AASHTO CAT
Research Roadmap

Continuity and Implementation Plan

July 2021

Acknowledgments

Consultant Team

Disclaimer

Contents

Overview

This Research Roadmap aims to assist the AASHTO Council on Active Transportation (CAT) in implementing its Strategic Plan, which includes goals and strategies related to research. The Roadmap was developed through the National Cooperative Highway Research Program (NCHRP) Project 20-123, which provides support to any AASHTO committee or council to help advance and implement its strategic goals. The Roadmap and supporting documents were developed by a consultant team from the Transportation Research and Education Center (TREC) at Portland State University and Toole Design Group, with guidance from a Project Panel and the CAT Steering Committee.

The Research Roadmap project consists of three products:

- **The Roadmap**. Section I of the Roadmap provides an introduction and description of the process and methods used to develop the Roadmap. Section II includes information about 110 prioritized research needs.

- A **Research Review** that summarizes the existing and ongoing research on 22 topics.

- This **Continuity and Implementation Plan** that provides the CAT with tools and mechanisms to implement the Roadmap.

The Roadmap is designed to lead to active transportation research that will address the most important needs of state DOTs and similar transportation agencies. Implementation of the Roadmap should lead to more active transportation research, through the research problem statements included in the Roadmap and through increased coordination between the CAT and other AASHTO Councils and Committees. In addition, other research programs (University Transportation Centers, FHWA, etc.) may look to the Roadmap for ideas. The priorities identified in the Roadmap were developed through an extensive outreach effort as well as the focused review of existing research. This helped ensure that the needs identified are high priority and fill major gaps.

The Roadmap should be considered a starting point. Active transportation research and practice is a fast-changing field. As new research is released and practice and policy advances, the research needs identified in the Roadmap will need to be revised, updated, and expanded. While the Roadmap was developed with the input of many voices from the CAT and state DOTs, it undoubtedly misses some valuable information and ideas. This Continuity and Implementation Plan focuses on activities the CAT can undertake to further develop and advance the research needs in the Roadmap and to keep up on the ever-growing volume of research that will shape that effort.

The plan is divided into two parts:

- **Implementing the Roadmap**. This section outlines the processes the CAT can take to help advance the prioritized research needs from the ideas presented here to actual research projects. It also explains the tools the

CAT can use in both the short-term and longer-term to help track implementation.

- **Keeping up on Research.** This section provides the CAT guidance and tools to help keep track of relevant new research – both findings from new, completed research and new research projects that may help address the CAT's research needs.

Advancing Research Needs

Introduction

This section of the Plan first provides information about the processes the CAT can use to advance the 110 research needs included in the Roadmap. The needs are divided into four priority levels, and the needs within each level have different amounts of information (Table 1). We explain the information provided for each level and discuss strategies to advance the needs.

Table 1: Roadmap Research Need Priority Levels

Priority Level	Information included in the Roadmap
A. Highest	6 needs with Research Problem Statements (RPSs). These RPSs are a starting point for the CAT to advance the research need in the NCHRP funding process and can be further refined as needed.
B. High	9 needs with Research Need Briefs (RNBs). RNBs are intended to provide information to help guide the CAT in its next steps to advance the research need, including information to help write an RPS.
C. Medium	31 needs with Research Need Briefs
D. Lower	64 needs with references to the relevant Research Review section, current projects, and existing Research Needs Statements (RNSs) in the TRB database or RPSs from other AASHTO councils or committees

The second part of this section discusses the sets of tools the CAT can use to keep track of progress in advancing the needs in the Roadmap. We first cover tools to use immediately, in the short-term. These are primarily spreadsheet files. We then present an option for the longer-term, modeled after another research roadmap effort within AASHTO.

These tools are important because this is a Roadmap built upon a shifting landscape. The volume of active transportation research has increased significantly in recent years and continues to do so. This is a positive thing, but adds complexity to implementing the Roadmap. In particular, there are two other activities happening simultaneously that the CAT will need to coordinate with:

- The Federal Highway Administration (FHWA) is developing a *Pedestrian and Bicycle Safety Program Strategic Plan*. Outreach for that project occurred in August and November 2020. The Roadmap team participated in the workshops for that project and communicated with the staff and consultants on the plan to coordinate as much as possible. However, the final plan was not released before the Roadmap was finalized. FHWA did provide a list of project titles that will be in the plan. Those are referred to throughout the Roadmap.

- In mid-April 2021, AASHTO selected a new set of projects for the FY2022 National Cooperative Highway Research Program (NCHRP). At the time the team was preparing the Roadmap, we did know which problem statements were selected for funding. We used this information in preparing the Roadmap content, reducing potential duplication of efforts as much as possible. However, the final scope of work for any NCHRP project can differ from the original Research Problem Statement (RPS).

Throughout the Roadmap, we make references to relevant project titles from the FHWA plan and RPSs selected for the FY2022 NCHRP. In addition, new active transportation research findings are being released every day. By the time the CAT begins to focus on some needs, new research findings may exist that require altering a research objective proposed in the Roadmap. The Roadmap content and short-term tools (discussed below) include information about relevant research projects underway at the time it was prepared. The second section of this plan provides guidance and tools for the CAT to keep up on future research.

Highest Priority Needs

The Roadmap includes RPSs for the six highest priority needs identified:

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; and

A6.   Speed management solutions and strategies to improve pedestrian and bicyclist safety on arterial roadways.

