## CONTENTS

**EXECUTIVE SUMMARY**  
V

**CHAPTER 1: INTRODUCTION**  
1

**CHAPTER 2: ELEMENTS OF BIKE SHARE**  
3

2.1 WHAT IS BIKE SHARE?  
4

2.2 BIKE SHARE TECHNOLOGY COMPARISON  
5

2.3 EMERGING TECHNOLOGY TRENDS  
9

2.4 SAFETY  
12

**CHAPTER 3: EXISTING CONDITIONS**  
13

3.1 GEOGRAPHIC CONDITIONS  
14

3.2 LAND USE  
14

3.3 TRANSPORTATION INFRASTRUCTURE  
17

**CHAPTER 4: PUBLIC AND STAKEHOLDER ENGAGEMENT**  
22

4.1 PUBLIC ENGAGEMENT ACTIVITIES  
23

4.2 AGENCY AND ORGANIZATIONAL STAKEHOLDER ENGAGEMENT  
25

**CHAPTER 5: FEASIBILITY RECOMMENDATION**  
27

5.1 PEER CITY ANALYSIS  
28

5.2 BIKE SHARE BENEFITS  
33

5.3 BIKE SHARE CHALLENGES  
33

**CHAPTER 6: SYSTEM PLANNING**  
35

6.1 PRELIMINARY SYSTEM PLAN  
36

**CHAPTER 7: BUSINESS PRO-FORMA**  
48

7.1 GOVERNANCE STRUCTURE  
49

**APPENDIX A: FULL SURVEY RESULTS**  
A1
### FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feasibility study process.</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Bike Share Systems in the United States.</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Process for using bike share.</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Smart dock systems utilize docking points mounted on a heavy platform and connected to a kiosk where transactions occur. Bikes are locked at the docking point.</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Smart bike stations are flexible, allowing the station to be installed around utilities, landscaping and other street furniture.</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Smart bike systems provide the locking mechanism on the bike itself, which provides more flexibility for where the bikes can be parked. Users can check out a bike at the bike itself. Kiosks and customized bike racks can be purchased as optional to replicate the look of a station.</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Green Apple Bikes in Manhattan, KS is a free bike share program that operates with community volunteers.</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Infographic on the Usage of E-Assist Bicycles.</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>Fargo, ND, has one of the highest ridership rates of any bike share system in the United States, partly because the system is integrated with North Dakota State University’s Bison student card.</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Walking and bicycling risk in 68 California cities in 2000. The injury rate reduces exponentially with the number of cyclists using the road system.</td>
<td>12</td>
</tr>
<tr>
<td>11</td>
<td>Safety messaging on the downtube of a Kansas City B-cycle bike.</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Bike share safety features.</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>Percentage of annual trips by elevation change in Seattle’s Pronto Cycle Share.</td>
<td>14</td>
</tr>
<tr>
<td>14</td>
<td>Population Heatmap.</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>Employment Heatmap.</td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td>Existing bike routes in Lawrence.</td>
<td>17</td>
</tr>
<tr>
<td>17</td>
<td>Transit ridership heatmap, based on average weekday boardings and alightings at each stop.</td>
<td>18</td>
</tr>
<tr>
<td>18</td>
<td>Tabling display outside of the Tuesday Farmer’s Market, near the public library.</td>
<td>23</td>
</tr>
<tr>
<td>19</td>
<td>Cards with the address of online engagement tools were handed out at public outreach events.</td>
<td>23</td>
</tr>
<tr>
<td>20</td>
<td>The project team conducted additional outreach to KU students and gathered 693 responses to a short survey.</td>
<td>23</td>
</tr>
<tr>
<td>21</td>
<td>Student responses to the question “For what reasons would you not use bike share?” Students could select more than one answer.</td>
<td>24</td>
</tr>
<tr>
<td>22</td>
<td>Potential Bike Share Demand Heatmap in Lawrence, Kansas.</td>
<td>38</td>
</tr>
<tr>
<td>23</td>
<td>Environmental Justice Zones as defined by the Lawrence-Douglas County FFY 17-20 Transportation Improvement Program.</td>
<td>40</td>
</tr>
<tr>
<td>24</td>
<td>Accessible bike in College Park’s bike share system.</td>
<td>41</td>
</tr>
<tr>
<td>25</td>
<td>Potential Bike Share Stations Suggested by the Public in Lawrence, Kansas.</td>
<td>42</td>
</tr>
<tr>
<td>26</td>
<td>Peer City System Comparison.</td>
<td>45</td>
</tr>
<tr>
<td>27</td>
<td>Proposed Phasing Plan.</td>
<td>46</td>
</tr>
<tr>
<td>28</td>
<td>Governance Structure Chart.</td>
<td>50</td>
</tr>
<tr>
<td>29</td>
<td>Governance Structure of Midwest Bike Share Programs.</td>
<td>51</td>
</tr>
</tbody>
</table>
TABLES

Table 1: Comparison of Smart Dock and Smart Bike Technologies  
Table 2: Bike share Potential Outcomes 
Table 3: System Comparison of Peer City Bike Share Programs 
Table 4: Comparison of University-affiliated systems 
Table 5: Heatmap Weights 
Table 6: System Metrics by Phase 
Table 7: Relationship between System Owners and System Operators 
Table 8: Assessment of Different Bike Share Governance Models in Lawrence, KS 
Table 9: Comparison of Capital Costs for Different Bike Share Technologies 
Table 10: Suggested Fee Schedule for Lawrence Bike Share 
Table 11: Comparison of Model Inputs for Case Study Bike Share cities 
Table 12: Lawrence Bike Share Pro-Forma
EXECUTIVE SUMMARY

The Lawrence-Douglas County Metropolitan Planning Organization (MPO) engaged Toole Design Group (TDG) to explore the feasibility of a bike share program in Lawrence, KS and to explore what a future program might look like including who would use the program, how large it would be, how it would be rolled out, who would own, manage, and operate it, how much it would cost, and how it would be funded. Based on extensive stakeholder and public outreach and a local context analysis, it would be feasible to implement a bike share program in Lawrence. Using best-practice planning principles from around the country, this report provides a framework for a bike share program that can be used by the region’s stakeholders to guide its future development.

BIKE SHARE IN THE UNITED STATES

Bike share programs operate in over 60 cities in the United States including in many mid-sized communities, Midwestern cities, and in numerous cities with a significant university presence. They are a mobility option that allows users to access a network of bicycles that can be checked out automatically and returned to any station in the system. It is typically made available through a subscription fee that is a few dollars for one-day access and $25 to $150 for annual access.

Although there are low-tech bike share options, most modern systems in the United States utilize a variety of technology including radio frequency identification (RFID), Global Positioning Systems (GPS), and secure payment technologies to increase accountability and reduce theft and vandalism. There are two major types of bike share technology: “smart dock” systems that rely on hardware at the station to lock and unlock bikes and “smart bike” systems where the locking and check-out technology is housed on the bicycle itself. Many equipment vendors are also developing electric pedal assist (e-assist) bike share solutions and at least one vendor is already operating e-assist bike share systems in the United States and other parts of the world.

LOCAL CONTEXT ANALYSIS

Bike share fits with many of the City’s policy objectives and is consistent with Horizon 2020, Transportation 2040, the Lawrence Complete Streets Policy, the Countywide Bikeway System Plan, the Climate Protection Task Force, the Douglas County Community Health Plan, and the University of Kansas (KU) Sustainability Plan. Lawrence has a number of features that make it desirable for a bike share program but also a number of challenges.

The City has several areas with high density and a variety of land uses including in Downtown Lawrence and the KU and Haskell Indian Nations University campuses include a significant population of students, faculty, and staff that are likely to be early adopters of a bike share program. However, land use is relatively spread out in other parts of the city and the program would need to be deployed strategically in those areas. The city is relatively flat with the exception of some steep sections between Downtown and KU, which could be addressed through a number of planning, programmatic, and technological solutions, including considering some portion of the fleet as e-assist bicycles. There is a core network of bicycle infrastructure including several shared use pathways and numerous separated on-street bike lanes, but there are also some gaps in the network that do not fully connect the city.

STAKEHOLDER ENGAGEMENT

A comprehensive stakeholder and public outreach process was conducted as part of this project, which included in-person outreach and meetings with the Bike Share Steering Committee, the Lawrence-Douglas County Bicycle Advisory Committee, key community stakeholders representing over 26 individuals from 23 organizations, stakeholder field trips to Topeka Metro Bikes and Kansas City B-cycle, three tabling events to outreach to the general public, and online outreach in the form of a long- and short-form survey and an online map where people could suggest bike share stations. These were promoted by bus advertisements, media articles, listserv notifications, social media distribution, and specific tabling events on the KU campus to invite participation from KU students.

Bike Share in 4 Easy Steps

- sign up
- check out
- ride
- dock
The response to public outreach was excellent with over 500 people completing the full-length survey and almost 700 students responding to the short-form student survey. In general, bike share had broad support both from the public and from stakeholders. Almost three-quarters of respondents to the full-length survey (74%) thought bike share is a good idea for Lawrence and just over half (52%) said that they would use bike share if it were available in Lawrence. Many people saw that the biggest opportunities are to connect students with downtown and give residents another transportation option. The biggest concerns were a lack of bicycling infrastructure, steep terrain, and finding funding for the system.

Students responded that they were more likely to use bike share, and would use it more often than the general public. Eighty-one percent (81%) of students responding to the short-form survey supported bike share, and 70% supported using student fees to pay for a bike share system if the fees guaranteed some amount of free ride time per day. When asked for potential reasons why they might not use bike share, most students said that they did not want to ride up hills or preferred their current mode of transportation.

Overall, stakeholders were generally interested in the idea of a bike share program and saw its potential in delivering an additional mobility and recreation option for Lawrence residents. Stakeholder discussions focused on the potential governance structure, equity concerns, and funding options.

**FEASIBILITY RECOMMENDATION**

Based on the local context analysis and stakeholder engagement process, bike share is feasible in Lawrence. There are a number of ways that a bike share system could benefit Lawrence and many characteristics that support its implementation. The KU campus in particular, is well placed to initiate a bike share program to capitalize on student, staff, and faculty interest as early adopters of bike share. The concept of a bike share program was well received by the public and local stakeholders. However, a number of challenges will need to be addressed including a lack of bicycling infrastructure in parts of the city, steep terrain, and finding funding for the program.

**SYSTEM PLANNING**

A demand analysis was conducted to help understand where the system is expected to be the most used. A number of demographic and geographic data points were used in this analysis including population and employment density, major attractions and destinations, and proximity to transit. The analysis showed that the highest potential for bike share is in Downtown and on the KU campus. These areas provide a broad and generally contiguous area that would be the core of the system. In addition to the main service area, bike share stations could be well used for recreation at regional parks such as Rock Chalk Park and the Rotary Arboretum.

Social and geographic equity were identified as high priorities by the public and stakeholder groups. The bike share program should broaden its spectrum of users by focusing on the following equity goals:

- Increasing access to the system by increasing the number of station locations in historically underserved and transit-dependent communities.
- Supporting the development of more comfortable bicycle infrastructure throughout the City.
- Reducing the barriers to entry like up-front costs and payment requirements.
- Providing a targeted and context-sensitive outreach campaign.

Boundaries for the service area of the program were developed based on the results of the demand analysis, potential station locations identified by the public as part of the online crowdsourcing map, and adjusted to
include contiguous Environmental Justice Zones defined in the 2017-2020 Transportation Improvement Program. The resulting areas were divided into phases to represent a possible roll-out of the system and the number of stations calculated based on station densities observed in peer cities. The proposed phasing plan is summarized in Table E1 and shown on Figure E1. However, the size of each phase is flexible depending on the amount of funding available and the bike share equipment vendor selected and it may be prudent to split the first phase into more manageable parts starting on the KU campus and a few stations Downtown and then growing the system outwards. There may also be locations where it is prudent to time the deployment of stations with redevelopment, with new bicycling infrastructure, or with new investment into the program.

Table E1: Proposed Phasing Plan

<table>
<thead>
<tr>
<th>PHASE</th>
<th>SERVICE AREA (MI²)</th>
<th>PERCENT OF CITY AREA</th>
<th>STATIONS</th>
<th>DOCKS</th>
<th>BIKES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.2</td>
<td>12%</td>
<td>33</td>
<td>495</td>
<td>291</td>
</tr>
<tr>
<td>2</td>
<td>4.0</td>
<td>12%</td>
<td>28</td>
<td>420</td>
<td>247</td>
</tr>
<tr>
<td>Total</td>
<td>8.2</td>
<td>24%</td>
<td>61</td>
<td>915</td>
<td>538</td>
</tr>
</tbody>
</table>

Figure E1: Proposed Phasing Plan

Bike Routes
- Bike Lane
- Bike Route or Shared Lane Marking
- Shared Use Path

Potential Service Area
- University
- Lawrence City Limits
- Parks
PROPOSED GOVERNANCE STRUCTURE

One of the key decisions for any bike share program is to determine who will own, manage, and operate the program. Existing U.S. bike share programs operate under different governance models depending on the local environment but can be broken into four broad categories – agency owned, non-profit owned, privately owned and operated, and systems operated by other entities.

Each of these governance models was explored in the context of Lawrence and it was found that the models with the most potential were a program owned and operated by a newly formed non-profit or a University-owned program that could expand later into the City and other areas. Follow-up discussions with KU Parking & Transit showed a strong interest in housing the program to complement existing transit services on campus and to help in the transition to fixed lot parking permits. There are a number of templates of this model around the country including at Purdue University, where the program is run by the Office of Sustainability and was recently expanded through Memoranda of Understanding with the Cities of Lafayette and West Lafayette.

If the university were to take on the program they would need to:

- Continue to build support amongst the student body and university leadership and show that students support its development. The support of the Student Senate will also be critical. Create a coordinating steering committee comprised of various University of Kansas departments, City of Lawrence representatives, and other entities as needed. This coordinating steering committee will continue to explore project development by establishing a work plan and determining financial possibilities.
- Identify funding for initial seed money to hire staff and purchase equipment and ongoing operating funds for the portion of the program on the KU campus. Other partners will be responsible for funding for their parts of the program.
- Build staff capacity to oversee the program. These needs will depend on whether or not the program is contracted out to a third party operator, or if KU Parking & Transit decides to build internal capacity to operate the program.
- Secure the appropriate approvals and permits for stations on the campus.
- Procure equipment and other vendors providing third-party services, including other stakeholders in this process if permitted by the procurement rules.

PROJECTED COSTS AND REVENUES

Cost, ridership, and revenue projections for the program were determined based on observed performance of peer systems, the proposed size and phasing of the program, and an assumed user fee structure. The capital cost to implement the entire program is likely to be between approximately $2.4 and $4.0 million over the next five years depending on the type of technology and the vendor. These costs include the purchase of the equipment (including the bicycles and stations), replacement parts, and station siting.

The program will also require ongoing operating funding. It will recover some of its operating costs through collection of membership and usage fees – expected to be around 40-percent. The additional 60-percent of operating costs could be recovered from a combination of sponsorship, advertising, private, or student funding. Cost efficiencies could be gained from housing the program in an existing entity such as KU Parking & Transit and utilizing existing services, staff, and equipment. Funding is likely the critical path to implementation and so it is recommended that community partners form an exploratory committee to help secure funding for the program.
CHAPTER 1
INTRODUCTION
The Lawrence-Douglas County MPO engaged Toole Design Group (TDG) to assist the MPO in exploring options for a bike share program in Lawrence, Kansas. This feasibility study provides a document that can be shared with stakeholders in the region to move forward with the implementation of a program.

