

*Appendix Outline:*

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## APPENDIX E: VALUES OF BICYCLE TRANSPORTATION



### E.0 The Value of Bicycle Transportation

Given the extensive commitment of time and resources needed to fulfill the goals of this plan, it is also important to assess the immense value of bicycle transportation.

Scores of studies from experts in the fields of public health, urban planning, urban ecology, real estate, transportation, sociology, and economics have supported such claims and affirm the substantial value of supporting bicycling as it relates to active living and alternative transportation. Communities across the United States and throughout the world are implementing strategies for serving the bicycle needs of their residents, and have been doing so for many years. They do this because of their obligations to promote health, safety and welfare, and also because of the growing awareness of the many benefits of bicycling.

### E.1 Increased Health and Physical Activity

A growing number of studies show that the design of our communities—including neighborhoods, towns, transportation systems, parks, trails and other public recreational facilities—affects people’s ability to reach the recommended daily 30 minutes of moderately intense physical activity (60 minutes for youth). According to the Centers for Disease Control and Prevention (CDC), “physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic.”

<sup>1</sup> The increased rate of disease associated with inactivity reduces quality of life for individuals and increases medical costs for families, companies, and local governments.

The CDC determined that creating and improving places to be active could result in a 25 percent increase in the number of people who exercise at least three times a week<sup>2</sup>. This is significant considering that for people who are inactive, even small increases in physical activity can bring measurable health benefits. Enhancing a safe and reliable bicycle network in Carrboro will positively impact the health of local residents. The Rails-to-Trails Conservancy puts it simply: “Individuals must choose to exercise, but communities can make that choice easier<sup>3</sup>.”

### E.2 Economic Benefits

Bicycling is an affordable form of transportation. According to the Pedestrian and Bicycle Information Center (PBIC), of Chapel Hill, NC, the cost of operating a bicycle for a year is approximately \$120, compared to \$7,800 for operating a car over the same time period<sup>4</sup>. Bicycling becomes even more attractive from an economic standpoint when the rising price of oil (and decreasing availability) is factored into the equation. Since 2000, oil prices have more than quadrupled. As of summer 2008, gasoline prices have topped \$4 a gallon and are generally forecast to continue to increase<sup>5</sup>. The rising cost of fuel reinforces the idea that local communities should be built to accommodate people-powered transportation, such as walking and biking. Carrboro’s current compact land development patterns, combined with new strategies for improving bicycle transportation, could facilitate a substantial local reduction in auto- and oil-dependency.

From a real estate standpoint, consider the positive impact of trails and greenways, which are essential components of a complete bicycle network. Accord-





ing to a 2002 survey of recent homebuyers by the National Association of Home Realtors and the National Association of Home Builders, trails ranked as the second most important community amenity out of a list of 18 choices<sup>6</sup>. Additionally, the study found that ‘trail availability’ outranked 16 other options including security, ball fields, golf courses, parks, and access to shopping or business centers. Findings from the American Planning Association (How Cities Use Parks for Economic Development, 2002), the Rails-to-Trails Conservancy (Economic Benefits of Trails and Greenways, 2005), and the Trust for Public Land (Economic Benefits of Parks and Open Space, 1999) further substantiate the positive connection between trails and property values across the country.

Finally, from a tourism perspective, cyclists can add real value to local economies. For example, in the Outer Banks, NC, bicycling is estimated to have an annual economic impact of \$60 million; 1,407 jobs are supported by the 40,800 visitors for whom bicycling was an important reason for choosing to vacation in the area. The annual return on bicycle facility development in the Outer Banks is approximately nine times higher than the initial investment<sup>7</sup>. Similarly, Damascus, VA, the self-proclaimed ‘Friendliest Trail Town’, features 34-miles of trail where approximately \$2.5 million is spent annually related to recreation visits. Of this amount, non-local visitors spend about \$1.2 million directly into the economies of Washington and Grayson counties<sup>8</sup>. While these examples feature beach and mountain destinations, the Town of Carrboro also has key advantages, such as a popular downtown, events at UNC-Chapel Hill, and the proximity of a large population of potential

riders/tourists. In fact, local tourism also experiences a boost from area cyclists, many of whom ride in Carrboro and spend time and money in downtown.

