

T² ROADS ON THE RANGE

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From the Desk of the Director



The T2 center has several exciting workshops planned in the upcoming 2020 training season. We will have an asphalt workshop in a couple of locations late in March. This workshop will come in handy for local government personnel managing pavement maintenance/rehabilitation activities on asphalt pavements. In April, we bundled two workshops related to the OSHA 10 hour training and preventing runovers and backovers. The last time we offered the OSHA workshop, we had to arrange for a second session due to high demand. Make sure that you register early if you or your employees need this training. Our main event of the year, the

Safety Congress, will be hosted on the 30th of April at the Ramkota Hotel in Casper. Just like previous years, we will have the transportation track, LPA certification, workzone training, and ATSSA flaggers certifications. All brochures for all of these workshops have already been posted on our web site.

The data collection on the county paved roads for the western side of the state has been completed. We are expecting to get the data for analysis sometime in February, 2020. Counties on the western side of the state will receive their condition reports as soon as they are available. We have submitted a proposal to the FHWA Aid Demonstration program so that we can utilize the data collected on county paved roads and implement a full blown PMS which would quantify overall needs for all paved county roads in the state. We will have an update about this proposal at our Safety Congress in April.

The new special drone project is in full swing so make sure that you read the article in this issue about how you can take advantage of this program.

We are excited about the new programs/training opportunities that we have lined up for 2020. Make sure that you take advantage of these opportunities and let us know how we can address your needs in training/technical assistance.

All T2 staff members are looking forward to working with you all in 2020.

In This Issue

- T2 Center Takes to the Skies for Wyoming's Roads
- More Than Just a Number; Establishing Speed Limits
- Weather Responsive Management Strategies
- Upcoming
 Workshops

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T2 Center Takes to the Skies for Wyoming's Roads



Photo courtesy of Destry Dearden, Lincoln Co.

By Austin Woody

The Technology Transfer Center is excited to announce the launch of an Unmanned Aerial Systems (UAS) or "drone" program in Wyoming. This program will assist transportation professionals throughout the state to incorporate this emerging technology into a variety of everyday work tasks.

This program is made possible by a generous STIC grant from the Federal Highway Administration (Wyoming Division). The FHWA selected drone technology for inclusion as a part of their Every Day Counts (EDC) innovation program. In its's fifth round for 2019-2020 (EDC-5), the EDC initiative "is a State-based model that identifies and rapidly deploys proven, yet underutilized innovations to shorten the project delivery process" (FHWA, 2019). UAS technology fits perfectly under this description. UAS has rapidly developed into a versatile, proven and increasingly accessible platform for a variety of users from private leisure-time enthusiasts to large-scale industrial applications. As new technologies tend to do, drone systems have advanced at a feverpitch in recent years, becoming increasingly capable, user-friendly and affordable. As this pace of advancement continues, the Wyoming T2 Center will take an active role to stay abreast of new developments within the world of UAS, and in-turn work to get transportation systems and professionals throughout the State of Wyoming up-to-speed with UAS technology.

The transportation industry is an area where UAS technology is making a particularly significant impact. As drone use has expanded across transportation

applications, this technology has repeatedly shown its ability to increase safety while saving time and money. Potentially dangerous tasks such as aggregate stockpile measurement or bridge inspections that have traditionally involved placing workers in precarious locations can now be performed by a remote pilot standing clear from harm's way. Complex construction sites can be flown in a matter of minutes, creating precise three-dimensional models of work progress, materials and assets. Landslides or cut banks can be observed and measured from above providing a depth of context unavailable from boots-on-the ground observation and without incurring expenses of manned aircraft flyovers.



