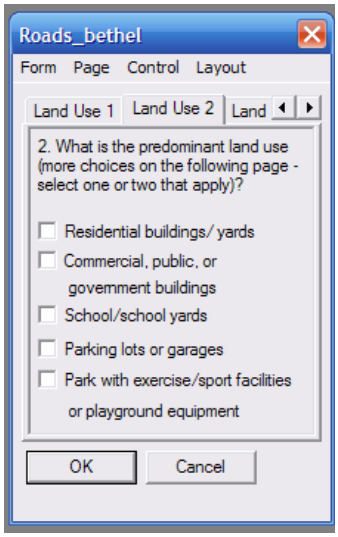
Stop time: _____

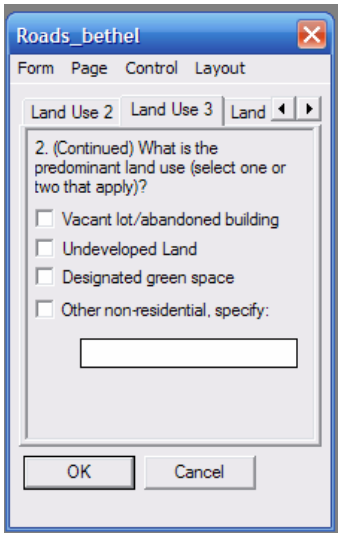
Appendix B

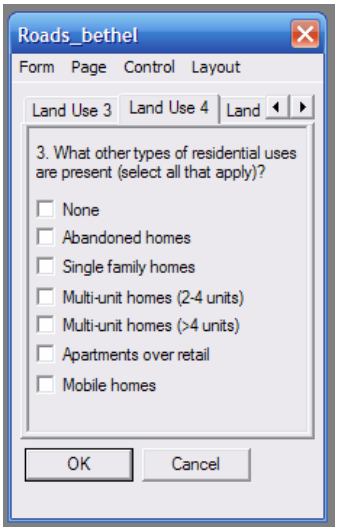
ArcPad Screenshots

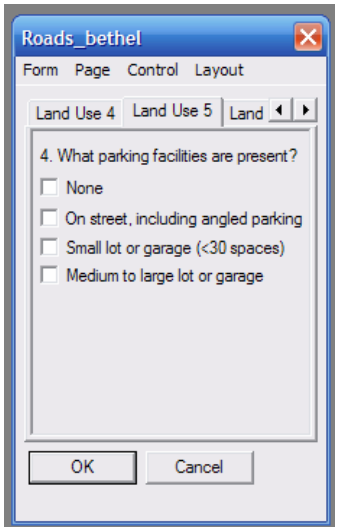
Land Use


Roads_bethel
Form Page Control Layout
Land Use 1 Land Use 2 Land
Is any building or section of the sidewalk or roadway under construction or being repaired?
Yes, specify:
No
1. Are residential and non-residential land uses present?
OK
Cancel

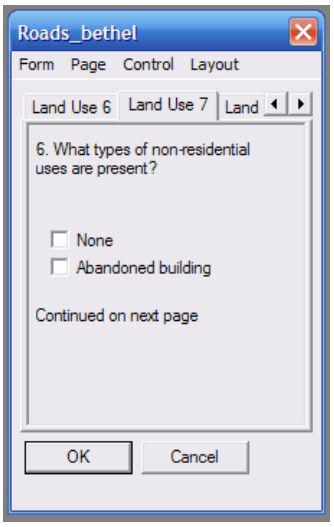

Roads_bethel
Form Page Control Layout
Land Use 1 Land Use 2 Land
2. What is the predominant land use (more choices on the following page - select one or two that apply)?
Residential buildings/ yards
Commercial, public, or government buildings
School/school yards
Parking lots or garages
Park with exercise/sport facilities or playground equipment
OK
Cancel

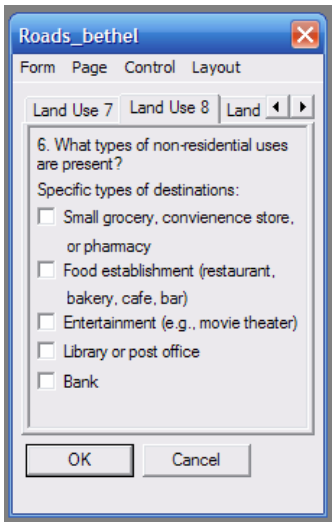

Roads_bethel
Form Page Control Layout
Land Use 2 Land Use 3 Land
2. (Continued) What is the predominant land use (select one or two that apply)?
Vacant lot/abandoned building
Undeveloped Land
Designated green space
Other non-residential, specify:
OK
Cancel

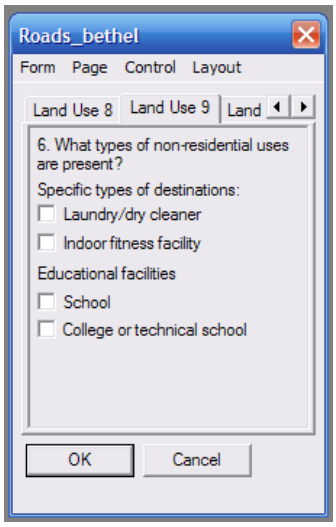

Roads_bethel
Form Page Control Layout
Land Use 3 Land Use 4 Land
3. What other types of residential uses are present (select all that apply)?
None
Abandoned homes
Single family homes
Multi-unit homes (2-4 units)
Multi-unit homes (>4 units)
Apartments over retail
Mobile homes
OK
Cancel

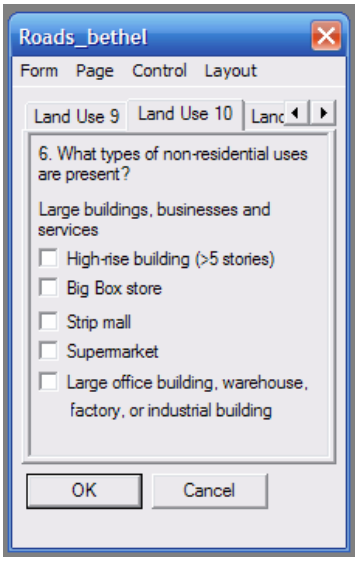

Roads_bethel
Form Page Control Layout
Land Use 4 Land Use 5 Land
4. What parking facilities are present?
None
On street, including angled parking
Small lot or garage (<30 spaces)
Medium to large lot or garage
OK
Cancel

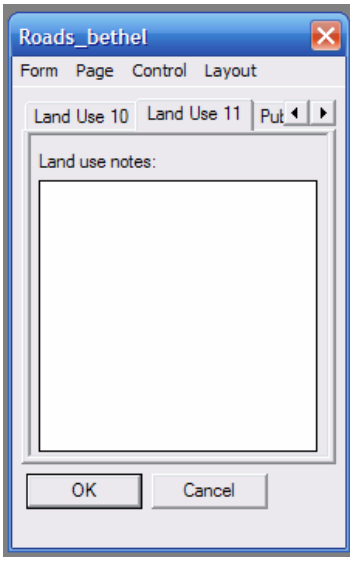

Roads_bethel
Form Page Control Layout
Land Use 5 Land Use 6 Land
5. What PUBLIC recreational facilities and equipment are present including in the schoolward if publicly accessible (select all that apply)?
Park with sport facilities
Off road walking/biking trail
Sports/playing field
Basketball/tennis/volleyball court
Playground
Outdoor pool
Other, specify:
OK
Cancel


Roads_bethel
Form Page Control Layout
Land Use 6 Land Use 7 Land
6. What types of non-residential uses are present?
None
Abandoned building
Continued on next page
OK Cancel

