

AASHTO Innovation Initiative
[Proposed] Nomination of Innovation Ready for Implementation

Sponsor	<p>Nominations must be submitted by an AASHTO member DOT willing to help promote the innovation</p>	<ol style="list-style-type: none"> 1. Sponsoring DOT (State): 2. Name and Title: Organization: Street Address: City: State: Zip Code: E-mail: Phone: Fax: 3. Is the sponsoring State DOT willing to promote this innovation to other states by participating on a Lead States Team supported by the AASHTO Innovation Initiative? Yes or No: 																				
Innovation Description (10 points)	<p>The term "innovation" may include processes, products, techniques, procedures, and practices.</p>	<ol style="list-style-type: none"> 4. Name of the innovation: 5. Please describe the innovation. Describe how this innovation transforms your existing "state of play." 6. If appropriate, please attach photographs, diagrams, or other images illustrating the appearance or functionality of the innovation (if electronic, please provide a separate file). Please list your attachments here. 7. Briefly describe the history of its development. 																				
State of Development (40 points)	<p>Innovations must be successfully deployed in at least one State DOT. The All selection process will favor innovations that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.</p>	<ol style="list-style-type: none"> 8. How ready is this innovation for implementation in an operational environment? Please check of the following options. Please describe <input type="checkbox"/> Prototype is fully functional and yet to be piloted <input type="checkbox"/> Prototype demonstrated successfully in a pilot environment <input type="checkbox"/> Technology has been deployed multiple times in an operational environment <input type="checkbox"/> Technology is ready for full-scale adoption 9. What additional development is necessary to enable routine deployment of the innovation? What resources—such as technical specifications, training materials, and user guides—are already available to assist with the deployment effort? 10. Has any other organization used this innovation? Yes or No: If so, please list organization names and contacts. Please identify the source of this information. <table border="1"> <thead> <tr> <th>Organization</th><th>Name</th><th>Phone</th><th>E-mail</th></tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> 	Organization	Name	Phone	E-mail																
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**Potential
Payoff
(30 points)**

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

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

12. What type and scale of benefits have your DOT realized from using this innovation? Include cost savings, safety improvements, transportation efficiency or effectiveness, environmental benefits, or any other advantages over other existing baseline practice. Please identify the following benefit types:

Check boxes that apply	Benefit Types	Select a rating from the drop down menu
<input type="checkbox"/>	Cost Savings	
<input type="checkbox"/>	Shortened Project/Service Delivery Schedule	
<input type="checkbox"/>	Improved Customer Service	
<input type="checkbox"/>	Improved Quality	
<input type="checkbox"/>	Environmental Benefits	
<input type="checkbox"/>	Organizational Efficiency	
<input type="checkbox"/>	Improved Safety	
<input type="checkbox"/>	Improved Operational Performance	
<input type="checkbox"/>	Improved Asset Performance	
<input type="checkbox"/>	Others (please describe)	

Provide an additional description, if necessary:

13. Please describe the potential extent of implementation in terms of geography, organization type (including other branches of government and private industry) and size, or other relevant factors. How broadly might the technology be deployed?

**Market
Readiness
(20 points)**

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

14. 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:
<input type="checkbox"/>	Gaining executive leadership support	
<input type="checkbox"/>	Measuring performance (e.g. benefits documentation)	
<input type="checkbox"/>	Improving technology understanding	
<input type="checkbox"/>	Overcoming financial constraints	
<input type="checkbox"/>	Addressing legal issues (if applicable) (e.g., liability and intellectual property)	
<input type="checkbox"/>	Acquiring in-house expertise	
<input type="checkbox"/>	Resolving conflicts with existing regulations and standards	
<input type="checkbox"/>	Other challenges	

- 15.** What is the estimated cost, effort, and length of time required to deploy the innovation in another organization?

Please describe:

Cost

Level of Effort

Time

- 16.** To what extent should the 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.

Submit Completed form to: <http://aii.transportation.org/Pages/Solicitation-Submit-Nomination.aspx>

GPS Inspector Tablet overview

Chris Pucci, PLS, Construction Automation Surveyor

Oregon Department of Transportation

Engineering Automation Section

Background

ODOT is using DT Research model DT391GS and DT301TR, survey-grade RTK GPS tablets capable of reaching accuracies of +/- 0.07 feet. The tablet is an off-the-shelf item with an embedded GPS antenna that runs Windows 7 and Windows 10 operating systems and surveying software. Currently 40 tablets are assigned to 16 construction offices across the state.

