

August 2020

“We Had No Idea”

**UDOT at the Cutting Edge
of Road Safety**



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Introduction

Utah’s Department of Transportation is motivated by three strategic goals, among them optimization of mobility and preservation of infrastructure. Their top priority, however, is the commitment to bringing the number of roadway fatalities down to zero on the many roads and highways that crisscross the State of Utah.

UDOT has been among national leaders in adopting innovative and technological approaches to this great task of improving road safety. Robert Miles, UDOT’s Director of Traffic Safety, is driven to find cutting edge data-driven solutions to the pressing issues facing road safety today.

For Miles, “each death is a fundamentally preventable tragedy that represents some failure of the system. We take our commitment to Zero Fatalities very seriously, so we’re willing to look into innovative technologies that appear promising.”



Challenges on the Road to Safety

The search for safer roads has led UDOT to implement the industry's best and newest analytical tools, but nevertheless these tools have their limits. The best software available has been built around analysis of crash data that many government bodies have been aggregating for years now. This particular approach can provide an excellent picture of the problems faced by safety engineering professionals, showing where and when crashes occur.

However, this approach is not very effective at determining the underlying causes of these crashes, the underlying "why" of the meticulously collected statistics often remains a mystery. Relying solely on historic data is necessarily reactive, road safety solutions that are proactive and predictive require a different approach.

Robert Miles explains: "A road safety methodology that is informed solely by crash statistics is incomplete. Even assuming we know exactly what to do to solve a given problem, as roads become safer, fewer crashes will occur, and it actually becomes harder and harder to understand where improvements need to be made."

Understanding this, when approached by RDV Systems in August 2019, Miles was quickly able to see the potential in their recently developed RSA-3D road safety technology.

A Disruptive Approach

RDV (Rapid Design Visualization) was originally recruited by UDOT to provide visualization services for a project to widen highway 5600 West through its 123BIM cloud-based 3D modeling platform.

During this project, RDV contacted Robert Miles and set up a meeting to present its recently developed road safety technology, Road Safety Audit 3D (RSA 3D). This software builds a precise virtual model of highway systems, and then performs automated analyses based on the road safety standards set by the federal government.



