

AASHTO Innovation Initiative  
Nomination of Technology Ready for Implementation

<p><b>Sponsor</b></p>	<p>Nominations must be submitted by an AASHTO member DOT willing to help promote the technology</p>	<p>1. Sponsoring DOT (State): <b>Vermont</b></p> <p>2. Name and Title: <b>Nina Safavi, Survey &amp; GIS Project Manager</b>          Organization: <b>Vermont Agency of Transportation (VTrans)</b>          Street Address: <b>1 National Life Drive</b>          City: <b>Montpelier</b> State: <b>VT</b> Zipcode: <b>05633-5001</b>          E-mail: <b>nina.safavi@state.vt.us</b> Phone: <b>802-279-8686</b> Fax:</p> <p>3. Is the sponsoring State DOT willing to promote this technology to other states by participating on a Lead States Team supported by the AASHTO Innovation Initiative? Yes or No: <b>Yes</b></p>
<p><b>Technology Description (10 points)</b></p>	<p>The term "technology" may include processes, products, techniques, procedures, and practices.</p>	<p>4. Name of Technology: <b>ROW SPATIAL VIEWER</b></p> <p>5. Please describe the technology.</p> <p>An online interactive map of highway right-of-way (ROW) plans. The website is public facing and allows users to easily access available plans by geographic location  <a href="http://host.appgeo.com/vtrans">http://host.appgeo.com/vtrans</a></p> <p>The technology solution advantages are threefold:</p> <p><b>1. Spatial-</b> Conversion of CADD and paper plans to GIS (Geographic Information Systems) format. The georeferenced plans are now available and catalogued.</p> <p><b>2. Accessibility-</b> Publish the data as a web service so it is accessible on mobile devices at all times.</p> <p><b>3. Connectivity:</b> Present other relevant data layers in the same Viewer (e.g. roads, mile markers, town boundaries, areal imagery, other CADD features, project management details, source path of original document, and precision of data.</p> <p>6. If appropriate, please attach photographs, diagrams, or other images illustrating the appearance or functionality of the technology. (If electronic, please provide a separate file.) Please list your attachments here.</p> <p>The ROW Spatial Viewer is available at: <a href="http://host.appgeo.com/vtrans">http://host.appgeo.com/vtrans</a></p>

