

Effectiveness of Highway Safety Public Education at Montana Motor Vehicle Division and Vehicle Registration Stations by Streaming a Variety of Safety Content



by

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PROBLEM STATEMENT

As state departments of transportation look to eliminate fatalities and serious injuries as a result of initiatives such as Toward Zero Deaths, it is important to utilize a 4E approach (engineering, emergency management services, enforcement, and education) to improve safety. Educating the public about safety initiatives helps to improve an area's safety culture. Traffic Safety Culture is the shared beliefs (including values, assumptions, etc.) of a group that affect behaviors related to traffic safety. Traffic safety culture strategies such as public awareness campaigns and safety videos are an important way to educate the public and possibly change their beliefs and influence their behaviors. These strategies can be used to convey the need/benefits for safety countermeasures (e.g., roundabouts and rumble strips), as well as the consequences of risky behaviors (e.g., texting while driving, driving while impaired, distracted driving, driving unbuckled, etc.).

The Montana Department of Transportation (MDT) finds value in educating Montanans about traffic safety. Therefore, this proposed project focuses on showing safety videos during wait times (i.e., five minutes or longer) at Motor Vehicle Division driver license stations and County Treasurer Offices. The project will also encompass an evaluation to identify if the strategy shows a change in traffic safety culture.

BACKGROUND SUMMARY

Based on a preliminary literature search, there is limited information available about examples of traffic safety educational material being displayed at department of motor vehicle (DMV) offices. A search of TRB's Transportation Research International Documentation, Research in Progress, and other search databases produced only a few examples that specifically discussed traffic safety educational material being displayed at department of motor vehicle (DMV) offices. There was one reference to a *recommendation* for one such deployment in Missouri, which stated, "Play the video in DMV locations across the State for visitors to gain an understanding of the benefits and safe use of roundabouts" (U.S. Department of Transportation, Federal Highway Administration, 2010); however, it appears that this effort was not deployed. Other examples of studies where educational material (not specific to traffic safety) was provided at DMV offices were reviewed. In addition, a study that discussed the evaluation of educational efforts was also reviewed. These studies are discussed hereafter.

Tarko et al. (Tarko, Anastasopoulos, & Zuriaga, 2011) evaluated the effectiveness of education and enforcement on crash occurrence involving commercial motor vehicles. This study discussed the results of a deployment of the Ticketing Aggressive Cars and Trucks (TACT) program in Indianapolis. There were three phases to the evaluation: pre-education dissemination, during education dissemination, and post-education dissemination. The program was evaluated using two methods: 1) an analysis of video images, and 2) 1,047 surveys collected by police officers. Through their review of the literature, one important point to note is that reviewed articles indicated that, "One problem identified with this type of campaign is that unless the authorities frequently and visibly penalize noncompliance, the procedure probably loses some of its effectiveness." They also cited a specific difference found in a study when comparing males and females, highlighting the relevance of including gender. For their study, they used order probit models to evaluate the effectiveness of the educational and enforcement efforts. They found that women leave less space between vehicles, older drivers leave more space, and semi-truck drivers leave more space (when compared with passenger cars). They also concluded that those who saw the educational program left more space between themselves and other vehicles.

In *Understanding Organ Donation: Applied Behavioral Science Perspectives* (Siegel & Alvaro, 2010), one effort was discussed which made use of DMV offices to disseminate the developed educational materials. It was estimated that 650 people per day viewed the information at DMV offices. Unfortunately, no information was provided regarding the possible impact of these messages, other than the estimate of the number of individuals reached.

BENEFITS AND BUSINESS CASE

The potential benefits of this project are multi-faceted, providing benefits at the national level, to MDT, and to the public.

Overall, the education/public awareness piece of this project should provide the following benefits to the public: increase safety (i.e., by changing beliefs), improve the efficiency/service of proven safety countermeasures (e.g., correct use of roundabouts), and increase public awareness of safety countermeasures (i.e., benefits of countermeasures and potential risks of behaviors). This particular method for education has the potential to reach rural residents who would not otherwise hear this information via other means. It is also an efficient use of space (i.e., a tv will not take up much space), time (i.e., people are already waiting), and messaging (i.e., where better to educate about traffic safety than in a driver license station or country treasurer office).

To assist in quantifying the projects effect on changing driver behavior, the WTI team will plan to utilize numerical ratings in the survey questions. Specifically, this will be a priority for the questions related to the three public benefits mentioned above:

1. increase in safety
 - quantify if the public feels the videos will influence their behavior
 - quantify if the public feels the video changed their beliefs about particular actions
2. improve the efficiency/service of proven safety countermeasures
 - quantify if the public learned something new about a safety countermeasure
 - quantify if the public feels the videos will influence their behavior
3. Increase public awareness of safety countermeasures
 - quantify if the public has previously seen any of MDTs other public awareness campaigns
 - quantify if the public plans to share this information with anyone else

A summary of these benefits will be provided in the Task 4 Report and will be provided in a Performance Measure Report in Task 5. Further discussions on quantifying the benefits will be conducted in the kick-off meeting.

As stated in the Request for Proposal (RFP), the benefits to MDT include that “this research will clearly support MDT’s Vision Zero goal of no fatalities or serious injuries are acceptable on Montana’s highways. The educational component is shown as a strategy within Montana’s Comprehensive Highway Safety Plan. These safety videos will also support the Department’s current effort to educate the traveling public on various topics such as proper use of roundabouts, flashing yellow arrows and rumble strips, to name a few.” Another benefit to MDT is that piloting this project, prior to full state deployment, has the potential to ensure that the expected benefits are achieved, as well as to determine the best equipment to use for ease of use and limited maintenance.

Lastly, this approach has the potential of advancing a universal technique used across the country. There is a lack of documentation on this technique; therefore, the evaluation and documentation of this project would also provide benefits nationally (e.g., helping other states determine if this

technique would benefit them as well.)

OBJECTIVES

As stated in the RFP, the objectives of this project are as follows:

- Identify and secure already available safety content (as opposed to creating new content) and purchase and deploy the appropriate equipment to display safety content;
- Survey the public to determine if they are paying attention to the videos shown at the Motor Vehicle Division (MVD) driver license stations and County Treasurer offices; and
- Determine if the safety messages have an impact on the behavior of the viewing public.

RESEARCH PLAN

The research plan consists of five separate tasks: project management; pre-deployment planning; deployment; evaluation & support; and documentation. More detail for each task is provided below.

Task 1: Project Management

This task will include internal virtual meetings, quarterly progress reports, the MDT Kick-off Meeting, and other MDT reporting requirements.

At the Kick-off Meeting, the Technical Panel and research team will discuss the contractual obligations, scope of work, deliverables, project milestones, timetable, appropriate office policies and procedures, technical issue clarifications, and concerns with the project. The WTI Team also recommends that the deployment locations are discussed at this meeting and agreement is reached on preferred and back-up locations. This would allow the WTI Team to do on-site scoping visits to these top locations to determine room layouts which will affect equipment recommendations (Task 2) and survey procedures (Task 4). In preparation for the meeting, the research team will prepare and submit meeting materials to the MDT Research Project Manager at least two weeks in advance of the meeting. The research team will also submit meeting notes for Technical Panel review no later than two weeks following the meeting.

The WTI Team understands that ongoing communication and project quality assurance (QA)/quality control (QC) are extremely important to the success of this project. Therefore, the WTI Team recommends check-in calls with the MDT Technical Panel every other month throughout the project.

Please note that due to the geographical diversity of the WTI Team, it is assumed that all proposed meetings will be virtual.

Task 2: Pre-Deployment Planning

This task will include identification of equipment, deployment location finalization, securing video content, storyboard creation, additional resource creation, an interim meeting, and a task report. More details for each subtask are provided below.

Identification of Equipment

As part of the proposal process, the WTI Team has begun researching and testing the appropriate equipment. Several options have been considered and four options were originally described in the letter of interest submitted to MDT. Since then, the WTI Team has narrowed it down to a top recommendation and a back-up in order to provide a more accurate budget.

The WTI Team considers the most reasonable choice to be the use of a smart LCD or LED TV with video playback through various options of peripheral media players. Thinking of the whole as a video display system, it is comprised of several components. These include a: 1) display stand, 2) a flat screen “smart” TV, 3) digital media storage, and 4) remote control. The technology and stand would be “off the shelf,” consumer technology that does not require custom development or interface. More details on this system can be found in Appendix A.