The plan provides an overview of what a bike share program could look like in terms of its users, its size, phasing, and organizational structure as well as providing financial estimates for capital purchases and operating costs. The plan was developed using the process outlined in Figure 1, which included analyzing current industry trends, a community analysis and public and stakeholder outreach, making a feasibility recommendation, undertaking system planning, an assessment and recommendation of a governance structure, and a financial analysis.

The report includes the following chapters:

**Chapter 2: Elements of Bike Share** presents an overview of bike share in the United States, including a discussion of technology types and emerging trends.

**Chapter 3: Existing Conditions** summarizes existing conditions in Lawrence, including geographic, land use, and transportation infrastructure conditions, and provides an overview of local policies.

**Chapter 4: Public and Stakeholder Engagement** discusses the public and stakeholder outreach efforts undertaken as part of the project, and summarizes online and in-person survey results.

**Chapter 5: Feasibility Recommendation** discusses the feasibility of bike share in Lawrence, focusing on the opportunities and challenges to implementing a program. Program goals are also presented in this chapter.

**Chapter 6: System Planning** explores system planning principles and describes phasing recommendations, including the number of bikes, stations, and docks for a bike share system in Lawrence.

**Chapter 7: Business Pro-Forma** explores different governance structures and recommends a structure that will meet the needs of the program in Lawrence. This chapter also includes a financial pro-forma for the program and presents a potential funding plan that the program owner could pursue.

---

**Figure 1: Feasibility study process**
CHAPTER 2
ELEMENTS OF BIKESHARE
2.1 WHAT IS BIKE SHARE?

Bike share is a mobility option that allows users to access a network of bicycles that can be checked out automatically and returned to any station in the system. It is typically made available through a subscription fee that is a few dollars for one-day access and $25 to $150 for annual access. There are over 60 bike share programs operating in the United States, some of which are shown in Figure 2, and at many more in various stages of planning. Bike share has become an effective low cost mode of transportation for short trips. Most trips in existing U.S. bike share systems are between 15 to 35 minutes duration and between one and three miles long. Common trip types include connecting with transit, commuting, social/entertainment trips, and recreation.

Bike share is different from bicycle rental in that it functions more like a transit system, encouraging short trips and high turnover by using a fee structure that charges higher rates the longer a bicycle is checked out.

Most existing U.S. bike share programs are automated and do not require on-site staff to check out or return bikes. To provide easy access and increase accountability, systems utilize radio frequency identification (RFID), Global Positioning Systems (GPS), and secure payment technologies. The systems are easy to use, allowing members to sign up online or at a station. They provide comfortable and adjustable bikes to fit most adults. The process for using bike share is shown in Figure 3.

Figure 2: Bike Share Systems in the United States

Bike Share in 4 Easy Steps

Figure 3: Process for using bike share.

sign up  check out  ride  dock
2.2 BIKE SHARE TECHNOLOGY COMPARISON

The two most common bike share technologies in the United States are the “smart dock” and “smart bike” systems. The primary difference between these two technologies is where the electronics and locking features are housed.

SMART DOCK

Smart dock systems utilize an electronic terminal (kiosk) where users can complete payment transactions and which communicates with a series of connected docks and remotely with a central computer. The components of a smart dock station are shown in Figure 4.

Users can sign up for the program online before going to a station, at the station kiosk, or using a mobile app. Debit card, cash, and other payment types are available in many systems. Longer-term members are provided with an RFID card or fob that can be used to check-out bikes directly from the dock, allowing them to bypass the kiosk. Casual users without an RFID card or key fob must use the kiosk to release a bike.

Station components are typically mounted on heavy steel plates and held in place by their own weight or with bolts connected to the pavement. Because the docks are wired together, smart dock stations require a contiguous area to place the station.

The primary advantage of smart dock stations is that they provide users with the predictability of knowing where to find a bike. Their presence as a permanent part of the transportation infrastructure will garner attention from passers-by and maximize opportunities for self-promotion of the system. The stations are designed to maximize branding and opportunities for sponsorship and/or advertising.

RFID Card/Fob: A card or fob allowing users to check out a bicycle directly from the dock.

Figure 4: Smart dock systems utilize docking points mounted on a heavy platform and connected to a kiosk where transactions occur. Bikes are locked at the docking point.
SMART BIKE

Smart bike systems house the technology on the bike itself, including a PIN pad, lock, and a GPS unit. Users sign up for the program online or via a mobile app and check out a bike by entering their PIN code on the bike itself. Most vendors also offer customized bike racks, information panels, and payment kiosks to recreate the feel of a station. If the station has a kiosk, casual users can pay for a membership at the kiosk. The components of a smart bike station are shown in Figure 6.

The primary advantage of smart bike systems is flexibility and cost. A smart bike system could be set up with just the bicycles, utilizing existing bike racks to minimize capital costs. However, most smart bike vendors offer add-on features such as branded bike racks and payment kiosks to recreate the features of a smart dock station and encourage users to return the bike to a station. Stations can be split up to avoid utilities, street trees, and other street furniture (Figure 5). Users have more flexibility in where they can park, which can make it less predictable to find a bike. The system relies more on smart phone technology for users to locate bikes that are not at a station. The GPS unit on each bike allows smart bike operators to find bikes in the field and to “geo-fence” an area around a station so that if a station is full, a user can park the bicycle at a nearby bike rack without incurring an out-of-station fee.

Because there are fewer hardware components, smart bike systems are generally less expensive than smart dock systems. Operating costs are generally similar to smart dock systems.

Figure 5: Smart bike stations are flexible, allowing the station to be installed around utilities, landscaping and other street furniture.

Figure 6: Smart bike systems provide the locking mechanism on the bike itself, which provides more flexibility for where the bikes can be parked. Users can check out a bike at the bike itself. Kiosks and customized bike racks can be purchased as optional to replicate the look of a station.
Both systems require rebalancing (moving bikes from one station to another to meet demand), but since smart bikes can be docked out of a station, more effort may be required to access bikes to perform maintenance checks, rebalance the system, and replace batteries. Both systems utilize solar power and wireless communications and require no excavation, although smart dock systems offer the option to connect the station to the power grid. A comparison of the two technologies is included in Table 1.

Table 1: Comparison of Smart Dock and Smart Bike Technologies

<table>
<thead>
<tr>
<th></th>
<th>SMART DOCK</th>
<th>SMART BIKE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAPITAL PURCHASE PRICE</strong></td>
<td>Less than other transit options, but more expensive than smart bike.</td>
<td>Less expensive than smart dock. Exact pricing depends on how many kiosks and custom bike racks are to be included.</td>
</tr>
<tr>
<td><strong>OPERATING COSTS</strong></td>
<td>Includes maintenance, cleaning, marketing, customer service, staffing, etc. Similar to smart bike systems.</td>
<td>Similar to smart dock systems, though rebalancing costs may be slightly higher if bicycles are routinely docked out-of-hub.</td>
</tr>
<tr>
<td><strong>VISIBILITY</strong></td>
<td>Smart dock systems have a physical presence that draws attention. The system can be branded and maximizes space for logos, branding, sponsorship, or advertising.</td>
<td>Station permanence and branding is flexible. Customized bike racks, kiosks, and map panels can be purchased to increase visibility to be similar to smart dock systems. A less expensive system can be provided by using small stations with regular bike racks, but reduces visibility of the system.</td>
</tr>
<tr>
<td><strong>ACCESSIBILITY</strong></td>
<td>Users can sign up in advance online or via mobile app or at any station using a credit card. Debit, cash, and other membership types are possible.</td>
<td>Not all stations have kiosks and so users may have to sign up online or via smartphone. Debit, cash, and other membership types are possible.</td>
</tr>
<tr>
<td><strong>PREDICTABILITY</strong></td>
<td>Smart dock stations provide reliable locations where users can find a bicycle.</td>
<td>Smart bikes can be parked anywhere, although users are encouraged to return the bike to a station. Out-of-hub fees can be set at the operator’s discretion to provide additional incentive for users to return the bikes to a station.</td>
</tr>
<tr>
<td><strong>FLEXIBILITY</strong></td>
<td>Users must park the bicycle at a docking point, limiting the number of destinations that can be served. If a station is full, the user must find another station.</td>
<td>Users can park a bicycle outside a station. Operators can geo-fence an area around the station so that if a station is full, the user can park their bike at a nearby bike rack.</td>
</tr>
<tr>
<td><strong>STATION SITING</strong></td>
<td>Because the docking points all need to be connected to the kiosk, station locations need a long, contiguous space free of utilities and street furniture.</td>
<td>Each dock (rack) is independent so stations can be contiguous or split to go around utilities and street furniture.</td>
</tr>
</tbody>
</table>
LOW-TECH BIKE SHARE SOLUTIONS

There are lower tech bike share options available. These programs have a lower capital cost, but often are applied with less oversight and are not as effective at delivering a city-wide bicycle transit solution.

Green Apple Bikes in Manhattan, KS offers a free bike share service that uses inexpensive bikes distributed at nine designated stations in the city, though the bicycles can be left unlocked anywhere in the city. The capital cost of this system is much less than an automated bike share system; approximately $300 per bike and the program budgets for replacement of the entire fleet each year. Similar free bike programs tend to have less oversight, are generally less visible (compared to smart dock and smart bike systems), are marketed through word of mouth, and are often less reliable (given that bikes could be anywhere in the city). The Manhattan program has been successful by recruiting local business sponsors and a dedicated team of volunteers to maintain, retrieve, and rebalance the bicycles.

Manhattan is one of very few free bike programs operating in the United States (Figure 7). A well-known example of a similar program was Portland’s Yellow Bike program that operated in the 1990s with refurbished bikes distributed around the city. These were free to use and could be left anywhere. The bikes were eventually all stolen, vandalized, or fell into disrepair and the program was discontinued after three years.

Variations on low-tech bike share solutions are a bike library similar to the Fort Collins Bike Library, which has a number of locations where a bicycle can be checked out, or a bicycle co-op where abandoned bikes are refurbished and given away in exchange for volunteer time or sold to the public.

Although a high-tech solution, “smart lock” systems are similar to free bike systems in that they can use any type of bicycle. Smart lock systems consist of a fleet of bicycles each equipped with a Bluetooth-enabled U-lock. Members must have a Bluetooth-enabled smartphone to unlock a bike. Stations can be set up using branded bike racks, but the bicycles can be parked anywhere, and so function similar to a smart bike system. There are no city-scale smart lock systems operating in the U.S.
2.3 EMERGING TECHNOLOGY TRENDS

E-ASSIST BICYCLES

Electric pedal-assist (e-assist) bicycles are becoming more popular and are being introduced into bike share systems. Birmingham, AL was the first U.S. city to implement an e-assist bike share system. Approximately one quarter of its fleet consists of e-assist bicycles. Since then, other cities including Richmond, VA, Baltimore, MD, and Seattle, WA have announced that they will launch e-assist bike share programs. Almost all bike share equipment vendors are developing an e-assist bike share solution, although few are currently operating.

E-assist bicycles can reduce some of the barriers to bicycling including overcoming steep topography, extending the distance that someone can comfortably ride, improving access for the aged and disabled, and reducing the effects of hot weather (see Figure 8). Research has shown that e-assist bicycles encourage people to be active and that the effort expended does increase the heart rate and can deliver many of the same benefits as regular bicycling.

Additional station infrastructure is required for an e-assist bike share program. Stations must have larger solar panels, connection to the power grid, or more frequent battery replacement. E-assist capital costs are approximately 20-percent higher than regular bike share and although there are more components on an e-assist bike, operators suggest that maintenance is similar to standard bike share systems. If there is a problem with the electric motor, the operator simply removes the assembly and sends it back to the manufacturer for repair or replacement. Given the power draw of the e-assist feature, these systems may require more frequent battery replacement.

OTHER TOPOGRAPHY SOLUTIONS

Most cities consider e-assist bicycles when dealing with steep topography, such as the steep hill between Downtown Lawrence and the University of Kansas. Apart from e-assist bicycles, some other techniques for addressing the steep topography include:

- Additional gearing: bikes can be ordered with up to 8 gears. Relatively flat cities such as Kansas City and

![Figure 8: Infographic on the Usage of E-Assist Bicycles](image-url)
Topeka use bikes with three gears; hillier cities such as Seattle and San Francisco have bikes with seven or eight gears.

- **Uphill ride credits:** some systems in Europe provide credits for riders that take bikes back to the top of a hill. This can help to reduce rebalancing costs, though the effectiveness of these programs is unclear.

- **Marketing:** embracing the challenge of the hills could be a part of the bike share operator’s marketing. For example, they could run a “King of the Mountain” competition, offering prizes or incentives for users taking the most trips uphill.

- **Integrating with other modes:** co-locating bike share stations with transit, car share, and other transportation options provides alternatives to travel back up the hill.

- **Smart system design principles:** placing stations along gentler slopes and showcasing these routes on station maps and promotional materials.

---

**COLLEGE AND UNIVERSITY SUPPORT AND INTEGRATION**

Fargo, ND has one of highest ridership bike share programs in the United States (approximately 6.5 trips per bike per day). This is primarily because the bike share membership is included with student fees (an estimated $5 per student per year goes to bike share)¹ and is integrated with the North Dakota State University Bison student ID card (Figure 9). Students sign up for the bike share program online and can then tap the Bison card at a dock to access bike share. There are four stations located on campus and seven downtown stations. An analysis of 2015 ridership data shows that 95% of trips were taken by students, which make up approximately 13% of the general population of Fargo.

Including the University of Kansas and Haskell Indian Nations University as partners and integrating with their student ID card systems could greatly increase the success of a bike share system in Lawrence. There are a number of potential challenges that will need to be addressed. First, the operator would need to reach agreement with each university for how student memberships would be

---


---

*Figure 9: Fargo, ND, has one of the highest ridership rates of any bike share system in the United States, partly because the system is integrated with North Dakota State University’s Bison student card. (Source: NDSU)*
purchased. This could be through an increase in student fees for full memberships for every student, discounted memberships for those who choose to join, or merely a simplified sign-up process for students. Second, the equipment chosen would need to have multi-frequency radio-frequency identification (MFRFID) capabilities. Last, the student ID card needs to be an RFID card and the RFID frequency needs to be compatible with the vendor’s MFRFID readers (some card vendors offer encrypted products that are not compatible).

**TRANSIT INTEGRATION**

Bike share systems and transit are naturally complementary. A successful transit system offers a seamless transition between multiple modes and bike share can expand the catchment area served by a transit stop beyond walking distance. In the U.S., bike share systems are moving further towards integration with other transit systems. As shown from other cities, proper integration increases overall mobility and the potential pool of riders.

Integration of transit and bike share could occur on a spectrum on five different levels. These include:

**Level 1 – Geographic Integration**

Stations are placed at or near transit stops. Several systems have utilized Federal Transit Administration grants (e.g., Chattanooga, TN and Boston, MA) and others are utilizing new federal grant funding rules to place bike share stations within a three-mile radius of transit stops.

**Level 2 – Station Branding and Bike Share Marketing Integration**

Bike share and transit is co-branded and co-marketed. For example, Tucson, AZ is considering co-branding their bike share system as Sun Bike, which would be consistent with their bus and streetcar transit systems, Sun Tran and Sun Link.

**Level 3 – Semi-Integrated Fare Payment**

A separate bike share payment chip is placed on the transit fare payment card to allow a single card to be used for bike share and transit fare payment. However, the back-end financial processing systems are separate and users would need to maintain two separate accounts. For example, Los Angeles Metro recently launched a bike share program that allows transit users to add bike share membership to their TAP card. In this case, when members sign up for bike share, either the transit agency or the bike share operator creates a new TAP card with both a transit chip and a bike share chip.