### **E.3 Environmental Improvements**

As demonstrated by the Southern Resource Center of the Federal Highway Administration, when get out of their cars and onto their bicycles, they reduce measurable volumes of pollutants<sup>9</sup>. Other environmental impacts include a reduction in overall neighborhood noise levels and improvements in local water quality as fewer automobile-related discharges wind up in the local rivers, streams, and lakes.

Trails and greenways are also part of any bicycle network, conveying unique environmental benefits. Greenways protect and link fragmented habitat and provide opportunities for protecting plant and animal species. Aside from connecting places without the use of air-polluting automobiles, trails and greenways also reduce air pollution by protecting large areas of plants that create oxygen and filter air pollutants such as ozone, sulfur dioxide, carbon monoxide and airborne particles of heavy metal. Finally, greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff.

### **E.4 Transportation Benefits**

In 2001, the National Household Travel Survey found that roughly 40% of all trips taken by car are less than 2 miles. By taking these short trips on a bicycle, rather than in a car, citizens can substantially



impact local traffic and congestion. Additionally, many people do not have access to a vehicle or are not able to drive. According to the National Household Travel Survey (NHTS), one in 12 U.S. households does not own an automobile and approximately 12 percent of persons 15 or older do not drive<sup>10</sup>. An improved bicycle network provides greater and safer mobility for these residents.

Traffic congestion is often a major problem in fast growing areas, such as Orange County. Congestion reduces mobility, increases auto-operating costs, adds to air pollution, and causes stress. Bicycle users can help alleviate overall congestion because each cyclist is one less car on the road. Incidentally, cyclists take up significantly less space on the road (see images at left). While some may argue over the degree to which overall congestion is alleviated by cyclists, one aspect of the argument is particularly difficult to challenge: for the individuals who choose to ride a bike rather than drive, the negative impacts of congestion (stress, operating costs, and sometimes even mobility) are greatly reduced.

### E.5 Quality of Life

Many factors go into determining quality of life for the citizens of a community: the local education system, prevalence of quality employment opportunities, and affordability of housing are all items that are commonly cited. Increasingly though, citizens claim that access to alternative means of transportation and access to quality recreational opportunities such as parks, trails, greenways, and bicycle routes, are important factors for them in determining their overall pleasure within their community. Communities with such amenities can attract new businesses,

industries, and in turn, new residents. Furthermore, quality of life is positively impacted by bicycling through the increased social connections that take place by residents being active, talking to one another and spending more time outdoors and in their communities.

According to the Brookings Institution, the number of older Americans is expected to double over the next 25 years<sup>11</sup>. All but the most fortunate seniors will confront an array of medical and other constraints on their mobility even as they continue to seek both an active community life, and the ability to age in place. Trails built as part of the bicycle transportation network generally do not allow for motorized wheelchairs, which is an important asset for the growing number of senior citizens who deserve access to independent mobility.

Children under 16 are another important subset of our society who deserve access to safe mobility and a higher quality of life. According to the U.S. Environmental Protection Agency, fewer children walk or bike to school than did so a generation ago. In 1969, 48 percent of students walked or biked to school, but by 2001, less than 16 percent of students between 5 and 15 walked or biked to or from school<sup>12</sup>.

According to the National Center for Safe Routes to School, “Walking or biking to school gives children time for physical activity and a sense of responsibility and independence; allows them to enjoy being outside; and provides them with time to socialize with their parents and friends and to get to know their neighborhoods<sup>13</sup>.” In a 2004 CDC survey, 1,588





adults answered questions about barriers to walking to school for their youngest child aged 5 to 18 years<sup>14</sup>. The main reasons cited by parents included distance to school, at 62%, and traffic-related danger, at 30%. Strategic additions to Carrboro's trail system could shorten the distance from homes to schools, and overall bicycle improvements can improve the safety of our roadways.