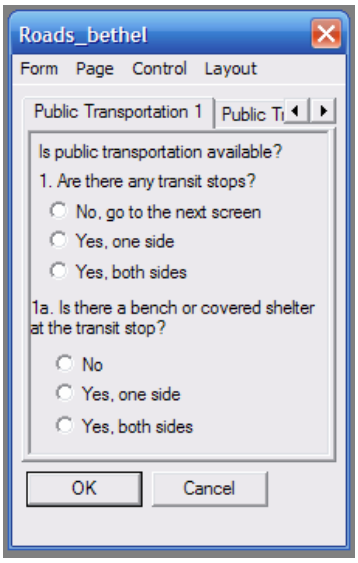

Roads_bethel
Form Page Control Layout
Land Use 7 Land Use 8 Land
6. What types of non-residential uses are present?
Specific types of destinations:
Small grocery, convienence store, or pharmacy
Food establishment (restaurant, bakery, cafe, bar)
Entertainment (e.g., movie theater)
Library or post office
Bank
OK Cancel

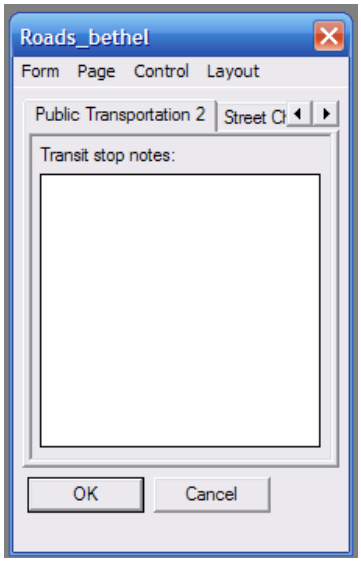

Roads_bethel
Form Page Control Layout
Land Use 8 Land Use 9 Land
6. What types of non-residential uses are present?
Specific types of destinations:
Laundry/dry cleaner
Indoor fitness facility
Educational facilities
School
College or technical school
OK Cancel


Roads_bethel
Form Page Control Layout
Land Use 9 Land Use 10 Lanc
6. What types of non-residential uses are present?
Large buildings, businesses and services
High-rise building (>5 stories)
Big Box store
Strip mall
Supermarket
Large office building, warehouse, factory, or industrial building
OK Cancel

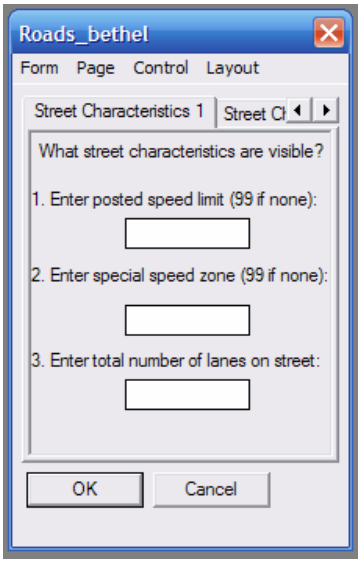

Roads_bethel
Form Page Control Layout
Land Use 10 Land Use 11 Put
Land use notes:
OK Cancel

