1-888-488-7446

VER-MAC

WORK ZONE SAFETY & MOBILITY SOLUTIONS

- Portable Presence Light
- Work Zone Digital Speed Limit
- Variable Speed Limit
- Dynamic Automated Queue Warning
- Dynamic Late Merge (Zipper Merge)
- Truck Entry System
- Smart Arrowboard
- Work Zone Location Sensors

ASK FOR A QUOTE

Ver-Mac worked closely with North Carolina DOT to develop a portable, easy to set up, non-diesel powered Presence Lighting solution. Presence Lighting allows the motoring public to visually see from a distance an upcoming nighttime lane closure.

PRESENCE LIGHT OBJECTIVES:

- Improve worker & motorist safety
- Increase motorist awareness of approaching night-time lane closure
- Decrease speeds approaching and through the work zone
- Improve motorist visibility through the work zone
- Reduce work zone rear-end collisions

PRESENCE LIGHT APPLICATIONS

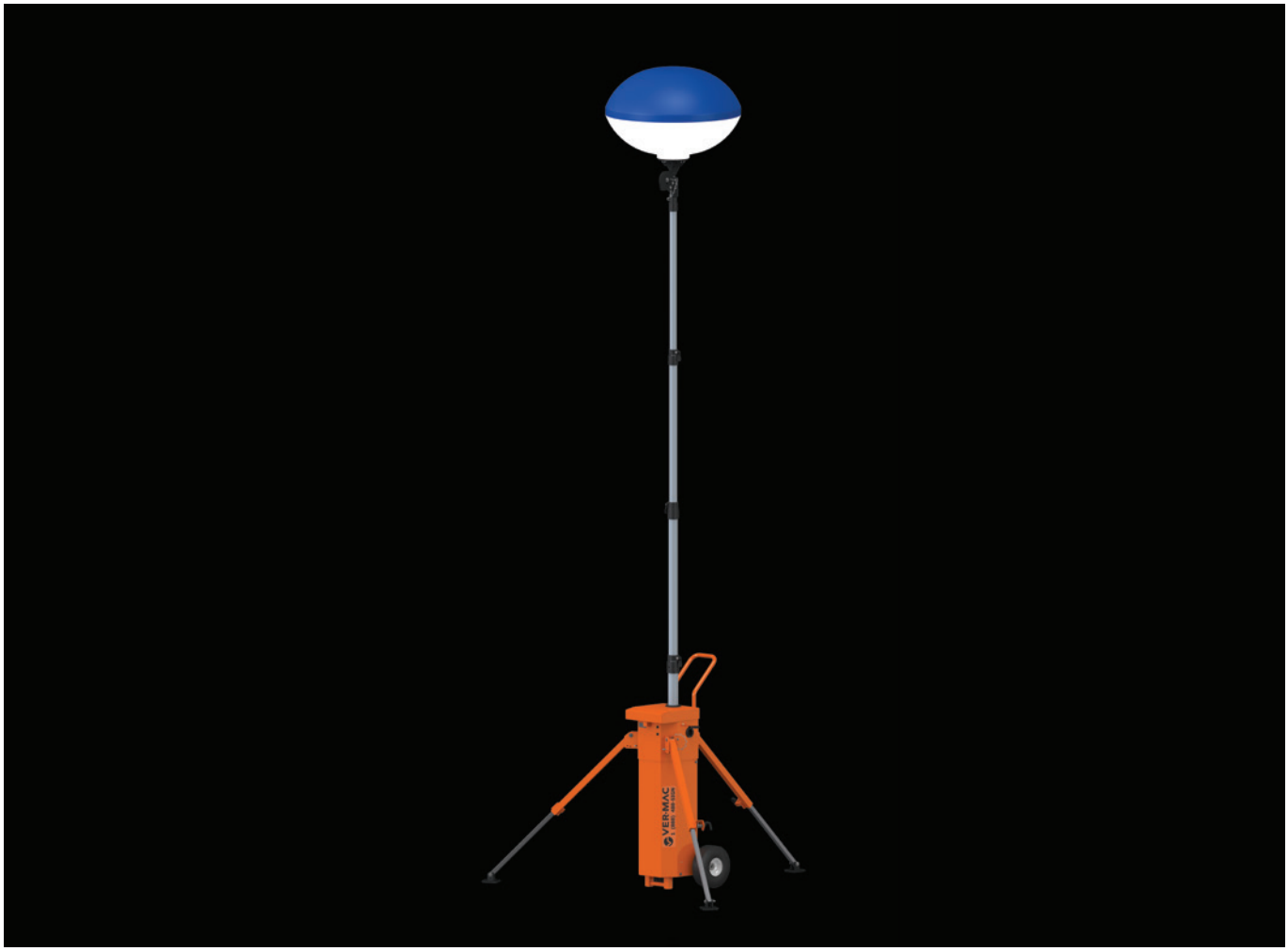
- Any nighttime applications where a lane is taken intermittingly for construction
- Multi-lane highway and interstate
- Rural areas with no additional highway lighting
- Nighttime asphalt paving & bridge closures

