INNOVATIVE URBAN BIKEWAY DESIGN: A SURVEY OF CITIES

GREEN LANE PROJECT
Cities across the U.S. are improving their streets to make riding a bike a more comfortable and attractive way to get around. Many are installing protected bike lanes, which add an element of physical separation such as curbs, planters, parked cars, or posts between the lane for cars and the lane for bikes. These designs are relatively new to the U.S. but their numbers are growing quickly, from 62 on the ground at the beginning of 2012 to 102 at the end of that year.

The design of protected bike lanes, like all street projects, must follow accepted engineering standards and guidance to ensure safety and consistency across the country. In early 2013, Secretary Ray LaHood, head of the United States Department of Transportation (USDOT), pledged to make sure that national design guidance was keeping pace with the state of the practice in cities.

The Green Lane Project, a program associated with the nonprofit PeopleForBikes, conducted an online survey in April of 2013 to learn how many cities are building innovative bike projects, whether existing design guidance is adequate, and how these projects are funded.

Responses came from 107 people in 82 cities in 36 states. Most respondents are city staffers (67%) or consultants working for cities (14%). The remaining 19% work for county, regional, or state transportation departments. A quarter are licensed Professional Engineers. The online survey was publicized through various listservs so there is an element of self-selection. It is not a statistically significant survey, but it provides interesting insight into a quickly evolving field.

**KEY FINDINGS:**

- Most of the cities are at least talking about innovative bike projects. A majority have either already built facilities or plan to build them by 2016.
- There is a strong desire for better national guidance on how to design the projects so they are safe, comfortable, and successful. 76% of respondents find the *Urban Bikeway Design Guide* from the National Association of City Transportation Officials (NACTO) helpful, and 91% of respondents feel it would be helpful if the Federal Highway Administration (FHWA) recognized the Guide.
- State Departments of Transportation are not particularly supportive of city efforts to build these facilities.
- Cities are using a wide variety of funding sources to build bikeways.
Respondents from 82 cities in 36 states participated in the survey.
Is your city installing...

<table>
<thead>
<tr>
<th>Treatment</th>
<th>On the ground</th>
<th>Planning</th>
<th>Talking about it</th>
<th>Not on our radar</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffered bike lanes</td>
<td>50%</td>
<td>16%</td>
<td>21%</td>
<td>8%</td>
<td>5%</td>
</tr>
<tr>
<td>Green color</td>
<td>35%</td>
<td>23%</td>
<td>27%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Protected bike lanes</td>
<td>33%</td>
<td>22%</td>
<td>29%</td>
<td>14%</td>
<td>2%</td>
</tr>
<tr>
<td>Bike boxes</td>
<td>29%</td>
<td>17%</td>
<td>33%</td>
<td>15%</td>
<td>6%</td>
</tr>
<tr>
<td>Bicycle-specific signals</td>
<td>26%</td>
<td>15%</td>
<td>24%</td>
<td>28%</td>
<td>7%</td>
</tr>
<tr>
<td>Bicycle boulevards</td>
<td>20%</td>
<td>34%</td>
<td>28%</td>
<td>11%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Nearly all (91%) of the cities that responded are at least talking about innovative designs to improve conditions for biking.

The most popular treatment – buffered bike lanes – is also one of the simplest, as it provides a wider painted buffer between car lanes and the bike lanes, without any physical protection.

In 2011, the FHWA gave interim approval of green as the color to use for bike facilities in the U.S. Cities are using green in various ways, from highlighting conflict areas at intersections to painting entire lanes green.

Protected bike lanes include some sort of physical protection between the car lanes and bike lanes. Cities are using plastic posts, parked cars, curbs, or planters.

Bike boxes and bicycle-specific traffic signals are still considered experimental by the FHWA, though the agency seems to be moving toward interim approval of both.

Bicycle boulevards, also known as neighborhood greenways, are on quieter side streets (usually residential) where the speed and volume of car traffic has been reduced to create more comfortable places to ride. Cities are using these designs to complement multi-use pathways and bike lanes to create interconnected low-stress bike networks.
Do the AASHTO Bicycle Facilities Guide and the MUTCD provide adequate guidance on innovative bike projects?

