

Hardening Blocking Vehicles for Traffic Incidents and Planned Special Events

Report of Workshop Proceedings

Emergency Responder Safety Institute



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Executive Summary

This report summarizes a workshop convened during the 2018 National Traffic Incident Response Awareness Week on how to harden blocking vehicles to protect responders and the public. First, the workshop had presentations on innovations in blocking vehicles:

- Grand Rapids (MI) FD Utility 2, a repurposed dump truck outfitted as a blocking unit
- Irving FD Blocker Units, which are decommissioned reserve fire apparatus stripped of firefighting equipment and re-marked as blocking units
- Tennessee Department of Transportation Safety Service Patrol units purpose-built on F350 utility truck bodies
- Fire Police units built as advance warning, traffic control, and blocking units

The group then identified best practices in innovative traffic control devices:

- Arrow devices and message boards should be large, mounted high, programmed to shut off when the vehicle is in motion, used only for directing traffic, able to be rotated to face traffic, and employ flash patterns such as dancing diamonds.
- Departments should consider adding connected vehicle technology to their fleet, such as the HAAS Alert responder-to-vehicle device.
- Departments should consider queue and speed control innovations, including positioning a police unit at the back of the queue, deploying portable speed bumps or rumble strips, erecting screens, setting sequential flares, deploying folding barricades, installing a speed device to display approaching vehicles' speeds, installing RADAR on emergency vehicles to detect speeding traffic and then send a "heads up" alert to responders, and autonomous vehicle technology.
- Retroreflective striping and markings should be used inside compartments to make doors visible when open and arrow-shaped when appropriate to indicate direction.

Finally, participants identified the best practices they have seen regarding outfitting and deploying blocking vehicles.

- interagency cooperation
- blocking vehicle sourcing
- SOPs
- markings
- emergency lighting
- reinforcement
- rear cameras
- advance warning and traffic control devices
- arrow and message boards
- truck-mounted attenuators (TMAs)
- planned special events
- stay current
- help other departments

Workshop Description

On November 13, 2018, the Emergency Responder Safety Institute, a program of the Cumberland Valley Volunteer Firemen's Association, convened a distinguished group of roadway safety practitioners and advocates during National Traffic Incident Response Awareness Week to exchange ideas on how to better harden blocking vehicles to protect responders and the public at roadway incident scenes and at planned special events. The workshop was held at a Pennsylvania Turnpike facility in Middletown, PA.

The first part of the daylong workshop included presentations from innovators who have created new ways to make heavy, protective vehicles available as blockers at incident scenes. The following individuals were invited to brief the group on blocking vehicle initiatives in their departments:

- Ron Tennant, Grand Rapids (MI) Fire Department
- Chief Victor Conley, Irving (TX) Fire Department
- John Sullivan, Tennessee Department of Transportation
- Tom Martin, Virginia Safety Service Patrol

In the second part of the workshop, the group identified best practices for outfitting and using blocking vehicles.

Workshop Participants

The following persons attended the workshop.

Steve Austin
Cumberland Valley Volunteer Firemen's
Association

Victor Conley
Irving (TX) Fire Department

Jerry Daniels
Cumberland Valley Volunteer Firemen's
Association

Todd Leiss
Pennsylvania Turnpike Commission

Tom Martin
Project Manager, Parsons
Virginia State Police (Ret.)

Jerry Ozog
Volunteer Firemen's Insurance Service,
Inc. (VFIS)

Eric Rickenbach
Rescue Techs

Jack Sullivan (Facilitator)
Director of Training
Emergency Responder Safety Institute

John Sullivan
Tennessee Department of Transportation

Deputy Chief Ron Tennant
Grand Rapids (MI) Fire Department

John Tippet
National Fallen Firefighters Foundation

Bill Troup
U.S. Fire Administration

Mike Wieder
Oklahoma State University

Dave Wolfe
Pennsylvania Turnpike Commission

Rod Ammon and Cathy Dipierro, both from Stonehouse Media, attended on behalf of ResponderSafety.com.

Grady Carrick, Florida Highway Patrol (Ret.), and Rick Debrousse, MJR Equipment, were invited but unable to attend.

Grand Rapids (MI) Fire Department “Utility 2”



Figure 1: Front and back views of GRFD Utility 2. (Photo credit: Grand Rapids Fire Department.)

