



# Memphis Bike Share Feasibility Study

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Prepared for City of Memphis

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- Downtown Memphis Commission
- Memphis Area Transit Authority
- Memphis Convention and Visitors Bureau
- Memphis Medical Center
- University of Memphis
- University of Tennessee Health Sciences Center

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# EXECUTIVE SUMMARY

Across the globe, cities are embracing an innovative approach to urban mobility that combines the flexibility of a bicycle with the accessibility of public transportation. In Chattanooga, Miami, Spartanburg, Nashville, Charlotte, and more than 200 other cities on six continents, bike sharing is part of a critical and powerful movement in public transportation that promotes healthier living, cleaner air, safer streets, improved accessibility to businesses, job creation, recruitment, and economic growth.

Bike sharing consists of a fleet of bicycles available on demand for short-term rentals from a network of stations at key destinations citywide. Membership and fee-based rentals are appropriate for short trips, transit-linked trips, and tourist trips; for many riders, they help complete “the last mile” of a commute to work or other destination. Autonomous and technologically advanced, bike sharing is easy to use, relatively affordable compared to other modes of public transit, and – requiring

virtually no alteration to a city’s existing infrastructure – easily and quickly installed.

Memphis has many of the characteristics needed for establishing a bike share system including:

- A supportive policy environment that has activated significant growth in bicycling and the amount of bike facilities.
- A downtown core offering a mixed market of residents, employees, students, and visitors as well as nodes of activity at key destinations radiating from the center of the city.
- A substantial, well-supported tourism industry with internationally-renowned visitor attractions, museums, events, parks and trails.
- A strong network of potential supporters including major corporations, local businesses, an engaged health and medical community, a number of large employers, colleges and other institutions with the potential for sponsorship or large membership boosts.

Although Memphis offers a number of nodes with sufficient density and mix of activity to support bike sharing, there are significant distances between many of these destinations that would best be mitigated by improving bikeway connections between districts, providing a network of comfortable bike routes within bike share districts, and exploiting opportunities for linking transit trips with bike share trips.



*Capital Bikeshare bikes docked at a station in Washington D.C.*



PHOTO COURTESY OF THE GREEN LANES PROJECT.

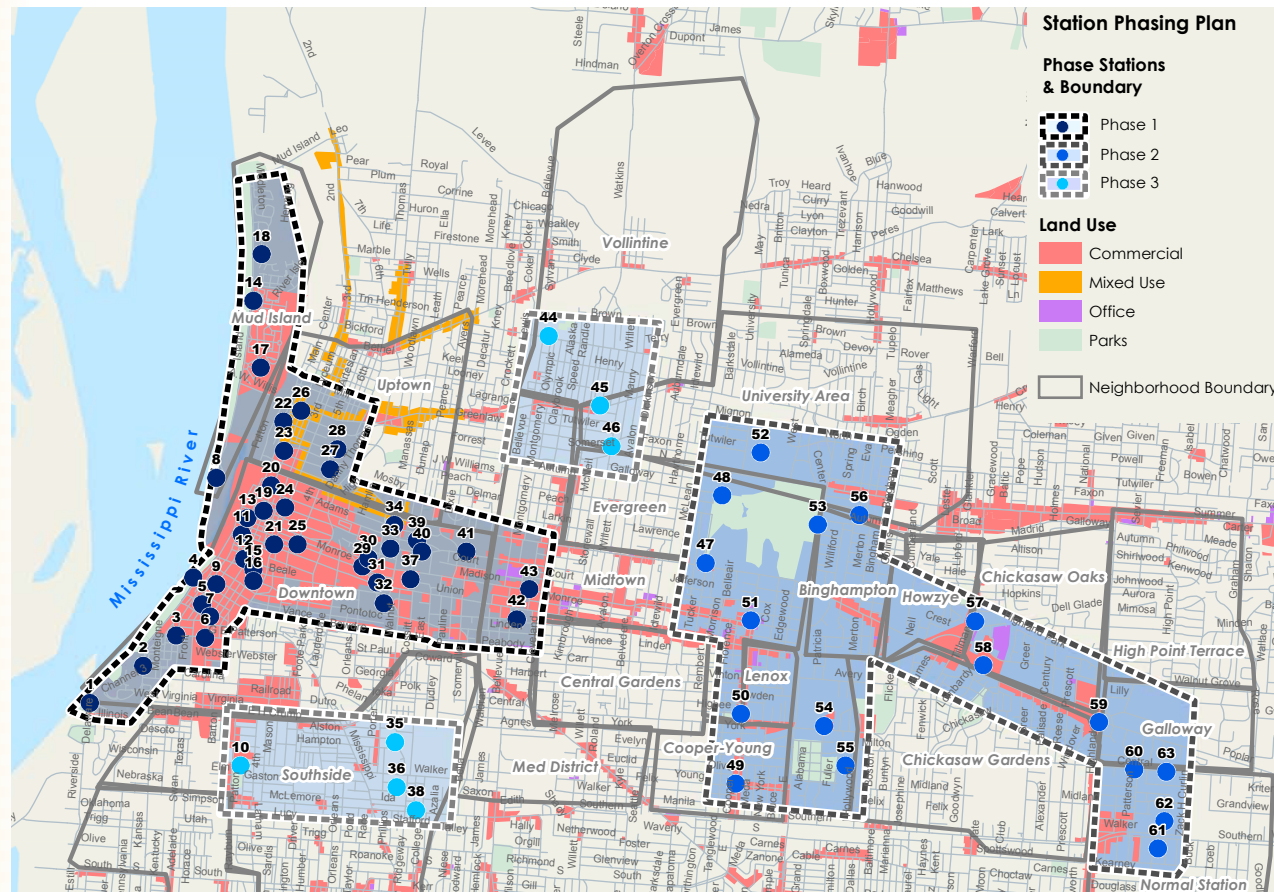
*The City’s emphasis on bicycling has resulted in enhanced bike facilities.*

An additional (ongoing) challenge is to counter the traditionally auto-oriented culture of the City and continue to make inroads in creating a bicycling culture and an environment supportive of bicyclists. Development of the system in collaboration with MATA, the Convention & Visitors Bureau, the Downtown Memphis Commission, and other stakeholders will go towards addressing the mobility needs of tourists, residents, students, and employees within the target areas.

Based on land use and population densities, the City could support a 63 station / 580 bike system that would be logically phased to start in the CBID and Medical District and expand into Midtown and the University District. These locations offer the highest potential demand for bike sharing.

Over five years, a 63 station system would cost approximately \$11.1 million to purchase, launch, and operate. Approximately \$4.5

million is expected to be recouped through membership and usage fees leaving approximately \$6.6 million that would need to be funded through federal grants (such as grants offered by FHWA, FTA, and CDC), local match, private foundation funding, and system sponsorship. A “financially constrained” system, utilizing \$2 million in funding (over five years), would provide a 20 station / 200 bike system that may be a more realistic initial system launch.



Proposed Bike Share System Plan for Memphis, Tennessee.

Based on the model in other US cities and adjusted for the cost of living, members would be able to access the system for a cost of approximately \$70 for an annual membership, \$12 for a three-day pass, and \$6 for a 24-hour pass. Members will be able to take as many trips as they like with the first 30 minutes free, after which time a graduated pricing scheme charges users for longer trips. It is expected that over 350,000 rides will be taken each year once all 63 stations are in place.

Bike share provides a relatively low cost transportation mode for low-income and other traditionally underserved populations. Subsidized membership and other programs should be part of an overall strategy to increase access to low-income, non-English speaking, health sensitive, and other traditionally underserved populations. Inclusive outreach and a strategy for growth of the system into lower demand areas should also form part of this strategy. To this end, stations are proposed for North and South Memphis



A rider uses the map provided at a Hubway station in Boston.



PHOTO COURTESY OF B-CYCLE SPARTANBURG

*A user signs up for membership at the kiosk.*

as part of the initial system.

Although the decision on a business model is yet to be made, other US cities have successfully adopted some combination of the public, non-profit, and private sectors to own, administer, and operate the system. It is recommended that the City first make a decision on their interest in a publically owned system and depending on this interest, the City could then issue an RFP for operating the system or an RFEIO for non-profits (established or new) or the private sector to register their interest to own, administer, and operate the system.

The City, regardless of whether they own or administer the system, will play a major role as a fundraising partner and as a permitting agent for stations placed in the public right-of-way. Other key partners will be the corporate community, large employers, the health sector, and major institutions as potential

sponsors and corporate members of the program. Support at every level is required and involvement from the visitor and tourism sectors, local business and neighborhood associations, bike shops, advocacy groups, and organizations offering health and social support programs will be critical to the success of bike sharing in Memphis.

With bike sharing, Memphis will build on the momentum created around active and healthy living. A self-powered extension of the city's existing public transit infrastructure will simultaneously provide individual health, environmental, and economic benefits. A comprehensive, citywide system will also go a long way towards Memphis achieving "Bicycle Friendly" status by the League of American Bicyclists and generate significant publicity ahead of the 2013 Tennessee Bike Summit to be held in Memphis.

From inception to launch, a bike share system takes approximately 12 to 14 months to implement. Specific milestones will include: finalization of a preferred business plan, fundraising to identify "seed" money with which to issue an RFP, finalization of a station plan and permitting of stations, equipment purchase, warehouse and office lease, hiring and training of an administrative team, and continuous branding, marketing, and advocacy to promote bike share as widely as possible.



*Bike sharing provides a travel option to link trips with transit or for those trips too far to walk.*



# 1: INTRODUCTION

The City of Memphis has recently elevated the role of bicycle transportation in the metropolitan region and increased its investment into the bikeway network. As an opportunity to build on this momentum, the City of Memphis, Livable Memphis, Shelby County Health Department, and the Hyde Family Foundation have commissioned this study to explore the potential for a bike sharing system to operate in Memphis.

The objectives of this report are to:

- Introduce bike sharing in a way that can be shared with decision makers, potential partners, and key stakeholders.
- Present experience from other U.S. cities operating bike sharing systems to identify key system parameters and explore potential funding and ownership / operation models.
- Perform a Local Context Analysis to assess the preparedness of Memphis for bike sharing and identify potential issues.
- Develop a System Plan that outlines what a bike sharing system would look like in Memphis including the potential service area, system size, and phasing.
- Prepare a Financial Analysis that reviews possible funding sources and forecasts membership and ridership to develop an estimate of user-generated revenues.

This report is organized as follows:

**Section 2** introduces the concept of bike sharing and the typical components that make up a bike share system.

**Section 3** provides an overview of the



*Capital Bikeshare, Washington, D.C.*

benefits of bike share systems, and case studies of cities that are currently operating or are about to implement bike share systems are presented in **Section 4**.

The unique character and current environment of the City of Memphis as it relates to bike sharing is detailed in the Local Context Analysis in **Section 5**.

A System Plan is included in **Section 6** and will define program parameters including

the size and extent of the system, program phasing, and proposed station locations, and discusses how low income and underserved communities can be involved.

The Business Model included in **Section 7** summarizes the advantages and disadvantages of different bike sharing business models that have been applied elsewhere in the United States and highlights the primary considerations for selecting a particular model.

**Section 8** includes a Financial Analysis that reviews possible funding sources and how they relate to Memphis. A membership and ridership forecast will be used to estimate user-generated revenues; and a comparison of estimated costs and revenues will determine what level of additional funding is required. A recommended funding scenario will be presented.

An Implementation Plan that outlines the “next steps” for advancing bike sharing and a possible timeline is included in **Section 9**.

*“[In 2010] our total costs for theft and vandalism were only about \$5,000.”*

–Bill Dossett, Executive Director of Nice Ride Minnesota, a fourth-generation bike share system

## Program Goals

A series of goals for a potential bike share program were developed by a technical committee representing the project partners including the City of Memphis, Shelby County Health Department, Livable Memphis, and the Hyde Family Foundation. These goals provide a definition of what would be considered a “successful” bike share system that can be used to measure the feasibility of a bike sharing system in Memphis. The goals include:

1. To operate a financially sustainable bike share system.
2. To achieve visible success through positive media, financial performance, and high ridership.
3. To provide visitors with an effective means of moving around town, while also providing an effective transportation system for local residents that is inclusive of lower income and other traditionally underserved populations now or in the future.
4. To make use of local opportunities such as the high number of annual visitors to the city, the prevalence of large health care institutions, the number of higher-learning campuses and large student population, and supportive local businesses.
5. To enhance local transit and make active transportation a competitive mobility option and to extend the reach of existing infrastructure and transportation services.
6. To use bike share to leverage increased support of bicycling.

## 2: BACKGROUND

### What is Bike Sharing?

Bike sharing provides a cost-effective and elegant mobility option for trips too far to walk, but not long enough to take transit or drive.

A bike share system consists of a network of bikes placed at stations located around a city and is a relatively inexpensive and quick implementation extension to a city's public transportation offerings.

Bike sharing is affordable and systems can be structured to operate like automated bike rental services, or to encourage shorter, spontaneous trips through membership and usage fees where a bike can be taken from a station and returned to any other station.

Chattanooga, Miami, Spartanburg, Tulsa, Nashville, Denver, Minneapolis, and over 300 other cities worldwide are investing in bike sharing as a relatively inexpensive and quick implementation urban transportation option (see **Figure 2.1**). These cities, like Memphis, recognize the potential economic, environmental, and social benefits of bike sharing.

### Development of Bike Share Technology

The international community has experimented with bike share programs for nearly 40 years. **Figure 2.2** (page 4) tracks the historic development of bike share systems. Until recently, these programs experienced low to moderate success because of theft and vandalism. In the last five years, innovations in technology to increase accountability have given rise to a new generation of technology-driven bike share programs.

The renaissance of bike sharing was linked to the introduction of technological advancements such as credit card transactions and RFID chips (radio-frequency identification) that allow operators to introduce accountability and reduce theft and vandalism.

The most recent bike share technologies, developed in North America, are modular systems that do not require excavation because they use solar power and wireless communication, as opposed to hardwired installation. In this way, the stations can be moved, relocated, expanded, or reduced to meet demand. Even with this technology available, some cities, such as London, have chosen to utilize a hardwired system.

Other recent advancements include non-station based technologies and incorporating electric bikes. However, the majority of recent high-profile bike share installations in the United States utilize fourth-generation technology, the focus of this study.

The components of a modern bike share system are described in **Figure 2.3** (page 5). The bikes are typically upright bicycles, which have the advantage of being “one-size-fits-all” and encourage movement at a slower pace. They typically include safety features such as puncture-resistant tires, a bell, and a light that is powered by pedaling the bicycle.

**Figure 2.1: Bike Share Systems of North America**

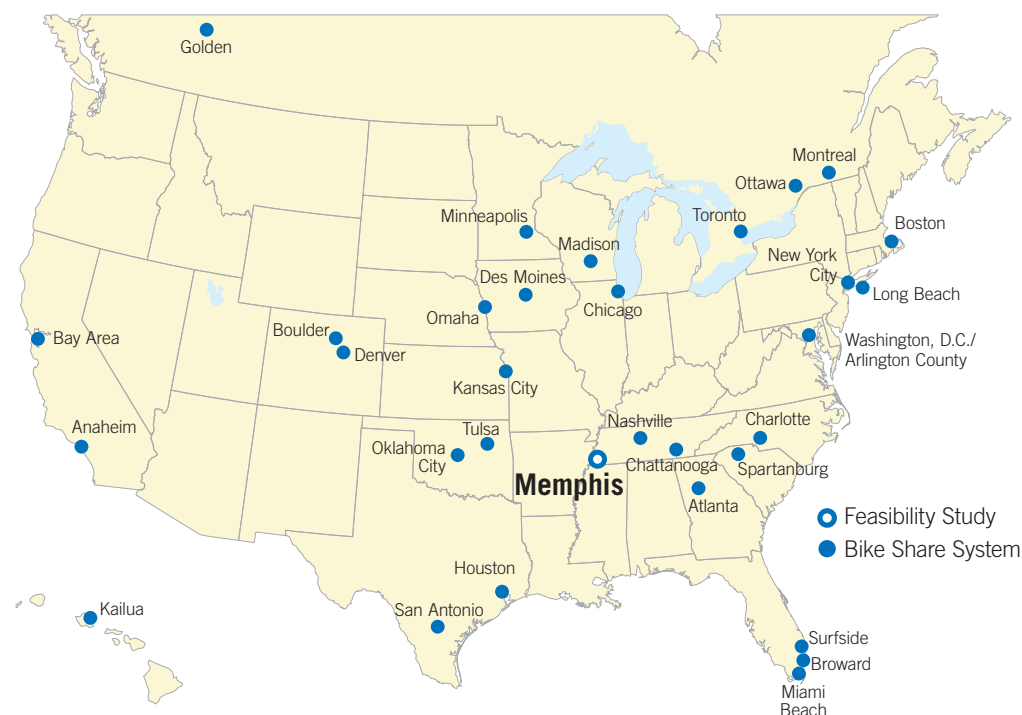


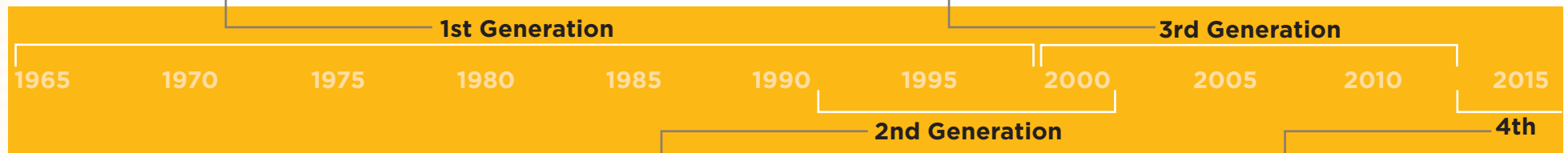
Figure 2.2: Historic Development of Bike Sharing Technology



Distinctive-looking bikes (e.g., paint color)  
Subject to theft and poor organization  
Amsterdam; Portland, Oregon;  
Boulder, Colorado; Austin, Texas\*



Credit card transactions and radio-frequency identification chips  
User identification and security deposit provide accountability against theft and vandalism  
Paris and Lyon, France; Rome, Italy



Locking mechanism and check-out deposit  
Minimal deposit not enough to significantly reduce theft  
Copenhagen, Denmark; La Rochelle, France\*



Solar powered, wireless communication  
Modular systems do not require excavation  
Boston; Denver; Washington, D.C.



\*System still in operation

**Figure 2.3: Elements of a 4th Generation Bike Share System**



*A software back-end that keeps track of transactions and ridership information and can be linked to real-time website and mobile device applications and user profiles that report the number of trips, distance travelled, calories burned, etc.*

*A fleet of bicycles - specially designed for short trips and constructed of customized components to limit their appeal to theft and vandalism.*

*A network of stations spread across a broad area to provide convenient access to bikes. Each station includes a terminal where transactions are made and docking points where the bicycles are secured when not in use. Recent technologies have introduced modular station platforms that can be relocated, expanded, and have solar power and wireless communications.*

*Maintenance: staff and programs to rebalance bikes amongst the stations and maintain the system infrastructure.*

# 3: BENEFITS OF BIKE SHARING

Bike share has been transformative for many cities. Relative to its cost, bike sharing brings numerous benefits. This section provides a summary of some of the financial, health, environmental, and transportation / mobility benefits that support bike sharing.

## Financial Benefits

Bike sharing is a relatively inexpensive and quick to implement urban transportation option compared to other transportation modes. As shown in **Figure 3.1**, the relative cost of launching a bike share system is several orders of magnitude less than investments in other modes.

Unlike other transportation modes, North American cities have generally funded bike sharing through federal and state grants, private donations, corporate sponsorship, and

user revenues. Little to no *local* public funding has been used in bike sharing to date.

Bike share systems in the US have performed well in terms of “farebox recovery” (i.e. the percentage of operating cost recovered by user revenues). **Figure 3.2** compares bike share farebox recoveries to traditional transit services and shows that recoveries of 36% (Boulder) to 97% (Capital Bikeshare<sup>1</sup>) compare favorably to traditional rail and bus transit systems in the U.S. that operate with an average farebox recovery of 35 percent and for major Tennessee cities, generally even lower.

Full farebox recovery may or may not be possible in Memphis; however where user fees do not cover the cost of operating the system, other cities have been able to pick up the shortfalls without having to rely on public funding.

Bike sharing systems are also:

- High-profile additions to a city that in themselves become an **attraction for visitors and tourists and generate positive national and international media** exposure that would otherwise be difficult or costly to generate.
- **Create “green” jobs** with on-going positions for managing and operating the system. The size of system being considered in Memphis (approximately 40 stations) could generate around 8 full-time jobs.



Shelby Farm recreation (Photo: Baxter Buck)

## Figure 3.1: Relative Cost of Transportation Investments

Capital cost of adding one lane-mile of urban highway\*

\$10-20 million

Capital cost of entire Capital Bikeshare system

\$6.2 million

Capital cost of one transit bus\*\*

\$321,000-375,000

\*Source: Victoria Transport Policy Institute. Smart Congestion Relief: Comprehensive Analysis of Traffic Congestion Costs and Congestion Reduction Benefits. 25 May 2012. [http://www.vtpi.org/cong\\_relief.pdf](http://www.vtpi.org/cong_relief.pdf) (accessed June 2012)

\*\*Source: Federal Transit Administration. Transit Bus Life Cycle Cost and Year 2007 Emissions Estimation. 2 July 2007. [http://www.fta.dot.gov/documents/WVU\\_FTA\\_LCC\\_Final\\_Report\\_07-23-2007.pdf](http://www.fta.dot.gov/documents/WVU_FTA_LCC_Final_Report_07-23-2007.pdf) (accessed June 2012)

## Figure 3.2: Comparison of Farebox Recovery: Transit versus Bike Share

Annual farebox recovery of Memphis Area Transit Authority

21%

Annual farebox recovery of other Tennessee transit systems\*

8% - 28%

Average farebox recovery of U.S. metro transit systems\*\*

35%

Annual farebox recovery of sample U.S. bike share systems\*\*

36% - 97%

\*Nashville Metropolitan Transit Authority. Nashville Strategic Transit Master Plan, Chapter 4. 27 August 2009. <http://www.nashvillemta.org/setpage.asp?page=finalplan.html> (accessed June 2012)

\*\*Based on Boulder B-cycle, Denver B-cycle, and Capital Bikeshare 2011 annual reports available through the following organizations: Boulder B-cycle, Denver Bike Sharing, and Bike Arlington.