With the increased use of Automated Machine Guidance (AMG) technology in the construction industry, contractors are now providing little to no physical staking on construction projects. Inspectors traditionally use stakes to find their position and to verify line and grade. With the introduction of the GPS tablet, the inspector can now use the same digital design data that the contractor receives from the roadway designers to verify line and grade. Use of the Oregon Real Time GNSS Network helps the tablets achieve its accuracies. The software's capability to use XML files for alignments, surfaces and design elements allows inspectors to make the same checks they would have made if there had been traditional construction staking on the project. The check is a fully independent check, as the inspector is using the design files from the roadway designer and utilizing the ORGN and not the contractor's survey control system. The software will also allow for performing measurements for pay notes and data gathering operations for as-constructed survey tasks. Other uses for the tablet include being able to save contract documents on the tablet for easy reference and use in the field, and utilization of other pre-loaded software for note taking and documentation.

What are the benefits of using the GNSS tablet?

- Provides a means for an independent check for position, line and grade.
- Ability to read and use XML files for alignment, surfaces and design elements.
- Ability to use CADD files for reference and checks.
- Ability to save and use other contract documents (i.e., PDF, Excel, Word) on tablet.
- Familiar Windows 7 operating system and interface.
- Mobile cell card allows for mobility to use throughout the state.
- User-friendly survey software interface allows for easy data gathering workflows.
- Able to create lines and shapes for linear, perimeter or area measurements/quantities.
- Able to check random elevations to compare against a design surface for grade verification.
- Survey-grade positioning and functionality at a fraction of the cost of current GPS survey equipment.
- Ability to add pictures and audio recordings to point for quick and efficient inspection note taking.

How is ODOT using the GNSS tablet?2015

- Researched equipment and found hardware and software that meet ODOT's needs.
- Purchased 10 tablets.
- Developed eight-hour training class, including handouts and help documents.
- Initial training and equipment delivered
 - Four Construction offices trained
 - 40 people trained
 - Trained and delivered tablet to Technical Services, Pavements unit to assist in gathering location data for QA elements on paving projects.

2016

- Purchased five additional tablets for Construction offices.
- Four additional Construction offices trained.
- Job site visits and hands-on training for inspectors at jobsites where tablets are being used
 - Oregon 99, Newburg/Dundee bypass
 - U.S. 20, Pioneer Mt-Eddyville
 - U.S. 101, East Devil Lake Project
 - I-5, Beltline, Unit 4
 - Oregon 140, Bly Mountain

2017

- Moved from pilot project to statewide implementation
- 25 additional tablet purchased for Construction offices
- All construction offices trained statewide
- Implementation on most AMG projects statewide

What have we learned?

- Works well in all weather. Tablets have been used in a wide range of temperatures and in rain.
- Rugged design stands up to field conditions and accidental drops or impacts.
- Works best with internal SIM card, but also works well with a mobile hot-spot or using the hot spot on a smart phone or tablet.
- MicroSurvey FieldGenius software is very forgiving and user friendly. A non-surveyor can learn to use it with minimal training.
- Construction offices and asset management groups are adapting tablet capabilities into their workflows. Possibly can be used by other groups at ODOT.
- Could assist in documenting progress of construction projects and keeping records of items inspected.
- Cost savings by outfitting non-survey personnel with survey-grade data collector without having to invest in expensive survey equipment.



How are we moving forward?

- Continue site visits and construction office visit for hands-on training and support. Continue development of training. Advanced inspector surveying classes offered to incorporate GPS surveying techniques for data gathering with tablet system
- Provide guidance for data gathering workflow and data utilization for pay notes and documentation.

ODOT GNSS Positioning Tablets



Survey grade positioning tablets are being used by ODOT construction personnel and other non-surveyors to determine "line and grade" on modern stakeless Automated Machine Guidance (AMG) jobsites. The tablets allow construction inspectors to have the same data and information that the advanced automated equipment is using to build a project.

The project is currently in full statewide deployment with 60 tablets in use across the state and over 250 personnel having been trained. All equipment setup, training, and deployment is being handled in house by ODOT's Engineering Automation Section.

The tablets, DTRResearch Model DT391GS and DT301TR, have fully integrated survey grade GNSS which uses cellular data to access ODOT's Oregon Real Time GNSS Network (ORGN) to achieve accuracies of +/- 0.07'.