Ron Tennant, deputy chief of the Grand Rapids (MI) Fire Department (GRFD), detailed their innovative program that repurposed a public works dump truck into a blocking unit,¹ named “Utility 2.” After three incidents over a short period of time in which fire apparatus were struck, approximately \$150,000 of repair/replacement expenses incurred, and the damaged units were out of service for an extended period of time, the GRFD, Kent County Road Commission, and the Michigan Department of Transportation (MDOT) came up with the idea to use a dump truck as a blocker instead of an expensive fire apparatus.

A dump truck being decommissioned for cost reasons by the Grand Rapids Water Department was modified specifically to function as a blocking vehicle for temporary traffic control at roadway incidents. The vehicle was repainted as a fire department vehicle and the bed was loaded with concrete barriers for weight. It was equipped with emergency warning lights, high visibility chevrons on the rear, and a full-sized arrow board. Due to the comparatively rough ride of a dump truck, a well-padded seat that would better secure the driver of the vehicle in the event it was struck was installed. MDOT funded an attenuator trailer for the truck as well and provided technical assistance in the use of attenuator-

¹ A blocking unit positions upstream of a roadway incident scene across closed lanes of traffic to provide a protected work area for responders.

outfitted vehicles. The GRFD service area is not covered by the state safety service patrol, therefore some safety funding was available from the state to contribute to the cost of revamping the unit. Utility 2 was put into service in August 2011. The overall cost to outfit and implement Utility 2 was less than \$10,000. Currently, an LED arrow stick is being added to the unit and the GRFD is considering adding a rear camera. Traffic control devices are not carried on Utility 2; they are brought to the scene on other responding units.

Utility 2 is housed at a fire station close to the interstate. Utility 2 is assigned by the company officer. The station has two fire companies, so if one is out, the other can deploy Utility 2. There is backup for deployment of Utility 2 if both of those companies are out. Utility 2 is maintained by the GRFD; the GRFD apparatus maintenance supervisor ensures inspections of the vehicle using a checklist.

The truck is staffed from the fire department by drivers who have received four hours of MTime training, which is comparable to the content in the Federal Highway Administration Second Strategic Highway Research Program (SHRP 2) National Traffic Incident Management (TIM) Responder Training Program but is specific to the state of Michigan, plus specialized training for this blocking unit. A 2.5 hour refresher course is required every five years. The driver typically stays in the truck while parked at the incident; s/he does not get out on the roadway. Drivers are empowered to conduct a risk-benefit analysis to determine whether to stay in the truck or not at a particular scene.

The truck is deployed about 550 times a year, going to all freeway incidents as a standard deployment and to other incidents as requested by a company or through mutual aid. The GRFD also has a policy requiring sending one additional unit solely to provide blocking at every roadway incident where the posted speed is 45 mph or higher, and many times Utility 2 responds in addition to that second unit. Utility 2 is typically dispatched at the same time as fire and EMS units.

Utility 2 provides the initial block before motorists approach fire apparatus working the actual emergency. Utility 2 blocks linear only, due to the use of the attenuator. Advance warning is deployed upstream of the blocker. The second blocking unit, a fire apparatus, is used only for blocking and positions at an angle to close the necessary lanes, downstream of Utility 2. Utility 2 has been successful in protecting incident scenes and preventing distracted motorists from striking firefighters or fire apparatus at the incident scenes where it has been deployed.² The large arrow board is especially effective at helping motorists understand which way they have to go to pass the incident scene safely. The attenuator trailer has been struck several times with minimal damage. Overall hits to emergency vehicles have decreased since Utility 2 went into service.

Deputy Chief Tennant also reported that a neighboring community has also deployed their own blocking unit from a repurposed truck and they are staffing from the department of public works. GFRD chose to staff from the fire department because DPW personnel would not have been able to respond fast enough. Similar types of units are in service in other

² John Tunison. "Grand Rapids Fire Department Unveils Truck to Block Freeway Traffic, Absorb Potential Crashes." *MLIVE*, August 1, 2011.

departments in the United States, including in Wyoming, MI, which also repurposed a dump truck unit for blocking.