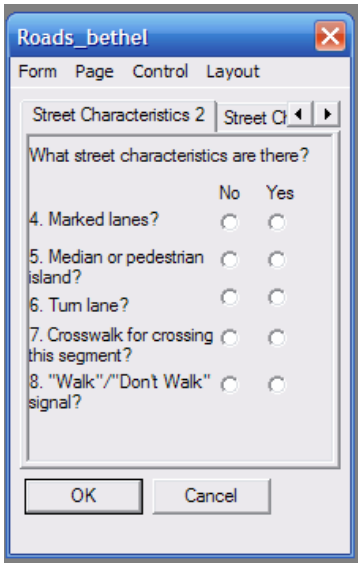
Public Transportation

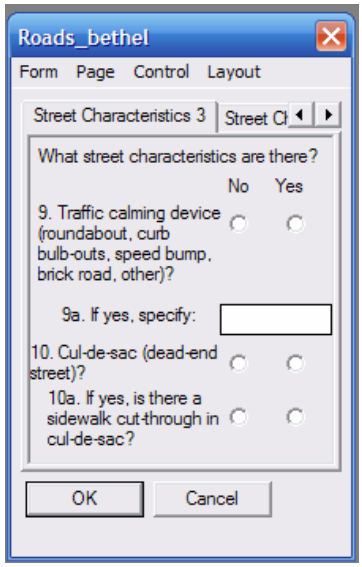


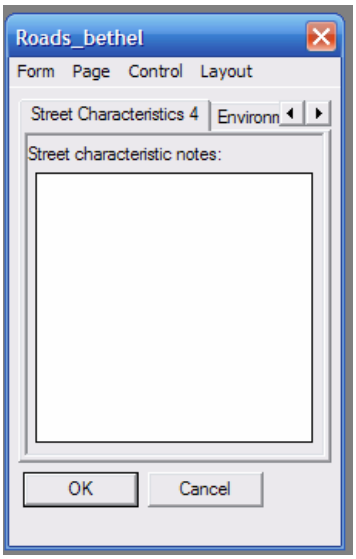


Street Characteristics

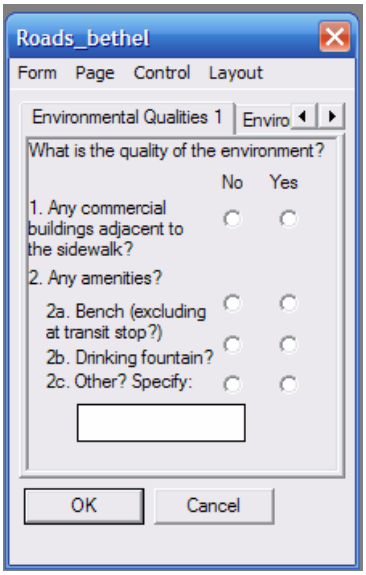


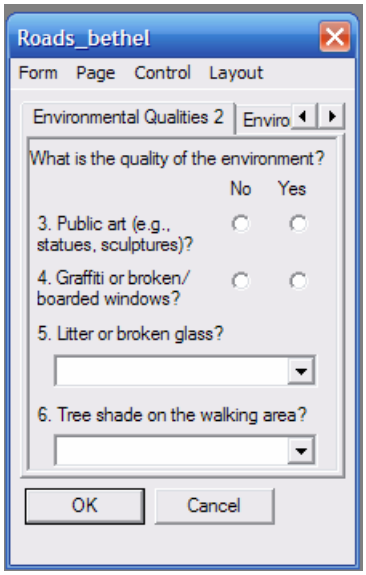


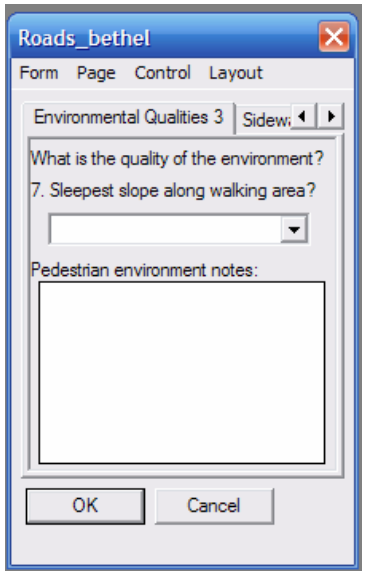




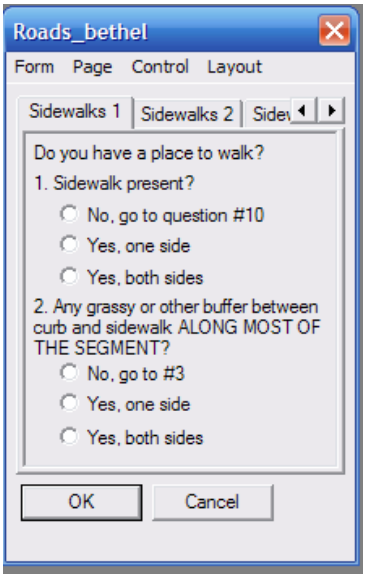
Environmental Qualities

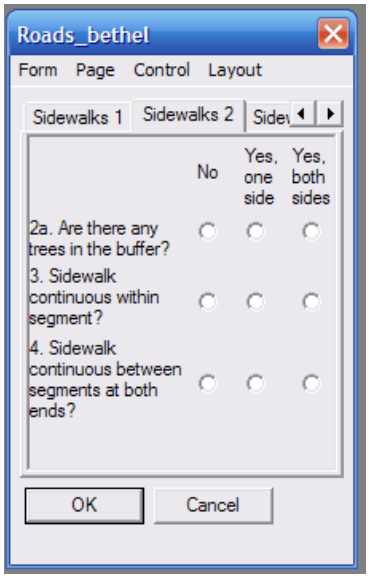


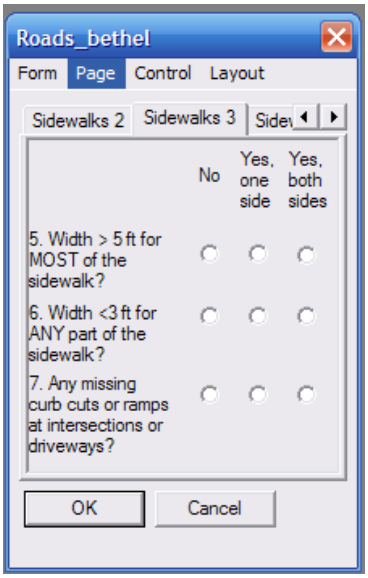


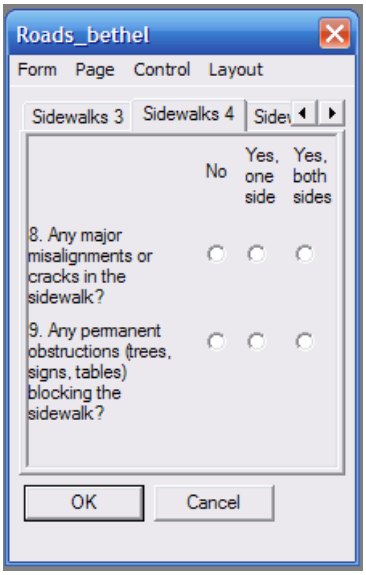


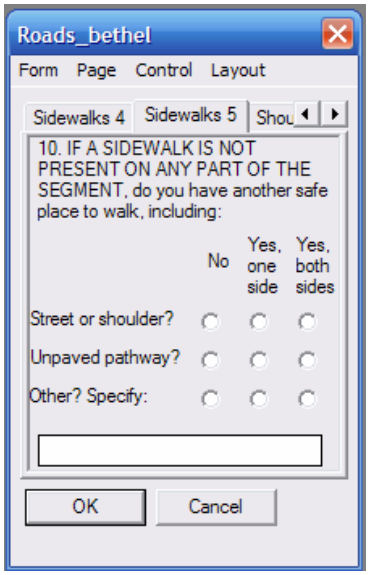
Sidewalks


Roads_bethel
Form Page Control Layout
Sidewalks 1 Sidewalks 2 Sidev
Do you have a place to walk?
1. Sidewalk present?
No, go to question #10
Yes, one side
Yes, both sides
2. Any grassy or other buffer between curb and sidewalk ALONG MOST OF THE SEGMENT?
No, go to #3
Yes, one side
Yes, both sides
OK
Cancel

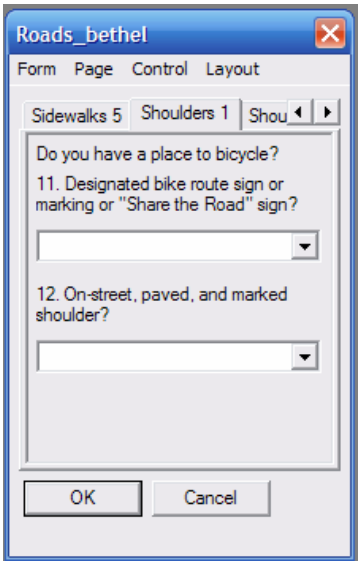

Roads_bethel
Form Page Control Layout
Sidewalks 1 Sidewalks 2 Sidev
No
Yes, one side
Yes, both sides
2a. Are there any trees in the buffer?
3. Sidewalk continuous within segment?
4. Sidewalk continuous between segments at both ends?
OK
Cancel

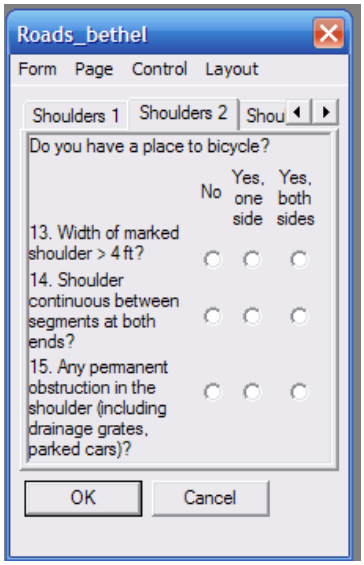

Roads_bethel
Form Page Control Layout
Sidewalks 2 Sidewalks 3 Sidev
No
Yes, one side
Yes, both sides
5. Width > 5 ft for MOST of the sidewalk?
6. Width <3 ft for ANY part of the sidewalk?
7. Any missing curb cuts or ramps at intersections or driveways?
OK
Cancel

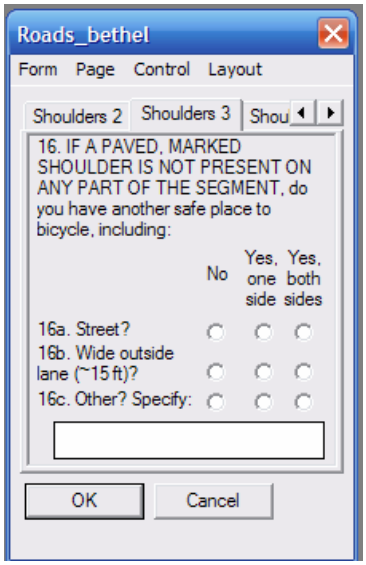

Roads_bethel
Form Page Control Layout
Sidewalks 3 Sidewalks 4 Sidev
No
Yes, one side
Yes, both sides
8. Any major misalignments or cracks in the sidewalk?
9. Any permanent obstructions (trees, signs, tables) blocking the sidewalk?
OK
Cancel

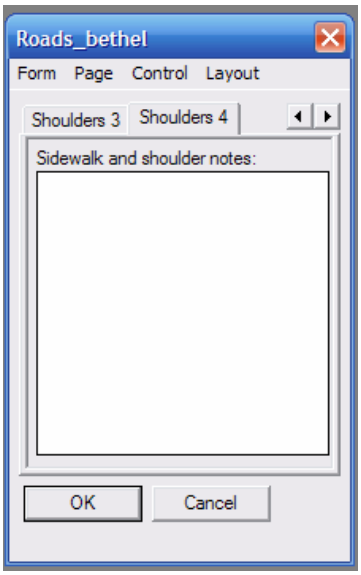

Roads_bethel
Form Page Control Layout
Sidewalks 4 Sidewalks 5 Shou
10. IF A SIDEWALK IS NOT PRESENT ON ANY PART OF THE SEGMENT, do you have another safe place to walk, including:
No
Yes, one side
Yes, both sides
Street or shoulder?
Unpaved pathway?
Other? Specify:
OK
Cancel

Shoulders/Bike Lanes









Appendix C

Environmental Audit Presentation

Active Neighborhood Checklist: Protocol

Using at the Saint Louis University School of Public Health for Audit Training Sessions

April 8th, 15th, and 22nd, 2005

1

Audit Tool - Definition

- Systematic assessment of factors in the physical and social environment that hinder or facilitate physical activity

2

Goals of an Audit: The 3 A's

- **Advocacy**
  - An audit can be used to identify needs in the community for advocacy initiatives (e.g., no safe routes to school).
- **Action Research**
  - An audit can be used in the needs assessment phase of intervention research (e.g., the most accessible place to build a new walking trail).
- **Analytic Research**
  - An audit can be used to determine the factors in the environment that influence physical activity behavior.

