Bicycle Intern Guide
Henri Venable
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Making the Case:

The heavy reliance on motor-vehicle transportation in the United States is undeniable. The historically cheap personal cost of owning and operating a car and urban planning dominated by auto-centric programs has marginalized pedestrians and bicyclists as road users. In 2009 cycling made up only 1 percent of all daily trips in the U.S. and walking only 11 percent (Buehler 2012). “European countries…have active transport rates at least twice as high” as the United States (Buehler 2012). Nevertheless, the fatality and injury rates for cyclists in the United States are 3 to 5 times greater than Denmark, Germany, the United Kingdom, and the Netherlands (Buehler 2012). This low rate of cycling and high rate of accidents point to an exclusionary transportation system that has impeded the growth of active transportation alternatives. Active transportation refers to any human powered mode of transportation including walking, cycling, running, skateboarding, and other variants. Additionally, American perceptions of cycling differ from their European counterparts. In the United States, cycling is primarily a recreational activity undertaken by the young. About 75% of bike trips in the U.S are for recreational purposes compared to only 35% in Germany or 27% in the Netherlands (Buehler 2007). A lack of utilitarian cycling tradition and the marginal legal, cultural, and infrastructure status of cyclists has substantially impeded progress (Pucher 1999). As a result, cycling rates in the United States continue to trail behind those of other modernized countries.

Excessive reliance on, and use of, motorized personal transport has a multitude of direct and indirect impacts at local, regional, national, and global levels. Activities of the transportation industry release several million tons of gas into the atmosphere a year including carbon monoxide, nitrogen oxide, methane, chlorofluorocarbons, lead and others that have been associated with global warming (Rodrique 2013). At the regional, national, and local level these emissions contribute to acid rain, smog, air pollution, respiratory problems, skin irritations, and more (Rodrique 2013). Runoff of oil, dirt, brake dust, deposited vehicle exhaust, road particles, automotive fluids, de-icing chemicals and road salts from roadways and parking lots contaminate rivers, lakes, and oceans. Finally, the expansive infrastructure needed for personal automobiles impacts the urban and natural landscape and leads to urban sprawl, soil erosion, and the reduction of natural areas.

Induced demand, the tendency of demand to rise as supply increases, compounds these issues. In essence, “congestion reaches a point at which it constrains [traffic growth]. If the road capacity increases, the number of…trips also increases until congestion again limits …growth” (Litman 2014b). There is no sustainable future in a transportation system tailored exclusively toward the automobile. A shift in emphasis toward programs and policies in support of active transportation, including cycling and walking, can help overcome these issues.
Current transportation realities at Indiana University can be broken down into two main user classes: students and employees. There are approximately 42,000 students enrolled at Indiana within 3 miles of campus (TDM 2012). One third of this population lives on-campus in residence halls or apartment complexes (TDM 2012). Additionally, 57 percent of faculty and 35 percent of staff live within 3 miles of campus (Master Plan). Individuals commute to campus in a variety of modes including walking, biking, driving, riding public transit, apartment shuttles, or carpooling. Driving alone is the primary mode of transportation among employees, making up 71 percent of the modal split (TDM 2012). The modal split for off-campus students is substantially more balanced. Within this group 24 percent walk, 23 percent drive alone to campus, and 19 percent use Bloomington City transit. In both groups, however, bicycling remains an underutilized transportation option. The City of Bloomington has made substantial progress in creating a well connected, clearly labeled, and safe bicycle system and actively encourages cycling and educates community members on how to cycle legally, confidently, and safely. Indiana University, however, has fallen behind in comparable infrastructure and programmatic improvements. Only one, poorly labeled bike lane exists on campus, 32 percent of university racks are the less secure “wheel only racks”, and only 6% of all racks are covered (TDM 2012).

