2024

US Department of Transportation

Strengthening Mobility and Revolutionizing Transportation (SMART) Grant Application

Reckless Speed Warning Initiative

MDOT

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

Maryland SHA's SMART Initiative:

Integrating AI for Safer and Sustainable Transportation Networks

The Maryland Department of Transportation's State Highway Administration (SHA) is seeking funding through the U.S. Department of Transportation's (USDOT) Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program to implement advanced smart community technologies aimed at addressing critical transportation challenges. The increase in roadway deaths in Maryland in 2023 (in contrast to the decrease nationwide) has underscored the urgent need for innovative solutions to enhance traffic management, improve safety, and ensure the resilience of transportation networks. This proposal outlines how deploying Altumint's Viocam technology and Vioview software can provide such a solution. By integrating cutting-edge intelligent sensors and artificial intelligence (AI), MDOT can achieve improvements in safety, resiliency, and environmental sustainability.

SMART Grant Stage 1

The SMART Grants Program, established under the Bipartisan Infrastructure Law, aims to support the development and deployment of advanced smart community technologies to improve transportation safety and efficiency. The program offers funding to projects that address critical transportation challenges through innovative technological solutions. The SMART program is divided into two stages, with Stage 1 focusing on planning and prototyping.

Stage 1 Objectives

Stage 1 of the SMART Grants Program provides funding of up to $2,000,000 per project for a period of up to 18 months. The primary objectives of Stage 1 include:

1. **Planning and Prototyping**: Supporting early-stage activities such as planning, feasibility studies, and small-scale prototyping to develop and refine project concepts.
2. **Stakeholder Engagement**: Facilitating collaboration and engagement with community stakeholders, including local governments, private sector partners, and the public, to ensure that projects meet local needs and priorities.
3. **Technology Demonstration**: Demonstrating the viability and effectiveness of proposed technologies in real-world settings to build a strong case for further development and deployment.
4. **Data Collection and Analysis**: Gathering and analyzing data to assess the potential impacts and benefits of the proposed technologies, including safety, environmental, and economic outcomes.
5. **Scalability and Replicability**: Developing plans to scale successful prototypes and replicate them in other communities, ensuring that the benefits of the projects can be widely shared.

Priority Areas

The SMART Grants Program emphasizes the following priority areas:

- **Safety and Reliability**: Improve the safety of systems for pedestrians, bicyclists, and the broader traveling public. Enhance emergency response.
- **Resiliency**: Increase the reliability and resiliency of the transportation system, including cybersecurity and adaptation to climate change effects.

- **Equity and Access**: Expand access for underserved or disadvantaged populations. Improve access to jobs, education, and essential services.
- **Climate**: Reduce congestion and air pollution, including greenhouse gas emissions. Improve energy efficiency.
- **Partnerships**: Enhance economic competitiveness and incentivize private sector investments or partnerships.
- **Integration**: Improve the integration of systems and promote connectivity of infrastructure, connected vehicles, pedestrians, bicyclists, and the broader traveling public.

Eligible Technologies

Projects eligible for SMART grants must demonstrate at least one of the following technology areas:

- Automated and connected vehicle technologies
- Smart grid technologies
- Intelligent sensor systems
- Innovative aviation and logistics solutions
- Systems integration efforts for better efficiency

Problem Statement

Speeding: According to the Governors Highway Safety Association, speeding accounted for 29% of all traffic fatalities in 2022[1] From 2018 to 2022, speed caused an average of 86 fatalities and 2,504 injuries in the State of Maryland.[2] This number is likely to rise as 2023 numbers are finalized, considering that Maryland's number of people killed on the road rose in 2023 while the national average declined.[3]

Work Zone Speeding: Speeding poses a threat to other drivers but is especially dangerous to pedestrians. Since 2010, pedestrian deaths have increased 77% overall compared to just a 25% increase in other traffic fatalities[1]. Work zones are a special area of concern for both workers and pedestrians. According to the latest data reported by the National Workzone Safety Information Clearinghouse[4], over 2019-2021, Maryland experienced 25 work zone fatalities, including two worker fatalities and nine non-worker pedestrian fatalities.