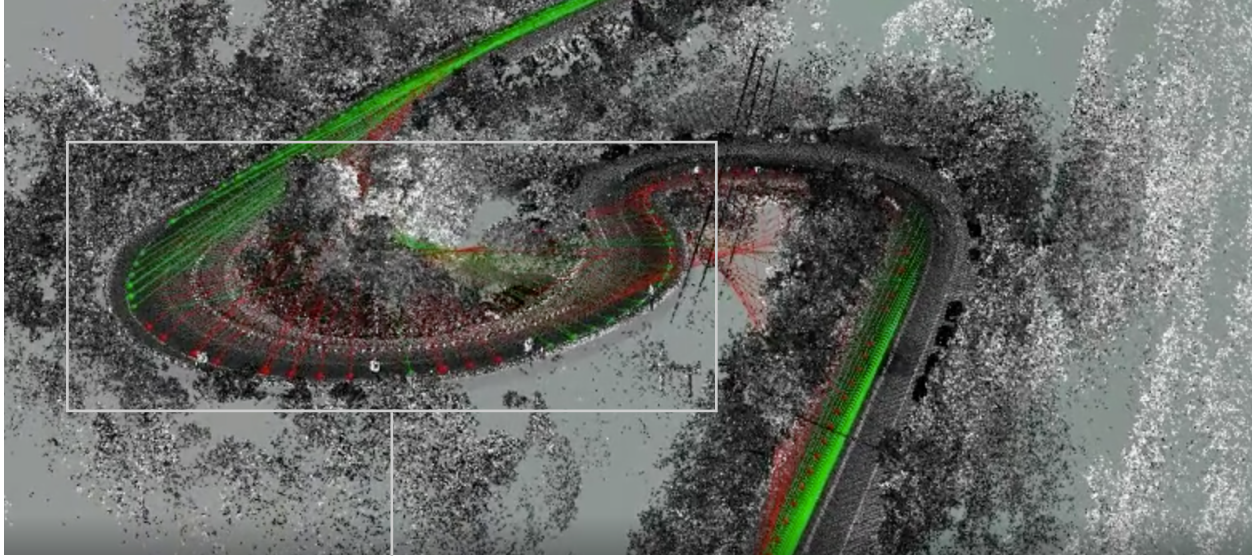


Figure 1 - Utah Sight Lines

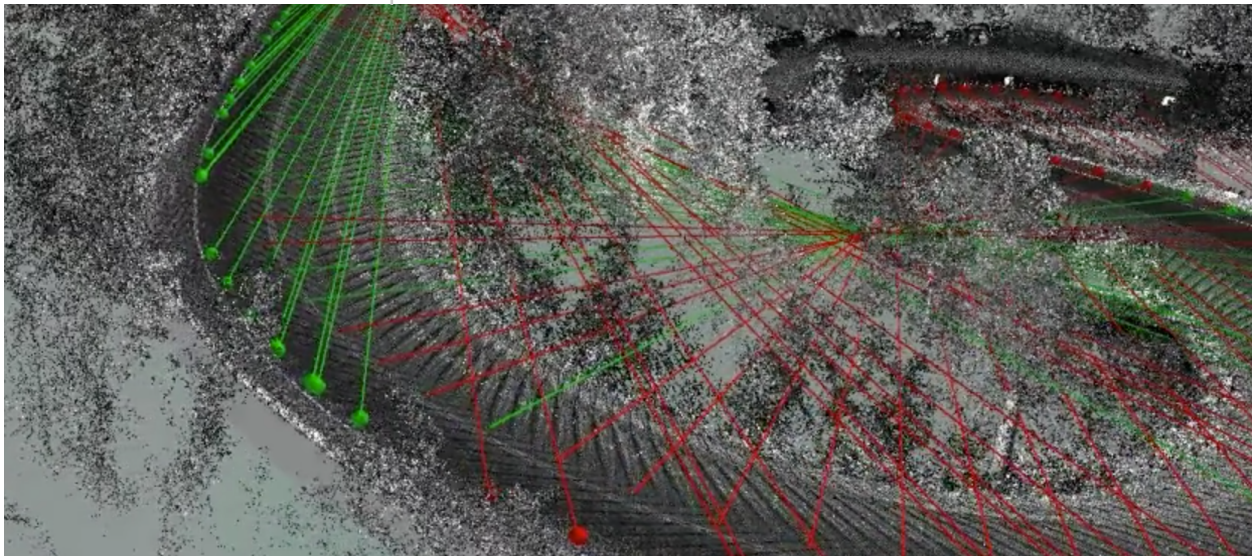


Figure 2 - Utah Sight Lines (Close View)

Initially, the technology was developed to work with 3D models built from roadway CAD design files. However, during the presentation, Miles saw the potential of the technology to analyse Utah's entire existing road network. He challenged the RDV team to adapt their technology to work with 3D LiDAR scans of existing roads, which UDOT had been commissioning annually from LiDAR service provider, Mandli Communications. According to Sean McBride of Mandli, "we have had a very collaborative relationship with UDOT since 2013, we are always very excited to work with them on developing innovative products that will help the entire industry. That relationship coupled with our relationship with RDV will yield some incredible results."



Natan Elsberg, CEO of RDV Systems, recalls rising to the challenge:

"We had been working with LiDAR data and had known about it for the last 15 years or so. For the majority of that time, while the technology had shown a lot of promise, it was also laden with a lot of pitfalls. The extremely large size of the files and the hundreds of millions of points needed to do even a small-scale survey were prohibitive with desktop computing. We took Robert's challenge and said it was time to re-evaluate where we are in 2019. What we found was that recent innovations in cloud computing made it so that processing all those data points could be done without needing high powered hardware in-house, making it a viable medium to work with. When I realised that we could do accurate and efficient analysis of real roads that people drive on every day, I had a feeling that we had landed on something really revolutionary."

Robert laughingly remembers: "Actually, while we were waiting for everyone to arrive at the meeting to discuss RDV's initial results, Natan and I admitted to each other that both of us were so excited thinking about this new opportunity and what it might mean for the future that we had trouble falling asleep the night before."