When the purchasing decisions have been finalized, it may be that one system fits all locations. However, variations in the locations may require adjustments in the system to provide the best

viewing experience and obtain the best participation. The primary differences anticipated in the system would be the addition of higher quality speakers using an attached sound bar (if sound is determined to be desirable based on the safety messages), and the possible need for a smaller or larger screen size. *(Note that the need for sound will be discussed further in the kick-off meeting).*

The full analysis for the equipment chosen will be provided in the Task 2 Report and Technical Panel approval will be sought prior to purchase in Task 3.

Deployment Location Finalization

In this task, the appropriate number and specific locations for deployment will be decided. Along with considerations achieving statistically significant evaluation results, considerations will also be made for distance from MSU Bozeman in order to allow for trouble shooting of equipment as necessary.

At this time, it is assumed that five locations will be chosen within a two-hour drive-time radius of Bozeman and that only permanent driver license stations will be considered.

Within the 2-hour radius, there are 16 potential locations. It is recommended that two MVD (only 4 total candidate locations) and 3 total County Treasurers office (only 12 total candidates) locations would be chosen. When choosing the exact locations, considerations will include:

- who visits the County Treasurer's office, and why? (e.g., is there a bias as to typical ages or demographics of patrons),
- how many days the offices are open annually, and
- average visitors per day which will vary by population (this can impact the amount of survey data that can be collected).

To further evaluate these 16 potential locations, the WTI Team will work with DOJ to narrow down the locations. This may occur via phone conversations or photographs. Considerations will be room layouts for the equipment (e.g., available space, viewing distance, access to power and possible need for the unit to be secured) and locations for surveyors (Task 4) during unfavorable weather. Once the locations have been narrowed down, site visits will be conducted by the WTI Team to ensure the preferred locations will work.

The full analysis for the location decisions will be provided in the Task 2 Report and Technical Panel approval will be sought prior to deployment in Task 3.

Securing Video Content

MDT and the Department of Justice (DOJ) will provide the research team with access to the video safety content they have available to them including:

- Roundabouts,
- Flashing yellow arrows,
- Snow Plows,
- Rumble Strips,
- DUI,

- Seatbelt Use,
- Myth Busters, and
- Winter Driving.

Additionally, Sue Sillick, MDT Research Programs, will ask other state DOTs to determine if they have additional content available for MDT's use. The WTI Team will provide a list of questions/criteria to use when seeking content. It is assumed that this video content will be provided in the needed format (i.e., mp4 with H.264 encoding) and will already contain closed captioning. The MDT Technical Panel will meet prior to the project kick-off meeting to discuss the selection of video content. The proposed selection list could then be discussed/possibly modified with the WTI Team at the project kick-off meeting.

The WTI Team will secure additional safety content but will not be creating new videos. Securing new content will include obtaining the proper permissions for MDT to display this information. New content may include videos, as well as, still frame information. To obtain this new content, the research team will review websites such as the American Association of Motor Vehicle Administrators, Federal Motor Carrier Safety Administration, National Highway Traffic Safety Administration and the Montana Highway Patrol. The research team will also use their experience with the National Center for Rural Road Safety, to suggest known content. For example, one video that should be considered is the anticipated video on rumble strips that will be created as part of the Every Day Counts 5 FoRRRwD initiative. There are also several videos that have been created by other local agencies and DOTs (e.g. Washington State DOT; Clackamas County curve video) that could be used if MDT is amenable to the other agency's branding.

Additional topics to seek out include, but are not limited to:

- Emergency Vehicles – What to do when they are present and Move Over laws,
- Work Zones – How to navigate them,
- Traffic Incident Management,
- School Buses,
- Sharing the Road - Nonmotorized Users,
- Motorcycles,
- Speeding,
- Distracted Driving, and
- Agricultural Equipment.

It should be noted that identifying the appropriate contact and obtaining permission to use these additional videos can be time consuming. While time was built into the proposed schedule to accommodate this, there is a chance that certain videos will be unavailable due to difficulties in obtaining permission without affecting the project schedule.

All videos identified, the pros and cons, and the permissions to use them will be provided in the Task 2 Report.

Storyboard Creation

For this proposal, a “video mix” is defined as the entirety of the video content and still frames that will be displayed. Prior to creation of the “video mix,” storyboard(s) will be created for approval. The storyboards will serve as an outline showing the proposed topics, media (video content, still frames), and their order. Once storyboards have been approved, these videos and still frames will be combined into one loop (see Task 3). The goal is for the video mix to be short enough for a viewer to watch the entirety of the video mix while waiting, but long enough for a viewer to see a variety of safety topics. However, depending on a viewer’s wait time and the overall length of video mix, there is a chance that a viewer would not view the entire content loop. There is also a high probability that a viewer will not start the loop at the very beginning. All these factors will need to be considered when creating the mix (e.g., determining the length, when to add stills, and when to brand with the MDT logo).

For ease of surveying and to keep costs reasonable, the WTI Team recommends there be no more than two separate video mixes throughout the project life. Two video mixes (rather than one) would allow for more video content to be shown and to possibly accommodate seasonal changes. If two video mixes are chosen by the Technical Panel, it is intended for Mix #1 to be displayed from November to April and Mix #2 to be displayed from May to October.

Factors that will be considered when picking the content for the video mix include:

- Risk factor priorities in MDT’s Comprehensive Highway Safety Plan and Vision Zero/Towards Zero Deaths plans;
- Proven safety countermeasures deployed in Montana;
- Topics that should be addressed in different seasons;
- Upcoming safety awareness days/weeks/months;
- Video length;
- Video permissions;
- Video format and available closed captioning.

The WTI Team will create at least four storyboards for MDT’s review. The storyboards will provide a proposed mix of topical videos, as well as, still frames and will take into consideration both the video length, as well as, the content.

The storyboard options will be provided as appendices in the Task 2 Report and Technical Panel approval will be sought prior to deployment in Task 3.

Additional Resource Creation

The WTI Team would also recommend providing additional information outside of the video content. Additional information may include rack cards, a QR code on a poster, or adding information to the MVD emails or website. This would provide a more robust educational campaign, as well as allow measurement of subsequent actions taken due to the videos. Because this may affect the video evaluation and budget, the pros, cons, and cost for each option will be provided to MDT for discussion prior to the Interim Meeting.

Options for additional resources will be provided in the Task 2 Report and Technical Panel

approval will be sought prior to deployment in Task 3.

Task 2 Report

The WTI Team will document the equipment options, recommendations, specifications; the deployment location recommendations and specifications; the video content pros, cons, and permissions; the draft storyboards; and drafts for the additional resources in the Task 2 report. The MDT Technical Panel will be provided with one month for review. The revised technical memorandum will be submitted within two weeks after receipt of the MDT comments.

It is anticipated that the review of this document would occur prior to the Interim Meeting (described further below) to accommodate approvals for moving forward at that meeting.

Interim Meeting

Prior to beginning Task 3 (deployment), the WTI Team will hold a one- to two-hour Interim Meeting with the Technical Panel to discuss the results of the Task 2 report and to gain approvals for the equipment purchase, deployment locations, video mix(es), and additional resources.

In preparation for the meeting, the WTI Team will prepare and submit meeting materials to the MDT Research Project Manager at least two weeks in advance of the meeting. The WTI Team will also submit meeting notes for Technical Panel review no later than two weeks following the meeting.

Please note that due to the geographical diversity of the WTI Team, it is assumed that the proposed meetings will be virtual.

Task 3: Deployment

In this task, the WTI Team will complete the equipment purchase, video production, equipment deployment, video deployment, and staff training.

Equipment Purchase

The WTI Team anticipates equipment purchase to occur directly following the approvals granted at the Interim Meeting.

Video Production

Video production will occur after storyboard approval is provided at the Interim Meeting (Task 2). While the WTI Team will **not** be creating new content or editing/modifying existing content, in the interest of consistency and reliability, the WTI Team does recommend video production work be completed to limit the variables in the safety/educational content to be conveyed to the public. The production would be completed with hardware, software, technical skillset and personnel available as part of WTI's Communication Services.