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<p>State of Development (30 points)</p>	<p>Technologies must be successfully deployed in at least one State DOT. The All selection process will favor technologies that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.</p>	<p>7. Briefly describe the history of its development.</p> <p>The Vermont Agency of Transportation has a long history of managing and maintaining the state road network going back to the late 1800s. Over time, the State has acquired a lot of property as part of its right-of-way (ROW) portfolio, and managing this information has always been difficult. Until recently, ROW information could be found in historic surveys, blueprints, and more recently, in CADD drawings. Unfortunately, finding information about any given site took a lot of research and time. The ROW section gets hundreds of data requests annually from other VTrans sections, other state agencies, municipalities, civil engineers, land surveyors, researchers and the public. The ROW Spatial Viewer makes highway record plans easily accessible in an efficient way.</p> <p>To improve efficiency and transparency, the agency worked with a consultant to develop a technology solution for modernizing the data and making it more accessible. The timeline is as follows:</p> <p>2012- Contracted with a consultant              -Return on Investment Report to define costs and benefits of the project              -Pilot project to determine automation of process for modernizing ROW data          2012-Data digitizing, georeferencing and loading into ROW Spatial Viewer          2013-ROW Spatial Viewer made available online for routine use          2014-Outreach across VTrans and other stakeholders</p> <hr/> <p>8. For how long and in approximately how many applications has your State DOT used this technology?</p> <p>2 years. While the digital plans were made available by request from the inception of the project, the most widely used application of the data is through the ROW Spatial Viewer, which was made available in Spring 2013. Users of the data include:</p> <p><u>Internal</u>          VTrans Plans &amp; Titles- <i>determining ROW for roadway project delivery</i>          District Maintenance staff- <i>to determine where their equipment can go within the ROW</i>          VTrans Operations- <i>planning tool for stormwater management within ROW</i>          VTrans Environmental Planning- <i>locating potential sites for solar panels</i>          VT Agency of Natural Resources- <i>Acquisition for land conservation</i></p> <p><u>External</u>          Civil Engineers (internal and external)- <i>construction projects</i>          Townships- <i>Town parcel mapping</i>          Surveyors- <i>to determine real property rights on the ground</i>          Public- <i>homeowners trying to better understand property boundaries and rights</i>          Other States- <i>Using the ROW Spatial Viewer as a model for advancing their own technology</i></p>
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		<p>9. What additional development is necessary to enable routine deployment of the technology?</p> <p><b>Data Maintenance:</b> To ensure that the data remains current, the final phase of the project will include further data cleanup and a maintenance plan. The ROW Spatial Viewer incorporated an interactive approach to data cleanup; the data was made available to the public while the technology was a work in progress. Users had the functionality to flag problems they come across. This approach allowed users to benefit from the project as it was being completed. Additionally the ROW staff could gather feedback along the way, while building user support for the technology.</p> <p><b>Data Loading:</b> Complete the remaining 30% of data loading.</p> <p><b>Training:</b> VTrans also plans to create an online video to demonstrate how users can best utilize the technology to its full potential.</p> <p>10. Have other organizations used this technology? Yes or No: Yes If so, please list organization names and contacts.</p> <table border="1" data-bbox="467 783 1542 1018"> <thead> <tr> <th>Organization</th> <th>Name</th> <th>Phone</th> <th>E-mail</th> </tr> </thead> <tbody> <tr> <td>Vermont Center for Geographic Information</td> <td>Leslie Pelch</td> <td>802-882-3002</td> <td>lesliep@vcgi.org</td> </tr> <tr> <td>Arizona DOT</td> <td>James Meyer</td> <td>602-712-8037</td> <td>JMeyer@azdot.gov</td> </tr> <tr> <td>Vermont Survey &amp; Engineering</td> <td>Stephen Fraser</td> <td>802-229-9138</td> <td>sfraser@vermontsurvey.com</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Organization	Name	Phone	E-mail	Vermont Center for Geographic Information	Leslie Pelch	802-882-3002	lesliep@vcgi.org	Arizona DOT	James Meyer	602-712-8037	JMeyer@azdot.gov	Vermont Survey & Engineering	Stephen Fraser	802-229-9138	sfraser@vermontsurvey.com				
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<p><b>Potential Payoff (30 points)</b></p>	<p>Payoff is defined as the combination of broad applicability and significant benefit or advantage over other currently available technologies.</p>	<p>11. How does the technology meet customer or stakeholder needs in your State DOT or other organizations that have used it?</p> <p>Use cases were determined and assessed prior to the development of the technology. The ROW Spatial Viewer incorporates stakeholder needs including the following:</p> <ul style="list-style-type: none"> <li>-Increased efficiency</li> <li>-Less burden on internal staff</li> <li>-Accessibility via mobile device in the field</li> <li>-Data published as a web service</li> <li>-Cost savings</li> <li>-Increased transparency</li> <li>-Enhanced visualization of information</li> <li>-Connection to other data layers available in the ROW Spatial Viewer e.g., roads, areal imagery, tax maps, project details, town boundaries, and precision of data</li> </ul>																				