PRESENCE LIGHT FEATURES:

- Non-glare balloon canopy produces safe light source
- Compact design for easy setup and storage
- Maintenance-free high-powered batteries eliminate diesel generator
- Intelligent fast-charging system charges batteries is under 3 hours
- Photocell that allows for early setup and automatic turn on/off for dusk to dawn operation

PRESENCE LIGHT BENEFITS:

- **IMPROVED SAFETY** - Motorists see the presence of lighting and slow down. Reduced rear-end collisions.
- **ENHANCED MOBILITY** - Smoother transition to reduce speed differential.
- **REDUCED SPEEDS** - Tests have shown speed reduction up to 7.25 MPH.
- **INCREASED WORK ZONE VISIBILITY** - Lighting guides motorists through merge/transition improving safety.

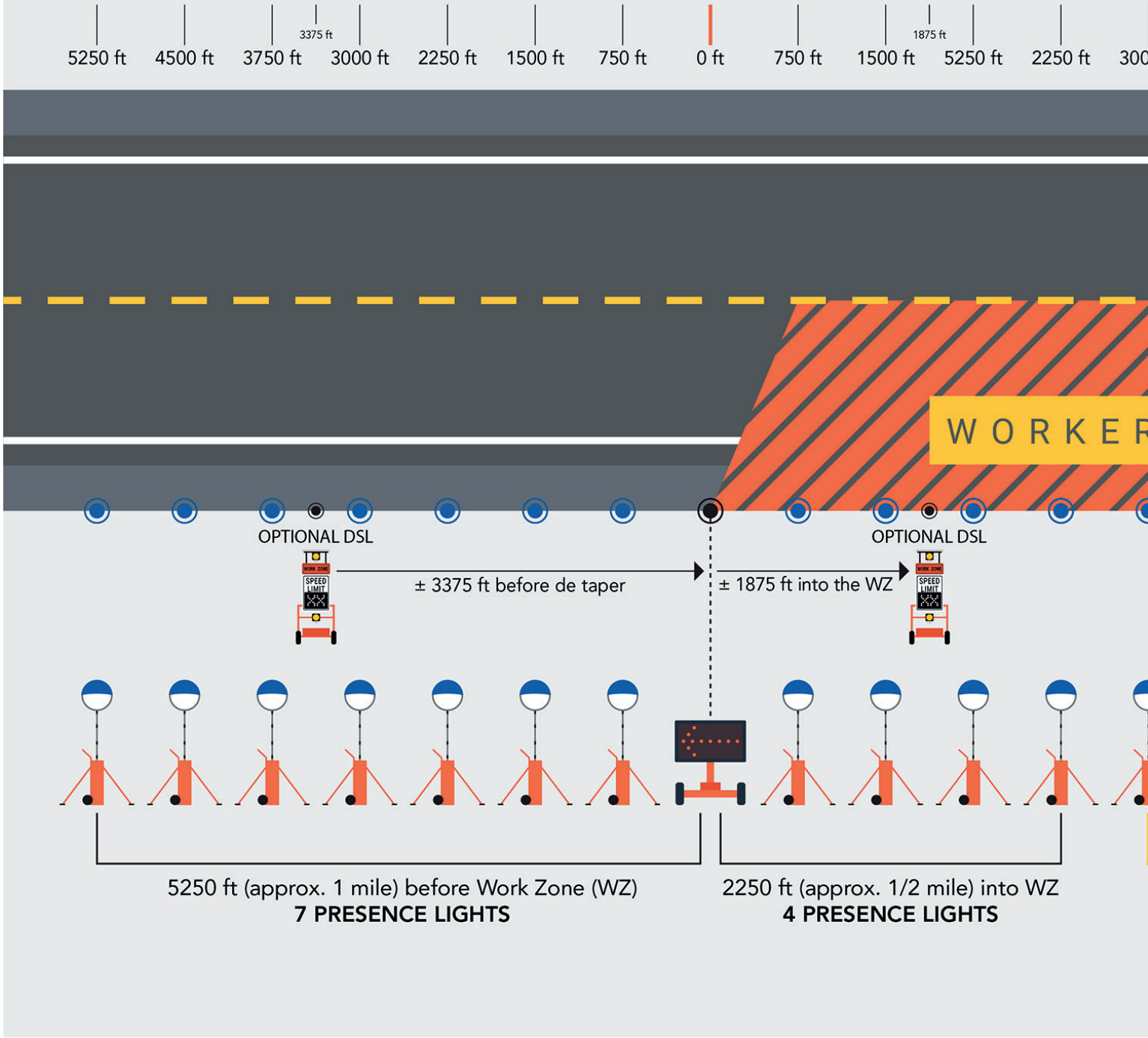


PRESENCE LIGHTING DEMO RESULTS

	LOCATION	# VEHICLES	WORK ZONE SPEED LIMIT	SPEED WITHOUT PRESENCE LIGHT	SPEED WITH PRESENCE LIGHT	AVERAGE REDUCTION OF SPEED