The engineers and other professionals who design bike projects (and all road projects) are required to follow accepted standards and guidance, augmented by their professional judgment. While many states and some cities have developed their own design guidance, the most common references are the Bicycle Facilities Guide from the influential American Association of State Highway Transportation Officials (AASHTO), which provides standards such as bike lane width, and the Manual on Uniform Traffic Control Devices (MUTCD), which covers signs, signals, and pavement markings.

Neither document directly addresses the design of innovative bike facilities, leading 58% of responders to say the guidance is not adequate. Some designers (35% in this survey) report that they can piece together standards and guidance from the two documents to build safe facilities and justify their design decisions.

QUOTES

“Relevant at times, and good to reference every now and then.”

“Those guides are decades behind state-of-the-art bicycle facility design.”

GREEN LANE PROJECT
Do you use the NACTO Urban Bikeway Design Guide?

In response to requests from their member cities, NACTO created the **Urban Bikeway Design Guide**, which provides a high-level overview of how to combine accepted standards and guidance from the AASHTO Guide and the MUTCD to build innovative bike projects. Released in 2011, the guide is being used frequently or occasionally by 78% of the respondents.

**QUOTES**

“The NACTO Bike Guide has been a huge help on my current project. Using it to show how much larger municipalities provide for cycling transportation infrastructure has been key in gaining buy-in for cycling items in my project.”

“Most engineers have concerns about liability in not using an AASHTO-approved treatment.”

“The NACTO guide needs to be much more robust, especially for the average engineer to rely upon it, since they often lack an understanding of bike design principles to begin with.”

**GREEN LANE PROJECT**
Would it be helpful if the FHWA adopted the designs in the NACTO *Urban Bikeway Design Guide* as national guidance?

Cities strongly endorse the concept of the designs in the NACTO guide being recognized by the FHWA. This “seal of approval” would increase the confidence of city engineers that the designs have been deemed safe and effective. In the U.S., engineers are sometimes called upon to defend their design decisions in court. While “engineering judgment” and examples from other cities are helpful in justifying designs, following nationally recognized guidance can be the most effective defense.

**QUOTES**

“MUTCD is the bible here and elsewhere. Having the weight of the federal government behind bike regulations would help immensely.”

“Needs more detail to be a true design guide.”

“In the DOT world, AASHTO carries more weight than NACTO.”

**INNOVATIVE URBAN BIKEWAY DESIGN: A SURVEY OF CITIES**

Photo by: Steven E. Gross

Photo by: Steven E. Gross

**GREEN LANE PROJECT**

peopleforbikes
How helpful is the NACTO Urban Bikeway Design Guide?

The NACTO Urban Bikeway Design Guide is considered somewhat or very helpful by 76% of respondents. The primary criticism is that it is not highly detailed. Protected lane projects can be fairly complex from an operational standpoint, particularly 2-way facilities on one side of a street, and the guide does not provide detailed direction for a wide variety of conditions.

QUOTES

“It’s really helpful, but it isn’t a technical guide. We start with the NACTO Guide and adapt it to the specific situations in the city.”

“There are always conditions unique to each project. The Guide is not yet advanced enough to provide clear guidance on which treatment to use under which conditions.”
Where do you need the most guidance on innovative bikeway design?

IN ORDER OF PRIORITY

1. Detail on intersection design for protected lanes
2. Context
3. Transit operations on streets with protected lanes
4. Use and application of green color
5. Complying with Americans with Disabilities Act
6. Maintenance strategies and costs
7. Construction costs

Detailed design for protected lanes at intersections was ranked as the top priority for project designers. This makes sense, as intersections are the most common place for crashes for all roadway users, due to the complexity of movements. Protected bike lanes must be carefully designed to ensure that turning movements by cars do not conflict with through movements by bikes, particularly with 2-way protected lanes on one side of the street.

The number two choice “context” refers to guidance that would help cities decide which type of innovative bike facility is most appropriate in a certain set of conditions: speed and volume of car traffic, type of street, number of lanes, etc. Cities are also interested in learning how to minimize conflicts between buses and bikes on the right side of the road, particularly with transit passengers crossing protected bike lanes.
Where do you get guidance on innovative bikeway design (beyond AASHTO, MUTCD, and NACTO guidelines)?

