AASHTO
AASHTO INNOVATION INITIATIVE

AASHTO Innovation Initiative

[Proposed] Nomination of Innovation Ready for Implementation

Sponsor

Nominations must be submitted by an AASHTO member DOT willing to help promote the innovation. If selected, the sponsoring DOT will be asked to promote the innovation to other states by participating on a Lead States Team supported by the AASHTO Innovation Initiative.

1. Sponsoring DOT (State): Michigan Department of Transportation (MDOT)

2. Name and Title: John Martin – MDOT Project Manager

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Innovation Description (10 points)

The term "innovation" may include processes, products, techniques, procedures, and practices.

3. Name of the innovation:

Visual Basic Application (VBA) Tool for Developing a Consistent Data Driven Methodology to Multimodal, Performance Based and Context Sensitive Design

4. Please describe the innovation.

A visual basic application (VBA) tool was developed that can be used at the early planning stage in order to aid the Michigan Department of Transportation (MDOT), MPOs, Municipalities, and stakeholders in key mobility design decisions, such as the consideration of specific trunkline corridor planning and the selection of relevant cross-sectional contextual characteristics. The tool includes content from a review of state and national guidance focused on the selection of appropriate crossing treatments to accommodate pedestrians and bicyclists, with gradations of associated decision criteria. A review was also conducted as to the availability of pertinent data sources statewide pertinent to the local design context. A review of best practices led to the identification of various pedestrian and bicyclist treatments for various site types. This information was supplemented by a review of current MDOT practices, culminating in the development of a treatment matrices for four site types: (1) pedestrian segments; (2) bicycle segments; (3) midblock crossings; and (4) intersection crossings. For each site type, the corresponding matrices identify potential treatments that are appropriate based upon site context (rural, suburban, urban), median type, lane configuration (crossing distance), annual average daily traffic (AADT), and speed limit. For each combination of these input variables, up to three prospective treatments can be identified. The end result is to identify treatment options via the matrices and tool. The resulting treatment options, up to three suggested treatments (potential treatment and two alternatives), will aid transportation agency staff and stake holders with data driven decision-support and analysis. The excel spreadsheet-based tool allows the user to enter site-specific information, such as traffic volume, speed limit, road features, and other features, which are then used to identify prospective treatments that can be applied across a range of scenarios. The content developed as a part of this project will assist transportation agencies and stake holders in applying a consistent data-driven approach to Complete Streets design that is multimodal, performance-based, and context-sensitive.

5. What is the existing baseline practice that the innovation intends to replace/improve?

Traditional design strategies focus more on geometrics and tend to lag in human needs in all facets of mobility. Current “curb to curb” mental approach lacks the ability to fully address the evolving multimodal needs as well as promoting a full understanding of mobility as promulgated from socio economic shifts in active transportation. The traditional approach to design is strict adherence to design standards. Global events as well as crash data have facilitated a vital need for a contextual analysis tool. The application of this tool allows stakeholder to analyze corridor design options to address directly impacting context sensitive design.

6. What problems associated with the baseline practice does the innovation propose to solve?

Historically, transportation agencies have designed streets, sidewalks and other roadway features with a one-size-fits-all approach. This approach does not consider the broader project context of where these facilities are located or who uses them. When using this one-size-fits-all design approach yields challenges that result in facilities do not adequately serve the needs of pedestrians, bicyclists, and transit riders providing a complete multimodal system within the Right-Of-Way. More traditional design strategies

are largely focused on physical aspects, standards, and specifications. Furthermore, issues related to economic, social, environmental resources, context-sensitive system solution need to be considered earlier in the design process project as it would result in meeting contextual needs, maximizing cost efficiencies and a more proactive approach to promoted and utilize stakeholder engagement to addressing community concerns. This tool can be used at the early planning stage in order to aid transportation agencies in key design decisions, such as the consideration of specific travel modes and the selection of relevant cross-section characteristics. The tool developed will assist transportation agencies in applying a consistent data-driven approach to corridor design that is multimodal, performance-based, and context-sensitive for all legal users. The immediate benefits from this tool includes project prioritization, detailed modal analyses, and design evaluation at various stages of the project development process. This tool also incorporates the Safe Systems Approach (SSA) by looking at ways to mitigate risk within the transportation system.