These RPSs were developed with the intent that they could be edited and submitted to the regular NCHRP project selection process. Each RPS follows the 2020 NCHRP problem statement format but does not include sections that identify the potential panel members and the persons submitting the statement. The next deadline for submitting RPSs will be on or around November 1, 2021.

Next Steps for Highest Priority Needs

❑	Review and discuss each RPS to ensure that it still meets the current needs of the CAT. Some RPSs refer to anticipated FHWA or FY2022 NCHRP projects. Get updated information about those projects.
❑	If the Roadmap lists a relevant current research project that was due to be completed by now, check on its status. Use the Research Roadmap Tracking Spreadsheet to find links to the Research in Progress (RIP) records for listed projects.
❑	Work with other organizations that may support advancing the need. Confer with other AASHTO Councils or Committees to identify common interests in the research. Ideas are listed in the Research Need Matrix in the Roadmap. Confer with relevant TRB committees that may be working on similar RNSs.
❑	Update the RPS based on new information gathered from above. Add information about who is submitting it and potential panel members. Edit author information. Refer to this guidance on preparing a strong statement: http://onlinepubs.trb.org/onlinepubs/nchrp/docs/EffectiveNCHRPProbStmt.pdf
❑	Submit updated RPSs in fall 2021 (likely November 1).

High and Medium Priority Needs

For each of the high and medium priority needs, the team prepared a research need brief (RNB). The brief provides information to help guide the CAT in its next steps to advance the research need. An explanation of each section appears in Table 2. The information in the brief should provide the CAT with a head start on preparing a RPS, if it wants to advance that need through the regular NCHRP process. The information will also be useful If another funding pathway is chosen.

Table 2: Content of Research Need Briefs for High and Medium Priority Needs

RNB Section	Explanation
Overview	*A short description of the need, highlighting key research gaps, based on the Research Review document.* This could be used for the Background section in an RPS.
Research Objectives	*Specific suggestions for research projects based on the Research Review, input from the workshops, and the team's expertise and considering on-going and anticipated research.* In some cases, all of the research objectives might not be appropriate for a single project. The CAT should decide which objectives are most important.
Research Type	This section can help determine the appropriate pathway. **New empirical research** may need to be a larger-scale project (regular NCHRP, pooled fund, TCRP, BTSCRP, or US DOT) or broken into discrete smaller projects, perhaps with UTCs as partners. Small scale projects might be supported through an AASHTO standing committee that has funding for quick response research. **Research on best practices** is best when the objective focuses more on how agencies are implementing policies and programs and applying research. If smaller in scope, these projects may fit well with the NCHRP Synthesis program. **Technology transfer** projects are useful when solid empirical research exists but is not being widely adopted. One option may be the Implementation Support Program (NCHRP 20-44) which provides funding to facilitate the use of NCHRP research. A **systematic review** of existing research (vs. best practices or implementation) is useful when there is empirical research from several different studies, but the findings are not consistent or compared in an objective way.
Research Review	*The summaries in the Research Review that provide information on existing research findings relevant to the need.* The information in the Review summary can be used to help prepare the literature review section of an RPS.

RNB Section	Explanation
Possible Funding Pathway	*For each need, we identify one or more possible funding pathways.* These are described in the Roadmap.
Research Timeline	*A suggested timeline, in general terms, for pursuing this research need.* It is based, in large part, on on-going research projects. This is a starting point for CAT to plan its timeline for Roadmap implementation. In most cases, the Roadmap suggests starting to scope research in the next two years. However, it is likely not feasible for the CAT to advance all of its needs simultaneously. The timeline for some needs can be shifted based on the CAT's priorities, as well as new information about other projects and new research findings.
Research Partners	*Possible partners that the CAT could collaborate with on this research need.* The list starts with other AASHTO councils and committees, followed by TRB Committees. FHWA and other US DOT agencies are often listed as partners, in many cases because the agency is likely to fund a research project on the topic. For some topics, partners might include other transportation agencies (e.g. MPOs) and professional organizations.
Related Projects	*The most relevant on-going research projects appear here.* The description of the project focuses on how it may address the research need, providing some guidance to the CAT on what needs may still remain.
Other Ongoing Research	*Other related, but less relevant on-going research projects.* These may not be national in scope or only address the need in a small way.
Related RNSs	*Other RPSs developed within AASHTO (though not currently selected for funding by NCHRP) and RNSs included in the TRB database.* These statements can be useful in developing a future RPS and in identifying possible research partners.

Next Steps for High and Medium Priority Needs

☐ Review this set of needs and decide on any additional prioritization, perhaps at the CAT summer 2021 meeting.

☐ Identify priority needs that may fit with pathways other than the regular NCHRP process. Check deadlines and develop a plan for advancing the need through those processes.

☐ For priority needs that fit well with the regular NCHRP process, develop a plan for submitting an RPS in fall 2022.

Between now and summer 2022, monitor the status of the relevant new FHWA and NCHRP projects, which may affect the objectives and scope of the research.

☐ Work with other organizations that may support advancing the need through any of the pathways:
- Other AASHTO Councils or Committees with common interests in these high and medium priority research needs. Ideas are listed in the Research Need Matrix in the Roadmap and in each brief (RNB).
- Relevant TRB committees that may be interested in the topic. Ideas for these are included in each brief.
- Other potential partners are also listed in each brief.

