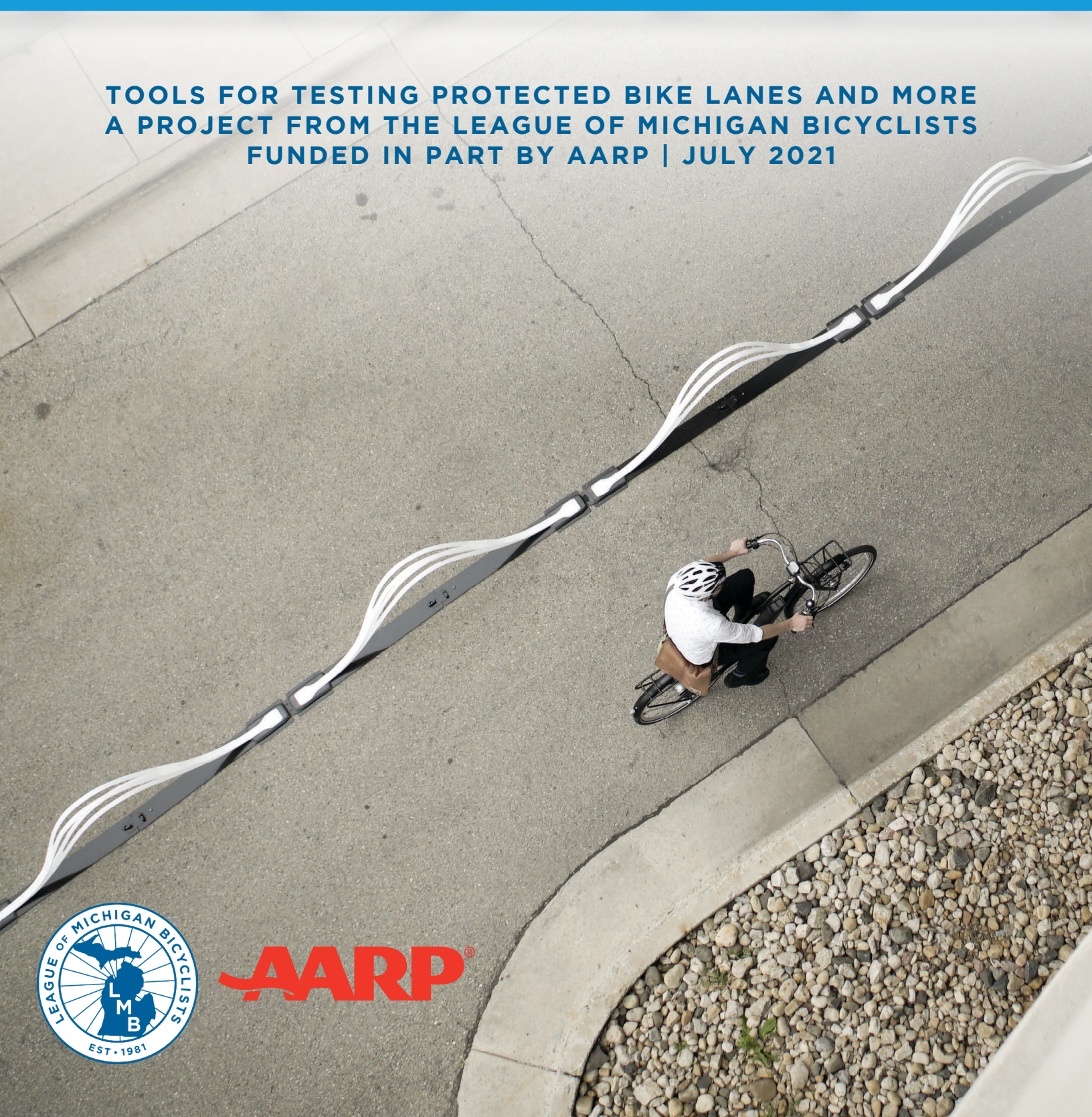


BIKE WAVE

TOOLS FOR TESTING PROTECTED BIKE LANES AND MORE
A PROJECT FROM THE LEAGUE OF MICHIGAN BICYCLISTS
FUNDED IN PART BY AARP | JULY 2021