**Level 4 – Fully Integrated Fare Payment**

Transit fare and bike share payment systems are fully integrated into one account with a single card that can be used to pay for all transit modes. In the U.S., there are no bike share systems that have implemented a fully integrated fare payment. Bike share vendors have begun to explore backend integration, however there are technical and contractual issues that have to be overcome.

**Level 5 – Operations, Maintenance, and Oversight Integration**

In this scenario, the bike share system is owned and operated by the transit agency, similar to the models implemented in Boise, ID and Topeka, KS.

At this stage, levels 1, 2, and 5 are possible in Lawrence. However, levels 3 and 4 are not possible because Lawrence Transit does not currently use electronic ticketing. If Lawrence Transit were to develop a smart card fare payment structure in the future, integration with bike share should be considered.

**FLEXIBILITY**

Most equipment vendors are adapting to the changing needs of bike share in the United States. This includes incorporating different payment technologies and fare payment media such as transit passes and student cards, developing e-assist bicycles, and developing hybrid systems that can act as either smart dock or smart bike systems.

Understanding how quickly the bike share technology market evolves, it is recommended that the technology options be left open during the Request for Proposals (RFP) to encourage equipment vendors responding to the RFP to showcase their latest innovations in equipment.
2.4 SAFETY

Although bike share is a relatively new transportation option in the U.S. (the oldest systems are in their seventh year of operations), its safety record is impressive. Only one bike share fatality has occurred in a U.S. system, and the rates of injury crashes are lower than private bicycling.²

Bike share’s safety record is helped by a number of factors:

- Safety in numbers
- Opportunities for bicycling education and advertising the rules of the road
- The bicycles’ safety features

The “safety in numbers effect” is well established. A study published in Injury Prevention in 2003 showed that the “likelihood of a person walking or bicycling being struck by a motorist varies inversely with the amount of walking and bicycling” (Figure 10).³

Bike share media and equipment may include safety messaging, and many systems have included tips on bike handle bars, down tubes, or other visible locations (Figure 11).

The comfortable and upright design of bike share bicycles, built in safety features (see Figure 12), and regular maintenance likely contribute to the good safety record.

---


CHAPTER 3
EXISTING CONDITIONS
To determine the feasibility of a bike share program, it's important to understand the local context. This section discusses factors that may influence the feasibility of a bike share system in Lawrence (or influence the type or focus of the system). These factors include:

- Geographic conditions
- Existing and future land use
- Existing transportation infrastructure
- Local policy environment

### 3.1 GEOGRAPHIC CONDITIONS

Lawrence experiences typical Midwestern weather, from very hot, humid days in the summer to cold, snowy winters. Additional weather factors, including wind, rain, and storms, may influence bicycling patterns. Although there are likely to be seasonal impacts on ridership during the winter, the bike share system would be expected to remain open as a smaller system year-round. The benefits of providing reliable, year-round service likely outweigh the cost to remove and store the equipment. Winter weather is variable and could provide days or times where bicycling conditions are more favorable.

Topography is an important consideration for a bike share system in Lawrence. Most of the city is relatively flat, but KU sits on a steep plateau. San Francisco and Seattle are examples of hilly cities that have implemented bike share. Both systems started with seven gear bikes; Seattle will soon transition to an e-assist system. Figure 13 shows trip distribution by elevation change in Seattle; downhill trips accounted for 24% of overall trips, while uphill trips only accounted for 8% of trips. A system in Lawrence would likely have to redistribute bikes back to the KU campus after being ridden downhill. E-assist bicycles and incentive programs to encourage riders to return bikes up the hill may have an effect in counteracting this.

**Figure 13:** Percentage of annual trips by elevation change in Seattle's Pronto Cycle Share.

### 3.2 LAND USE

Bike share is most successful where there are high concentrations of population and employment and a mixture of land uses. Lawrence's population densities (Figure 14) are fairly dispersed, with higher densities near downtown and at student housing on the KU campus. Employment densities (Figure 15) are focused on the university and downtown. Outside of these areas, land use tends to be relatively low density and single use. Expanding the system into these areas will require careful planning and a focus on destinations.

A mixture of land uses is important to activate bike share during different parts of the day. Key destinations include university and college campuses, medical facilities, restaurant and entertainment districts, and parks. Encouraging mixed use in land use codes will provide a supportive environment for bike share. Additional analysis of land use variables is included in the System Planning chapter.
Figure 14: Population Heatmap (data from 2010 Census).
Figure 15: Employment Heatmap (2014 data from onthemap.ces.census.gov).
3.3 TRANSPORTATION INFRASTRUCTURE

Lawrence has several highways crossing through the city (US-40, US-59, and K-10). These roads are wide with high volumes of vehicle traffic, and have limited crossings, providing easy access by car but posing a barrier to bicycle and pedestrian travel. Parking downtown is relatively available and inexpensive, with many free, two-hour spots. Metered spots cost $1 for 2-10 hours with fines of $5, and 10 hour lots have an annual fee of $192. KU on-campus parking is more limited and permits will cost between $275 and $520 for the 2016-2017 school year.

In terms of bicycling infrastructure, Lawrence has several separated shared-use pathways and plans for more, but is missing some key bike facilities to fully connect the city. The existing network of bicycle facilities is shown in Figure 16. The MPO Countywide Bikeway System Plan recommends a connected network of bicycle facilities that would provide bike share users with low-stress routes

Figure 16: Existing bike routes in Lawrence (data from Lawrence-Douglas County MPO, May 2016).
throughout the city. Bike share could provide additional impetus to prioritize these and other bike infrastructure segments.

Lawrence Transit, in conjunction with KU on Wheels, operates 18 bus routes throughout the city. Figure 17 shows a heatmap of transit ridership. The transit heatmap shows that most activity occurs at the KU campus.

While the bus system is relatively robust (appropriate routes are transitioning to frequencies of 30 minutes or less during peak times), the system does not provide a 24/7 frequent network of routes. Fixed routes typically begin at 6 or 7 a.m. and do not run past 7 or 8 p.m. Lawrence Transit offers Night Line service between 8 p.m. and 6 a.m. However, the night service requires rides to be scheduled in advance, which can be difficult for spontaneous trips.

Figure 17: Transit ridership heatmap, based on average weekday boardings and alightings at each stop.
Bike share is available 24/7, and could be an additional transit option when buses are not running, or a more convenient replacement for short bus trips. Bike share could provide increased access to the transit system by providing a first or last mile connection to the bus.

3.4 GOALS AND POLICIES

Bike share is in line with many of the City’s goals outlined in various plans and policies, including the Countywide Bikeway System Plan, Lawrence Complete Streets Policy, Transportation 2040, and Horizon 2020.

COUNTYWIDE BIKEWAY SYSTEM PLAN

The vision of the Countywide Bikeway System Plan is: “To advance bicycling as a safe and efficient means of transportation through facility development, educational programs, and progressive governmental policy, with the ultimate goal of connecting Lawrence and Douglas County’s areas and neighborhoods, improving quality of life, and meeting transportation and recreation needs.”

The Countywide Bikeway System Plan recommended a bike share system as a potential improvement to meet the goals of the plan.

The study suggested that “a small system could be supported in the Downtown area and University of Kansas area” and “a full bike share feasibility analysis should be conducted to determine if such a system could work and how it would be funded.” The Countywide Bikeway System Plan was the precursor for this study.

LAWRENCE COMPLETE STREETS POLICY

On March 27, 2012, the Lawrence City Commission approved the Lawrence Complete Streets Policy.

The policy uses an “interdisciplinary approach to incorporate the needs of all users into the design, construction, and maintenance of public and private transportation infrastructure within Lawrence where feasible and fiscally appropriate.” Further, the policy “establishes guiding principles and practices to create an equitable, balanced, and effective transportation system that encourages walking, bicycling, and transit use, to improve health and reduce environmental impacts, while simultaneously promoting safety for all users of streets.”

Bike share provides a new transportation option to encourage more bicycling and active transportation. The Complete Streets Policy is complementary to providing more comfortable and safe facilities for these users.

TRANSPORTATION 2040

Transportation 2040 has an entire chapter dedicated to expanding bicycle and pedestrian transportation in the region. The chapter concludes with 12 Action Steps, many of which are encouraging of bike share.

While none of the Action Steps specifically call out bike share, many of them will create a more comfortable bicycling environment, and bike share will help to achieve these goals. Action Step 8, which calls for planning and construction of bicycle and bicyclist amenities, will encourage more bicycling by people who aren’t regular bicyclists.

HORIZON 2020

Horizon 2020 is the current Comprehensive Plan for Lawrence and Unincorporated Douglas County. In 2014-15, an update to this plan led to the formation of an Issue Action Report, identifying concerns that needed review due to the community’s changing needs. Bike share may play a role in helping to address some of these issues. Out of 19 total issues, the following 8 were identified as those which bike share could help to address:

1. Create Employment Opportunities

   Bike share can help create access to employment for those who cannot afford a personal vehicle and may live beyond walking distance from employment or transit.

2. Address Quality Housing for All Incomes

   Affordable housing is sometimes not available within walking distance of employment or transit. Bike share can help expand the areas in which people can live by providing an additional transportation option.

Chapter 3: Existing Conditions
3. **Consider Increasing Height/Density in Appropriate Locations**
   Bike share works particularly well for short commuting trips, something that increased density would help to achieve.

4. **Create Quality Neighborhoods for All Ages**
   Bike share can be an amenity that contributes to quality neighborhoods.

5. **Manage future Lawrence growth**
   Similar to issue #3, bike share can support anti-sprawl policies.

6. **Plan for the size and location of retail development**
   Bike share can help increase economic activity at retail locations.

7. **Provide opportunities for small neighborhood retail**
   Bike share can connect residents to small commercial/retail spaces and mitigate the need for large parking areas.

8. **Encourage infill development**
   Bike share can support higher-density land development with limited dedicated space for parking.

**CLIMATE PROTECTION TASK FORCE**

In 2008, a Task Force on Climate Protection was formed and presented a Climate Protection Plan to the Lawrence City Commission on March 31, 2009. Strategy #4 in this plan was to “develop transportation policies and programs to consume less energy and reduce emissions.” Bike share will address this strategy by offering an additional sustainable mode of transportation in Lawrence.

**DOUGLAS COUNTY COMMUNITY HEALTH PLAN**

The 2013 Douglas County Community Health Plan, “Roadmap to a Healthier Douglas County”, includes physical activity as an important component of the plan, with a goal of creating "an environment and culture... that makes physical activity easier and more rewarding for people of all ages and abilities." A bike share system allows residents easy access to bicycles to use for transportation and recreation, thereby increasing physical activity and the community’s overall health.

**KU BIKE MASTER PLAN AND KU SUSTAINABILITY PLAN**

Both of these KU plans include goals to increase the percentage of students, faculty, and staff that bike to campus. Bike share is included as a way to achieve this goal.

**POLICY SUMMARY**

Implementation of a bike share system will bring Lawrence and the region closer to the goals and policies in these documents.

Table 2 illustrates how a bike share system can be used as a tool to help cities reduce environmental impact, increase transportation options, improve public health, provide economic development, increase tourism, and contribute towards equity goals.

Some of the other specific policy issues that may need to be explored further include:

- Reviewing local policies, including policies on KU and Haskell campuses, on the use of street furniture sponsorship and advertising. These revenues will help offset the operating cost of a bike share program. There may be precedents with existing street furniture or bus shelter advertising models.

- Understanding station permitting processes and whether bike share stations are an appropriate use of public right-of-way and the permits that will be required for installing stations. Many cities develop special permits to allow bulk permitting of stations.

- A lack of bicycle infrastructure may be a barrier to some riders and may encourage others to ride on the sidewalk, which is not allowed downtown.
### Table 2: Bike Share Potential Outcomes

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Measures</th>
<th>How Achieved Through Bike Share</th>
<th>Potential Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emissions and Climate Reduction</strong></td>
<td>GHG, particulate, and other emissions</td>
<td>Mode shift to bicycle trips</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Number of single occupant vehicle (SOV) trips</td>
<td>Mode shift to bicycle trips</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Vehicle Miles Traveled (VMT)</td>
<td>Mode shift to bicycle trips</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Increase Mobility</strong></td>
<td>Mode of access to transit</td>
<td>Reduces the need for auto parking</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>First and last mile connections</td>
<td>Provides additional transportation option</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Bicycles on board transit</td>
<td>Reduces need for private bicycles to be carried on buses, if bike share stations are located near transit stops.</td>
<td>High</td>
</tr>
<tr>
<td><strong>Improve Public Health</strong></td>
<td>Minutes of physical activity</td>
<td>Increase in active transportation</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Bicycle mode share</td>
<td>Overall increase in all bicycling</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Reduced barriers to entry to encourage bicycling</td>
<td>Increase in new bicyclists</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Increase in Economic Development</strong></td>
<td>Increased spending in retail and commercial areas</td>
<td>Increases non-motorized access to retail and commercial areas</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Trips to commercial areas</td>
<td>Improves access to areas where parking may be constrained</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Connect to major employment centers</td>
<td>Inclusion of bike share in employer Transportation Demand Management programs</td>
<td>High</td>
</tr>
<tr>
<td><strong>Encourage equity and greater participation</strong></td>
<td>Provide an affordable mobility option</td>
<td>Change in household transportation costs</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Provide opportunities for all residents to participate in the program</td>
<td>Participation from low income and minority populations</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Increase in Tourism</strong></td>
<td>Connect attractions and encourage visitor spending</td>
<td>Increased visitor attendance at local attractions</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Provide a unique visitor experience</td>
<td>Number of casual bike share users</td>
<td>Medium</td>
</tr>
</tbody>
</table>
A comprehensive stakeholder and public outreach process was conducted from early June to late September 2016. In-person outreach included meeting with the Bike Share Steering Committee and the Lawrence-Douglas County Bicycle Advisory Committee, three stakeholder meetings, stakeholder field trips to Topeka Metro Bikes and Kansas City B-cycle, three tabling events to conduct outreach to the general public, and online outreach in the form of a survey and an online map where people could suggest bike share stations. The purpose of the outreach was to gather public and stakeholder input on the feasibility of a bike share program in Lawrence. A summary of this input is included below.

4.1 PUBLIC ENGAGEMENT ACTIVITIES

The project team conducted three in-person public outreach events, collecting input from approximately 125 people. The first outreach event was a table outside of the Lawrence Public Library during the Tuesday evening farmer’s market on June 21 (Figure 18). The project team reached approximately 100 people, providing details on what bike share is, what it might look like in Lawrence, and providing cards with the project website (Figure 19) prompting people to take the project survey.

Outreach was also conducted outside of the Hy-vee on 6th St on Wednesday, June 22nd, and at the Free State Family Fun Fest on Saturday, June 25th. A Topeka Metro Bike was borrowed for these events to spur interest and provide an example of what a bike share bike looks like.

Bike share also received media attention in a Lawrence Journal-World article on June 16, 2016. After this article was published, there was a noticeable uptick in the number of survey and crowdsourcing map responses.

Most people who stopped to talk about bike share were in favor of a system, which was reflected in the online survey, where 74% of respondents thought bike share is a good idea for Lawrence.

University of Kansas students were invited to take the survey through a parking services email and posters placed on 50 buses. One hundred and twenty four students responded to the survey (representing 24% of all respondents). In an effort to further engage students and better understand their interest and/or support for a bike share system, the Steering Committee developed a five question student specific survey and offered KU students a chance to win one of three Amazon gift cards for participating. The survey was open for ten days and students/staff tabled on Wescoe Beach (Figure 20), distributed surveys on KU on Wheels buses, and shared the survey link through social media and existing student groups and listservs.