☐ When advancing a priority need through any of the pathways, use the list of related RPSs and RNSs to help prepare necessary documents and identify potential partners. These are included in the Research Roadmap Tracking Spreadsheet.

☐ For all needs, check progress on relevant on-going research. This will be necessary to potentially refine the objectives identified in the brief. These are included in the Research Roadmap Tracking Spreadsheet, with links to the projects in the TRID Research in Progress (RIP) database.

Lower Priority Research Needs

The lower priority needs are included in the Roadmap in tables with information about the relevant summary in the Research Review, the most relevant on-going research projects, and relevant RNS and RPSs prepared by other organizations.

Next Steps for Lower Priority Needs
☐   Review this set of needs and decide on any additional prioritization, perhaps at the CAT summer 2021 meeting.
☐   If the CAT decides some of these needs should be higher priority, use the references to the relevant Review summary, on-going research, and other RNSs/RPSs to develop the need further.
☐   Monitor the most relevant on-going research to help determine whether new research largely addresses the need or provides clarity on what additional research is needed.
☐   Confer with relevant AASHTO and TRB committees to support their efforts to advance these needs.
☐   Regularly review this list to decide if needs should be a higher priority.

Short-term Tracking Tool

The project team created an Excel spreadsheet for the CAT to use in the short-term to help track the research needs, current research projects, and other research statements (RPSs and RNSs). This Research Roadmap Tracking Spreadsheet file has four sheets:

- **Roadmap Needs** is a list of the 110 research needs in the Roadmap, with the information displayed in the matrix in the main Roadmap document. There is also a field for the CAT to enter its next steps for each need.

- **Current Research Projects** provides a catalog of ongoing pedestrian and bicycle research projects identified through the Research Roadmap process. These projects are from the Research Problem Statements or Research Need Briefs in the Roadmap. The sheet can be used to find additional information on each project, and to organize or filter projects. Available fields include project titles and descriptions, research sponsors, performing organizations, project funding amounts, start and end dates, and project URL links in the Research in Progress (RIP) database. The CAT should use this sheet to track ongoing research, including checking for project completion and looking for reports and other relevant project outputs. This will allow the CAT to update research needs presented in the Roadmap, including noting if further needs exist, or if completed projects have alleviated the need for further research.

- **Other Research Statements** provides a listing of the Research Needs Statements (RNSs) in the TRB database (https://rns.trb.org/) relevant to active transportation. The project team focused on needs developed or updated since 2015. The tracking sheet includes RNS titles, sponsor TRB committees, date posted and last update, and a link to the RNS listing in the RNS database. The list also includes relevant RPSs that were not selected for funding in the FY22 NCHRP balloting process. The CAT can use this sheet in the coming years as a reference when developing additional research needs into Research Problem Statements.

- **TRID Searching.** This sheet has pre-populated TRID searches that can be used to find new research projects entered into TRID since the Roadmap was prepared.

As with any spreadsheet, this tool gives the CAT flexibility to add new entries (rows) or fields (columns), update information, and sort and filter the data to be most useful. We recommend that CAT maintain the Current Research Projects and Research Statements sheets with new projects and statements, as well as noting when projects are completed, or when RPSs/RNSs are funded. As AASHTO transitions to Microsoft Teams, we recommend storing the file there and use it as a shared file within the Teams eco-system. This would allow for file-sharing and real-time editing, and reducing the likelihood of multiple versions of the same file circulating.

Longer-term tool

As part of the background information gathering for the implementation task of the CAT Research Roadmap, the project team explored how other AASHTO Research Roadmaps tracked research ideas, needs, and funding candidate statements. One option is to use a website to catalog and track research needs and potential projects. The Transportation Asset Management (TAM) AASHTO subcommittee produced a research roadmap in 2016 (NCHRP 08-36(134)). To track research needs, the consultant team developed a web platform. The AASHTO TAM Portal website includes a database (https://www.tam-portal.com/rms-report/) of research project ideas that allows authorized users to catalog needs by subject area, category of funding (e.g. Full NCHRP, Synthesis, Pooled Fund, etc.) or time frame (e.g. FY 2021), and to track ideas through various stages of NCHRP (or other) funding, such as progressing from a project idea, to a candidate statement, to a funded project. Screenshots from the site are shown in Figure 1, Figure 2, and Figure 3.

In practice, TAM coordinates with the TRB Asset Management committee on adding to and updating the research needs on the TAM Portal. Several committee members have volunteered to keep the page updated and have administrative access to log in and make changes as necessary. Any user can comment on individual ideas or suggest new ideas. Decisions on the advancement of ideas through the system, in terms of progressing to problem statements submitted for NCHRP or other funding, are made through committee processes; the volunteers then implement the changes in the system.

Getting Started with the TAM Research Management System

The TAM Research Management System (RMS) provides a framework for structuring discrete research efforts around common priorities and objectives.

The RMS includes tools to help meet the information needs at each step of the research development process – establishing roles and responsibilities, defining milestones and recommended sequencing, and supporting collaboration and prioritization.

What's in the RMS

The RMS includes three main areas for organizing TAM research information. The project pipeline organizes current active and programmed projects. The candidate pool contains all the concepts for potential future research ideas. And the management platform is used to manage the development of formal research statements.

How the RMS Works

The RMS is updated on an ongoing basis. New candidate research statements can be submitted at any time. Candidate statements are developed and prioritized using the RMS's collaborative rating and editing tools.