During the discussion on Utility 2, workshop participants also noted:

- the existence of a “move over” camera system for blocking vehicles that assesses an oncoming vehicle’s speed and lane and calculates whether or not that driver should be able to move the vehicle over and/or slow down, then takes a picture and issues a citation if the driver does not obey the move over law;
- the challenges that rural departments would have implementing this type of unit—many miles of interstate run through rural and sparsely populated communities whose departments may not be able to afford this type of unit even though they could benefit tremendously due to the interstate runs they make.

Irving (TX) Fire Department “Blocker” Units

Victor Conley, fire chief of the Irving (Texas) Fire Department, presented their blocking vehicle program, which grew out of his community risk reduction research for the Executive Fire Officer program at the National Fire Academy.

In July 2015, Ladder 52 from the Irving Fire Department was called to block on the airport freeway as police officers investigated an abandoned car. While it was blocking, Ladder 52 was hit by a tractor trailer going close to 70 mph. The 30-ton ladder truck spun 180 degrees and rolled over. Three firefighters were tossed onto the roadway and injured. The tractor trailer caught fire and its driver died. It cost \$1.3 million to replace the totaled ladder truck.

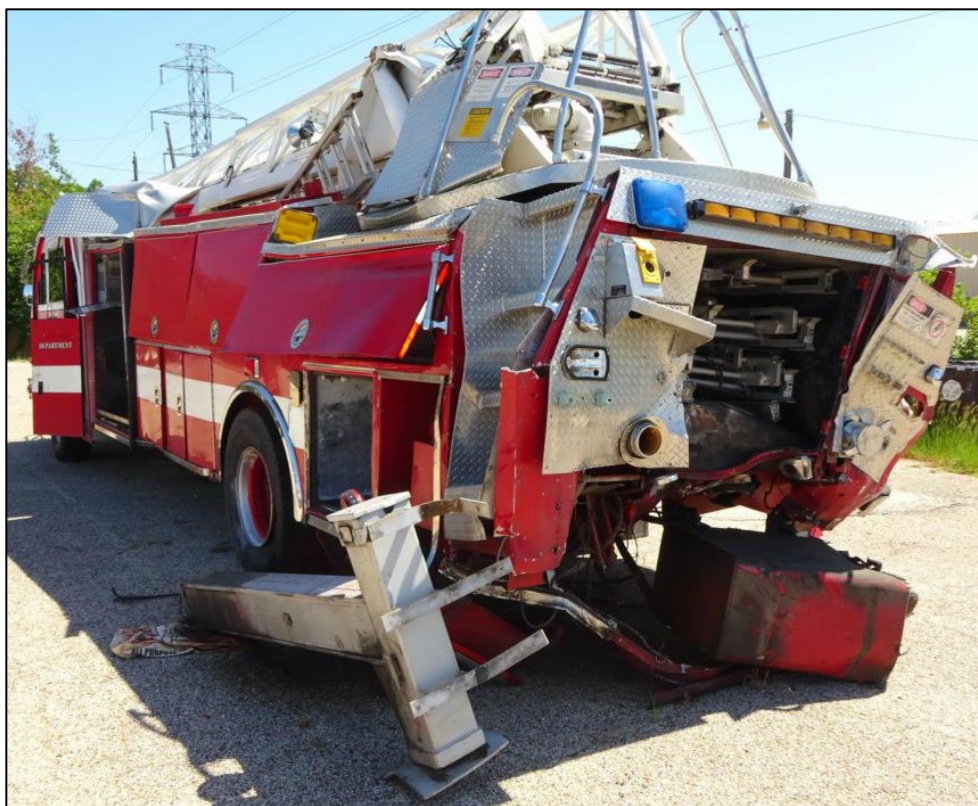


Figure 2: Irving FD Ladder 52 after being struck in July 2015. (Courtesy Irving Fire Department.)

This wasn't the only incident. Over a five-year period, nine Irving apparatus were struck while blocking at roadway incidents. Two of those vehicles, including Ladder 52, were totaled. The total time out of service for all the damaged apparatus was 2,018 days (more than 5.5 years), which forced the department to operate with reserve equipment. Repair and replacement of these apparatus cost the department \$1.5 million plus medical expenses for the injured firefighters.