Overview

Bicycling makes life better. For too many people, though, the available bicycle infrastructure on Michigan roads is not sufficient to let them travel safely and comfortably to their desired destinations for work, school, shopping, or play. About half of the people interested in bicycling are “interested but concerned” about the safety of bicycling on roads; they prefer separated bike lanes or shared use paths over painted bike lanes or paved shoulders (see graphic, page 5.)

For Michigan communities, adding separated bike lanes to existing roads can be difficult. Best practices for design of protected lanes and intersections are not widely known. Deployment of protected lanes, even for a brief pilot, benefits from specialized materials. Decisions about long-term infrastructure often rest on long-term data gathering and extensive community engagement.

Bike Wave, a project from the League of Michigan Bicyclists (LMB) with support from AARP, aims to address these challenges. In summer 2021, LMB received an AARP Community Challenge grant to create a lending library of demonstration tools for communities to test protected bike lanes and curb extensions. Communities can apply to conduct pop-up demonstration projects in 2021 and 2022. Selected communities will receive Saris Wave Delineator separators for protected bike lanes, bike counters, and curb extender cones to use to pilot active transportation infrastructure improvements.

This guide provides help for communities to **design** their pilot project, **deploy** it successfully, and then **decide** whether to make it permanent. The guide will be revised and updated as we learn.



Why Protected Bike Lanes?

In 2019, the National Transportation Safety Board (NTSB) found that “separated bike lanes could prevent bicycle crashes involving motor vehicles at midblock locations and, thereby, also reduce the number of fatalities and serious injuries associated with such crashes.”¹ Protected bike lanes are more accepted than ever before. As an example, the NACTO Urban Bikeway Design Guide is officially supported by the Federal Highway Administration and almost entirely permitted under the MUTCD.²

Research has shown multiple economic and safety benefits for separated or protected bike lanes.

A 2021 study of the Toronto area found that “regular cyclists were 2.28 times more likely to bicycle almost every day for commuting following the addition of a local cycling facility [and] on-street separated cycle tracks were much more effective in encouraging increased cycling than painted lanes.”³

A 2020 study by Portland State University studying bicycle infrastructure in six cities found either positive or non-significant effects on sales and employment for local businesses. In Minneapolis, bike lanes were installed on Central Avenue in place of parking lanes. Retail employment increased almost 13% — significantly higher than the 8.5% increase in the control area — and food sales increased 52%, more than double the 22.5% increase in the control area. In Seattle, a protected bike lane along Broadway brought a significant 31% increase in food service employment compared to 2.5% and 16% increases in control areas.⁴

A 2019 study of twelve large cities found that safety improved for all road users, including drivers, where protected bike lanes were present. “After analyzing traffic crash data over a 13-year period in areas with separated bike lanes on city streets, researchers estimated that having a protected bike facility in a city would result in 44% fewer deaths and 50% fewer serious injuries than an average city.”⁵



How to Apply

>>> **Apply online at [LMB.org/getbikewave](https://lmb.org/getbikewave)**

Your community should complete the online application form ASAP but no later than Sept. 10 to be considered for the 2021 program. We will accept applications for 2022 starting Sept. 11 through at least March 15, 2022.

Application questions are below for ease of reference. We recommend copying them into a shared document and working on answers together before submitting. Suggested word counts are not hard limits, just suggestions.

REFERENCE QUESTIONS

1. Please describe your project. How did you determine the need for it? (~250 words)
2. When is the earliest date this year (2021) that your community would be ready to start your project? *We anticipate availability starting in August.*
3. How much advance notice do you need if selected?
4. When is the latest date this year (2021) that your community would need to end your project?