The production work would:

- Sequence the chosen selection of videos onto one continuous timeline;
- Add consistent transitions between each clip (e.g., fade to black);
- Ensure all content formatted to fit HD 1080 16:9 ratio with screen fill as appropriate;
- Ensure existing captioning is consistent;

- Discuss and select appropriate playtime to display still images of safety messages;
- Possibly add consistent titles and/or numbers to each clip before it plays; and
- Render one continuous video file with all clips as optimized file for HD 1080.

The production considerations will provide the following benefits:

- Ensure consistency in playback sequence and timing;
- Reduce need for location staff to interact with TV/media playback;
- Ensure clear distinction between separate pieces of content;
- Ensure all content displays as intended and not distorted to fit wide screen;
- Ensure that still images will have varying times that is needed to observe, assess and contemplate;
- Adding titles and or numbers to each segment will help if response to specific content is requested as a part of the survey. This would also provide an indication of how long the viewer was actively watching the content; and
- One file, one video format, one data stream size will place less of a burden and reduce variables for the playback and display of the video.

Deploying the Equipment

For the purposes of this project, “deployment” is considered as the sum of all activities involved in providing a “ready to play” system to predetermined locations. These deployment activities include, communications, planning, travel logistics, installation/setup, testing, training and follow up communications.

A deployment plan/checklist will be developed, completed and maintained for each location with accommodation for any special considerations at specific locations. The plan will include a deployment schedule, contact information, technology serial numbers/warranty information and additional equipment or activity necessary to ensure a smooth deployment.

Information will be provided to each location as to the anticipated amount of time needed for deployment, testing and subsequent training. The amount of time needed will have been established as part of a short-term in-house testing period.

Each display system will be set up and tested at WTI prior to deployment. Any reasonable steps will be taken in order to minimize the amount of time required for installation such as removal of non-essential packaging materials, battery installation and device setup menu, etc.

Communication with the locations and scheduling for installation will be coordinated through DOJ.

The deployment plan/checklist will be attached as appendices to the Task 3 Report.

Deploy Videos

As mentioned previously in Task 2, the WTI Team recommends no more than two video mixes. If the Technical Panel chooses two mixes rather than one, there will be a need to change the video mix. Mix #1 would be deployed with equipment deployment (from November through April).

whereas, Mix #2 would be deployed after six months (from May through October).

Deployment of Mix #2 could either be accomplished by mailing the USB drive to the locations and having the on-site contact switch it or the WTI Team could visit each site to change out the USB drive. This will ensure that there is no error in displaying the correct video mix and could be done in conjunction with checking the functionality of the equipment.

Although it is intended that the Technical Panel choose between one or two video mixes and provide approval for both (if two chosen) during the Interim Meeting (Task 2), Mix #2 could be approved later since it will be deployed later. The Technical Panel will review and approve the final content prior to deployment.

The impact of choosing two video mixes is described further in Task 4 subtask surveying.

Training Staff

Training of MVD and County Treasurer Office staff will be an essential part of the deployment. Besides the day to day on-off routine, training will include “what if?” scenarios for trouble shooting possible situations such as image quality, “media not found,” “frozen image,” and power supply. This is similar to the trouble shooting section found in the back of instruction manuals for electronic devices.

The training will also include appropriate cleaning and basic maintenance of the equipment. Two important parts of this would be the proper use of appropriate cleaning supplies (which would be provided), and if deemed necessary the use of forced air aerosol to remove dust particles from interior rear of the LCD screen. This may only be necessary if a location is known to have dust build up. The basic maintenance should be no more than the time already spent by staff to maintain other equipment already in their office (e.g., computer monitor). While the initial cleaning supplies may be provided as a part of this project, it will be made clear to participating offices that future cleaning supplies will be their responsibility.

To accommodate learning styles, training will include demonstration, reference instruction materials and “hands-on” practice. The reference instruction materials will be created specifically for how the technology will be used for this project; however, it may refer to the generic user manual as appropriate. The training will also include opportunities for questions, feedback and checking for understanding.

As part of the in-person training and printed material, it will be clearly stated that technical support will be available during normal business hours and contact information will be provided. Any changes to the contact information will be communicated to all locations. The training will take at most one to two hours and will be conducted the day of equipment deployment.

The training materials will be attached as appendices to the Task 3 Report.

Task 3 Report

The WTI Team will document the outcomes from Task 3 in the report and will include the deployment plan/checklist and training materials in the Appendices. The MDT Technical Panel will be provided with one month for review. The revised technical memorandum will be submitted within two weeks after receipt of the MDT comments.

Task 4: Evaluation & Support

This task includes equipment maintenance, creation of survey instruments, surveying, analysis of

survey data, and documentation.

Equipment Maintenance

The WTI Team itself will include a technical support team housed in Bozeman with specific training to ensure not only a thorough understanding of the system as it is deployed, but also a more in depth understanding of the functions of the technology. They will also have appropriate links and contact information to be able to access technical support from the technology manufacturer. As indicated above, the deployment plan will include serial number, purchase date and warranty information for technology at each location. This will help facilitate technical support if the inquiry is elevated above the support provided by the project team.

To lessen the need for technical support, the WTI Team will first provide on-site training to staff (as stated in Task 3) and will also create a FAQ document to provide quick reference to anyone providing maintenance/technical support to the project. Initially this document would provide answers to questions that came up during the equipment set up and testing phase. It would be developed further if other questions arise as the project proceeds.

The WTI Team will conduct a courtesy call to each location at the end of the first week of deployment and then monthly thereafter to ensure that everything is running smoothly. The team will also be available during normal business hours for requests coming in from the locations.

The WTI Team has included one in-person trip per location to check the equipment. This will occur concurrently with the WTI Team switching the video mix (as described in Task 3).

Survey Instrument Development

The WTI Team will create an intercept survey and a follow-up survey (i.e. hard copy, mailed) for each of the video content mixes (i.e., Mix #1 and Mix #2).

The intercept survey would determine if clients had looked at the TV (for at least five minutes), if they observed the content that was looping on the monitor (Objective 2), their demographics (e.g. age), and contact information for the follow-up mailed survey. The date on which the intercept survey occurred would also be recorded by the WTI Team. Safety messages generally have a higher effect on targeted audiences so the demographic information would assist with understanding how the safety content was received by various cohorts. (Note: See background information for how gender can impact education results.)

The follow-up survey would be kept short (anticipated time to complete, 5 minutes or less) and would primarily focus on if the clients recall seeing the video content to ascertain if they changed their behavior based on the content provided on the screen.

All surveys will be developed in coordination with MDT's input and the final version will be approved by MSU's Internal Review Board before dissemination. The draft surveys will be provided to MDT with one month for review. The revised surveys will be submitted within two weeks after receipt of the MDT comments.

Intercept Survey

Assumptions

200,000 visitors were identified as visiting MVD offices annually. With 19 offices identified, this is about 10,526 people per location (average), and assuming 262 days per year of operation (likely varies), this would result in approximately 40 people per day.

600,000 visitors were identified as visiting County Treasurer’s offices annually. With 56 offices identified, this is about 10,714 people per location (average), and assuming 262 days per year of operation (likely varies), this would result in approximately 40 people per day. These assumptions, which end up both being approximately 40 people per day, were used for data collection assumptions.

Plan

The WTI Team would intercept those departing the MVD or County Treasurer’s Office (if the person stayed five minutes or more) to conduct a simple survey. Four separate survey collection time periods will be conducted by two WTI Team members collecting the data for each data collection. This will result in two data collections of a single location per week of data collection.

In anticipation of two video mixes being selected in Task 2, with Mix #1 being displayed from November 2020 through April 2021 and Mix #2 being displayed from May 2021 through October 2021, data captures would be proposed for: 1) December 2020 2) March 2021, 3) June 2021, and 4) September 2021. For the first survey data capture (December), both researchers will conduct the survey at the same office together with the intent to ensure consistency in the surveying approach. Table 1 shows the approach for the inaugural week.

Table 1: Survey Data Collection, Inaugural Approach

	Day 1	Day 2	Day 3	Day 4	Day 5
WTI Team Member 1	Location 1	Location 2	Location 4	Location 3	Location 5
WTI Team Member 2	Location 1	Location 3	Location 5	Location 2	Location 4

After the first day, the WTI Team members will rotate through the remaining four locations so that each WTI Team member surveys at each location once, thereby collecting two days of survey data for each location. Due to the limited expected number of average visitors per day (calculated as approximately 40 people on average), the WTI Team member will be on site the entire duration that the office is open and approach anyone using the services.