1 Pedestrian and Bicycle Information Center. (2010). Economic Benefits: Money Facts. Retrieved 1/20/2010 from [www.bicyclinginfo.org/why/benefits\\_economic.cfm](http://www.bicyclinginfo.org/why/benefits_economic.cfm)

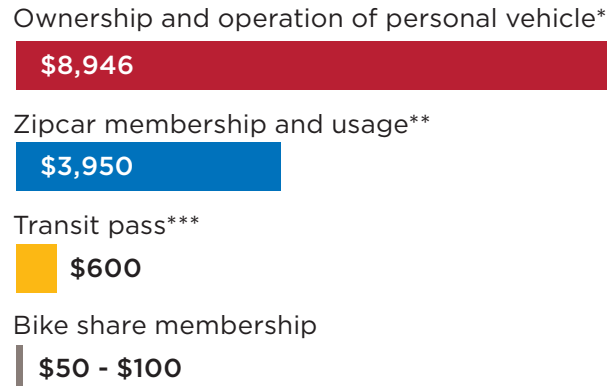
**Table 3.1: Job Creation from Bike Sharing Services**

Program	Bikes	Full Time Employees	Part Time Employees
Denver Bikesharing	500	7	6
Hubway (seasonal)	1,065	9	17
Nice Ride Minnesota (seasonal)	1,325	14	6
Capital Bikeshare	1,505	17	31
DecoBike	1,000	25	3

Source: Metrobike

- Provide existing businesses an additional way to get customers to their front door or to provide employees with an inexpensive transportation option for commuting to work and running errands during the day. (Bike sharing could form part of a business' Travel Demand Management toolbox.)
- Provide businesses of all sizes an **opportunity for brand development** through station / bike sponsorship. Bike sharing also represents a positive "community amenity" contribution for many companies and property developers.
- Household budgets can benefit from bike sharing by reducing transportation costs. In some cases, bike sharing can eliminate the need for an extra vehicle.
- The wireless and modular nature of stations provides a number of benefits over other transportation infrastructure. The system **can be installed quickly and inexpensively** and stations can be expanded, reduced, or moved to optimize demands.

**Figure 3.3: Annual User Cost for Various Transportation Modes**



\*Source: AAA annual report cited by <http://www.usatoday.com/money/perfi/basics/story/2012-04-27/cost-cars-gas-tires-driving/54565944/1>  
 \*\*Assumes one hour per reservation, 10 weekday reservations per week, and \$50 annual membership. Gas, insurance, and up to 180 miles per reservation are included in the membership. Source: <http://www.zipcar.com/>  
 \*\*\*Assumes MATA 31-Day FastPass purchased for each month of the year. Source: <http://www.matatransit.com/faresPasses.aspx>

Bicycling, and in particular bike sharing, is an affordable form of transportation. The cost of using a bike share bicycle for a year can be as low as the annual membership fee, typically between \$50 and \$100 per year, compared to almost \$9,000 to operate a car over the same time period.<sup>2</sup> Increasingly, bicycling will become an even more attractive transportation option as gas prices continue to rise.<sup>3</sup>

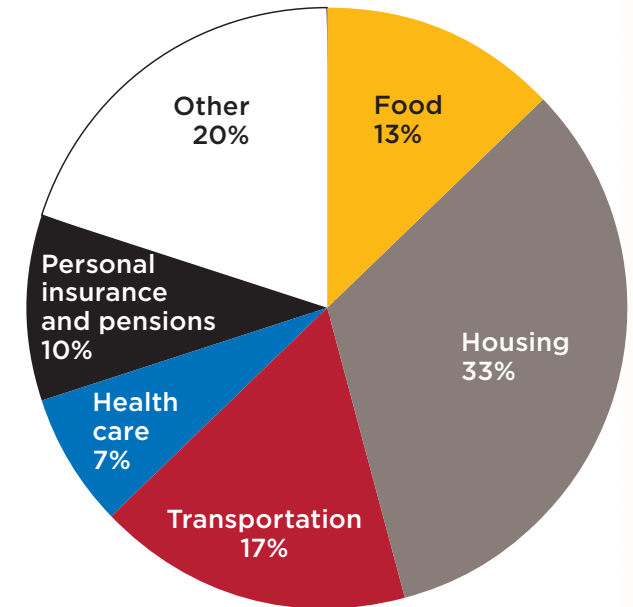
## Health Benefits

The health benefits of bicycling are well recognized and include the potential to reduce obesity, heart disease, and other sedentary lifestyle diseases. The goal of increased

<sup>2</sup> King, Neil. (2/27/08). The Wall Street Journal: Another Peek at the Plateau

<sup>3</sup> Robert Wood Johnson Foundation and University of Wisconsin Public Health Institute. (2012) County Health Rankings and Roadmaps. Retrieved from [www.countyhealthrankings.org](http://www.countyhealthrankings.org)

**Figure 3.4: Household Spending on Transportation in Memphis**



Source: Bureau of Labor Statistics, retrieved from: <http://www.bls.gov/cex/2010/region/region.pdf>

Transportation is second to housing as a percentage of household expenditure, and the top expense for many low income families. According to the Bureau of Labor Statistics Consumer Expenditure report, residents in the Southern U.S. spent an estimated 17 percent of their household budget on transportation in the 2009-2010 fiscal year.

physical activity and healthier lifestyles in Memphis is being propelled by a number of agency and community initiatives as a goal of Memphis, such as Livable Memphis, Healthy Memphis Common Table, the Shelby County Health Department's Healthy Schools and Health Promotion programs, and the *Regional Bicycle and Pedestrian Plan* of the Memphis Urban Area metropolitan planning organization.

Shelby County, Tenn., (home to Memphis) ranks 59th and 66th out of 95 Tennessee counties for health outcomes and health factors, respectively, according to the 2012 County Health Rankings and Roadmaps study.<sup>4</sup> The health outcomes ranking considers mortality and morbidity rates, while the health factors classification considers health

4 Source: <http://healthyamericans.org/reports/obesity2011/release.php?stateid=TN>

behaviors, clinical care, and the social, economic, and physical environment. Notably, Shelby County ranked last (95th out of 95 Tennessee counties) for the physical environment, which reflects limited access to recreational facilities and high levels of air pollution.

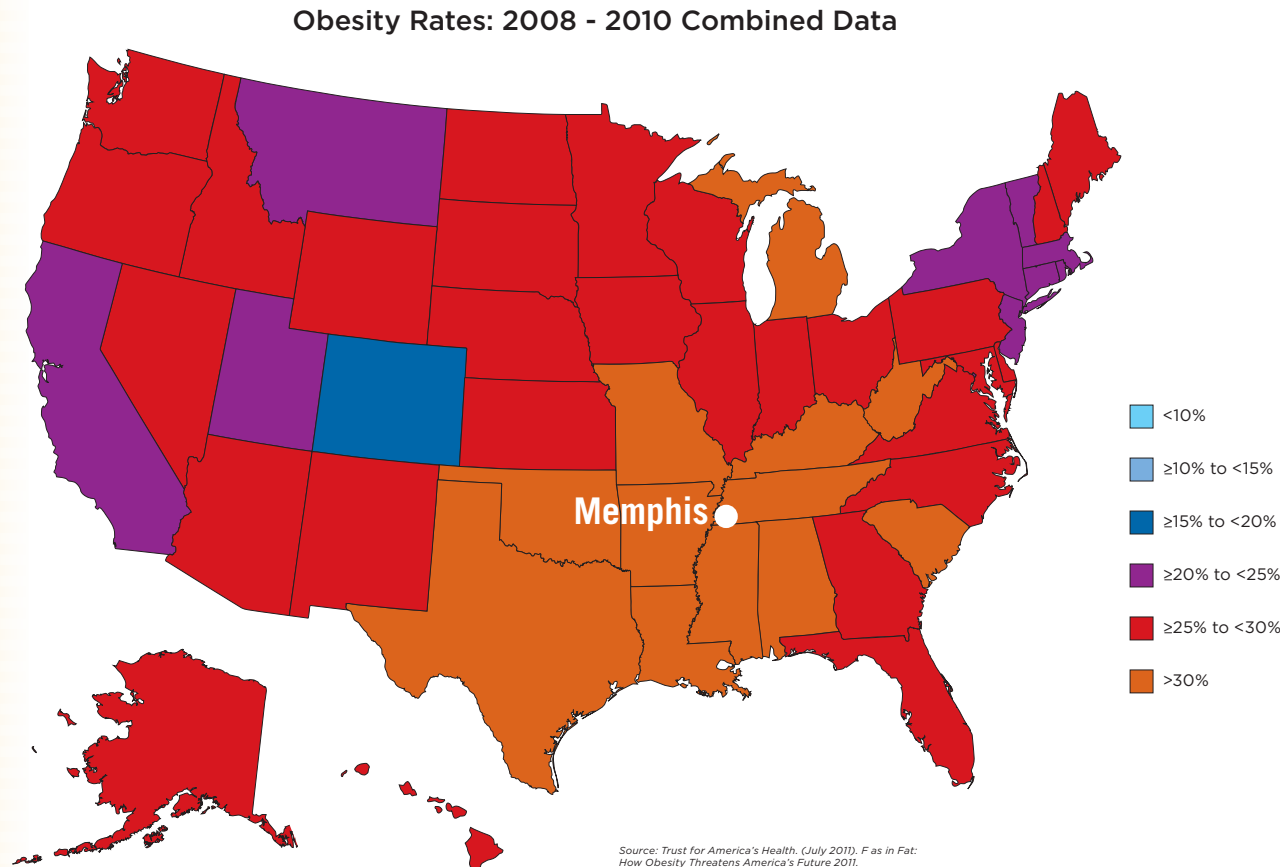
Tennessee has the fourth highest rates of obesity in the country.<sup>5</sup> (**Figure 3.5**). Additionally, it has one of the fastest rates of increase in obesity in the period since 1995 (along with Oklahoma and Alabama).<sup>6</sup> The Centers for Disease Control reported that, in 2005, more than one-fourth of adults in Shelby County were obese, and an even higher percentage of adults were overweight.<sup>7</sup>

**The synergies with health have attracted considerable interest from the health care industry with health care providers becoming major sponsors of bike sharing systems in Minneapolis and Denver.**

## Environmental Benefits

Bike sharing is practically carbon neutral. The stations are solar powered and environmentally friendly facilities and equipment can be chosen for operations (such as cargo bikes or electric vehicles for bicycle redistribution).

North American cities with bike sharing report that approximately **25 percent of trips replace a vehicle trip**, reducing emissions, fuel use, and the need for hard space taken up by automobile parking.



**Figure 3.5: More than 30% of Tennessee Adults are Obese**

5 "F as in Fat: How Obesity Threatens America's Future 2011"

6 Bailey, J., Tang, J., and Lewis, C. (2006). Memphis and Shelby County Behavioral Risk Factor Survey 2005. Memphis TN.

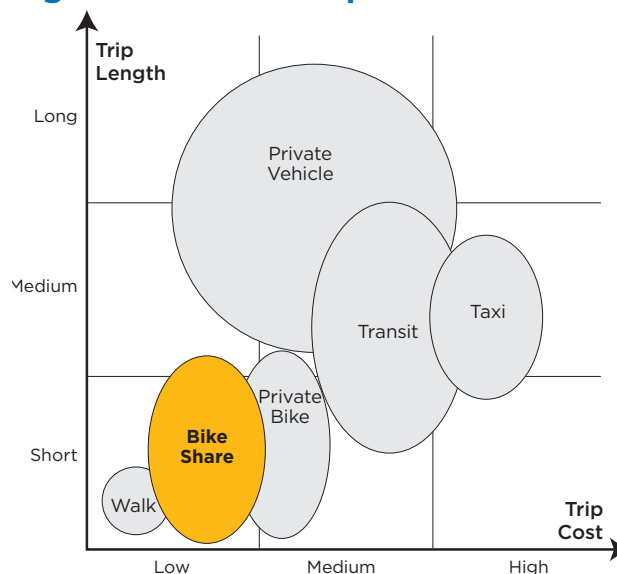
7 [http://www.ecf.com/4575\\_1](http://www.ecf.com/4575_1)

## Transportation / Mobility Benefits

Bike sharing provides an additional mobility option for short urban trips for residents and visitors. **Figure 3.6** illustrates how bike sharing fills an existing gap between trips too far to walk, but not long enough to justify waiting for transit or the cost of driving or catching a taxi. Bike sharing can also:

- **Reduce reliance on the private automobile.** Initial experience in North American cities has shown that approximately 25 percent of bike share trips replace a vehicle trip.
- **Extend the reach of transit** by providing a first- and last-mile transportation solution or providing service to under-served areas or areas that do not justify the cost of other transit options.
- **Encourage more bicycling.** In Paris, for example, consumers have bought more than 2 million bicycles since the city launched its Velib bike share program. Approximately 66 percent of surveyed users in Minneapolis (2010) and 82 percent in Washington DC (2011) stated that they bicycle more since subscribing to bike share.

**Figure 3.6: Urban Trip Modes**



- **Introduce people to cycling** that do not typically ride. The 2010 user survey in Minneapolis showed that approximately one-third of system users cycled less than once per month prior to signing up with Nice Ride.
- **Reduce barriers to cycling**, as there is no need to own or store a private bicycle or to worry about locking your bike and having it stolen. Sixty-four percent of Capital Bikeshare survey respondents reported that they would not have otherwise made the trip and 40 percent reduced their driving miles by using bike share.

## Safety Benefits

Bike share systems have to date observed a solid safety record. In North American systems, few serious injuries or fatalities have been reported, and in Washington DC a total of 14 crashes were reported in the first year of operation, of which only one was serious in nature. Approximately one million trips were made during this same period – an injury crash rate of 0.83 injuries per million miles (the average trip length was approximately 1.2 miles per trip), which is lower than the injury rate of 7.3 injuries per million miles ridden for private bicycling.<sup>8</sup>

<sup>8</sup> Source: U.S. Census, 2010



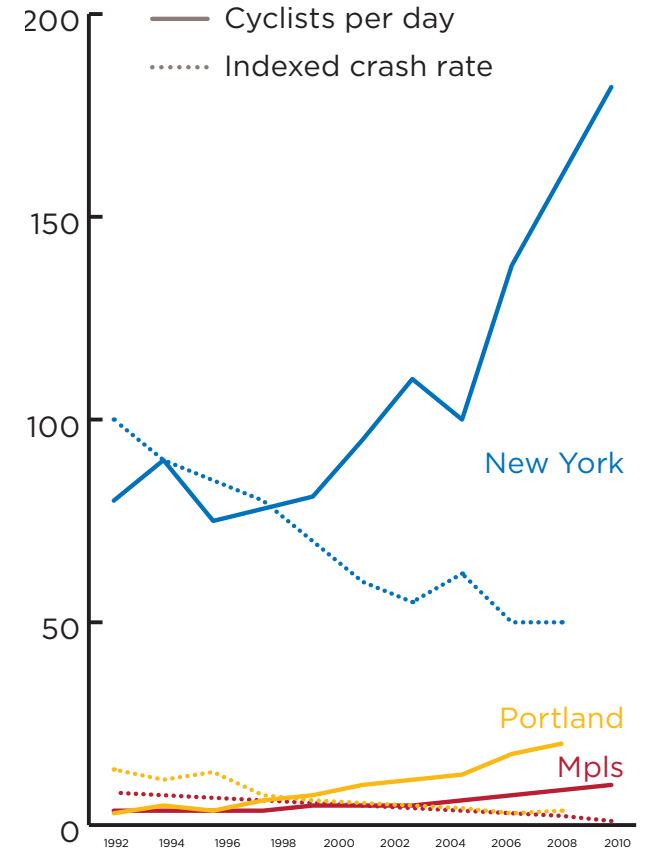
Some of the factors contributing to this safety record could include:

- The “safety in numbers” effect and increased driver awareness due to increased media; increased numbers of cyclists on the street; and, because more drivers use the bike share system or own a bicycle. Many cities have seen a reduction in bicycle crash rates associated with an increase in bicycling, as shown on **Figure 3.7**.
- The safe design of the bike as a visible, slow-speed, upright bicycle fitted with internal safety features such as lights and bells. Further, the bikes are regularly inspected to ensure that all safety features are in proper working order (**Figure 3.8**).

**Figure 3.8: Safety Features of Bike Share Bikes (DecoBike, Miami Beach)**



**Figure 3.7: Comparison of Cycling Crash Rates and Ridership**



Source: League of American Bicyclists. (February 9, 2011). Ridership up crashes down, safety in numbers in Minneapolis. Retrieved from <http://blog.bikeleague.org/blog/2011/02/ridership-up-crashes-down-safety-in-numbers-in-minneapolis/> (accessed June 2012).

# 4: EXPERIENCE IN OTHER CITIES

Many cities in North America are investing in bike share systems for the reasons outlined previously. Their success in these cities has dramatically increased the visibility of bicycling and increased activity and investment in bicycling.

Bike share systems in North America are diverse and include different generations of technology and varying fee structures and loaning periods to cater for the local environment. However, sophisticated tracking and transaction technology, web-based applications to track real-time availability of bicycles, and fully modular station technology with solar power and wireless communications has broadened the appeal of fourth generation bike sharing and are by far the predominate type of bike sharing in the United States. These systems are the focus of this review.

## Case Studies

Third generation bike share generally kicked off with the launch of the system in Lyon, France in 2005 and was accelerated with the high profile launch of the Velib system in Paris in 2007. Since the spread of systems throughout Europe, largely funded through street furniture advertising, other countries have started to implement bike sharing systems including in Canada and the United States.

North American systems have generally looked towards other means of funding rather than street furniture advertising contracts.

**Montreal** was the first North American city to significantly invest in fourth-generation bike sharing, with a system known as Bixi. The technology for the system was developed by

Public Bike System Company (PBSC), financed through a loan from Ville de Montreal. The Bixi technology has been sold to other cities including Toronto and Ottawa, London (UK), Melbourne (Australia), and Minneapolis, Washington DC, Boston, Chattanooga, and New York in the U.S. The Montreal system launched in 2009 with 300 stations, and has since expanded to 411 stations. As of the end of season in 2011, a total of 4 million trips had been made on the system.

Following the lead of Montreal, several U.S. bike share programs launched in 2010 and 2011. These introductions saw new vendors enter the market and the creation of several innovative business models, which continue to develop. Case study systems launched at that time or since include:

- **Boulder B-Cycle:** a 15 station / 120 bike system owned and operated by Boulder B-cycle, a specially created non-profit organization. The equipment for this program is provided by B-Cycle, a partnership of Humana, Trek Bicycle Corporation, and Crispin Porter + Bogusky, who have also provided equipment for systems in Denver, Colorado, Madison, Wisconsin, and a number of other cities.
- **Capital Bikeshare** (Washington DC / Arlington, Virginia): a 179 station / 1,560 bike system funded through federal grant money and some local public funding. The system is sustained solely on user-revenues and there is no corporate sponsorship of the bikes, stations, or other infrastructure. In its first year the system recorded just under one million trips and signed 16,726

annual members, 1,664 monthly members, 4,118 weekly members, and 86,019 casual (24-hour) users.

- **Chattanooga Bike Transit:** a 30 station / 300 bike system owned by an existing non-profit organization and operated by Alta Bicycle Share. Pre-sale of annual memberships sold out during spring 2012. The system launched in summer 2012.
- **DecoBike** (Miami Beach): is a privately owned and operated North American bike share system. A private operator was responsible for raising the capital for the initial 100 station / 1,000 bike system and obtaining sponsorships that supplement user-fees to sustain operations. This system utilizes technology developed by the Sandvault Group.

These case studies are presented in more detail in **Figure 4.1** (next page). These cities were chosen to represent the experience of smaller markets in Boulder and Chattanooga; to highlight different ownership / operations models including public private partnership and non-profit models; and to highlight different target markets, such as the commuter population in the DC area and the tourist population in Miami Beach, Florida.

## Figure 4.1: Case Studies of Cities Relevant to Memphis

### Boulder B-cycle

**Launch:** May 2011

**Size:** 15 stations / 120 bikes

**Population:** 97,385

**Funding:** Capital funding obtained through federal, state and local government grants, private funding and foundation grants (\$1.25 million – 85% grants / 15% donations). Operations funding comes from sponsorship (a number of sponsorship options are available including on the basket, badge, and station kiosk), memberships, and usage fees (\$500,000 per year (est.) – 64% sponsorship / 36% membership and usage fees).

**Management:** Non-profit

**Cost:** \$55 annual membership, \$15 weekly, \$5 daily pass; first 60 minutes free, \$4 for each additional 30 minutes.