How the RMS is Organized

The RMS is designed around an annual research development process. Once a year, candidate projects are selected from the candidate pool to be developed into research statements and prioritized for advancement. To help focus this process, the RMS is organized by the TAM Framework introduced in the AASHTO TAM Guide. Every candidate, statement, and active project in the RMS is indexed and searchable using the six TAM Framework elements.

I want to…

Review Research Candidates	Review Research Statements	Manage Research Statements	Review the Research Pipeline
Add a research candidate	View the current set of research statements	Log in to edit a statement	View the current project pipeline
View all research candidates	Add a comment on a candidate statement	Log in to assign an author	Log in to update project information
Add a comment on a research candidate	Volunteer to help develop a statement	Log in to run a prioritization session	Log in to add a new project
		Prepare a report	Prepare a report

Figure 1 TAM Research Management System "About" page

TAM

Resources ⌄   Events ⌄   Community ⌄   About   🔍

TAM Research Management System

Candidate Pool ▾   Statement Development ▾   Project Pipeline   Create a Report   About the RMS   TRB RNS ↗

Use the filters below to specify which candidate statements to include in your report.

Research Statements | Projects

Research Framework Element
- ☐ Asset Performance
- ☐ Information & Systems
- ☐ Monitoring & Adjustment
- ☐ Organization & People
- ☐ Resource Allocation
- ☐ TAM Strategy & Planning

Categories of Funding
- ☐ AASHTO Committee Support
- ☐ FHWA
- ☐ Full NCHRP
- ☐ Implementation
- ☐ Other CRP
- ☐ Pooled Fund/TSP
- ☐ Synthesis

Research Years
- ☐ 2015
- ☐ 2016
- ☐ 2019
- ☐ 2020
- ☐ 2021

Submit   Reset

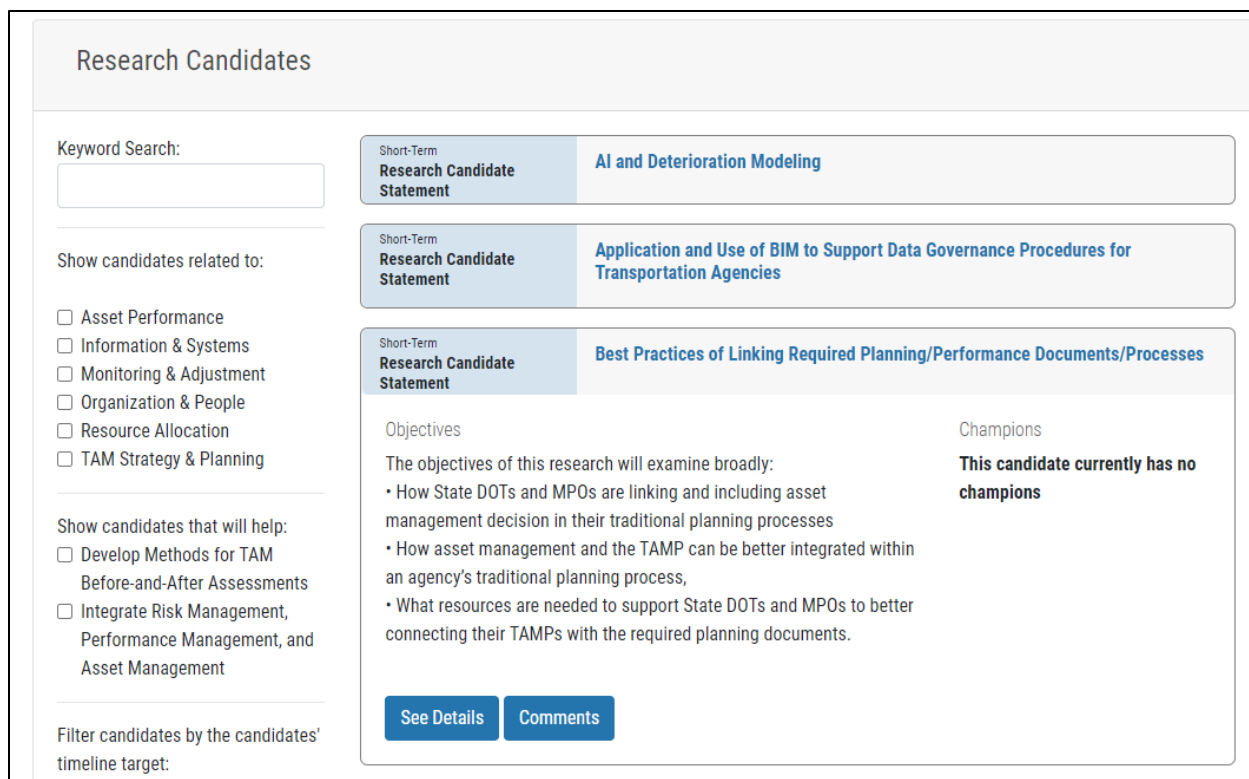Figure 2 Research project candidate page filtering options

Figure 3 Candidate statement view and comment options

The Roadmap project team had several conversations with the TAM Portal project team, including both AASHTO staff and the consultant. These conversations indicated that the site is actively used and works smoothly. The consultant is currently in the process of making several site improvements that we think will make it even more useful. The Research Management System page was designed to be flexible and modular, allowing for categories and fields to be adjusted simply. These characteristics would make it simple to adapt the website and database infrastructure to other AASHTO research roadmaps, including the CAT Research Roadmap. We presented this option to the CAT Steering Committee at a meeting in April 2021, and they expressed interest in pursuing such a portal for the CAT Roadmap. A decision to do this would require resources and should probably consider the value of doing so for more than one AASHTO council or committee.

