NCHRP Project 20-123 (02)

Research Roadmap for the AASHTO Council on Active Transportation

APBP Webinar
February 2, 2022
Roadmap for my presentation

- Process for developing the Roadmap
- What's in the Roadmap?
- How can you use the Roadmap and get involved in research?
Our Team

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Project Tasks

Task 1: Inventory of Existing Research and Research Needs
- Inventory existing and ongoing research and identified research needs

Task 2: Initial Research Needs and Gaps Assessment
- Surveyed professionals for initial prioritization of research needs and assessment of gaps

Task 3: Focused Review of Existing Research
- Summarized existing research using previous research reviews and new research
- Identified relevant ongoing research and assessed research gaps

Task 4: Outreach for the Roadmap
- Conducted workshops to refine and prioritize research needs

Task 5: Roadmap and Related Deliverables
- Identified research priorities and implementation pathways
- Developed 6 research problem statements

Task 6: Continuity/Implementation Plan
- Developed plan for Council to track Roadmap progress and keep up on new research

Research Roadmap and Continuity Plan
Prioritizing Research Needs

110 needs placed into 3 priority levels using survey & workshop input and team’s knowledge

Top 15 needs reviewed by Panel and CAT Steering Committee. Their input + survey of CAT members used to select top 6.

6 Highest priority (Research Problem Statements)
9 High priority (Research Need Briefs)
31 Medium priority (Research Need Briefs)
64 Lower priority
Roadmap for my presentation

- Process for developing the Roadmap
- What's in the Roadmap?
- How can you use the Roadmap and get involved in research?
Where to find the final documents

- Or search research roadmap AASHTO council active transportation
Bikeways: Ridership and demand

This review focuses on the literature related to the ridership and demand of bikeways, with a focus on factors that influence these metrics. The current research in this field is discussed, and future research directions are outlined.

Related:
- Transportation
- Public health
- Environmental sustainability
- Urban planning
- Bicycle infrastructure

What do we know about the ridership and demand on bikeways?
- Ridership is influenced by factors such as safety, convenience, and accessibility.
- Demand can be affected by factors such as weather, events, and marketing efforts.

What is the concept of bikeway ridership and demand?
- Ridership refers to the number of individuals who use a bikeway for transportation purposes.
- Demand refers to the amount of work that needs to be done to accommodate the number of users.

Current research on bikeway ridership and demand:
- Research has focused on understanding the factors that influence ridership and demand.
- This research has implications for the design and implementation of bikeway infrastructure.

Some key factors affecting ridership and demand:
- Weather
- Public safety
- Accessibility
- Marketing

Research reviews:

Conclusion:
- Further research is needed to better understand the factors that influence bikeway ridership and demand.
- This research can inform the design and implementation of effective bikeway infrastructure.
The Research Roadmap
The Research Roadmap:
Highest Priority Needs (6)
Research Problem Statements

RPSs for the six highest-priority needs (not ranked):

A1. Applying and integrating active transportation data into planning and operations.
A2. Using minimum accommodations vs. alternative approaches to increase active transportation.
A3. Determining context-driven optimal spacing between marked crosswalks.
A4. Addressing barriers to integrating active transportation throughout planning and engineering practice.
A5. Racial and economic disparities in pedestrian and bicyclist safety.
A6. Speed management solutions and strategies to improve pedestrian and bicyclist safety on arterial roadways.

Follow the 2020 NCHRP problem statement format
## The Research Roadmap:
### High (9) & Medium (31) Priority Needs