5. What is your preferred duration for your project?
Select all that apply.

- ☐ 1 week ☐ 3 weeks
☐ 2 weeks ☐ 4 weeks ☐ Other (describe)

6. If we are not able to schedule your project in 2021, when is the earliest date in 2022 that your community would be ready to start your project?

7. When is the latest date in 2022 that your community would need to end your project?

8. What equipment will you need? Include a detailed description, and send a sketch or diagram of your project to bikewave@lmb.org.

Please do not request more than you need. We may be able to accommodate multiple communities during the same time period based on equipment needs.

- Qty Saris Wave Delineators (200 available)
 Qty Eco Counter (2 available)
 Qty Channelizer Cones (50 available)
 Qty Sign Boards (2 available)
 Qty Yield to Ped. Signs (2 available)

Description: (~250 words)

9. Do you have approval for this project by your public works department, planning department, city attorney, etc? Who supports it? (~100 words)

10. Do you agree to the terms of the attached waiver? ____ Yes ____ No (see page 9 for text)

11. How will you educate the public and engage the local cycling community about the project (media outreach, celebration, ride, etc)? (~500 words)

12. How do you plan to pick up/drop off the equipment in Lansing? (~100 words)

See technical specs. LMB hopes to coordinate community-to-community drop-off and pick-up logistics based on geography/dates in order to minimize travel time and extra handling.

>>> All applicants must commit to pick up and drop off in Lansing if needed, with two+ people.

13. How will you conduct bike counts to measure impact - before and during demonstration project (manual, EcoCounters, other, etc)? (~250 words)

14. How will you recruit volunteers from the local cycling and/or AARP communities to participate in set-up, promotion, and tear-down? (~100 words)

15. How will you document your project and measure its success? (~250 words)

16. How will you decide whether to make your demonstration project permanent, and how soon after the conclusion of the pilot will you announce the next steps? (~250 words)

17. How will you share any collected data and photos with LMB? Will you grant LMB permission to use photos of the project? Will you acknowledge LMB and AARP in communications? (~100 words)

SELECTION CRITERIA

LMB will select projects based on:

- Impact on bicycling (30%)
- Community participation (30%)
- Quality of design (20%)
- Chance of permanent improvement (20%)

QUESTIONS?

For questions on your project, application or status, contact info@lmb.org or call (517) 334-9100.



BICYCLIST DESIGN USER PROFILES

Interested but Concerned

51%-56% of the total population

Often not comfortable with bike lanes, may bike on sidewalks even if bike lanes are provided; prefer off-street or separated bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.

Somewhat Confident

5-9% of the total population

Generally prefer more separated facilities, but are comfortable riding in bicycle lanes or on paved shoulders if need be.

Highly Confident

4-7% of the total population

Comfortable riding with traffic; will use roads without bike lanes.



**LOW STRESS
TOLERANCE**

**HIGH STRESS
TOLERANCE**

Design

TARGET USERS

One of the first steps in design is identifying your target user. The profiles above represent potential users of a bicycle network. Networks that require high stress tolerance serve fewer users, while those that are low-stress serve more users.

"A Low-Stress Bicycle Network (also referred to as an "all ages and abilities network" or a "high comfort network") is one that is designed to be safe and comfortable for all users. The emphasis is on the quality of the bikeway, not just the presence of a bikeway. Depending on roadway conditions, a given street or bikeway may not be sufficient to provide a safe and comfortable experience for all bicyclists. For example, an adult new to bicycling or a parent pulling their child in a bike trailer may not be willing to use a traditional bike lane on a multi-lane road with high speeds and volumes of traffic." (FHWA Bikeway Selection Guide, p. 14)

Note: the percentages above reflect only adults who have stated an interest in bicycling. Source: p. 13, Bikeway Selection Guide, Federal Highway Administration, February 2019