A vital step in expanding unmanned aerial system use among Wyoming's road professionals will be increasing awareness of the capabilities of this equipment, as well as the affordability of UAS equipment. While there is an abundance of UAS information available on-line, many of these resources are commercially oriented and provided by UAS consultants and contracted service providers. There is a dearth of resources for un-biased, publicly available information about how to deploy a UAS program from within an organization. To this end, the Wyoming T2 center will be issuing a tech brief outlining some of the fundamental considerations and steps to integrating UAS technology. In addition to this tech brief, we will be publishing a manual offering a more comprehensive introduction to UAS in transportation covering regulatory considerations, associated software, safety assessment etc. Through a process of identifying needs and considering available options this manual will serve as a guidebook for transportation professionals exploring the prospect of utilizing UAS technology, whether it be as an in-house resource, or through hiring

consultants.

In addition to providing more readily accessible information for transportation professionals interested in utilizing UAS technology, the Wyoming T2 Center will also provide a series of workshops, demonstrations and on-site technical assistance. As some may recall, Joe Campbell from the FHWA in Minnesota gave a presentation and demonstration of drones in transportation at the Wyoming T2 Center's 2019 Safety Congress in Casper this past April. Mr. Campbell's presentation was well received by attendees and eyeopening as to the capabilities of this technology. We will continue along this thread at our 25th Annual Safety Congress in Casper on April 30th, 2020. This presentation and demo will delve more into some of the data processing software and surveying capabilities of drones for transportation specific tasks such as aggregate stockpile measurement and 3-dimensional modelling in applications that road professionals in Wyoming would be likely to encounter. For those who missed the Safety Congress event, or are hoping to gain as much knowledge about UAS as possible, we will also be scheduling and holding several workshops that will include more real-world applications and demonstrate the comprehensive work flow of actual projects that may be encountered on Wyoming's road networks.

In order to deliver these hands on project demonstrations, we are in the process of training and certifying two Federal Aviation Administration Part 107 licensed Remote Pilots. Additionally, we have purchased several DJI Mavic 2 drones, a set of GPS enabled ground control points and licensing to Pix4D photogrammetry software. This setup will provide the T2 Center with the capabilities to gather high-definition aerial imagery, assist with bridge inspections, produce 3dimensional digital models of land surfaces or structures, complete volumetric measurement of stockpiles/pits, and assist with other tasks as needed or requested. This assemblage of equipment and software was selected to maximize versatility across numerous transportation applications, but also to demonstrate the capabilities of "prosumer" level equipment. In UAS speak, "prosumer" refers to unmanned aircraft systems that are relatively affordable (usually between \$1,000 and \$2,000). This level of unmanned aircraft has seen drastic advancements in recent years, resulting in drones that are not only highly capably but also incredibly user friendly with features such as automated hands-free flight options, collision detection sensors etc. While state -of-the art professional level drones do offer higher capabilities in terms of photographic clarity and survey accuracy, this level of UAS can require hundreds of thousands of dollars' worth of equipment. A central mission that the Wyoming T2 Center aims to accomplish with this program is to demonstrate just how much can be done with these more accessible "prosumer" UAS platforms. With this knowledge, transportation professionals will be better equipped to determine what tasks could potentially be performed in-house with "prosumer" level equipment, vs. when it is necessary to hire more costly UAS contractors.

The T2 Center is excited for the opportunity to work with UAS and we look forward to seeing more organizations utilizing these powerful new tools on Wyoming's transportation networks. As this program develops we invite interested transportation professionals throughout the state to contact the T2 Center with questions and/or requests for assistance.



More Than Just a Number; Establishing Speed Limits



By Austin Woody

In 2019, the T2/LTAP center continued to assist counties throughout Wyoming to establish speed limits on rural roadways. While the process of assigning a logical speed limit to a stretch of road seems simple enough, road managers are required to substantiate the establishment or alteration of speed-limits through well-defined process to meet specific standards by conducting an engineering study.

In 2011 The Wyoming T2 Center along with WYDOT developed a set of guidelines and standards for establishing speed limits on Wyoming's road networks. These standards were then reviewed and approved by the Wyoming County Commissioners Association and the Wyoming Association of County Engineers and Road Superintendents. The standards include the necessary data collection and analysis needed to set the appropriate speed limits on paved and unpaved roads. This process involves the completion of several standardized forms including a data collection form (Form TR-11) and a declaration of speed limit form, both of these forms are available at http://www.uwyo.edu/ wyt2/setting%20speed%20limits/. Once data is collected by an appropriately trained technician, analysis and speed limit recommendations can be completed by a professional engineer.