1	MI (I-75 NB, BAY CITY)	3,213	65 MPH	77.37 MPH	71.14 MPH	6.23 MPH
2	TX (I-35 SB, AUSTIN)	27,342	55 MPH	63.23 MPH	58.47 MPH	4.76 MPH
3	NH (I-95 SB, HAMPTON)	2,224	60 MPH	63.85 MPH	59.68 MPH	4.17 MPH
4	MA (I-495 NB (HAVERHILL)	6,308	65 MPH	68.80 MPH	64.89 MPH	3.91 MPH
5	PA (I-76 WB, PA TURNPIKE)	5,509	50 MPH	56.10 MPH	52.16 MPH	3.94 MPH
6	NC (U.S 17, WILMINGTON)	3,869	55 MPH	57.70 MPH	51.94 MPH	5.76 MPH
7	MI (U.S 23, TAWES)	1,678	55 MPH	56.92 MPH	51.27 MPH	5.65 MPH
8	MI (I-94 EB, KALAMAZOO)	11,191	60 MPH	65.19 MPH	57.94 MPH	7.25 MPH
9	MI (I-94 WB, JACKSON)	7,192	60 MPH	67.78 MPH	62.82 MPH	4.96 MPH
10	MI (I-94, JACKSON (2nd Demo))	22,145	60 MPH	68.48 MPH	62.82 MPH	6.95 MPH
11	TN (I-40E, HAYWOOD)	7,865	65 MPH	68.76 MPH	63.82 MPH	4.94 MPH
12	TN (I-75, MCMINN COUNTY)	12,248	70 MPH	74.76 MPH	68.89 MPH	5.87 MPH
13	VA (I-64 EB, CHARLOTTESVILLE)	36,244	65 MPH	67.47 MPH	60.62 MPH	6.85 MPH
14	GA (I-85 SB MM 120, BRASELTON)	11,265	60 MPH	64.76 MPH	60.05 MPH	4.71 MPH