Figure 18: Tabling display outside of the Tuesday Farmer’s Market, near the public library.

Figure 19: Cards with the address of online engagement tools were handed out at public outreach events.

Figure 20: The project team conducted additional outreach to KU students and gathered 693 responses to a short survey.
ONLINE SURVEY RESULTS

The full-length survey was completed by 506 people. A general summary of the results is included below.

Support

Fifty-two percent (52%) of respondents said that they would use bike share if it were available in Lawrence. Only 20% said that they wouldn’t use it, and 28% were unsure if they would use it. Seventy-four percent (74%) of respondents thought that bike share is a good idea for Lawrence; indicating that even if some people would not use it, they still see benefits to a bike share system in Lawrence.

Opportunities

Many people saw opportunities to connect students with downtown and give residents another transportation option. The most commonly cited potential trip types were for recreation, social trips, exercise, and running errands.

Challenges

People thought the biggest barrier to bike share was the lack of bicycling infrastructure. Other significant challenges included steep terrain and finding funding for the system. When people had the opportunity to write-in comments on why they didn’t think bike share would work in Lawrence, the cost and lack of bicycle infrastructure was reiterated as a major concern.

Pricing

The average suggested price for a monthly pass was $16. Approximately 90% of respondents thought a day pass should cost $5 or less; the average suggested daily price was $4. All passes would include approximately 30 minutes of free ride time per trip.

University Integration

One hundred and twenty-four (124) of the full-length survey responses were from students, representing 24% of the total full-length survey responses. Students responded that they were more likely to use bike share, and would use it more often than the general public.

Six hundred and ninety-three (693) students responded to the short format KU specific survey. Eighty-one percent (81%) of respondents support bike share, and 70% of respondents support using student fees to pay for a bike share system if the fees guaranteed some amount of free ride time per day. On average, respondents supported a $3.75 per semester student fee to support the bike share system.

When asked what potential reasons they might not use bike share, most students said that they did not want to ride up hills. All responses to this question are shown in Figure 21 (note that students could select more than one answer).

Figure 21: Student responses to the question “For what reasons would you not use bike share?” Students could select more than one answer.
CROWDSOURCING MAP

Station Locations

A total of 103 station locations were suggested via the wikimap, with 408 comments on those stations. The publicly suggested stations were used in the system planning process, discussed in further detail in Chapter 6.

4.2 AGENCY AND ORGANIZATIONAL STAKEHOLDER ENGAGEMENT

A series of three stakeholder workshops were conducted over two days on June 21 and 22, 2016. An additional stakeholder meeting, focusing on funding, was held via phone on July 20. Approximately 26 individuals from 23 organizations attended these meetings, representing transportation, health, economic development, advocacy interests, university interests, and City departments. Staff from the following organizations attended the workshops and/or bike share field trips:

- Douglas County Community Foundation
- Haskell Indian Nations University Sustainability Office
- Kansas Department of Transportation
- KU Center for Sustainability
- KU Parking and Transit
- KU Endowment
- KU School of Architecture, Design, and Planning
- Lawrence-Douglas County Bicycle Advisory Committee
- Lawrence-Douglas County Health Department
- Lawrence-Douglas County Sustainability Office
- Lawrence City Manager’s Office
- Lawrence City Manager’s Office University Liaison
- Lawrence Parks and Recreation
- Lawrence Pedestrian Coalition
- Lawrence Police Department
- Lawrence Public Works
- Lawrence Public Library
- Lawrence Sustainability Action Network
- Lawrence Transit
- Sunflower Foundation

Overall, stakeholders were generally interested in the idea of a bike share system and saw its potential in delivering an additional mobility and recreation option for Lawrence. Discussions centered around governance structure, equity concerns and funding options.

GOVERNANCE STRUCTURE

Several options for governance were discussed. At this time, no organization has committed to owning or operating a bike share program, but KU has expressed interest in exploring these options further. Stakeholders discussed multiple options, including a non-profit or the University of Kansas owning the program. Additionally, the transit agency was discussed as a potential operator of the program.

Several opportunities and challenges present themselves with these governance structures. Stakeholders suggested that Lawrence has a strong non-profit sector, which is both an opportunity because of the presence of skilled non-profit fundraisers, and a challenge because of the potential for a saturated market.

KU students are expected to be a large percentage of bike share users, and a system run by KU would provide a logical connection and an established organizational structure. Additionally, a KU owned system could tap multiple avenues for funding and appeal to alumni donors. However, there are several challenges to running a program through KU. While student fees could help pay for the system, fees would have to be approved by the Student Senate. Many of the University funding sources may be unavailable or may require a major change in the way programs are funded; for example, parking fees can currently only pay for parking programs. The current education funding climate in Kansas is providing additional stress on existing funding structures, creating a barrier to introducing new programs.

EQUITY

Stakeholders emphasized the need for equity in the system. Main discussions centered on barriers to access, including digital (access for people without smartphones) and physical (access for people who are not physically able to ride a bike). Examples of programs provided by other systems (detailed in Chapter 6) were discussed, and some solutions offered, such as training library staff to help people sign up for the system using library resources.
Low-income memberships could be provided to residents receiving services through programs at Ballard or other social service agencies.

For people who are not physically able to ride a bike, a potential solution could be to provide accessible bicycles through a central location or a separate program through another agency. Additionally, a bike share system could provide a small number of jobs to low-income and other disadvantaged communities.

**FUNDING OPTIONS**

The general consensus in the stakeholder meetings was that there was no large funding opportunity for the entire program. Lawrence is a relatively small city, and therefore not eligible for many of the funding sources used by Topeka or Kansas City to start their bike share programs. There are many potential smaller funding options, including local business owners and health care organizations (such as Lawrence Memorial Hospital), individual donors, and smaller grants from local foundations. Other funding options that may be able to provide larger sums include Blue Cross Blue Shield and corporate advertisers that may be interested in reaching the KU campus. There may be an opportunity to expand the reach of existing KU sponsors Adidas and Coca Cola to sponsor on-campus stations or a program run by the university.
CHAPTER 5
FEASIBILITY RECOMMENDATION
The previous chapters identified a number of ways that a bike share system could benefit Lawrence and showed that there are areas of the City that could support a program now and in the future. In particular, the KU campus is best placed to initiate a program that can then expand to other parts of the City. Overall, bike share was well received by the public and local stakeholders and there is enough support to move forward with the implementation of a program.

To further inform the feasibility recommendation, several cities with bike share systems and similar characteristics to Lawrence (e.g., topography, population size, public transit and transportation options, etc.) were analyzed to provide a peer city comparison to Lawrence.

In addition to the peer city analysis, this chapter summarizes the expected benefits that a bike share program would provide, along with how the challenges will be addressed. These are then considered in the framework of establishing goals for the program that can guide the planning, implementation, and evaluation of the future bike share program.

5.1 PEER CITY ANALYSIS

TOPEKA METRO BIKES

A local example, this system was launched in 2015 and is owned and operated by Topeka Metro Transit. It is a smart bike system launched initially with 100 bikes, using $100,000 in federal funding from KDOT along with funds from Metro’s capital budget. The system was expanded last year to 200 bikes with sponsorship from Capital Federal. The bikes are distributed at over 109 locations throughout the city including some stations with customized bike racks and some with regular bike racks. Several of the regular bike racks that are used were preexisting to the bike share program.

Comparisons to Lawrence

The Topeka system worked with business owners to establish “hubs” at various businesses, including grocery and big box stores. The idea is that people would be able to ride to the store and use an existing bike rack to lock up the bike without incurring out-of-hub fees. An additional lesson learned from Topeka is the value of recreational riders. The two stations at Lake Shawnee, which has a shared-use path around it, account for almost half of the program’s ridership. Phase 1 stations at Rock Chalk Park and the Rotary Arboretum could capture the same type of recreational use.

KANSAS CITY

A local example, this system was established in 2013 as an initiative of the non-profit organization, BikeWalkKC. A separate non-profit was established to launch the initial program that included 12 smart dock stations and 90 bikes. The program has since expanded using grants from county and local capital improvement funds, district discretionary funds, the Kauffman Foundation, developers, and other small funders, and is now 28 stations and 156 bikes. A spin-off non-profit manages and operates the program.

Comparisons to Lawrence

The Kansas City program is run by a non-profit, BikeWalkKC. Much of their funding has been incremental, with individual stations sponsored by business owners (such as Boulevard Brewing), funded by small grants, through City Council discretionary funds, and even through public crowdsourcing. Lawrence will likely also need to fund individual stations through similar funding mechanisms.

UNIVERSITY OF VIRGINIA

An example of a University run system that is open to the public, the UBike system launched in 2015 with 120 smart bikes. The program started with a student project that won $56,000 in TAP funds. The program is operated out of the Parking and Transportation Department, which generates revenue through parking and citation fees.

Comparisons to Lawrence

The ownership structure of this system could be comparable if the system is housed in the KU Parking & Transit office and is discussed further in Chapter 7.

BIRMINGHAM

The Zyp bike share program was borne out of a feasibility study conducted by the regional Metropolitan Planning Organization (MPO). The MPO then enlisted REV
Birmingham, an economic development organization focused on quality of life in Birmingham’s City Center and Neighborhood Commercial Centers, to operate the program. They also assisted REV in obtaining federal funding for the initial 30 station and 300 bike program launch. The system is currently expanding to 40 stations and 400 bikes and both phases include approximately one-quarter of the bike fleet as e-assist bicycles.

Comparisons to Lawrence

Birmingham has significant hills and summer heat. Using e-assist bikes provides a way for people to use bicycles without worrying about hills or sweating. Only 30% of Birmingham’s fleet consists of e-assist bicycles, but these bikes are used 2-3 times as much as regular bikes.

Key characteristics and performance metrics for each of these cities are summarized in Table 3, along with a comparison to the proposed Lawrence system (discussed further in Chapter 6).

OTHER UNIVERSITY-AFFILIATED PROGRAMS

In addition to the four cities studied, an overview of University-affiliated programs is included in Table 4. These systems are primarily focused on University campuses, but some, such as Fargo, ND, have stations downtown as well as on the University campus. These case studies provide valuable examples and informed the feasibility recommendation for Lawrence.
**Table 3: System Comparison of Peer City Bike Share Programs**

<table>
<thead>
<tr>
<th></th>
<th>TOPEKA, KS</th>
<th>KANSAS CITY, MO</th>
<th>UNIVERSITY OF VIRGINIA, CHARLOTTESVILLE, VA</th>
<th>BIRMINGHAM, AL</th>
<th>LAWRENCE (PROPOSED)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Name</strong></td>
<td>Topeka Metro Bikes</td>
<td>Kansas City B-Cycle</td>
<td>UBikes</td>
<td>Zyp Bikes</td>
<td></td>
</tr>
<tr>
<td><strong>Start Date</strong></td>
<td>November 2014</td>
<td>July 2012</td>
<td>January 2015</td>
<td>October 2015</td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Smart Bikes</td>
<td>Smart Dock</td>
<td>Smart Bike</td>
<td>Smart Dock</td>
<td></td>
</tr>
<tr>
<td><strong>Days in Operation</strong></td>
<td>86</td>
<td>365</td>
<td>365</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td><strong>Number of Bikes</strong></td>
<td>100</td>
<td>156</td>
<td>120</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td><strong>Number of Stations /Hubs</strong></td>
<td>109</td>
<td>28</td>
<td>21</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>Average Bikes per station</strong></td>
<td>0.9</td>
<td>5.5</td>
<td>5.7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>**Service Area (sq. mi.) **</td>
<td>15.1</td>
<td>4.5</td>
<td>1.5</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td><strong>Station Density (stations per sq. mi.)</strong></td>
<td>7.2</td>
<td>6.2</td>
<td>14</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td><strong>Single Ride</strong></td>
<td>$2.50/hour</td>
<td>$3.00</td>
<td>$3.00/hour</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Cost of Annual Membership</strong></td>
<td>$25.00</td>
<td>$65.00</td>
<td>$80.00</td>
<td>$75.00</td>
<td></td>
</tr>
<tr>
<td><strong>Cost of 24-Hour Pass</strong></td>
<td>N/A</td>
<td>$7.00</td>
<td>N/A</td>
<td>$6.00</td>
<td></td>
</tr>
<tr>
<td><strong>Usage Fees</strong></td>
<td>All members: 2 hours free ride time per day; $2.50/hour (pro-rated) for additional time and walk-up users</td>
<td>7-day and monthly members: first 30 minutes free; annual members: first 60 minutes free and $2.00 for each additional 30 minutes</td>
<td>All members: 90 minutes free ride time per day; pro-rated at $1.00/hour for additional time; pay-as-you-go option is pro-rated $3.00/hour</td>
<td>All members: first 45 minutes free, $2.00 for first additional 30 minutes, $4.00 for each additional 30 mins</td>
<td></td>
</tr>
<tr>
<td><strong>Casual Members</strong></td>
<td>2,076</td>
<td>8,230</td>
<td>not available</td>
<td>4,013</td>
<td></td>
</tr>
<tr>
<td><strong>Annual Members</strong></td>
<td>1,074</td>
<td>127</td>
<td>not available</td>
<td>462</td>
<td></td>
</tr>
<tr>
<td><strong>Total Trips</strong></td>
<td>3,641</td>
<td>13,285</td>
<td>7,123</td>
<td>16,670</td>
<td></td>
</tr>
<tr>
<td><strong>Member Trips</strong></td>
<td>2,673</td>
<td>not available</td>
<td>6,161</td>
<td>7,568</td>
<td></td>
</tr>
<tr>
<td><strong>Casual Trips</strong></td>
<td>968</td>
<td>not available</td>
<td>962</td>
<td>9,107</td>
<td></td>
</tr>
<tr>
<td><strong>Trips per Bike per Day</strong></td>
<td>0.42</td>
<td>0.23***</td>
<td>0.16</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>127,679</td>
<td>467,007</td>
<td>21,238</td>
<td>212,113</td>
<td></td>
</tr>
<tr>
<td><strong>Total Trips per 1,000 People</strong></td>
<td>29</td>
<td>28</td>
<td>335</td>
<td>78</td>
<td></td>
</tr>
</tbody>
</table>

* Note that metrics for Topeka are based on less than three months of data.

** Station service areas were calculated by buffering each station or hub by a half mile and then subtracting a quarter mile buffer. The resulting service area approximates a quarter mile buffer around each station, while still capturing interior areas that may be more than a quarter mile away from a station or hub.

***B-Cycle added 7 stations in mid-2015, resulting in an under-estimated trips/bike/day for 2015.
Table 4: Comparison of University-affiliated systems. Blank cells indicate that information was unavailable.

