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RESEARCH BRIEFS

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Walkability Standards:

a test of common assumptions related to walkable access

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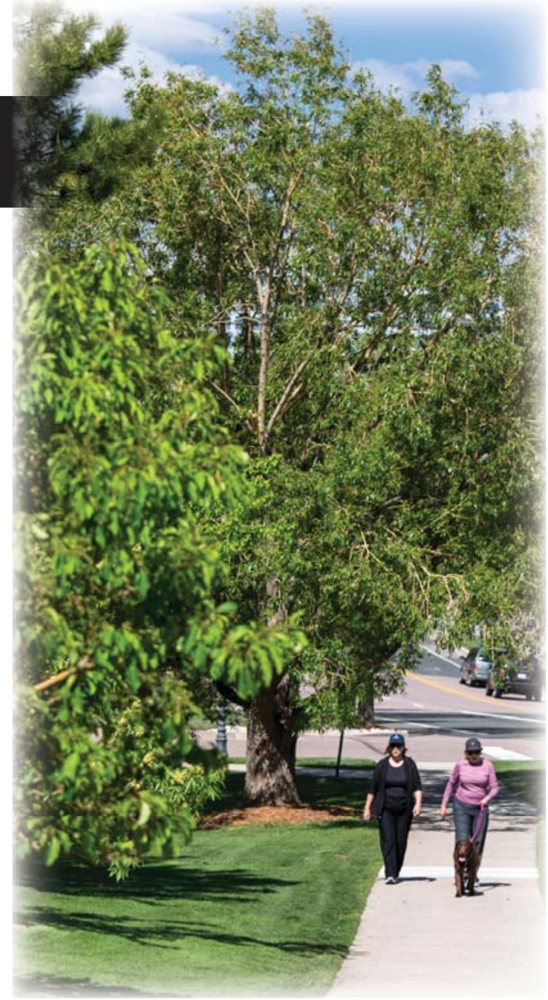
Abstract

The increasing interest in walking as a healthy and sustainable means of getting around highlights a need to fill the gaps in what is known about walking as a form of transportation. Planners have traditionally relied on normative standards rather than ones based on evidence to determine time and distance relationships associated with walkability. This paper reports the results of an activity designed to test basic assumptions about walking speed and distance in the built environment and provides suggested guidelines for use in planning for walkability.



Introduction

Determining how far apart to space things like parks, trails and transit stops has a direct bearing on the cost of providing such services to the public. Placing facilities too far away may discourage people from using them, while spacing them too close together is inefficient. It is important to get it right.

Parks are a good example. Providing parks within walking distance of people's homes has long been a basic principle of urban planning. But serious study of the relationship between walking and parks has been lacking, so planners have relied on general practices and rules of thumb, rather than standards based on research. The increasing emphasis of walking as a viable and desirable means of transportation highlights a need to fill the gaps in what is known about walking as it relates to parks and other destinations. Questions such as how far and how fast people walk; what influences their choices of when to walk and where to walk; and other behavioral aspects of walking have relevance to an expanding cadre of people interested in walking.

The purpose of this paper is to offer some insight into the principles behind planning for walkability.

Normative Standards for Walking

Planners typically use ten minutes as the duration that people are willing to spend to walk to a destination. While there is little empirical evidence to support the validity of this measure, it has nonetheless been accepted as a standard. Translating ten minutes of walking into a measure of distance brings up the question of walking speed. Obviously, speed varies depending on the physical ability of the pedestrian and any encumbrances they may have, such as pushing a baby stroller or carrying packages. Other factors, such as the nature of the route (including such things as pavement type, terrain, and impediments like busy streets or waterways) affect pedestrian speed as well. As a result there is a lack of consistency in the distances used among planners to make decisions related to walking. Distances ranging from 1/8 mile to a mile or more are found in planning studies, with ¼ mile being the most commonly used standard for determining walkable access.