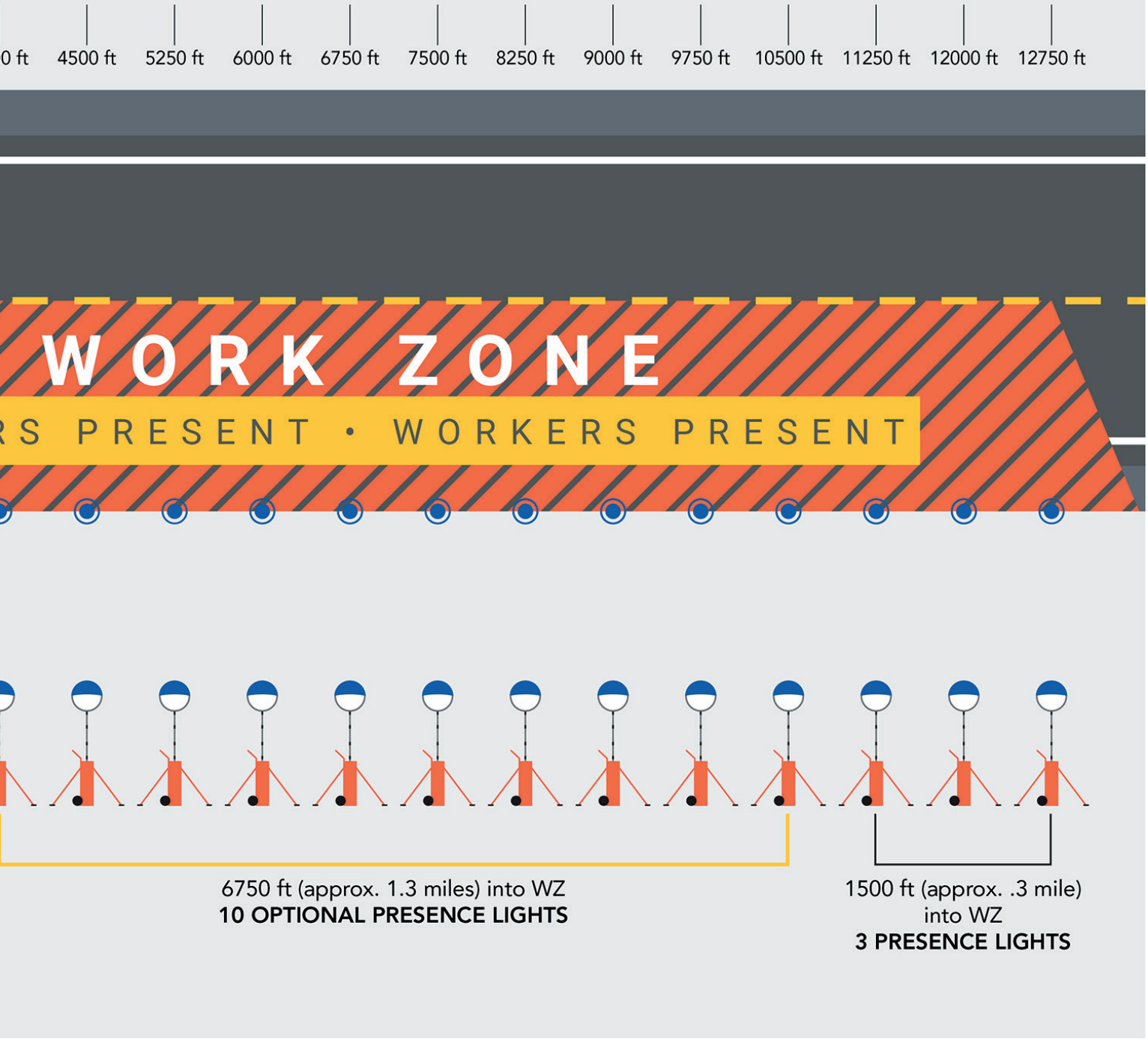
VER-

WORK ZONE PRESENC



MAC®

E LIGHT APPLICATION



WORK ZONE DIGITAL SPEED LIMIT (DSL)

ASK FOR A QUOTE

Ver-Mac worked closely with Ohio DOT to develop a Work Zone Digital Speed Limit (DSL) trailer to reduce speeds approaching a work zone when workers are present. The DSL features a two digit, 18-inch-high white LED display and two 12-inch flashing beacons. During non-construction hours and when workers are not present, the DSL will display the posted speed limit. During construction hours and when workers are present, the DSL will display the work zone speed limit and activate the two 12-inch beacons.

WORK ZONE DSL OBJECTIVES:

- Improve worker & motorist safety
- Increase motorist awareness of an upcoming work zone
- Decrease speeds in work zones
- Reduce work zone rear-end collisions