**Access:** casual users pay with credit card at a kiosk, members are provided a B-Card.

Boulder B-cycle is operated by a non-profit that was specially-formed to bring bike sharing to Boulder. The City of Boulder is represented as a liaison to the Board of Directors. The objectives of the program are to provide a green transportation option to residents and visitors, encourage more people to bicycle, and to operate a financially sustainable transportation system.

**Statistics:** In 2011, the system garnered 1,170 annual members, sold 6,000 24-hour passes, and experienced 18,500 trips (48% by annual members). Three-quarters of annual members were part of a corporate membership program; 83% of trips less than 60 minutes (the free-ride period); 76% of users have a transit pass and 20% of these say they connect to public transit.



### Capital Bikeshare

**Launch:** September 2010

**Size:** 179 stations / 1,560 bikes

**Population:** 601,723/207,627 (Washington DC/ Arlington, Virginia)

**Funding:** Capital Bikeshare of DC is 100 percent publicly funded while the Arlington branch of the system is 65 percent privately funded. Funding began with a \$6 million federal grant (Congestion Mitigation Air Quality) and local funding for DC, with \$200,000 in private funding for Arlington.

**Management:** Public - private partnership. The local governments own the system within their respective jurisdictions, with Alta Bicycle Share serving as the private operator of the system.

**Cost:** \$7 for day pass (24 hour), \$15 for 3-day pass, \$25 for 30-day pass, and \$75 annual membership

**Access:** casual users pay with credit card at the kiosk and receive a 5-digit code to unlock a bike, members are provided a membership key to unlock bikes without using the kiosk.

**Statistics:** On the anniversary of its launch, Capital Bikeshare experienced its one-millionth bike share ride and had accrued 16,726 annual members, 1,664 monthly members, 4,118 weekly members, and 86,019 casual (24-hour) users. By its 20-month anniversary, Capital Bikeshare experienced its two-millionth bike share ride and 10,000 additional annual members (totaling 26,000).

This current Capital Bikeshare system was introduced after a different bike share system, SmartBike DC, had operated for two years previously. The current system is widely seen as a success due to its high usage rates and 'farebox recovery' ratio.



## Chattanooga Bicycle Transit System

**Launch:** 2012

**Size:** 30 stations / 300 bikes

**Population:** 170,000

**Funding:** Capital funding obtained through federal grant (\$2 million CMAQ) and private foundation support (\$0.2 million). Operations funding comes from sponsorship (a number of sponsorship options are available including on the basket, badge, and station kiosk), memberships, and usage fees.

**Management:** Public - private partnership. A private operator (Alta Bicycle Share) will operate the system under a direct contract with Outdoor Chattanooga (a department of the city's Parks & Facilities Division).

**Cost:** \$75 annual membership, \$6 daily pass; first 60 minutes free, \$5 for each additional 30 minutes.

**Access:** casual users pay with credit card at the kiosk, members are provided a membership key.

**Statistics:** The system recorded 10,000 trips during the first 120 days of operations.

Chattanooga Bicycle Transit System is a public / private partnership model whereby the City and the operator (Alta Bicycle Share) will share in revenues from the system. The objectives of the program are to provide an additional mobility option as an extension of the existing CARTA transit service.



## DecoBike Miami Beach

**Launch:** March 2011

**Size:** 100 stations / 1000 bikes

**Population:** 87,779

**Funding:** 100 percent private funding provided by private investor; funding levels are not disclosed.

**Management:** Private vendor ownership and operation through DecoBike

**Cost:** \$15 monthly (minimum three month membership), \$14 daily, \$49 for 5 days, first 30 min free for memberships and day passes, \$4 for 30 min, \$5 for 60 min, \$6 for each additional hour

**Access:** casual users pay with credit card at station console, members are provided a BeachPASS membership card to access the bikes.

**Statistics:** For the period between March 15, 2011 and March 15, 2012, DecoBike reported 717,522 rides and more than 1,978,310 miles of bicycling. The company also attributes 30 new "green" jobs to DecoBike Miami Beach.

DecoBike launched the Miami Beach bike sharing system in partnership with the City of Miami Beach. The company now operates bike sharing systems in Surfside, Florida, and Long Beach, NY, as well.





*Taipei Bikeshare, Taiwan (Photo: Richard Masoner/Cyclelicious)*

## Trip Characteristics

The expected users of the system and the geographic spread of regional attractions bring forth a diversity of potential trip types including:

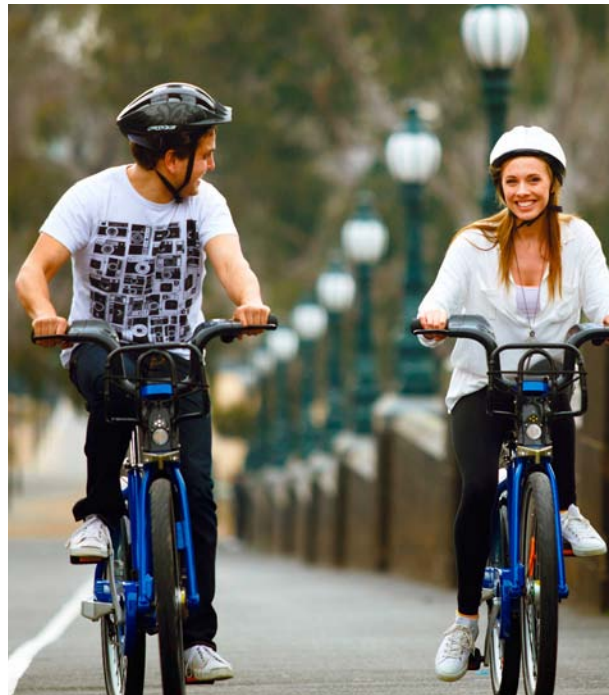
- Short distance trips around built-up areas and downtown centers.
- Short distance trips to and from transit stops.
- Recreational rides or longer trips between major destinations.

A key early decision will be to determine which trip types should be served by the bike share system and which should be left to other transportation options. Traditionally, bike sharing has targeted shorter duration and distance trips, leaving longer trips to transit, private biking, bike rental, and other modes. A similar structure could be adopted in Memphis with a focus on access to/from key transit hubs and travel within downtown centers, and satellite systems in outlying activity centers connected by transit or other modes. An example of this might be travel within downtown Memphis from the North End Terminal that serves regional transit.

**Table 4.1: Trip Characteristics of Sample Bike Share Systems**

System	Average Trip Distance	Average Trip Duration	Trips/Bike/Day	Most Popular Station
Boulder B-cycle	-	<30 minutes	0.62	15th & Pearl Street (Downtown parking garage)
Hubway*	1.13 miles	70 minutes (casual user)/17 minutes (annual member) <sup>2</sup>	1.95	Boston Public Library
Capital Bikeshare	1.33 miles	44 minutes (casual user)/20 minutes (annual member)	2.67	Dupont Circle
Denver B-cycle	2.05 miles	-	1.44	16th & Market Street

\*Source: <http://transportationnation.org/2011/11/29/in-its-first-season-boston-bike-share-exceeds-projections-will-expand-next-spring/>



*Riders using bike share bikes in New York (above left) and Boston (above right).*

# 5: LOCAL CONTEXT ANALYSIS

## Market Segments

Cities interested in bike share systems now have the opportunity to learn from a growing base of information from existing programs. The technology of modern bike share systems allows automatic collection of substantial data related to bike share system usage and users. Analysis of existing systems reveals that the early adopters of bike share are typically:

- 18-34 years of age
- Relatively well educated
- Interested in environmental and social issues.<sup>9</sup>

The four primary user groups identified for bike share are: employees, students, visitors, and local residents. Any bike share system can be expected to engage each of the four categories, however cities vary in terms of which group makes up the largest market segments for bike share usage. Capital Bikeshare system is used heavily by employees for weekday commutes to work, and three-quarters of Boulder B-cycle members subscribe through a corporate membership program. **Figure 5.1** (at right) provides a snapshot of the variation of bike share market segments of several U.S. cities. Bike share usage differs in terms of ‘what’ members purchase, ‘where’ members live, ‘how’ the system is used, ‘why’ individuals choose to use bike share, and ‘who’ is signing on to the program.

Assessing the opportunities and challenges for implementing a bike share system in Memphis requires an analysis of the local

community’s character and built environment, as well as direct comparisons to relevant cities that have implemented bike share. The City of Memphis has many of the characteristics traditionally thought to support bike sharing including well supported visitor and recreational attractions, institutional and political support, investments in the Central Business Improvement District (CBID), a rapidly expanding network of bicycling infrastructure, and an extensive public transportation system.

However, there are also a number of challenges including the city’s lower density and spread out network of destinations, a limited (but growing) bicycle infrastructure, and a traditionally automobile-dominated transportation culture.

Factors considered important to the success of bike sharing are reviewed below. Underperformance in any one of these areas does not exclude the feasibility of a bike share system but each factor influences the potential success of the system.

## Policy Environment

The policy environment for bicycling in Memphis has improved substantially in the last five years. In 2008, Memphis was ranked by *Bicycling Magazine* as one of the least bicycle-friendly cities in the U.S. and key city staff did not support installation of bicycle lanes. Since that time, the City has gained a vocally supportive Mayor, established a full-time bicycle and pedestrian staff position in the Division of Engineering, and adopted new local bicycling ordinances. It has installed

### Figure 5.1: Market Segments by the Numbers

What do we know about bike share market segments?\*

#### WHAT?

**Casual memberships** generally make up more than 80% of all bike share subscribers

**Annual memberships** usually make up less than 20% of all bike share subscribers

#### WHERE?

62% of Hubway’s annual members **live in Boston**  
70% of all Boulder B-cycle users surveyed **live in Boulder**

#### HOW?

20% of all Hubway users and 32% of Nice Ride annual members **link bike share trips with transit**

88% of Nice Ride annual members use bike share for **transportation**

Over 60% of Boulder B-cycle users surveyed use bike share to **run errands**

#### WHY?

50% of all Hubway users **do not own a working bike** at home

Nearly 40% of Boulder B-cycle users surveyed **saved money on gasoline and** over 20% saved money on **parking**

#### WHO?

62% of Nice Ride annual members were **25-44 years old**

40% of Hubway users are **20-29 years old**

37% of Nice Ride annual members and 30% of Hubway users are **female**

About 1/3 of Hubway users and 2/3 of Nice Ride annual subscribers **earn less than \$100,000**

\*<http://transportationnation.org/2011/11/29/in-its-first-season-boston-bike-share-exceeds-projections-will-expand-next-spring/>

<sup>9</sup> All Nice Ride Minneapolis data reflects 2010 usage; All Boston Hubway and Boulder B-cycle data reflects 2011 usage.

35 miles of bike lanes and secured a total of \$16.4 million dollars in federal funds to implement more than 50 miles of new bicycle lanes and multi-modal connections.<sup>10</sup> The bike/ped connections will be further developed through roughly \$15 million of funding from a TIGER IV grant, announced in June 2012, which focuses on the Harahan Bridge between downtown Memphis to West Memphis. As stated by Tennessee Congressman Steve Cohen in support of the project, **such investments will “improve livability in downtown Memphis, will increase tourism, will drive economic development and create jobs, make our city more attractive to young people, and enable people to bike over the historic, scenic Mississippi River.”**<sup>11</sup> Similar arguments can be applied to bike share.

Memphis also gained a boost in the spring of 2012, when the Bikes Belong selected Memphis to participate in the Green Lane Project. The Project is a national effort to join city engineers and officials from around the country to study and document best practices in protected bikeway design. This recognition on a national scale has solidified support for bicycling among local leadership and boosted the city’s image as a bicycle-friendly community.

As City staff and leadership have made progress in improving the bicycling environment,

10 The City secured \$1.4 million in CMAQ funding for bicycle lanes and \$15 million in TIGER IV funding for the Main to Main Multi-Modal Connector Project. More information can be found here <http://www.commercialappeal.com/news/2012/may/18/motorists-adapt-to-bicycle-lanes/?print=1> and here <http://www.downtownmemphiscommission.com/article.asp?id=76>.

11 Source: Congressman Steve Cohen (19 June 2012), press release retrieved from <http://cohen.house.gov/press-release/cohen-announces-15-million-tiger-iv-grant-main-street-main-street-multi-modal> (accessed June 2012).



*Main Street - Downtown Memphis*

the visibility of local advocacy groups has risen significantly, as well. Several organizations and agencies in Memphis are promoting the broader goals of increased physical activity and healthier lifestyles. These include Livable Memphis, Healthy Memphis Common Table, and the Shelby County Health Department. Walk Bike Memphis, an initiative of Livable Memphis, and Revolutions Community Bicycle Shop have served crucial roles as community-based efforts to grow the cycling community and engage citizens in the effort to improve the bicycling environment.

As a matter of policy, Memphis does not require adults to wear a helmet while bicycling. Helmets are mandatory for children 16 years of age and younger. The absence of a mandatory helmet law for adults reduces barriers to bike share usage. The City’s bicycling ordinances specify the bicyclists’ rights to the

road, including riding with traffic whether a bicycle lane or other facility is present or not. Bicyclists may ride two abreast in the roadway and the laws do not prohibit bicycling on sidewalks, except in areas where signage stating such is posted. The City also has a Complete Streets Policy drafted, though not yet adopted.

Overall, the combined efforts of community-based advocates, local nonprofits, elected officials, and city staff has created a policy environment that is supportive of bicycling. This political environment and the recently adopted bicycling ordinances are conducive to successful implementation of bike share.

## Demographics

Bike share systems are most successful where there is a mix of land uses and where trip-making occurs throughout the day. In Memphis, bike sharing would provide an additional mobility option for:

- Local residents who live, work, and recreate in the area covered by the bike share program (the “service area”).
- Commuters travelling to the service area via transit or other transportation. In this way the system can:
  - Offer a “last mile” option for existing transit services, including the trolley.
  - Extend the reach of transit into areas that are currently underserved or do not currently warrant bus service (such as Mud Island).

- Students, faculty, and staff of the many college and higher learning campuses around the city.
- Visitors and tourists accessing entertainment and cultural attractions.

The face of bike share is constantly changing. Many U.S. transportation officials were skeptical that bike sharing would be able to replicate the success of its European counterparts and initially, bike share systems in the U.S. were considered limited to only large cities with high population and employment density and large mass transit systems.

As more success is realized, larger cities are expanding bike sharing into lower density and lower income areas and new, smaller cities (such as Boulder, Charlotte, Spartanburg, Nashville, and Chattanooga) are entering the bike share market. These systems are the first real test of bike sharing in smaller markets, and in many cases it is too early to fully measure their success.

**Table 5.1: Select characteristics of U.S. cities with bike share systems**

Characteristic	Boulder, CO	Charlotte, NC	Nashville, TN	Chattanooga, TN	Memphis, TN
Population	100,000	540,000	545,000	170,000	650,000
Population 25-34	16%	17.6%	18.4%	14%	15%
Population Density	4,000	2,450	1,265	1,200	2,100
Median Income	\$52,000	\$53,000	\$46,000	\$37,000	\$36,000
Daytime Population*	130,000	655,000	650,000	235,000	750,000
Annual Visitors	n/a	14.4 million	-	3 million	10 million
Transit Mode Share	7.7%	3.8%	2.3%	1.5%	2.5%
Indicates lowest figure			Indicates highest figure		

Sources: U.S. Census 2010; U.S. Census State & County QuickFacts; U.S. Census 2000 (daytime population only); Meet Minneapolis: Official Convention + Visitors Association; Destination DC; River City Company; Memphis Convention & Visitors Bureau; Charlotte CVB visitation statistics

\*Estimates of daytime population are based on U.S. Census 2000 Journey to Work data and retrieved from two corroborating sources – ProximityOne ([http://proximityone.com/city\\_daytime\\_population.htm](http://proximityone.com/city_daytime_population.htm)) and South Carolina Budget and Control Board (<http://www.sccommunityprofiles.org/census/daylead.php>)

**Table 5.1** offers a comparative look at a number of demographic characteristics for the City of Memphis and four comparable cities operating bike share systems.

### Population

With a population of nearly 650,000 people, Memphis is the largest city in Tennessee and the third largest city in the southeastern United States. For comparison, Chattanooga, Tenn., has a population just under 170,000 and, in April 2012, announced the first bike share system in the state. Memphis' city-wide population density is approximately 2,000 persons per square mile, which is lower than cities included in the initial deployment of bike sharing, but higher than some others that have since entered (e.g. Chattanooga).

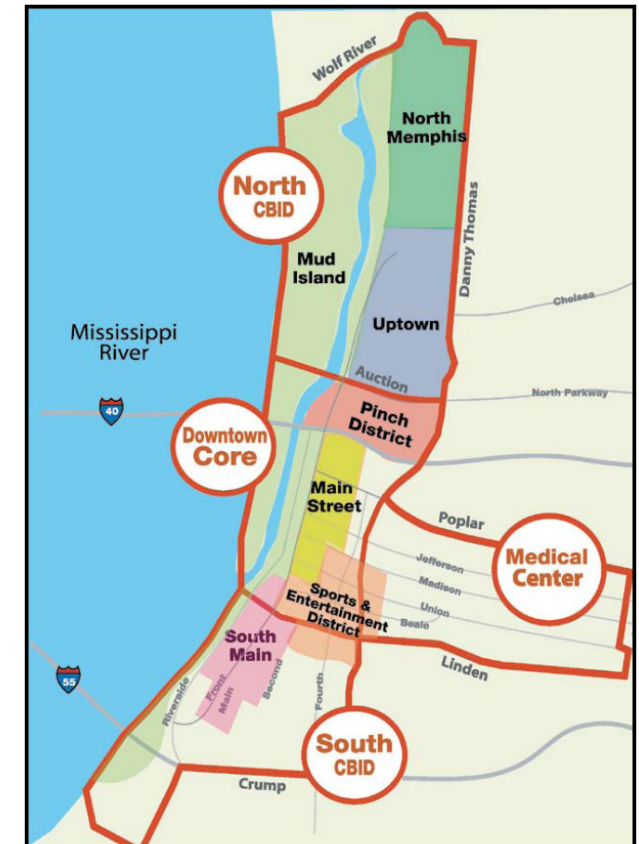
The CBID is home to approximately 23,000 people, which reflects a 12 percent population (net) increase since 2000. In recent years, apartments in the CBID have some of the

highest occupancy rates in the metro area, with an average occupancy rate above 90 percent from 2000 to 2009 (**Figure 5.2**).

### Early Adopters

It is still unclear what impact age and income have on bike share usage. Thus far, other

**Figure 5.2: Central Business Improvement District**



The Central Business Improvement District is home to an estimated 23,000 people.

Source: Downtown Memphis Commission

cities have found that younger age groups and higher income brackets are disproportionately more likely to use bike sharing than older and lower income populations. However, this may be related to a higher proportion of these populations living and working in the system service area.

Nevertheless, other cities have found that higher income households are more likely to use bike sharing, e.g. approximately 46 percent of Capital Bike Share users and 39 percent of Nice Ride users reported incomes over \$100,000. In Memphis, households with incomes greater than \$75,000 per year are the fastest growing income demographic in the CBID.<sup>12</sup>

Other cities have also found that populations aged 25 – 34 years old represent the largest group of bike share users (39% - 49% compared to representing only 18% - 22% percent of the general population). The City of Memphis has a slightly lower percentage of residents aged 25-34 years old than other cities operating bike share.

However, **targeting initial bike share system deployment in areas of “early adopters” such as universities, colleges, and concentrations of young urban professionals along with targeted marketing campaigns, will maximize potential ridership and early success of the system.**

The University District, which encompasses the University of Memphis’ Main Campus, is suited to bike sharing with plenty of student

housing nearby and connections to entertainment districts such as Cooper Young and Midtown. Approximately 25 percent of residents in the District are aged between 18 and 24 years old.

The 2007 *University District Comprehensive Plan* identified improving safe and convenient bicycle access and improving intra-district public transit as key goals for the area.<sup>13</sup> The University of Memphis is preparing to launch a bike lending program that will provide students with semester-long access to a bicycle. This program will further encourage bicycling on the campus and is complementary to a bike share program.

## Employment

Memphis is the employment hub of the region with an estimated 600,000 jobs<sup>14</sup> and a day-time population of three-quarters of a million people.<sup>15</sup> In 2007, the Memphis CBID had an estimated 65,000 employees, 50 percent of which worked in the Medical District.<sup>16</sup> In addition to the Medical District, major employers include FedEx, local, state and federal government offices, city and county school systems, and other health care providers.<sup>17</sup>

<sup>13</sup> Comprehensive Planning Studio Consulting Team/Graduate Program in City & Urban Planning/University of Memphis. (2007).

<sup>14</sup> Greater Memphis Chamber of Commerce. (March 2012). Employment by Industry. Retrieved from: <http://welcome.memphischamber.com/Economic-Development/Data-Center.aspx> (accessed June 2012)

<sup>15</sup> ProximityOne. (Updated October 2011). City/Place Daytime Population. Retrieved from [http://proximityone.com/city\\_day-time\\_population.htm](http://proximityone.com/city_day-time_population.htm) (accessed June 2012)

<sup>16</sup> Economic Research Associates and Urban Construct. (2008). Memphis Downtown Market Study.

<sup>17</sup> Greater Memphis Chamber of Commerce. (2011). Major Employers. Retrieved from: <http://welcome.memphischamber.com/Economic-Development/Data-Center.aspx>

**Table 5.2: Major employers in Memphis may serve as important destinations for bike share users<sup>\*</sup>**

Employer	# of Employees
FedEx Corp.	30,000
Memphis City Schools	15,991
United States Government	15,500
Tennessee State Government	9,000
Methodist Le Bonheur Healthcare	8,700
City of Memphis	7,231
Baptist Memorial Health Care Corp.	6,845
Shelby County Government	6,336
Walmart Stores Inc.	6,000
Shelby County Schools	5,200
Harrah’s Entertainment Inc. dba Harrah’s Tunica	5,000

<sup>\*</sup>Memphis Chamber of Commerce. (2011). Memphis MSA 2011 Major Employers.