If the CAT does implement this type of system, several operational issues should be discussed to ensure its success:

- **Roles and responsibilities.** Who within the CAT will be administrators that create new entries, update entries, etc.?

- **Timing.** How often will the entries be updated? Will this be done at specific times during the year?

- **Content.** What fields would be most useful for the CAT Research Roadmap? (See Figure 2 for examples.) How inclusive should the site be? For example, should it include state DOT projects?

- **Committee coordination.** The TAM Portal is a cooperative effort between the AASHTO and TRB committees. Both the Bicycle and Pedestrian committees of TRB are very active in developing RNSs and may be interested in collaborating on this tool. Doing so can add complexity, but also improve coordination and, likely, effectiveness in advancing research. In addition, the CAT should discuss how to use the tool to collaborate with the Joint Non-Motorized Technical Committee (JNMTC) on advancing research.

Keeping up on Research

Overview

As described in the methods section of the Research Roadmap, our initial inventory of the existing research encompassed over 17,000 publication records from the TRID database under the subject of Pedestrians and Bicyclists, published from 2000 to 2020. A year later, as we were updating the Research Review, we ran another search and found over 1,200 publication that have been added in that time period. Keeping up with this volume of research is impossible and finding the most relevant and useful sources can be challenging. This section of the Continuity and Implementation Plan provides the CAT some guidance on how to do effective searches in TRID for both new published research and new research projects that have been entered in TRID's Research in Progress (RIP) database. The guidance is based largely on the sources used in the Research Review conducted for the Roadmap. Therefore, we first review what those sources reveal about using TRID for searching various active transportation topics. The section after that presents detailed guidance on conducting TRID searches to find research similar to that used in the Roadmap.

Analysis of the Sources used in the Research Review

The sources that the project team used in the Research Review are some of the most useful sources available. Therefore, it is advantageous to examine them to help guide future searches. While TRID is the most comprehensive database available for published transportation research (and the only one for transportation research in progress), it does not have everything. No database does. The final draft of the Research Review for the Roadmap used 434 sources, 80% of which are in TRID. About half of sources missing from TRID were articles in peer-reviewed journals, though primarily not transportation journals. These included journals from health, medicine, urban planning, and other fields. Other sources not in TRID were from "grey literature" such as blog posts or websites and news media, such as newspapers. Whether the sources used were in TRID varied some depending upon the topic.

In addition, TRID records are input by many different people and the use of subject areas and index terms can be inconsistent. Of the sources we used that were in TRID, about 15% (52) were not categorized in the Pedestrians and Bicyclists subject area. Nine of these sources did have a term specific to walking, bicycling, or active transportation in the title, possibly revealing some small oversights in indexing. The others were more general research that included some findings relevant to active transportation.

Looking at both the rate of sources being in TRID and the share that were in the Pedestrians and Bicyclists subject area reveals that it may be relatively more difficult to conduct efficient searches for some topics. This is particularly true of emerging topics and under-researched topics:

What is TRID?

In 2011, TRB and ITRD released TRID, the TRIS and ITRD Database. TRID (Transport Research International Documentation) is the world's largest and most comprehensive bibliographic resource on transportation research information. It is produced and maintained by the Transportation Research Board of the U.S. National Academies with sponsorship by State Departments of Transportation, the various administrations at the U.S. Department of Transportation, and other sponsors of TRB's core technical activities.

- *Equity and personal safety.* This is a very under-researched topic. We used 17 sources, many of which were from grey literature.

- *Equity and pedestrian travel.* This is another topic that is under-researched, with some new, useful sources in the grey literature.

- *Micromobility, including e-scooters.* This is a very new topic, with many sources from the grey literature. This is likely to change over time.

- *Access management and active transportation.* This topic had fewer sources (13). Nearly all are from standard sources, though two were websites (BIKESAFE and PEDSAFE) that are not indexed in TRID. Several were also about access management broadly and, therefore, were not in the Pedestrians and Bicyclists subject area.

- *Policy, planning and decision-making.* This review relied upon some articles that were not published in transportation sources.

- *Economic benefits of walking and bicycling.* Some of this research is published in economics and health journals.

- *Accessibility for pedestrians and cyclists with disabilities.* Some of the sources we used were from sources focused on disabilities and medicine, rather than transportation.

- *Bicycle and pedestrian data: Safety.* Most of these sources were in TRID, though many were not in the Pedestrians and Bicyclists subject area.

- *Speed management and active transportation.* Most of these sources were in TRID, though many were not in the Pedestrians and Bicyclists subject area.

Every TRID record has index terms assigned to it. The most frequent and consistent terms are from TRB's Transportation Research Thesaurus (TRT). We used these terms extensively in the Roadmap to categorize and search for research. The TRID sources we used in the Research Review included nearly 550 unique TRT index terms, though about half of these were only used in a single record. Each record had an average of eight terms. We looked at the TRT index terms used for each summary topic to identify the terms that may be most useful in searching for new research moving forward. These terms are included at the end of each research summary and in Table 3 at the end of this document.