Table 2 shows the approach for the other 3 weeks.

Table 2: Data Collection, 3 Remaining Collection Periods

	Day 1	Day 2	Day 3	Day 4	Day 5
WTI Team Member 1	Location 1	Location 2	Location 4	Location 3	Location 5
WTI Team Member 2	Location 4	Location 3	Location 5	Location 2	Location 1

An assumption is that only seventy-five percent of visitors to these locations may be willing to respond to our intercept survey, thereby potentially allowing us to capture 30 people per day total per location.

Follow-up Survey

Two weeks after the intercept survey at the MVD/County Treasurer's Office, a follow-up survey will be mailed to intercept survey respondents who indicated seeing the safety content. The hard copy survey, an incentive (\$1 to compel survey completion), and a paid, addressed envelope will be sent to the address provided. (Note: an online forum will not be used because as noted for the Mobility Mindset of Millennials in Small Urban and Rural Areas, many Montanans were only reachable via telephone; online is still fairly inaccessible by a large portion of the Montana population.)

An assumption is made that fifty percent of the 30 people will agree to participate in the follow-up survey and will actually in fact respond to the mailed query, which results in 15 people responding to the in-depth survey. For the three weeks after the inaugural week, this would result in 150 surveys captured, with 135 during the inaugural week, for a total estimate of 585 surveys. With four of the locations having two survey periods per week of survey, assuming 30 intercept surveys collected, a total of 960 intercept surveys will be collected. Since during the first survey period of the fifth location the survey will be conducted by both WTI Team members, the fifth location will have only 210 (versus 240 at other locations) surveys collected. This will result in 1170 intercept surveys that can be analyzed. This will provide a robust understanding for MDT of who and what content is being watched.

The following information indicates a 95% confidence level with varying margins of error.

- 95% CI, 3% margin of error = $[(1.96)^2 * (0.5)*(1-0.5)] (0.03^2) = \sim 1067$
- 95% CI, 4% margin of error = $[(1.96)^2 * (0.5)*(1-0.5)] (0.04^2) = \sim 600$
- 95% CI, 5% margin of error = $[(1.96)^2 * (0.5)*(1-0.5)] (0.05^2) = \sim 384$

Therefore, with the estimates of 1170 intercept surveys and estimate that 50% would be returned for a total of 585 surveys, this would be about a 95% confidence level with a 4% margin of error.

Analysis of Survey Data

The WTI Team members will perform an econometric modeling analysis on the resulting survey data using NLogit5, assuming enough of a sample size can be achieved based on the above assumptions. (Simple t-tests or the like will be used if data estimates are not achieved.) Using econometric modeling allows for simultaneous analysis of a variety of independent variables to predict the outcome. For Objective 2, a binary logit model (0 for did not observe content on TV screen, 1 for an observation) will be developed with potential independent variables including age and gender. For the broader impact, because the intercept surveys and follow-up surveys will be able to be linked by return address, the results will allow the WTI Team members to compare, based on which content the survey respondent reported seeing, whether or not they changed their behavior as a result of the safety content.

Task 4 Report

The WTI Team will document the methodology and results of the evaluation in the Task 4 Report and the FAQs and survey instrument will be attached as appendices. The MDT Technical Panel will be provided with one month for review. The revised technical memorandum will be submitted within two weeks after receipt of the MDT comments.

Task 5: Documentation

This task will include a final report; a final presentation; an implementation meeting and report; and a TRB poster.

Final Report

The Final Report would document the results and proposed recommendations from the project. The Final Report will meet MDT's guidelines. The MDT Technical Panel will be provided with one month for review for both documents. The revised report will be submitted within one month after receipt of the MDT comments.

Final Presentation & Implementation Meeting

A Final Presentation (combined with the Implementation Meeting) will be made to the MDT Technical Panel. At this presentation, the WTI Team will provide an overview of the project, the findings, recommendations, and implementation recommendations. In preparation for the meeting, the WTI Team will prepare and submit meeting materials to the MDT Research Project Manager at least two weeks in advance of the meeting. The WTI Team will also submit meeting notes for Technical Panel review no later than two weeks following the meeting.

Please note that due to the geographical diversity of the WTI Team, it is assumed that the proposed meetings will be virtual.

TRB Poster

A TRB Poster will be created following the TRB guidelines and MDT's Communication Guide. The MDT Technical Panel will be provided with one month for review. The revised poster will be submitted within two weeks after receipt of the MDT comments.

It is assumed that the TRB poster would be shown at TRB in January 2022. To accommodate this, the WTI Team will submit the poster proposal for the TRB August 2021 submittal. This subtask includes travel and TRB registration for one member of the WTI Team in order to accompany the poster for presentation.

Implementation Report, Performance Measures Report, & Project Summary Report

Following the Final Presentation & Implementation Meeting, the Principal Investigator will document the discussion in the form of an Implementation Report following MDT's guidelines. This includes the following sections: Introduction and Purpose, Implementation Summary, and Implementation Recommendations (includes Principal Investigator's recommendations and MDT response). The Implementation Report will include directions on how MDT can update the video mixes used in this project, as well as, create new ones. The MDT Technical Panel will be provided with one month for review. The revised report will be submitted within two weeks after receipt of the MDT comments.

The WTI Team will also complete a Performance Measures Report discussing the outcomes of the benefits as discussed in the Benefits and Business Case section. This report following MDT's guidelines. This will be provided to MDT after the comments are received on the final report. The MDT Technical Panel will be provided with one month for review. The revised report will be submitted within two weeks after receipt of the MDT comments.

Lastly, the WTI Team will also complete a Project Summary Report following MDT's guidelines. This will be provided to MDT after the comments are received on the final report. The MDT

Technical Panel will be provided with one month for review. The revised report will be submitted within two weeks after receipt of the MDT comments.

MDT & TECHNICAL PANEL INVOLVEMENT

For the project to be as successful as possible, the following involvement by task will be needed from MDT and the Technical Panel Members:

Task 1: Project Management

- Participation in the Kick-off Meeting.
- Participation in every other month Meetings.

Task 2: Pre-Deployment Planning

- Provide additional data beyond the RFP. More specifically, detailed data on daily visitation at each particular office would be useful in determining the locations chosen and the weeks chosen for evaluation to ensure statistical significance.
- Assist with coordination with the 16 potential MVD and county treasurer office locations to determine the layouts of the offices and ability to accommodate the project.
- Providing the reference safety videos as well as additional information about them (length, format, availability of closed captioning).
- Review and approval of Task 2 Report.
- Final approval on equipment to purchase.
- Review and approve on the proposed number and specific locations of the 5 (MVD driver license stations and County Treasurer offices) locations.
- Review and approve the final content of the safety videos that will be displayed at the MVD driver license stations and county treasurer offices.
- Review and provide approval on the use of additional education materials
- Participate in an Interim Meeting.

Task 3: Deployment

- Assist with installation of mounting brackets (if necessary) at the locations.
- Provide contact information for the representatives at the 5 approved MVD and county treasurer offices for coordination of installing the equipment, approval to survey those using their services, and understanding of where surveyors are permitted to stand while conducting the survey.
- Access to MVD and county treasurer offices for installation and maintenance of the equipment.
- Concurrence that MVD and county treasurer staff will turn on the videos daily, participate in a one-time training on how to operate the videos, provide slight maintenance as necessary (e.g., wipe down screen and remove dust from back), and contact the WTI Team if the equipment/videos malfunction.

- Review and approval of Task 3 Report.

Task 4: Evaluation & Support

- Access to MVD and county treasurer offices for swapping USBs (if necessary).
- Access to MVD and county treasurer offices for maintenance (if necessary).
- Review and approve the intercept and follow-up survey instruments.
- Access to MVD and county treasurer offices for in-person surveying.
- Review and approval of Task 4 Report.

Task 5: Documentation

- Review and approval of the final report.
- Participate in the final presentation and implementation meeting.
- Review and approval of the TRB poster.
- Review and approval of the implementation plan.
- Review and approval of the project summary report.

PRODUCTS

The project deliverables will include:

- Quarterly progress reports,
- Kick-off meeting summary,
- List of questions/criteria to use when seeking video content from other state DOTs,
- Video storyboards,
- Draft additional resources,
- Task 2 Report,
- Interim meeting summary,
- Video mix #1 and #2,
- Deployment plan & checklist,
- Training materials,
- Task 3 Report,
- Maintenance FAQ document,
- Survey instruments,
- Task 4 Report,
- Final Report,
- Final presentation and implementation meeting summary,
- TRB poster,
- Implementation Report,
- Performance Measures Report, and
- Project Summary Report.