Major employers will serve as important trip generators and attractors for the bike share program, and be important corporate partners that could bring sponsorship, corporate membership, or integrate bike sharing into their employee wellness and/or travel demand management programs. Bike sharing, in combination with public transit services, could considerably increase residents’ access to jobs.

## Visitors

The Memphis area has more than 60 tourist attractions and, in 2010, benefitted from nearly \$3 billion in visitor expenditures. The tourism industry additionally contributes \$1.8 billion in payroll to the Memphis economy annually and \$125 million in local and state taxes. There are 10 million visitors each year

<sup>12</sup> Memphis City Center Commission. (2010). Downtown Memphis Housing Report 2000-2010.

to Memphis and Shelby County<sup>18</sup> including nearly half of a million international tourists. International tourists are likely users of a bike share. The peak tourist season stretches from Memorial Day to Labor Day.

Memphis is nationally and internationally known as the home of Elvis Presley and the birthplace of blues and rock and roll music. With approximately 700,000 visitors per year, Graceland is consistently ranked as one of the top five most visited homes in the country.

Additionally, historic Beale Street receives an estimated 4.2 million visitors per year and is one of the most visited tourist sites in the state.<sup>19</sup> The Beale Street Music Festival and other music-related special events attract hundreds of thousands of visitors each year.<sup>20</sup> Such events could be considerable attractors for bike sharing. Many of the technologies available are adaptable to temporary, manned stations that allow eventgoers to check in and check out bikes at the event location. Bike sharing could provide an alternative means for accessing events.

The Memphis Zoo has received recognition as a tourism draw, as well, earning the title of America's number one zoo from TripAdvisor.com in 2008 and as the top-rated zoo in the country in 2009, based on a national survey by Morey Associates.<sup>21</sup>

<sup>18</sup> Memphis Convention and Visitors Bureau. (2012). Economic Impact: Memphis and Shelby County

<sup>19</sup> Gnuschke, J. and Wallace, J. (2004). Economic impact of the music industry in Memphis and Shelby County. Retrieved from: [http://findarticles.com/p/articles/mi\\_hb2998/is\\_3\\_16/ai\\_n29144075/](http://findarticles.com/p/articles/mi_hb2998/is_3_16/ai_n29144075/)

<sup>20</sup> Ibid.

<sup>21</sup> Memphis Zoo. Retrieved from: <http://www.memphiszoo.org/about>



*The FedEx Forum is a major destination that could be a popular spot for a bike share station.*

Although many of these attractions are not centrally located and may not be covered in the first phase of bike sharing, their indirect impact of drawing visitors to hotels, restaurants, and other attractions is significant. In addition, bike sharing could link to other transportation options (such as tour and shuttle buses) that would allow visitors to not require a car and offer them the opportunity to experience Memphis at a slower pace by bicycle.

## Physical Characteristics

The City of Memphis is located on the banks of the Mississippi River. The city covers approximately 314 square miles with a downtown of approximately 6.5 square miles. The city is generally flat with some gentle undulations. The City sits at an average elevation of approximately 300 feet above sea level. **The city's relatively flat terrain will positively contribute to demand for bike sharing.**



PHOTO: BIKE/PED MEMPHIS

*Biking in Memphis*

## Land Use and Density

Memphis has a population density of approximately 2,000 persons per square mile. This is not high in comparison to some of the earlier U.S. bike-sharing cities; however, the City has several key districts that have higher density and a good variety of uses. This includes the downtown (or CBID), Midtown, and the University District. While the Medical Center is an important hub for the City, the district has a limited mix of land uses dominated by institutional and office uses.

Downtown Memphis is predominantly characterized by office and institutional buildings and retail and restaurant establishments. However, the area has seen a recent increase

in residential development and also includes a mix of important recreational and tourist destinations.

Midtown is a favorite destination for local residents and has a balanced mix of single family residential neighborhoods, higher density neighborhoods, retail and restaurant establishments, and small office uses. The area is within a short bikeable distance of the popular Overton Park and Cooper Young District.

The University District is comprised of low- and high-density residential areas in the form of residential neighborhoods, campus housing, and off-campus student apartments. Commercial land uses are concentrated along Poplar Avenue, but also exist in smaller pockets adjacent to the University of Memphis campus. The University District is approximately five miles from Midtown, which is a bikeable distance, though further than the average two to three mile trip distance in other U.S. bike share systems.

Beyond the key districts noted, Memphis is characterized by moderate to low density development. Generally, areas outside of the I-40/I-240 loop are low density with little mix of land uses.

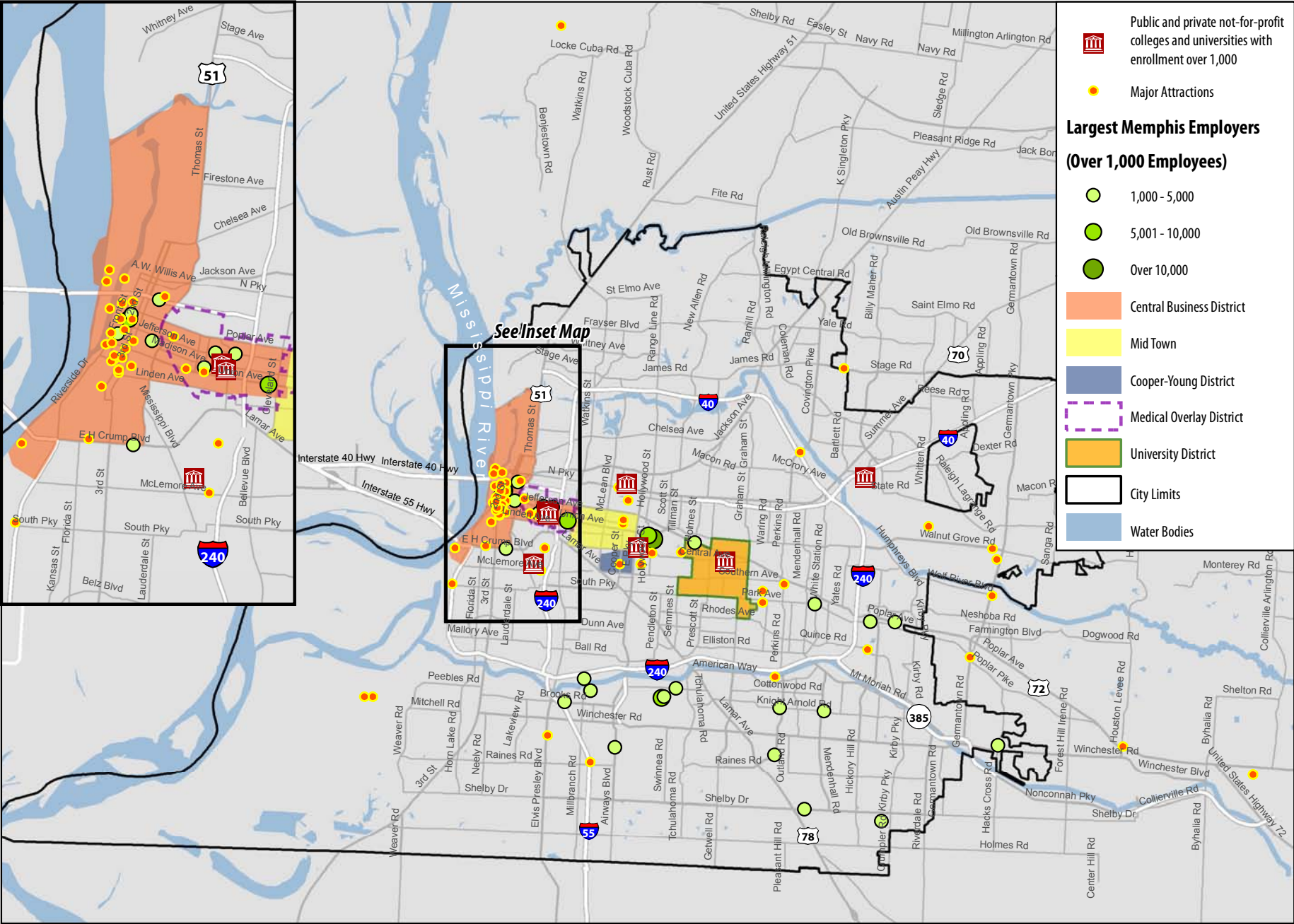
Connecting areas of higher density / mixed land use will be a challenge for the system. This can be addressed, in part, by determining whether to design bike sharing in Memphis as a contiguous system (perhaps with a longer “free ride period” to allow longer distance travel between districts), or to provide a core system (potentially in the Downtown) with smaller satellite systems in nearby areas (such as in Midtown and the

University District). **Transit will play an important role in connecting between these areas with bike share providing a first and last mile option at each end of the transit trip.**

## Key Destinations

Memphis has numerous destinations that would serve as trip attractors for bike share users. **Figure 5.3** (next page) highlights the geographic distribution of major employers, tourist attractions, and colleges or universities, all of which serve as important bike share destinations.

Figure 5.3: Key Destinations and Employers



## **Downtown (CBID)**

### **OPPORTUNITIES**

- Tourists and trolley users
- 22,400 residents
- 70,000 daytime workers
- Large special events
- Access to the Riverfront Trail
- Mix of land uses
- High density of land use
- Multi-modal transit hubs at north and south ends of CBID
- Large number of hotels and visitor attractions

### **CHALLENGES**

- Lack of existing bicycle infrastructure
- Biking for transportation is not common

## **Medical District**

### **OPPORTUNITIES**

- 30,000 employees
- 10,000 students
- Bikeable distance between institutions
- Bikeable distance between the Medical District and downtown
- Supportive role of Memphis Medical Center
- Bike share was recommended for this district previously
- Parking and transportation need improvements
- Terminal of Madison Avenue trolley line

### **CHALLENGES:**

- Lack of existing bicycle infrastructure
- Physical constraints in terms of siting stations
- Biking for transportation is not common
- Singular land use type (institutional)

## **Midtown**

### **OPPORTUNITIES**

- Popular destination
- Reflects demographics of bike share early adopters
- Bikeable distances to Cooper Young and University Districts
- Mix of land uses, including residential neighborhoods
- Madison Avenue bike lane recently added

### **CHALLENGES**

- Lack of existing bicycle infrastructure that connects to other areas
- Not a close biking distance to downtown
- Relatively low land use density

## **Cooper Young**

### **OPPORTUNITIES**

- Popular destination
- Reflects demographics of bike share early adopters
- Bikeable distances to Midtown and University Districts
- Mix of land uses, including residential neighborhoods
- Attractive to tourists

- Active business and community associations
- Support for bike facilities

### **CHALLENGES**

- Lack of existing bicycle infrastructure
- Not a close biking distance to downtown
- Relatively low land use density

## **University District**

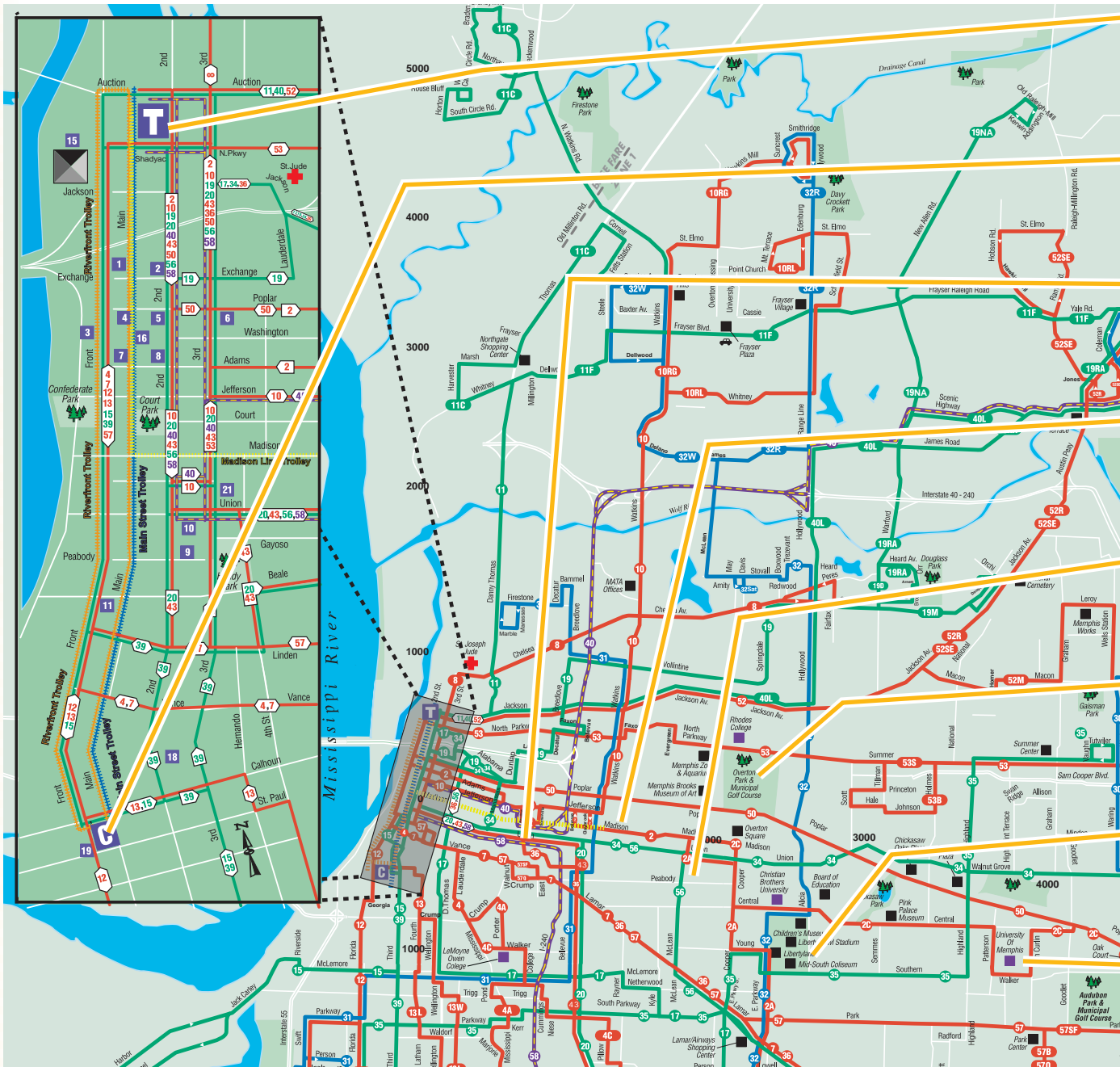
### **OPPORTUNITIES**

- Over 20,000 college students
- Supportive role of University of Memphis
- Parking and traffic need improvements
- Bikeable distances to the Midtown and Cooper Young districts.

### **CHALLENGES**

- Lack of existing bicycle infrastructure
- Biking for transportation is not common
- Long biking distance to Downtown Memphis
- Commuter students may have little incentive

**Figure 5.4: MATA Transit and Bike Share Linkage Opportunities**



The North End Terminal is a hub for multi-modal trip-linking and bus activity. Providing a bike share station at this location would encourage bike-bus trips and directly connect bike share users to many local bus routes.

A bike share station at the MATA Central Station at Main & G.E. Patterson would provide access to downtown trolley routes and local bus routes.

For individuals and employees who commute to the Medical Center by bus, bike share stations in this area would provide a means for traveling to and from destinations within the district without a car.

Providing a bike share station at the easternmost stop of the Madison Avenue Trolley Line would encourage tourists and infrequent transit users to link their biking and transit trips.

MATA provides direct routes to the popular Midtown district, which could link bike share users to many bikeable destinations within that area.

Transit stops 53 and 50 provide access to Overton Park and Overton Square, as well as the nearby destinations of Rhodes College, Memphis Zoo & Aquarium and The Memphis Brooks Museum of Art.

Transit users who ride MATA to a game at the Liberty Bowl, could use bike share to connect to other destinations in the area, such as restaurants and retail stores.

Bike share could provide a 'last mile' option for students taking MATA between the campus and downtown.

## Transportation

### Transit

The Memphis Area Transit Authority (MATA) transports nearly 40,000 riders per day throughout Memphis and the surrounding areas with a 244-vehicle fleet that includes paratransit vans, vintage rail trolleys and conventional accessible buses.

The rail trolleys operate on a loop route along the downtown riverfront and along Main Street and a linear route out to the Medical District along Madison Avenue. There are a total of 24 trolley stations. The downtown trolley system is anchored at the north and south ends by intermodal transportation hubs, which would be good candidates for bike share stations. Also, the easternmost station on the Madison Street line would be a good location for bike sharing for trolley passengers to extend their transit trip.

MATA is in the process of revising its bus route network with changes likely to emphasize quicker, less circuitous routes. There are also plans for a bus rapid transit line to extend north-south along Elvis Presley Boulevard.

Transit stops are good candidates for bike share stations allowing transit users to extend their trip. For some shorter trips, bike sharing offers a more efficient option than existing transit. Other cities have found that the added service offered by bike sharing has reduced dependency on private automobiles and increased the attractiveness of transit as a travel option. Bike sharing could also link visitors from their hotels to tour and shuttle bus operations to take them to attractions further



*Transit stops and stations are good candidates for bike share station placement.*

afield (e.g. linking to the shuttle that operates from Sun Studios to Graceland).

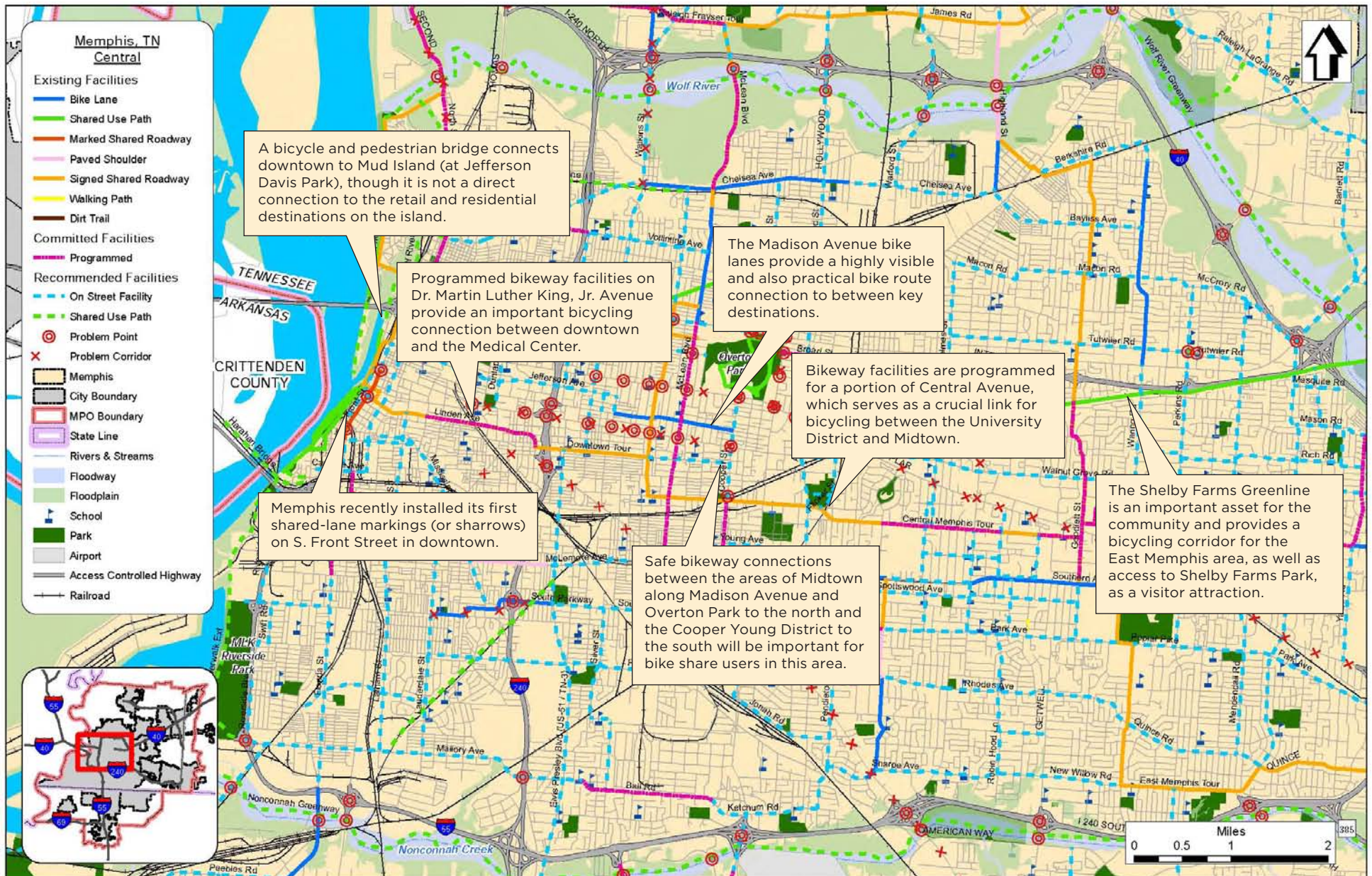
However, many stakeholders in Memphis noted a general lack of interest in bicycling for transportation among the majority of Memphis residents and, in some cases, animosity towards cyclists. Additionally, MATA does not yet serve choice riders, which may limit opportunities for linking bike share trips with transit. Public opinion regarding each of these issues is highly subjective and several bike share systems have evidenced that bike share spurs new bicycling activity and trip

linking, rather than simply capitalizing on existing travel patterns and mode choice. A survey of 5,000 Capital Bikeshare users showed that 82 percent of respondents increased bike use since subscribing to the system and 70 percent cited Capital Bikeshare as an important reason for doing so.<sup>22</sup>

**Figure 5.4** illustrates opportunities for linking MATA transit service with bike share usage.

22. Capital Bikeshare. (June 2012). 2011 Capital Bikeshare Survey Executive Summary. Retrieved from <http://www.capitalbikeshare.com/system-data> (accessed June 2012).