3

Audit Tool – Characteristics

- It is both a **METHOD** and a **TOOL**.
- It can be detailed or simplistic.
- It can be comprehensive or focused.
- It can be subjective or objective.
- It can be costly or inexpensive.
- It can complement other sources of data.

4

Purpose of the "User-Friendly" Active Neighborhood Checklist

- To serve as a short, user-friendly audit tool that assesses the most important features of the street-scale environment for physical activity
- Designed for community members and public health practitioners for research and advocacy.

5

Background of the "User-Friendly" Active Neighborhood Checklist

- Many research audit tools are long and require extensive training
- Many lay audit tools are subjective and have not undergone rigorous testing.

6

Background of the "User-Friendly" Active Neighborhood Checklist

- The following sources of evidence were used to refine audit tools that had been previously developed and tested at SLU-SPH
  - Reliability of audit items
  - Association of audit-derived measures and physical activity behavior
  - Scientific literature
  - Key informant feedback from researchers and practitioners

7

Testing the "User-Friendly" Active Neighborhood Checklist

- Audit 5-6 segments in 18 areas stratified by:
  - Commercial vs. residential
  - Very high density, high density, lower income, middle income, higher income, low density
  - Traditional vs. suburban
- Assess ease of use
- Test inter-rater reliability

8

Getting Started…

9

Street Segment - Definition

- A section of street or road (1/4 mile or less) between two adjacent intersections or between an intersection and cul-de-sac (dead end).

10

Maps

11

Materials

- ✓ Audit tool
- ✓ Map
- ✓ Clipboard
- ✓ Pencil/pen
- ✓ Comfortable shoes
- ✓ Watch
- ✓ Cell phone
- ✓ Sunscreen
- ✓ Umbrella

12

Labeling

- Date: Enter today's date (4/8, 4/15, 4/22)
- Segment ID: Enter team ID + number (e.g. A1)
- Auditor ID: Enter your name
- Neighborhood ID: See map
- Street Name: Enter street and intersecting segments (e.g., Elm between 1st and 2nd Street)
- Start time: Enter time
- Stop time (on 2nd page): Don't forget!

13

Labeling -- Example

- Date: 4/8/05
- Segment ID: A2 (2nd segment audited by team A)
- Auditor ID: Christy
- Neighborhood ID: Kirkwood
- Street Name: Elm between 1st and 2nd Street
- Start time: 10:45 am
- Stop time: 10:55 am

14

Is any building or section of the sidewalk or roadway under construction or being repaired?

- For buildings→ only note major renovation or construction (i.e., not repair of a roof on a single home)

What land uses are present?

16

1. Are residential and non-residential land uses present?

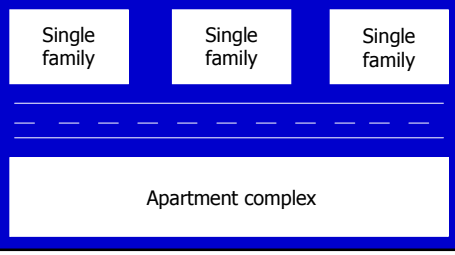
Look at how the space is used and the quantity of uses

- ❑ All residential
- ❑ Both residential and non-residential
- ❑ All non-residential

17

1. Are residential and non-residential land uses present?

Example 1:
(red = non-residential, white=residential):



18

1. Are residential and non-residential land uses present?

Example 2:
(red = non-residential, white=residential):

Single family | Single family | Single family

Strip mall with 4 stores

19

1. Are commercial and residential land uses mixed?

Example 4:
(red = non-residential, white=residential):

6-family home | 6-family home | 6-family home

Church and parking lot

20

1. Are commercial and residential land uses mixed?

Example 6:
(red = non-residential, white=residential):

Apt over retail | Apt over retail | Apt over retail

Strip mall with 8 shops

21

1. Are commercial and residential land uses mixed?

Example 7:
(red = non-residential, white=residential):

Single family | Single family | Single family

Park

22

2. What is the predominant land use?

- ❑ Residential buildings/yards
- ❑ Commercial buildings
- ❑ School/school yards
- ❑ Parking lots or garages
- ❑ Park with exercise/sport facilities or playground equipment
- ❑ Vacant lot/abandoned building
- ❑ Undeveloped land
- ❑ Designated green space
- ❑ Other non-residential, specify: _____

23

Park with facilities

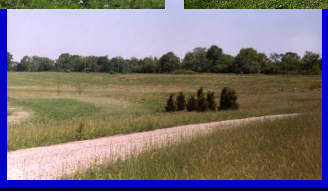
24

Vacant lot / abandoned building

Note: Vacant lots are about the same size as buildings on the segment or nearby segments.

25

Undeveloped land



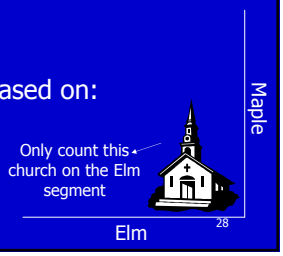
26

Designated green space

27

Where to "count" specific land uses for items #3-6

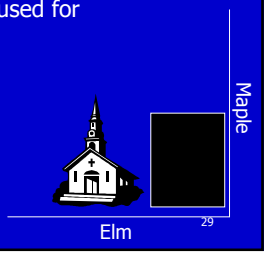
- Do not double-count destinations when they are located on the corner of 2 segments
- Count destinations based on:
  - Address
  - Front of building



28

Where to "count" specific land uses for item #4

- Count parking lots based on:
  - The segment which contains the building that the parking lot is used for
  - Entrance
  - Size



29

3. What types of residential uses are present?

- ❑ None
- ❑ Abandoned homes
- ❑ Single family homes
- ❑ Multi-unit homes (2-4 units)
- ❑ Apartments or condominiums (>4 units, 1-4 stories)
- ❑ Apartments or condominiums (>4 units, >4 stories)
- ❑ Apartment over retail
- ❑ Other (retirement home, mobile home, dorms)

Note: to distinguish between single and multi-unit homes, look for multiple mailboxes or doorbells.

30

4. What parking facilities are present?

- ❑ None
- ❑ On-street, including angled parking
- ❑ Small lot or garage (<30 spaces)
- ❑ Medium to large lot or garage

Note: As long as there is no "No Parking" sign, you can assume that on-street parking is present.

31

5. What *public* recreational facilities and equipment are present (including in the schoolyard if publicly accessible)?

- ❑ Park with exercise/sport facilities or playground equipment
- ❑ Off-road walking/biking trail
- ❑ Sports / playing field
- ❑ Basketball / tennis / volleyball court
- ❑ Playground
- ❑ Outdoor pool
- ❑ Other: _____

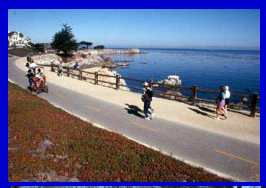
32

Public parks or schoolyards

- Do not include:
  - Church playgrounds
  - Daycare playgrounds
  - Apartment playgrounds
  - Gated and locked schoolyards
  - Note the above in the "Land use notes"

33

Off-Road Walking, Bicycling, or Multi-Use Trail?



Counts as a sidewalk AND an off-road walking trail

34

5. What types of non-residential uses are present?

- ❑ Abandoned/vacant blg

Specific types of destinations

- ❑ Small grocery, convenience store or pharmacy
- ❑ Food establishments (restaurant, bakery, café, coffee shop, bar)
- ❑ Entertainment (e.g., movie theater, 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 blgs housing 1+ businesses/ services

- ❑ High-rise building (>5 stories)
- ❑ Big box store (e.g., Walmart, Office Depot, Best Buy)
- ❑ Mall
- ❑ Strip mall
- ❑ Supermarket
- ❑ Large office building, warehouse, factory or industrial building

35

Abandoned building

- Do not count houses or commercial buildings that are "for sale."
- If a large number of houses or commercial buildings are "for sale," note this in the "Land use notes."