In either case, speeding directly impacts not just the number of collisions but also their survivability. For example, adult pedestrians involved in a collision with a car going 40 MPH have only a 50% chance of surviving; those in a collision with a car going 20 MPH have a 90% chance of surviving[5]. For vehicle-only crashes, every 10 MPH in speed over 50 MPH doubles the risk of a fatal or disabling car crash[6]. By causing crashes, speeding causes economic harm. The annual economic cost for crashes is estimated at $4.476 billion in Maryland[7].

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[1] https://www.ghsa.org/issues/speeding-aggressive
[2] https://zerodeathsmd.gov/resources/crashdata/, data available through 2022
[3] https://www.wusa9.com/article/news/local/maryland/600-deaths-maryland-roads-2023/65-b30b0933-a6e7-43ad-85fb-90314cf71e36
[4] https://workzonesafety.org/work-zone-data/work-zone-fatal-crashes-and-fatalities/, data available through 2021
[5] https://aaafoundation.org/wp-content/uploads/2018/02/2011PedestrianRiskVsSpeedReport.pdf.
[6] https://zerodeathsmd.gov/wp-content/uploads/2023/01/FFY23_SpeedInvolved_ProgramAreaBrief-Data_Final.pdf
[7] https://www.transportation.gov/research-and-technology/state-state-crash-data-and-economic-cost-index

@Solution: Viocam™ with Automated Reckless Speed Warning Technology

Altumint's **Viocam™** with Automated Reckless Speed Warning technology measures the speed for all traffic and captures images of those vehicles going a reckless speed (defined for this program as at least 25MPH over posted speed). The system uses a state-of-the-art 4D UHD radar intelligent sensor system for vehicle speed detection and tracking, integrated with a 4K color video camera with auto aperture for speeding event capture and powerful InfraRed (IR) illuminators. Unlike white light strobe flashes that can cause driver disorientation or visual distraction, the IR illuminators do not affect the driver's ability to stay safe. The system can capture multiple speeders at the same time. It can also capture vehicles going well over 100MPH, making it an ideal solution for detecting excessive speeders.
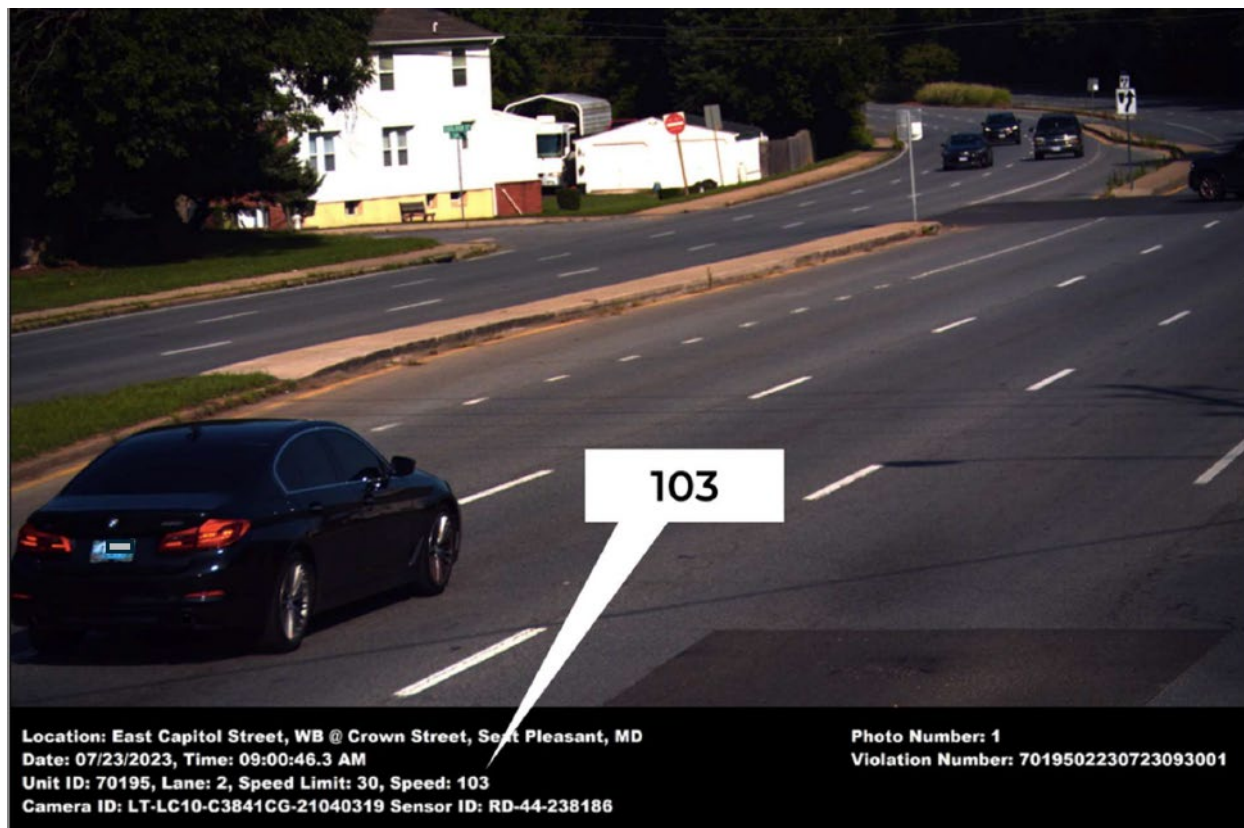