Conley started looking for solutions and considered pushing for an ordinance to charge drivers, but it was felt that the area was too conservative for that measure to pass. So, he looked inward. Conley noticed that Irving Fire, which has a policy of a 15-year lifespan on apparatus, was auctioning off its decommissioned reserve pumpers for \$4000 each, a small fraction of their value. He had an idea of how to put them to a much better use. Since they were already equipped with fire department markings and lighting, he thought why not repurpose them as blocking units.

Chief Conley worked for two years to get buy-in for the idea and formulate the plan for how to implement it. The first of the repurposed units, Blocker 12, went into service in October 2017. As of January 2019, five units are in service at fire stations around the city.





Figure 3: Views of Irving Fire Department "Blocker" 3. (Photo credit: Firehouse.com.)

The retiring pumpers are stripped of all their firefighting equipment and turned into traffic incident management units used for the sole purpose of blocking. The tanks remain and are filled with water for weight and ballast. Large, amber traffic arrow boards are installed on both sides of the trucks and on the rear. They cost about \$3500 and can be moved to another unit if the current unit is totaled or taken out of service. The large arrow devices on the sides of the units help drivers approaching an incident to see the unit from a distance when it is parked on an angle as a blocking unit. Traffic control equipment, including cones, flares, oil absorbent, and brushes are carried on the blocking units as backup supply for units working the scene.

The procedure of parking large fire apparatus on an angle in advance of an incident scene is standard practice in most areas of the country and is a tactic taught as part of the Federal Highway Administration's SHRP2 National TIM Responder Training Program that is being deployed nationwide. Although it is not common to see large arrow devices on the sides of fire apparatus, the units in Irving have demonstrated their effectiveness during the early stages of traffic incidents, when it is sometimes difficult for local transportation agencies to respond quickly with work zone trucks and temporary traffic controls.

The blocker units are kept at fire stations in Irving, where they are stored outside (weathering is not a concern) and plugged in. The dispatch CAD is responsible for assigning the blocker unit to a response. Any firefighter can drive the blocker unit, including modified

or light duty personnel. The blocker goes to every response on a major thoroughfare. It can also be requested for other roadways. The blocking units are also available to the police department for planned special events and highway closures for investigations.

When dispatched to an emergency, one of the personnel assigned to the ladder company will drive the blocker unit to the incident and position it as a blocking vehicle. Irving Fire's blocker units angle-block approximately 200-300 feet upstream of the incident. Apparatus are left running while blocking. The driver of the blocker unit then joins the ladder crew and sits in the responding engine, not in the blocker unit itself, for the duration of the incident. The responding police units position downstream of the blocker.

As decommissioning units are rotated into the blocking program, older units are retired from the program as "expired." Irving Fire is able to donate apparatus to the forest service, which can in turn donate the apparatus to a volunteer department. This mechanism will be used to get blocker units retiring from Irving Fire's program into the fleets of volunteer departments who might not be able to afford creating a blocker unit on their own. Thus, the flow of apparatus through their lifespan with Irving Fire goes: active → backup → blocker → donation.

The idea has caught on in Texas, where the cities of Dallas and Garland are both implementing similar programs.

Chief Conley noted that the department has a contract with a wrecker service that includes a 20-minute response time and relocation of damaged cars for final tie-down of the vehicle for transport. The police department was at the table for negotiating those terms.

The group discussed the insurance issues surrounding blocking units because their sole purpose is to get hit, which means damage. Irving Fire is self-insured. Insurance treats these blocker units as fleet vehicles. Deputy Chief Tennant from GRFD noted that they actually received a grant from their insurance company to outfit blocking vehicles because the blockers protect the more expensive pieces of equipment and their personnel.

Tennessee Department of Transportation Safety Service Patrol Units and Virginia Safety Service Patrol Units

John Sullivan from the Tennessee Department of Transportation (TDOT) presented their use of Ford F450-based, utility-body vehicles equipped with roof-mounted message boards for blocking and traffic control as part of their Safety Service Patrol (SSP) HELP program. The HELP units are also equipped with emergency vehicle lighting (red and amber) and a push bumper capable of handling a tractor trailer. Their model was the Georgia Department of Transportation's HERO Roadside Assistance Program trucks. TDOT's HELP Program began in June of 1999 and is celebrating its 20th year in 2019. Today, four original 1999 crew members, including John Sullivan, are still with the program. All four were working class supervisors at the time this report was written.