36

Big Box Store

- Examples include:
  - Walmart
  - Borders
  - Home Depot

- Does not include destinations counted elsewhere:
  - Supermarkets
  - Factories
  - Office building

37

Strip Mall

- A strip mall typically has a name (e.g., Clock Tower Center)
- Count strip mall as well as specific destinations in them.

38

Land use notes

- Include:
  - Major natural landscape features (e.g., lakes, rivers)
  - Major barriers (e.g., railroad tracks, highway)
  - Other distinct characteristics
  - Questions you have regarding classifying types of destinations

39

Is Public Transportation Available?

40

Transit Stop (Bus, Train, or Other)

41

Bench or Covered Shelter at Transit Stop?

42

What Street Characteristics are Visible?

43

One-Lane Street

44

Two-Lane Street

45

Three-Lane Street

46

Four-Lane Street

47

Marked Lanes?

Marked

Unmarked

48

Median or Pedestrian Island

49

Turn Lane?

A turn lane should be a special lane designated for turning

50

Posted Speed Limit or Special Speed Zone

Posted speed limit

Special speed zone

51

Crosswalk for Crossing This Segment?

52

"Walk"/ "Don't Walk" Signal Present?

53

Traffic Calming Devices (Roundabout, Curb Extension, Speed Bump)

54

Cul-de-sac Present (dead end street)? Sidewalk Cut-Through in Cul-de-Sac?

Yes, cul-de-sac
Yes, sidewalk cut-through

Yes, cul-de-sac
No, sidewalk cut-through

55

Street Characteristic Notes:

- Description of:
  - Traffic volume or speed
  - Condition of crossing aids
  - Lots of cars pulling in and out of drive ways

56

What is the quality of the environment?

57

Any Commercial Building Adjacent to Sidewalk?

No

Yes

58

Bench?

Excluding benches at bus stop and benches in parks

59

Drinking Fountain?

60

Public Art?



61

Graffiti or Broken/Boarded Windows?


Try to limit boarded windows to those that reflect physical disorder

62

Litter or Broken Glass?

A lot

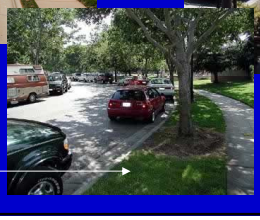

None or a little

Some (if primarily cigarette butts and few amounts of other litter)

Tree Shade on the Walking Area


No/little shade

Some or a lot



Some or a lot

64

Slope Along the Walking Area

- This item is somewhat subjective
- Compare your street to a flat street and a street with a steep slope.

A flat or gentle slope would hardly be noticeable to most individuals

Walking on a moderate slope may increase someone's heart rate, but would not act as a barrier for most individuals

A steep slope would act as a barrier to someone who is not active or who has physical limitations

65

Pedestrian Environment Notes:

- Description of:
  - Cross-slopes

  - Distinct or attractive features that make this segment especially pleasing to a pedestrian (e.g., street furniture, lots of flower boxes, awnings)

66

Do you have a place to walk or bicycle?

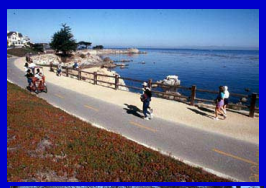
67

Response choices

- No
- Yes, one side
- Yes, both sides

68

Off-Road Walking, Bicycling, or Multi-Use Trail?



Counts as a sidewalk AND an off-road walking trail

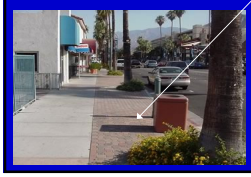
69

Sidewalk Present?


70

Any Grassy or Other Buffer Between Curb and Sidewalk?


Buffer




No Buffer

Any Grassy or Other Buffer Between Curb and Sidewalk?

Buffer?

72

Tree(s) in Buffer?



73

Sidewalk Continuous Within Segment

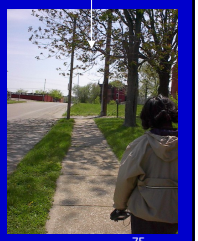

Not continuous

Continuous

74

Sidewalk Continuous Between Segments at Both Ends?


NOT continuous



Continuous

75

Width ≥ 5ft for Most of Sidewalk?



76

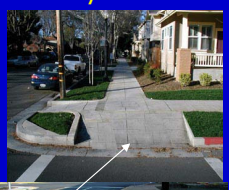
Width <3ft for Any Part of Sidewalk



No

Yes

Any Missing Curb Cuts or Ramps at Intersections or Driveways?


Yes

No

Any Major Misalignments or Cracks in the Sidewalk?

79

(Minor Misalignments)

80

Any Permanent Obstructions (e.g., Trees, Signs, Tables) Blocking the 3-ft Walk Area?

Only an obstruction if it blocks the 3-foot walking area

If A Sidewalk is Not Present on Any Part of the Segment, Do You Have Another Safe Place to Walk?

Sidewalk Notes

- Description of
  - Curb cuts
  - Misalignments
  - Obstructions
  - Sidewalk width

83

Designated Bike Route Sign or Marking "Share the Road" Sign?

On Street, Paved, and Marked Shoulder? Width of Marked Shoulder >=4 ft?

Shoulder

(Use measured foot or tape measure for width if safe)

Not a shoulder

85

Shoulder Continuous Between Segments at Both Ends?

86

Permanent Obstruction in the Shoulder (including drainage grates, parked cars?)

Leaves or branches should not be considered a *permanent* obstruction

Drainage grates are only an obstruction when the holes are aligned with bicycle path

This is *not* an obstruction

87

If Paved, Marked Shoulder is Not Present on Any part of the Segment, Do You Have Another Safe Place to Bicycle?

Street, if little traffic

Wide outside lane

88

Shoulder Notes:

- Description of:
  - Traffic volume or speed
  - Condition of bike lane
  - Obstructions

89

Sample Street

Sample Street

Rules for Today's Auditing

1. Personal Safety
   - Remain in eyesight of your partner
   - If you feel threatened, leave the area or call the police.
   - If someone approaches you to ask what you are doing, reply, "We are collecting information about the walkability of neighborhood streets."

92

Rules for Today's Auditing

2. Street Safety
   - If there is NO PATH or SIDEWALK, walk on the shoulder or road (if there is minimal traffic)
   - If there NO SAFE PLACE TO WALK, choose a safe vantage point or drive the segment.
   - Look up when you cross the road (not at the audit tool).

93

Rules for Today's Auditing

3. Talking to each other
   - You may not talk to your partner about your responses to the audit tool
   - You may only discuss issues, such as:
     - Where to count certain land uses located on the corner of 2 segments (e.g., parking lots)
     - Where to start and stop on segments in which the intersections are not clearly defined.