Numerous data points are used to inform decisions regarding the establishment of new speed limits. On non -paved roads free-flow traffic speed, traffic volume (Average Daily Traffic) and volume of truck traffic (ADTT) are calculated by pneumatic traffic classifiers. On paved routes, ADT and ADTT are observed via pneumatic traffic classifiers, but free-flow traffic speed is collected manually using a radar gun and the data collection Form TR-11 mentioned above. By either method, once a data set of free-flow traffic speeds has been determined, percentiles are established from this distribution of different speeds travelled. Specifically, the 85th percentile of observed speeds rounded to the nearest multiple of 5 often becomes the recommended speed limit (for example, an 85th percentile speed of 37.9 mph would indicate a speed limit of 40 mph). This guideline can be altered by the judgement of a professional engineer based upon observation of additional data describing additional conditions on the roadway.

In addition to traffic speed and volume, speed limits are



impacted by other factors effecting safety of motorists on the route in guestion. All significant horizontal curves along the route are driven at multiple speeds while horizontal forces are measured with a ball bank indicator within the vehicle. This data describes appropriate speeds for drivers to safely negotiate curves along the route. Additionally, a detailed inventory of signage along the route is taken. This process involves photographing every sign, recording specific locations with GPS coordinates and describing general sign condition and legibility to motorists. Additionally, access points to the roadway are counted and recorded. Historical crash data is compiled for the route, classifying not only numbers of crashes but their specific locations and severity as well. General conditions along the route such as school bus stops, wildlife on/near roadway, bridges, downgrades, roadside collision hazards, etc. are observed and described in a compiled speed study to be provided to the professional engineer to inform his or her analysis and determination of speed limit.

There are a variety of reasons that a speed limit may need to be reevaluated. In some instances, very lightly used roads in rural areas may have never had an established or posted speed limit to begin with. Some of the most common reasons that the T2/LTAP Center has been requested to complete speed studies in the past have been significant changes in traffic patterns or roadway conditions. This past summer, the T2 Center assisted Converse County Road and Bridge Department with a speed study after construction began on a new natural gas processing facility adjacent to a gravel Converse County Road. This unpaved rural dirt road provides access to numerous farm houses and residences with numerous school bus stops along the route. The advent of heavy industrial activity and truck traffic created concern amongst home owners and a reevaluation of speed limit was requested. Following a speed study completed by T2 Center staff, the Converse County Commission approved a measure to lower the speed limit on this road from 35 mph to 25 mph to address these concerns.

The T2 Center was also requested to assist on a speed limit study this past fall due to a change in conditions on the roadway itself. Late in the summer, the Sublette County Road and Bridge Department paved a heavilyused gravel road which serves a continually growing ranchette subdivision. Prior to the paving of the route, this road had a posted speed limit of 30 mph. After the paving of the route, many motorists felt that the route could safely accommodate higher speeds. Our collected speed data supported this logic, showing a majority of traffic traveling well in excess of 30 mph. This speed decision was further complicated by additional factors including a high density of access points along the route (mostly private driveways), several corners requiring speeds of less than 20mph to negotiate, frequent wildlife sightings on the route as well as several school bus stops along the route. This serves as an example of when speed studies provide additional situational information in addition to the included traffic speed and volume data. In this instance an advised range 30mph-40mph was provided in the report. As demonstrated in this example, speed limit studies completed by the T2 Center provide a range for acceptable speed limits which allows for flexibility in the decision making process by local road and elected officials. The goal of these studies is not to tell road managers what their speed limit should be, but to provide the relevant information and data to inform and substantiate their decisions in establishing speed limits.

As ice covered roads melt and Wyoming emerges from winter the T2 Center will be available to assist local road official throughout the state with speed limit studies and we invite requests for this assistance.