Figure 4: Front view of a Tennessee Department of Transportation Safety Service Patrol Vehicle. (Courtesy Tennessee Department of Transportation.)



Figure 5: Rear view of a Tennessee Department of Transportation Safety Service Patrol Vehicle, with roof-mounted message board deployed. (Courtesy Tennessee Department of Transportation.)

These HELP units are response vehicles that also must function as blockers. Thus, the vehicles are equipped with traffic control devices, including 30 cones. Operators are trained to limit their exposure when setting cone tapers. Operators are also aggressive about “move it or work it” and are proactive about getting vehicles off the roadway to a safer location as quickly as possible.



Figure 6: Sample message on a Tennessee Department of Transportation Safety Service Patrol Vehicle. (Courtesy Tennessee Department of Transportation.)



Figure 7: Sample message on a Tennessee Department of Transportation Safety Service Patrol Vehicle. (Courtesy Tennessee Department of Transportation.)



Figure 8: Multiple TDOT Safety Service Patrol vehicles at a roadway incident scene. (Courtesy John Sullivan.)

These units use short, direct messages on their high-mounted message boards to provide advance warning to the public that they are approaching an incident. The messages use text or text and arrow, with either a pre-programmed or custom message. Messages appear either 12" high (for two-line messages) or 8" high (for three-line messages). TDOT has found that short messages with short words are received best and most accurately. TDOT is also testing "dancing diamonds" and has found them very effective.³

³ "Dancing diamonds" is a flash pattern on a message board or arrow board where an open diamond shape flashes from one position to the other to draw driver attention.

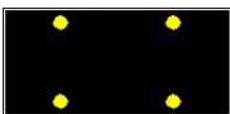
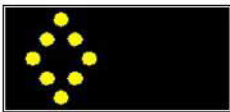
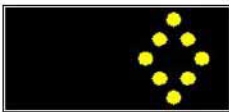
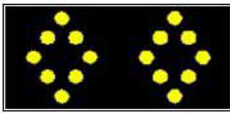
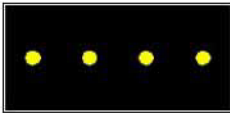
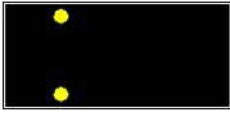
CAUTION DISPLAYS		
	Flashing Sequence 1	Flashing Sequence 2
"Flashing Box" or "Flashing Four-Corner"		
"Dancing Diamonds" or "Alternating Diamonds"		
"Flashing Diamonds"		
"Bar" or "Flashing Line"		
"Alternating Two-Corner"		

Figure 9: Common flashing displays used on message boards and arrow boards.

Historically, SSP's units Tennessee's SSP units provided linear blocking. John Sullivan has been advocating for a switch to angled blocking, which has been well received. TDOT has revamped county maintenance units with truck-mounted attenuators and is now doing some updating for angled blocking.

TDOT has had several units hit, including one the night before the workshop. The trucks are absorbing impacts well, even though they are standard utility bodies. Units are decommissioned mainly by mileage at around 400,000 miles. They then get surplused out and are worth a few thousand dollars. Some have gone to rural districts once they were stripped of their lighting and lettering.

Tom Martin, Virginia Safety Service Patrol Project Manager for state contractor Parsons, continued the discussion of SSP units with the Virginia fleet. Virginia uses the lighter-weight F250 body, but Martin reports that it has held up well in crashes. In five years, the Virginia SSP has had 87 crashes. In addition, three SSP professionals have been assaulted on the job in the last 2.5 years. The majority were struck when working at a scene, and all were on interstate highways. Virginia has worked diligently to replace an aging fleet and focus on professionalism. Martin acknowledged that what they can do is heavily influenced by budget. Obtaining liability insurance as a private sector contractor has made a big difference in being able to do operations such as push-pull-drag to clear.



Figure 10: VDOT Safety Service Patrol vehicle. (Courtesy of the Virginia Department of Transportation.)

Martin has seen that motorists react differently to SSP vehicles based on how they are marked. For example, some motorists think an SSP vehicle from an insurance company won't help them if they don't have insurance with that carrier. Martin also noted that we don't "train" drivers well — SSP trucks are all different, with different lighting, marking schemes, and procedures.