Location: East Capitol Street, WB @ Crown Street, Seat Pleasant, MD
Date: 07/23/2023, Time: 09:00:46.3 AM
Unit ID: 70195, Lane: 2, Speed Limit: 30, Speed: 103
Camera ID: LT-LC10-C3841CG-21040319 Sensor ID: RD-44-238186
Photo Number: 1
Violation Number: 7019502230723093001

Figure 1 Vehicle Going 103 Miles Over the Speed Limit (Plates Partially Redacted)

Viocam uses edge processing to append an encrypted data bar to the image to report accurate, location-specific data.

Once the system has recorded an excessive speeding event, the event is sent to **Vioview™** for processing. Vioview uses AI and machine learning to integrate the data from the cameras and sensors and detect and look up the license plate for the vehicle's registered owner(s). Altumint then performs a DMV lookup review and quality assurance in Vioview, matching the vehicle type with the photo images to ensure that the citation or warning is associated with the correct vehicle. After the citation goes through quality assurance in Vioview, Altumint will create and mail a reckless speed warning to the vehicle owner. Altumint will work with the Maryland DOT SHA to design this warning, which will include vehicle images the system captures.

Additional information on the warning includes but is not limited to:

- Images of serious crashes
- Number of warnings issued to this owner
- Vehicle speed, where, when
- Local traffic injury and fatality stats
- QR codes for safe driving courses
- The tone of the message tracks with the number of warnings and/or the speed detected
- Victim advocate stories

SHA will work with Altumint to determine the best way to engage stakeholders.

Figure 2 Sample Warning Message

For Non-Work Zones: The system is a trailer-based, unmanned solution, which takes up a small footprint at the roadside and is moved easily from one site to another. Altumint recommends a solar trailer for

non-work zones positioned in the optimal location to maximize solar power output for continuous traffic data collection.

For Work Zones: The recommended platform is a portable trailer powered by solar with a compact diesel generator for backup during inclement weather. This solution will offer 24/7 power for continuous traffic data collection in the work zone. In addition, the system will include a warning sign stating the speed limit and using radar to display the vehicle's current speed. Altumint will also equip the system with flashing blue lights synchronized to the work zone flashing lights that indicate when workers are present.

These systems can be moved as needed between locations and are deployable within two hours of arriving at a new location to address urgent traffic safety needs rapidly.

Safety Benefits of this Project:

Decreased Risk of Work Zone (and Other Pedestrian) Fatalities or Disabling Injuries: Speeders can hurt themselves and their vehicle passengers, the surrounding drivers, and pedestrians (such as workers in work zones). Each collision that is either avoided or that occurs at a lower speed makes Maryland roads safer.

Data for Safety Insights: Viocam's intelligent sensors collect not just the data needed to issue warnings for vehicles speeding excessively but also the speed and distance between vehicles for all traffic. Having this information will allow MD SHA to measure the system's impact not just on the excessive speeders but on the overall traffic. Using this data, you can calculate traffic statistics such as the 85th percentile, the max, and the average for each lane monitored. This data will provide insight into program effectiveness.