Searching TRID

General

TRB provides many resources to help people use TRID, including videos and written documentation. These are linked from the main TRID website (trid.trb.org). The main TRID site includes a simple search form (Figure 4). This is useful when you are searching for a particular title or a unique term. For the purpose of searching for new research and projects added to TRID since the Roadmap effort (to prepare an RPS, for example), we recommend choosing the option to "add additional filters" (circled in Figure 4).
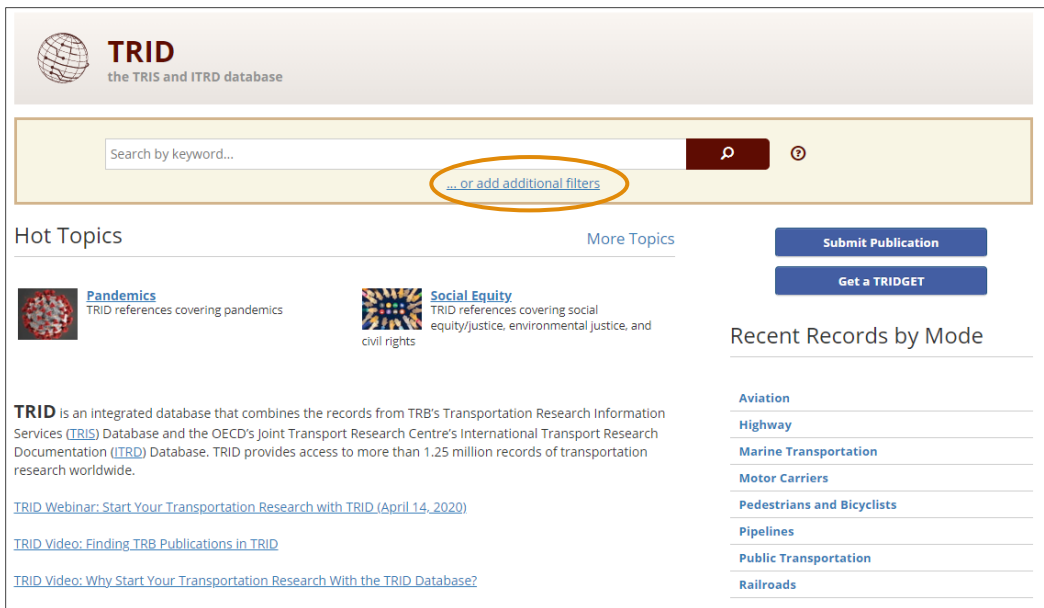
Figure 4: Screenshot of main TRID website (Source: TRB and The National Academies)

The available filters are shown in Figure 5. Users can click on the question mark symbol for a pop-up quick description of the filter.

Figure 5: TRID Filters (Source: TRB and The National Academies)

Keywords: This field searches many TRID data fields, including the abstract. It is useful to put phrases in quotes, such as "bicycle lane" rather than bicycle lane. The former yields about 300 results, while leaving the quotation marks out yields over 3,000 because it includes items with both words, but not as a phrase.

Try using one or more of the most common index terms listed in the Most Common Index Terms by Topic section that follows. Using the boolean "AND" between terms can narrow the search.

Title: Searching for words in the title usually yields fewer, more targeted results, though some useful sources will be missed.

Subject Area: For the Roadmap, the project team limited most of our searches to the subject area Pedestrians and Bicyclists. While this may miss some records, it usually makes a broad search more manageable. Additional subject areas (e.g. Safety or Design) can be added.

Index Term: Typing in this field will bring up the TRT index terms. Using this field will limit the search to the index term field, excluding the title, abstract, and other fields.

Result Type: This field is useful for limiting the search to only documents (e.g. reports and articles on finished projects) or research projects. TRID recently added datasets as a type of record. It is becoming more common, particularly with the US DOT's Public Access Plan, for researchers to provide their data for others to use.

Language of Publication: Use this field to limit results to English (or another) language.

Select Date Range: For quick searches, the 1 month, 1 year, and 5 year buttons are handy.

For updating the sources and projects in the Roadmap, we recommend using a custom search range starting from 202103 (March 2021) to a date in the future, such as 202212 and "Record Created Date."