Rural and volunteer departments continued to be a pressing concern for the group during this discussion. Donating decommissioned SSP trucks is another way to get traffic control/blocking vehicles out to more departments. Another suggestion was made to work to get greater buy-in from state police and safety service patrols to provide blocking for rural and volunteer fire departments. These departments often have difficulty getting out the units they do have, and thus providing extra units solely for blocking is not always possible.

Fire Police Traffic Control Vehicles



Figure 11. Gettysburg (PA) Fire Police unit. (Courtesy of Jack Sullivan.)

Fire Police are responsible for traffic control at roadway incidents and planned special events in at least 14 states. Typically, Fire Police units are part of the fire department. They respond to an incident on any roadway, not just highways. Fire Police units often have specialized vehicles specifically designed for traffic control and blocking. The following features are recommended for Fire Police vehicles:

- utility-body truck or repurposed emergency vehicle such as a brush truck or ambulance;
- emergency lighting;
- a high-mounted arrow or message board;
- transverse or curbside-opening compartments to hold equipment and traffic control devices;
- at least 5 MUTCD-compliant cones;
- flares;
- pink Emergency Scene Ahead signs;
- stop/slow paddles;
- spill cleanup and roadway rehab supplies;
- barricades;
- high visibility apparel and PPE;
- AED.

Fire Police units enable firefighters to focus on rescue and firefighting and police to focus on investigation.

Manual on Uniform Traffic Control Devices 2019 Revision

Following the TDOT example, the group discussed the research finding that dancing diamonds are more effective than four-corner arrows; both are recognized by the federal MUTCD, but not by all state supplements. This point suggests that the MUTCD, which is currently undergoing revision, should seek more input from the experiences of first responders, not just traffic engineers. Jack Sullivan is the sole member of the MUTCD Temporary Traffic Control Committee who represents the perspective of boots-on-the-ground first responders. Jack Sullivan reported that the MUTCD does not prohibit the use of arrow boards on shoulders. Although the Federal rules do not prohibit that use, some states do not allow the use of arrows for units parked on shoulders. Some agencies now display an arrow while parked on the shoulder to reinforce the “Move Over” laws that now exist in all states. A new MUTCD revision is expected to be announced in 2019.

Decommissioning Vehicles For Repurposing in Traffic Control

The group had concerns about the use of decommissioned vehicles to be repurposed for traffic control, particularly for Fire Police, due to the lack of guidelines on how to determine

whether these vehicles remain safe for use in traffic control. The group suggested some factors to consider when evaluating the safety of decommissioned vehicles under consideration for use in traffic control:

- whether the vehicle passes state inspection;
- maintenance and refurbishing records;⁴
- start/steer/stop testing;
- conformity to best practices or standards in markings and conspicuity;
- no obvious safety hazards (holes, missing seatbelts);
- potential to be properly outfitted as a traffic unit;
- potential as a blocking vehicle (weight, size);

Innovative Traffic Control Practices

The group also discussed innovative traffic control ideas they have seen or heard about.

Arrow Devices and Message Boards

The group agreed that small arrow devices (i.e. arrow sticks) are not as effective and that departments should purchase as large an arrow or message board as possible. Also, the group agreed that arrow or message boards should be mounted as high up on the vehicle as possible, even above the hose bed on a fire apparatus. Finally, the consensus was that an arrow device on fire apparatus should be programmed to shut off when the vehicle is in motion so people are not confused about its use as a traffic control device. It was felt that the arrow sticks should only be used when directing traffic, otherwise the effect of grabbing driver attention is ruined.



Figure 12: Horry County (SC) fire unit with a small, traditional arrow stick on the rear panel. Minimal level of effectiveness. *(Courtesy of Jack Sullivan.)*

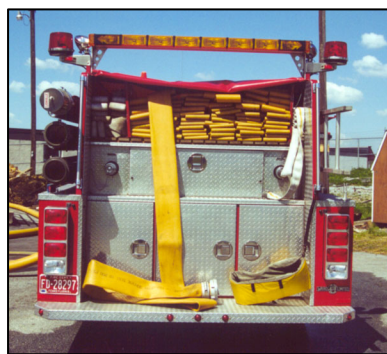


Figure 13: Larger arrow stick high-mounted above the hose bed on a Lionville (PA) Fire Company engine. Moderate level of effectiveness. *(Courtesy of Jack Sullivan.)*

⁴ See information in *NFPA 1901* annex about refurbishing.