Methodology

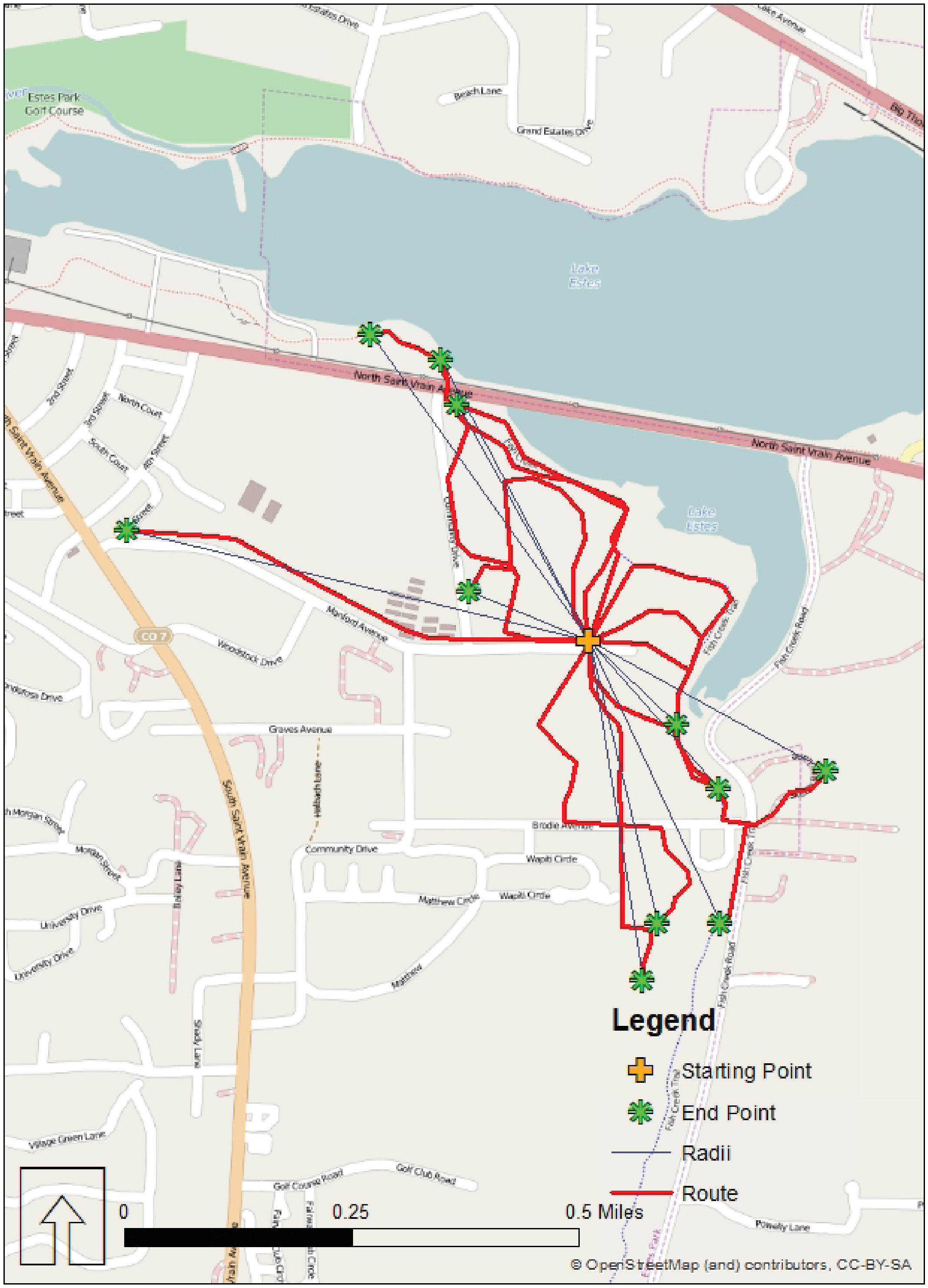
A gathering of people interested in parks and other public spaces at the GP RED Think Tank in Estes Park, Colorado in 2014 provided an opportunity to test assumptions about walking and generate empirical data. The event was attended by approximately 50 participants from the US and Canada. The participants came primarily from the fields of parks and recreation, land management, and public health. While they ranged in age and physical condition, all were adults able to walk without the aid of mobility devices. They agreed to take part in a quasi-experiment to study walking behaviors through a short exercise. In the exercise, the participants were divided into groups of three people (11 groups total) and given a set of maps and instructions. All of the groups were taken to a single starting point located between a community park and a high school. Figure 1 shows the starting point and surrounding area.