Indiana University is poised to reap substantial benefits from relatively small and low cost changes in its transportation system. Active transportation, and bicycling specifically, provides a myriad of benefits with relatively low associated costs. These benefits are system-wide and personal and effect economic vibrancy, environmental sustainability, health, and the longevity and efficiency of transportation infrastructure.
Table 4  Active Transportation Benefits and Costs

<table>
<thead>
<tr>
<th>Potential Benefits</th>
<th>Improved NMT Conditions</th>
<th>Increased NMT Transport Activity</th>
<th>Reduced Automobile Travel</th>
<th>More Compact Communities</th>
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</thead>
<tbody>
<tr>
<td>• Improved user convenience and comfort</td>
<td>• User enjoyment</td>
<td>• Reduced traffic congestion</td>
<td>• Improved accessibility, particularly for non-drivers</td>
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<tr>
<td>• Improved accessibility for non-drivers, which supports equity objectives</td>
<td>• Improved public fitness and health</td>
<td>• Road and parking facility cost savings</td>
<td>• Transport cost savings</td>
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<tr>
<td>• Option value</td>
<td>• Increased community cohesion (positive interactions among neighbors due to more people walking on local streets) which tends to increase local security</td>
<td>• Consumer savings</td>
<td>• Reduced sprawl costs</td>
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<tr>
<td>• Higher property values</td>
<td>• Increased security</td>
<td>• Reduced chauffeuring burdens</td>
<td>• Openspace preservation</td>
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<tr>
<td>• Increased security</td>
<td></td>
<td>• Increased traffic safety</td>
<td>• More livable communities</td>
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<table>
<thead>
<tr>
<th>Potential Costs</th>
<th>Improved NMT Conditions</th>
<th>Increased NMT Transport Activity</th>
<th>Reduced Automobile Travel</th>
<th>More Compact Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Facility costs</td>
<td>• User enjoyment</td>
<td>• Reduced traffic congestion</td>
<td>• Improved accessibility, particularly for non-drivers</td>
<td></td>
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<tr>
<td>• Lower traffic speeds</td>
<td>• Improved public fitness and health</td>
<td>• Road and parking facility cost savings</td>
<td>• Transport cost savings</td>
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<td>• Increased community cohesion (positive interactions among neighbors due to more people walking on local streets) which tends to increase local security</td>
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<td>• Increased traffic safety</td>
<td>• More livable communities</td>
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<td></td>
<td></td>
<td>• Energy conservation</td>
<td>• Higher property values</td>
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<td></td>
<td></td>
<td>• Pollution reductions</td>
<td>• Improved security</td>
<td></td>
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<td></td>
<td></td>
<td>• Economic development</td>
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Active transport can have various benefits and costs.  
(Table from Litman 2014a)

Health

The Center for Disease Control recommends that adults spend 150 minutes per week doing moderate physical activity (CDC 2011). Spread across a 5-day workweek this equates to just 30 minutes a day. Bicycling allows individuals to fit low-impact physical activity into their commute while not inordinately increasing their commute time. Inadequate physical activity has been associated with higher rates of heart disease, hypertension, stroke, depression, diabetes, osteoporosis, cancer, dementia, and obesity (CDC 2011). Commuting by bicycling can help reduce these risks and their associated cost. A study of Portland, Oregon found that it saved $544 a year in health-care costs per individual (Gotschi, 2011). Using health care and fuel cost savings less any investment cost, Gotschi, estimated that even the most basic bicycle investment plan proposed by Portland would yield $394 million in savings by 2040, $380 million of which would be attributed to health care savings (Gotschi, 2011).

Infrastructure

In 2008, Portland estimated the replacement cost of its 300-mile bike network to be about $60 million: roughly the same price as just 1 mile of urban freeway (Geller 2012). In California, Roseville estimated the cost of signage and striping for a mile of bike lane to be $60,000 while repaving of 3 miles of interstate would be $75 million (Flusche 2009). Prices vary depending on location, road condition, and other factors but in all instances a bike lane and cycling system is cheaper to build and maintain than motor-vehicle infrastructure. The lower space requirement of bicycles also helps to reduce congestion. Bicycles lanes can accommodate 7 to 12 times as many people per meter of lane per hour than car lanes for as little as $5,000 a mile (Flusche 2009). Bicycling infrastructure…is by far the most cost-effective way to provide for personal mobility in an urban transportation system (Geller 2012).
**Table 12**  