Figure 5.5: Regional Bicycle and Pedestrian Map



## Bike Network

The City of Memphis has a limited but rapidly growing bikeway network. Throughout Memphis, community stakeholders recognize a lack of safe bicycling infrastructure. Yet the city has a strong and growing bicycling culture, characterized by Revolutions Bicycle Shop (a community-led bike co-op with increasing presence), thriving retail bike shops, annual increases in the number of participants in Bike to Work Day, and the work of coalitions like Walk Bike Memphis.<sup>23</sup> As mentioned previously, Memphis has made significant advances in its bikeway network and in securing funding for implementing new bikeway facilities since 2008.

According to the 2011 *Regional Bicycle and Pedestrian Plan* prepared by the Memphis metropolitan planning organization, the bikeway network in Memphis includes:

- 31 miles of bicycle lanes
- 12 miles of shared-use paths
- 67 miles of signed shared roadways
- 1 mile of a marked shared roadway
- 4 miles of paved shoulders

Those facilities are part of a regional network that includes 186 miles of on-street bikeways, 61 miles of shared-use paths and 32 miles of natural surface trails. The 2011 *Regional Bicycle and Pedestrian Plan* recommends an additional 484 miles of on-street bikeway facilities and 91 miles of shared-use paths in the City of Memphis.

There is limited information to suggest

23 Source: Alta Planning + Design conducted select in-person and phone interviews with community stakeholders, as well as informally with the public in May 2012.

whether a dense network of bicycle infrastructure is required in order for bike sharing to be successful. There are cities such as Lyon, France, or Boston, Mass., where successful bike share systems have been introduced with small bikeway networks. For North American systems, it is noted that **bike share systems have acted as a catalyst for increased investment in bicycle infrastructure and to date have recorded no fatal crashes and very few injury-causing crashes.**

Although an extensive bikeway network may not be essential to launch of a bike share system, providing a core network of low-stress, obvious bikeways to connect the various neighborhoods would promote the success of the system. Low cost infrastructure improvements that help deliver a core cycling network could be packaged together with the launch of bike sharing.

**Figure 5.5** shows the regional bicycle and pedestrian network and illustrates opportunities to utilize the existing bikeway network and highlights additional connections that would enhance a future bike share system.

## Automobile Usage

Memphis is still largely an auto-oriented city. The auto mode share for commuters is approximately 92% including single-occupant vehicles and carpoolers.<sup>24</sup> The use of automobiles, even for short trips, is encouraged by the availability and low cost of parking. This represents a significant challenge to bike sharing (as well as transit and other modes) in competing for mode share.

24 U.S. Census Community Profiles 2010

As an example, there are approximately 40,000 parking spaces in the CBID.<sup>25</sup> A Colliers International study of CBID structured parking rates found that the average daily parking rate in Memphis of \$4 per day was the lowest amongst 56 U.S. cities.<sup>26</sup> The average unreserved monthly rate of \$57 per month and the reserved monthly rate of \$100 per month are also low.

Much of the on-street parking inventory is free or low-cost with only 1,200 spaces metered and these costing the user only \$1 per hour or free after 6pm weekdays or on weekends.<sup>27</sup>

## Weather

Weather can influence bike share demand. **Figure 5.6** shows average monthly temperature in Memphis for the period 1981 to 2010. In general, the region experiences warm to hot temperatures during summer months with limited precipitation events from June to October. The winters have increased incidence of precipitation with mild to cold temperatures. The average annual precipitation is 54 inches.<sup>28</sup>

The highest demand months will occur during the peak tourist season from May to September (Memorial Day to Labor Day). As in other cities, bike share demand will reduce on extremely hot days and during off-season months (as much to do with the reduction in

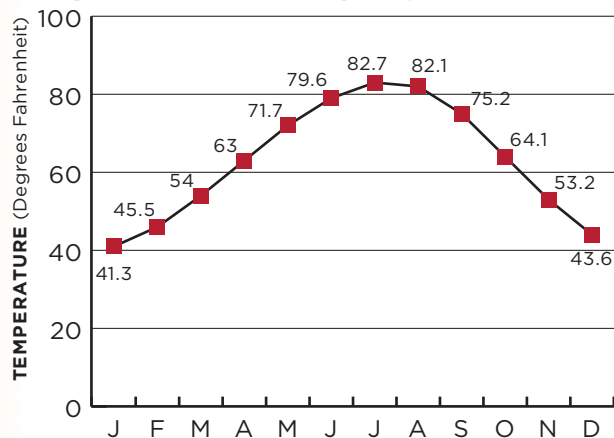
25 Downtown Parking Demand Management Action Plan, Memphis Case Study.

26 Colliers International, 2011 Parking Rate Survey.

27 City of Memphis (2012). Parking Meter Study. Conducted by Walker Parking Consultants.

28 National Oceanic and Atmospheric Administration. National Weather Service Forecast Office.

**Figure 5.6: Average Monthly Temperature in Memphis, 1981-2010**



Source: National Oceanic and Atmospheric Administration, National Weather Service Forecast Office

visitor numbers as the weather). The pleasant spring and fall weather and the relatively mild winters will provide steady riding demand outside the peak season – primarily from residents. Many bike share systems shut down during winter months due to snowfall and icy conditions. It is not expected that Memphis will require a seasonal closure of the bike share program.

## Role of Stakeholders

Important local partners will include public agencies, local businesses and the corporate community, existing and new non-profit agencies, local bike shops, bicycling advocacy groups, neighborhood / business / and visitor associations, large employers, and hotel / guest services. The potential roles of key representative groups within Memphis are described below, however, many additional partners, stakeholders, and engaged supporters will be involved in developing a broadly successful bike share program in Memphis.

### Public Agencies

#### POTENTIAL FUNDERS / OWNERS / ADMINISTRATORS

Public agencies can play a role in funding, management, and operation of bike sharing. In terms of funding, most North American systems to date have used very little local public funds, relying more on federal and state grants, corporate sponsorship, and user-generated revenues. Nevertheless, there may be opportunities for agencies to secure grant funding or contribute some portion of capital or operating costs through steady revenue sources, e.g., parking revenues, bus bike rack advertising, etc.

Public agencies have tended to take a back seat in administering and operating bike share systems, instead contracting these services to nonprofit organizations or private companies. Public agencies do, however, bring the



*Trolley at Cannon Center (Photo: Baxter Buck)*

following skills and support to bike sharing:

- Providing public support from senior ranking officials and politicians.
- In-kind services such as staff time, assistance with permitting, etc.
- Right-of-way and/or property for station locations.
- Avenues and skills for pursuing grant funding.
- Potential local public funding sources.
- Outreach to potential members.
- Marketing through promotional and informational materials (such as website and bicycle maps) and market research.

Public agencies can also support bike share with supportive policies and regulations. For the most part, plans and policies in the region already recognize non-motorized transportation as a critical element in achieving livability

and transportation goals. Bike sharing would be well supported by additional commitments to increasing bicycle infrastructure and programs.

**Gaining the support of senior staff and / or elected officials will expedite bringing bike sharing to the region.** This support will also be important in convincing the corporate community to invest in the program and is likely required prior to seeking commitments from corporate partners. Ideally, these briefings will generate the sort of interest gained in Minneapolis and Denver, where mayoral support expedited these programs. As the policy environment analysis of this Study demonstrates, the City of Memphis has already made significant progress in gaining political and institutional support for bicycling investments.

Two other public agencies that may have a role in bike share implementation are the Shelby County Health Department and MATA. MATA, while supportive of the project, does not anticipate a role in providing direct funds or staff time toward implementation or operation of bike share in Memphis. Linking station placement with transit stops to encourage trip linking is a role that MATA can play. In Chattanooga, Tennessee, the Chattanooga Area Transit Authority has served as the fiscal agent for federal funds used to develop the bike share system. Recognizing the strong partnership with the transit agency, the bike share system in Chattanooga is branded as Chattanooga Bike Transit. Similarly, MATA may have an opportunity to serve as a conduit for applicable federal funds for bike

share. Shelby County Health Department may have a similar opportunity for serving a liaison to the Centers for Disease Control and other federal agencies for funds for bike share.

## Local Businesses / Corporate Partners

### POTENTIAL FUNDERS

Bike sharing has synergies with the corporate community. Sponsorship or advertising opportunities can provide a revenue stream to sustain operations and maintenance (or in some cases capital costs). In return, potential sponsors are provided a variety of options ranging from station sponsorship to naming rights sponsorship of the entire system. Sponsorship may be beneficial to businesses from a direct marketing standpoint or may align with their corporate interests (e.g., a health care provider's mandate to improve community health). Businesses can utilize the transportation benefits of bike sharing and offer an active and healthy travel alternative for customers and employees. A determination needs to be made about the capacity of the corporate community in Memphis to judge whether corporate sponsorship is a realistic means of funding part of the system. There are numerous sponsorship arrangements possible - from a single sponsor to multiple sponsors of varying financial commitment. Sponsorship is different from advertising in that it typically involves a long-term relationship between the sponsor and the vendor, where less obtrusive logos and stickers are put on the infrastructure (bikes, stations, website, etc.). Sponsorship opportunities can be arranged to a business of any size can be

involved at some level. These include:

- **Title Sponsor:** includes naming rights to the system as well as full and exclusive sponsorship of all of the components, i.e. stations, bikes, etc. Example: London Barclay's Cycle Hire.
- **Presenting Sponsor:** receives some name recognition, e.g., "Denver Bike Sharing presented by Kaiser Permanente". Presenting sponsors do not have exclusive sponsorship rights.
- **Station Sponsorship:** includes placement of logos on the map frame, the kiosk, and / or the docking points.
- **Bicycle Sponsorship:** logos can be placed on the bicycle frames, baskets, or fenders.
- **Other Components:** webpage, back of receipt, membership keys, helmets, or mobile applications.

Stakeholders interviewed for the purposes of this study suggest that Memphis has important avenues for recruiting potential sponsors already in place. The Memphis Convention & Visitors Bureau is supportive of bike share as a tourism amenity and provides an important link to potential corporate and small business sponsors within the tourism industry. The Memphis Medical Center provides an equally important connection to decision-makers of potential institutional and corporate sponsors within the health care and academic realm of the Memphis medical district. Additionally, the Downtown Memphis Commission and Memphis Chamber of Commerce may serve as additional partners for identifying and approaching potential business sponsors.



*Chattanooga's bike share system provides easy connections between attractions like the Chattanooga Choo-Choo Hotel, the Convention Center, the Tennessee Aquarium and the Hunter Museum of American Art.*

## Bike Shops

### POTENTIAL PARTNERS AND OPERATORS

Local bike shops will be particularly important partners. Although not obvious, bike sharing can be beneficial to bike retail and rental markets. Bike sharing introduces residents and visitors to bicycling. Further, the heavier design and limited gearing of typical bike share fleets means that bike rentals are still attractive for off-road, longer duration, and longer distance bike riding.

The fee structure can also be established so as not to compete with bike rentals. For example, most larger scale bike share systems in North America limit the “free-ride period” to less than an hour, with a steep increase in fees when bikes are kept for longer durations. Nevertheless there has been a recent increase in bike share systems that do offer long-term rentals, such as the Miami DecoBike and Tulsa Townies programs. Local bike shops can also benefit from formalized partnerships that recognize these retailers as places for long-term rentals and cycling gear (such as helmets). Bike shops have also taken on an operational role in a number of systems such as San Antonio B-Cycle and the pilot system in Chicago. However, allowing a single shop to operate the system may provide an unfair business advantage – an alternative may be to create a coalition of bike retailers teaming together to operate the system.

Longer-term bike rental operations, such as Greenline Rentals, Midtown Bike Company, and Peddler Bicycle Shops, may have an opportunity to expand or tailor their services to complement the bike share system.

## Nonprofit Organizations

### POTENTIAL OWNERS / ADMINISTRATORS / OPERATORS

The role of nonprofit organizations can be various. A number of existing bike share programs, such as Denver Bike Sharing and Nice Ride Minnesota, are administered and operated by a nonprofit. There are funding advantages to this arrangement, as nonprofits can provide tax benefits to private sector funding and establish procedures to utilize public funding.

While Denver Bike Sharing and Nice Ride Minnesota are nonprofit organizations created for the purpose of operating the bike share system, other communities rely on existing nonprofits. In Des Moines, Iowa and Spartanburg, South Carolina, the nonprofit organization existed prior to implementation of the bike share system with a mission that sufficiently overlapped with the outcomes of bike sharing.

A recent study for bike sharing in King County, Washington proposed a slight variation to this model whereby the nonprofit would administer the system but utilize the skills of the private sector to launch and operate the system. Existing nonprofits may also play a role and could provide an “arm” for bike sharing or a place to house an interim organization while a dedicated bike share nonprofit becomes established.

## Other Organizations

### POTENTIAL SUPPORTERS / PROMOTERS

There are a number of other organizations that could deliver users to the bike sharing program including:

**Employers:** could incorporate membership as part of a travel demand management program or as part of their employee benefits program. University of Tennessee Health Sciences Center and the University of Memphis expressed particular interest in this partnership role. Additionally, the Memphis Medical Center has access to some of the largest employers of the region.

**Advocacy groups:** can promote bike sharing amongst their constituents. In return, bike sharing could deliver new riders and members to the advocacy groups. Livable Memphis and groups such as Revolutions Bicycle Shop are key partners in growing the Memphis bicycle community.

**Resorts / hotels / seasonal employers:** can deliver young, active populations looking for affordable transportation options. The Downtown Memphis Commission, Memphis Convention & Visitors Bureau, and Memphis Chamber of Commerce can provide information to and encourage such businesses to support bike share usage among employees.

# 6: SYSTEM PLAN

This chapter provides general guidance on the characteristics of a potential bike share system in Memphis. It provides recommendations on the extent, size, and phasing of the program and considers key parameters that impact the cost and operation of a bike share system such as the density of stations, the ratio of bikes per station, and the number of extra docks that should be provided. This chapter also introduces typical station types and criteria for the placement of stations.

## Service Area and Phasing

The size and location of a bike share system is directly tied to the amount of available funding and the goals of the system. The amount of available capital generally dictates the size of the system. However, **launching the system initially in the highest demand areas will accelerate visible success, maximize initial revenues, and increase the likelihood of future expansion.**

The goals of the system, in particular what decision makers constitute as a “successful” system, will also have an influence on the decision to expand, the location of expansion, and the funding landscape. Most cities balance high ridership and financial sustainability metrics with “public service” goals such as covering traditionally under-served communities.

In terms of maximizing ridership, bike sharing is most effective in areas with high density and a variety of land uses. Areas with high potential demand for bike share were identified through a heat mapping exercise that allocated “points” to where people live, work,

shop, play, and take transit. The results of this analysis are shown on **Figure 6.1**.

This analysis, supported by field review and stakeholder consultation, suggests that **the Central Business Improvement District (CBID) and the nearby Medical District, with its mix of residential, commercial, and visitor destinations, provide the most suitable areas in Memphis for early adoption of bike sharing.** Bike share stations within these districts will be used by professionals, visitors, transit users, residents, and a broad workforce within the CBID and Medical District. These areas will generate the highest ridership and the highest user-revenue in the city. This area is recommended for the first phase of bike sharing in Memphis.

Major destinations in Memphis tend to be spread throughout the city rather than concentrated together. However, several activity centers have clusters of major destinations and a sufficient density of potential users. The Midtown District (Overton Park and the surrounding area) and the University District (University of Memphis and the surrounding area) have concentrations of commercial and institutional destinations, as well as local populations likely to embrace bike sharing. It is recommended that these areas be introduced as part of a Phase 2 expansion of the system.

A proposed third phase would expand the system into North and South Memphis. A lower density of stations is anticipated in these areas reflective of lower density land use. North Memphis is currently undergoing significant redevelopment and bike share

would complement transit to provide an important link to the CBID and other destinations. Stations in South Memphis would provide residents another transportation option to connect them to jobs and services in Downtown and the rest of the city.

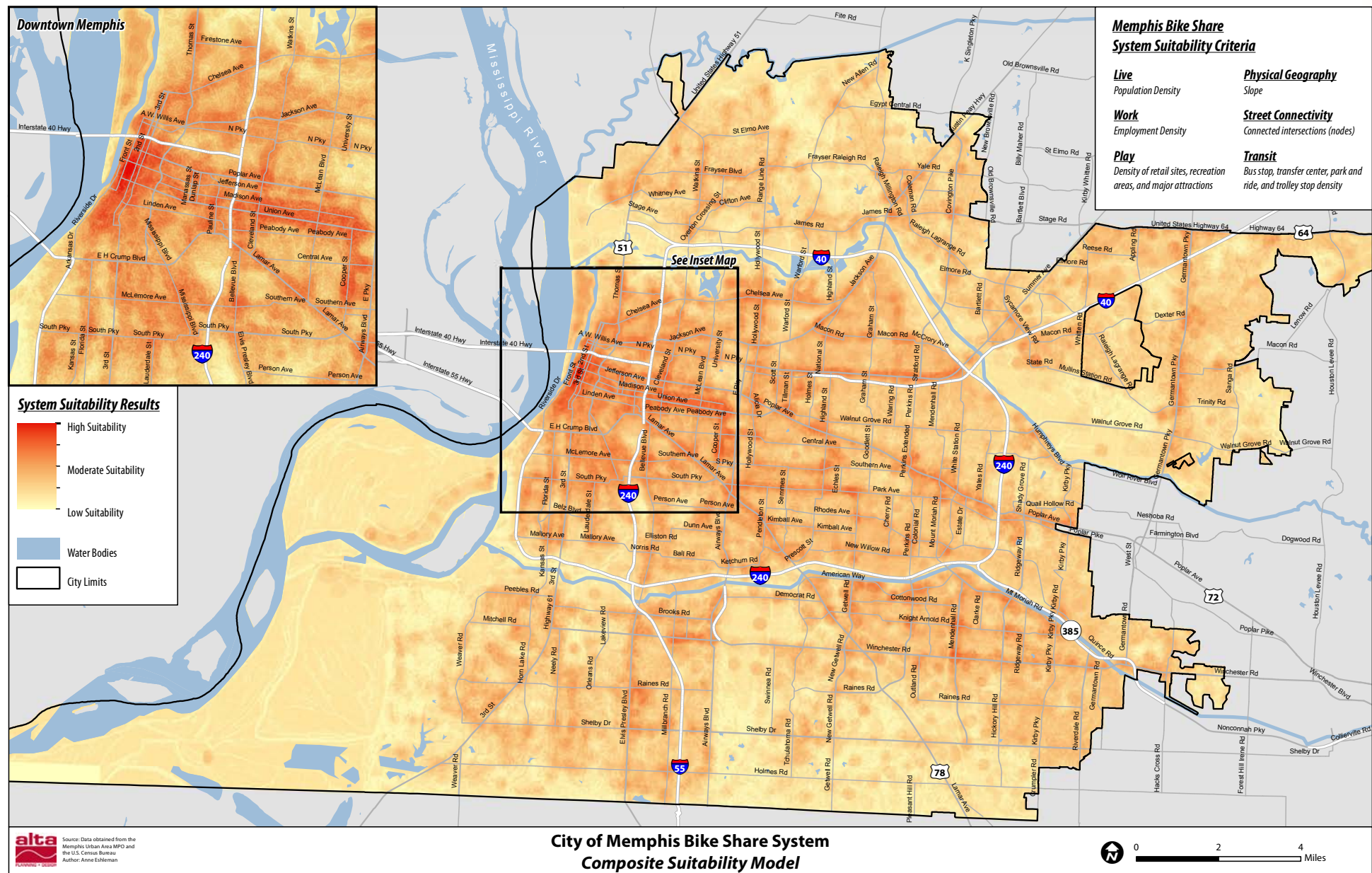
## Equity Considerations

Bike share systems have typically launched in high demand (and higher revenue) areas such as downtowns and higher income areas. However, geographic and social equity have become important considerations for new and existing bike share systems with cities such as Minneapolis and Washington D.C. having recently expanded their systems into lower demand areas, with a particular emphasis on making the system available to all demographics and providing an additional, low-cost transportation option to underserved communities. As noted in Goal 3 for the system (see Section 2), Memphis prioritizes bike share’s role as an accessible means of transport for low-income and mobility-limited populations.

A spatial analysis of three variables associated with traditionally underserved populations was undertaken as part of this study: (1) the percentage of population living in poverty, (2) the percentage of non-white population, and (3) the percentage of non-English speaking population. The highest occurrences of these criteria are shown in **Figure 6.2** (page 33) as a “composite equity map” that combines the percentage scores for each criterion by census tract.