<table>
<thead>
<tr>
<th>Resource</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association of Pedestrian and Bicycle Professionals</td>
<td>77%</td>
</tr>
<tr>
<td>Staff in other cities</td>
<td>69%</td>
</tr>
<tr>
<td>Institute for Transportation Engineers</td>
<td>51%</td>
</tr>
<tr>
<td>European and other international resources</td>
<td>50%</td>
</tr>
<tr>
<td>Other</td>
<td>11%</td>
</tr>
</tbody>
</table>

**QUOTES**

“The Street Plans Collaborative have been proving helpful links and tips.”

“TRB studies. It would be especially good to have a TRB program dedicated to bicycle and pedestrian research like they have for all other modes of transportation. More research is needed in these areas to support the design decisions.”
What is the expertise level in designing innovative bike projects among your...?

<table>
<thead>
<tr>
<th></th>
<th>City staff</th>
<th>Consultant pool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>17%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>39%</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>44%</td>
<td>33%</td>
</tr>
</tbody>
</table>

While momentum and interest in innovative bike facilities is growing, the designs are still relatively new to the U.S., so the level of expertise in designing the facilities is not high among city staff and consultants, suggesting that additional training could be helpful.

**QUOTES**

“Other than our bicycle/ped manager, there is a limited understanding of good bicycle facility design, especially in a dense urban environment.”

“Depends on the consultant: some are really progressive while others are in the dark ages.”

“Educating city staff and consultants on innovative, and even standard, bikeway designs is an ongoing issue.”

Green Lane Project
Is your State Department of Transportation...

<table>
<thead>
<tr>
<th>Provided Service</th>
<th>Strongly no</th>
<th>Somewhat no</th>
<th>Somewhat yes</th>
<th>Strongly yes</th>
<th>NA/don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing training or assistance in safe design of these facilities</td>
<td>39%</td>
<td>18%</td>
<td>20%</td>
<td>7%</td>
<td>16%</td>
</tr>
<tr>
<td>Receptive to protected bike lanes on state-controlled roads</td>
<td>36%</td>
<td>20%</td>
<td>13%</td>
<td>4%</td>
<td>27%</td>
</tr>
<tr>
<td>Providing guidance that allows or encourages these projects</td>
<td>33%</td>
<td>30%</td>
<td>21%</td>
<td>6%</td>
<td>10%</td>
</tr>
<tr>
<td>Helpful in using state or federal funds to build protected lanes</td>
<td>25%</td>
<td>16%</td>
<td>22%</td>
<td>6%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Survey responses indicate that many State Departments of Transportation (DOTs) are not helpful to cities in implementing innovative bike projects. In most cities, at least some major streets are controlled by the state. More than half of respondents (56%) said their state DOT was not receptive to building protected lanes on state roads, even through the heart of urban areas. Only 17% said their state DOT was helpful in that respect.

The DOTs are slightly more helpful as cities tap into federal money to build protected lanes. Federal regulations require that the State DOTs approve designs for projects using federal money, so their role can be significant. State DOTs were more helpful in using state or federal money (29% helpful) than allowing the projects on state-controlled roads (17%). It must be noted that respondents from some states indicated that their DOT was helpful and supportive in both areas.

**QUOTE**

“Our DOT is getting more comfortable routinely providing bicycle lane connections across barriers and along urban state-controlled roads. They are still very reluctant to use lanes less than 11 feet in width, which makes even conventional bike lanes challenging in retrofit situations. In many cases, they default to unmarked shoulders and wide curb lanes in high speed contexts, claiming that this is the standard and appropriate bicycle facility.”

**GREEN LANE PROJECT**
What is your primary source of funding for innovative bike projects?

Local taxes and fees are usually the most flexible of funds available to cities, so it is not surprising that more than half of cities (52%) use them as their primary funding source for innovative bike projects. Using federal funds is often more complicated and takes a longer time period. Cities using federal dollars as their primary source of funds are generally incorporating innovative elements into larger transportation projects, or are building the most robust versions of protected lanes (for example, installing curbs rather than just plastic posts).

QUOTES

“A regional sales tax funds most of our innovative bike projects.”

“To date, local. In coming years, federal.”

GREEN LANE PROJECT
What types of funding are you using?