Table 1 Data Gathered Over Four Hours in a Work Zone

Lane	Average Vehicle Gap (s)	Max Vehicle Speed (mph)	Average Vehicle Speed (mph)	Vehicle Count
1	4.59	71.1	54.0	2,447
2	3.94	73.4	56.1	2,017
3	3.87	74.5	60.0	2,461
4	6.72	76.1	64.7	1,730
Grand Total	**4.66**	**76.1**	**58.3**	**8,655**

Reduction in Speeders: In Altumint's deployment of this technology to date, the firm has seen a reduction in speeders as a percentage of total traffic of 44.6% or more. In work zones where the firm have issued citations, the jurisdictions with this technology have seen a drastic change in driver behavior; this grant will explore whether the warnings also positively affect driver speed.

Improving Traffic Safety: Areas with significant minority populations often experience higher rates of traffic incidents. When deployed in those areas, this project can reduce the occurrence and severity of traffic accidents.

Flexibility to Adjust to Changing Safety Conditions: The system can be moved easily to "follow" workers as they move through a work zone or from one dangerous road to another to address safety concerns as they arise. Deployable in two hours, it provides a quick solution as traffic dangers are identified.

Force Multiplier: By focusing on traffic safety, this program allows law enforcement officers to reduce routine traffic stops. Viocam provides a 24/7 deterrent to help improve driver behavior. In addition, unlike enforcement systems, which require law enforcement personnel to verify each speeding event to issue a violation, this system focuses on warnings and does not require law enforcement review.

Economic Benefits of this Project:

No-Cost Enforcement: Some have objected to deploying automated enforcement systems (which issue citations) on roads in lower-income communities because the cost of the citations issued impacts those communities more severely. Since the Reckless Speed Automated Warning System issues warnings and not citations, there is no economic cost to the community.

Savings from Preventing Fatalities and Disabling Injuries: By protecting the citizens from excessive speeders, the system can prevent fatalities, which have an average cost of $1,869,000 per life lost, along with disabling injuries, which have an average cost of $162,000[8].

Rapid Deployment: Each trailer can be moved to create a comprehensive traffic safety net. This grant application includes suggested sites for two phases. SHA anticipates supporting up to 30 locations throughout the grant period, providing substantial value over a large coverage area. Altumint can adjust the system warning parameters and operations in real-time through the system's secure modem and operating software without requiring a site visit.

Equitable Enforcement: Viocam captures all reckless speeders, regardless of who the driver is or what vehicle the driver is operating.

Environment Benefits of this Project:

Reduced Speed Means Reduced Fuel Consumption: Speeds over 50 MPH and aggressive driving (speeding and then braking) result in excess fuel consumption. Reducing speeds increases gas mileage, which reduces the use of fossil fuels.[9]

Reckless Speed Automated Warning System Implementation

In selecting the sites for this project, MD SHA looked for roads that had many of the following factors:

- Location on a state or US highway
- Locations in diverse economic areas
- Locations with higher incidences of accidents, injuries, and fatalities, as shown in the Fatal Crash Dashboard
- Knowledge of Maryland traffic patterns as a firm with headquarters in Maryland
- Areas targeted by state and local authorities for traffic law enforcement
- Non-congested urban areas in which reckless speeding is more likely to occur

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[8] https://injuryfacts.nsc.org/all-injuries/costs/guide-to-calculating-costs/data-details/
[9] https://www.fueleconomy.gov/feg/driveHabits.jsp

Proposed Phase 1 Locations: [10]