High proportions of traditionally underserved

Figure 6.1: Bike Share Suitability Analysis



populations are located in the south, north-east, and southeast areas of the city. The proposed Phase 1 service area would include underserved communities in and near the Medical District. The Howzye neighborhood would be included in the Phase 2 area, and the underserved neighborhoods of Southside and Vollintine would be included in Phase 3. **Table 6.1** shows that approximately 36% of census tracts included in the service area are considered “most underserved”. A further 23% are considered “somewhat underserved”. Bike sharing can provide a relatively low-cost travel option in combination with transit to improve access to jobs and services. Other cities are employing a variety of strategies to engage typically under-served communities including:

- Guarantor programs to provide access for unbanked populations (i.e., those without credit cards). These programs shift cost responsibilities for the hire of a bike from the individual to the guarantor organization (e.g. New York City).
- Boston: the operator partners with the Boston Public Health Commission to sell \$5 memberships. The Boston Medical Center has a pilot program called “Prescribe a Bike” for low-income individuals with health-related issues that care providers believe can be addressed, in part, by

moderate exercise. The program allows physicians to literally prescribe Hubway membership at no cost to the patient.

- Washington, DC: the operator works with Bank On DC, an organization that seeks to provide financial education and services to unbanked families and individuals. Reduced price memberships are provided to Bank On DC account holders.
- New York City: significant outreach to low income and non-English speaking populations has been conducted prior to the launch of Citibike to increase awareness of the system and station locations, distribute bicycling safety resources (such as helmets), and provide information on registration and assisted payment options.

## System Parameters

### Minimum System Size

A system that is too small limits its effectiveness. For a city the size of Memphis, a system of 10 stations is considered the absolute minimum to provide an effective mix of trip origins and destinations and to justify the cost of operations. The following should be considered when planning the system:

- The coverage area at which bicycling becomes a more attractive option than walking. The median walking trip is

approximately five minutes, in which time a person can walk approximately ¼ of a mile, but can cycle approximately ¾ of a mile.

- The system must provide a variety of trip origins and destinations or there is no reason to use the bikes.
- The system should provide a reasonable station density so that users can easily access a station. If stations are too far apart, users will consider they have to walk too far to access a bike and will not make the trip or will take a different mode.
- The system needs to be a reasonable size to justify the cost to operate the system. There are some economies of scale in terms of operating the system.

### Station Density

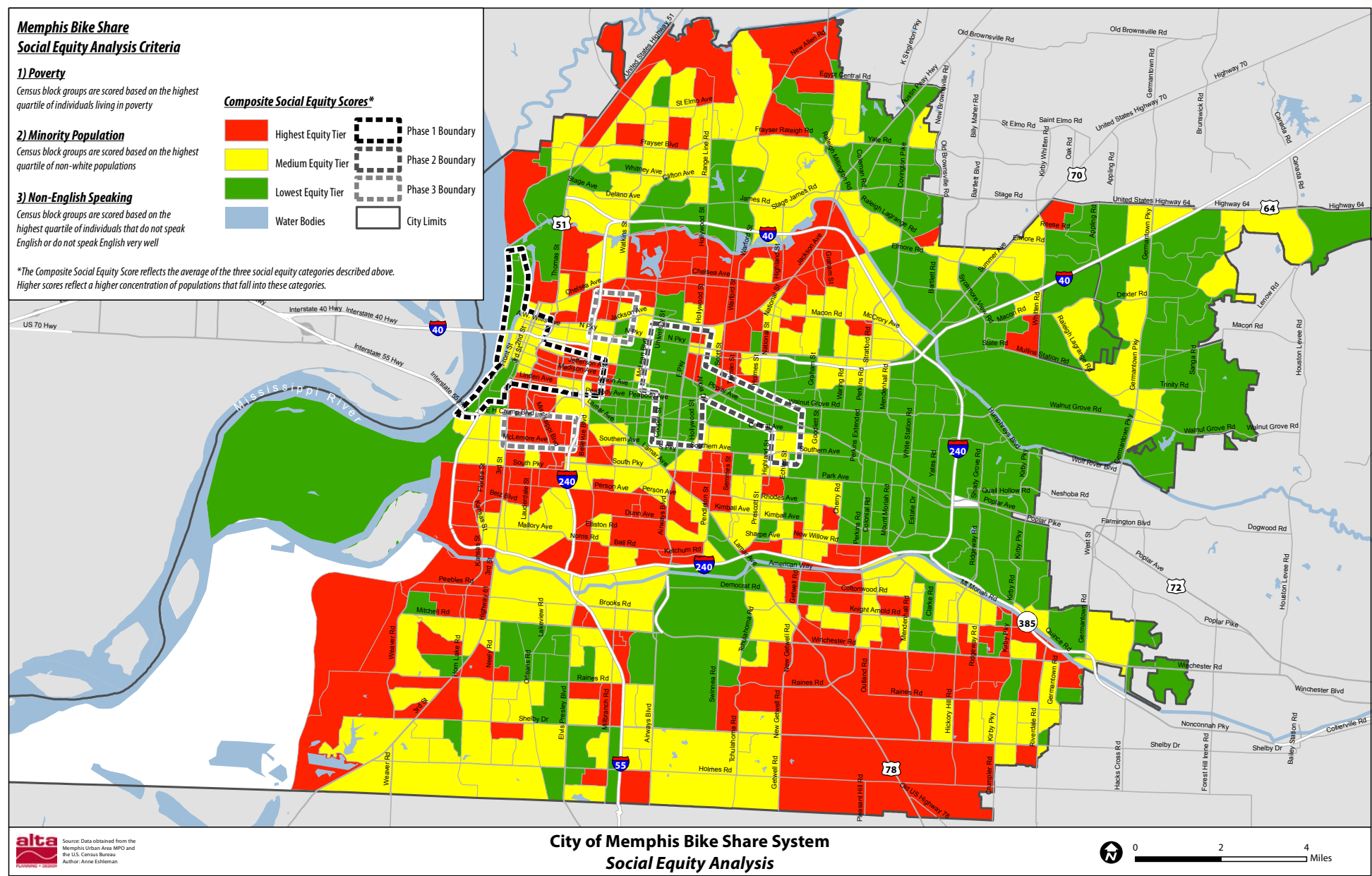
In denser, mixed-use environments, such as the CBID and Medical District, the size of the system is generally a function of the coverage area and the desired spacing / density of stations. State-of-the-practice in other North American bike share systems suggest that in the densest areas, stations should be spaced no more than 1,000 feet to 1,300 feet apart on average (this represents approximately 16 – 28 stations per square mile). This spacing provides access to a bike within a short walk of anywhere in the service area and provides a nearby alternative to return a bike if the destination station is full.

However, station densities across the entire service area are typically much lower, representing the change in density moving away from the city center. Average, system-wide station densities in other bike share cities are

**Table 6.1: Equity Breakdown of Proposed Bike Share Service Area**

	Most Underserved (Highest Equity Tier)	Somewhat Underserved (Medium Equity Tier)	Well Served (Lowest Equity Tier)	All
Census Tracts in Proposed Bike Share Service Area	30 (36%)	19 (23%)	34 (41%)	83 (100%)

Figure 6.2: Social Equity Analysis Based on Three Factors from US Census Data



summarized in **Table 6.2**. For a city the size of Memphis, the average station densities range from three to five stations per square mile. Following these general guidelines, recommended system sizes are as follows:

- Phase 1 in the CBID and Medical District: 39 stations covering a 7.7 square mile area (a density of approximately 5.1 stations per square mile).
- Phase 2 in the Midtown and University districts: 17 stations covering a 7.9 square mile area (a density of approximately 2.2 stations per square mile). Stations should be provided at lower densities to reflect the lower density of land use. Stations

should generally follow the location of key destinations and larger activity centers.

- Phase 3 in North and South Memphis: 7 stations covering a 3.8 square mile area (a density of approximately 1.8 stations per square mile). Stations should be provided at a lower density still to reflect land use and population densities.
- Total: 63 stations covering a 19.4 square mile area. A density of approximately 3.2 stations per square mile.

### Number of Bikes and Docks

In addition to the number and density of stations, the number of bikes per station and the dock ratio (i.e., the number of docks per bike)

are important considerations that impact customer experience and influence cost and operation of the system.

- Bikes per station: **Table 6.3** provides a comparison of bike-to-station ratios in several cities operating bike share systems. In higher density areas, cities typically plan for approximately ten bikes per station. This ratio is recommended for Phase 1 in Memphis. In lower demand areas (such as future Phases 2 and 3 in Memphis) a lower ratio (e.g., seven to eight bikes per station) may be appropriate. The size of each individual station will vary depending on specific demands of that location, but stations should have no less than five to seven bikes to ensure that a sufficient number of bikes are available at any given time.
- Dock ratio is the number of docks per bike. It is important that there be sufficient empty docks for riders to return bikes. Operators have tested dock-to-bike ratios ranging from 1.5 docks per bike to 2.0 docks per bike. Higher ratios require more upfront capital cost and more physical space, but save the operator significant rebalancing cost as there are docks available more often for riders to return bikes. A ratio of 1.7 docks per bike is a reasonable balance and is recommended as a starting point for cost estimating in Memphis.

**Table 6.2: Comparison of Station Density in Select Bike Share Cities**

City	Stations	Area (sq. mi.)	Station Density (stations / sq. mi.)
New York City (proposed) <sup>1</sup>	420	17.4	24.1
Manhattan	260	8.9	29.2
Brooklyn	160	8.5	18.8
London <sup>2</sup>	345	16	21.6
Chattanooga <sup>3</sup>	27	1.5	18.0
Miami <sup>4</sup>	91	6.3	14.1
Boston <sup>4</sup>	60	11.8	4.8
San Antonio <sup>4</sup>	23	4.8	4.2
Denver <sup>4</sup>	52	12.6	4.1
Washington DC / Arlington <sup>4</sup>	140	36.0	3.9
Minneapolis <sup>4</sup>	145	33.3	3.3
Boulder <sup>4</sup>	15	4.7	3.2
Memphis (proposed)	63	19.4	3.2

Notes:

1 Source: New York City Bike Share

2 Based on system size at launch.

3 Based on system size as of June 2012.

4 Source: FHWA (2012) Bike Sharing in the United States report. System size based on the number of stations at time of report. Service area calculated as the area within a ½ mile of stations.

Recommended System Summary

The following station, bike, and dock numbers are recommended for the initial phases of a bike share system in Memphis:

- **Phase 1:** CBID / Medical District: 39 stations including 390 bikes and 660 docks.
- **Phase 2:** Midtown and University Districts: 17 stations including 135 bikes and 230 docks.
- **Phase 3:** North and South Memphis: 7 stations including 55 bikes and 95 docks.
- **Total:** 63 stations including 580 bikes and 985 docks.

Station Plan

**Figure 6.3** (page 36) illustrates preliminary bike share station locations for the proposed three-phase implementation of bike sharing in Memphis. Station locations considered the results of heat mapping, public and stakeholder input, and field review by the project team.

Table 6.3: Bikes-to-Station Ratio for North American Bike Share Systems

City	Bikes	Stations	Bikes-to-Station Ratio
Montreal	5,050	405	12.5
Boston	610	61	10.0
Denver	520	52	10.0
Chattanooga	270	27	10.0
Nashville (proposed)	200	20	10.0
Minneapolis	1,300	145	9.0
Miami	800	91	8.8
San Antonio	200	23	8.7
Washington D.C. / Arlington	1,560	179	8.7
Boulder	110	15	7.3
Memphis (proposed)	580	63	9.2

Visibility at major trip origins and destinations is important. Prime locations for bike share stations include:

- Tourist attractions, landmarks, civic facilities
- Higher density housing and employment centers
- Neighborhood and commercial centers
- Tourist accommodations and hotels
- Key transit stops
- College and hospital campuses

The station locations shown on **Figure 6.3** (page 36) are intended to be general. They are not meant to represent the specific street corner, property owner, or station type and have not at this stage considered public input, available property and right-of-way, the interest of adjacent land owners, or the physical constraints of each site.

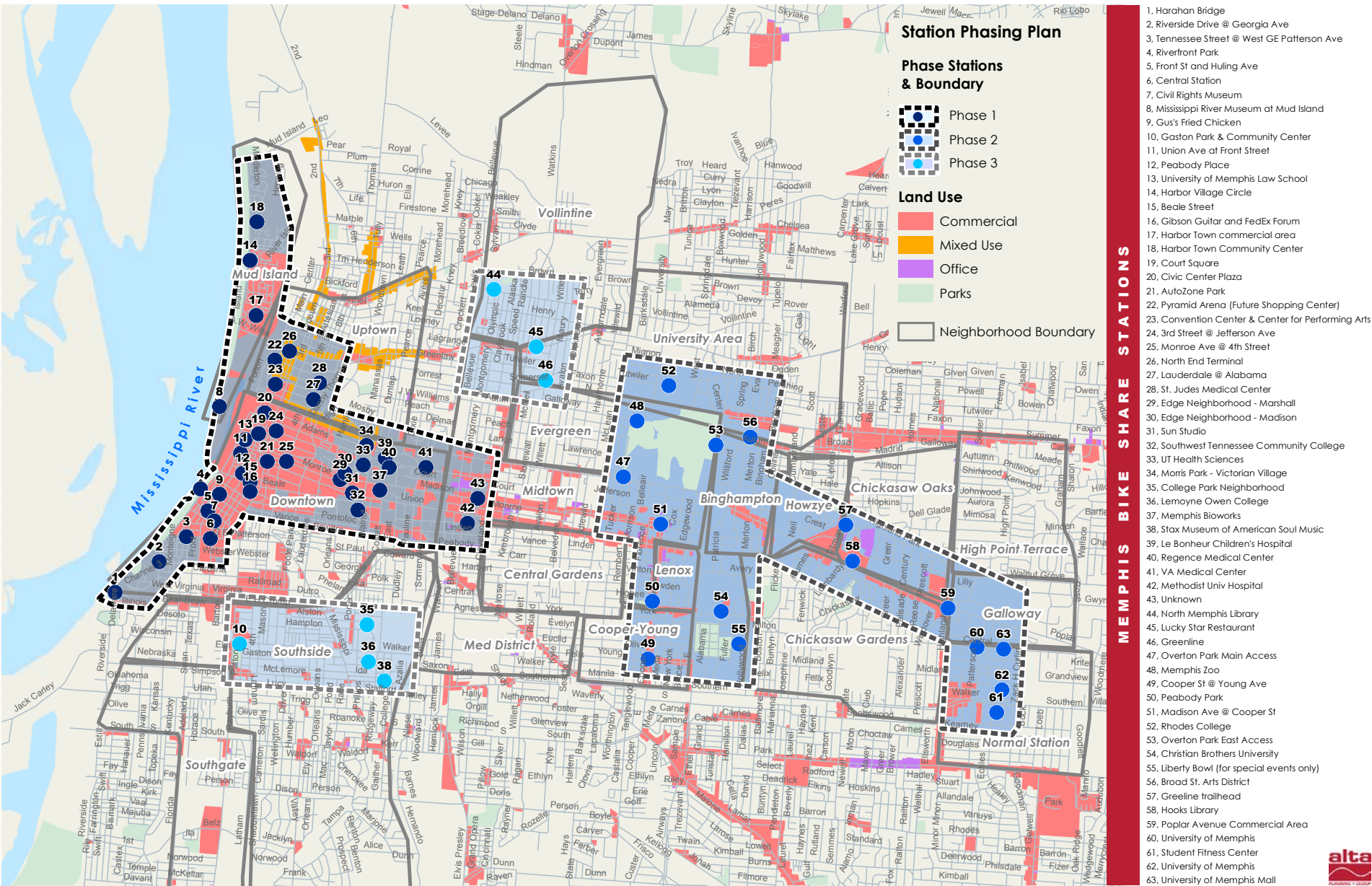
Siting Considerations

Bike sharing equipment has been designed to fit the urban environment. Although docking points can be fixed and hardwired into the pavement, fourth generation station technology has the advantage of being modular and uses solar power and wireless communications that do not require excavation or hardwiring. As such stations can be moved, relocated, or expanded to meet demand.

Station locations should be visible and accessible and need to consider other modes of travel (e.g., they should not impede pedestrian circulation or be placed in bus zones or block building entrances). There may be opportunities to place stations under existing cover, although stations do require a certain amount of vertical clearance and solar access.

The physical space occupied by a station varies depending on the equipment provider and the number of docking points. Modules generally come in ten-foot lengths that accommodate four docking points each and are approximately six feet wide with bikes parked. Additional space is required behind the bike to allow users to pull the bike out from the station. As an example, a 15 dock station (plus a payment kiosk) would be approximately 40 feet in length.

Figure 6.3: Proposed Bike Share Station Locations



Examples of typical station placements are shown at the end of this section in **Figure 6.4** through **Figure 6.7** using possible station locations in Memphis and described below:

- **Sidewalks:** many of the sidewalks in Memphis are narrow and some have cracked or uneven pavement surfaces that would require repair. Bike share stations are approximately six feet deep with bikes parked. The Engineering Department should be consulted to determine what width of sidewalk is considered appropriate to maintain sufficient pedestrian circulation (in other cities, nine to ten feet of clear pedestrian space, or 15 to 16 feet of total sidewalk width is considered adequate). This may vary depending on the volume of pedestrians.



**Figure 6.4: Example On-Street Station Placement (Civil Rights Museum)**

It is expected that there will be few sidewalk installations in Memphis without sidewalk widening, repair, or other upgrades. Sidewalk stations could be considered where sidewalk repairs are scheduled, in front of development / redevelopment projects responsible for upgrading the sidewalk, and as part of curb extension and other capital projects.

- **On-street** (Figure 6.4 and Figure 6.5): many of the streets in the service area have motor vehicle parking lanes that could accommodate bike share stations. Stations take up anywhere from 30 feet (for an 11 dock station – the absolute minimum recommended) to 100 feet (for a 39 dock station – the expected maximum station size in Memphis). This represents two to five vehicle parking spaces. Although a bike



**Figure 6.5: Example On-Street Station Placement (North End Station)**

share station can park more people in the same space (39 bike share parking docks will fit in the same space as five motor vehicle parking spaces), conversion of parking is generally a controversial decision with adjacent businesses and local business improvement associations. However, other cities have found supportive local businesses to advocate for parking conversion in front of their properties. Other considerations for on-street installations include:

- **Protection:** there is no one-size-fits-all solution to protect a station from moving traffic. Some cities require little to no protection, whereas others require engineering treatments such as painted end treatments, wheel stops, and flexible delineators. Cities also differ on whether bikes should be pulled towards the sidewalk (requiring construction of a platform so the bikes can be at ground level as at certain stations in London) or into the street. There is also variance on the minimum clearance allowed behind bikes when placed next to moving traffic lanes (installation next to a bike lane or buffer is preferred, but depending on the volume and speed of traffic, parking lanes eight feet wide or wider are generally acceptable for on-street installations).
- **Clear zones:** stations cannot be placed in transit lanes, in off-peak parking lanes (that convert to moving traffic lanes during peak hours), or in other clear zones. Potential displacement of bus stops, loading zones, and other curbside uses needs to be considered.

- **Metered parking:** the City of Memphis would need to provide direction on whether metered parking replacement would be acceptable and the terms of its use. Some cities require that metered parking loss be minimized and that the owner / operator reimburse the city for any lost revenue, whereas other cities have allowed metered parking conversion and write off the revenue impact as an “in-kind” contribution.
- **Off-street** (Figure 6.6 and Figure 6.7): stations in publicly-owned plazas, public spaces, and in parks require consultation with the relevant city or agency department. For stations on privately-owned lands, agreements would need to be negotiated between the owner / operator and the individual land owner. Of importance, these sites need to be publicly accessible at all times.



**Figure 6.6: Example Off-Street Station Placement (Civic Plaza)**



**Figure 6.7: Example Off-Street Station Placement (University of Memphis)**

# 7: BUSINESS MODEL REVIEW

## Ownership and Operations

The first major decision of a city exploring bike sharing is to decide on a business model for the program – who will own the assets, who will administer the program, and who will be responsible for day-to-day operations?

North American bike share systems operate under many different business models. In fact, each existing system (and those in planning) has identified a governance and organizational structure that fits the needs of the local market, the municipal and/or regional procurement offices, and the funding environment. A summary of North American bike share business models is shown in **Table 7.1** (pages 40-41).

There are generally three business models used for bike sharing in the United States; however, each program has slight variations to fit the needs of the local market, the municipal and/or regional procurement offices, and the funding environment. The basic models include:

- **Publicly Owned / Privately Operated:** under this business model, a government agency takes on the financial risk of purchasing and owning the system and contracts operations to a private company that takes on liability for the system (note: certain operating tasks may be taken on by the jurisdiction, e.g., marketing).
- **Non-Profit Owned and Operated:** an existing or a newly formed non-profit takes on the responsibility of ownership, administration, and operation. Financial risk is taken on by the non-profit, although government

agencies may provide start-up funds or act as a fiscal agent for the pass-through of federal, state, or local funding.

- **For Profit Business:** a private company takes on the responsibility of providing and operating the system. The private sector takes on all risk and fundraising responsibility and retains all profits (although it is not uncommon for a portion of profits to be paid to the jurisdiction for use of right of way, advertising, etc.). This model is highly dependent on the capacity of private sector fundraising.

The advantages and disadvantages of the three major models are summarized in **Table 7.2** (pages 42-43) in terms of ownership of assets, operating responsibility, agency role, transparency, share of profit and risk, use of operating expertise, fundraising responsibility, expansion potential, and staff capacity / organizational interest.