Weather Responsive Management Strategies



Weather-responsive traffic management (WRTM) strategies increase the effectiveness of traffic operations during adverse road weather conditions, and weather-responsive maintenance management (WRMM) strategies help reduce costs associated with winter maintenance.

Over the last 10 years, vehicle crashes have averaged more than 5.7 million per year. Twenty-one percent of those crashes-nearly 1.21 million –occurred under adverse weather conditions. On average, nearly 6,000 people are killed and over 445,000 are injured in weather -related crashes each year. Likewise, the delays associated with weather can be profound, resulting in significant losses in efficiency. WRTM strategies provide relevant and timely information to agencies on the need for appropriate traffic intervention methods to mitigate the impacts of weatherrelated road and traffic conditions. The result is improved mobility, reduced delays, and safer travel during inclement weather. WRMM strategies are also used by agencies to improve mobility and safety in adverse weather, as well as reduce the negative environmental impacts and costs associated with road salt use.

Weather-Responsive Traffic and Maintenance Management

The FHWA Road Weather Management Program develops and deploys road weather management strategies that help agencies respond to adverse weather conditions by providing traffic advisories and warnings to travelers and controlling the flow of traffic on the highways during inclement weather. A recent focus of the program is using mobile observations and connected vehicle data to support traffic and maintenance management. The program developed and published the Guidelines for deploying Connected-Vehicle Enabled Weather Responsive Traffic Management Strategies.

Adopting weather-responsive traffic and maintenance management strategies that use road weather data from Integrating Mobile Observations (IMO) and connected vehicle technologies, combined with informed decisions stemming from Pathfinder, will enable State and local agencies to be proactive and manage the system before negative impacts occur. In addition, more accurate and location-specific road weather condition data will allow appropriate traffic management strategies to be deployed where they are needed and reduce costs associated with winter maintenance, including salt and chemical applications.

Benefits:

- Safer Roads. Agencies can use traffic management and traveler information systems to reduce delays and crashes resulting from adverse weather.
- Informed Travelers. Agencies can provide weather impact statements that enable drivers to make better decisions regarding whether, when, and where to travel.
- Environmental Sustainability. The negative environmental impacts of road salt use by many agencies can be reduced as the right quantities of chlorides and other chemicals are only applied when they are warranted.

State of the Practice

States and local public agencies that have readily adopted Pathfinder and IMO are leading the deployment of WRTM and WRMM. States that have already implemented or are implementing WRTM strategies using mobile observations from vehicles include Wyoming, Michigan, South Dakota, Washington, and Delaware. States that have implemented winter maintenance/anti-icing strategies using IMO data include Minnesota, Michigan, and Nevada. In addition, several local agencies, such as the City of West Des Moines, lowa, have made extensive investments in vehicle-based technologies for more efficient and effective traffic and maintenance management.

For more information, please visit:

https://www.fhwa.dot.gov/innovation/ everydaycounts/edc_5/ weather_strategies.cfm

Or contact:

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Upcoming Workshops

March Workshops

Asphalt Paving and Patching for Local Agencies—March 31, 2020—Rock Springs, WY

April Workshops

Asphalt Paving and Patching for Local Agencies– April 2, 2020 Buffalo, WY

OSHA Training—April 21-22, 2020—Casper, WY
Preventing Backovers/Runovers—April 22, 2020—Casper, WY

Safety Congress—April 30, 2020

Workshops at the Safety Congress:

LPA Work Zone Safety ATSSA (Flagger) Certification WACERS Meeting

May Workshops

Drones (UAS) in Transportation – May 13, 2020 – Location TBD WMTC Aggregate III Certification – May 18-20, 2020 – Laramie, WY WMTC Concrete III Certification – May 20-22, 2020 – Laramie, WY WMTC Asphalt III Certification – May 27-29, 2020 – Laramie, WY Work Zone Safety – Date TBD – 2 Locations ATSSA (Flagger) Certification – Date TBD – 2 Locations

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For more information and to register for upcoming workshops, please follow the link below.

http://www.uwyo.edu/wyt2/workshops/ index.html