#### Research Need Briefs

<table>
<thead>
<tr>
<th>Research Topic</th>
<th>B4: Designs to improve safety at shared-use path intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td>Shared or multi-use paths invite a wide range of users, including pedestrians, bicyclists, and other wheeled users, with a range of transportation purposes such as commuting, exercise, and recreation. For rail alignment paths, the crossings may also include transverse railroad tracks. Adequate accommodations, shared-use path crossings can present users with complex tasks including gap selection, scanning for turning vehicles, and interacting with other path users. Ensuring safe crossings for all users at these locations is essential. There is a large body of research on the effectiveness of enhanced crossing features for pedestrians only crossings. Pedestrian-activated yellow flashing beacons, usually in combination with high visibility crossings or advance yield markings, enhance medium islands, rapid rectangular flashing beacons (RRFBs), and pedestrian hybrid beacons (PHBs) have all been shown to increase driver yielding rates and pedestrian safety. Additional enhancements and design elements such as signage, markings, and geometry can also be used at these crossings. While some or all of these tools translate to shared-use path crossings, it is not clear how to integrate treatments for different types of path users, road classifications, land use contexts, and crossing geometries. Overall, there is limited guidance for treatment selection, particularly for paths next to railroads. Research is needed to identify contextually appropriate designs, and which design elements and tools practitioners should use in the shared-use path environment.</td>
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</table>
| **Research Objectives** | Research in this area would likely include best practice scores, particularly to better document and understand how to safely implement shared-use path crossings in a wide variety of different state, land use, and roadway and path contexts. New empirical research may also be needed to confirm or validate typical designs and treatments. The research should seek to address the following:  
  - Develop a design toolbox, including retrofit improvements, that is context sensitive and distinguishes how to assess and apply treatments at intersections of paths on all roads, including midblock crossings, and for different path user types. This toolbox would benefit from detailed case studies, including urban, suburban and rural, and guidance on appropriate performance measures for evaluating improvements (e.g., driver yielding, conflicts, crashes).  
  - How best to design and accommodate people of all ages and abilities ages, socioeconomic groups, mobility devices, types of bikes, visual acuity, and preferred speeds.  
  - How to design intersections and paths to plan for changes in technology that can help mitigate conflicts with trail users. |
| **Research Type** | Analysis, Conceptual |

#### Related Projects

- **NCHRP 03-141: Midblock Pedestrian Signal Warrants and Operation**  
  - This research may focus on when signals are suitable for midblock crossings.  
  - Status: Start 2021  

- **NCHRP 17-57: Strategies to Improve Pedestrian Safety at Night**  
  - This research may touch on lighting for shared-use path intersections.  
  - Anticipated: 2021  

- **FHWA Outreach and Awareness Program on Strategies to Enhance Pedestrians and Bicyclist Safety at Intersections**  
  - Research on this topic should coordinate with this project described in FHWA’s Pedestrian and Bicycle Safety Program Strategic Plans.  
  - Anticipated: 2021-2022  

- **Traffic Control at Shared-Use Path-Road Crossings (A0203, Bicycle Transportation)**  
  - https://www.fhwa.dot.gov/beacon/a0203.htm  

- **Intersection Sight Distance for Bicyclists (A0204, Bicycle Transportation)**  
  - https://www.fhwa.dot.gov/beacon/a0204.htm  

- **Evaluation of Pedestrian Crossing Design Practices Based on User Behavior and Psychology (A0110, Pedestrians)**  

#### Potential Funding Pathways

<table>
<thead>
<tr>
<th>Research Timeline</th>
<th>Bicycle at intersections: Design and safety</th>
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<tbody>
<tr>
<td><strong>2021 - 2022</strong></td>
<td>TRB Cooperative Programs: NCHRP regular process</td>
</tr>
<tr>
<td><strong>2023 - 2026</strong></td>
<td>Other: FHWA</td>
</tr>
<tr>
<td><strong>2027 and later</strong></td>
<td>Monitor and coordinate with NCHRP 03-141</td>
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</tbody>
</table>

#### Research Partners

- **AASHTO Committees: Design, J/11NNMT: Safety**  
- **TRB Committees: Pedestrians, Bicycle Transportation**  
- **USDOT: FHWA**  
- **Other organizations: Rails-to-Trails Conservancy**
Nine high-priority needs (no ranking within):