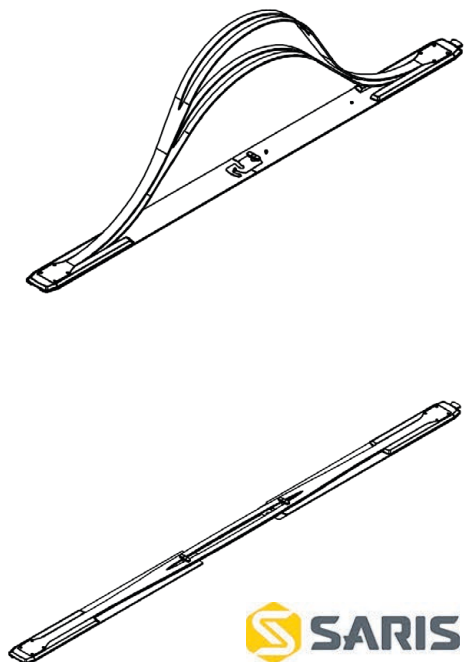
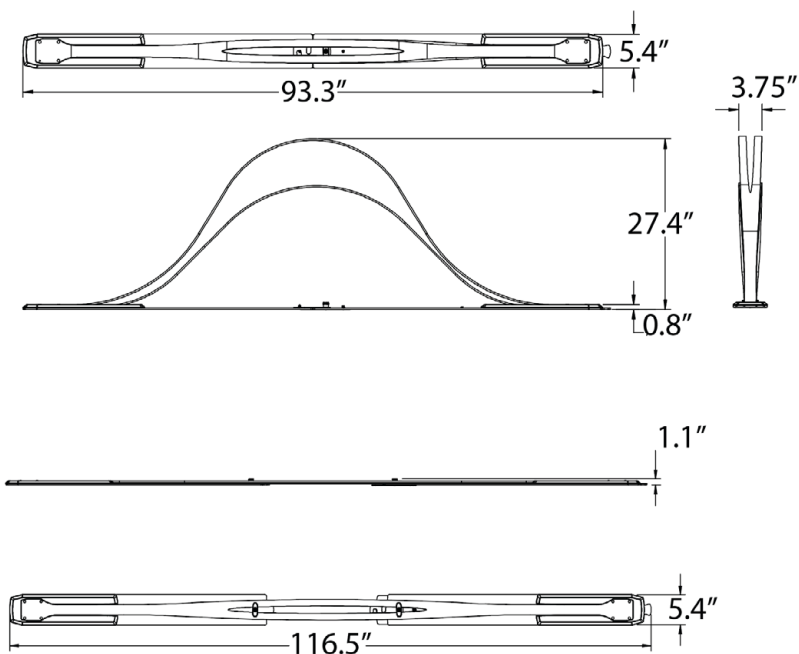
LOCATION AND LAYOUT

Your community's bike plan should guide your choice of location. Ideally, your project should be responsive to expressed community needs as identified in a robust planning process. In the Separated Bike Lane Planning and Design Guide, FHWA suggests these planning considerations (p. 37):

Plan for a separated bike lane in context of a bike network, not as an isolated project. Connect origins and destinations. Develop a low-stress bike network accessible to novice cyclists.

Use separated bike lanes to create safety benefits at specific locations or along high-volume corridors. Providing physical separation may improve safety and provides peace of mind to novice cyclists.

Strategically deploy separated bike lanes where most needed. Consider context and use design flexibility on separation type, intersection treatments, and other



Each 4' by 4' box holds 50 units, and can be lifted by forklift or pallet jack (not provided.)



Wave units can also be easily hand-carried in small quantities. Each weighs 11 lbs.



Units can be stored in wardrobe boxes instead (10 per box) and moved by hand truck.



Opportunities for community feedback and outreach are critically important.

design elements to promote safety and manage traveler expectations.

Desired bikeway routes may already attract cyclists. Plan for separated bike lanes along corridors that naturally draw cyclists to expand opportunities. Fill unmet needs on busy streets that discourage cycling due to high-traffic volumes.