<table>
<thead>
<tr>
<th></th>
<th>NDSU</th>
<th>UVA - CHARLOTTESVILLE</th>
<th>UMD</th>
<th>OHIO STATE BIKE SHARE</th>
<th>STONY BROOK UNIVERSITY</th>
<th>PURDUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM NAME</td>
<td>Great Rides</td>
<td>Ubike</td>
<td>mBike</td>
<td>Wolf Ride</td>
<td>Purdue Bike Share</td>
<td></td>
</tr>
<tr>
<td>LOCATION</td>
<td>Fargo, ND and North Dakota State University</td>
<td>University of Virginia Charlottesville campus</td>
<td>College Park, MD and University of Maryland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAUNCH DATE</td>
<td>March 2015</td>
<td>January 2015</td>
<td>May 2016</td>
<td>August 2015</td>
<td>April 2013</td>
<td>August 2015</td>
</tr>
<tr>
<td>SIZE (INITIAL)</td>
<td>101 bikes, 11 stations (4 stations on campus, 7 stations in Downtown, including two at NDSU buildings)</td>
<td>120 bikes, 18 stations (all on campus)</td>
<td>125 bikes, 14 stations (half on campus and half in city)</td>
<td>115 bikes, 17 stations</td>
<td>48 bikes, 3 stations</td>
<td></td>
</tr>
<tr>
<td>EXPANSION</td>
<td></td>
<td></td>
<td></td>
<td>63 bikes, 7 stations (expanded in August 2014)</td>
<td>15 bikes, 3 stations in West Lafayette in 2016</td>
<td></td>
</tr>
<tr>
<td>RIDERSHIP</td>
<td>6.1 trips per bike per day (Year 1), i.e., 143,000 trips</td>
<td></td>
<td></td>
<td>8,200 rides (launch to July 2014)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPERATING MODEL</td>
<td>Non-profit owned and operated Great Rides Bike Share is a 501c3 that oversees the program. It consists of a Board represented by Great Rides, NDSU, the City of Fargo, and sponsors&quot;</td>
<td>University owned program with private (third-party) operator</td>
<td>City / University overseen program with leased equipment and third party operator</td>
<td>University owned and operated program</td>
<td>University run program with MOUs with adjacent cities; leased equipment and third party operator</td>
<td></td>
</tr>
<tr>
<td>EQUIPMENT VENDOR</td>
<td>Bicycle</td>
<td>Social Bicycles</td>
<td>Zagster</td>
<td>Zagster</td>
<td>PBSC</td>
<td>Zagster</td>
</tr>
</tbody>
</table>

Chapter 5: Feasibility Recommendation
### Table 4, Continued

<table>
<thead>
<tr>
<th>OPERATOR</th>
<th>CAPITAL FUNDING</th>
<th>OPERATING FUNDING</th>
<th>PER BIKE PER MONTH OPERATING COST</th>
<th>UNIVERSITY ROLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Northern Bicycle Company (local bike shop contracted by Great Rides Bike Share)</td>
<td>From NDSU, City, YMCA, GNBC, sponsors</td>
<td>$90,000 per year (estimated prior to launch)</td>
<td>$74.26</td>
<td>Seats on the Board of Directors, contributed to capital costs. Student government has contributed $65,000 per year for operating expenses. Membership is included (integrated) into the Bison student card.</td>
</tr>
<tr>
<td>Blue Ridge Cyclery (local bike company)</td>
<td>$350k VDOT grant plus funds from UVA Department of Parking &amp; Transportation</td>
<td>From contract pricing: $5,000 per month</td>
<td>$41.67</td>
<td>Program overseen by UVA Parking &amp; Transportation. Operations contracted to local bike company.</td>
</tr>
<tr>
<td>Zagster (3-yr contract)</td>
<td>$375k MDOT grant, City CIP funds and developer contributions for 10% local match, UMD 10% local match</td>
<td>From UMD / City MOU: bikes cost $1,560 per year to lease equipment and operations services; $4,678 per station upfront for installation</td>
<td>$130.00*</td>
<td>University and City jointly oversee program through an MOU. Zagster owns all equipment. UMD/City contract all operations to Zagster, who employ local mechanics to maintain bikes and do minimal redistribution.</td>
</tr>
<tr>
<td>Zagster</td>
<td>$518.50 per bike (for equipment purchase), $2,000 per station for installation</td>
<td>$1,560 per bike for ongoing operations</td>
<td>$130.00*</td>
<td>Program overseen and operated by Office of Sustainability.</td>
</tr>
<tr>
<td>SBU Office of Sustainability</td>
<td>$1,000 per station installation</td>
<td>$1,440 per bike per year (for operations in West Lafayette)</td>
<td>$120.00</td>
<td>Program overseen by Purdue Office of Sustainability. Purdue has MOU with Cities of Lafayette and West Lafayette to operate in those cities. Equipment and operations contracted to Zagster.</td>
</tr>
</tbody>
</table>

*Note that Zagster costs include lease of equipment in most cases*
### 5.2 BIKE SHARE BENEFITS

Overall, stakeholders, students, and the general public were supportive of the program and see its potential to provide an additional mobility option that would extend the reach of transit; increase economic development; connect students and visitors to Downtown, the KU campus, and Haskell Indian Nations University; and provide recreation and exercise opportunities that could encourage active lifestyles and improve community health outcomes.

There are potentially many different types of users of the bike share system. However, the following are expected to be the primary users:

- **KU students, staff, and faculty making intra-campus trips.** The KU campus is large and spread out and bike share could connect between classes and other destinations on campus. It could also be useful as Parking & Transit makes the transition to fixed lot parking permits, meaning students may be parked further from their classes.

- **Connecting students and local residents to services, dining, and entertainment options in Downtown.** Bike share is also an opportunity to better connect Haskell students to Downtown and the rest of the community.

- **Local residents using the program for exercise and recreation.** In particular, stations at Rock Chalk Park and the Rotary Arboretum could be popular riding spots utilizing the local trail systems in these areas.

Bike share provides a multitude of mobility, transportation, community-building, economic, health, environmental, and safety benefits. Some of the major benefits that bike share could bring to Lawrence include:

- Providing an additional transportation option that by itself or combined with other options presents an opportunity to reduce dependence on automobile transportation.

- Expanding and enhancing existing transit service by providing a new first- and last-mile option.

- Introducing new riders to the benefits of bicycling by reducing some of the common barriers to entry.

- Providing an impetus for further investment in bicycle facilities.

- Promoting physical and mental health and well-being.

- Building on the City’s reputation as a forward-thinking, bicycle-friendly community, and promoting the city to potential employers, residents, and visitors.

- Providing an economic benefit to local businesses, particularly those Downtown.

### 5.3 BIKE SHARE CHALLENGES

The major concerns identified for a bike share program in Lawrence are how to overcome the sections of steep terrain, particularly between Downtown and KU, the lack of bicycle infrastructure in some parts of the city, and funding to bridge the expected gap between operating costs and system revenues. These concerns are not fatal flaws and it is proposed that they be addressed as follows:

- **Address steep topography by making some part of the bike share fleet e-assist bicycles.** At least one vendor is already operating e-assist bike share programs and the industry continues to develop with most vendors in the process of developing an e-assist option.

- **The initial system will make best use of the bicycling infrastructure that is in place.** There are opportunities through messaging on the bike share equipment or education programs associated with the bike share program to promote safety messaging and good riding behavior. In other cities, introducing new riders through bike share has resulted in increased interest in developing more bicycling infrastructure.

- **Similar to other transit services,** most bike share programs are not economically self-sustaining from membership and usage fees alone. This requires cities to piece together funding from grants, private donations, and sponsorship to help fund the program. KU would have some unique opportunities and funding sources, including potential donations that could be solicited through the endowment fund and sponsorships and advertisement revenue. Other university systems have incorporated student membership into their student activity fees to provide access to the program for all students and a steady source of operating funds. In the longer term, the City, Haskell Indian Nations University, and other partners can buy into the program once they find the funding to support capital expansion and ongoing operations.
5.4 PROGRAM GOALS

Measuring the future success of the bike share program requires understanding the program’s role in the community, deciding what benefits are considered most valuable, and determining what will be considered a successful program. To this end, a set of system goals and objectives were developed based on meetings with key regional stakeholders and initial feedback from the public.

Two types of goals were defined for the system: Policy Goals and Financial Goals. The Policy Goals are the reasons why the system will exist – the fundamental drivers. These should match the desires of the community. However, the primary need of any program is to maintain financial viability so it can continue to operate. The Policy Goals include mobility, economic, and mode split goals defined below.

**Mobility:**
Offer additional transportation options for residents, students, employees, and visitors to Lawrence.

**Economic:**
Increase the attractiveness of Lawrence as a place to live, work, visit and do business. Increase visitation and spending at local businesses accessible by bike share.

**Mode Split:**
Increase the amount of bicycling in Lawrence to encourage improved health outcomes and further investment in bicycling infrastructure.

**Financial Goals:**
Create a program that is financially viable and can meet the above Policy Goals.
CHAPTER 6

SYSTEM PLANNING
System planning needs to understand local objectives, build on local opportunities, and fit the system into the physical environment. Most cities take a measured approach to building out their system due to funding and other constraints, and most launch in phases starting in the denser areas that are likely to attract early adopters and adding phases to expand the service area and/or infill the system as momentum grows.

This chapter includes a demand analysis, an equity analysis, and the results of a public station suggestion map. These analyses were used to develop a Preliminary System Plan that identifies where the bike share system should be deployed and how it should be phased including the number of stations, bikes, and docks recommended for each phase.

6.1 PRELIMINARY SYSTEM PLAN

DEMAND ANALYSIS

A demand analysis helps understand where the system is expected to be used the most and considers geographical, demographic, land use, transportation, and infrastructure characteristics through a GIS-based heat mapping analysis.

Experience from existing bike share programs in the United States suggests that a mix and density of population, jobs, and other activity maximizes potential usage. The following four indicators were selected to measure potential demand in Lawrence:

**Population Density**

The number of residents per square mile measured using the 2010 U.S. Census. Residents may want to use bike share for commuting purposes, may link to transit, or may use the bicycles for recreation, personal business, or to access retail and entertainment venues.

**Employment Density**

Employment density was calculated by the number of workers per square mile measured by place of employment using information from the U.S. Census Bureau's 2014 Longitudinal Employer Household Dynamics – Area Profile Analysis. Employment density is an indicator for commuting and employment-based trips (e.g., traveling

---

**Stations and Hubs**

This chapter uses the term “station” to mean both traditional stations in smart dock systems, and what are sometimes called “hubs” in smart bike systems. The only difference is that in a smart bike system, bikes may still be considered locked “inside” the hub, even if they are not locked in official racks.

**Docks and Racks**

This chapter uses the term “docks” to refer to both traditional smart dock system docks and to racks used in smart bike systems. The only difference is that smart docks house locking technology, and racks do not.

---

Racks are docks with no technology

Docks house the technology to lock the bike
to or from work, running errands, or attending meetings during the day).

**Proximity to Destinations**

Various destinations may act as trip generators for bike share users. This analysis uses the “amenities” data available from Open Street Maps. The data was filtered to include destinations that might attract bicyclists and pedestrians, such as schools, cafes, bars, entertainment venues, and social services. Auto-oriented amenities such as drive-throughs and car washes were not included. Parks were not included in the amenities analysis, but were considered when planning the final service areas.

**Proximity to Transit**

In other U.S. cities, a high percentage of bike share trips are in some way linked to transit, either as a first- and/or last-mile extension of a longer transit trip, or as an on-demand replacement for transit trips in programs with less frequent transit service. Average weekday activity (boardings + alightings) was used as an indicator of potential bike share demand.

In addition to the demand indicators, the following metrics were considered when planning the bike share service area:

**Proximity to Existing Bicycling Infrastructure**

The presence of on- or off-street bicycling facilities may impact a person’s decision on whether to use the system. A well-connected network of bicycle-friendly facilities can encourage bike share trips and, in particular, attract the “interested but concerned” rider that prefers separation from moving traffic. The location of existing bike lanes, routes, and off-street shared use paths was provided by the Lawrence-Douglas County MPO, and was overlaid on the heat map.

**Topography**

Steep slopes have a negative impact on bicycle ridership. Bike share bicycles weigh significantly more than most private bicycles (approximately 40 to 50 pounds each), and casual bicyclists may not be willing to ride up significant hills. Lawrence has a few significant hills, including a steep slope from downtown to the KU campus.

The heat map was constructed using the following process:

- GIS maps were developed for each of the indicators listed above.
- For each indicator, different areas were scored based on their relative performance against other areas; e.g., census tracts with population densities in the top quartile were scored higher than those in the middle and bottom quartiles.
- The values for each indicator were normalized on a scale of 1-10. For example, the highest concentration of employment would have a value of 10, as would the highest concentration of amenities.
- Weightings were assigned to each indicator based on the project team’s judgement to account for the relative influence each variable is expected to have on potential bike share demand. These weightings are shown in Table 5.

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>10</td>
</tr>
<tr>
<td>Employment</td>
<td>10</td>
</tr>
<tr>
<td>Amenities / Attractors</td>
<td>10</td>
</tr>
<tr>
<td>Transit Access</td>
<td>5</td>
</tr>
</tbody>
</table>

Weighted scores were tallied to create an aggregated score and then mapped to create the final heat map shown in Figure 22.

The heat map shows that the areas with the highest potential for bike share demand are in Downtown and on the KU campus. These areas provide a broad and generally contiguous area that would be the core of the system. In addition to the main service area, bike share stations may also be well used for recreation at regional parks such as Rock Chalk Park and the Rotary Arboretum. These locations have popular off-street shared use paths. Based on the experience of Topeka, it is likely that some people will want to use bike share purely for recreational purposes, and may even drive to parks to use bike share.

Future phases would extend the system around the Downtown and KU areas. There may also be opportunities
Figure 22: Potential Bike Share Demand Heatmap in Lawrence, Kansas.
to extend the system to commercial and retail activities on 6th Street and south along Iowa Street to 31st Street. However, there are some missing links in the separated bike network to connect these locations that would need to be integrated into future system expansion.

**EQUITY ANALYSIS**

Bike share is an on-demand, first- and last-mile transportation option that could serve a broad cross-section of the community. However, like any transportation investment, its launch needs to be targeted to gain early success and build support for future expansion of the program. To this end, the system planning process balances the interests of demand (to provide strong early usage and revenue for the program) and geographic and social equity (to ensure that a broad cross-section of the community has access to the program).

The project team used the Environmental Justice zones as defined in the 2017-2020 Transportation Improvement Program and additional census data to conduct an equity analysis to understand where there may be opportunities to integrate Environmental Justice Zones into the bike share system plan.

Figure 23 shows the Environmental Justice Zones. Citywide in Lawrence, approximately 21% of households live below the federal poverty threshold, compared to 13% statewide. A high concentration of low income households are located in the central city and near the University of Kansas, and areas of the Sunset Hills neighborhood and the area south of 31st Street and west of Iowa Street experience approximately 50% poverty rates.

In terms of race, the population of Lawrence is approximately 87% white and 13% non-white. Neighborhoods with the highest percentage of non-white households are around the KU campus and the neighborhoods south of 23rd Street. The highest non-white representations in these areas are Hispanic, Black, and Asian. There is also a significant American Indian population around the Haskell Indian Nations University campus and in the Brook Creek and Prairie Park neighborhoods.

Approximately half of the area of the proposed phases (Figure 23) are Environmental Justice Zones. Bike share represents an opportunity to provide an affordable transportation option for lower-income communities. However, due to a number of factors, including that bike share is generally expected to be financially self-supporting, most systems are deployed and marketed towards technologically savvy and higher-income demographics. Uptake in both minority and low-income communities has been low for a variety of reasons, but many systems are developing programs to try and reverse this trend. These barriers and solutions are discussed below.

**System Planning**

Bike share systems typically launch in dense urban areas to attract early adopters. Where stations are located in lower density, traditionally underserved neighborhoods there tend to be fewer, more sparsely spaced stations and less bicycling infrastructure. Choosing station locations that leverage the existing bicycle network, support the development of more bicycling infrastructure, and offer the same density of stations across the system will help bridge the accessibility gap.

**Digital Divide**

Bike share marketing budgets are low and tend to focus on early-adopter and technologically-savvy users. Outreach programs to low-income and minority communities can be more resource intensive. Existing community resource centers such as the Lawrence Public Library could help overcome this barrier by publicizing the program or assisting people who want to sign up but may not know how or may need access to library computers to sign up.