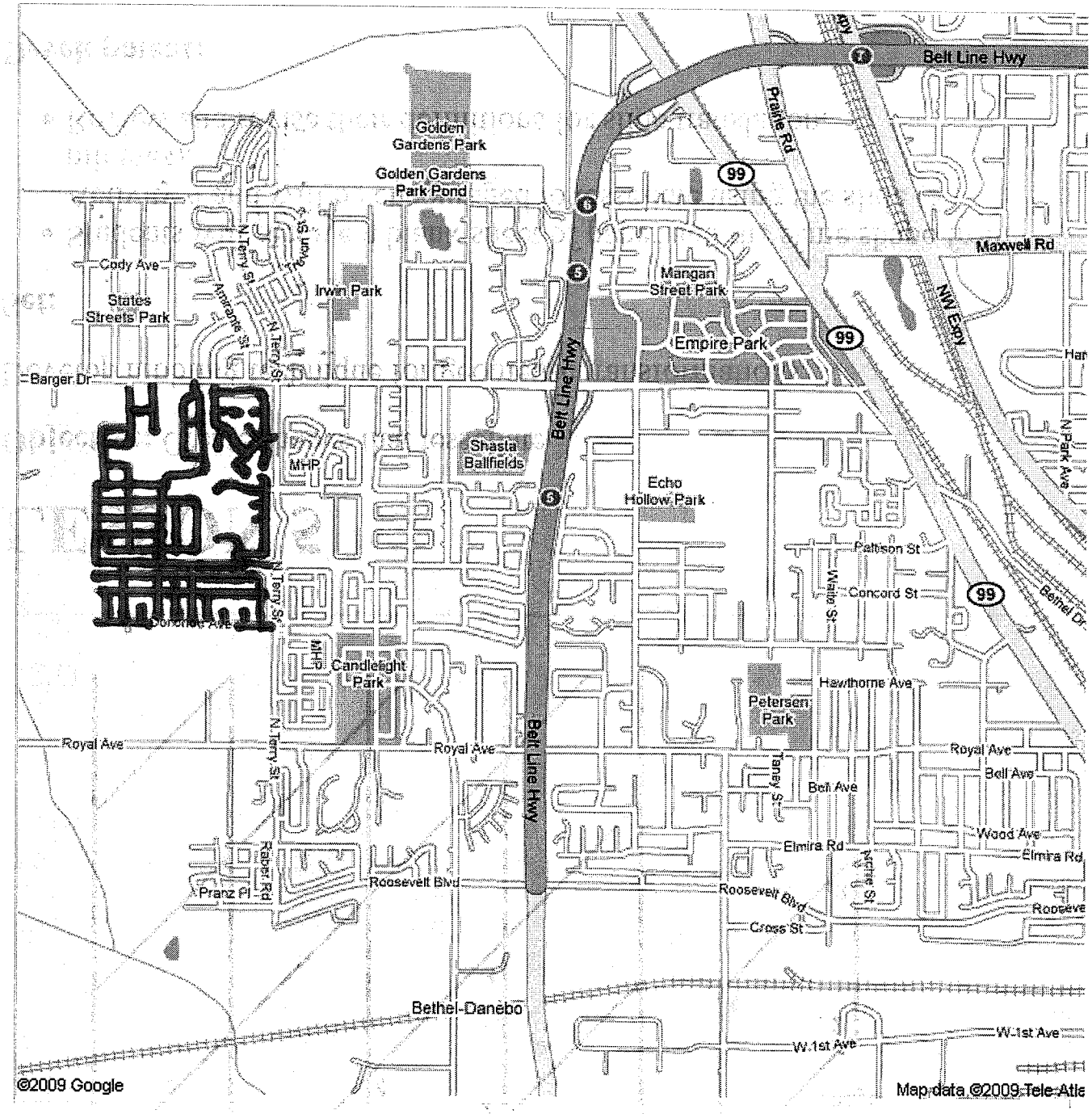
94

Appendix D

Environmental Audit Materials

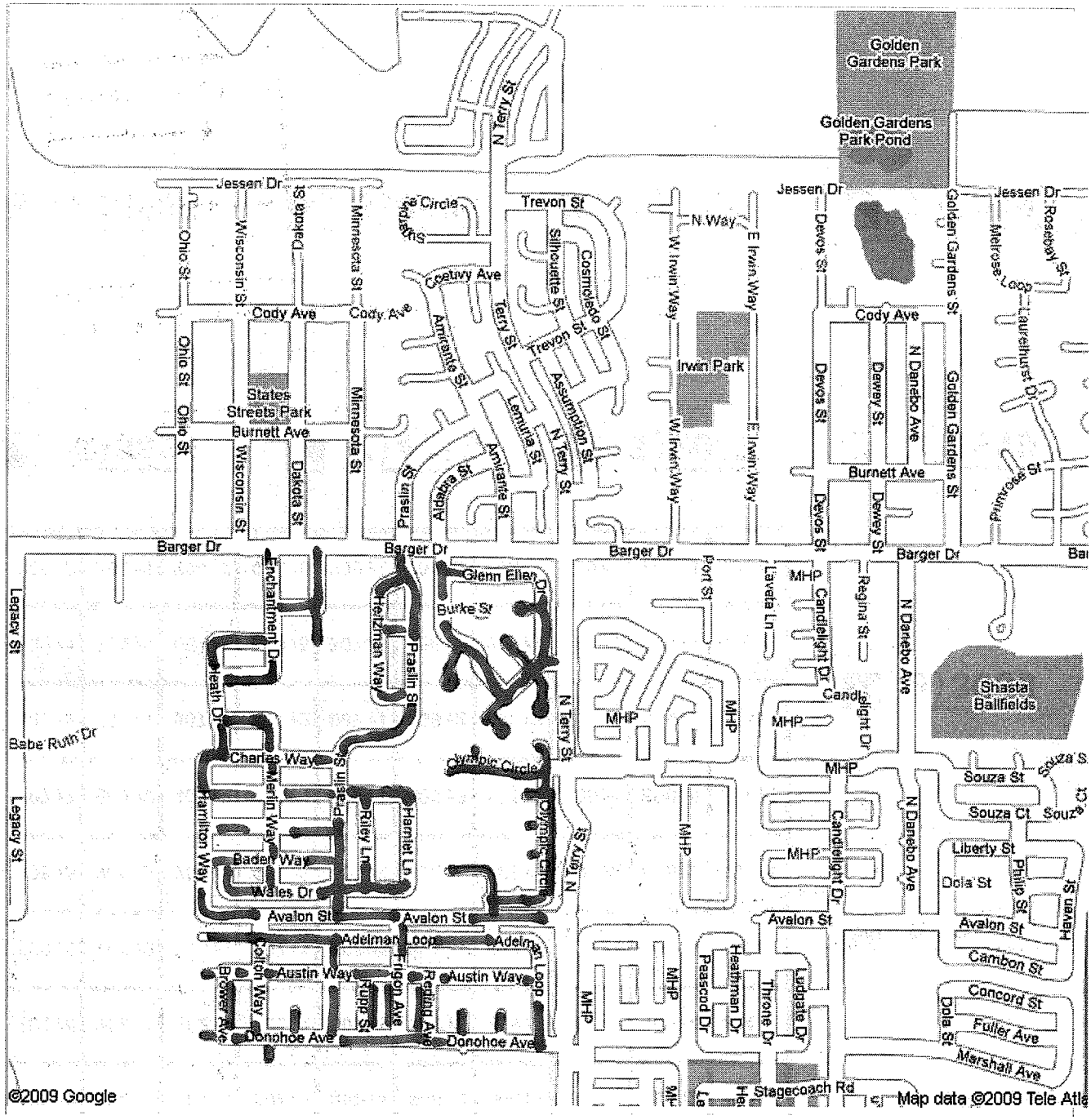
Google Maps

Address **Eugene, OR**



Google Maps

Address **Eugene, OR**



Active Neighborhood Checklist

Date: _____ Segment ID: _____
Auditor ID: _____ Neighborhood ID: _____
Street Name: _____
Start Time: _____

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 or public/government buildings
- ☐ School/school yards (elementary, middle, high school)
- ☐ Parking lots or garages
- ☐ Park with exercise/sport facilities or playground equipment
- ☐ Vacant lot/abandoned building
- ☐ Undeveloped land
- ☐ Designated green space
- ☐ 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 parking facilities are present?
Select all that apply.

- ☐ None (no parking allowed on street at any time)
- ☐ On-street, including angled parking
- ☐ Small lot or garage (<30 spaces)
- ☐ Medium to large lot or garage

5. What *public* recreational facilities and equipment are present (including in the schoolyard if publicly accessible)?
Select all that apply.

- ☐ Park with exercise/sport facilities or playground equipment
- ☐ Off-road walking/biking trail
- ☐ Sports/playing field
- ☐ Basketball/tennis/volleyball court
- ☐ Playground
- ☐ Outdoor pool
- ☐ Other: _____

6. (*OPTIONAL*) What types of non-residential uses are present?
Select all that apply.