<table>
<thead>
<tr>
<th>Measure</th>
<th>Typical Costs (2000 U.S. Dollars)</th>
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<tbody>
<tr>
<td>Bike lanes</td>
<td>$10,000-50,000 per mile to modify existing roadway (no new construction).</td>
</tr>
<tr>
<td>Bicycle parking</td>
<td>$50-500 per bicycle for racks and lockers</td>
</tr>
<tr>
<td>Center medians</td>
<td>$150-200 per linear foot</td>
</tr>
<tr>
<td>Curb bulbs</td>
<td>$10,000-20,000 per bulb</td>
</tr>
<tr>
<td>Marked crosswalk</td>
<td>$100-300 for painted crosswalks, and $3,000 for patterned concrete.</td>
</tr>
<tr>
<td>Path (5-foot asphalt)</td>
<td>$30-40 per linear foot</td>
</tr>
<tr>
<td>Path (12-foot concrete)</td>
<td>$80-120 per linear foot</td>
</tr>
<tr>
<td>Pedestrian refuge island</td>
<td>$6,000-9,000, depending on materials and conditions.</td>
</tr>
<tr>
<td>Sidewalks (5-foot width)</td>
<td>$20-50 per linear foot</td>
</tr>
<tr>
<td>Speed humps</td>
<td>$2,000 per hump</td>
</tr>
<tr>
<td>Traffic signals</td>
<td>$15,000-60,000 for a new signal</td>
</tr>
<tr>
<td>Traffic signs</td>
<td>$75-100 per sign.</td>
</tr>
<tr>
<td>Traffic circles</td>
<td>$4,000 for landscaped circle on asphalt street and $6,000 on concrete street.</td>
</tr>
</tbody>
</table>

*This table summarizes examples of active transport facility costs. Of course, costs may differ significantly from these values depending on specific conditions.*  
(Table from Litman 2014a)

**Environment**

Approximately 40 percent of vehicle trips are within two miles of home (Pedaling to Prosperity 2012). These short motorized trips consume larger amount of resources (petrol) and generate higher emissions per mile due to vehicle cold starts (the inefficiency of an engine in the first few minutes of operation) (Litman 2014a). These trips are often the first to be replaced with active transportation alternatives and each 1% shift toward non-motorized travel reduces fuel consumption by 2-4% (Komanoff 1993). Bicycling helps “bypass the fossil fuel system to which the American economy has become addicted” (USDOT 1993). Additionally, active transportation encourages smart growth by emphasizing compact development and mixed transportation systems. These systems reduce urban sprawl, create transportation and access equity, reduce car use and accompanying pollution, and enhance the public space (Litman 2014a).

**Table 10**  
**Smart Growth Benefits** (Burchell, et al. 2002; Litman 1995)

<table>
<thead>
<tr>
<th>Economic</th>
<th>Social</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced development and public</td>
<td>Improved transport options,</td>
<td>Greenspace and habitat preservation</td>
</tr>
<tr>
<td>service costs</td>
<td>particularly for nondrivers</td>
<td>Reduced air pollution</td>
</tr>
<tr>
<td>Consumer transportation cost</td>
<td>Improved housing options</td>
<td>Energy conservation</td>
</tr>
<tr>
<td>savings</td>
<td>Community cohesion</td>
<td>Reduced water pollution</td>
</tr>
<tr>
<td>Economies of agglomeration</td>
<td></td>
<td>Reduced “heat island” effect</td>
</tr>
<tr>
<td>More efficient transportation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This table summarizes various benefits to society of smart growth development patterns.*  
(Table from Litman 2014a)
Economic
The average annual operating cost of a bicycle is $308 compared with $8,200 for the average car (Pedaling to Prosperity 2012, Your Driving Costs 2013). These substantial savings add up to $4.6 billion a year nationally (Pedaling to Prosperity 2012). All things being equal, a bicyclist will have more free income than a motorist and will in turn benefit the local economy. Portland businesses recognized this fact and have requested and supported the removal of 100 car parking spaces around the city in exchange for 1,000 bicycle parking spaces (Geller 2012). Economic benefits even extend to employers. Employees who are encouraged to bike to work use up to 32% fewer sick days, have up to 55% lower health costs, and are up to 52% more productive than their counterparts (Andersen 2014).

The benefits of bicycle transportation have not gone unnoticed. American cities and universities are increasingly undertaking programs designed to promote bicycle transportation. Independent groups are similarly advocating for bicycle transportation around the nation; including the League of American Bicyclists, the Alliance for Biking and Walking, People for Bikes, and a multitude of local and regional bicycle groups and clubs. From 1977 to 1995 the amount of trips by bike have doubled and the percentage of trips by bike rose from .6% to .9% (Pucher 1999). Spending on bicycle transportation by government of all levels is on the rise in no small part because of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) (Pucher 1999). In ISTEA’s 6-year life $972 million in federal funds was spent on bike and pedestrian projects as compared to only $41 million in the previous 20 years (Pucher 1999). Universities around the nation, including Indiana University, are adopting Bicycle Master Plans (BMP) to solidify the designation and expansion of bike routes, foster a safe environment for cycling, and promote bicycling as a viable transportation option. Demand for bicycle facilities is growing from the ground up. Nationally, seven in ten people would like to bike more than they do but they are dissatisfied with their community’s bicycle infrastructure (Flusche 2009).