### E.6 Quantifiable Benefits for Carrboro

Non-motorized transportation can serve recreational purposes, improve mobility, and improve health. The "BikeCost" model, made available by the National Pedestrian and Bicycle Information Center (<http://www.bicyclinginfo.org/bikecost>), quantifies these benefits. Though focused primarily on bicycling, the model provides a starting point for identifying the potential cost savings of improving Carrboro's non-motorized transportation system. Several modeling assumptions should be discussed. First, the BikeCost model is project-specific, requiring specific information regarding project type, facility length and year of construction. Because this study focuses on a larger study area, several variables were used. The model was based on the addition of 5 miles of proposed new on-street bicycle lanes. The expected "mid year" of construction for the new system was assumed to be 2011. The model also required other inputs obtainable from the 2000 U.S. Census, including bicycle commute mode share, average population density, and average household size.

Based on the variables described above, the BikeCost model estimated annual recreational, mobility and health benefits. The benefits were quantified based

on a combination of research from previous studies as well as other factors (identified in the footnotes in the table below).

The table below summarizes the estimated benefits of enhancing the bicycle lane network in Carrboro by five miles. Except for mobility benefits, the model outputs represent aggregate benefits of a potential future system of bicycle lanes. Potential annual recreational benefits range from a low estimate of about \$3 million to a high estimate of over \$31 million. Annual health benefits range from about \$178,000 to about \$1.2 million. Mobility benefits were estimated on a per-trip, daily and annual basis. The roughly \$3.60 per-trip benefit of bicycle lanes could translate to an annual benefit of nearly \$2 million. Decreased auto usage could also generate monetary benefits. As most of the study area is generally urban in character, the enhanced bikeway network could generate over \$169,000 in annual savings from reduced vehicle trips.



**ESTIMATED AGGREGATE ANNUAL BENEFITS OF AN ENHANCED BICYCLE NETWORK**  
*Annual Benefits*

|                              | <b>Low Estimate</b> | <b>Mid Estimate</b> | <b>High Estimate</b> |
|------------------------------|---------------------|---------------------|----------------------|
| <b>Recreation</b>            | <b>\$3,057,159</b>  | <b>\$19,769,628</b> | <b>\$31,590,643</b>  |
|                              |                     |                     |                      |
|                              | <b>Per Trip</b>     | <b>Daily</b>        | <b>Annually</b>      |
| <b>Mobility-Bicycle Lane</b> | <b>\$3.60</b>       | <b>\$7,904</b>      | <b>\$1,857,540</b>   |
|                              |                     |                     |                      |
|                              | <b>Low Estimate</b> | <b>Mid Estimate</b> | <b>High Estimate</b> |
| <b>Health</b>                | <b>\$178,683</b>    | <b>\$764,764</b>    | <b>\$1,179,310</b>   |
|                              |                     |                     |                      |
|                              | <b>Urban</b>        | <b>Suburban</b>     | <b>Rural</b>         |
| <b>Decreased Auto Use</b>    | <b>\$169,596</b>    | <b>\$104,367</b>    | <b>\$13,046</b>      |

Source: *Benefit-Cost Analysis of Bicycle Facilities* (“Bike-Cost”) Model, Pedestrian and Bicycle Information Center.

(1) Recreational benefit estimated at \$10 per hour (based on previous studies). Assumes one hour of recreation per adult. \$10 value multiplied by the number of new cyclists minus the number of new commuters. This value multiplied by 365 days to estimate annual benefit.

(2) Assumes an hourly time value of \$12. This value multiplied by 15.38 minutes (the amount of extra time bicycle commuters are willing to spend to travel on a bicycle lane without adjacent on-street parking). Per-trip benefit then multiplied by the daily number of existing and

induced commuters. This value then doubled to account for round-trips, to reach daily mobility benefit. Daily benefit then multiplied by 50 weeks per year and 5 days per week.

(3) Based on a network of 118 additional miles of off-street trails.

(4) Based on a network of 236 additional miles of on-street bicycle lanes.

(5) Annual per-capita cost savings from physical activity of \$128 based on previous studies. This value then multiplied by total number of new cyclists.



## Footnotes

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