- ☐ None
- ☐ Abandoned building

Specific types of destinations:

- ☐ Small grocery, convenience store (including in gas station), or pharmacy
- ☐ Food establishment (restaurant, bakery, café, 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)
- ☐ Mall
- ☐ Strip mall
- ☐ Supermarket
- ☐ Large office building, warehouse, factory, or industrial building

Land use notes:

Developed at Saint Louis University School of Public Health, 2006

B. Is public transportation available?

	No	Yes, one side	Yes, both sides
1. Any transit stop (bus, train, or other)?	go to C1		
1a. Bench or covered shelter at transit stop?			

Transit stop notes:

C. What street characteristics are visible?

	No	Yes
1. Enter posted speed limit (99 if none):		
2. Enter special speed zone (99 if none):		
3. Enter total # of lanes on street:		
4. Marked lanes?		
5. Median or pedestrian island?		
6. Turn lane?		
7. Crosswalk for crossing this segment?		
8. "Walk" / "Don't Walk" signal?		
9. Traffic calming device (roundabout, curb bulb-outs, speed bump, brick road, other)?		
	If yes, specify type(s):	
10. Cul-de-sac (dead-end street)?	go to D1	
10a. Sidewalk cut-through in cul-de-sac?		

Street characteristic notes:

D. What is the quality of the environment?

	No	Yes
1. Any commercial buildings adjacent to the sidewalk?		
2. Any amenities?		
2a. Bench (excluding at transit stop)?		
2b. Drinking fountain?		
2c. Other? Specify: _____		
3. Public art (e.g., statues, sculptures)?		
4. Graffiti or broken/boarded windows?		

5. Litter or broken glass?		None or a little
		Some
		A lot
6. Tree shade on the walking area?		None or a little
		Some or a lot
7. Steepest slope along walking area?		Flat/gentle
		Moderate
		Steep

Pedestrian environment notes:

E. Do you have a place to walk or bicycle?

	No	Yes, one side	Yes, both sides
SIDEWALKS			
1. Sidewalk present?	go to E10		
2. Any grassy or other buffer between curb and sidewalk *along most of the segment*?	go to E3		
2a. Tree(s) in buffer?			
3. Sidewalk continuous within segment?			
4. Sidewalk continuous between segments at both ends?			
5. Width ≥5 ft for *most* of the sidewalk?			
6. Width <3 ft for *any part* of the sidewalk?			
7. Any missing curb cuts or ramps at intersections or driveways?			
8. Any major misalignments or cracks in the sidewalk?			
9. Any permanent obstructions (trees, signs, tables) blocking the 3-ft walk area?			
10. ***If a sidewalk is not present on any part of the segment***, do you have another safe place to walk, including:			
Street or shoulder (if safe)?			
Unpaved pathway?			
Other? Specify: _____			

Sidewalk notes:

	No	Yes, one side	Yes, both sides
SHOULDERS (*OPTIONAL*)			
11. Designated bike route sign or marking or "Share the Road" sign?			
12. On-street, paved, and marked shoulder?	go to E16		
13. Width of marked shoulder ≥ 4 ft?			
14. Shoulder continuous between segments at both ends?			
15. Any permanent obstructions in the shoulder (including drainage grates, parked cars)?			
16. ***If a paved, marked shoulder is not present on any part of the segment***, do you have another safe place to bicycle, including:			
Street?			
Wide outside lane (~15 ft)?			
Other? Specify: _____			

Shoulder notes:

Stop time: _____

Developed at Saint Louis University School of Public Health, 2006

Active Neighborhood Checklist - Protocol

Purpose

The Active Neighborhood Checklist is an observational tool designed to assess key street-level features of the neighborhood environment that are thought to be related to physical activity behavior. The data collected can be used to generate descriptive statistics about an area or route, to raise community awareness about the role of the environment in supporting or discouraging physical activity, and/or to mobilize community members to advocate for change. Its simple format, lay terminology, item specificity, and relatively short length were intended to make the tool user-friendly for multiple community stakeholders.

The Active Neighborhood Checklist is a product of the refinement of existing audit tools using a systematic process that weighted various forms of quantitative and qualitative evidence. Although the tool was tested and reviewed by a small, multidisciplinary group of community stakeholders in St. Louis, its application as an advocacy and evaluation tool have not been systematically examined. In addition, although its reliability was tested across a range of environments, its reliability in any single setting (e.g., rural, suburban, industrial) has not been assessed. Therefore, future studies are needed to provide information on its usability for different purposes and across various settings.

Content

The Active Neighborhood Checklist assesses five general areas: land use, public transit stops, street characteristics, quality of the environment for a pedestrian, and places to walk and bicycle. An area for note-taking follows each section of the tool to allow auditors to describe features or perceptions that may not be captured in the tool. Although some items are important indicators for bicycling, the Checklist is not comprehensive in its assessment of these factors. In addition, users are referred to existing data and other audit tools or methods for more detailed data on land use, quality and maintenance of recreational facilities, street connectivity, traffic speed and volume, characteristics of intersections, architecture, and crime incidents. Moreover, qualitative feedback from neighborhood residents along with photographs would provide important complements to the quantitative results obtained from the Checklist.

Instructions for Use

This two-page protocol gives brief instructions on ways to conduct audits of neighborhood streets, as well as operational definitions for key concepts in the Active Neighborhood Checklist. In practice, it is recommended that this protocol be supplemented with a 2-hour (approximately) training slide presentation. Training may be enhanced through practice audits followed by group discussion.

Land use item A6, which assesses specific destinations—those with the potential to generate walk trips and those associated with an automobile-oriented street—is optional because this information may be available from existing sources (e.g., Yellow Pages or parcel level land use data) and can be time-consuming to audit. Shoulder items (E11-16) are optional because these items tended to have lower reliability, and shoulders may be infrequent or a lower priority in some communities.

Choosing an Area or Route to Audit

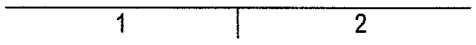
Begin by choosing what you wish to evaluate. Options may include 1) defined areas around a specific destination (e.g., school) or group of destinations (e.g., commercial center); 2) neighborhoods defined by administrative (e.g., Census tracts) or other boundaries; and 3) routes between destinations or groups of destinations (e.g., elementary school and a central location in a neighborhood).

Choosing a Sampling Approach

The Active Neighborhood Checklist is designed to collect information for street segments – the section of the road between two consecutive intersections. Options for selecting segments to be audited include, but are not limited to, auditing 1) all segments in an area or route, 2) a random sample of segments, 3) a proportionate random sample of segments, or 4) a stratified sample of segments, based on land use typologies (e.g., residential, commercial, mixed land use).

Identifying Street Segments

Using a street map – produced by computer software, purchased, or downloaded from the internet – assign all segments to be audited a unique identification number to facilitate organizing and analyzing data. The auditors can carry copies of these maps. The street maps may not be updated or contain all the segments, so auditors should be trained to know how to identify new segments or delete existing segments. Roads with few intersections should be divided into two or more ¼-mile segments. Short segments may be combined with adjacent segments.



A street with a T-intersection may be audited as two separate segments (e.g., 1 and 2 above). A reference point should be noted on the continuous side so that the recorded information is not duplicated for the adjacent segments.

General Rules for Auditing

The Active Neighborhood Checklist may be completed with paper and pencil. With a little practice, the Checklist can be completed in approximately 5-10 minutes per segment. For communities that intend to use the audit data for reports, it is important to avoid double-counting some land uses (items A3-A6), particularly those located on a corner. In general, buildings should be counted on the segment with the building's address or main entrance. Parking lots can be counted based on the 1) segment which contains the building for which the parking lot is used, 2) entrance of the parking lot; 3) segment in which the parking lot occupies the most area. Land uses that occupy multiple segments (e.g., parks, walking trails, malls, factories) can be counted on multiple segments, depending on how the data will be used.