All of the deliverables will follow the MDT and TRB formats as required and be 508 compliant. The reports will be clear, concise, and submitted in MS Word and Adobe PDF format. All products will be of exceptional quality including draft deliverables. To ensure this quality, all products will be peer reviewed by the research team and then reviewed by a technical editor.

As required, the project team will allow one month for MDT review of draft reports. All revised progress, task, or other interim reports will be submitted to MDT within two weeks after receipt of MDT comments. All future revisions will be submitted to MDT within one week of receipt of comments. The revised final and project summary reports will be submitted within one month of receipt of MDT comments. For all future revisions, the final and project summary

reports will be submitted to MDT within two weeks of receipt of comments.

IMPLEMENTATION

As this project is intended as a pilot study, the results will directly apply to MDT. The evaluation will tell MDT whether or not the results warrant a full-scale deployment of the technique at all locations across the state.

The pilot project will lay the groundwork for a full-scale implementation by identifying the appropriate equipment and creating the necessary documentation (i.e., deployment procedures, training materials, maintenance materials, and video content mixes).

The implementation section of the final report and the implementation plan will identify any changes the WTI Team recommends to the equipment and documentation based on the pilot implementation and evaluation. The WTI Team will also address potential barriers to a full-scale implementation and recommendations for how to reduce or eliminate the barriers.

As stated previously, this approach has the potential of creating a universal technique used across the country; however, it currently lacks documentation and evaluation. Therefore, this would potentially provide benefits nationally (e.g., helping other states determine if this technique would benefit them as well.)

SCHEDULE

The schedule for this project will be 30 months allowing for participation in the 2022 TRB Annual Meeting. The schedule in Table 3 depicts all meetings, deliverables, and MDT reviews. Please note that it is assumed that quarterly reports are due the month after the quarter ends.

BUDGET

The full total project budget, including both MDT and WTI portions is shown below in Figure 1. The total project cost is \$224, 655.76 over a 30 month period.

Budget		WTI Team								Total Hours/Total Costs	Other Direct Expenses						Totals
Task #	Task Title	Jaime Sullivan	Natalie Villwrick-White	Neil Hetherington	Karalyn Clouser	Dana May	Graduate Student	Communications Manager	Administration/Accounting		Travel	Operations/Communications	Minor Equipment (<5000)	Participant Support	Awards	Equipment >5000	Total Costs
1	Project Management	129	47	47	27	33	27	2	96	408	\$ -	\$ 706.27	\$ -	\$ -	\$ -	\$ -	\$19,034.44
		\$7,672.92	\$2,696.39	\$1,838.64	\$931.23	\$1,155.99	\$405.00	\$76.00	\$3,552.00	\$18,328.17							
2	Pre-Deployment Planning	188	44	160	8	8	156	8	0	572	\$ 1,000.00	\$ 600.00	\$ -	\$ -	\$ -	\$ -	\$24,765.88
		\$11,182.24	\$2,524.28	\$6,259.20	\$275.92	\$280.24	\$2,340.00	\$304.00	\$0.00	\$23,165.88							
3	Deployment	12	8	264	0	8	120	12	0	424	\$ 1,700.00	\$ -	\$ 6,500.00	\$ -	\$ -	\$ -	\$22,236.64
		\$713.76	\$458.96	\$10,327.68	\$0.00	\$280.24	\$1,800.00	\$456.00	\$0.00	\$14,036.64							
4	Evaluation & Support	4	480	112	480	44	292	8	0	1420	\$ 18,450.00	\$ 5,625.00	\$ 200.00	\$ -	\$ 1,100.00	\$ -	\$80,312.48
		\$237.92	\$27,537.60	\$4,381.44	\$16,555.20	\$1,541.32	\$4,380.00	\$304.00	\$0.00	\$54,937.48							
5	Documentation	160	80	88	72	20	80	24	0	524	\$ 2,500.00	\$ 150.00	\$ -	\$ -	\$ -	\$ -	\$25,494.84
		\$9,516.80	\$4,589.60	\$3,442.56	\$2,483.28	\$700.60	\$1,200.00	\$912.00	\$0.00	\$22,844.84							
	TOTAL HOURS	493	659	671	587	113	675	54	96	3348							
	TOTAL DIRECT COSTS (includes ben.)	\$29,323.64	\$37,806.83	\$26,249.52	\$20,245.63	\$3,958.39	\$10,125.00	\$2,052.00	\$3,552.00	\$133,313.01	\$ 23,650.00	\$ 7,081.27	\$ 6,700.00	\$ -	\$ 1,100.00	\$ -	\$171,844.28
	Indirect Costs at 25%	\$7,211.95	\$5,321.07	\$5,936.46	\$2,647.11	\$989.60	\$2,441.25	\$513.00	\$888.00	\$25,948.43	\$675.00	\$1,476.57	\$1,625.00	\$0.00	\$275.00	\$0.00	\$30,000.00
	Indirect Costs at 44%	\$209.37	\$7,269.93	\$1,101.62	\$4,249.17	\$0.00	\$158.40	\$0.00	\$0.00	\$12,988.48	\$9,218.00	\$517.00	\$88.00	\$0.00	\$0.00	\$0.00	\$22,811.48
	Total Project Costs	\$36,744.96	\$50,397.82	\$33,287.60	\$27,141.91	\$4,947.99	\$12,724.65	\$2,565.00	\$4,440.00	\$172,249.93	\$33,543.00	\$9,074.84	\$8,413.00	\$0.00	\$1,375.00	\$0.00	\$224,655.76

Figure 1: Total Project Budget

Of the total \$224, 655.76, MDT will provide \$150,000 in SPR funds with a IDC rate of 25% as shown below in Figure 2. WTI will use this \$150,000 as match for their UTC grant.

Budget		WTI Team								Other Direct Expenses							Totals
Task #	Task Title	Jaime Sullivan	Natalie Villivrick-Witte	Neil Hetherington	Karalyn Clouser	Dana May	Graduate Student	Communications Manager	Administration/Accounting	Total Hours/Total Costs	Travel	Operations/Communications	Minor Equipment (<5000)	Participant Support	Awards	Equipment >5000	Total Costs
1	Project Management	129	47	47	27	33	27	2	96	408							
		\$7,672.92	\$2,696.39	\$1,838.64	\$931.23	\$1,155.99	\$405.00	\$76.00	\$3,552.00	\$18,328.17	\$ -	\$ 706.27	\$ -	\$ -	\$ -	\$ -	\$19,034.44
2	Pre-Deployment Planning	180	36	136	8	8	132	8	0	508							
		\$10,706.40	\$2,065.32	\$5,320.32	\$275.92	\$280.24	\$1,980.00	\$304.00	\$0.00	\$20,932.20	\$ 1,000.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$21,932.20
3	Deployment	12	8	264	0	8	120	12	0	424							
		\$713.76	\$458.96	\$10,327.68	\$0.00	\$280.24	\$1,800.00	\$456.00	\$0.00	\$14,036.64	\$ 1,700.00	\$ -	\$ 6,500.00	\$ -	\$ -	\$ -	\$22,236.64
4	Evaluation & Support	4	200	72	200	44	292	8	0	820							
		\$237.92	\$11,474.00	\$2,816.64	\$6,898.00	\$1,541.32	\$4,380.00	\$304.00	\$0.00	\$27,651.88	\$ -	\$ 5,200.00	\$ -	\$ -	\$ 1,100.00	\$ -	\$33,951.88
5	Documentation	160	80	88	72	20	80	24	0	524							
		\$9,516.80	\$4,589.60	\$3,442.56	\$2,483.28	\$700.60	\$1,200.00	\$912.00	\$0.00	\$22,844.84	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$22,844.84
	TOTAL HOURS	485	371	607	307	113	651	54	96	2684							
	TOTAL DIRECT COSTS (includes ben.)	\$28,847.80	\$21,284.27	\$23,745.84	\$10,588.43	\$3,958.39	\$9,765.00	\$2,052.00	\$3,552.00	\$103,793.73	\$ 2,700.00	\$ 5,906.27	\$ 6,500.00	\$ -	\$ 1,100.00	\$ -	\$120,000.00
	Indirect Costs at 25%	\$7,211.95	\$5,321.07	\$5,936.46	\$2,647.11	\$989.60	\$2,441.25	\$513.00	\$888.00	\$25,948.43	\$675.00	\$1,476.57	\$1,625.00	\$0.00	\$275.00	\$0.00	\$30,000.00
	Total Project Costs	\$36,059.75	\$26,605.34	\$29,682.30	\$13,235.54	\$4,947.99	\$12,206.25	\$2,565.00	\$4,440.00	\$129,742.16	\$ 3,375.00	\$ 7,382.84	\$ 8,125.00	\$ -	\$ 1,375.00	\$ -	\$150,000.00

Figure 2: MDT Portion of Project Budget

Of the total \$224, 655.76, WTI's cost-share portion will be \$74,655.76 in UTC funds with a IDC rate of 44% as shown below in Figure 3. The WTI portion of the budget includes storyboard printing and additional resource creation (both salary and printing) in Task 2; communications and minor equipment for maintenance, the intercept survey (salary, travel, and printing), and equipment removal (salary and travel) in Task 4; and travel and printing for the TRB poster in Task 5.