After RDV showed that they were able to integrate LiDAR scans successfully, a pilot project was decided on that would act as a proof of concept for this new technology.

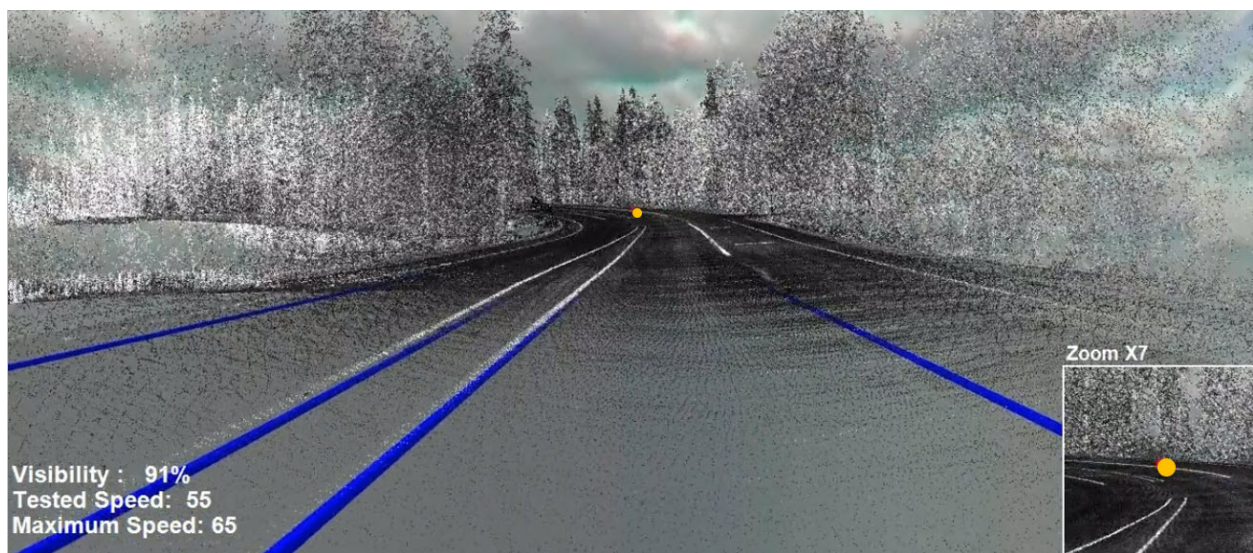


Figure 3 - Utah SSD Image



Humble Beginnings

The initial project would consist of analysing six different roads in Utah based on their LiDAR data. Roads with varying characteristics; two roads of each rural, suburban, and mountainous, were chosen to see the technology at work in a variety of conditions.

Miles explains about the pilot project: “We decided that the parameter we would analyse in our initial phase would be stopping sight distance. We had long been concerned that insufficient visibility was a contributing factor in many crashes, but had limited means of quantifying that claim. What we found out was that we can indeed use this technology to identify and then address areas of concern.”