WORK ZONE DSL APPLICATIONS

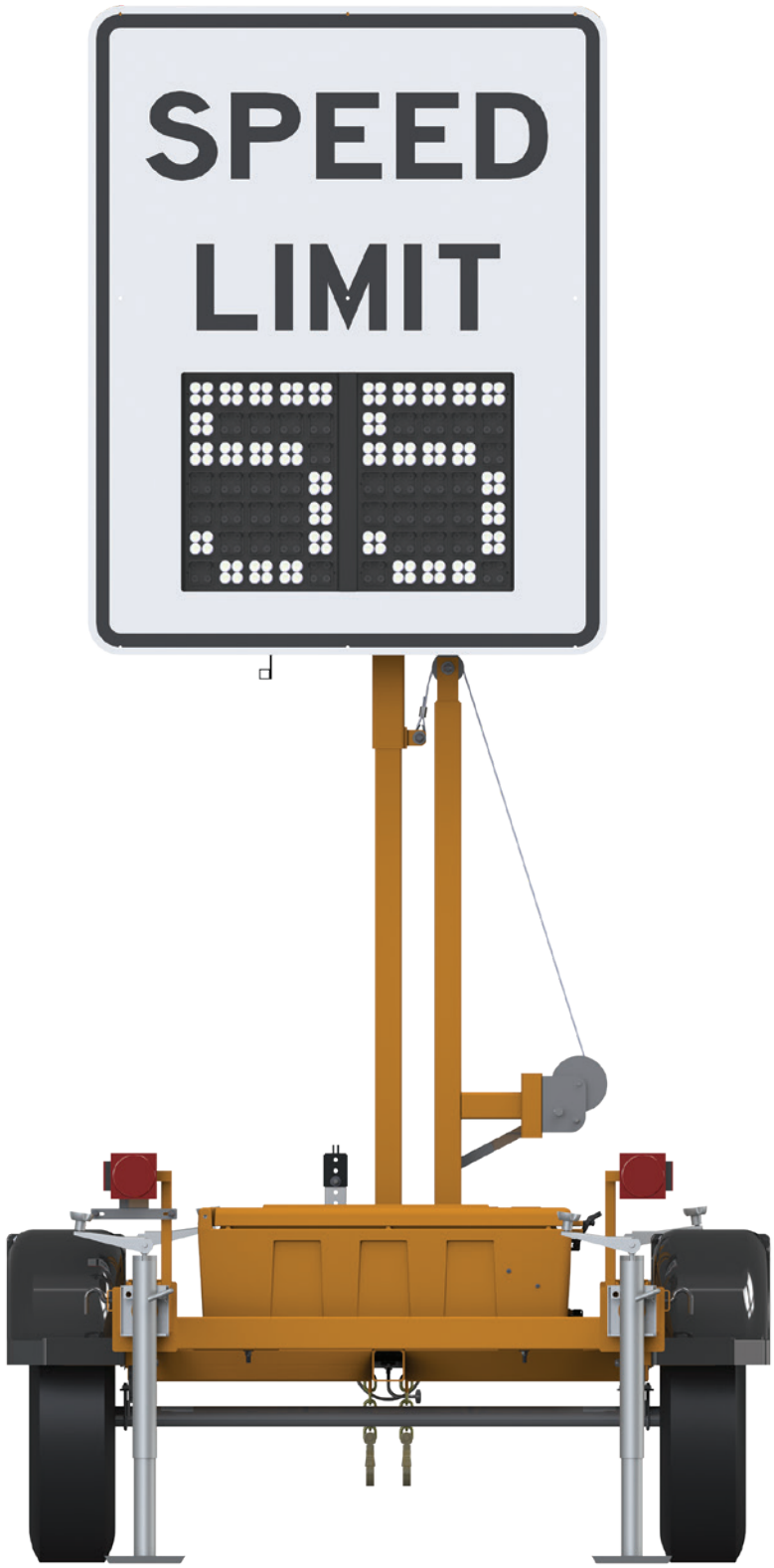
- Any multi-lane highway or interstate work zone without robust barrier between motoring public and workers
- Asphalt resurfacing projects
- Any applications where a lane is taken intermittingly for construction

WORK ZONE DSL FEATURES

- Real-time display of work zone speed limit
- Two 12 in. highly visible flashing beacons
- Highly visible 18 in. white LED numeric display
- Autonomous device (solar & battery powered)
- Local or remote activation/deactivation of variable speed limits
- Ability to create a pre-defined schedule using a laptop or smartphone
- JamLogic Software provides valuable information such as history of date, time, GPS location, speed and beacon activation.

WORK ZONE DSL BENEFITS:

- **IMPROVED SAFETY** - Smoother transition to reduce speed differential – less shock waves and work zone intrusions
- **REDUCED SPEEDS -** Tests have shown that motorists see the work zone variable speed limit sign and slow down. **(up to 7 mph avg. speed reduction)**
- **ENHANCED VISIBILITY** - Two-digit display & two flashing beacons provide positive behavior from motoring public
- **INCREASED COMPLIANCE** - Deactivation of beacons and reset to posted speed limits gives motorist real-time information