Other models, or variations to the above models, could also be considered. These include:

- **Administrative Non-Profit:** similar to other non-profit models, an existing or newly formed non-profit would own and administer the system, but would contract operations to a private company such as a specialist operator or a bike shop (e.g., Boulder B-cycle contracts many operational tasks such as bicycle and station maintenance and redistribution to the local Trek store in Boulder).
- **Public/Private Partnership:** public and private sectors share funding and ownership

of the system. Responsibilities for administering and operating the system as well as the split and use of profits are determined by contract (no examples to date).

- **Publicly Owned and Operated:** a jurisdiction (e.g., City or transit agency) takes on all responsibilities of owning, administering, and operating the system. To date there are no North American examples – generally because cities and transit agencies do not have the expertise, capacity, or risk-tolerance to take on operating responsibility (e.g., Deutsche Bahn, Germany and OV-Fiets, Netherlands).
- **Owned and operated as part of a street-furniture advertising contract.** This is a common model in Europe (Paris, Barcelona, Lyon) and is also used in Mexico City (Ecobici) and Brisbane, Australia. The Smartbike system in Washington, D.C., adopted this model and was a precursor to Capital Bikeshare. This model is not popular in North American cities as there is less transparency and often requires modification or renegotiation of street furniture advertising and sign code ordinances.

**Table 7.1: Bike Share Operating Models in North America**

System	Bikes	Stations	Approximate Service Area	Population	Launch Date	Total Capital Funding	Public Funding Amount
Capital Bikeshare – Washington D.C. (Phase 1)	1,110 (bikes circulate between both Washington DC and Arlington)	91 (105 total)	8 sq. mi.	600,000	Sept. 2010	\$5 million	\$5 million (83% CMAQ, 17% District funding)
Capital Bikeshare – Arlington (Phase 2/ current)		14 (105 total)	1 sq. mi.	210,000	Sept. 2010	\$500,000	\$200,000 (40%, state grants)
Capital Bikeshare – Washington D.C. (Phase 2)	1,560 (400 new; bikes circulate between both Washington DC and Arlington)	138 (179 total)	12 sq. mi.	600,000	2011	\$1 million	\$1 million (74%, CMAQ).
Capital Bikeshare – Arlington (Phase 2/ current)		41 (179 total)	4 sq. mi.	210,000	2011	\$1.5 million	Undisclosed.
Chattanooga	300	30	3 sq. mi.	170,000	2011	\$2 million	\$2 million (100%, CMAQ)
DecoBike, Miami Beach	1,000	100	-	-	2011	-	-
Denver Bike Sharing	510	53	5 sq. mi.	600,000	April 2010	\$1.5 million	\$210,000 (16%, ARRA federal Energy Efficiency and Conservation Block Grant program).
Ecobici, Mexico City	1,000	85	-	-	-	-	-
Fort Lauderdale	200	20	25 sq. mi.	170,000	2011	\$1.1 million	\$300,000 (27%, Florida DOT funds)
Hubway	725	83	8 sq. mi.	620,000	2011	\$4 million	\$3 million (75%, CDC Communities Putting Prevention to Work, CMAQ, FTA Bus Facilities Livability Initiative Program, State grants).
Montreal	5,050	405	24 sq. mi.	1,650,000	2008	\$33 million	\$33 million (City funds) to develop and market technology and plan the initial system.
Nice Ride Minnesota (Phase 1)	700	73	12 sq. mi.	380,000 (Minneapolis)	June 2010	\$3.0 million	\$1.75 million (58%, Bike Walk Twin Cities / FHWA). \$250,000 (8%, City Convention Center Fund).
Nice Ride Minnesota (Phase 2/current)	1,200 (500 new)	116 (63 new)	30 sq. mi.	670,000 (Minneapolis & St. Paul combined)	2011	\$2.3 million	\$1.0 million (43%, Bike Walk Twin Cities / FHWA). \$200,000 (9%, ARRA US Department of Health and Human Services). \$150,000 (6%, University of Minnesota).
San Antonio	230	23	3 sq. mi.	1,330,000	2011	\$840,000	\$840,000 (100%, U.S. Dept of Energy's Energy Efficiency and Conservation Block Grant (EECBG) program, CDC)

Note: All numbers in this table are round numbers from various publicly available sources, as well as other sources.

\*The City of Chicago now has plans to implement a new bike sharing system that will replace the current B-Cycle system.

Private Funding Amount	Ownership of Capital Infrastructure	Operations
\$0	DDOT and Arlington County (government agencies)	Operator direct contract with both Washington DC and Arlington County.
\$300,000 (60%, local BID sponsorship)		
\$350,000 (26%, revenues from system).		
Undisclosed.		
\$0 (future sponsorship may be sought)	Outdoor Chattanooga (government agency)	Public – private partnership; operator direct contract with local transit agency (which received federal funding).
-	DecoBike (private company)	Completely private system, privately owned and operated, concession agreement only.
\$1.3 million (84%, Kaiser Permanente as “presenting sponsor”, Denver 2008 DNC Host Committee, several foundations, multiple station sponsors).	Denver Bike Sharing (non-profit)	Non-profit set up by city.
-	Clear Channel Communications (private company)	Private advertising-funded system.
\$800,000 (63%, sponsorship / advertising)		
\$1 million (25%, multiple local sponsors and a naming sponsor).	Cities of Boston, Cambridge, Brookline, and Somerville (government agencies)	Public – private partnership; operator direct contract with the City of Boston, other municipalities to contract directly with operator (RFP issued by regional planning agency).
Subsequent stages funded by sponsorship, advertising, and user fees.	PBSC (non-profit)	Owned and operated by Public Bike System Company (PBSC), a non-profit organization.
\$1 million (33%, Blue Cross Blue Shield tobacco settlement funds).	Nice Ride Minnesota (non-profit)	Non-profit set up by city.
\$700,000 (30%, Blue Cross Blue Shield). \$250,000 (11%, Central Corridor Light Rail Funders Collaborative). \$30,000 (1%, Macalester College).		
\$0	San Antonio B-Cycle (non-profit)	Governed by non-profit set up by city – operated by bike rental company through tender.

**Table 7.2: Advantages and Disadvantages of Typical Bike Share Operating Models**

Model	Ownership	Operations	Agency Role	Transparency	Risk
Publicly Owned / Privately Operated	Public agency	Private contractor	The public agency is responsible for capital investment, owns the infrastructure and equipment, administers contract with private operator, and makes decisions and drives direction of the program.	This model allows for the greatest amount of agency control. The agency drives the direction of the program and sets the terms of the operating contract.	Financial risk is taken on by the public agency. Liability exposure is taken on by the private contractor.
Non-Profit Owned and Operated	Non-profit	Non-profit	Agency can be involved as a financial partner providing start-up funding for the non-profit or acting as a fiscal agent to pass through federal, state, and local funding. Agency may be represented on the non-profit board or as a technical advisor.	Some transparency through representation on Executive Committee	Financial and liability risk is shifted to the non-profit organization.
For Profit Business	Private	Private	Agency has a less active role and may only be responsible for certain aspects of planning for the system such as station siting and permitting.	Less control over decision-making, re-investment / expansion, and operations.	All risk is taken on by the private sector.

Profits	Operating Expertise	Fundraising	Expansion Potential	Staff Capacity / Interest	Examples
Agency retains (or splits) profits, which can be used to fund system improvements and expansion.	Makes use of private expertise to compliment agency skills.	Agency responsible for fundraising. Typically a mix of federal, state, local grants; sponsorships; and user revenues.	Expansion (within the jurisdiction) is contractually simple and depends only on additional funds being raised.	Requires agency staff capacity for fundraising and oversight of the system, but makes use of the private sector for operations.	Capital Bikeshare (Washington D.C. / Arlington, VA) Hubway (Boston)
Profits are generally reinvested into improvement and expansion of the system.	Non-profit often lacks start-up and operating expertise, which can affect level of service.	Provides the most diverse fundraising options. Agency or non-profit (or both) can fundraise and private sector is often more willing to sponsor / donate to non-profits. All funding types are in play under this model.	Expansion (within the jurisdiction) is contractually simple and depends only on additional funds being raised.	Staff dedicated specifically to the mission of bike sharing.	Denver B-cycle, Boulder B-cycle Nice Ride MN
Profit sharing with the public agency may be required to pay for use or right-of-way, etc. Private owners determine use of profits and expansion is likely only into profitable markets.	Makes full use of private sector experience, often tried in other cities. Private sector brings incentive to make the system as profitable as possible.	This model is more restrictive on the type of funds available for use - generally relying on private investment, sponsorship / advertising, and user revenues. Capital can generally be assembled more quickly.	Expansion will only occur in those areas deemed most profitable.	Makes full use of private sector experience, often tried in other cities.	Deco Bike (Miami Beach)



New Balance Hubway Bike Share, Boston (Photo: [effelarr/http://www.flickr.com/photos/8822495@N08/](http://www.flickr.com/photos/8822495@N08/))

# 8: FINANCIAL ANALYSIS

This section provides a review of the most common funding mechanisms for bike sharing in the United States, and reviews the capacity of the City of Memphis for these funding sources. It also provides a membership and ridership forecast using the Alta bike share demand model, which estimates user-generated revenues. These have been compared to expected system costs to identify the level of additional funding required. A recommended funding scenario is presented.

## Funding Sources

Most North American bike share systems have pieced together funding from whatever sources are available. The most common sources are public funding, private funding, membership and usage fees, and advertising and sponsorship. These are described in the context of Memphis in the sections below.

### Public Funding

Numerous public funding options are available for bike sharing in the United States but the most common forms are federal grants issued by agencies such as FHWA, FTA, or CDC, state grants, and local transportation funds.

The FHWA provides a summary of public funding sources in its guide to Bike Sharing in the United States (2012) (reproduced in **Figure 8.1**) and a summary of the requirements of USDOT funding related to bike sharing is found on its website at:

[http://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/funding/faq\\_bikeshare.cfm](http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/faq_bikeshare.cfm).

There is an excellent summary of public funding sources related to transportation capital improvements in the Memphis Urban Area MPO's *Direction 2040 Long-Range Transportation Plan*, Chapter 8 – Implementation Plan: [http://memphismpo.org/index.php?option=com\\_content&view=article&id=116&Itemid=416](http://memphismpo.org/index.php?option=com_content&view=article&id=116&Itemid=416)

A searchable government grant database is found at: <http://www.grants.gov/>

There are a number of factors to consider before pursuing federal funds:

- There is a significant amount of competition for federal funds and grants, and a

detailed understanding of the application process is often required.

- These sources are generally less flexible than other funding sources, e.g., FTA funding may only be used for bike share docks, equipment, and other capital costs but not for purchasing bicycles or for launch and operating costs, whereas FHWA funding can be used for all equipment including bikes. Few grants are available for operations.
- There may be additional requirements such as “Buy America” provisions for steel and iron products, NEPA environmental assessment, etc.

**Figure 8.1: Public Funding Sources Used for Bike Sharing in the United States (FHWA 2012)**

Federal					State and Local
US Department of Transportation (USDOT)		Centers for Disease Control (CDC)	Dept. of Health and Human Services (HHS)	Dept. of Energy (DOE)	
Federal Highway Administration (FHWA)	Federal Transit Administration (FTA)				
Congestion Mitigation Air Quality (CMAQ)	Job Access Reverse Commute (JARC)	Health and Obesity Prevention Grant	Communities Putting Prevention to Work	Energy Efficiency Conservation Block Grant	Public Health Grants
Surface Transportation Program: Transportation Enhancements (TE)	Bus Livability Pilot Programs				
Transportation, Community and System Preservation Program (TCSP)					Local Transportation Funds
Transportation Investment Generation Economic Recovery (TIGER)	Paul S. Sarbanes Transit in Parks Grant Program				
Nonmotorized Transportation Pilot Program					

- There are often delays associated with the application, evaluation, and distribution of funds, which can delay deployment. There may also be a timeline within which to use the funds, which can create difficulties in piecing together several grants.

To date, most cities have limited the use of local public funding (versus federal or state public funding) beyond in-kind services such as staff time, right-of-way use, or lost on-street parking revenues, although some cities have provided smaller “match” amounts as a show of support or to encourage private sector investment. Local funding would most likely be directed towards capital costs or a specific annual amount for operations. Agencies are less likely to want the responsibility (and uncertainty) of funding annual operating costs.

Ongoing public funding could potentially come from local “steady stream” sources such as parking revenues, bus bike rack advertising, special taxes, or distribution of license plate fees. Station purchase could also form part of the use of Traffic Impact Fees (TIFs) or form part of a developer’s travel demand management strategy. Other agencies, such as the Memphis and Shelby County Health Department or the Division of Housing and Community Development may also get involved, e.g. in Denver, funding from the Denver Housing Authority was used to install two stations at two public housing projects.

A scan of the public funding environment in Memphis shows:

- CMAQ funding of \$375,000 has been secured by the Health Department and set aside for bike sharing. These funds are administered by the Tennessee Department of Transportation and must be used by July 2013.
- The Harahan Bridge recently received TIGER funding for \$15 million. While there is no direct opportunity to use this funding (unless a station at the bridge can be funded as part of the project), it will increase bike infrastructure, including bike/pedestrian access over the Mississippi River, which will increase potential demand for bike share.
- City Council has invested in bike infrastructure in recent years, opportunistically using federal stimulus, TIGER, and private funds. It is anticipated that this model will also be applied to bike sharing with the City providing assistance in the form of permitting, station space and right-of-way, staff support in navigating the process, and assistance with fundraising and grant application.
- Given the synergies with transit and public health, there may be opportunities to pursue FTA grants (in conjunction with MATA), community health grants, or direct revenue opportunities such as bus bike rack advertising.

### Private Funding

Private funding is a key component of a number of systems in the United States. Private foundation grants and private donations are typical revenue streams for systems owned

and operated by non-profit organizations. For example, Denver B-cycle reported in 2011 that five to six percent of its operating budget came from “operating grants and contributions”, while Boulder B-cycle has received approximately ten percent of its total income from “gifts” since its inception. Relying on donations can be problematic, as this funding typically fluctuates from year-to-year.

Privately owned and operated systems, such as Deco Bike in Miami Beach and the Los Angeles Bike Share System, rely on private investment to fund the capital required to get a system off the ground. They also rely on high user-generated revenues and a strong local sponsorship market.

Private foundation and corporate funding are probably the best local prospects in the Memphis area. FedEx, AutoZone, large developers, and other corporate and philanthropic groups have been behind much of the movement towards active lifestyles in Memphis recently (including funding this bike share study, funding a study for greenways, Harahan Bridge, and cycle track development). The local health care industry and universities are also a likely source (e.g., BlueCross BlueShield has contributed funding to systems in Minneapolis/St. Paul, Kansas City, and Charlotte, and Kaiser Permanente is a funding partner of Denver Bike Share).

A searchable database of private foundations in the area can be found at:

<http://foundationcenter.org/findfunders/foundfinder/>

Sponsorship and Advertising

There is a subtle difference between advertising and sponsorship. Advertising includes a contract with a company to provide a regularly changing graphic display and message, which could be independent of the bike share station on other street furniture. The advertiser and/or message may not be associated with bike sharing or bicycling in general. Sponsorship typically involves a longer-term relationship between the sponsor and the vendor, where stickers are put on the infrastructure (bikes, stations, and/or website) with a logo and/or statement that “Company X supports Memphis Bike Share”.

Sponsorship provides the greatest funding opportunity in Memphis given the number of large employers, several large companies (e.g., FedEx and AutoZone) and the number of medical institutions with health and wellness central to their mission. Experience in other cities has shown that companies are generally interested in sponsorship for its positive impression and “good corporate citizen” benefits as much as for its media exposure.

The value of sponsorship will vary significantly between cities and the level of branding. It is expected that sponsorship in the range of \$5,000 to \$15,000 per station per year is achievable in Memphis based on experience in other cities:

- Nice Ride MN obtained approximately \$5,500 per station per year for presenting sponsorship from BlueCross BlueShield (this does not include additional station

sponsorship sales that would increase this rate).

- Denver B-cycle reported sponsorship of approximately \$11,700 per station in 2011.
- Citibank paid approximately \$13,500 per station per year for exclusive sponsorship of New York’s bike share system.
- Hubway obtained over \$16,500 per station per year for station sponsorship.

There are generally three approaches to sponsorship described in **Table 8.1**.

User Revenues

Some systems record sufficient demand such that user revenues entirely (or almost entirely) cover the cost to operate the system (e.g., Capital Bikeshare in Washington D.C.). This is not possible in every city; however, user-generated revenues will provide some level of income. User revenues consist of:

- Access fees: paid up-front to register for the system. These are typically offered for a variety of time periods ranging from a 24-hour “casual” subscription to annual membership.

Table 8.1: Common Bike Share Sponsorship Models in the United States

Sponsorship Model	Description	Advantages	Disadvantages
Exclusive Presenting Sponsorship	This can be a single sponsor that pays for full branding of system infrastructure (e.g., London or New York) or multiple sponsors that split the cost in exchange for proportional branding (e.g., Montreal or Toronto)	<ul style="list-style-type: none"><li>• One-time sale of sponsorship</li><li>• Known timeline and full “occupancy”</li><li>• Consistent and recognizable branding</li></ul>	<ul style="list-style-type: none"><li>• Often difficult to secure sponsor given the large initial investment</li><li>• Less opportunity for smaller businesses to get involved</li><li>• Competing brands can conflict certain tenants or nearby businesses</li></ul>
Multiple Station Sponsorship	This model sells sponsorship opportunities on system infrastructure to multiple smaller sponsors, e.g., Denver Bike Share sells logo placement on a station kiosk plus 10 bikes for \$30,000 per year or \$60,000 per year for three years	<ul style="list-style-type: none"><li>• Fewer competing interest concerns</li><li>• Opportunities for businesses of all sizes to be involved</li><li>• Opportunity to value sponsorship by station demand</li></ul>	<ul style="list-style-type: none"><li>• Income relies on “uptake” of a certain amount of sponsorship each year</li><li>• Significant effort required to secure numerous sponsors</li><li>• Less consistent branding</li></ul>
Hybrid - Presenting Sponsor and Smaller Station Sponsors	A single large sponsor pays for branding of certain parts of the infrastructure but still allows smaller station sponsors, e.g., Boston or Minneapolis	<ul style="list-style-type: none"><li>• Larger sponsorship provides more secure revenue (although at a lower rate)</li><li>• Opportunities for businesses of all sizes to be involved</li></ul>	<ul style="list-style-type: none"><li>• Significant effort required to secure numerous sponsors</li><li>• Less consistent branding</li></ul>

- Usage fees: charged to the user based on how long they use the system. Most systems offer a “free ride” period, typically between 30 and 60 minutes where the user pays no additional costs if the bike is returned within that time period. Fees are charged to users on a graduated scale once the free ride period is exceeded. The free ride period and the graduated rate scale can be different for annual members (typically residents) and casual users (typically visitors).

The logic of the rate system is to: (1) keep annual membership attractive to the resident population; (2) make the rates comparable to other bike share system rates, accounting for cost of living differences; (3) encourage use to the extent it does not compete with existing bike rental vendors; (4) provide reasonable and comparable prices to other public transportation modes; and (5) encourage short urban trips.

### FREE RIDE PERIOD

The decision to lengthen the free-ride period beyond 30 minutes should consider:

- The impact to and encroachment on the bike rental market. The original intent of bike sharing is to provide a short trip mobility option not in competition with bike rental shops that accommodate users for longer trips.
- Reduction in user fees, particularly from casual users. Providing a 45-minute or 60-minute free-ride period lengthens the window for a user to return the bike. Currently, 16% of casual subscribers’ trips in

Minneapolis and 19% of casual subscribers’ trips in Washington DC are between 30 and 60 minutes and subject to user fees (\$1.50 per trip). Although this distribution may change with a new time-limit structure, this represents lost revenue. It is feasible to have a longer free-ride period for annual members only, which would result in minimal revenue loss, while retaining the 30 minute period for casual users.

- Increasing to 45 or 60 minutes is convenient for tourists and visitors. Accommodating this market may attract added interest from the tourist industry to become potential sponsors, which may subsidize reduced revenue from user fees.

### RATE STRUCTURE

**Table 8.2** shows a suggested rate structure for Memphis based on comparable rates in other cities and takes into account differences in the cost of living (cost of living comparison is shown in **Table 8.3**). This includes an annual membership cost of \$70 per year (compared to \$50 for a monthly transit pass) and a \$6 per day casual membership. Given the geographic extent of the system, it is recommended that the free-ride period be extended to 45 or 60 minutes for annual members (if not immediately, then at the time that stations in Phase 2 come online). The free ride period would be kept at 30 minutes for casual users to maximize user revenues. The rate structure and free ride periods should be finalized as part of the response to RFP.

**Table 8.2: Proposed Rate Structure**

	Casual Fee Structure	Member Fee Structure
Base Subscription	\$6/day; \$12/3-day	\$70 annual
Duration:	Per trip fees	
0-30 mins	\$-	\$-
30-60 mins	\$2.00	\$-
60-90 mins	\$6.00	\$5.00
90-120 mins	\$14.00	\$10.00
Additional 30 min increments	\$8.00	\$5.00
>7 hours	\$100.00	\$100.00

**Table 8.3: Cost of Living Comparison**

City	Cost of Living Comparison <sup>1</sup>	Price Structure		
		Annual	3-day	24-hour
Memphis (Proposed)	1.00	\$70	\$12	\$6
Minneapolis	1.28	\$65	\$30 for 30 day	\$6
Denver	1.22	\$80	\$20 for 7 day	\$8
Capital Bikeshare	1.67	\$75	\$15	\$7
Chattanooga	1.09	\$75	-	\$6
Boston	1.59	\$85	\$12	\$5
San Antonio	1.08	\$60	\$24 for 7-day	\$10

<sup>1</sup> Cost of living comparisons sourced from CNN Money: <http://cgi.money.cnn.com/tools/costofliving/costofliving.html>

### MEMBERSHIP DRIVES

Apart from basic membership sales, special membership drives are a means of increasing membership sales and revenues (although additional operating costs are incurred as these members make trips). These programs offer purchase of large numbers of memberships

at a discounted rate and could be offered as part of Transportation Demand Management (TDM) programs aimed at large employers and higher-learning campuses (such as the University of Memphis and Southwest Tennessee Community College) or through online discounters such as Living Social or Groupon.