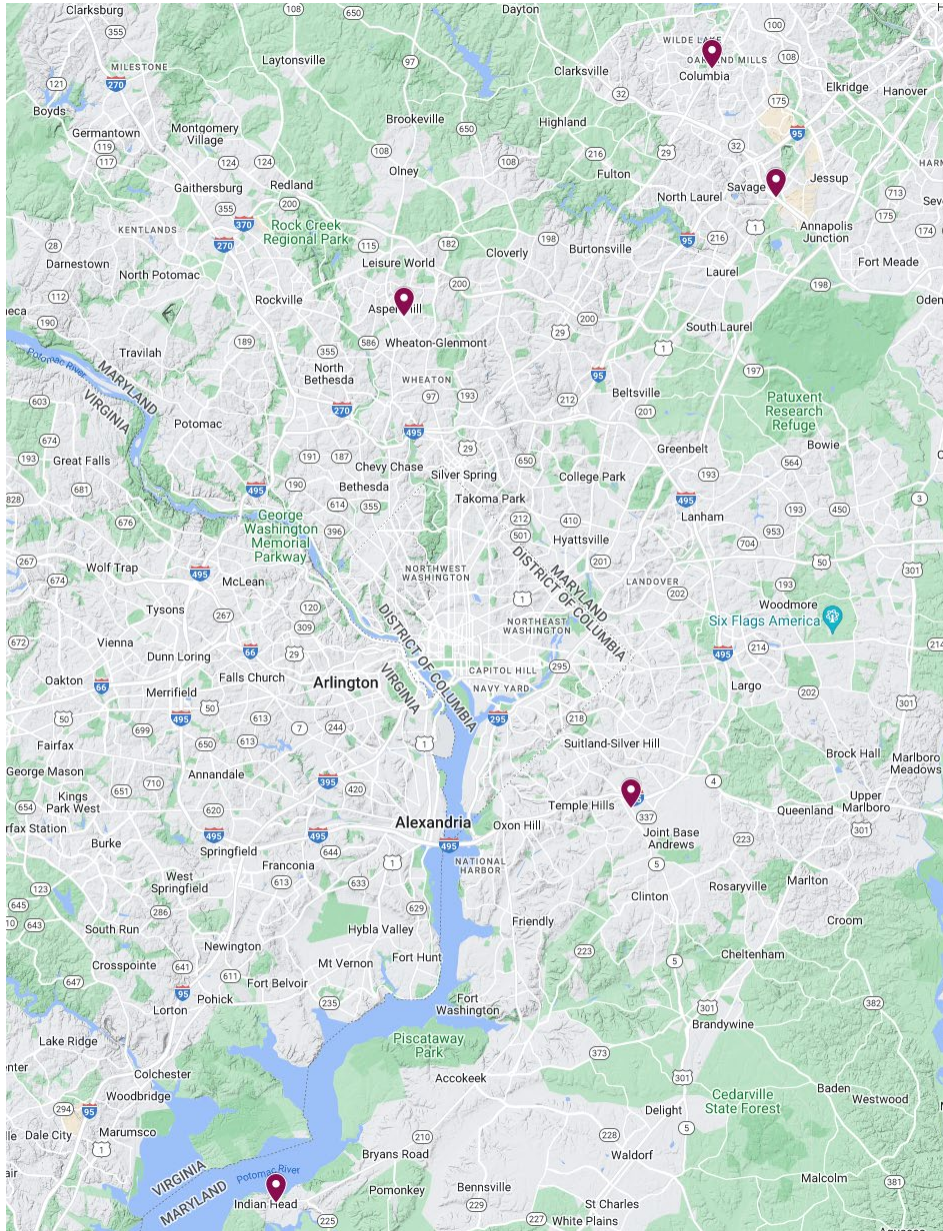*Figure 3 Proposed Phase 1 Enforcement Locations*

Table 2 Phase 1 Locations

Location: MD 210 (Indian Head Highway) *Cross Street: Pine Lane*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Charles	55	80	No	State Highway

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[10] Disadvantaged locations identified using https://screeningtool.geoplatform.gov/en/

Location: MD-32 (Patuxent Freeway) *Cross Street: US-1 (Washington Boulevard)*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Anne Arundel	55	80	No	State Highway

Location: US-29 (Columbia Pike) *Cross Street: South Entrance Road*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Howard	55	80	No	US Highway

Location: MD-97 (Georgia Ave) *Cross Street: Verona Drive*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Montgomery	35	60	Yes	State Highway