B6 Improving data on pedestrian and bicyclist fatalities and injuries
B4 Designs to improve safety at shared-use path intersections.
B5 Equitable representation in active transportation
B2 Bicycle networks: measures and effects
B3 Changes in bicycle ridership with innovative infrastructure
B7 Incorporating active transportation into travel demand modeling
B8 Safety and operations of separated bike lanes at intersections
B9 Using crash records and surrogate measures to identify safety hotspots and plan bicycle/pedestrian improvements
B1 Connected and autonomous vehicles and active transportation users
<table>
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<tr>
<th>Need</th>
<th>Relevant Research Reviews</th>
<th>Related Research Statements</th>
<th>Related Current Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>D12: Bicycle signal: face design, signal and other comprehensive</td>
<td>Bicycles at intersections: Design and safety</td>
<td>Optimal Methods to Communicate Allowable Periods or Permissive Movements to Bicyclists at</td>
<td>FHWA: Mainstreaming Best Practices for Nonmotorized Signal Timing Practices to Enhance</td>
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<tr>
<td>and other compliance</td>
<td></td>
<td>Signalized Intersections (ACHD) Bicycle Transportation)</td>
<td>Multimodal Safety (Anticipated, PBSP Strategic Plan)</td>
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<tr>
<td></td>
<td></td>
<td>Internally Undocumented Pedestrian Signal Indicators (AND45), Visibility</td>
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<td>D13: Bicycle signal: user comprehension and safety of permissive</td>
<td>Bicycles at intersections: Design and safety</td>
<td>Optimal Methods to Communicate Allowable Periods or Permissive Movements to Bicyclists at</td>
<td>FHWA: Mainstreaming Best Practices for Nonmotorized Signal Timing Practices to Enhance</td>
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<tr>
<td>D14: Deployment and effectiveness of emerging urban street and</td>
<td>Bicycles at intersections: Design and safety</td>
<td>Comprehensive Review and Synthesis of Emerging Urban Street and Intersection Design Guides</td>
<td>None identified</td>
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<tr>
<td>intersection and intersections design guides</td>
<td></td>
<td>(AMP11), Cosmetics Design</td>
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<tr>
<td>D15: Design and operations strategies to promote social/physical</td>
<td>None</td>
<td>None identified</td>
<td>None identified</td>
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<td>distancing of pedestrians during pandemics</td>
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**The Research Roadmap: Lower Priority Needs (64)**
Some themes

- Equity
- Research on practice and policy
- Some older, inadequate research and assumptions are barriers
- Need more crash modification factors
- Walking and bicycling should often be considered separately
Keep in mind...

• The Research Roadmap...
  • should be considered a starting point.
  • is not comprehensive.
Roadmap for my presentation

- Process for developing the Roadmap
- What's in the Roadmap?
- How can you use the Roadmap and get involved in research?
Is there any evidence that shared lane markings (sharrows) have a safety benefit?

- Studies of shared lane markings, or sharrows, indicate that they may influence cyclists' position on the road, but there is no evidence of a reduction in crashes or injuries (DiGiorgio et al., 2017). A more recent study found an increase in injury and crash rates in places with only sharrows as bicycle infrastructure (Ferencak & Marshall, 2019). A review of research on the effect of sharrows on lateral passing distance found mixed results (Rube et al., 2020).

What about economic impacts of active transportation infrastructure?

- A review of 15 North American studies found “positive effects for the vast majority of active travel facilities” (Volker and Handy, 2021, p. 19). That review included a study of seven corridors (in four cities) with bicycle and pedestrian improvements implemented and looked at several sources of employment and sales data. It found that such street improvements had “either positive impacts on corridor economic and business performance or nonsignificant impacts,” with the food service industry benefiting the most, followed by the retail industry (Liu & Shi, 2020).

- A study in New York City examining sales tax data before and after street projects involving walking and bicycling infrastructure found that storefronts in these areas generally outpaced comparable areas and corridors in terms of sales (New York City Department of Transportation, 2013).

- A study looking at the impact of bicycle and pedestrian infrastructure spending on employment in 11 U.S. cities found that of 56 such projects, an average of nine jobs were created per million dollars spent, including direct jobs via engineering and construction and indirect jobs in the supply chain (Garrett-Peltier, 2011).
Check the status of on-going research listed in the Review

Okay, but what about new research?
Okay, but what about new research?

- Use TRID to search! [https://trid.trb.org/](https://trid.trb.org/)
- The Research Review includes the most common Index Terms for each research topic
New to using TRID?

The Continuity & Implementation Plan provides advice on searching TRID to keep up on new research & projects.

There is also a spreadsheet with some pre-populated searches for new Research in Progress.
How can I influence the research?

National Highway Cooperative Research Program
Transit Cooperative Research Program
Behavioral Traffic Safety Cooperative Research Program

https://www.nationalacademies.org/trb/programs/cooperative-research-programs
Or go to trb.org and click on Programs.
How can I influence the research?

- TRB Committees (ACH10: Pedestrians and ACH20: Bicycle)
- State DOTs
  - Each has a research office and different processes for soliciting and selecting research projects.
  - Many state DOTs participate in “pooled fund” projects
- University Transportation Centers
  - All UTCs require non-federal matching funds
  - Will be new competition for UTCs this year under the IIJA/BI
- Provide input to US DOT on their *Transportation Research and Development Strategic Plan*
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