However, it is noted that although these programs improve membership and ridership statistics, they attract annual members who generate far less revenue than casual subscribers (because annual members rarely exceed the free-ride period). In fact, in Memphis it is expected that annual members will generate approximately \$0.88 per trip, whereas casual users would generate approximately \$8.36 per trip. Membership drives generate revenue from bulk purchase of annual memberships, but rely on a lower percentage of these subscribers (fewer than ten to twenty percent, depending on the discounted membership price) actually using the system to break even.

Membership drives that target casual users such as out-of-town visitors and tourists would be more lucrative. This could include

offering short term membership as part of hotel check-in or in conjunction with airline partners or travel booking websites, or as part of visitor attraction admission.

### System Costs

There are three major costs associated with a bike share system – start-up costs (broken into capital and launch costs) and operating costs. Each of these costs is described in detail below. The proposed system in Memphis includes a total of 63 stations, 580 bikes, and 985 docks as follows:

- Phase 1: 39 stations / 390 bikes (10 bikes per station) / 660 docks
- Phase 2: Additional 17 stations / 135 bikes (8 bikes per station) / 230 docks
- Phase 3: Additional 7 stations / 55 bikes (8 bikes per station) / 95 docks

**Table 8.4** provides costs estimates, by phase, based on rates observed in other cities with similar sized bike share programs. The estimate recognizes the variability of costs from city to city and system to system and presents the low and high ends of the cost range.

### Launch Costs

There are a number of “general system start-up” costs associated with establishing the system. These are mostly onetime costs (or are significantly less for future phases) that include “up-front” costs such as hiring employees, procuring a storage warehouse, purchasing bike and station assembly tools, website development, communications and IT set-up, and pre-launch marketing. There may be opportunities to reduce some of these costs through partnerships with other organizations or public agencies, such as using city-provided warehouse space. Each phase also has a start-up cost, although significantly less than the initial cost, which includes site planning and permitting, bike and station assembly, and station installation.

### Capital Costs

These are costs associated with purchase of equipment including stations, kiosks, bikes, and docks. Equipment costs vary depending on system parameters such as the number of bikes per station or the number of docks per bike, but also depend on additional features such as additional gearing, an independent lock, or equipping bikes with GPS. Per station

**Table 8.4: Cost Estimate for Proposed Memphis Bike Share Program**

Costs	Phase 1		Phase 2		Phase 3		All Phases	
	(38 stations/380 bikes)		(17 stations/136 bikes)		(8 stations/64 bikes)		(63 stations/580 bikes)	
	Low	High	Low	High	Low	High	Low	High
Launch	\$550,000	\$600,000	\$100,000	\$100,000	\$50,000	\$50,000	\$700,000	\$750,000
Capital	\$1,750,000	\$2,150,000	\$750,000	\$950,000	\$300,000	\$400,000	\$2,800,000	\$3,500,000
Operation (Annual cost)	\$950,000	\$1,200,000	\$300,000	\$400,000	\$150,000	\$150,000	\$1,400,000	\$1,750,000
Total	\$3,250,000	\$3,950,000	\$1,150,000	\$1,450,000	\$500,000	\$600,000	\$4,900,000	\$6,000,000

capital costs vary between vendors and depending on features and station size, but typically range from \$45,000 (low) to \$55,000 (high) per station.

## Operating Costs

Operating costs include those required to operate and maintain the system. This includes staff and equipment related to:

- Station maintenance: including troubleshooting technology problems with the kiosk or docking points, cleaning and clearing the station, snow removal, and removing litter and graffiti.
- Bike maintenance: including regular inspection and servicing of bikes as well as maintaining equipment inventory.
- Rebalancing: typically the highest operating cost for the system is the staff time and equipment associated with moving bikes from full to empty stations.
- Customer service: providing a responsive customer interface for enquiries and complaints as well as performing marketing and outreach to new and existing customers.
- Direct expenses: such as maintaining an operations facility, purchasing tools and spare parts, upkeep of software, communications, and IT, and general administrative costs such as insurance.

Operational costs will depend on a numerous factors, but are most influenced by the Service Level Agreement, which sets out the operating terms that must be met, e.g. how long a station can remain empty, how often bikes are inspected, or snow removal policy.

The agreed-upon service levels will need to balance operating costs with the impact on customer service from any operating cost cuts. Depending on the service levels, operating costs could range from \$2,400 to \$3,100 per bike per year.

## Reducing Costs

City agencies and other organizations can play a key role in minimizing costs by providing station right-of-way and a streamlined permitting process. There may be other in-kind contributions to reduce budget line items such as providing free or low-cost warehouse space, utilizing the existing city vehicle fleet, staff assistance for map design and production, and assistance with marketing and promotion.

## Demand Forecast

A forecast of expected bike share demand for the proposed bike share system in Memphis was estimated using Alta's Bike Share Demand Model, an empirical model based on observed monthly station demands compared to surrounding land use and demographics. The model was applied to the preliminary station plan and extrapolated to annual forecasts using monthly cycling profiles recorded by automatic bicycle counters in other southeast cities.

Trip-per-member rates observed in other cities were applied to the ridership forecast to estimate the number of annual members and casual subscribers, with consideration given to the relatively high number of visitors to Memphis. Bike share systems typically take a number of years to "mature" to their full

demand potential and as such, a "ramp up" profile was applied to the forecasts based on experience in other cities.

The system is expected to perform as follows:

- Ridership:
  - The initial 39 stations (390 bikes) in the CBID and Medical District are expected to generate approximately 170,000 trips in Year 1 (1.19 trip / bike / day).
  - With the addition of 17 stations for Phase 2, the 56 station (525 bike) system is expected to generate approximately 230,000 trips in Year 2 (1.2 trip / bike / day).
  - With the addition of 7 stations for Phase 3, the 63 station (580 bike) system is expected to generate 287,000 trips in Year 3 (1.36 trips/bike / day).
  - At system maturity, demand is expected to reach approximately 350,000 trips in Year 5 (1.65 trips / bike / day).
- Annual membership is expected to grow as follows:
  - 1,300 people in Year 1
  - 1,800 people in Year 2
  - Up to 2,700 people by Year 5
  - These rates assume no specific promotions, which could include large corporate membership sales or discount promotions through Groupon, LivingSocial, or other campaigns
- Casual membership is expected to increase as follows:

- 23,000 24-hour subscribers in Year 1
- 31,000 subscribers in Year 2
- Up to 47,000 subscribers at system maturity in Year 5
- This assumes no specific promotion or marketing, which could include subscription as part of travel deals or hotel accommodations.

First year membership and ridership statistics in Memphis are compared to first year statistics in Washington DC, Minneapolis, Montreal, Denver, and Paris for the following metrics:

- Trips / bike / day: the first year ridership forecast for Memphis represents approximately 1.19 trip / bike / day, which is on the lower end but comparable to Minneapolis and Denver (see **Table 8.5**).
- Members per bike ratio: the Memphis system is expected to see a member per bike ratio of 3.3 (see **Table 8.6**), which

is mid-range, but again comparable to Minneapolis and Denver.

The comparison of predicted statistics for Memphis to operating bike share systems confirms that the usage and revenue estimates are realistic.

**Table 8.6: Membership Comparison in First Year of Operation**

	Bikes	Members	Members / Bike
Memphis	390	1,300	3.3
Montreal <sup>1</sup>	5,000	32,371	6.5
Toronto	1,000	3,750	3.8
Capital Bikeshare	1,100	18,919	17.2
Minneapolis	600	1,295	2.2
Denver	500	1,784	3.6
Chattanooga	300	204 <sup>3</sup>	0.7
Paris	20,600 <sup>2</sup>	200,000	9.7

Notes:

1 Represents 2010 data from the third season of operation.

2 Based on first season Velib data (July 2007 to July 2008) that recorded 27.5 million trips with 20,600 bikes.

3 Based on data from first 120 days.

**Table 8.5: Trip Comparison for First Year of Operation**

	Operating Days	Trips	Bikes	Trips / Bike / Day
Memphis	365	170,000	390	1.19
Montreal	212 <sup>1,2</sup>	3,400,000	5,000	3.2
Toronto	169	336,000	1,000	2.0
Capital Bikeshare	375 <sup>3</sup>	1,045,000	1,100	2.5
Minneapolis	150 <sup>1</sup>	100,817	600	1.1
Denver	224 <sup>1</sup>	102,981	500	0.9
Chattanooga	120 <sup>4</sup>	10,000	300	0.3
Paris	365 <sup>5</sup>	27,500,000	20,600	3.66

Notes:

1 The number of operating days during the 2010 season. This varies season to season depending on conditions.

2 Represents 2010 data from the third season of operation.

3 Based on the first 375 days (just over one year) of operation of Capital Bikeshare.

4 Based on first 120 days of operation. Note: the number of bikes is based on the planned bike total - not all bikes were available during initial operations.

5 Based on first season Velib data (July 2007 to July 2008) that recorded 27.5 million trips with 20,600 bikes.

## Financial Analysis

**Table 8.7** applies the suggested rate structure to five-year estimates of membership and demand for the phased deployment of a 63 station system in Memphis, which includes an initial 39 station deployment in the CBID and Medical District and subsequent deployments of 17 stations (Phase 2) and 7 stations (Phase 3), respectively. The resulting user-generated revenue estimate is compared to capital, launch, and annual operating costs to determine the amount of additional funding that will be required over the initial five year operation period. From this, a five-year and an “interim” funding strategy were developed.

## Five-Year Funding Scenario

The total five-year cost to launch and operate all three phases of the proposed program is estimated at \$11.1 million (\$3.15 million capital + \$0.725 million launch + \$7.225 million operating ). Approximately \$6.2 million in funding (in addition to projected user revenues and already secured CMAQ funding) will be needed to fund capital, launch, and operating costs over the five year period. This equates to approximately \$20,000 per station per year (63 stations and 5 years).

The most likely funding model would be some combination of corporate sponsorship and public funding (e.g. grants, transportation funds, or local public funding). Assuming that sponsorship could raise \$11,000 per station per year – a total of \$3.5 million (other cities have raised anywhere from \$5,000 to \$16,500 per station per year) – this would leave approximately \$2.7 million to be raised

**Table 8.7: Five-Year Estimate of Demand, Revenue, and Funding Needs**

Description	Year 1	Year 2	Year 3	Year 4	Year 5
	Initial deployment of 39 stations in CBID and Medical District	Continuance of initial deployment and ramp up of demand, plus an additional 17 stations deployed in Midtown and University of Memphis	Continuance of 56 station system and ramp up of demand, plus an additional 7 stations deployed in North and South Memphis	Continuance of 63 station system and ramp up of demand	Continuance of 63 station system to full maturity of the system
<b>Demand</b>					
Bikes	390	525	580	580	580
Trips	170,000	230,000	287,000	338,000	350,000
Trips / Bike / Day	1.19	1.20	1.36	1.60	1.65
Member Trips	120,000	165,000	201,000	237,000	249,000
Casual Trips	50,000	65,000	86,000	101,000	101,000
<b>Membership</b>					
Annual Members	1,300	1,800	2,200	2,600	2,700
Casual Subscribers	23,000	31,000	38,000	46,000	47,000
<b>Cost</b>					
Capital	\$1,950,000	\$850,000	\$350,000	-	-
Launch	\$575,000	\$100,000	\$50,000	-	-
Operating (annual)	\$1,075,000	\$1,425,000	\$1,575,000	\$1,575,000	\$1,575,000
Total	\$3,600,000	\$2,375,000	\$1,975,000	\$1,575,000	\$1,575,000
<b>Revenue</b>					
Access Fees	\$270,000	\$375,000	\$450,000	\$555,000	\$565,000
Usage Fees	\$260,000	\$370,000	\$475,000	\$580,000	\$615,000
User Revenue / Bike	\$1,359	\$1,419	\$1,595	\$1,957	\$2,034
User Revenue / Trip	\$3.12	\$3.24	\$3.22	\$3.36	\$3.37
Secured Funding	\$375,000	-	-	-	-
Funding Required	\$2,695,000	\$1,630,000	\$1,050,000	\$440,000	\$395,000
Five-Year Total Funding	\$6,210,000 (-\$20,000 per station per year)				

from federal grants, transportation fund dollars, local public funding, or other sources.

Interim Funding Scenario

Most likely, the \$6.5 million price tag for the full system over the first five years will be difficult to achieve. If funding capacity is assumed to be smaller, e.g., that grants and public funding can achieve \$1 - \$2 million and corporate sponsorship can yield another \$1 - \$2 million, then a logical scenario would be to initially fund a smaller system while additional funding is being sought to gradually introduce the rest of the system. A sensitivity analysis was conducted on the Financial Analysis to determine the size of system that could be achieved for various initial investments. These are summarized in **Table 8.8**.

**Table 8.8: System Size with Various Levels of Initial Capital**

Initial Investment	System Size	Per Station Per Year Rate
\$1,000,000	14 stations / 140 bikes	\$14,200 per station per year
\$1,575,000	20 stations / 200 bikes	\$15,750 per station per year
\$2,000,000	24 stations / 240 bikes	\$16,400 per station per year
\$3,000,000	35 stations / 350 bikes	\$17,300 per station per year
\$4,000,000	45 stations / 450 bikes	\$17,800 per station per year

It is recommended that no less than a \$1.6 million investment be considered to ensure that the system is of adequate size to get the full benefits of bike share. A \$1.6 million initial investment may come from a combination of:

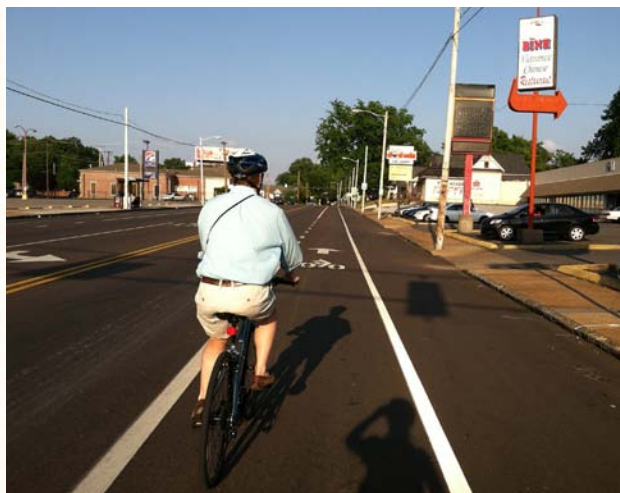
- Sponsorship: \$1.1 million, representing a rate of approximately \$11,000 per station per year, which is comparable to rates achieved in other cities. Sponsorship must be carefully marketed to ensure that a single sponsor would be willing to sponsor additional phases or open the door to other sponsors.
- Other funding: \$0.5 million. This could come from a variety of sources including federal or state grants, a combination of smaller private foundation grants and donations (under a non-profit model), or from local public funds.

Expansion of the system would be funded through continued fundraising efforts (it is recommended that staff continue to pursue federal grants and other public and private funding sources beyond the initial launch of the system), expansion of existing or new sponsorship contracts, and additional revenues coming from membership drives, merchandising, and other revenue streams.

# 9: IMPLEMENTATION PLAN

This section outlines a possible implementation plan for bike sharing in Memphis. It includes identifying the roles and responsibilities of key participants, next steps, a broad timeline, and a summary of potential risks to that timeline.

The first step will be to follow up this feasibility study with a report to Council to gauge the level of political support for bike sharing in Memphis. This report has 'taken the temperature' of other stakeholders and shows general support for bike sharing in the city. Showing this support to Council will show that there are willing partners.



*Bicyclist using Madison Avenue bike lane.*

## **Step 1: Report to Council and determine the level of political support for bike sharing in Memphis.**

Once political support is established, some early decisions need to be made on a business model. As described previously, there are generally three business models that have been applied to bike sharing in the United States:

- Publicly owned / privately operated.
- Non-profit owned and operated.
- For profit business.

There are advantages and disadvantages to each model. As well, each model can be tweaked to fit the needs of the local market, the municipal and/or regional procurement offices, and the funding environment. However, the biggest decision to be made is to determine the reality of a publicly owned system. In particular, it needs to be determined whether the City has the interest, resources, and skills to pursue this model. This will impact the type of RFP that needs to be issued, i.e. either an operating contract only (public ownership model) or an ownership / administration / operating contract (which could be responded to by either a non-profit or private entity).

## **Step 2: Determine if the City has the interest, resources, and skills to pursue a publicly-owned system.**

To date, an existing non-profit has not stepped forward to take on (even interim) responsibility for the program (although few specific approaches have been made and the study has not yet been made public). If no interest is forthcoming, and assuming the City is not interested in a publicly owned system, an Expression of Interest (EOI) to own and operate the system could be issued, which would allow response from any party – including an existing or new non-profit or the private sector.

**Step 3: Depending on interest from the City, issue an RFP to operate the system or an RFEOI to own and operate the system.**

Funding is likely to be the critical path under any model. The system is unlikely to be supported by user fees alone. Grant moneys take time to materialize and may have been tapped out in Memphis from other projects (such as TIGER funding for the Harahan Bridge). Sponsorship can take time to find and non-profits or private owners need to be given time to raise funds and attract sponsors. In other cities potential operators have taken up to 6 to 8 months for fundraising. The chances of finding private sponsors (and meeting a reasonable timeline) are greatly enhanced: (a) if the mayor or other high-profile community leaders assist or support the process; and (b) if there is some level of financial commitment or “match” from the City to show that it has a stake in the system and is looking for a “partnership” rather than relying on the private sector.

**Step 4: Assist with Fundraising including pursuing grants, opening discussions with potential sponsors, and seeking local public funding sources.**

At this stage, only a general timeline can be given without knowing the commitment of potential system owners, sponsors, and operators. Key milestones with estimated time frames are as follows:

- Wrap up feasibility study, decide on business model, prepare staff and Council briefings: 1 - 2 months.
- Issue, respond, and evaluate RFPs: 3 - 4 months.
- Contract with operator: 1 - 2 months.
- Fundraising: 4 - 8 months.
- Preparation and Launch: 6 months.
- Total timeline to launch: 15 - 22 months.

Major risks to the implementation timeline include the following:

- Funding: funding delays in other systems have come from the timeliness of securing and accessing grant funding (typically the less grant money used for a system, the quicker the road to implementation); and the time required to find and secure private sponsors (this is greatly enhanced by bringing some level of public funding to the table).

- Contract Signing: signing a contract with a vendor or with an operator can be delayed as a result of legal and bureaucratic requirements or while service agreements or other agreements are negotiated.
- Naming and Branding: other systems have found that it takes considerably more time than expected to name the system, determine a color scheme, and agree to a logo. These elements affect equipment manufacture, the production of maps, launch of website, etc.
- Installation and Launch: there are a number of unknowns that can arise during the planning, installation and launch periods ranging from equipment delays to staff availability to permitting delays. The latter can be expedited by the relevant permitting agencies defining a streamlined permitting process (e.g. to issue a blanket permit with station siting guidelines that require the operator only to prepare a drawing for review and confirmation).

# 10: SUMMARY

The City of Memphis bears many characteristics supportive of a successful bike share system. Key strengths include:

- A supportive policy environment with recent successes that have established momentum in the growing role of cycling
- Growth of the residential population in the CBID
- A substantial, well-supported tourism industry with internationally-renowned visitor attractions, museums, events, parks and trails
- A large college student population and young residents likely to be early adopters of bike share
- Density of employment and visitor service opportunities in the CBID
- A number of relatively dense mixed-use neighborhoods such as Midtown, the University District and the Medical Center
- Mild winters and moderately hot summers
- Flat, gentle topography
- An expansive transit network with plans for improvements
- A fast-growing bikeway network
- A well-connected street network in the central city that offers potential low-stress bike route options

The primary challenges that the City of Memphis will need to address in planning a bike share system are the separation of land uses and the limited existing bikeway network. There are significant distances between many of the key destinations and between the areas best suited to bike sharing. Those distances require bicyclists to navigate (along or across) large arterial and collector streets in order to access spread out destinations. This can be mitigated by improving bikeway connections between districts, providing a network of comfortable bike routes within bike share districts, and exploiting opportunities for linking transit trips with bike share trips.

An additional (ongoing) challenge is to counter the traditionally auto-oriented culture of the City and continue to make inroads in creating a bicycling culture and an environment supportive of bicyclists.

The identified strengths and potential issues both suggest that the City of Memphis should prioritize implementation of the recommended bikeway facilities of the 2011 *Regional Bicycle and Pedestrian Plan* and collaboration with MATA, the Convention & Visitors Bureau, and the Downtown Memphis Commission as key stakeholders in development of a bike sharing system. Implementation of the recommended bikeway network will improve the conditions for bike share users and reduce

the inconveniences created by separated land uses and destinations. It will also provide a necessary step toward increasing overall levels of bicycling and bicycle mode share in the community. Collaborating with MATA and other partners will allow the City to capitalize on areas of highest density and develop strategies for a bike share network that most effectively serves the needs of tourists, residents, employers, and transit users (or potential transit users) within those specific target areas.