If Indiana University is prepare for the future and reap the benefits of bicycle transportation, it must address its shortfalls and reduce the barriers to bicycle use. The League of American Bicyclists identified 5 areas of focus for universities seeking to become more bicycle friendly, these include: education, encouragement, enforcement, engineering, and evaluation. The remainder of this report sets out potential future projects with a vision to addressing these five areas, achieving the LAB platinum ranking, ensuring continuity between interns and providing a holistic, long-term vision of bicycle activism at Indiana University-Bloomington.
How to Use this Guide:

The following is a living document and should be added to and edited as necessary. Suggested initiatives have been listed to address each of the “5 E’s.” Along with these are included any references to previous work or research on the initiative in question. Included references are added to the appendix with a summary of work done and any files generated for the project. Again, what follows is meant to be a living document and interns should feel free to add initiatives and update or improve those previously “completed.”
Evaluation

Bike Counts:
Bike counts will be essential in the creation and implementation of the Bicycle Master Plan at Indiana University. Communities across the United States are beginning to ask questions about their bicycle systems: Where are bicycle activities taking place? What effect do facilities have on levels of cycling? Where are existing bicycle facilities located? (Pedestrian and Bicycle Data Collection 2005). Strategically measuring and recording bicycle usage can answer these questions and aid in prioritizing infrastructure improvement.

Behaviour Surveys:
Behaviour surveys are valuable in understanding why and how people bike as well as community attitudes associated with bicyclists (Arnold 2010). The City of Bloomington has undertaken similar surveys for the Civil Streets Campaign: highlighting a need to educate both cyclists and motorists about their respective rights and responsibilities. These studies could be helpful to IU in planning infrastructure improvements and additions as well as highlighting educational opportunities.

Internet Traffic Tracking:
There is a wealth of information that is, and can be, available on the Bicycle Sustainability page and IU Students for Bike Facebook page. These should act as “go-to” resources for those interested in cycling at Indiana University. Measuring traffic to these sites can demonstrate the utility, efficacy and accessibility of current information as well as student interest in bicycle transportation.

Crimson Cruisers Feedback:
The Crimson Cruisers library will benefit from any feedback, suggestions, and criticism of the program. These qualitative measures, provided by users of the bike library, can help guide the progress of the program. With this data the Crimson Cruisers administrators can identify and emphasize the practices and programs students, faculty, and staff prefer. At the same time, the data can reveal problem areas in the operation of the bike library and indicate how to address any issues.

Crimson Cruiser Usage Tracking:
Tracking the usage of the Crimson Cruisers bikes can serve multiple purposes. Usage numbers can demonstrate the value and impact of the program in a quantitative manner and help secure more funding and support. These numbers can give the Crimson Cruiser mechanics an idea regarding the potential amount of service and repair needed for any given bike. And lastly, encouraging use tracking can prompt and remind Crimson Cruiser recipients to use the bike they have been given.
Education

Print and Downloadable Materials:
Education is a key component of any campaign for change. Educational materials must be easily accessible, relevant, informative, and visually appealing. The nature of the student body is one of impermanence and so the distribution of materials should be wide and frequent. There are a host of materials already available online but this information should be altered to achieve a local and distinctly IU flavor.

Video Materials:
The League of American Bicyclists has a host of short educational videos covering riding tips, gear recommendations, and bicycle laws. This form of information dissemination is almost a necessity in the age of YouTube and Netflix and, indeed, many bike advocacy groups are creating similar videos. This tactic should be utilized at Indiana University – whether “borrowing” these videos and displaying them on the IUOS website or creating videos specifically for IU.

Online Riding Instruction:
One of the core aspects of the Crimson Cruisers Library was the inclusion of a riding class taught by Vince Caristo from the City of Bloomington. The class was a shortened version of the LAB Traffic Skills 101 classes. Crimson Cruiser ambassadors reviewed the class positively but suggested expanded class offerings. Finding a willing and available instructor to commit to 3-4 sessions a semester is a substantial obstacle. Providing this material online might be an effective solution.