Figure 1. Aerial Photo Map of Starting Point and Surrounding Area

The GP RED Think Tank in Estes Park, Colorado in 2014 provided an opportunity to test assumptions about walking and generate empirical data.

Upon a signal, the groups were asked to fan out simultaneously from the starting point. Each group was instructed to walk in a direction generally away from the starting point and away from the other groups, and to walk casually as a group for a period of exactly 10 minutes. At the 10-minute point they recorded their group's location on the map and returned to the starting point, re-tracing their route and marking it on the map. The maps were then collected and the starting point, routes, and end points were entered into a GIS map for analysis. Figure 2 shows the end points, routes, and a radial line from the starting point for all of the groups.

Figure 2. Map of Results for All Groups



Using the GIS, three specific aspects of walking were analyzed. First the Euclidian, or straight line (radial) distance between the origin and the destinations was measured. Second, the length of the actual routes walked were measured. Third, the speed at which the groups walked was calculated. The results are shown in Table 1.

Table 1. - Summary of Results

Group	Radial Length (Ft.)	Radial Length (Miles)	Path Length (Ft.)	Path Length (Miles)	Speed MPH
1	755	0.14	2155	0.41	2.45
2	1576	0.30	2035	0.39	2.31
3	1846	0.35	2337	0.44	2.66
4	2184	0.41	2838	0.54	3.23
5	703	0.13	1944	0.37	2.21
6	1144	0.22	1265	0.24	1.44
7	1808	0.34	2375	0.45	2.70
8	1688	0.32	2485	0.47	2.82
9	1995	0.38	2181	0.41	2.48
10	2753	0.52	2922	0.55	3.32
11	1571	0.30	2697	0.51	3.06
Average	1638	0.31	2294	0.43	2.61
Median	1688	0.32	2337	0.44	2.66

Rounding off the results, we find that the radial distance from the starting point ranged from as little as 0.13 miles (just over 1/8 mile) to as far as 0.52 miles (just over ½ mile). The average of all eleven teams was 0.31 (mean of 0.32), or just under 1/3 mile.

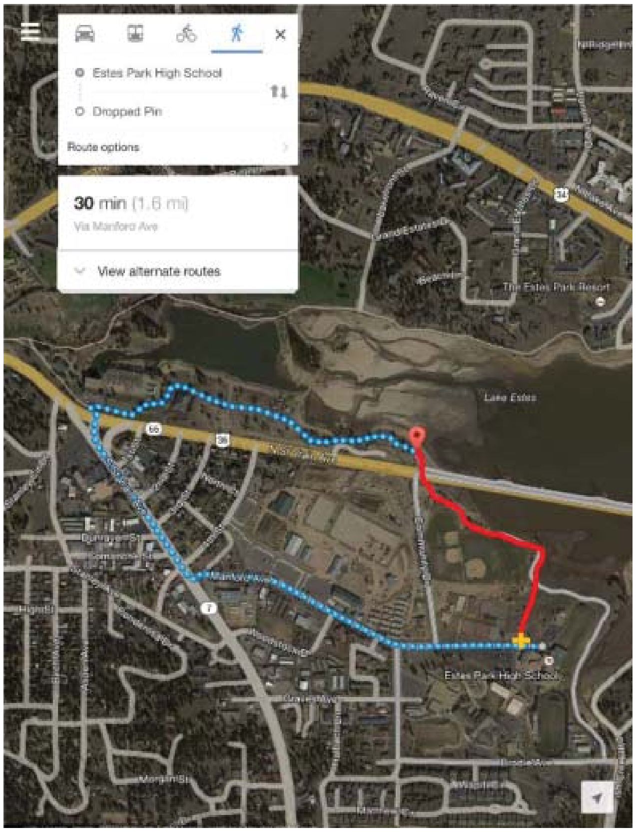
The lengths of the routes taken by the teams ranged from 0.24 (just under ¼ mile) to 0.55 miles (just over ½ mile). The speed of the teams (averaged over the 10 minute walking time) ranged from 1.44 miles per hour to 3.32 miles per hour, with an average speed of 2.62 (mean of 2.66) miles per hour.