<table>
<thead>
<tr>
<th>Funding Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local capital budget</td>
<td>74%</td>
</tr>
<tr>
<td>Local O&amp;M budget</td>
<td>59%</td>
</tr>
<tr>
<td>Federal enhancement funds</td>
<td>49%</td>
</tr>
<tr>
<td>State funds</td>
<td>33%</td>
</tr>
<tr>
<td>Federal STP funds</td>
<td>27%</td>
</tr>
<tr>
<td>Federal CMAQ funds</td>
<td>25%</td>
</tr>
<tr>
<td>Local developer exactions</td>
<td>24%</td>
</tr>
<tr>
<td>Federal Safe Routes to School funds</td>
<td>22%</td>
</tr>
<tr>
<td>Local improvement district funds</td>
<td>19%</td>
</tr>
<tr>
<td>Private funds - grants, etc.</td>
<td>18%</td>
</tr>
<tr>
<td>Other</td>
<td>17%</td>
</tr>
<tr>
<td>Federal TIGER or other stimulus funds</td>
<td>17%</td>
</tr>
<tr>
<td>Federal TAP funds</td>
<td>14%</td>
</tr>
</tbody>
</table>

Cities are using a wide source of funds for innovative bike projects. Nearly three quarters of cities are using funds from their capital budgets and 59% are incorporating innovative bike projects into operations and maintenance budgets, often through restriping and resurfacing projects. Cities are accessing a wide variety of federal funds to build the projects. These findings are an indicator of the resourcefulness of cities in finding funds for improvements.

**Quotes**

“A university funded the first cycle track in our community, and a developer will fund one in the future.”

“Lately, sewer funds pay for major street reconstruction, which includes surface redesign with cycle tracks.”

“We have funding from Scenic Byways and FTA Livability grants, federal enhancement funds, and local voter-approved funds.”
The transportation world is rife with acronyms and abbreviations. This brief glossary explains some of the abbreviations used in this document.

**AASHTO** – American Association of State Highway Transportation Officials is a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico. AASHTO publishes the “green book” which guides geometric design of highways and streets. Their *Guide for the Design of Bicycle Facilities* has been the standard go-to manual for bike projects in the U.S.

**CMAQ** – The federal Congestion Mitigation and Air Quality Improvement Program supports surface transportation projects and other related efforts that improve air quality and provide congestion relief. Jointly administered by the FHWA and FTA, it has been an important source of funding for bike projects since its creation in 1991.

**FHWA** – Federal Highway Administration is an agency of the USDOT. They provide stewardship over the construction, maintenance, and preservation of the nation’s highways, bridges, and tunnels. Most federal funding that is used for local bike projects flows through various FHWA programs.

**FTA** – The Federal Transit Administration, like the FHWA, is an agency within the USDOT. The growing interest in linking transit and bike trips has resulted in more bike projects being incorporated into federally funded transit-related improvements.

**MUTCD** – Manual on Uniform Traffic Control Devices is a publication of the FHWA that lays out the standards for signs, signals, and pavement markings in the U.S.

**NACTO** – The National Association of City Transportation Officials facilitates the exchange of transportation ideas, insights, and best practices among large cities. The *Urban Bikeway Design Guide* was released in 2011 and updated in 2012. The *Urban Street Design Guide*, released in September 2013, addresses a wider range of innovative urban facilities, including stormwater, bus rapid transit, and public plazas.

**O&M** – Operations and maintenance is a common budget line item in city transportation departments – the costs of taking care of the existing system, including sweeping, plowing, repaving, repairs to signs and signals, etc., as compared to the capital budget, which is used for building significant new projects.

**STP** – Surface Transportation Program is an FHWA administered program that distributes the bulk of federal transportation dollars to states and metro areas. The funds can be used for highways, streets, bridges, pedestrian, and bike projects (among others). The TAP program is a set-aside within the STP program, as was the earlier TE program. STP has been a common source of funding for bike projects in many cities.

**TAP** – Transportation Alternatives Program is a new stream of federal funds that consolidated a number of previous funding programs, including TE and Safe Routes to School. The TAP was created as part of the new federal transportation bill MAP-21, which passed in 2012.

**TE** – Transportation Enhancements is a set-aside of federal funding through the FHWA that has funded a significant number of bike projects. It was replaced by the Transportation Alternatives Program in 2012.

**TIGER** – Started in 2009 as part of federal efforts to stimulate the economy, the USDOT has funded a number of transportation infrastructure projects across the country through the Transportation Investment Generating Economic Recovery discretionary grants program.

**TRB** – Transportation Research Board is one of six major divisions of the National Research Council. It provides leadership in transportation innovation and progress through research and information exchange.

**USDOT** – United States Department of Transportation

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**FOR MORE INFORMATION**

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