Figure 14: Message boards high-mounted at the top of Inver Grove Heights (MN) Fire Department apparatus. Highest level of effectiveness. (Courtesy of Judy Smith Thill — Inver Grove Heights Fire Department.)

Also, the group expressed a desire for message and arrow boards to be designed to be rotated so they can be used on vehicles that provide angled blocks. Rotation could be achieved by separate control or by mounting on a ladder truck turntable, as the Calgary (Canada) Fire Department has done. Finally, the group agreed that the commonly used four-corner light pattern on arrow boards is not as effective at getting drivers' attention as the dancing diamonds flash pattern.



Figure 15: Calgary FD pumper outfitted with a Command Light Arrow Board that can rotate to aim at approaching traffic when parked at an angle. (Courtesy of Command Light.)



Figure 16: Calgary FD ladder truck with the arrow board on a turntable. (Courtesy of Calgary Fire Department.)

In another innovation, Montgomery County (MD) has placed arrow sticks on the sides of their fire apparatus where the arrow is more visible to traffic as it approaches a unit blocking on an angle.



Figure 17: Montgomery County (MD) Fire Rescue engine with an arrow board on the side (top left; not illuminated). Note that the engine also has DOT reflective tape on the rub rail. (Courtesy of Montgomery County Fire Rescue Service.)

HAAS Alert Responder-to-Vehicle Program

The GRFD is also piloting the HAAS Alert mobile responder-to-vehicle (R2V) program.⁵ This system uses a small device installed in emergency vehicles that emits a cellular signal. This signal transmits the emergency vehicle's location to the Internet "cloud," which is then accessed by traffic and navigation applications, enabling them to display a warning to users in the area that lets them know responders are enroute or at a particular location or incident scene. The HAAS Alert unit and other digital alerting devices are very cost-efficient and available on the market now with no need for major infrastructure installations.



Figure 18: HAAS Alert device, shown with a challenge coin for scale. (Courtesy of Jack Sullivan.)

Queue and Speed Control

Members of the group reported seeing various traffic queue and speed control practices including the following:

- placing a police unit at the back of the queue
- deploying portable speed bumps or rumble strips with advance warning
- erecting screens to obscure the view of the scene from passing cars
- setting sequential flares³
- deploying folding aluminum barricades (four legs in a V shape, the center pulls out to three times the storage size, with a message such as "Fire Line Do Not Cross" on the horizontal bar)
- installing a speed device at the back of the fire engine to display to oncoming motorists how fast they are going
- installing RADAR on the emergency vehicle to detect oncoming traffic that does not slow down, and sending a signal to a PASS-like device that vibrates on the responder's body to alert them of the oncoming vehicle (ADRAS⁴)
- autonomous vehicle technology to cut down on human error and poor driving practices

⁵ For more information about the HAAS Alert System, visit <https://www.haasalert.com/>

³ More information on sequential flares is available here: <https://pivariabiles.com/ics-sequential-flares/>

⁴ ADRAS Fact Sheet available here: https://www.dhs.gov/sites/default/files/publications/ADRAS-Fact-Sheet_v2-508.pdf



Figure 19: Portable speed bumps (Bloomsburg FD at left; Lynchburg FD at right). *(Courtesy of Jack Sullivan.)*

Retroreflective Striping

Retroreflective striping can be used to make the blocking vehicle more visible by outlining its full shape, the inside of compartment doors (for visibility when they are open) and rub rails. Striping can be configured as an arrow to also function as a directional to oncoming traffic for which way to flow around the incident.



Figure 20: Gettysburg (PA) FD Fire Police unit with compartment doors open to show high visibility markings inside the doors). (Courtesy of Jack Sullivan.)



Figure 21: North Washington (CO) FPD engine with white side stripe shaped like an arrow to indicate which direction traffic should flow around a block. Courtesy of North Washington (CO) Fire Protection District.)

Recommended Features and Practices for Outfitting and Deploying Blocking Vehicles

Participants had a free-wheeling discussion on the best practices they have seen regarding outfitting and deploying blocking vehicles.