7. Briefly describe the history of its development.

An extensive literature search was conducted on related research across the county. The literature that was examined showed tailored mobility solutions that came from applying Context Sensitive Solutions and Complete Streets design principles are often more cost-effective and result in greater customer satisfaction than traditionally designed treatments. Researchers combed through a variety of online databases to find reliable sources of information for traffic volumes, speed limits, population demographics, and land use data throughout Michigan. The data can be scaled to four sizes of communities and applied to four different types of sites. The research culminated in a decision matrix for each of the four site types that can be used to identify potential treatments based on specific parameters and population levels. A link to a summary of the project cycle can be found here: New tool helps MDOT customize roadway designs for all users (michigan.gov).

8. What resources—such as technical specifications, training materials, and user guides—have you developed to assist with the deployment effort? If appropriate, please attach or provide weblinks to reports, videos, photographs, diagrams, or other images illustrating the appearance or functionality of the innovation (if electronic, please provide a separate file). Please list your attachments or weblinks here.

The above QR CODE will direct the design team to the use agreement that will need to be filled out prior to the use of the tool.

Research Spotlight Profiling the study and the resulting Tool:

New tool helps MDOT customize roadway designs for all users (michigan.gov)

Corridor Planning Tool:

https://drive.google.com/file/d/10Dg8YlZKZN9DowKQeXyj6Sr9RRAeUknE/view?usp=share_link

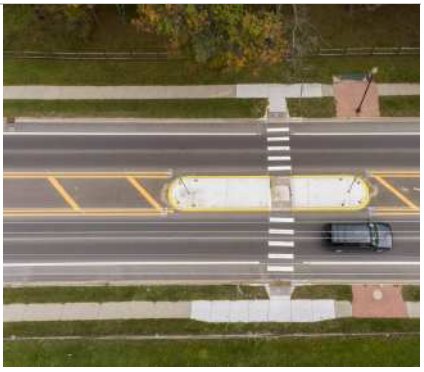
The video link below provides a brief overview of the Visual Basic for Applications (VBA) tool.

MDOT_MSU_CSS_Tool - MSU MediaSpace

The video link below provides a brief presentation of the research and the tool for the Michigan STIC meeting highlighting current innovations within the state.

From Complete Streets to Complete Design

Attach photographs, diagrams, or other images here. If images are of larger resolution size, please provide as separate files.



What is the site type?

--select--
Midblock
Segment level- pedestrian treatment
Segment level- bike treatment
Intersection

What is the context?

--select--
Rural (Pop < 5K)
Small urban areas (Pop 5K to 50K)
Small urbanized areas (Pop 50K to 200K)
Large urbanized areas (> 200K)

What is the median-lane configuration?

--select--
Undivided- 2 lanes, both directions total
Undivided- 3 lanes, both directions total (including TWLTL)
Undivided- 4+ lanes, both directions total
Median- 1-2 lanes in one direction
Median- 3+ lanes in one direction

What is the AADT range?

--select--
AADT (below 5,000)
AADT (5,000-10,000)
AADT (10,000-20,000)
AADT (above 20,000)

What is the speed (mph) range?

--select--
<=30mph
35-40 mph
>=45 mph

State of Development (40 points)

Innovations must be successfully deployed in at least one State DOT. The AII selection process will favor innovations that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.

9. How ready is this innovation for implementation in an operational environment? Please select from the following options. Please describe.

☐ Prototype is fully functional and yet to be piloted.

☐ Prototype has been piloted successfully in an operational environment.

☒ Technology has been deployed multiple times in an operational environment.

☐ Technology is ready for full-scale implementation.

The tool has been tested by many engineers and planners within MDOT as well as SEMCOG (Southeast Michigan Council of Governments) MPO. The tool has been communicated to stakeholders within Michigan including webinar training and presentations.