**Financial Barriers**

Although a relatively affordable transportation option when compared to other modes, traditional annual bike share memberships represent a significant one-time cost to a low-income individual. Monthly or weekly amounts are often easier to budget for. Exploring different pricing structures (e.g., monthly membership rather than annual, pay-per-ride options, etc.) and offering discounted memberships to qualifying individuals may help reduce this barrier. In Portland, OR, payment for the annual membership is done by 12 installments, rather than one large annual fee. A program in Philadelphia, PA,
Figure 23: Environmental Justice Zones as defined by the Lawrence-Douglas County FFY 17-20 Transportation Improvement Program.
allows residents to use their Pennsylvania Access Card (an electronic card used to access state services for low-income residents) as proof of eligibility for a $5/month low income bike share pass.

In addition to the cost of a membership, lack of a credit card or concerns about being charged a large deposit for the bike can create a barrier. Partner organizations can assist people without credit cards access the bike share program by assuming the financial risk if the bike is not returned. For example, in Washington, D.C., Bank On DC works with Capital Bikeshare to get unbanked people into the banking system and offers them a credit/debit card and a discounted bike share membership. In Philadelphia, Indego has partnered with PayNearMe to accept monthly cash payments at 7-11 and Family Dollar stores.

**Cultural Differences**

As a new form of transportation, many people do not know what bike share is or do not understand it. They may not understand that it is a public transit system that anyone can use. Targeted marketing and outreach, especially via a local champions, will help spread the word and break down cultural barriers. Local champions may be political figures, community organizers, or committed individuals with a proven means to influence their communities. An employment program could be part of the bike share system to boost opportunities for these populations to be involved.

**Physical Barriers**

Many systems are beginning to address equitable solutions for people who are not physically able to ride a standard two-wheeled bike. College Park, MD (Figure 24), Westminster, CO, and Carmel, IN, provide a few adaptive bikes in their fleet. Portland, OR is developing a pilot program to provide adaptive bikes to the community through staffed locations.

**PUBLICLY SUGGESTED STATIONS**

As part of the project’s outreach activities, an interactive map where the public could suggest possible bike share station locations was developed. The wikimap received input from 584 unique logins between May 3 and October 4, 2016. A total of 408 likes were received on 103 suggested stations. A map of suggested locations is shown on Figure 25 with each location weighted by the number of “likes”.

The map shows that the highest concentrations of suggested locations are in Downtown, along Massachusetts Street, on the KU campus, Haskell Indian Nations University, and Lawrence Memorial Hospital. There were also nodes of support for stations around the 9th and Iowa intersection, at Centennial Park and The Merc, as well as in North Lawrence at the N 2nd & Locust intersection that has a number of commercial establishments and access to the shared-use path along the Kansas River. There is also strong support for recreational stations at Rotary Arboretum, Clinton Lake State Park, Rock Chalk Park, Burcham Park, and along shared use paths. Most of these results are consistent with the results of the demand and equity analyses. There were several station suggestions in the residential neighborhoods near Downtown, but very few in the areas outside of the Downtown Core. An expansion of bicycle infrastructure connections to these areas may provide more support for stations in the future.

**SYSTEM PLANNING PRINCIPLES**

There are a number of parameters to consider in designing a bike share system. One of the key decisions is to determine the balance between coverage and station density. Some cities have chosen to launch their initial system with a high density of stations in a smaller area (e.g., Boise, Salt Lake City, etc.), whereas others have chosen to spread out the stations at lower densities and cover a larger service area (e.g., Cincinnati, Topeka, etc.). The experience of other U.S. bike share systems has been compiled into a number of design principles that the project team used to design the system in Lawrence. These include density, coverage area, system size, continuity, and dock-to-bike ratio.
Figure 25: Potential Bike Share Stations Suggested by the Public in Lawrence, Kansas.
Density

Providing bike share stations at high densities maximizes the visibility and convenience of the system and provides users with a reasonable expectation that there will be a station within walking distance from anywhere in the system area. This may also provide redundancy in the system so that if a station is empty or full, a user can go to a nearby station and find an available bicycle or an empty dock. Station density will vary by phase depending on the surrounding land use and expected demand. Early phases in downtowns and inner core neighborhoods generally launch with higher densities, which reduce as the program expands into fringe and suburban neighborhoods. Station locations in the latter areas may be dictated more by destinations rather than density.

Technology Differences

Smart bike systems can provide higher station densities than smart dock systems for the same price, because smart bike systems do not require a kiosk at every station, and existing bike racks can be used as stations. Most cities with smart bike programs choose to install kiosks at major stations where they expect a lot of new user sign ups. If a smart bike system is chosen for Lawrence, kiosks should be included at one or two major campus locations, downtown, at the library, and at the future transit center (location not yet determined). The disadvantage of not installing kiosks is that potential bike share users must either sign up online before visiting the station, or use a smartphone to sign up at a station.

Coverage Area

If stations are provided at high densities but the coverage area is too small, then the system may not provide much utility and may not be an effective alternative to walking. This is particularly relevant for smaller systems (10 – 30 stations). For a more spread-out system, stations at the edges of the system should have additional capacity available (i.e., more docking points) so that users are not faced with empty or full stations.

Technology Differences

Smart bike systems can expand the coverage area by allowing a bike to be parked “out of hub”. A small fee may be assessed to the user for this convenience. The system in Topeka, for example has a coverage area of approximately 15 square miles when considering the location of the branded bike share stations. However, the bikes can be docked out of a hub and the program has geo-fenced areas around City and private property bike racks that expand the service area to approximately 45 square miles. The disadvantage of this approach is that users may not be able to find a bike where they need one, as they are spread out across a much larger area. The minimal out-of-hub fee seems to be generally effective at minimizing bikes parked outside the hub locations. In Hamilton, Ontario, only 7% of all trips were parked outside of a hub. However, if out-of-hub parking is common, the operator may spend more time rebalancing the system and locating out-of-hub bikes.

System Size

A system that provides too few stations will be limited in the number of destinations it serves and therefore have less utility and be less attractive to potential users. However, cities generally must take a measured approach due to funding and other constraints and may not initially launch with the full system.

Continuity

Most systems are generally contiguous. Providing a contiguous system offers a larger number of connections between stations than if the same resources were split into several smaller (disconnected) systems.

Station Size

Most systems have an average of 8 to 10 bikes per station. This is an average and stations should be sized accordingly to meet demand.

Dock-to-Bike Ratio

All systems operate with more docks than bikes to ensure there is available space to park at a station. Most systems provide docks at a ratio of at least 1.5 docks to every bike and some as high as 2.0 docks per bike. Higher ratios require more up-front capital (unless existing bicycle racks
are used), but the higher the ratio, the lower the need and cost for rebalancing.

Technology Differences

In smart dock systems, bikes may only be returned to a dock. The dock-to-bike ratio is more important in this type of system. If the docks are full, the user must find another station to dock their bike. In a smart bike system, the user has the option to either lock to nearby bike racks that are within the hub area, or choose to lock out of hub and incur a fee.

Figure 26 compares system planning metrics for peer cities. The system maps are shown at the same scale to allow comparison of the coverage area, system shape, and density. The average station density among these cities is approximately 8 stations per square mile. The average station size is approximately 15 docks and the average dock-to-bike ratio is approximately 1.7 docks per bike.

SYSTEM PHASING PLAN

Boundaries for the service area of the program were developed based on the areas with the highest potential demands (shown in Figure 22), locations identified by the public as part of the crowdsourcing map (shown in Figure 25), and adjusted to include contiguous equity and low-income areas (shown on Figure 23). These were divided into phases to represent a possible roll-out plan as shown on Figure 27 and the number of stations calculated based on station densities observed in peer cities. This is summarized in Table 6.

Table 6: System Metrics by Phase

<table>
<thead>
<tr>
<th>PHASE</th>
<th>SERVICE AREA (MI²)</th>
<th>PERCENT OF CITY AREA</th>
<th>STATIONS</th>
<th>DOCKS</th>
<th>BIKES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.2</td>
<td>12%</td>
<td>33</td>
<td>495</td>
<td>291</td>
</tr>
<tr>
<td>2</td>
<td>4.0</td>
<td>12%</td>
<td>28</td>
<td>420</td>
<td>247</td>
</tr>
<tr>
<td>Total</td>
<td>8.2</td>
<td>24%</td>
<td>61</td>
<td>915</td>
<td>538</td>
</tr>
</tbody>
</table>

The size of each phase is flexible depending on the amount of funding available and the bike share equipment vendor selected (there are price differences between vendors that might mean more or less stations can be rolled-out in a phase). There may also be locations where it is prudent to time the deployment of stations with redevelopment, with new bicycling infrastructure, or at the start of a new semester.
Chapter 6: System Planning

Station Density

All systems mapped at the same scale. Service area represented in square miles, station and hub density in stations per square mile. Hubs are similar to stations, but refer to a “smart bike” system where a bike may be docked outside of a hub, usually for a small fee.

Figure 26: Peer City System Comparison
Figure 27: Proposed Phasing Plan
Phase 1 utilizes the generally comfortable Downtown streets and a grid street pattern that offers parallel low-stress routes to attract less confident riders. Where possible, stations should be located on bike routes or low-traffic streets. The stations at Rotary Arboretum and Rock Chalk Park are located near extensive shared-use path networks that provide a recreational opportunity and a low stress riding environment for casual or new bicycle riders to try the program.

**Phase 1 Options**

Phase 1 covers KU, Haskell Indian Nations University, Downtown, and several parks sites. This phase could be split into smaller sections with different entities owning or sponsoring stations (e.g., KU, Haskell Indian Nations University, the Chamber of Commerce and the Parks and Recreation department). An example of how the stations could be split up is listed below:

**Phase 1A:**
- KU: 10 stations
- Downtown: 4 stations

**Phase 1B:**
- Lawrence Memorial Hospital: 1 station
- Haskell Indian Nations University: 1 station
- Parks and Recreation: 3 stations (Rock Chalk Park, Rotary Arboretum, and South Park)
- Additional stations: 14 stations

A system launch with the KU stations and the downtown stations (Phase 1a) would provide the most useful first phase, connecting the areas with the most demand (as shown previously on the heatmap in Figure 22). Other stations (Phase 1b) could be connected to the system as funding becomes available.

**Phase 2 – Expansion**

Phase 2 would be a contiguous expansion building on Phase 1. It would expand the system around the downtown core and pick up the East Lawrence and Barker neighborhoods to the east and expand coverage west to Centennial Park. This phase would also increase coverage on the Haskell Indian Nations University and add coverage in the Brook Creek and Prairie Park neighborhoods that have a high percentage of low income and American Indian populations. This would provide better connections to the university as well as downtown and other recreational and entertainment destinations.

This phase will utilize some existing infrastructure such as the Burroughs Creek Trail. However, there are infrastructure projects, including completing the bike lanes along W 9th Street and W 19th Street that should be prioritized in time for roll-out of Phase 2. This phase adds an additional 4 square miles. Applying a lower station density of 7 stations per square mile, it will include an additional 28 stations, 245 bikes, and 420 docks.

**System Statistics**

When these two phases are built out, the system will include 61 stations, 538 bikes, and 915 docks. This would incorporate an area of approximately 8.2 square miles which represents approximately 24% of the City’s total land area and serves approximately 30% of the City’s population and 40% of its jobs.
CHAPTER 7
BUSINESS PRO-FORMA
### 7.1 GOVERNANCE STRUCTURE

One of the key decisions for any bike share program is to determine who will own and manage the program and who will operate it. Existing U.S. bike share programs operate under different governance models depending on the local funding environment, institutional capacity, and local program needs.

There are four broad categories of governance structures – agency owned, non-profit owned, privately owned and operated, and systems operated by other entities. The relationship between system owners and operators for select U.S. bike share systems is shown in Table 7. For additional clarification, select programs are shown in a governance flow chart in Figure 28.

Table 7: Relationship between System Owners and System Operators

<table>
<thead>
<tr>
<th>OWNERSHIP TYPE</th>
<th>PROGRAM MANAGER</th>
<th>PROGRAM NAME</th>
<th>OPERATOR</th>
<th>PUBLIC</th>
<th>NPO</th>
<th>PRIVATE</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Agency</td>
<td>Regional MPO</td>
<td>Metro Bike Share, Los Angeles, CA</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transit Agency</td>
<td>Boise Green Bike, ID</td>
<td>Valley Regional Transit</td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Topeka Metro Bikes, KS</td>
<td>Topeka Metropolitan Transit Authority</td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Link Dayton Bike Share, OH</td>
<td>Greater Dayton Regional Transit Authority / Bike Miami Valley</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>Divvy, Chicago, IL</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fort Wayne Bike Share, IN</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Non-Profit Organization (NPO)</td>
<td>Existing NPO</td>
<td>ColumBike, Columbus, IN</td>
<td>Columbus Park Foundation</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indiana Pacers Bikeshare, Indianapolis, IN</td>
<td>Indianapolis Cultural Trail</td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ann Arbor Bike Share, MI</td>
<td>Clean Energy Coalition</td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinoff NPO</td>
<td>Kansas City BCycle, MO</td>
<td>Kansas City BCycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New NPO</td>
<td>Madison BCycle, WI</td>
<td>Madison BCycle</td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nice Ride Minnesota, Twin Cities, MN</td>
<td>Nice Ride Minnesota</td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pronto, Seattle, WA</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Private Company</td>
<td>Private Company</td>
<td>Citi Bike, New York, NY</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grid Bike Share, Phoenix, AZ</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Other Entity</td>
<td>University</td>
<td>Purdue Bike Share, IN (Sustainability)</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U Bike, University of Virginia, Charlottesville, VA (Parking &amp; Transportation)</td>
<td>Private contractor</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of South Florida, Tampa, FL (Campus Recreation)</td>
<td>Campus Recreation</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Sponsor</td>
<td>Green Apple Bikes, Manhattan, KS</td>
<td>Overseen by major sponsor; operated by volunteers</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tulsa Townies, OK</td>
<td>Saint Francis Health System</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
</tbody>
</table>
Bike Share Governance

PRIVATE SYSTEM
- Partners pay a private operator

NONPROFIT SYSTEM
- Cities & agencies on board of directors

AGENCY OWNED
- Individual cities
- Regional agency
- Transit agency
- University
  - Universiy owns and operates; open to the public

- Non-profit operator
- Private operator
- Agency owns & operates
- Agency sets up, then transitions to nonprofit

- Operated by the non-profit
- Operated by quasi-governmental organization
- Operated by private 3rd party

GRID: Phoenix area
NYC & Jersey City: Manhattan area
KANSAS CITY: Twin Cities
GREENbike: Salt Lake City area
PRONTO!: Seattle area
Chic: Boston
Capital Bikeshare: Washington, D.C. area
ZYP: Birmingham area
Metro: LA area
TC BIKES: Fort Worth, TX

Figure 28: Governance Structure Chart
Other cities in Kansas and the Midwest (shown in Figure 27) have set up their bike share programs using the following models:

- Topeka, KS: owned and operated by Topeka Metro, the region’s transit agency.
- Kansas City, MO: owned and operated by Kansas City BCycle, a non-profit that was formed as a spin-off from BikeWalkKC, the local active transportation advocacy organization.
- Manhattan, KS: overseen by a staff person that is employed by CivicPlus, a private company. However, the system relies on volunteer assistance for rebalancing, bicycle maintenance, and other services.
- Columbus, IN: operated by the Columbus Park Foundation, which is the non-profit arm of the Columbus Department of Parks and Recreation. The Foundation took on the program as part of its mission to support and encourage full community participation in the City’s recreation programs.
- Indianapolis, IN: Indiana Pacers Bikeshare is a program of the Indianapolis Cultural Trail, Inc., an existing non-profit that maintains and programs the 8-mile bicycling and pedestrian trail in Downtown Indianapolis.
- Fort Wayne, IN: the City manages a contract with Zagster, a private operator that leases equipment and provides operating services.
- Purdue University bike share: an initiative of the University’s Office of Sustainability, which manages a contract with Zagster to lease equipment and operate the program. The Cities of Lafayette and West Lafayette have entered into a Memorandum of Understanding with Purdue University to expand the program into these cities. Under the MOU, the cities agree to pay Purdue to manage the contract with Zagster.
- Ann Arbor, MI: the Clean Energy Coalition (CEC) owns and operates the bike share program. The CEC is an established non-profit dedicated to promoting clean energy technologies and expanded its operations to include bike share.
- Dayton, OH: Link Dayton Bike Share is operated through a partnership with the Greater Dayton Regional Transit Authority (GDRTA), which maintains the bike share equipment and balances the distribution of bikes, and Bike Miami Valley, which handles memberships, organizational partnerships, education, marketing, and promotions.

