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): Minnesota Department of Transportation

2. Name and Title: Katie Walker, Office of Research & Innovation Director

Organization: Minnesota Department of Transportation

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Innovation Description (10 points)

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

3. Name of the innovation:

Mobile Application for Tracking MnDOT's Interactions with the Unsheltered Populations Camping within Its ROW

4. Please describe the innovation.

MnDOT staff developed a uniform data framework and mobile-based application for collecting and tracking homeless encampment activity along rights-of-way to help agencies respond safely and proactively. Since 2014, MnDOT staff have collected data on staff interactions with the Twin Cities area unsheltered population within the transportation rights-of-way, but the information collected and displayed was limited. The information was stored in a spatially-legible format, which was sufficient for printed summary maps, but offered few options for more in-depth analysis or the recording of detailed on-site conditions and statistics. MnDOT decided that a new more integrative and flexible data framework was needed to: (1) allow for real-time data collection by staff while in the field, to more accurately depict camps' locations and the conditions observed, and (2) expand the variables included in the dataset to allow for more thorough analysis of the camps' attributes and activities as well as MnDOT's response to them. Compared to the data's previous format, each record now potentially contains far more information than simply "where" and "when" an interaction occurred with MnDOT staff. MnDOT staff using the mobile collection app can now capture significantly more data while conducting their activities. Staff now use a mobile collection app, Live Unauthorized Encampment Collector, to capture real time data, for examples, arrival/departure time stamps, counts of camp residents, needles, Narcan kits, other drugs or weapons, propane tanks or other objects, outreach requests, and law enforcement requests. Online data sharing tool and time lapse analysis created in ArcGIS Pro 2.7 were also developed to allow for 3D views and time lapse analysis. The system can also display heat mapping.

In a related project, MnDOT is also piloting remote sensing infrared technology to detect human presence in unsheltered encampments along highway rights-of-way. MnDOT's encampment coordinators often enter an unsheltered encampment, thinking they are unoccupied because inhabitants do not respond to greetings or come out after the team is in the camp. This same technology may also be tested in mowing operations to detect people or objects, such as propane tanks, hidden in high grass. This would increase the safety of such operations for both staff and individuals experiencing homelessness.

In addition, MnDOT has developed procedures to ensure consistent and fair enforcement of roadside encampments and a seven-module training video series to help staff respond and know where to seek assistance when encountering unsheltered populations in the rights-of-way.

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

Since 2014, MnDOT staff have been collecting data on staff interactions with the Twin Cities area unsheltered population within the transportation rights-of-way, but the information collected and displayed was limited. The information was stored in a spatially-legible format, which was

sufficient for printed summary maps, but offered few options for more in-depth analysis or the recording of detailed on-site conditions and statistics. Click or tap here to enter text.

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

MnDOT decided that a new more integrative and flexible data framework was needed to: (1) allow for real-time data collection by staff while in the field, to more accurately depict camps' locations and the conditions observed, and (2) expand the variables included in the dataset to allow for more thorough analysis of the camps' attributes and activities as well as MnDOT's response to them. Click or tap here to enter text.

7. Briefly describe the history of its development.

Since 2014, MnDOT staff have collected data on staff interactions with the Twin Cities area unsheltered population within the transportation rights-of-way, but the information collected and displayed was limited. The information was stored in a spatially-legible format, which was sufficient for printed summary maps, but offered few options for more in-depth analysis or the recording of detailed on-site conditions and statistics. MnDOT recently decided that a new more integrative and flexible data framework was needed to: (1) allow for real-time data collection by staff while in the field, to more accurately depict camps' locations and the conditions observed, and (2) expand the variables included in the dataset to allow for more thorough analysis of the camps' attributes and activities as well as MnDOT's response to them.

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.

H:\Official\Innovation\Government innovation awards\2021 AASHTO Innovation awards\AASHTO AII Nomination Form Field Data Encampment.docmAttach photographs, diagrams, or other images here. If images are of larger resolution size, please provide as separate files.

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

x Technology is ready for full-scale implementation

Click or tap here to enter text.

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

For now, one of the most obvious limitations of the mobile application system is that it only captures activity within MnDOT's right-of-way, while the challenge of homelessness clearly extends well beyond the shoulders and underpasses of the state's highway systems. Moving forward, MnDOT hopes to work with other partners to build upon this system, and hopefully create a unified statewide system. The agency has already been sharing its schema with Twin Cities agencies, in hopes they can build or improve their own tracking system. Additionally, MnDOT hopes that collection and analysis of this data can assist in finding and implementing effective, long-lasting, and sustainable ways to address homelessness and meet the needs of those experiencing it.   Future plans include enriching the dataset to include attributes and analyses that specifically examine camp proximity to other transportation infrastructure – such as bridges and multi-modal (bike and pedestrian) corridors – as well as integration of metro-wide traffic collision data to further develop risk assessment for both residents experiencing homelessness and the traveling public. MnDOT also hopes to integrate data reflecting the implementation of past and proposed abatement practices, such as permanent fencing, planting relocation/expansion, and "defensive architecture," to foster more thorough cost-benefit analyses of these practices.

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

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

Organization	Name	Phone	Email
City of Minneapolis	Katie Topinka, Program Manager; Garrett Bing and Michael Peterson, GIS	Click or tap here to enter text.	Katie.topinka@minneapolismn.gov
Ramsey County and City of St Paul	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Hennepin County	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

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 project is a prime example of staff identifying an opportunity to use existing technology in a new and creative way to solve a problem that places people and their safety front and center. Through this project, MnDOT created a new framework for integrating field data into a mobile application for tracking information about the unsheltered population within its rights-of-way. This new system allows for real-time data collection using the Live Unauthorized Encampment Collection app by staff while in the field to more accurately depict camps' locations and the conditions observed. It also expands the variables included in the dataset to allow for more thorough analysis of the camps' attributes and activities as well as MnDOT's response to them. Data collected is available in interactive, 3D, time lapse formats to enhance data analysis.   Additionally, MnDOT is taking advantage of advances in thermal imaging to pilot use of infrared/thermal cameras to detect human activity or presence in roadside encampments. Both these projects will aid the agency's response to unsheltered encampment, make it easier to track, and also improve the safety of staff and unsheltered people.

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	Click or tap here to enter text.
Improved Customer Service	Click or tap here to enter text.
Improved Operation Performance	Click or tap here to enter text.

Provide any additional description, if necessary:

Click or tap here to enter text.

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)?

Any transportation agency could copy MnDOT's schema for the mobile application and deploy a similar application using ArcGIS. MnDOT has, in fact, already shared its schema with at least two local agencies and hopes to eventually create a unified statewide system for all Minnesota agencies.

Additionally, the infield testing results of the FLIR Thermal Camera technology can be used by the local and national transportation community, and may well set the standard for how to innovatively manage rights-of-way to improve the safety of both agency staff and the unsheltered homeless population. MnDOT's intends to develop and share its procedures/protocols for use of thermal imaging in unsheltered encampments in rights-of-way.

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	Click or tap here to enter text.
☐	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: Used existing ArcGIS software and in-house staff to develop tracking software. An additional $15,000 to purchase the FLIR E95 Infrared/Thermal Camera for related pilot project.

Level of Effort: Part-time software development from three in-house staff over 4-5 months using existing GIS software. In related project, existing maintenance staff have been able to pilot the thermal imaging technology with assistance from a consultant.

Time: See above

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.

Mobile application can be developed in-house or with consultants, depending on agency staffing, and with existing ArcGIS software, using MnDOT's schema. Purchase of thermal camera technology may be required if agency would also like to implement right-of-way scanning for roadside maintenance crews.