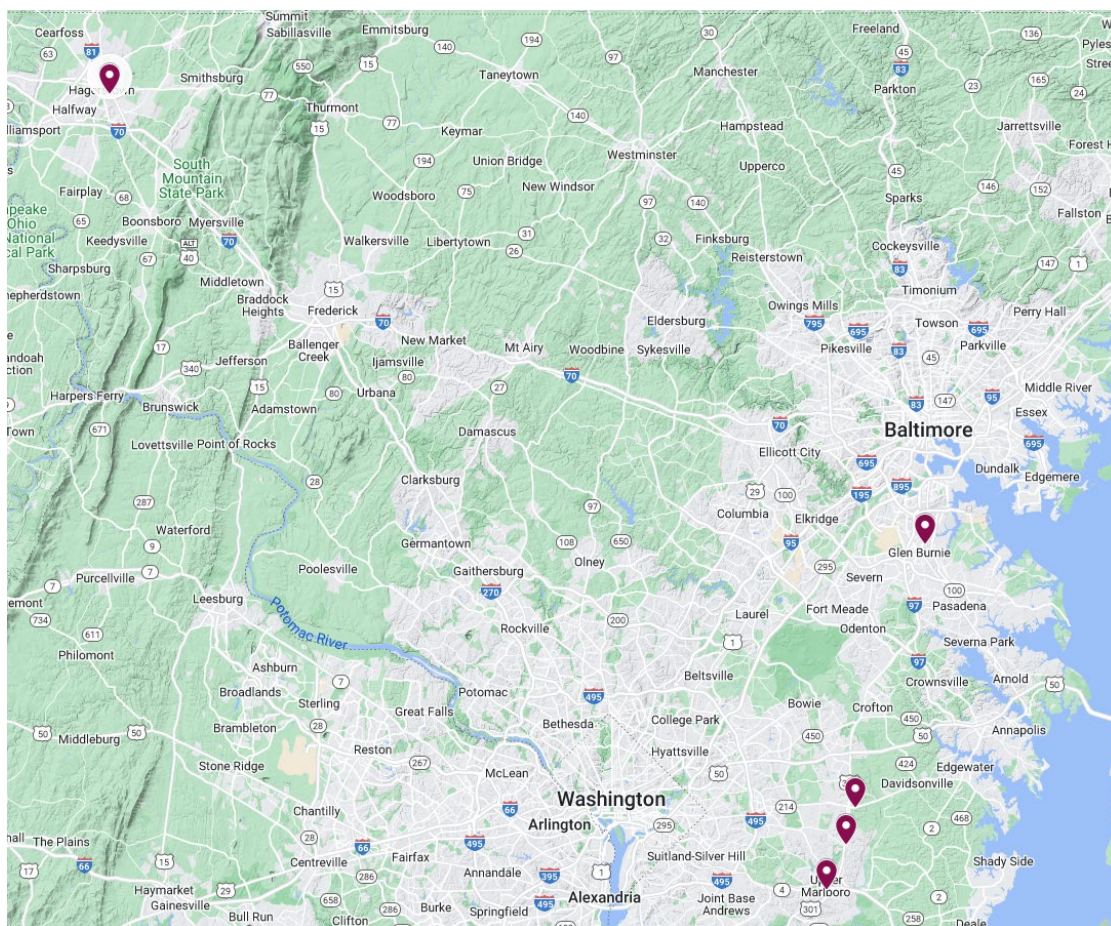| Location: MD-5 (Branch Avenue) *Cross Street: Linda Lane*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Prince George's	55	80	No	State Highway

Proposed Phase 2 Locations:

Figure 4 Proposed Phase 2 Enforcement Locations

Table 3 Phase 2 Locations

Location: US-29 (Governor Richie Highway) *Cross Street: 6th Ave NE*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Anne Arundel	45	70	No	US Highway

Location: US-40 (Dual Highway) *Cross Street: S. Cleveland Avenue*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Montgomery	35	60	Yes	US Highway

Location: MD-4 (Stephanie Roper Highway) *Cross Street: Water Street*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Prince George's	55	80	No	State Highway

Location: MD 301 (Crain Highway) *Cross Street: Leeland Road*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Prince George's	55	80	No	State Highway

Location: MD-214 (Central Avenue) *Cross Street: Hall Road*				
County	Speed Limit (MPH)	Warning Speed	Disadvantaged?	Road Type
Prince George's	50	75	No	State Highway

Additional Locations for Consideration:

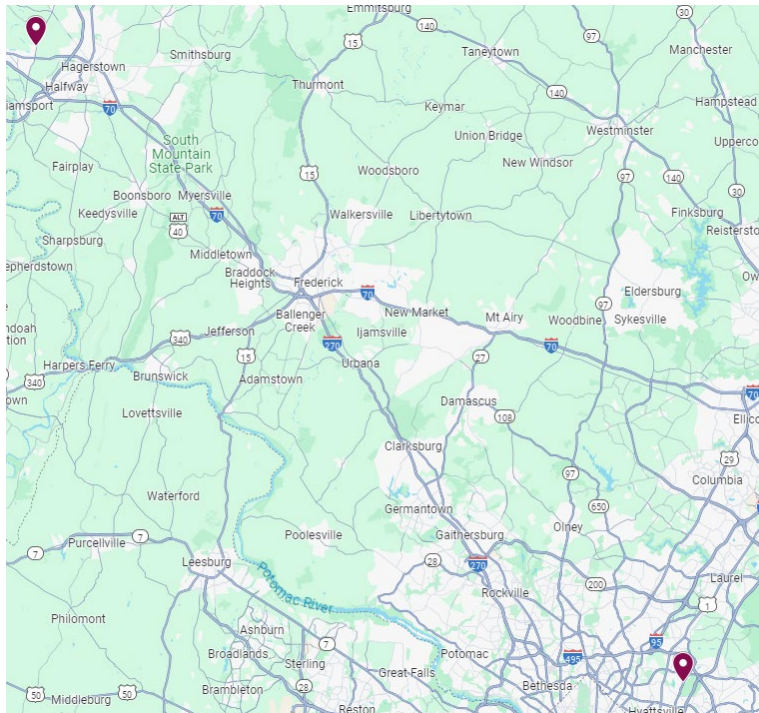*Figure 5 Additional Enforcement Locations*

Table 4 Additional Locations

Location: MD 63 (Greencastle Pike) *Cross Street: I-70*				
County	**Speed Limit (MPH)**	**Warning Speed**	**Disadvantaged?**	**Road Type**
Frederick	50	75	No	State Highway
Location: MD-201 (Kenilworth Avenue) *Cross Street: Pontiac Street*				
County	**Speed Limit (MPH)**	**Warning Speed**	**Disadvantaged?**	**Road Type**
Prince George's	50	75	No	State Highway

Non-Work Zone Solution:

Viocam with Reckless Speed Automatic Warning Technology Using a Solar Platform Features and Costs, priced per trailer per month:

Table 5 Viocam Non-Work Zone Pricing

Part	QTY	Unit Price	Ext Price
Altumint Reckless Speed Automatic Warning - Platform	5	$ 18,225	$ 91,125
Altumint Reckless Speed Automatic Warning – S&H	5	$ 1,050	$ 5,250
Altumint – Viocam Enforcement System	5	$ 14,501	$ 72,505
Altumint Reckless Speed Automatic Warning – Installation	5	$ 1,080	$ 5,400
Altumint Reckless Speed Automatic Warning – Total Viocam			**$ 174,280**

Vioview Warning Processing and Issuing for Work Zones, priced per month:

Table 6 Vioview Non-Work Zone Pricing

Part	QTY	Unit Price	Ext Price
Altumint – Field Services, Maintenance, System Upkeep	5	$ 56,104	$ 280,520
Vioview services for these trailers, including: • Warning templates design • Secure event transfer via 4G LTE modem • AI review of events captured to identify license plates Tag look-up • Quality assurance of events captured • Preparation and mailing of excessive speed warnings • Analytics to review the impact of the Reckless Speed Automatic Warning system on vehicle speed for non-work zone locations • Program management	5	$ 37,590	$ 187,950

Part	QTY	Unit Price	Ext Price
• Data storage • Additional SW development and maintenance • Program service support			
Altumint Reckless Speed Automatic Warning – Total VioView			**$ 468,470**

Work Zone Solution:

Viocam with Reckless Speed Automatic Warning technology, using a Hybrid Solar/Diesel Platform Features and Costs, priced per deployment hour:

Table 7 Viocam Work Zone Pricing

Part	QTY	Unit Price	Ext Price
Altumint Reckless Speed Automatic Warning for Work Zone - Platform	2	$ 58,000	$ 116,000
Altumint Reckless Speed Automatic Warning for Work Zone – S&H	2	$ 1,050	$ 2,100
Altumint – Viocam Enforcement System	2	$ 13,975	$ 27,950
Altumint Reckless Speed Automatic Warning for Work Zone – Installation	2	$ 10,000	$ 20,000
Altumint Reckless Speed Automatic Warning for Work Zone – Advance warning ('Your Speed is") sign	2	$4,500	$ 9,000
Altumint Reckless Speed Automatic Warning for Work Zone – Advance warning ('Your Speed is") sign – S&H	2	$ 500	$ 1,000
Altumint Reckless Speed Automatic Warning for Work Zone – IP Cameras	2	$ 3,800	$ 7,600
Altumint Reckless Speed Automatic Warning for Work Zone – Total Viocam			**$ 183,650**