Successful locations start with local support. Choose corridors where residential or business communities have bought into the idea of encouraging cycling through strategic infrastructure investment.

Use separated bike lanes to promote cycling as an option for commuting to transit-dependent or car-less households. Facilities can also improve connections to transit, jobs, schools, and essential services through safer first / last mile trips.

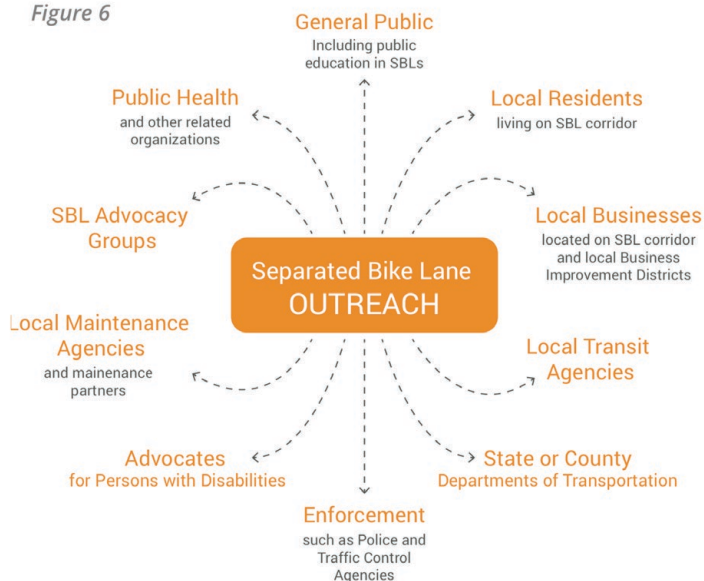
Consider using the Four Step Design Process (p. 75, Separated Bike Lane Planning and Design Guide):

1. Establish directional and width criteria
2. Select forms of separation
3. Identify mid-block design challenges and solutions
4. Develop intersection design

OUTREACH

Community outreach and participation are just as essential as a high-quality project design. Begin outreach as part of planning to avoid conflict and improve outcomes during deployment.

Figure 6



Deploy

SARIS DELINEATORS

The Saris Wave Delineator provided in Bike Wave is a flexible, portable, interlocking separator for protected bike lanes. **Each unit weighs 11 lbs. and measures 93.3" long (7' 9.3") when deployed.** Because most of the weight is in the base, the wave units are very stable and difficult to knock over (no adhesive needed!) If a continuous stretch is not feasible, we recommend interlocking groups of at least 2-3 units, with spacing between groups up to 20 ft. Consider using cones or posts to supplement protection at intersections, and remember that driveways may affect the number of units.



Length of 200 units, continuous: ~1,530 ft.



Length of 200 units with 25% spacing: ~2,040 ft.



Length of 200 units with 50% spacing: ~3,060 ft.

A two-way lane design will require separators for both directions.

The wave units are stored in open-top gaylord boxes: **50 units per box, 48" wide, 48" long, and about 60" high, ~600 lbs,** on a wheeled pallet. The boxes can be moved into trucks via forklift (not provided), loading dock, or lift gate with at least two people.

The units can also be removed from the gaylord, packed in wardrobe boxes (10 per box) and moved by hand truck. They can be stacked flat in a truck bed or trailer as well – **each unit is about 120" long, 5.5" wide and 1.25" thick when collapsed.** They can be hand-carried in small quantities. Many hands make light work.

A team of volunteers can be recruited for deployment; paint or chalk can be used to mark locations for wave units and cones, and boxes dropped along the route for set-up. Allow a day for set-up.

Outreach and public communication before and during deployment are essential. Over-communicate to eliminate unpleasant surprises.

CHANNELIZER

42" channelizer cones provide maximum visibility with a 5-tier design and optional reflective sheeting. Topped with a multipurpose handle, this channelizer tube can be used with caution tape, plastic chain, or a barricade flasher. Stackable and easy to transport, the 42" Channelizer cones come standard with a 16 lb recycled rubber base.