10. What additional development is necessary to enable implementation of the innovation for routine use?

The current version of the tool considers four contextual environments based upon MDOT-defined categories of rural, small urban, small urbanized, and large urbanized areas. It is feasible to potentially expand the tool to additional contexts or to consider related factors such as land use characteristics or the AASHTO five-category context system.

11. Are other organizations using, currently developing, or have they shown interest in this innovation or of similar technology?? ☒ Yes ☐ No

If so, please list organization names and contacts. Please identify the source of this information.

Organization	Name	Phone	Email
Michigan Department of Transportation	John Martin	(517) 582-8926	Martinj48@Michigan.gov
Michigan State University	Peter Savolainen	(517) 432-1825	pete@msu.edu

MPOs	Across the State of Michigan and Nationally		
SEMCOG	Jenya Abramovich	(313) 398-7441	abramovich@semcog.org
Mobility Consultants	Various design consultant stakeholders		

Potential Payoff (30 points)

Payoff is defined as the combination of broad applicability and significant benefit or advantage over baseline practice.

12. How does the innovation meet customer or stakeholder needs in your State DOT or other organizations that have used it?

This new tool gives designers and planners a consistent data-driven approach to identifying possible crossing design treatment options for a variety of context sensitive corridors. With better decision-making analysis that can be applied earlier, in various scenarios, during the design and scoping process, planners can identify multimodal needs given site characteristics. Transportation agencies, local or state, will be well equipped to collaborate with local communities and find thoughtful solutions that work for the location and legal users. As a result, the state's investment has produced early quantitative analysis for safe block crossing.

13. Identify the top three benefit types your DOT has realized from using this innovation. Describe the type and scale of benefits of using this innovation over baseline practice. Provide additional information, if available, using quantitative metrics, to describe the benefits.

Benefit Types	Please describe:
Improved Safety	Safety is improved by a decrease in pedestrian, bicycle, and Vulnerable Road User crashes.
Cost Savings	Costs are reduced by incorporating all modes in the initial planning efforts rather than integrating other modes later in the design process when it is cost prohibitive.
Improved Operation Performance	An integrated and holistic manner of designing a safer road for all users improves operational performance much like the Safe Systems Approach.

Provide any additional description, if necessary:

An additional strength of the tool is the ability to run multiple design scenarios to meet community needs.

14 How broadly might this innovation be deployed for other applications. in the transportation industry (including other disciplines of a DOT, other transportation modes, and private industry)?

Nationwide at State and Local levels.

Market Readiness (20 points)

The AII selection process will favor innovations that can be adopted with a reasonable amount of effort and cost, commensurate with the payoff potential.

15. What specific actions would another organization need to take along each of the following dimensions to adopt this innovation?

Check boxes that apply	Dimensions	Please describe:
☐	Gaining executive leadership support	Click or tap here to enter text.
☒	Communicating benefits	The materials already developed will assist other agencies in implementation.
☐	Overcoming funding constraints	Click or tap here to enter text.
☐	Acquiring in-house capabilities	Click or tap here to enter text.
☐	Addressing legal issues (if applicable) (e.g., liability and intellectual property)	Click or tap here to enter text.
☐	Resolving conflicts with existing national/state regulations and standards	Click or tap here to enter text.
☐	Other challenges	Click or tap here to enter text.

16. Please provide details of cost, effort, and length of time expended to deploy the innovation in your organization.

Cost: $300,000 – This initial investment cost was for the research and creation of the tool. No future cost to agencies is anticipated.

Level of Effort: Research was conducted by Michigan State University. There will be a minimal level of effort for users to download the tool. Overall effort would include communicating with all potential users that the tool is available for use. Video instructions are already made for the tool.

Time: Research and tool development lasted two years. The deployment of the tool into practice is very short in three steps. 1. Download waiver 2. Download tool 3. Begin using. The time spent using the tool is no more than would be used when planning and designing a road improvement project. By compiling the information together into one location, it may provide some time savings.

17. To what extent might implementation of this innovation require the involvement of third parties, including vendors, contractors, and consultants? If so, please describe. List the type of expertise required for implementation.

The user should be a planner or experienced with road design with an understanding of complete streets, context-sensitive design, and multimodal needs.