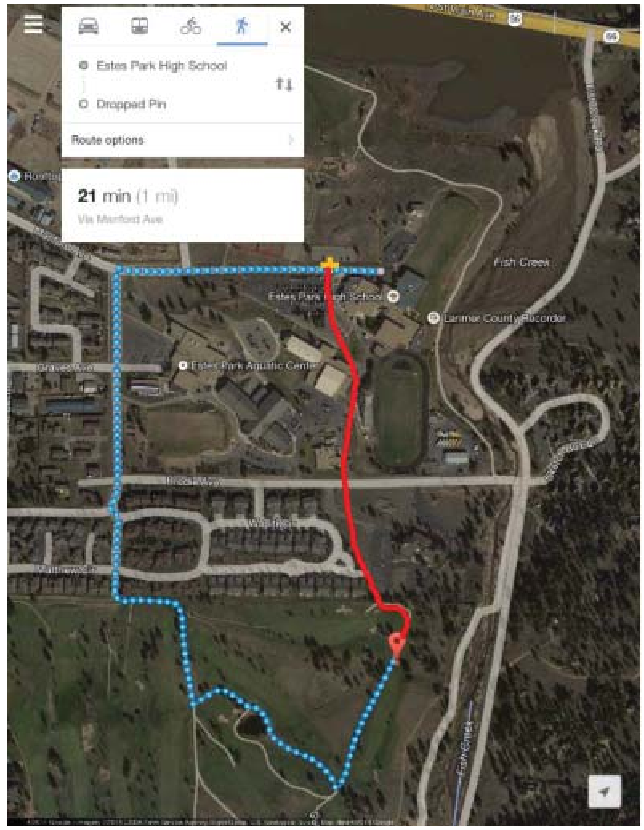
Radial vs Network Buffers

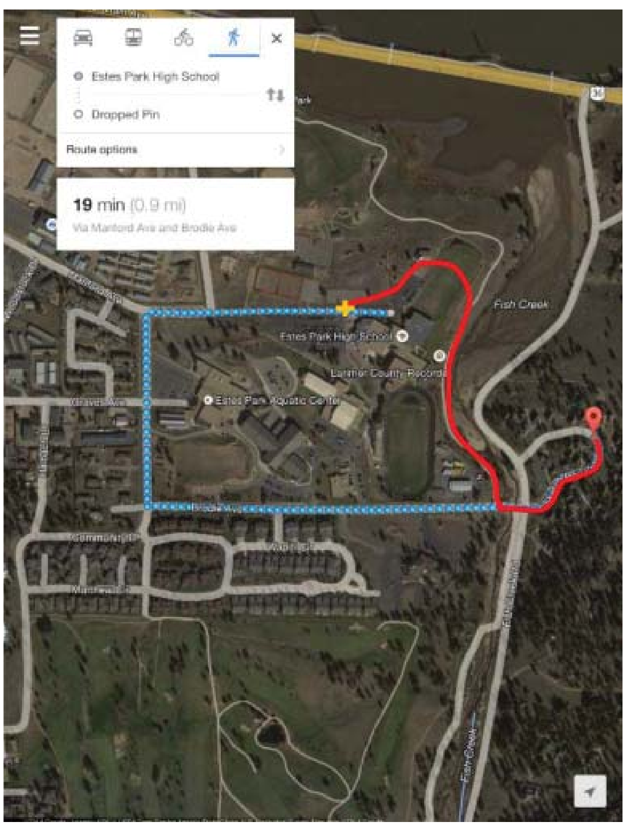
Buffers are typically used around origins or destinations to determine walkable access. Buffers are typically one of two types, although other types are sometimes used. Radial (also called Euclidian or straight-line) buffers are circular and have the travel origin or destination at their center. Network buffers are plotted along defined routes, such as streets, trails, or sidewalks. While radial buffers are commonly used and easily applied, some feel that network buffers produce more accurate results when measuring access between origins and destinations. However, to be accurate, network buffers require a GIS base map that contains all possible routes. In the case of the study area used here, it was possible for participants to take a number of shortcuts across the park and school grounds. As a result, some groups walked across the large parking lots and/or sports fields while others stayed on designated paths.

Barriers, such as highways and water bodies, also affect the results of different buffer types. Figure 3 shows the difference between some of the routes recorded by the groups and those prescribed by Google Maps along its known network. Note that while Google Maps accurately included the trail system as part of the walking network, it did not recognize the presence of a tunnel under the adjacent highway of which the two groups took advantage. The use of the tunnel made a significant difference in where the groups ended up on their prescribed 10-minute walk.