Budget		WTI Team								Other Direct Expenses						Totals	
		Jaime Sullivan	Natalie Villivick-Witte	Neil Hetherington	Karalyn Clouser	Dana May	Graduate Student	Communications Manager	Administration/Accounting	Total Hours/Total Costs	Travel	Operations/Communications	Minor Equipment (<5000)	Participant Support	Awards	Equipment >5000	Total Costs
Task #	Task Title																
1	Project Management	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0.00
2	Pre-Deployment Planning	\$475.84	\$458.96	\$938.88	\$0.00	\$0.00	\$360.00	\$0.00	\$0.00	64	\$ -	\$ 600.00	\$ -	\$ -	\$ -	\$ -	\$2,833.68
3	Deployment	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$0.00
4	Evaluation & Support	\$0.00	\$16,063.60	\$1,564.80	\$9,657.20	\$0.00	\$0.00	\$0.00	\$0.00	600	\$ 18,450.00	\$ 425.00	\$ 200.00	\$ -	\$ -	\$ -	\$46,360.60
5	Documentation	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	\$ 2,500.00	\$ 150.00	\$ -	\$ -	\$ -	\$ -	\$2,650.00
TOTAL HOURS		8	288	64	280	0	24	0	0	664							
TOTAL DIRECT COSTS (includes ben.)		\$475.84	\$16,522.56	\$2,503.68	\$9,657.20	\$0.00	\$360.00	\$0.00	\$0.00	\$29,519.28	\$ 20,950.00	\$ 1,175.00	\$ 200.00	\$ -	\$ -	\$ -	\$51,844.28
Indirect Costs at 44%		\$209.37	\$7,269.93	\$1,101.62	\$4,249.17	\$0.00	\$158.40	\$0.00	\$0.00	\$12,988.48	\$9,218.00	\$517.00	\$88.00	\$0.00	\$0.00	\$0.00	\$22,811.48
Total Project Costs		\$685.21	\$23,792.49	\$3,605.30	\$13,906.37	\$0.00	\$518.40	\$0.00	\$0.00	\$42,507.76	\$ 30,168.00	\$ 1,692.00	\$ 288.00	\$ -	\$ -	\$ -	\$74,655.76

Figure 3: WTI's Cost-share Portion of the Project Budget

More detailed tables describing the MDT portion of the budget are also provided below. They include Table 4: Pay Rate and Benefits, Table 5: Project Budget by Task, Table 6: Project Budget by State Fiscal Years, Table 7: Meetings, Table 8: Deliverables, and Table 9: Travel.

Table 4: Pay Rate and Benefits

Name of Employee	Hourly Rate without Benefits	Benefit Rate
Jaime Sullivan		
Natalie Villwock-Witte		
Neil Hetherington		
Karalyn Clouser		
Dana May		
Graduate Student		
Communications Manager		
Administration/Accounting		

Table 5: Project Budget by Task

	Direct Costs	IDCs	Total
1 – Project Management	\$19,034.44	\$4,758.61	\$23,793.05
2 – Pre-Deployment Planning	\$21,932.20	\$5,483.05	\$27,415.25
3 – Deployment	\$22,236.64	\$5,559.16	\$27,795.80
4 – Evaluation & Support	\$33,951.88	\$8,487.97	\$42,439.85
5 - Documentation	\$22,844.84	\$5,711.21	\$28,556.05
TOTAL	\$120,000.00	\$30,000.00	\$150,000.00

Table 6: Project Budget by State Fiscal Years

Item	2020	2021	2022	2023
Salaries	\$16,674.20	\$25,671.90	\$30,014.07	\$1,341.42
Benefits	\$6,196.70	\$10,789.19	\$12,545.48	\$560.78
In-State Travel	\$1,000.00	\$1,700.00	\$0.00	\$0.00
Out of State Travel	\$0.00	\$0.00	\$0.00	\$0.00
Expendable Supplies and Materials	\$70.63	\$2,882.51	\$2,882.51	\$70.63
Equipment	\$0.00	\$6,500.00	\$0.00	\$0.00
Awards (incentives)	\$0.00	\$550.00	\$550.00	\$0.00
Total Direct Costs	\$23,941.52	\$48,093.60	\$45,992.05	\$1,972.83
Overhead – 25%	\$5,985.38	\$12,023.40	\$11,498.01	\$493.21
Total Project Cost	\$29,926.91	\$60,117.00	\$57,490.06	\$2,466.03

Table 7: Meetings

Meetings	Cost	IDCs	Total
Internal Meetings (27)	\$6,493.23	\$1,623.31	\$8,116.54
Bi-monthly Meetings with MDT (14)	\$3,849.02	\$962.26	\$4,811.28
Interim Meeting	\$1,605.68	\$401.42	\$2,007.10
Final Presentation & Implementation Meeting	\$4,103.28	\$1,025.82	\$5,129.10
Total			\$20,064.01

Table 8: Deliverables

Deliverables	Cost	IDCs	Total
Video Storyboards	\$6,106.24	\$1,526.56	\$7,632.80
Additional Resource Creation*	\$0.00	\$0.00	\$0.00
Task 2 Report	\$4,678.40	\$1,169.60	\$5,848.00
Video Production - Mix 1&2	\$1,618.28	\$404.57	\$2,022.85
Deployment Plan & Checklist	\$1,298.88	\$324.72	\$1,623.60
Training Materials	\$1,298.88	\$324.72	\$1,623.60
Task 3 Report	\$3,021.40	\$755.35	\$3,776.75
Maintenance FAQs	\$432.96	\$108.24	\$541.20
Survey Instruments	\$7,348.80	\$1,837.20	\$9,186.00
Task 4 Report	\$9,527.44	\$2,381.86	\$11,909.30
Final Report	\$9,386.88	\$2,346.72	\$11,733.60
Implementation Report, Performance Measures Report & Project Summary	\$3,439.32	\$859.83	\$4,299.15
TRB Poster	\$5,915.36	\$1,478.84	\$7,394.20
Total			\$67,591.05

*As noted above, the Additional Resource Creation is part of the WTI cost-share

Table 9: Travel

Travel	Cost	IDCs	Total
Site Scoping Visit	\$ 1,000.00	\$ 250.00	\$ 1,250.00
Mix #1 Deployment	\$ 850.00	\$ 212.50	\$ 1,062.50
Mix #2 Deployment	\$ 850.00	\$ 212.50	\$ 1,062.50
Equipment Removal*	\$0	\$0	\$0
4 Intercept Survey*	\$0	\$0	\$0
TRB*	\$0	\$0	\$0
Total			\$ 3,375.00

*As noted above, the equipment removal, intercept surveys, and travel for TRB are part of the WTI cost-share

STAFFING

The following key personnel from the Western Transportation Institute will be responsible for conducting the research. They contribute expertise in safety, particularly as it relates to rural landscapes, and delivering and evaluating safety trainings

As stated in Table 10, Jaime Sullivan will serve as the Principal Investigator and safety specialist; Natalie Villwock-Witte will conduct the survey implementation and analysis; Neil Hetherington will serve as the technology specialist; Karalyn Clouser will conduct survey implementation and analysis; and Dana May will serve as a back-up technology specialist. The team will also include the Communications Manager for report preparation, editing, and review and Administration/Accounting Staff for progress report assistance, financials, and travel coordination. In addition, the team will utilize a Montana State University student to assist with the equipment deployment and maintenance. The student may also assist with the intercept surveys and with the data input/analysis of surveys.