The different governance structures were discussed with stakeholders during the outreach process and an assessment of the advantages, disadvantages, and potential for each model type in Lawrence is summarized in Table 8.
### Table 8: Assessment of Different Bike Share Governance Models in Lawrence, KS

<table>
<thead>
<tr>
<th>Description</th>
<th>Privately Owned and Operated</th>
<th>Publicly Owned</th>
<th>Non-Profit Owned</th>
<th>University Owned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESCRIPTION</strong></td>
<td>A private company brings established skills and experience in operating bike share programs and takes on the risk of funding and operating the program in return for revenues generated by the system. This model is most attractive in markets that support strong returns from street furniture advertising.</td>
<td>A government agency (e.g., a city, regional, or transit agency) takes on ownership and financial responsibility for the program. The agency oversees contracts with a third party (or parties) to provide equipment, operations, sponsorship and advertising, marketing, promotions, etc.</td>
<td>An existing, spin-off, or newly formed non-profit organization (NPO) takes on ownership and financial responsibility for the program. Most bike share NPOs also take on day-to-day operations of the system, but could choose to contract some services to a third party, e.g., marketing and promotions, sponsorship and advertising, etc.</td>
<td>A university takes on responsibility for the program including fundraising and administering operations for a bike share system on its campus. Different universities have built capacity in different places to operate the program. This could include Traffic and Parking, student operations, or hiring a private contractor.</td>
</tr>
</tbody>
</table>
| **EXAMPLES** | • Citi Bike: New York City, NY  
• Grid: Phoenix, AZ | • Divvy, Chicago, IL  
• Topeka Metro Bikes, KS  
• Metro Bike Share, Los Angeles, CA | • Ann Arbor Bike Share, MI  
• Kansas City B-Cycle: Kansas City, MO  
• Nice Ride: Minneapolis/St. Paul, MN | • Purdue University, IN  
• University of Virginia Charlottesville, VA  
• University of South Florida, FL |
| **ADVANTAGES** | • Removes risk and financial responsibility from the City and other local partners.  
• Private operator motivated to ensure visible success of the program (i.e., high ridership and profitability).  
• Private sector brings established skills and experience in operating other bike share programs. | • Agency negotiates operating performance standards with the contracted operator.  
• Offers flexibility in funding sources and access to federal, state, and local funding.  
• Ensures public transparency and accountability.  
• Agency maintains full control of the program including the brand and look of the program.  
• Agency objectives such as geographic and social equity can be reflected in the goals of the bike share program. | • Maximum flexibility in funding sources including access to local, state, and federal funds, sponsorships, advertising, and private donations.  
• Community-oriented missions of non-profits are well received by the public.  
• Engages a broader range of stakeholders including public, private, and community organizations through representation on the Board of Directors. | • Flexibility in funding sources including access to local, state, and federal funds, sponsorships, advertising, philanthropic and alumni contributions, and student fees.  
• Students, staff, and faculty are early-adopters and will support development of the program.  
• Bike share is consistent with several objectives and priorities of colleges including student mobility, reducing parking demand, and connecting with the broader community. |
<table>
<thead>
<tr>
<th><strong>PRIVATELY OWNED AND OPERATED</strong></th>
<th><strong>PUBLICLY OWNED</strong></th>
<th><strong>NON-PROFIT OWNED</strong></th>
<th><strong>UNIVERSITY OWNED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DISADVANTAGES</strong></td>
<td>Requires interest and capacity from an agency to take on responsibility for the program.</td>
<td>A new NPO can take time to establish and build the necessary capacity.</td>
<td>Some funding sources (such as advertising and sponsorship) may be limited to existing sponsors on campus.</td>
</tr>
<tr>
<td>• Market driven and dependent on interest from the private sector</td>
<td>• Risk and ongoing financial responsibility are undertaken by the agency.</td>
<td>• Skills and experience will need to be learned over time.</td>
<td>• Program expansion will need to be through agreement with other parties.</td>
</tr>
<tr>
<td>• Reduced agency control and less transparency than other models.</td>
<td>• Financial and operating performance is not the only priority.</td>
<td>• Typically the NPO sets its own performance standards that may not meet public and agency expectations for transit service.</td>
<td></td>
</tr>
<tr>
<td>• Funding options may be limited to what the private sector can bear.</td>
<td>• Expansion is typically market driven – may be more difficult to achieve equity goals.</td>
<td>• Program expansion will need to be through agreement with other parties.</td>
<td></td>
</tr>
<tr>
<td>• Expansion is typically market driven – may be more difficult to achieve equity goals.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SUMMARY</strong></td>
<td>Agency staff (including the City and Lawrence Transit) were supportive of bike share but did not believe that the public agencies were well placed or had the capacity to take on management of the bike share program. Other forms of public agency support will be critical no matter the final governance structure.</td>
<td>Lawrence has a number of existing non-profit organizations, but none have the mission or the capacity to take on a bike share program. The most likely option is to build a new non-profit to move forward the program with representation from interested and involved entities.</td>
<td>The University of Kansas’ Parking &amp; Transit office could be well positioned to take on responsibility for a bike share program. This would require the support of KU Leadership and the student body. The program could be expanded beyond the campus through Memoranda of Understanding with interested expansion partners.</td>
</tr>
<tr>
<td>The small scale of the advertising and sponsorship market in Lawrence may not attract a private investor, although if program sponsorship is available on the KU campus, this could be of interest to existing or new corporate partners. This could be tested by issuing of a Request for Expressions of Interest, which was done recently in Sacramento, CA and New Orleans, LA.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RECOMMENDED MODEL

There are a number of governance structures that are viable in Lawrence – however, several were ruled out of consideration. A privately owned and operated system was seen as unlikely, given the small market potential and street furniture advertising restrictions in Lawrence, although this could be tested in the marketplace with a Request for Expression of Interest. Public agencies, including the City of Lawrence and Lawrence Transit, are all interested partners in the bike share program, but do not believe that they are well placed or have the capacity to take on management of the bike share program. There are no obvious existing non-profits to take on the program – bike share would be well outside the mission of most existing non-profits. However, a new non-profit could be created to provide this capacity.

Many stakeholders identified the University of Kansas as the most logical partner to take on the bike share program given the importance that the university plays in the community and the significance of student participation to the success of the program. KU Parking & Transit has indicated a willingness to potentially house the program, to complement existing transit service on campus and help in the potential transition to assigned parking lots.

This model has been applied in other bike share programs, most notably at Purdue University, IN, where the Office of Sustainability launched a campus bike share program in 2015 and oversees the program. The program has since been expanded to the Cities of Lafayette and West Lafayette through Memoranda of Understanding (MOU) that puts in place agreements for these cities to pay the University to also oversee the program in these cities. Similarly, KU could enter into MOUs with the City of Lawrence, the Lawrence Parks and Recreation Department, Haskell Indian Nations University, and any other partners interested in expanding the program.

CONSIDERATIONS FOR THE UNIVERSITY-RUN MODEL

Implementing and operating a bike share program is an involved process. Some of the factors that the university will need to consider under this model are identified below.

Building Support

Students and university leadership will need to demonstrate support for developing this program, and show students how the program will benefit them. This feasibility study has made the first steps in gaining student support through extensive public outreach and an online survey that showed overwhelmingly that students surveyed were in favor of a bike share program. Student Senate support will also be critical to a successful startup.

The next step in exploring program development should be to create a coordinating steering committee comprised of various University of Kansas departments, City of Lawrence representatives, and other entities as needed. This coordinating steering committee will continue to explore project development by establishing a work plan and determining financial possibilities.

Fundraising Responsibility

The university will be responsible for fundraising initial seed money to hire staff to oversee launch and to purchase equipment for the first phase of the program, on the KU campus. They will also be responsible for funding the ongoing operations of the system on campus, while other partners will be responsible for fundraising to pay for their parts of the program. Potential funding sources are described in the next section.

Staff Capacity

KU Parking & Transit will need to build staff capacity for this program. Staffing needs will depend on Parking & Transit’s level of involvement in operating the program. During the pre-launch period, there are a number of planning items to oversee including fundraising, procurement, station planning and permitting, system branding, outreach, promotions, and marketing. This is at least a half time position six to twelve months prior to launch that may require hiring a part-time staff person or student intern.

Ongoing staffing needs will depend on whether the department decides to contract with a third party operator or build internal capacity to operate the program directly. Oversight of an operating contract is the lowest amount of involvement and could be integrated into an existing staff role or a part-time position. If KU Parking & Transit takes on operations, it will likely require a full-time program
coordinator as well as staff to maintain the program including mechanics, station technicians, bike rebalancers, outreach and marketing coordinators, etc. These positions could potentially be filled by students working part-time. Professional services such as legal, accounting, marketing, branding, and other services will also be required.

Permitting and Other Agreements

KU Design & Construction Management will need to provide support in planning the placement and any required construction of stations at preferred locations on campus. Site planning can be conducted in house or contracted to a third party. Station installation is often included as part of a vendor’s bid price.

Equipment Procurement

Procurement will need to follow university and state procurement requirements. However, other stakeholders that may be part of future expansion should be consulted about preferred system features and requirements and if permitted by the procurement rules, could also be included in the selection process.

7.2 BUSINESS PRO-FORMA

The project team prepared a business pro-forma to compare expected system costs and revenues for the bike share program and determine the expected funding gap. The pro-forma includes the twelve-month period leading up to launch and a five-year operating period. The assumptions that went into it are described below and the results included in Table 11 at the end of this section.

GENERAL ASSUMPTIONS

The pro-forma assumes that Phase 1 is launched in Year 1 and that Phase 2 is launched in Year 3. The actual rollout schedule may change based on available funding. A 3-percent per year price inflation was applied to all future year costs.

PROJECTED COSTS

Bike share costs can generally be divided into three types.

Capital Costs

Capital costs are those costs related to purchasing the equipment (e.g., the bicycles and stations), parts, site planning, and installation. They vary depending on the type of technology and the vendor. Actual equipment costs can only be determined through procurement. However, based on quotes and information provided to other cities, general price ranges for the different technology types are shown in Table 9.

In general, smart bike systems are the most cost effective because of their flexibility in whether or not to use customized bike racks, map panels, and electronic kiosks. Smart dock systems are more expensive given they must have docks and electronic kiosks. E-assist bike share technology is the most expensive. Many vendors offer, or are developing, the full range of these technologies so the technology (and the price) can be customized as appropriate. The pro-forma uses mid-range costs of $35,000 to $60,000 per station that will vary depending on the selected technology.

<table>
<thead>
<tr>
<th>TECHNOLOGY TYPE</th>
<th>COST RANGE*</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Bike</td>
<td>$25,000 - $40,000 / station</td>
<td>Cost depends on the number of customized bike racks, kiosks, and map panels</td>
</tr>
<tr>
<td>Smart Dock</td>
<td>$40,000 - $60,000 / station</td>
<td>Cost depends on the size of station including the number of docks and bikes at each station</td>
</tr>
<tr>
<td>E-assist Bikes</td>
<td>$45,000 - $65,000 / station</td>
<td>Approximately 15 – 20% more expensive than smart dock systems based on discussions with vendors</td>
</tr>
</tbody>
</table>

*All costs assume $4,000 per site for site planning, permitting, and installation. Efficiencies may be gained if the system is housed in a KU department that can do site planning and installation in-house.
**Startup Costs**

There are a number of costs that are incurred during the pre-launch period, which begins approximately 12 months prior to launch when a program coordinator is hired. These costs are expected to be approximately $300,000 for a system of this size and include:

- **Personnel costs:** including the early hire of a program coordinator and later hiring of an operations manager, a marketing coordinator, mechanics, station technicians, and other staff.

- **Marketing costs:** which may include hiring an agency to establish the name and brand of the system, develop the website, customize marketing materials (e.g., brochures, collateral, etc.), and hire event staff.

- **Direct operational costs:** such as leasing a workspace, vehicle purchase and upkeep, purchasing tools, equipment, and supplies, and providing employee training.

- **Administrative and professional costs:** such as insurance, legal, and accounting services.

If the program is housed in an existing entity, such as KU Parking & Transit, costs may be lower by reallocating duties to existing staff or using student employees.

**Operating Costs**

Operating costs include all day-to-day expenses once the program is launched such as system management, cleaning and maintaining the equipment, remote management of the station’s electronic access system, station rebalancing, running the call center, administration, marketing, and updating the website and social media. These costs vary depending on the use of the system and the performance standards negotiated between the program owner and the bike share operator. If the system is operated by a third party, then these costs are negotiated at the beginning of each contract period and remain constant for the duration of the contract.

Operating costs for the pro-forma were based on per-dock-per-month costs incurred by other systems of similar size. This metric is used because docks are a relatively stable element of infrastructure; a system usually operates with the same number of docks in service, while the number of bicycles in service can vary due to weather or usage patterns. An $80 per-dock-per-month operating cost was applied for the first year of operations, rising three percent each following year. This rate includes personnel costs, direct expenses, and some allowance for spare parts and bicycle replacement (due to theft, vandalism, and regular wear and tear). This assumes that some program costs will be minimal or free, such as the university donating a workspace, KU Parking & Transit providing professional services through existing staff resources, and operations utilizing relatively inexpensive student labor.

**Projected Revenues**

Under the traditional pricing scheme adopted by bike share programs in the United States there are three basic drivers of system revenue: annual (or monthly) membership, casual membership, and usage fees. To forecast potential revenues, the analysis assumes the pricing structure shown in Table 9, which is similar or a lower price than similar sized bike share programs including Ann Arbor, Cincinnati, Columbus, Dayton, Fort Wayne, and Indianapolis and is consistent with results of the bike share survey that received over 500 responses and asked respondents what they would be willing to pay to access the program.

Membership, ridership, and revenue inputs are summarized in Table 11 on the next page, and are based on trends observed in 10 peer cities.

<table>
<thead>
<tr>
<th>MEMBERSHIP TYPE</th>
<th>ACCESS FEE</th>
<th>0-45 mins</th>
<th>45-75 mins</th>
<th>Additional Half Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Membership*</td>
<td>$7.50 per month</td>
<td>Free</td>
<td>$2.00</td>
<td>$4.00</td>
</tr>
<tr>
<td>($90 annually).25*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual User**</td>
<td>$5 for 24-hours</td>
<td>Free</td>
<td>$2.00</td>
<td>$4.00</td>
</tr>
</tbody>
</table>

*Many bike share programs have moved to a monthly membership to replace annual membership. Pro-forma assumes that monthly members commit to 12 months of membership or $90 per year.