After entering search terms and selecting filters and clicking "Apply", the results will display. At this point, the user can add additional filters. For example, Figure 6 shows the results of a search using "crowdsourcing" as a key word and within the Pedestrians and Bicyclists subject area. This term was the most common TRT index term used in the review of emerging user-based data. This search was also limited to records created in the past year. There are 25 results. At this point, the user can apply additional filters (e.g. limiting it to projects or publications) or start using the records.
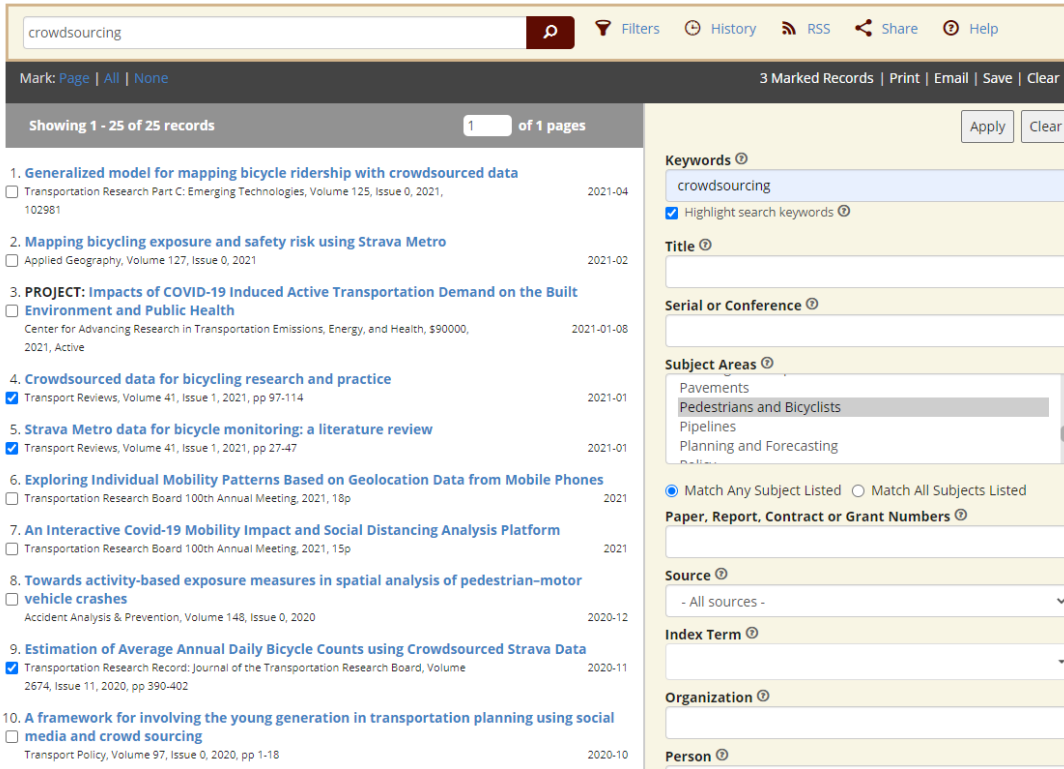
Figure 6: Example of search results from TRID (Source: TRB and The National Academies)

One useful tool, particularly when you are trying multiple different search terms, is to mark records by clicking the box to the left of the record. After marking the records for one search, the user can enter new, related search terms to find a new set of results. The records previously marked will remain marked and the user can add more records. Once all records of interest are marked, the user can print, email, or save the records. The format options for printing or saving are shown in Figure 7. The Citation & Abstract and Microsoft Word formats are probably the most useful for the CAT's work. The Microsoft Word format provides all of the fields from the record and may be particularly useful for research projects (from RIP) because it will show who is doing the research, start and end dates, funding amount, and other details. All of this information will also display on-screen when the user clicks on the project. Once records are saved, emailed, or printed, the user can clear the marked records to start a fresh search.
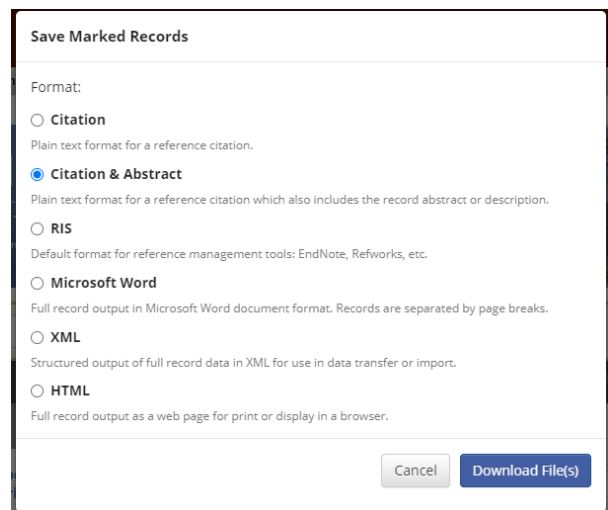
Figure 7: Format options for printing or saving TRID records (Source: TRB and The National Academies)

Most Common Index Terms by Topic

Table 3: Most Common Index Terms by Topic

Research Summary Topic	# TRID sources in P&B subject area	# TRT index terms used	Most common terms (# times included)	
Access management and active transportation	5	43	Access control (Transportation)	3
			Pedestrian safety	2
			Crosswalks	2
			Driveways	2
Accessibility for pedestrians and cyclists with disabilities	9	75	Accessibility	6
			Pedestrians	5
			Roundabouts	4
			Blind persons	4
			Crosswalks	3
			Urban design	3
Autonomous and connected vehicles	25	197	Pedestrians	9
			Cyclists	8
			Intelligent vehicles	7
			Autonomous vehicles	6
			Highway safety	5
			Traffic safety	5
			Bicycles	5
			Behavior	5
			Vulnerable road users	5
			Connected vehicles	4
			Crash avoidance systems	4
Bicycle and pedestrian data: Emerging user-based data	15	108	Crowdsourcing	7
			Bicycling	6
			Cyclists	5
			Global Positioning System	5
			Mobile applications	5
			Smartphones	5
			Bicycle counts	4
			Pedestrians	3
			Data analysis	3
			Travel patterns	3