- **Interagency Cooperation.** Work with your partners in the police department, public works, and transportation to brainstorm ideas for providing better protection and roadway incidents and planned events.

- **Blocking Vehicle Sourcing.** Think creatively about repurposing retiring and decommissioned apparatus and large vehicles, such as those from public works and DOT, as blocking vehicles equipped with traffic control devices.
- **SOPs.** Integrate blocking units into the department's training, staffing, and callout procedures.
- **Markings.** Paint units to be in compliance with standards, such as *NFPA 1901*, then go further with retroreflective outlining of the unit and the rub rail.
- **Emergency Lighting.** Equip blocking units with LED lighting visible from all angles, high power and low power settings, and different flash patterns to distinguish responding from stationary status.⁸
- **Reinforcement.** When possible, reinforce oft-hit areas, such as bumpers and wheel wells, to keep strikes away from the body of the vehicle.
- **Rear Cameras.** Install rear cameras to see traffic behind the unit, or provide 360 degree coverage if possible. Link the feed to the Traffic Management Center.
- **Advance Warning and Traffic Control Devices.** Equip blocking units with advance warning and traffic control devices such as message or arrow boards, cones, flares, and pink Emergency Scene Ahead signs.
- **Arrow and Message Boards.** Use large message boards or arrow boards/sticks mounted as high as possible and with short, simple, direct action messages. Better conspicuity of directional devices is achieved by using big, bold, fat letters surrounded by negative space. When possible, select arrow and message boards that rotate so they can face traffic when the vehicle itself is positioned at an angle or when the ladder is rotated (if mounted on the ladder). Consider a flip up message board if fixed position high-mounting presents clearance issues. Ensure that equipment is not obscuring the message board.
- **Truck-Mounted Attenuators.** When possible, have an attenuator mounted on the back of a blocking or advance warning vehicle.
- **Planned Special Events.** Make blocking vehicles available for public events through coordination with the police department.
- **Stay Current.** Stay updated on innovations in traffic control, such as connected vehicles or dancing diamonds, and their effectiveness so you can choose the most appropriate equipment for your community's needs.
- **Help Other Departments.** Consider the needs of volunteer departments with fewer resources and seek ways to donate vehicles such as decommissioned SSP units or retiring fire apparatus or ambulances from larger departments.

Training

Although the meeting was about outfitting blocking vehicles, the group discussion

⁸ It was noted that *NFPA 1901* may need to be modified to allow for low power lighting. ERSI is working with the NFPA 1901 committee to define maximum and minimum as well as recommend intensity percentages for low power, nighttime lighting.

concluded with remarks on training because it is an integral part of practicing safety at the roadway scene.

- Steve Austin shared that CVVFA/ERSI is working with the Fire Department Safety Officers Association (FDSOA) to offer a Pro Board-accredited certification program for NFPA 1091. The certification should debut in 2019.
- John Tippet shared that the NFFF held a meeting to discuss a National Response Policy, which would include traffic incident management, detailing best practices for nationwide implementation. It should include operating on roads crossing state lines. The NFFF will make a recommendation for an NFPA guide on response.
- Tom Martin described a project underway with the Federal Highway Administration to sustain the SHRP2 National TIM Responder Training Program to define what the continuing education (in-service) requirements should be, how it should be institutionalized like NIMS, and whether there should be a national TIM qualification system. He further raised the point that perhaps there should be something like TIM 100 and 200 modeled on the ICS sequence and integrated with state and local requirements.
- It was noted that the industry continues to add training requirements even as the ranks of volunteers are thinning and departments are combining. This is creating a burden on volunteer departments that has to be addressed.

Looking Forward

The meeting concluded by noting that drivers are changing—distraction is rampant, volume is up, today's connected and autonomous vehicles have more capabilities than some drivers, autonomous and semi-autonomous vehicles are now on the road in some areas, connected technologies are being widely deployed, and the mix of vehicles on the road is more diverse than ever (antique, electric, hybrid, fleet, and more). Even with everything that is being done to improve safety, firefighters and other emergency response personnel are still dying and being injured in struck-by incidents both on and off duty. The fire service and all public safety and incident response personnel must continue to evolve and respond to meet these new challenges.