Vioview Warning Processing and Issuing, priced for a total of 1,500 deployment hours (750 hours per Viocam Enforcement System):

Table 8 Vioview Work Zone Pricing

Part	QTY	Unit Price	Ext Price
Travel to SMART Summit (4 attendees)	1	$ 10,000	$ 10,000

Part	QTY	Unit Price	Ext Price
Altumint – Field Services, Maintenance, System Upkeep	2	$ 60,204	$ 120,408
Vioview services for these trailers, including: • Warning templates design • Secure event transfer via 4G LTE modem • AI review of events captured to identify license plates Tag look-up • Quality assurance of events captured • Preparation and mailing of excessive speed warnings • Analytics to review the impact of the Reckless Speed Automatic Warning system on vehicle speed for non-work zone locations • Program management • Data storage • Additional SW development and maintenance • Program service support	2	$ 512,595	$ 1,025,190
Altumint Reckless Speed Automatic Warning for Work Zone – Total VioView			**$ 1,155,598**

Grant Total: $ 1,981,998

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Honorable Pete Buttigieg
Secretary of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Secretary Buttigieg,

I am writing on behalf of National Organizations for Youth Safety (NOYS), which is a national youth-powered organization positioning marginalized youth to lead in advancing traffic safety through equity-centered community design and engagement. We commit to working with Altumint on the federal SMART Grant program in partnership with Maryland Department of Transportation State Highway Administration to advance traffic safety through the use of automated speed warning systems.

To support the project and its partners, National Organizations for Youth Safety (NOYS) commits to the following:

Providing communications and marketing subject matter expertise on crafting and deploying relevant and culturally responsive traffic safety messaging; recruiting and meaningfully engaging underrepresented youth in Maryland in promoting technology-driven traffic safety solutions; and serving as a program partner in executing equity-centered community engagement activities.

This commitment is new, specific, and measurable in the following ways:

NOYS has an extensive track record of building the capacity of marginalized youth to lead in reducing traffic-related serious injuries and deaths in their local communities. In past years, NOYS has worked collaboratively with Maryland partners to equip youth influencers in promoting innovative and effective traffic safety messaging targeting their peers.

NOYS

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The partnership uniquely positions Altumint to deploy seven cutting-edge automated reckless speed warning systems in over 30 locations on Maryland roadways while incorporating the voices of marginalized youth and responding to the critical need to utilize technology-driven solutions to end reckless driving.

In conclusion, NOYS is thrilled to partner with the Maryland Department of Transportation State Highway Administration and Altumint in a commitment to achieving the stated goals and objectives of leveraging the SMART Grants Program to help reduce roadway crashes and deaths, while supporting the use of advanced automated reckless speed warning technology.

Jacob Smith

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Maryland State Highway Administration
7201 Corporate Center Drive
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Dear Mr. Moges:

The Johns Hopkins Center for Injury Research and Policy (JHCIRP) is pleased to support your application for funding under the U.S. Department of Transportation SMART Grant program. JHCIRP began working with safety partners to advance adoption of the Safe System approach in 2021 with the *Recommendations of the Safe System Consortium*, a policy advocacy initiative aimed at increasing federal support for this approach to road safety improvement. Since that time, we have offered capacity-building opportunities for local safety leaders, including a *Summer Safe System Institute* in 2022 and a 5-day *U.S Vision Zero Academy* in 2024.

Throughout these efforts, it has been clear that a central goal of U.S. Safe System implementation is to manage vehicle speeds. Beyond addressing aggressive speeders, Safe Systems need to focus on reducing average vehicle speeds across our transportation systems. International experience has shown that widespread use of automated enforcement programs can be very effective at managing these system speeds and that even small reductions in average speed can result in substantial savings in crash deaths and injuries.

Your proposed concept of implementing advanced automated reckless speed warning technology in locations across the state is a very constructive step that could contribute to managing both extreme offenders and the routine moderate speeders who contribute to higher average speeds. We will be very interested in the impact of your project on speeds and crash outcomes, and we are also optimistic that public familiarity with automated warning systems will be effective in building support for automated speed enforcement.

We are very pleased that the Maryland State Highway Administration is taking such an innovative approach to speed management, and we look forward to collaborating on your project implementation and evaluation plans.

Sincerely,

Dr. Jeffrey Michael
Center for Injury Research and Policy
Department of Health Management and Policy