Figure 3. Network-Based Routes vs. Actual Routes Walked







Google Maps for IPad was used to see how computer-generated network maps would compare to the actual routes taken by the groups. The blue dotted lines show suggested routes from Google Maps application. The red lines show the actual routes walked by the group to that destination in 10 minutes.

(Note: the starting points are slightly different in the Google Map from the actual starting points of the groups. This is due to the way Google Maps selects starting locations. This makes the distance of the route as calculated by Google Maps approximately 0.05 miles longer than it would be if it was calculated from the true starting point.)

Limitations

This study was conducted as an exercise using volunteers. The sample size is small, and the participants were not randomly selected. They are not intended to represent the set of all pedestrians who may want to walk to a park, school, or other destination. The results described here should not be considered statistically valid nor generalizable to other places and situations. The intent was simply to test generally-held assumptions about walking patterns against empirically measured results in a specific case. It is hoped that additional studies will be conducted by others to build the base of knowledge and allow more informed decisions to be made by planners.

The location used for this case study consisted in large part of a developed park and the grounds of a public school campus and local government center. Thus, the results may apply best to situations such as university grounds; government or corporate campuses; regional shopping centers; downtowns with high proportions of public plazas and open parking lots; and large parks and open space areas. They may not apply as effectively to residential areas with gridded streets and/or cul-de-sacs.

Recommendations

The results suggest some general guidelines that may be useful to planners, keeping in mind the limitations discussed earlier. These guidelines are only suggestions, and are not intended to be final or definitive.

For Radial Distances from a Destination (such as a Park or School)

1/8 mile is the radius of a circle centered on the destination within which typical pedestrians should be able to arrive at the destination within 10 minutes. Any walk originating inside this circle and proceeding towards the destination by the most expedient route should arrive within 10 minutes in most circumstances.

1/3 mile is the average radial distance from the destination from which a walker will arrive at the destination in 10 minutes. Stated differently, the average of all possible 10 minute walks to the destination would originate this far away in a straight line.

½ mile is the farthest radial distance from the destination that can be covered in 10 minutes by a typical pedestrian. This distance will capture essentially all possible walkers traveling at a normal pace within 10 minutes of the destination. I.e., all possible walks of 10 minute duration at normal walking speed and ending at the destination are captured within this distance.

For Network Distances

½ mile should be considered the maximum distance along a network from which a destination can be reached in ten minutes. The average ten minute walk would be slightly shorter.

1/8 mile should be considered the distance along a network from which most everyone should be able to arrive at the destination within ten minutes, except in unusual situations.

Summary

The results of this study suggest that the standards in common use, including 1/8 mile, ¼ mile, and ½ mile, are all useful, but should be applied with a clear understanding of how they differ and what they actually represent. It is recommended that **1/3 mile** be used as a standard for radial buffers that represent the average origin of a ten minute walk to a selected destination. A distance of **½ mile** should be used as the typical distance along a network from which a 10 minute walk to a selected destination would originate. Walks originating closer to the destination along the network would be likely to take less than 10 minutes.

When GIS base data is known to be complete and accurate, or if non-network shortcuts are not common within the proximate area of a destination, network buffers are recommended. However, if base data is incomplete or if there are numerous possible shortcuts, radial buffers are recommended.

It is important to note that this study does not address the validity of ten minutes as a planning standard for the duration of walks. Further tests are recommended to determine the true relationship between walk duration and people's motivation to walk.

Additional Resources

While research on walking behaviors, particularly those associated with walking to parks, seems to be lacking in the literature, there is growing interest and discussion in the subject of walking. The following examples might be useful to those interested in this topic:

Kuzmyak, Richard, & Dill, Jennifer (2012). Walking and Bicycling in the United States: The who, what, where, and why. *TR News*, 280, 4-15. PDF.

Walker, Jarrett (2011). Basics: walking distance to transit. *Human Transit: the professional blog of public transit planning consultant Jarrett Walker.* 24 July 2011. Web. 25 July 2014.

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Tags: Walkability; walking buffers; walking behaviors; walking distances; walkable access; walking studies; pedestrian standards; walking standards.

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