Cones can be used as curb extenders for a protected intersection, to mark the beginning and end of a line of wave units, or other uses.

COUNTER

TUBE Counter: Quick to deploy and easy to install, this bike counter is ideal for short-term bike volume studies. The pneumatic TUBE system detects pressure changes when cyclists ride over the tubes. This easy-to-install, temporary solution is ideal for short-term counting. The same system can be used on-street using the Selective tubes to select out cyclists, or on paths without motorized vehicles using the thin Greenways tubes. One set of tubes is included.



Installation: Tubes can be laid across a path or road and affixed with provided nails and fasteners. The tubes are then connected to the counter's data logging components housed in a provided metal box at the side of the path. Maximum width 30'.



SIGNAGE

Sandwich board signs, Bike Wave yard signs, and Yield to Ped signs are available for use as well. Additional designs are available and sign use is up to you – please contact LMB for details if interested.



Decide

Pilot projects are most successful when:

Participants know how to give feedback through a survey, exhibit, and/or public meeting.

Decision-makers commit to a public, timely, and transparent process to determine next steps – a longer pilot, a different location, or a permanent installation of a protected bike lane.

Everyone's experiences are heard and valued.

Inspiration and Resources

Links to the resources mentioned in this document, along with other sources of inspiration and guidance, including a sample press release, signs, etc. can be found online at [LMB.org/bikewave](https://lmb.org/bikewave).

About LMB

The League of Michigan Bicyclists (LMB) is a non-profit, 501(c)(3) statewide membership organization working to improve life through bicycling.

We envision a state where bicycling makes life better for everyone; serves as an everyday option for more people to commute, get around and have fun on roads and trails; and connects us to the natural world and each other. Our communities benefit through healthier people and stronger economies. Our transportation system becomes more equitable and environmentally sustainable. Our streets and trails are safe and accessible to people of every age, race, gender, ability, and economic status.

LMB supports and leads efforts to preserve and rebuild safe neighborhoods and streets, and seeks to educate bicyclists, motorists, engineers, and law enforcement. LMB offers the award-winning *What Every Michigan Bicyclist Must Know* booklet, training programs for law enforcement, and resources for parents, bicycle commuters, and everyone who rides a bike.

The easiest way to get involved in LMB is by becoming a member or making a donation. Each supporter helps to amplify our voice and political clout, to make a more bicycle-friendly Michigan.

Waiver

In consideration of being provided with a lending library of demonstration tools to test protected bike lanes and curb extensions from the League of Michigan Bicyclists ("LMB"),

_____ ("Borrower") acknowledges and agrees to the following:

1. The LMB has provided Borrower with certain equipment from the lending library of demonstration tools for communities and other organizations to test protected bicycle lanes and curb extensions.
2. The Borrower, its respective administrators, directors, agents, officers, members, volunteers, and employees will reimburse the LMB for any damaged or missing property cause by use, misuse, theft, or any other manner while the property is in the possession of Borrower, other than damage considered ordinary wear and tear through use of the property for its intended purposes.
3. Borrower will release and indemnify the LMB from all liability claims, demands, losses, or damages caused or alleged to be caused, in whole or in part, by the negligence of the Borrower relating to the use of the borrowed property. If the Borrower or any other person makes a claim against the LMB relating to the equipment/property and/or use of the equipment/property, Borrower will indemnify, save, and hold harmless the LMB, its agents, employees, and officers from any claims, including litigation expenses, attorney fees, and costs which may be incurred as the result of such claim.