Jaime (Eidswick) Sullivan, P.E., Rural Safety Engineer, Director

Western Transportation Institute, Montana State University

Jaime.sullivan2@montana.edu (774)571-3503

Jaime Sullivan is a WTI Research Engineer with 17 years of experience. Her focus is in applied **rural safety** and operations research for Departments of Transportation (DOTs) and Public Lands such as the National Park Service. She currently serves as the Director for the National Center for Rural Road Safety (Safety Center). In this role, she manages all training programs and technical assistance, develops and maintains the website, leads the monthly webinar series, assists in the development of training videos, and spearheads the development of the National Working Summit on Transportation in Rural America. Jaime is also the Manager for the Public Lands Transportation Fellows (PLTF) program within the U.S. Fish & Wildlife Service and previously served as the Resource Manager and a technical liaison for the Paul S. Sarbanes Transit in Parks Technical Assistance Center (TRIPTAC).

Jaime's research portfolio focuses on advanced transportation technologies, as well as emerging safety issues such as local road safety, Toward Zero Deaths/Road to Zero strategies, and traffic safety culture. She has extensive experience in the planning, deployment and **evaluation** of Intelligent Transportation Systems (ITS), leading multiple projects to develop ITS architecture, implementation plans, policy and procedure documents, and operational guidelines. She has also developed and evaluated multiple traveler information systems and created a congestion management toolkit. For the Safety Center, she has conducted recent research to develop a Rural ITS Toolkit, the Local Road Safety Plan handbook, and a Local Road Safety Certificate.

Natalie Villwock-Witte, Ph.D., P.E., Assistant Research Professor/Research Engineer

Western Transportation Institute, Montana State University

N.villwockwitte@montana.edu (505)340-3570

Natalie Villwock-Witte performs research for both the **Safety and Operations program**, and the Mobility and Public Transportation program. She has more than 13 years of experience, having held numerous engineering positions at the city, county, state and federal levels of government prior to joining WTI. Natalie performs multi-disciplinary research to address the needs of the

Federal Highway Administration, federal land managers, state and local departments of transportation in the areas of travel behavior, safety, and bicycle and pedestrian travel.

Her recent work on multiple National Association of Development Organizations (NADO) projects (enabling older rural residents in Texas to access basic needs like groceries and assessing the feasibility of a rural public transportation system in Lebanon, Missouri) resulted in the 2019 Excellence in Regional Transportation Award from NADO, the NADO Research Foundation, and Rural Planning Organizations of America (RPO America). She also has an eye for identifying important emerging issues – her recent research on the transportation trends of Millennials was featured in *Wired* magazine.

In addition to research, Natalie developed and taught engineering courses at Montana State University, the University of New Mexico, and Central New Mexico Community College. Recently, she has also worked with the West Region Workforce Transportation Center on education and workforce development initiatives related to careers in the field of transportation.

Neil Hetherington, Visual Communications Manager

Western Transportation Institute, Montana State University

nhetherington@montana.edu (406)994-3566

Neil Hetherington has over 26 years of experience in instructional design and training material development and provides **technical support for video content management** and hardware setup, testing and **maintenance**. and. He has a comprehensive background and broad experience in all aspects of visual communication development, including 20 years in photography, video, motion graphics, and graphic design/illustration, and is well versed in the interpretation and visualization of technical concepts. This expertise is invaluable to WTI and Mr. Hetherington's support is utilized for all of WTI's research projects in the areas of print and digital media production, web development, and video production for the purposes of illustration, demonstration, and training. Mr. Hetherington has a demonstrated ability to fulfill multiple roles on multiple projects at various levels.

Karalyn Clouser, Training Evaluation and Marketing Coordinator

Western Transportation Institute, Montana State University

Karalyn.clouser@montana.edu (406)529-0654

Karalyn Clouser serves as the WTI **Training Evaluation** and Marketing Coordinator for the National Center for Rural Road Safety, a Federal Highway Administration Center of Excellence managed by WTI. The center provides rural safety training, technical assistance, and resources to local, state, and tribal road owners. In her role with the Safety Center she evaluates the **training evaluations**, coordinates **participant surveys**, and provides outreach, marketing, and communication services and maintains the Safety Center distribution list which includes over 1,700 contacts. She manages and prepares bi-weekly training newsletters, quarterly newsletters, and training invitations. Ms. Clouser has conducted **survey analysis** on multiple projects including the WYDOT Last Mile Package Delivery and the Maryland Severe Weather Index. She also provides GIS and transportation planning support to WTI research projects. She created maps of the **survey response data** for the Mobility Mindset of Millennials in Small Urban and Rural Areas project.

More detailed information about project staffing for the MDT portion of the project is shown below in Table 10.

Table 10: Project Staffing

Name of Principal, Professional, Employee, or Support Classification	Role in Study	Task						Percent of Time vs. Total Project Hours (total hrs./person /total project hrs.)	Percent of Time Annual Basis (total hours/ person/ 2080 hr.)
		1	2	3	4	5	Total		
Jaime Sullivan, Research Engineer	Principal Investigator & Safety Specialist	129	180	12	4	160	485	18	23
Natalie Villwock-Witte, Assistant Professor/ Research	Survey Implementation & Analysis	47	36	8	200	80	371	14	18
Neil Hetherington, Visual Communications	Technology Specialist	47	136	264	72	88	607	23	29
Karalyn Clouser, Research Associate	Survey Implementation & Analysis	27	8	0	200	72	307	11	15
Dana May, Proposal Development Coordinator	Back-up Technology Specialist	33	8	8	44	20	113	4	5
Graduate Student 1	Technology Specialist, Survey Implementation & Analysis	27	132	120	292	80	651	24	31
Communications Manager	Report Preparation, Editing, and Review	2	8	12	8	24	54	2	3
Administration/ Accounting	Progress Report Assistance, Financials, Travel Coordinator	96	0	0	0	0	96	4	5
TOTAL		402	128	464	404	1264	3186	N/A	N/A

FACILITIES

The Western Transportation Institute (WTI) is the nation's largest transportation institute focusing on rural transportation issues. WTI is housed in the Transportation and Systems Engineering Building on the south side of the Montana State University (MSU) campus, which provides ready access to MSU's library, computing, and other facilities. The 27,000 square feet of office space provides dedicated onsite space for project staff as well as facilities for archiving and transmitting data. An adjacent 7,000 square foot building houses additional laboratories.

Specific to this MDT project, WTI's location in south central Montana provides central access (relative to the large size of the state of Montana) to multiple deployment locations. This proximity will be helpful depending on the level of technical support that is needed. The equipment necessary for deployment will need to be purchased. The options are described in detail in the Appendix of the Research Plan in this proposal.

As the lead organization for the National Center for Rural Road Safety, WTI has access to a large resource of safety content. These resources include videos created as part of Every Day Counts 5 FoRRRwD initiative, as well as those created by other local agencies and DOTs.

As a department within the College of Engineering at MSU, WTI is supported by the College and by the umbrella of MSU administrative, academic, and research resources. Facilities and resources include the Structural engineering, geotechnical, materials, transportation and Sub-Zero laboratories in the Civil Engineering Department. WTI enjoys a close relationship with the Department which has approximately 22 faculty, 500 undergraduate students, and 50 graduate students.

The research facilities at WTI are assisted by a backbone of support staff to assist with human resources, budgeting, procurement, contracts, and accounting. Communications staff provides technical editing, layout, graphic design, and web support. Information Technology staff maintains network servers staff computers, software, and hardware.

The MSU Library system has licenses with the largest databases of published literature as well as open access to published articles in numerous peer reviewed journals. Literature and information gathering is performed through the Carnegie Research Level 1 Library (Renne Library). In addition to an extensive collection of printed material, the library subscribes to dozens of databases and hundreds of refereed journals in print and electronic format. Specific items not accessible through these sources can be located and retrieved by the Interlibrary Loan service, which is affiliated with other research libraries across the United States. Typical sources used to aid literature searches include: TRIS Online (Transportation Research Information Services), E-Science Server, Transportation Research Board Research Records and Annual Meeting CD-ROMs, Google Scholar, Google, and Montana Local Technical Assistance Program library.

