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): Arizona Department of Transportation

2. Name and Title: Kathy Boyle, Asst. Communications Director for Internal Communications

Organization: Arizona Department of Transportation

Street Address: 1655 W. Jackson St. Room 170 MD 126F

City: Phoenix

State: AZ

Zip Code: 85007

Email: kboyle@azdot.gov

Phone: 602.712.2608

Fax: N/A

Innovation Description (10 points)

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

3. Name of the innovation:

Guardrail Crabb

4. Please describe the innovation.

It's a tool that handles lifting and aligning guardrail into place without having crews do the lifting and potentially getting injured in the process. The guardrail crabb helps eliminate injuries to backs, legs and arms.

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

A guardrail crabb replaces having to hold the guardrail, which weigh about 185 pounds each, in place by employees and reducing the number of employees needed to fix guardrail at one time from a crew of four or five to two. The tool also improves safety for employees on the job site as it eliminates potential injury to backs, arms, feet and legs, and also improves safety while working on roadways.

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

To fix or install guardrail, the old method of lifting and leveling the guardrail was done by hand. A 25-foot with beam guardrail weighs approximately 185 pounds. On spillways, crews needed to double the guardrails, thus increasing the weight to 370 pounds – all done by hand. The job would require a crew of four to five employees, lifting and straining backs to complete the work. If a guardrail slipped, then employees suffered injuries to arms, legs and feet as well. Injured employees would need to take sick time to recover.

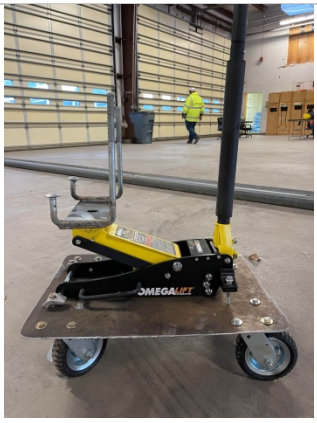
7. Briefly describe the history of its development.

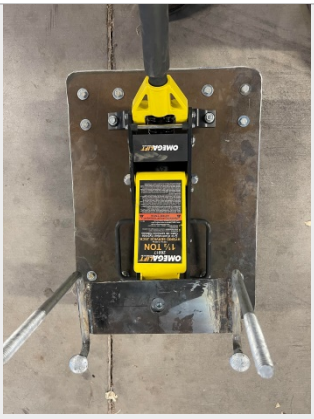
Nogales, Arizona Maintenance employee Francisco Romero created the guardrail crabb by using a jack-type lever on all-terrain wheels with hooks, and the height can be adjusted to hold the guardrail in place. Once the prototype was developed, a similar one was replicated and tested with positive results.

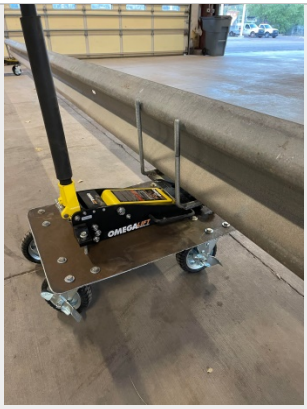
8. What resources—such as technical specifications, training materials, and user guides—have you developed to assist with the deployment effort? If appropriate, please attach or provide weblinks to reports, videos, photographs, diagrams, or other images illustrating the appearance or functionality of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

There are two videos to watch how the guardrail crabb is used:
https://drive.google.com/file/d/1GnFU5hz6Tuh6SNoBX_gBnErSP19ReH7i/view
https://drive.google.com/file/d/1DBHb0MDcNiopUZcBaquISWVudcw7JrEo/view The first photo depicts the old method of holding the guardrail in place by employees. The next five photos show the component parts of the guardrail crabb, and how the tool holds the guardrail in place while moving it to the location where the repair or replacement is to take place.

Attach 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

☐ Technology is ready for full-scale implementation

ADOT's Southcentral District has used the guardrail crabb multiple times in replacing guardrail.

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

The Southcentral District in Tucson, AZ has demonstrated the guardrail crabb to other district leaders at ADOT and is waiting for confirmation that all districts will use this new tool. District leaders have expressed an eagerness to use the tool.

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
ADOT Districts/State Engineer's Office	Deputy Director Dallas Hammit	602.712.7391	dhammit@azdot.gov
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	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?

The guardrail crabb saves resources – keeps employees safe from injuries and the need to use sick time to recover from injuries, and saves time and money in moving guardrail to a particular location. The guardrail crabb has the capacity to lift 3,000 pounds with all-terrain wheels. It can move in any terrain. The tool eliminates the need to use large trucks equipped with cranes as some work zones don't have enough room to bring such large trucks on site.

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	Lessens injuries to backs, arms and legs to employees.
Organizational Efficiency	Doesn't require a team of 4-5 to replace guardrail but only a team of two to do so. Other maintenance work can get scheduled and performed by other team members.
Improved Operation Performance	Saves money overall – healthcare costs and time.

Provide any additional description, if necessary:

Nothing else to add.

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)?

The concept tool was presented at a statewide meeting of district supervisors at ADOT. It was well received and discussed in implementing at other district maintenance sites in the state.

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	Would need buy-in to the concept.
☒	Communicating benefits	Sharing information to others in an organization and demonstrating its use.
☐	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: Approximately $300 for each guardrail crabb.

Level of Effort: Simple

Time: A week was spent to design and create the tool.

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 Southcentral District used the state's procurement system to buy parts to the make the guardrail crabb. It requires access to the right parts vendor. The tool was very simple to make.