**The pro-forma assumes a day pass with 45 free minutes.
### Table 11: Comparison of Model Inputs for Case Study Bike Share cities

<table>
<thead>
<tr>
<th>TYPE OF MEMBERSHIP</th>
<th>VARIABLE</th>
<th>PEER CITY AVERAGE*</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly</td>
<td>Annual members per population</td>
<td>0.42%</td>
<td>Does not include any promotions or group membership sales**</td>
</tr>
<tr>
<td></td>
<td>Trips per annual member</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of trips incurring usage fees</td>
<td>2%</td>
<td>Annual members are more price sensitive and few exceed the free-ride period</td>
</tr>
<tr>
<td></td>
<td>Average usage fee incurred</td>
<td>$5</td>
<td></td>
</tr>
<tr>
<td>Casual</td>
<td>Casual members per station per year</td>
<td>410</td>
<td>Casual members typically learn about bike share by seeing a station</td>
</tr>
<tr>
<td></td>
<td>Trips per casual member</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of trips incurring usage fees</td>
<td>30%</td>
<td>Casual members are less price sensitive and some will exceed the free-ride period</td>
</tr>
<tr>
<td></td>
<td>Average usage fee incurred</td>
<td>$9</td>
<td></td>
</tr>
</tbody>
</table>

* Peer programs used in the pro-forma: Boise GREENbike, Zyp Bikeshare (Birmingham), Boulder BCycle, Charlottesville, VA, Chattanooga Bike Share, Link Bike Share (Dayton), Des Moines BCycle, Salt Lake City GREENbike, Spartanburg BCycle, and Topeka Metro Bikes.

**Membership sales could be increased through promotions, corporate membership sales, integrating with transit, integrating with student cards, or the appeal of e-assist bicycles.

### Summary of Results

The results of the pro-forma are shown in Table 11. These were compared to metrics observed in peer cities and showed that the results are reasonable when compared to the following metrics:

- **Trips per bike per day**: used globally to measure system usage. The pro forma predicts an average ridership of approximately 0.33 trips per bike per day over five years. Results from peer cities range from 0.21 trips per bike per day in Spartanburg, SC to 1.66 trips per bike per day in Salt Lake City, UT. While the projection for Lawrence is reasonable for a city of its size, it is below the average rate of 0.62 trips per bike per day observed across all peer cities.

- **Percentage of casual and annual member rides**: the forecast output predicts a split of approximately 47% of rides made by annual members and 53% by casual users. This is consistent with the peer city average.

- **Farebox recovery**: is the amount of operating cost recouped by membership and usage fees. This factor is important in understanding the financial needs of the system. The pro forma shows that around 40% of operating expenses are expected to be recouped through membership and usage fees. This is approximately the same as the average farebox recovery observed in peer cities.

The pro-forma (Table 12) shows that, assuming Phase 1 is implemented in Year 1 and Phase 2 is implemented in Year 3, the system will require capital funding of approximately $2.4 to $4.0 million over five years and will cost approximately $3.8 million to operate over the same period. Approximately $1.5 million or 40-percent of this cost will be recouped through user revenues. However, this will leave an operating funding shortfall of approximately $2.3 million over five years, an average of $462,000 per year.

### FUNDING

Apart from membership and usage fees, bike share systems in the United States have generally used three other types of funding sources: public, private, and advertising/sponsorship. While most programs use a variety of these sources, generally, public funds and private foundation grants are used towards capital costs whereas membership and usage fees and advertising/sponsorship revenues are used towards operating and maintenance costs. The different funding sources are reviewed in this section.
Table 12: Lawrence Bike Share Pro-Forma

<table>
<thead>
<tr>
<th></th>
<th>YEAR 0</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
<th>YEAR 4</th>
<th>YEAR 5</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stations</td>
<td>-</td>
<td>33</td>
<td>-</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>61</td>
</tr>
<tr>
<td>Bikes</td>
<td>-</td>
<td>291</td>
<td>-</td>
<td>247</td>
<td>-</td>
<td>-</td>
<td>538</td>
</tr>
<tr>
<td>Docks</td>
<td>-</td>
<td>495</td>
<td>-</td>
<td>420</td>
<td>-</td>
<td>-</td>
<td>915</td>
</tr>
<tr>
<td>Annual members</td>
<td>-</td>
<td>800</td>
<td>850</td>
<td>1,650</td>
<td>1,750</td>
<td>1,850</td>
<td>6,900</td>
</tr>
<tr>
<td>Casual users</td>
<td>-</td>
<td>9,500</td>
<td>10,000</td>
<td>19,500</td>
<td>21,000</td>
<td>22,000</td>
<td>82,000</td>
</tr>
<tr>
<td>Annual member rides</td>
<td>-</td>
<td>14,000</td>
<td>15,000</td>
<td>30,000</td>
<td>31,000</td>
<td>33,000</td>
<td>123,000</td>
</tr>
<tr>
<td>Casual user rides</td>
<td>-</td>
<td>16,000</td>
<td>17,000</td>
<td>33,000</td>
<td>36,000</td>
<td>37,000</td>
<td>139,000</td>
</tr>
<tr>
<td>Total rides</td>
<td>-</td>
<td>30,000</td>
<td>32,000</td>
<td>63,000</td>
<td>67,000</td>
<td>70,000</td>
<td>262,000</td>
</tr>
<tr>
<td>% Rides Annual</td>
<td>-</td>
<td>47%</td>
<td>47%</td>
<td>48%</td>
<td>46%</td>
<td>47%</td>
<td>47%</td>
</tr>
<tr>
<td>% Rides Casual</td>
<td>-</td>
<td>53%</td>
<td>53%</td>
<td>52%</td>
<td>54%</td>
<td>53%</td>
<td>53%</td>
</tr>
<tr>
<td>Capital Purchase and Installation – Phase 1</td>
<td>-</td>
<td>$(1,155,000) to $(1,980,000)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$(1,155,000) to $(1,980,000)</td>
</tr>
<tr>
<td>Capital Purchase and Installation – Phase 2 and 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$(980,000) to $(1,680,000)</td>
<td>-</td>
<td>-</td>
<td>$(980,000) to $(1,680,000)</td>
</tr>
<tr>
<td>System Startup (pre-launch)</td>
<td>$(300,000)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$(300,000)</td>
</tr>
<tr>
<td>Total Capital &amp; Startup Costs</td>
<td>$(300,000)</td>
<td>$(1,155,000) to $(1,980,000)</td>
<td>-</td>
<td>$(980,000) to $(1,680,000)</td>
<td>-</td>
<td>-</td>
<td>$(2,435,000) to $(3,960,000)</td>
</tr>
<tr>
<td>Operations and Maintenance Costs – Phase 1</td>
<td>-</td>
<td>$(480,000)</td>
<td>$(490,000)</td>
<td>$(500,000)</td>
<td>$(520,000)</td>
<td>$(530,000)</td>
<td>$(2,520,000)</td>
</tr>
<tr>
<td>Operations and Maintenance Costs – Phases 2 and 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$(430,000)</td>
<td>$(440,000)</td>
<td>$(450,000)</td>
<td>$(1,320,000)</td>
</tr>
<tr>
<td>Total O&amp;M Costs</td>
<td>-</td>
<td>$(480,000)</td>
<td>$(490,000)</td>
<td>$(930,000)</td>
<td>$(960,000)</td>
<td>$(980,000)</td>
<td>$(3,840,000)</td>
</tr>
<tr>
<td>User Revenues* – Phase 1</td>
<td>-</td>
<td>$160,000</td>
<td>$180,000</td>
<td>$190,000</td>
<td>$220,000</td>
<td>$230,000</td>
<td>$980,000</td>
</tr>
<tr>
<td>User Revenues* – Phases 1 &amp; 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$160,000</td>
<td>$180,000</td>
<td>$190,000</td>
<td>$530,000</td>
</tr>
<tr>
<td>Total User Revenues</td>
<td>-</td>
<td>$160,000</td>
<td>$180,000</td>
<td>$350,000</td>
<td>$400,000</td>
<td>$420,000</td>
<td>$1,530,000</td>
</tr>
<tr>
<td>Operating Shortfall – Phase 1</td>
<td>-</td>
<td>$(320,000)</td>
<td>$(310,000)</td>
<td>$(310,000)</td>
<td>$(300,000)</td>
<td>$(300,000)</td>
<td>$(1,540,000)</td>
</tr>
<tr>
<td>Operating Shortfall – Phases 2 &amp; 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$(270,000)</td>
<td>$(260,000)</td>
<td>$(260,000)</td>
<td>$(790,000)</td>
</tr>
<tr>
<td>Total Operating Shortfall (fundraising need)</td>
<td>-</td>
<td>$(320,000)</td>
<td>$(310,000)</td>
<td>$(580,000)</td>
<td>$(560,000)</td>
<td>$(560,000)</td>
<td>$(2,310,000)</td>
</tr>
<tr>
<td>Farebox Recovery (all phases)</td>
<td>-</td>
<td>33%</td>
<td>39%</td>
<td>39%</td>
<td>42%</td>
<td>43%</td>
<td>40%</td>
</tr>
</tbody>
</table>

*User revenues in this pro-forma do not assume any KU student fees will be used to support the bikeshare program. Should a $1 increase in student fees per semester be redirected to fund the bike share program, the program should expect an additional $48,000 per year in general funding support. However, the bike share program may lose out on some of the revenue generated through the sale of full price membership to students, should student fees be increased and a free or discounted membership to access the bike share program be negotiated.
Public Funding

Federal, state, and local funds are all important sources of funding for bike share.

Federal funds typically come from the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) and are limited to capital and equipment, i.e., they cannot be used to fund operations. The FTA and FHWA maintain a list of grants eligible for bike share capital expenses at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm.

Different restrictions apply depending on which federal agency provides the funds. For example, FTA funds may only be used for docks, stations, and other equipment but not for the bicycles themselves. In addition, bike share projects are only eligible for FTA funds if they are within a three-mile radius of existing transit stops, which would cover almost all of Lawrence. FHWA funds have fewer restrictions and can also be used to purchase bicycles.

Both FHWA and FTA funds are subject to Buy America regulations, which ensure that transportation projects are built with American-made products. The requirements stipulate that the product must be produced with at least 90-percent domestically made steel or iron content and the FTA also requires each end product and its components to be assembled in the United States.

Two popular federal grant programs for funding bike share capital are the Congestion Mitigation and Air Quality (CMAQ) program and the Transportation Alternatives Program (TAP). CMAQ is only available to communities that do not attain air quality performance levels. Lawrence is not in this category and therefore does not qualify.

TAP is an initiative of the Fixing America’s Surface Transportation Act (FAST Act) that apportions funds to the states to carry out the program. The Kansas Department of Transportation (KDOT) is responsible for administering the program in Kansas. Eligible projects include bicycle and pedestrian projects and bike share has been a TAP eligible project in a number of other states. Access to the funds requires a 20 percent local match and the call for applications occurs every two years and will likely be again in September 2017. Potential project sponsors include local governments, regional transportation authorities, transit agencies, and several other government agencies. A non-profit is not an eligible sponsor but can work with a government agency to sponsor the application. More information is available at: https://www.ksdot.org/bureaus/burtransplan/TransAlt.asp.

Other smaller grants may also be available through the Kansas Health Foundation or the City’s Transient Guest Tax grant program which provides grants of up to $15,000 each year for programs that “benefit the Lawrence community or enhance the visitor experience in Lawrence”. More information is available at: https://lawrenceks.org/cmo/tgt-grants/.

Private Funding

Private funding sources are various and include grants from private foundations, private gifts and donations, and private sector investment. These sources are used in many U.S. cities that have non-profit owned bike share systems. In Minneapolis and St. Paul, Boulder, and Denver, donations make up 5% to 10% of revenues.

Other private funding sources may include:

- Bulk membership commitments from large employers.
- Student fees from the University of Kansas and Haskell Indian Nations University used to purchase bulk student membership. Developer incentives to encourage direct station purchase or collection of development charges to go towards bike share stations near their development.
- Crowdsourcing. Kansas City BCycle recently raised $400,000 through crowdsourcing to expand their system.

Another potential source of funding for a KU owned bike share program is through alumni donations. KU Endowment could assist with identifying alumni interested in donating to the program. Capital donations to the program are likely to be more appealing as one-time donations that can be recognized for establishing the program.
Sponsorship and Advertising

Sponsorship and advertising are important funding streams used in most U.S. bike share programs. In most cities, sponsorship on the bicycles themselves is generally well accepted as they are free to circulate and are not fixed street furniture (similar to wraps on city buses). Preliminary discussions in Lawrence suggest this will also be the case. However, the Signage Code states that “new advertising signs are prohibited” which may limit the use of advertising on the stations and map panels. Nevertheless, other cities have used “sponsorship” rather than advertising and an interpretation of the regulation regarding sponsorship should be sought. The Signage Code is available at: https://assets.lawrenceks.org/assets/pds/devservices/bsd/licensing/ds_bsd_city_code_article_18_amended_2015_june.pdf.

Potential sponsors may be interested in the bike share program for a number of reasons including brand recognition or association with a positive social and environmental program. There are a variety of different bike share sponsors around the country, however the most sponsorships have come from the health care and financial sectors. There are a number of ways to divide sponsorship offerings including:

- Title sponsorship: where a sponsor pays a premium price to be the exclusive sponsor of the program. The title sponsor gets to brand the program and all its assets using its corporate colors, name, and messaging.
- Presenting sponsorship: allows the system to retain branding and naming rights to the program, but offers large sponsorship opportunities to one or multiple sponsors. This often includes a sponsor purchasing system-wide logo placement on, for example, all the bicycle fenders. Most systems retain some sponsorship opportunities at the station or on the bicycle baskets to provide smaller and local sponsors with an opportunity to be involved in the program.
- Individual sponsors: individual assets are sold to sponsors, for example, a company might sponsor 10 bike fenders or have their logo on 5 map panels. Each deal has to be negotiated and requires staff time to identify and secure multiple sponsors.

The University of Kansas has a number of existing sponsors and there is a move at the university to update these contracts to require a percentage of these revenues to fund special projects on campus. This could be used to support operations and these sponsors may also be interested in expanding their sponsorship for brand recognition on the bikes and stations.

Student Funding

Another potential source of funding is to incorporate low cost membership to the program into the required student campus fee. This model has been applied at a number of universities. The Great Rides bike share program that operates on the University of North Dakota in Fargo, ND, includes a $5 membership as part of its student activity fee. This provides access to the program for every student using their student ID card. In the first season of operation (2015), 8,000 of the university’s 15,000 students registered their membership with Great Rides and approximately 6,000 took at least one bike share trip. By simplifying access, the Great Rides program is also one of the highest ridership bike share programs in the United States. Examples of other universities that have used student fees to fund their bike share programs include:

- Washington State University, Pullman, WA
- University of Oregon, Eugene, OR
- Drury University, Springfield, MO (bike share funded as part of a $20 per year sustainability fee)
- Cornell University, Ithaca, NY ($2 per year fee increase)
- Yale University, New Haven, CT

The results of the student survey indicate that students would be willing to contribute approximately $3.75 in student fees, per semester, to support a bike share program. To pursue this funding source, student representatives should continue to be included in bike share discussions.

7.3 SUMMARY

The business pro-forma indicates that approximately $300,000 to $600,000 a year will need to be raised in sponsorships and advertising to cover the costs of a full build out of a bike share system. Additional efficiencies gained from housing system operations in an existing
entity, such as KU Parking & Transit, could significantly lower these costs. Additionally, Phase 1 could be launched in parts as funding becomes available. Phase 1a, consisting of approximately half of the Phase 1 stations (4 downtown stations and 10 stations on the KU campus) could potentially operate requiring $135,000 of sponsorship and advertising per year. Community partners should form an exploratory committee to continue to work towards securing funding to ensure the success of a bike share system in Lawrence.