Riding Workshops:
League of American Bicyclist certified instructors teach extensive riding classes around the nation. These classes provide strategies for how bicyclists can be predictable, courteous, assertive, visible, and alert and often take 9 hours over 3 days. This time commitment might be a major impediment to students, faculty, and staff. Some “homegrown” version tailored to Indiana University and administrated by interns or volunteers may be more effective.

Maintenance Workshops:
Many of the issues riders face regarding bike maintenance are simple fixes. Hosting maintenance workshops can teach riders how to adjust brakes and shifting, change tires, and patch tubes. This knowledge gives riders an understanding of the bicycle they rely on and a feeling of self-sufficiency. Empowering and educating potential riders can reduce the intimidation and cost felt by many to be a barrier to entry.
Encouragement

Advertising
Many students come from areas where bicycle transportation is nonexistent or negatively stigmatized. Regularly advertising and supporting bicycling as a legitimate transportation alternative at Indiana University can present a transportation option to people who would otherwise not consider it. For many, college is a time of experimentation and financial hardship, which presents the perfect circumstance to instill life-long transportation habits. Materials for encouragement, like educational materials, must be distributed widely, frequently and through as many media as possible.

Bike Ride and Safety Pledge:
Stanford University uses a pledge to encourage safe riding. Obtaining a commitment to ride frequently, or to ride safely, has been shown to influence the thought process of those making the pledge. This is due to the social value placed on ones consistency in word and action. Pledges of this sort, along with small incentives, should be used to persuade safe and legal bicycle transportation practices (McKenzie-Mohr 2011).

Special Events:
Fun rides and bike related challenges could help expand the visibility of bicycling at Indiana University. The City of Bloomington has found success with its “Terrible Horrible No Good Very Bad Bike Ride” and the “Bike to Work Day” event. The possibilities for special events are limitless and each intern should attempt to host at least one such event each year.

“Demand for bicycle facilities is growing from the ground up, seven in ten said they would like to bike more than do now but less than half were satisfied with their communities design for biking (Flusche 2009). ”
Engineering

Bicycle Master Plan:
A BMP will provide a long-term blueprint for Indiana University. This involves setting the vision and goals for the future of bicycle transportation at Indiana University, providing an overview of existing conditions, recommending new bicycle projects and programs, and establishing measures and methodologies for evaluation. This is an essential component for cities and universities around the country and will help to solidify bicycle transportation as a priority on campus.

Bike Racks on Campus Buses:
Providing the option to bike-n-bus extends the catchment area of public transit and encourages bicycle transportation by increasing the mobility of transit users at access and egress points (Bicycles and Transit Policy 2012). Bicyclists may choose not to bike a section of a commute to avoid large distances, dark or unsafe conditions, hills, poor weather or they may have suffered some mechanical failure. This option should be available through Campus Bus Services on the longer-range campus bus routes.

Parking:
The Transportation Demand Management survey found 32% of bike parking on campus utilizes the less secure wheel-lock only racks and only 6% of bike parking is covered and protected from the elements (TDM 2012). Complaints about the lack of parking in high use areas and the quality of parking generally have been voiced through the IU Students for Bikes Facebook page and the bicycle@indiana.edu email. A concerted effort should be made to remedy this issue and standardize the quantity and quality of bike parking on campus.

Bike Library:
The bike library received very positive feedback from the first round ambassadors. However, helpful criticisms were also voiced and some issues became apparent. The issue of a permanent and sufficient location is still unresolved, some older bikes experienced minute to moderate mechanical issues with feedback suggesting a desire for newer bikes, and the administrative structure regarding IUOS, OA, and the TWG intern needs to be resolved and streamlined.

“Bicycling infrastructure…is by far the most cost-effective way to provide for personal mobility in an urban transportation system (Geller 2012).”
**Enforcement**

Light and/or Bell Distribution Event with IUPD:
The City of Bloomington regularly mounts campaigns in conjunction with the Bloomington Police Department to pass out lights and bells to cyclists on the street that don’t have them. The law requires these two items and many cyclists go without them due to cost or ignorance. Targeted and regular campaigns to provide these items of IU students could open dialogue between IUPD and the student population and increase awareness of bicycle rights and responsibilities among both the campus population and IU Police Department.
Works Cited


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