The software, MicroSurvey FieldGenius, allows easy display and interaction with field data. The goal is to allow inspectors to make the same checks they would have made if there had been traditional construction staking on a project, not to make inspectors into surveyors.

- **Rugged Weather Resistant Touchscreen Tablets**
- **Full Survey Software with data display and data collection**
- **Built in Survey Grade GNSS**
- **Built in Digital Camera, can collect photos directly in Survey Software**
- **Hot swappable batteries for continuous operations**
- **Cellular Data sim card slot for internet and data access**
- **Windows 7 or Windows 10 Operating System**
- **Lower overall cost than dedicated survey equipment**

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ODOT Inspector Positioning Tablets

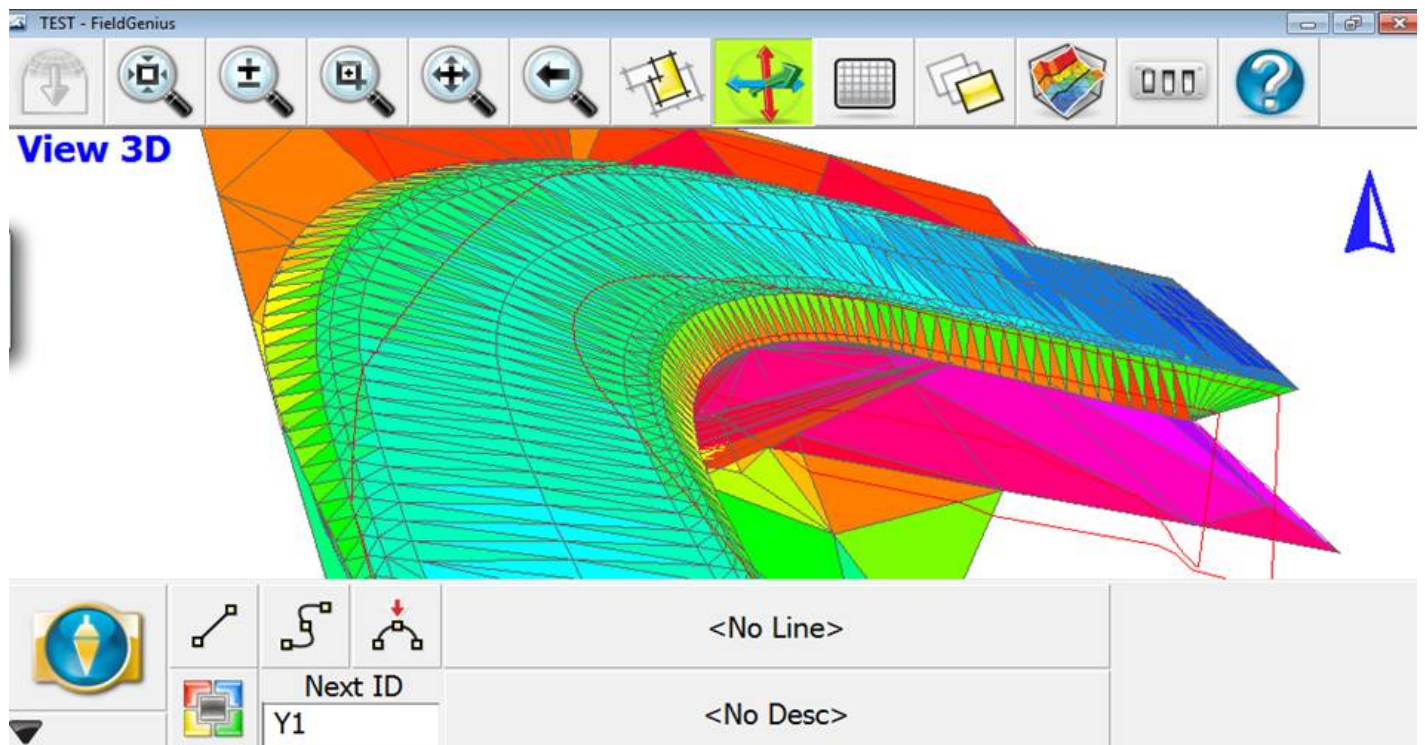
DT Research DT391GS - 9" Touch Screen – Integrated Dual Frequency Survey Grade GNSS

<http://www.dtresearch.com/Industry/products/GNSS-Tablet.html>



MicroSurvey FieldGenius Survey Software - 3D Interactive Display – Direct XML Import/Export

<http://www.microsurvey.com/products/fieldgenius/>



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