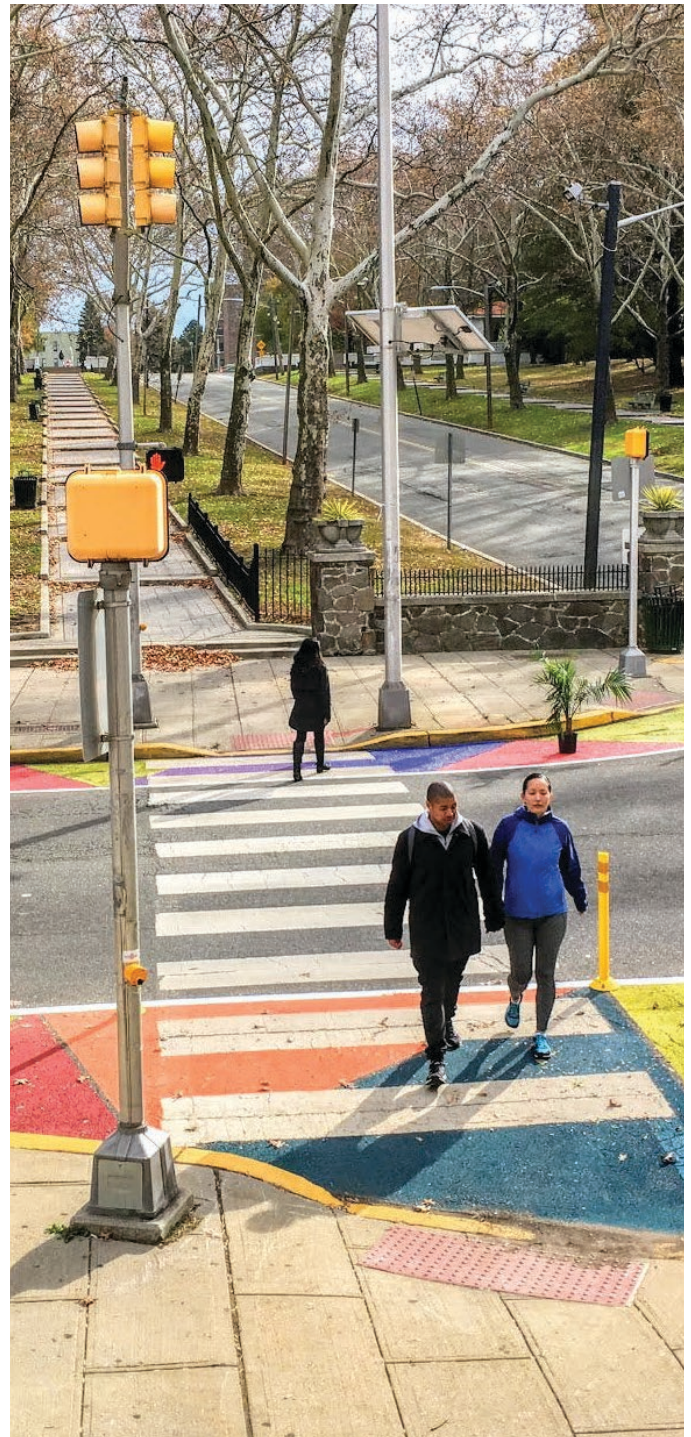
I AM 18 YEARS OF AGE OR OLDER, HAVE READ AND UNDERSTAND THE TERMS OF THIS AGREEMENT, AND HAVE AUTHORITY TO BIND THE BORROWER TO THE TERMS STATED ABOVE.

Signed: _____

Printed Name: _____

Community: _____

Title: _____



Colorful paint and vertical delineators can improve safety by slowing down traffic and narrowing crossing distances. Photos on pages 1, 4, 6, and 10 courtesy of Saris.

References

- (1) <https://www.nts.gov/news/events/Documents/2019-DCA18SS002-abstract.pdf>
- (2) <https://nacto.org/publication/urban-bikeway-design-guide/>
- (3) <https://www.ryerson.ca/city-building/news-research/2021/05/new-cycling-data-dashboard/>
- (4) <https://trec.pdx.edu/news/study-finds-bike-lanes-can-provide-positive-economic-impact-cities>
- (5) <https://usa.streetsblog.org/2019/05/29/protect-yourself-separated-bike-lanes-means-safer-streets-study-says/>



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