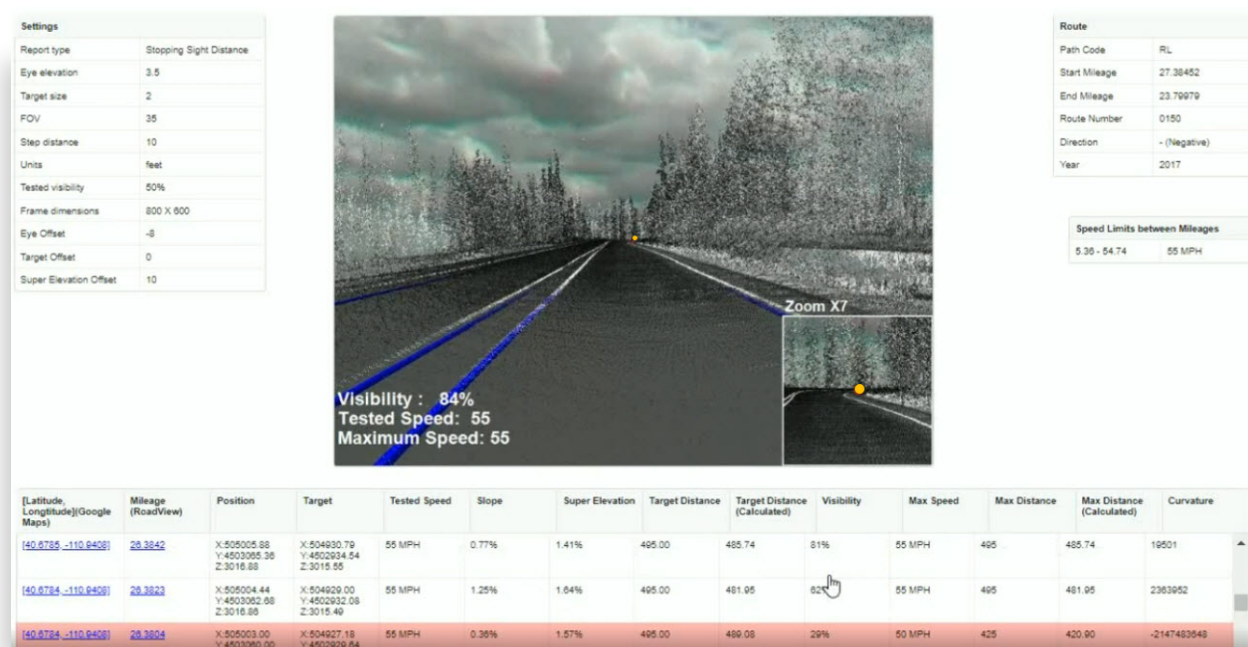


Figure 4 - Utah SSD Report ([See Report](#))

This pilot project showed promising results, and was able to provide some very useful insights. Somewhat surprisingly, although many sight distance deficiencies were identified, most were not resultant from the roadway base geometry alone. In many cases, there was some man-made or natural obstruction to the driver's view. “All of a sudden now this becomes an area where we can start to focus our engineering efforts and our maintenance activities. If trees are blocking the sight distance, or rock outcroppings, anything like that, it allows us to be able to go in there and very quickly now, identify where we might have problems” remarks Carlos Braceras, Executive Director of UDOT. The results showed many examples of previously unidentified “low-hanging fruit”, real safety hazards that could be mitigated simply, for instance by cutting off a branch of a tree.



UDOT is now able to use these insights in combination with the sources of data that they already have access to in order to come up with cost-effective and meaningful solutions to the many hazards that may cause crashes.

Carlos Braceras:

*"We invested in LiDAR before we could fully comprehend its potential. But, we went ahead because we are convinced that data is the key to the future of transportation. At that time, **we had no idea** we could do this. Now, a company that came to us to do 3D visualizations is helping realize and unlock the potential we believed in when we first invested in LiDAR."*



Carlos Braceras
Executive Director of UDOT

Scaling Up

Utah's DOT is at the forefront of government organizations who are beginning to recognize that today's cutting edge technology such as LiDAR, cloud computing, and automated analysis are likely to radically change the way that road safety is approached.

Robert Miles and his team are motivated by their responsibility to the people of Utah, and will continue searching for new innovations in road safety. He concludes:

"Many government agencies are fundamentally changing the way they think about crashes. What was once considered an inherent consequence of high speed transportation is now seen as an engineering challenge with real and practical solutions. Technologies like RSA 3D are integral tools that allow safety professionals to solve problems previously deemed impossible and bring us closer to a future with zero roadway fatalities."



Robert Miles
UDOT's Director of Traffic Safety



Looking forward, RDV and UDOT are moving towards incorporating the entire Utah roadway network with RSA 3D. Phase two of the collaboration is underway, focusing on intersections, flat spots, and integration with UDOT systems including their many sources of crash data analysis. The goal is an unprecedented comprehensive analysis of the thousands of miles of road that traverse the State of Utah.

Join the Road Safety Innovation.

Contact RDV Systems Today:



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RDV Systems—Laser Focused on Safety