Operational Definitions

The following selected terms are defined to promote consistency in data coding, particularly when the data will be used for reports. A training slide presentation provides visual examples for features that may be unfamiliar or challenging to code. The built environment is very complex; therefore, it is difficult to anticipate how to code every street type. Users of this tool are encouraged to develop strategies for documenting built environment characteristics that may not be defined here, particularly if the data will be used in reports.

A1. Residential land uses: Include any of the types listed in A3.

A1. Non-residential land uses: Include any land uses that are not residential (e.g., business, school, library, park).

A2. Commercial or public/government buildings: Any business or government-owned building (e.g., library, post office)

A2. Vacant lot: A lot about the size of the buildings on the segment or nearby segments with visible signs of neglect.

A2/A3. Abandoned building/home: Uninhabited building that shows visible signs of neglect. Does not include homes or commercial buildings that are "for sale" unless there are obvious signs of neglect.

A2. Undeveloped land: Large area of natural space that is not maintained by public or private entities.
A2. Designated green space: Large area of natural space that is maintained by public or private entities and open to the public.
A5.Off-road walking/biking trail: Off-road sidewalk or trail (including sidewalks around parks) that people walk or bike on primarily for exercise or leisure.
A6. Indoor fitness centers: Examples include yoga, pilates, dance, and martial arts studios, public recreation centers, and indoor tennis clubs.
A6. Big box store: Large, rectangular commercial buildings, typically with standardized facades, large parking lots, and facing major traffic arterials. Examples include Walmart, Office Depot, Best Buy, and Home Depot.
A6. Strip mall: Commercial centers with attached units arranged in a row, typically denoted by a sign. This is an indicator of an auto-oriented street so it should not be selected for all connected commercial units.
A. Land use notes: Note major natural landscape features (e.g., lakes, rivers), major barriers (e.g., railroad tracks, highway), or other distinct land use characteristics or destinations.
B. Transit stop notes: Note the condition of a transit stop.
C2. Special speed zones: Speed limit signs for special situations, such as school zones, construction zones, or sharp turns in the roadway.
C3. Total # of lanes: Number of lanes (including unmarked lanes) for traffic. Excludes the turning lane and parking lanes
C5. Median or pedestrian island: Raised island or refuge for pedestrians between traffic lanes. May take up all or part of the segment. Extremely narrow medians or medians with so much landscaping as to prevent pedestrians from using them should not be counted.
C6. Turn lane: Only count turn lanes that occupy a lane for the entire length of the roadway.
C7. Crosswalk: Denoted by painted white line(s), flashing light(s), and/or pedestrian crossing sign(s)
C9. Traffic calming device: Device intentionally designed to reduce traffic speed or volume, such as a roundabout, brick road, speed hump, flashing speed sign, or "watch for children" sign. Curb bulb-outs (technically crossing aids) are areas of the sidewalk/curb that extend into the street, mostly at intersections, to shorten pedestrian crossing distances.
C10a. Sidewalk cut-through: Sidewalk or path that connects a cul-de-sac to a nearby street or greenbelt without permitting passage of automobiles.
C. Street characteristic notes: Note street characteristics that may influence a pedestrian's or bicyclist's feelings of comfort and safety from traffic, such as perceived traffic volume and speed, aggressive drivers, and condition of crossing aids and medians.
D1. Commercial buildings adjacent to the sidewalk: Building that can be entered directly from the sidewalk along the street without crossing a parking lot. If no sidewalk is present, check "no."
D2a. Bench: Includes public benches along the sidewalk, not in a park.
D2b. Drinking fountain: If the drinking fountain is not functional, then do not count it and note its condition in the notes section.
D3. Public art: Statues, sculptures, fountains, or murals. May include banners if they stand out and enhance the aesthetic quality of the street. Excludes artwork placed in the windows of commercial buildings or associated with residential buildings (e.g., yard art, private fountains).
D5. Litter or broken glass: When evaluating the amount of litter and broken glass, imagine an immaculate street and heavily littered street for relative comparisons with the street being audited.
D6. Tree shade along the walking area: Evaluate tree shade that would cover the sidewalk or other walking area at approximately noon. During months when trees are without leaves, envision what shade the trees might provide with leaves. Shade provided by buildings should not be counted here. As with litter and broken glass, consider the extremes.
D7. Steepest slope along the walking area: Compare the slope along the segment to a street with a flat slope and a steep slope. A flat/gentle slope would hardly be noticeable to most individuals. A moderate slope would not act as a barrier to most individuals but walking on it may increase some individuals' heart rates. A steep slope would act as a barrier to individuals who are not active or with physical limitations.
D. Pedestrian environment notes: Note distinct features that enhance or detract from a pedestrian's walking experience.
E2. Any grassy or other buffer between curb and sidewalk along most of the segment: A buffer includes grass, trees, flowerpots, and/or textured sidewalk that provides separation between pedestrians and traffic.
E2a. Tree(s) in buffer: Trees provide a buffer from traffic for pedestrians, as well as aesthetic appeal.
E3. Sidewalks continuous within segment: There are no interruptions (other than driveways) in the sidewalk within a single segment.
E4. Sidewalks continuous between segments at both ends: The sidewalk continues in one or more directions beyond the segment audited. This must be true for both ends of the segment.
E5. Width ≥ 5 ft for *most* of the segment: Width can be determined by estimating or by measuring each auditor's foot prior to auditing to determine how many "auditor's feet" would equal 5 feet. In rare cases when parking lots and sidewalks are juxtaposed, do not count the parking lot when measuring the width of the sidewalk.
E6. Width < 3 ft for *any part* of the sidewalk: By estimating or using auditor's measured foot (see E5), determine if the walking area is less than 3 feet for *any part* of the sidewalk. The width may be <3 feet due to its original design, permanent obstructions (see E9), sidewalk disrepair (e.g., large broken sections), or other reasons.
E7. Any missing curb cuts or ramps: Missing curb cuts are places where there is no curb cut or ramp leading smoothly down from a sidewalk to a street or driveway. The sidewalk ends abruptly with a 4-6 inch curb. Short curbs (< 3 inches) should not be counted (i.e., they are mountable for a person on a bike, with a stroller, or in a wheelchair).
E8. Major misalignments or cracks: Only note misalignments or cracks that an older person or person with a stroller or wheelchair would find difficulty maneuvering.
E9. Permanent obstructions: Obstructions that remain on the sidewalk on a daily basis, such as signs, trees/shrub overgrowth, street furniture, telephone poles, and fire hydrants. Excludes cars, bicycles, garbage bins, leaves or branches, which may be temporarily positioned on the sidewalk.
E10. Sidewalk not present on any part of the segment: Assess alternate places to walk if a sidewalk is not present or not continuous within a segment. An "unpaved pathway" (or goat path) may be an unplanned path worn over time by pedestrians.
E. Sidewalk notes: Note the condition of curb cuts, misalignments, obstructions, or other sidewalk-related features.
E12. On-street, paved, and marked shoulder: Includes paved (not gravel) shoulders that are wide enough to walk or bike in (at least 2 feet). A marked shoulder or sections of the shoulder intended primarily for parking should not be counted.
E13. Width ≥4 ft: By estimating or using the auditor's measured foot (if safe from traffic; see E5), determine if the width is at least 4 feet.
E14. Shoulder continuous as both ends: The shoulder continues in one or more directions beyond the segment audited. This must be true for both ends of the segment.
E15. Permanent obstructions: Includes legally parked cars and drainage grates in which the holes are aligned with the bicycle path (i.e., parallel to the street). Does not include garbage bins, vehicles illegally parked in the shoulder, or leaves and branches.
E16. Shoulder not present on any part of the segment: Assess alternate places to bike if a shoulder is not present or continuous within a segment.

Direct all inquiries and requests for the training slide presentation and/or scoring options for the Active Neighborhood Checklist to Christy Hoehner (hoehnerc@slu.edu) or Ross Brownson (brownson@slu.edu) at Saint Louis University School of Public Health. This work was funded by The Robert Wood Johnson Foundation and the Centers for Disease Control and Prevention (Prevention Research Centers Program).