Research Summary Topic	# TRID sources in P&B subject area	# TRT index terms used	Most common terms (# times included)	
Bicycle and pedestrian data: Location-based counts	30	207	Pedestrian counts	11
			Bicycle counts	10
			Nonmotorized transportation	10
			Annual average daily traffic	9
			Data collection	9
			Traffic estimation	9
			Cyclists	6
			Traffic volume	6
			Traffic surveillance	6
			Bicycles	6
			Pedestrians	5
			Bicycle travel	5
			Traffic counts	4
Bicycle and pedestrian data: Safety	8	58	Pedestrian safety	3
			Pedestrians	3
			Pedestrian-vehicle crashes	3
			Traffic safety	3
			Crash injuries	3
			Crash data	3
			Bicycle crashes	2
			Cyclists	2
			Risk assessment	2
			Crowdsourcing	2
			Police reports	2
Bicycle and pedestrian data: Surveys	9	51	Bicycling	6
			Pedestrians	4
			Travel surveys	3
			Surveys	3
			Data collection	2
			Attitudes	2
			Travel demand	2

Research Summary Topic	# TRID sources in P&B subject area	# TRT index terms used	Most common terms (# times included)	
Bicycles at intersections: Design and safety	27	218	Bicycle crashes	14
			Intersections	13
			Bicycling	9
			Highway safety	9
			Bicycle lanes	9
			Traffic safety	8
			Cyclists	7
			Signalized intersections	7
			Highway design	6
			Crash causes	5
			Bicycle facilities	4
			Case studies	4
			Traffic conflicts	4
Bike share	20	133	Vehicle sharing	19
			Bicycles	8
			Bicycling	7
			Spatial analysis	5
			Bicycle sharing stations	5
Bikeways: Ridership and demand	24	195	Bicycle lanes	11
			Bicycle facilities	11
			Cyclists	9
			Bicycling	7
			Highway design	7
			Highway safety	6
			Bicycle travel	5
			Attitudes	5
			Traffic safety	4
			Literature reviews	4
			Surveys	4
			Built environment	4
			Comfort	4

Research Summary Topic	# TRID sources in P&B subject area	# TRT index terms used	Most common terms (# times included)	
Bikeways: Safety and design	28	199	Bicycle lanes	16
			Traffic safety	12
			Bicycling	10
			Bicycle crashes	10
			Highway safety	6
			Cyclists	5
			Bicycle safety	5
			Literature reviews	4
			Intersections	4
			Bikeways	4
			Safety	4
			Drivers	4
			Passing	4
Distraction and impairment: Impacts on pedestrian and bicyclist safety	16	126	Pedestrians	9
			Distraction	9
			Fatalities	7
			Pedestrian safety	6
			Traffic safety	5
			Literature reviews	4
			Walking	4
			Cellular telephones	4
			Bicycling	3
			Behavior	3
			Risk assessment	3
			Crash characteristics	3
			Alcohol use	3
			Pedestrian vehicle crashes	3
Economic benefits of walking and bicycling	9	66	Bicycle facilities	6
			Economic impacts	4
			Bicycling	2
			Cyclists	2
			Cities	2
			Neighborhoods	2
			Modal shift	2
			Health	2
			Benefit cost analysis	2

Research Summary Topic	# TRID sources in P&B subject area	# TRT index terms used	Most common terms (# times included)	
Equity and bicycling	28	211	Bicycling	16
			Cyclists	8
			Equity (Justice)	8
			Demographics	5
			Bicycle crashes	5
			Bicycle facilities	4
			Walking	4
			Accessibility	4
			Literature reviews	4
			Infrastructure	4
			Gender	4
			Low income groups	4
			Females	4
Equity and pedestrian travel	14	102	Pedestrian safety	6
			Pedestrian-vehicle crashes	6
			Demographics	4
			Pedestrians	4
			Low income groups	3
			Behavior	3
Equity and personal safety	7	48	Bicycling	4
			Females	3
			Bicycle travel	3
Micromobility, including e-scooters	5	39	Bicycles	4
			Scooters	4
			Vehicle sharing	3
			Mobility	2
			Sidewalks	2
			Shared mobility	2
Modeling and traffic impact analysis	7	47	Travel demand	5
			Bicycling	4
			Walking	4
			Pedestrians	3
			Built environment	3
			Nonmotorized transportation	2
			Mode choice	2
			Metropolitan planning organizations	2
			State of the practice	2

Research Summary Topic	# TRID sources in P&B subject area	# TRT index terms used	Most common terms (# times included)	
Pedestrian Crossings: Design and safety	20	179	Pedestrian safety	16
			Crosswalks	10
			Pedestrian movement	7
			Pedestrian-vehicle crashes	6
			Pedestrian vehicle interface	5
			Pedestrians	4
			Traffic safety	4
			Best practices	3
			Highway safety	3
			Countermeasures	3
			Before and after studies	3
			Pedestrian areas	3
			Visibility	3
Policy, planning and decision-making	10	71	Pedestrians	5
			Transportation planning	5
			Bicycling	5
			Nonmotorized transportation	4
			Policy	3
			Equity (Justice)	3
			Cyclists	2
			Decision making	2
			Bicycle travel	2
			Urban areas	2
			Performance measurement	2
Rural and small urban areas	9	73	Rural areas	6
			Pedestrian safety	4
			Rural highways	4
			Pedestrians	3
			Bicycling	3
			Bicycle safety	3
Speed management and active transportation	9	59	Fatalities	4
			Pedestrian safety	3
			Pedestrian-vehicle crashes	3
			Traffic safety	2
			Pedestrian vehicle interface	2
			Crash analysis	2
			Injury severity	2
			Literature reviews	2
			Speed	2
			Speed control	2