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		<p>12. What type and scale of benefits has your DOT realized from using this technology? Include cost savings, safety improvements, transportation efficiency or effectiveness, environmental benefits, or any other advantages over other existing technologies.</p> <p><b>Technology Advantage:</b> VTrans' digital print room (DPR) continues to host scanned and indexed ROW project plans that can be downloaded from the DPR website. The distinguishing advantage of the ROW Spatial Viewer is its spatial functionality, which allows for advanced querying and better visualization of data. The ROW Spatial Viewer makes the data far more accessible.</p> <p><b>Financial Advantage:</b> The project's Return on Investment study includes a cost-benefit analysis that determines low and high estimates of cumulative loss/savings for implementing the technology. Factors considered were staff efficiency, self-service capability, potential for property selloffs, and duplicate effort. The results showed that after the first year the benefits start to significantly outweigh the costs, with benefits amounting to \$9,845 – 14,373 by year 5.</p> <p style="text-align: center;"><b>Low to High (in thousands)</b></p> <p>Year 1: -\$128 Year 2 : \$2,421 – \$3,561 Year 3: \$5,202 – \$7,466 Year 4: \$7,519 – 10,889 Year 5: \$9,845 – 14,373</p> <p><b>Environmental Advantage:</b> Based on our Mission &amp; Vision statement, VTrans aspire to <i>provide a safe and resilient transportation system in an environmentally responsible manner</i>. In that respect, the modernized ROW data can now serve as a planning tool for alternative green uses of ROW within VT. Moreover, given that highways span across state and national borders, the VT ROW data can support regional planning for alternative energy, watershed-based water quality improvements, sustainable forestry, vegetation management, and wildlife corridor management across neighboring states and Canada.</p>
		<p>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?</p> <p>The technology can be adopted by DOT's and other organizations that manage a large portfolio of ROW plans and have a need for modernizing accessibility to the data.</p>
<p><b>Market Readiness (30 points)</b></p>	<p>The All selection process will favor technologies that can be adopted with a reasonable amount of effort and cost, commensurate with the payoff potential.</p>	<p>14. What actions would another organization need to take to adopt this technology?</p> <ul style="list-style-type: none"> <li>-Explore/understand internal data and processes</li> <li>-Embrace transparency</li> <li>-Digitize ROW paper plans</li> <li>-Georeference paper and CADD plans</li> <li>-Convert the plans into GIS format</li> <li>-Make data accessible on the web</li> <li>-Develop web application to enable querying data</li> <li>-Outreach to all stakeholders</li> </ul>

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		<p>15. What is the estimated cost, effort, and length of time required to deploy the technology in another organization?</p> <p>2 years with a cost of \$600,000. Deliverables were:</p> <ul style="list-style-type: none"> <li>-A Return on Investment Report</li> <li>-A ROW data conversion Pilot</li> <li>-Implementation/data loading</li> <li>-Customization of the ROW Spatial Viewer</li> </ul>
		<p>16. What resources—such as technical specifications, training materials, and user guides—are already available to assist deployment?</p> <ul style="list-style-type: none"> <li>-The ROW Spatial Viewer is available at <a href="http://host.appgeo.com/vtrans">http://host.appgeo.com/vtrans</a></li> <li>-The Return on Investment report documents the costs, benefits and use cases of the project.</li> <li>-Documentation of the digital conversion process.</li> <li>-The ROW Spatial Viewer is a customized open source web tool developed by Applied Geographics, Inc.</li> <li>-A webinar presenting on the project background, process and demonstration of the ROW Spatial Viewer is available through the FHWA GIS webinar series.</li> </ul>
		<p>17. What organizations currently supply and provide technical support for the technology?</p> <ul style="list-style-type: none"> <li>-VTrans ROW Section</li> <li>-VTrans IT team</li> <li>-Applied Geographics, Inc. (AppGeo) was the consultant on the project.</li> <li>-Pro-West and Associates, Inc. (PWA) handled the digitizing of the data.</li> </ul>
		<p>18. Please describe any legal, environmental, social, intellectual property, or other barriers that might affect ease of implementation.</p> <p>A web browser is required to view the ROW Spatial Viewer.</p>
<p><b>Submit Completed form to</b></p>		<p><a href="http://web.transportation.org/tig_solicitation/Submit.aspx">http://web.transportation.org/tig_solicitation/Submit.aspx</a></p>