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APPENDIX A

The following describes in more detail the components of the system and the optional accessories.

1. Display method flat screen LCD TV

In today's consumer market, what are known generically as "smart TVs" include specifications and features built-in and accessible through the user interface by a remote control that are for the most part, more than adequate for the purpose of this project. The reduction in price with increased screen size, specifications and features make these a viable option as cost-effective long-term display units. Despite being intended as residential TVs, they are commonly used in many commercial applications such as retail sales demonstrations, trade show exhibitions, museum instructional displays, education, and tourist activity awareness. Due to the frequent updates and changes in this type of technology, when it comes time for making purchasing decisions a review of several reputable brands would be completed to check the state of available specifications, features and prices. Some of the considerations are to accommodate for the fact that multiple units will be purchased, which will be operating in various locations that have different room layouts, size, lighting, and other characteristics. Taking these considerations into account will support the success of the project. For example, if the TVs are not easily visible, they are less likely to capture and hold the attention of the intended audience. After completing comparisons and reviews, a decision would be made for purchasing.

The required specifications, features and choice factors that will be considered for purchase include:

- *Single brand purchase* - This is preferable for consistency of product familiarity, training and product replacement. There is a possible disadvantage of some form of safety recall or product malfunction that affects all TVs of one brand, which would affect all locations, but this is considered (by several retailers) as unlikely. During a pilot phase, another choice would be to purchase two options and compare them in controlled and real locations. Some brands that will be considered are Samsung, LG, and Vizio.
- *Screen size/resolution* – Screen size and resolution would be dependent on the location set-up. As indicated above, a single brand would be recommended; however, having options of two or three screen sizes might be necessary in order to accommodate variations in the locations. Screen sizes that would be considered are in the range of 36" to 52" with a resolution of 1080HD. While higher resolution screens, e.g. UHD 4K, are readily available and decreasing in price, this level of resolution would not necessarily be a requirement for the needs of the project.
- *Color gamut and anti-reflectivity* – Given the varying locations of the TV screens, consideration may need to be given to the lighting conditions in the rooms. Bright rooms with direct sunlight or dark rooms with intense light sources may cause reflections on the screen, making viewing difficult. Some "better quality," but still medium price range, TVs have built in features that adjust color range/gamut and anti-reflectivity in order to automatically adjust to ambient conditions.
- *Energy consumption* - Consideration of energy consumption may be important. Generally, all smart TVs of reputable brands have EnergyStar ratings.

- *User interface* - A logical and user-friendly interface will assist in the ease of use and engagement of the staff that will be trained and tasked with operating the TVs. Most TVs meet ADA standards in providing accessible user interfaces with features such as high contrast, large text and audio menus.
- *Built in video player utilizing USB drive (Thumb Drive)* - As mentioned earlier, the specifications and features built into today's smart TVs change on a regular basis. The ability to play videos through an external USB drive is one that varies from brand to brand and over time. This, in the absence of a wireless internet connection, is considered the "simplest" and most affordable interface for playing videos. The base requirements are to continuously loop video preferably in MP4 format. While simple in principle, an important part of the success of the project will be the reliability and consistency in how the videos are played and looped. With that in mind it will be recommended that the final video provided for each period, will have gone through an editing process to ensure the consistency and reliability of the playback. More details on Thumb Drives and video production considerations are provided in other sections.
- *ADA compliance for displaying videos as part of a state funded project in a state funded operation - ADA compliance for captioning videos.* At the time of project kick-off, the accessibility compliance requirements will be discussed and clarified to ensure all appropriate accommodations are being made. At this time, the understanding of the proposal team is that "narrative captioning" is the compliance requirement. Relying on a particular TV's ability and audience interaction to activate and display closed captioning may lead to frustrations and inconsistencies in viewer experiences. As such, the current recommendation from the team is to "burn" the captions* into the video as "open captioning." Besides providing accessibility to those having a hearing disability, it will also reduce the reliance on utilizing the built in or additional speakers and will provide a redundancy in the system (i.e., the content can be conveyed via two communication methods).

(Note: to "burn" the captions means that the captioning is included directly in the video so they cannot be turned off and would be difficult to update.)

- *Built in speakers* – These are currently standard on all medium-priced smart TVs; however, they do have limitations. In particular, they are not the highest quality, are relatively low powered, and are typically rear facing. This consideration is likely one that is dependent on each particular location. If it is discovered that the built-in speakers and sound quality are inadequate, alternate speaker options would be considered, or after discussion and approval, some locations may not utilize sound at all. Additional speakers are discussed below in "Peripheral Accessories."
- *Manufacturer's warranty* - For peace of mind, a purchasing consideration will be to compare the warranties for the different brands and to conduct research into the option of purchasing extended warranties. Upon basic inquiry it has been discovered that standard extended warranties offered by retailers (e.g. Square Trade) do not cover equipment that is being used in a non-residential application. However, there may be a commercial version available. This can be researched further if considered necessary for the project or long-term deployment.

2. Video playback through USB Thumb drive

Commonly used today for data storage and transfer, these devices have increased in specifications while maintaining or even dropping in price. In particular, having a high enough capacity and data transfer rate to be able to stream videos is relevant and useful to this project.

The primary specifications for these include:

- Memory capacity of 16GB to 32GB. While larger capacity is available, smart TVs are better at handling this size. Some larger ones also draw more power through the USB, which can cause video playback problems.
- Data transfer rate medium of Class @ MB/s (to be verified).
- PC formatted as Fat 32.

3. Optional accessories

While a particular brand of TV may provide all of the features needed for the project, there are several accessories to consider in the interest of improving the outcome of the project through enhancing usability and consistency. These include:

- *Additional speakers* - On a location by location basis, the option to purchase a sound bar will be considered in order to improve sound quality without being loud and distracting. Generally speaking, the technology for connecting speakers is universal using a digital optical cable and/or Bluetooth wireless. Despite this, there are often advantages to purchasing the same brand as the TV as they have additional features that are brand specific. Some advantages to this are ease of connection, use of one remote control and for some brands assessment of the sound within a room with automatic or manual adjustments to improve sound quality. The following are requirements or considerations: compatibility to connect (wired or wireless), ease of use, price, and ability to mount to display stand or TV.
- *HDMI digital media player* - Somewhat of an emerging technology, this relatively affordable plugin accessory is similar to connecting a DVD player to the TV. However, it is designed specifically to play media from thumb drives or external hard drives. These players have several features that could provide improvements to the playback of videos, including automatic playback and looping, potentially easier options to play closed captioning if deemed as a requirement over open captioning, and ability to play from larger capacity thumb drives. Possible disadvantages to this technology are the need for external power (more cables) and an extra remote control. Requirements would include improved ease of use and functionality balanced against increased user interaction; ability to play “sidecar” closed caption files* with MP4 videos; and ability to power through power source using the TV’s built in USB port. (This port would not be in use since the USB thumb drive would be connected to the digital media player.)

(Note that a “sidecar” closed caption file is when the closed captions are not burned into the video, but rather are provided as a separate text file. These will be needed for all videos. To use the closed captions, the tv will need to know where to look on the USB device for these files.)*

- *Display stand* - Various options have been developed specifically to hold flat screen monitors or TVs. They are designed to be on display over long periods of time, have the relatively small footprint in the amount of space they take up and depending on the style,

are sturdy and robust. Some options are a static or mobile unit with wheels, additional print media display rack and custom printed fabric wrap. These display stands are relatively compact and lightweight for transportation. When considering the variations in different locations it may be decided that two or more options should be available to best suit specific needs. As a part of the display stand, there will be a flat screen mounting bracket. Depending on the base(s) chosen, a separate mounting bracket may need to be purchased. For the most part, these are universal.

4. Installation Accessories

Additional accessories possibly needed for installation include:

- Extension cables, various lengths, (government approved);
- Cable management and pedestrian protection;
- Spare batteries;
- Backup thumb drive;
- Training and technical support information (see Task 3);
- Informational signage and instructions;
- Cleaning supplies and instructions; and
- Security measures – Options for securing the media players discussed above are limited. Cover boxes can be attached to the back of the TV; however, this may void the warranty. Similar limitations exist to securing the TV. Some accessories are available to connect cables to the TV and a fixed object, however the application of this in the varying locations may not be practical. It should be considered that the locations are relatively secure in themselves.