SPEED
LIMIT

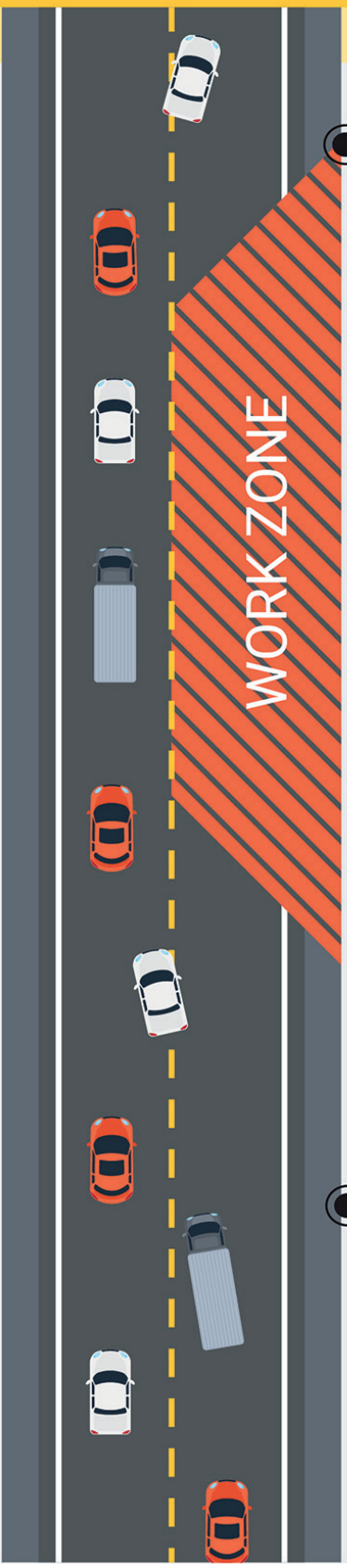
SCENARIO 1: WORKERS ***ARE*** PRESENT

The speed is put back to normal speed limit.

When workers *ARE* present, the speed posted is lowered to 55 mph 1 to 2 miles before entering the work zone and the flashing beacon is activated.

*Multiple VSL trailers can be deployed before entering the work zone.

E DIGITAL SPEED LIMIT (DSL)



SCENARIO 2: WORKERS ***ARE NOT*** PRESENT

Normal speed limit is displayed.

When workers *ARE NOT* present, the speed posted is the standard speed limit (65 mph) and the flashing beacon is deactivated.

*Multiple VSL trailers can be deployed before entering the work zone.

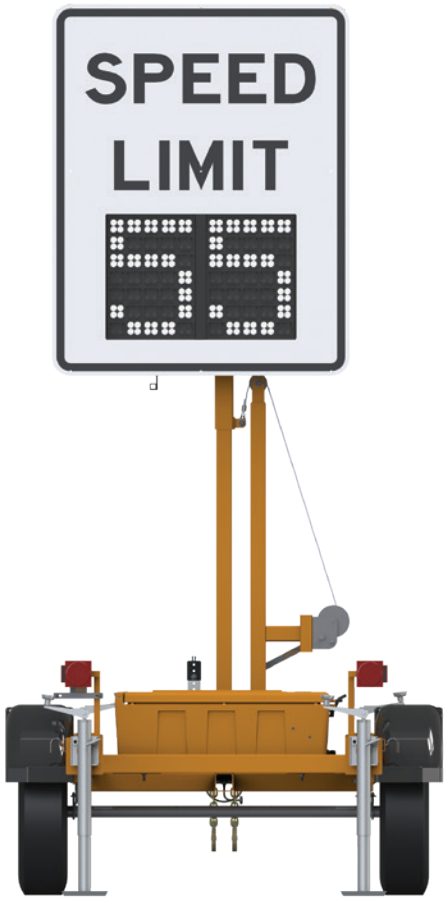
VARIABLE SPEED LIMIT (VSL)

ASK FOR A QUOTE

Ver-Mac worked closely with Utah DOT and a Consulting Engineering Company to develop a Portable Variable Speed Limit (VSL) System designed to automatically change prevailing speeds downstream near active work zones. The system is designed to post the work zone speed limit only when approaching the active work zone. Utilizing portable sensors (Speed Mac VP), Ver-Mac's JamLogic® software gathers speed data near the active work zone and can lower speeds further to harmonize speeds through the work zone. The test data supports higher compliance of speed limits by the motoring public near the active work zone and a reduction in work zone incidents.

VSL OBJECTIVES:

- Improve worker & motorist safety
- Reduce speed differential approaching work zones
- Improve harmonization of speeds through work zones



VSL APPLICATIONS

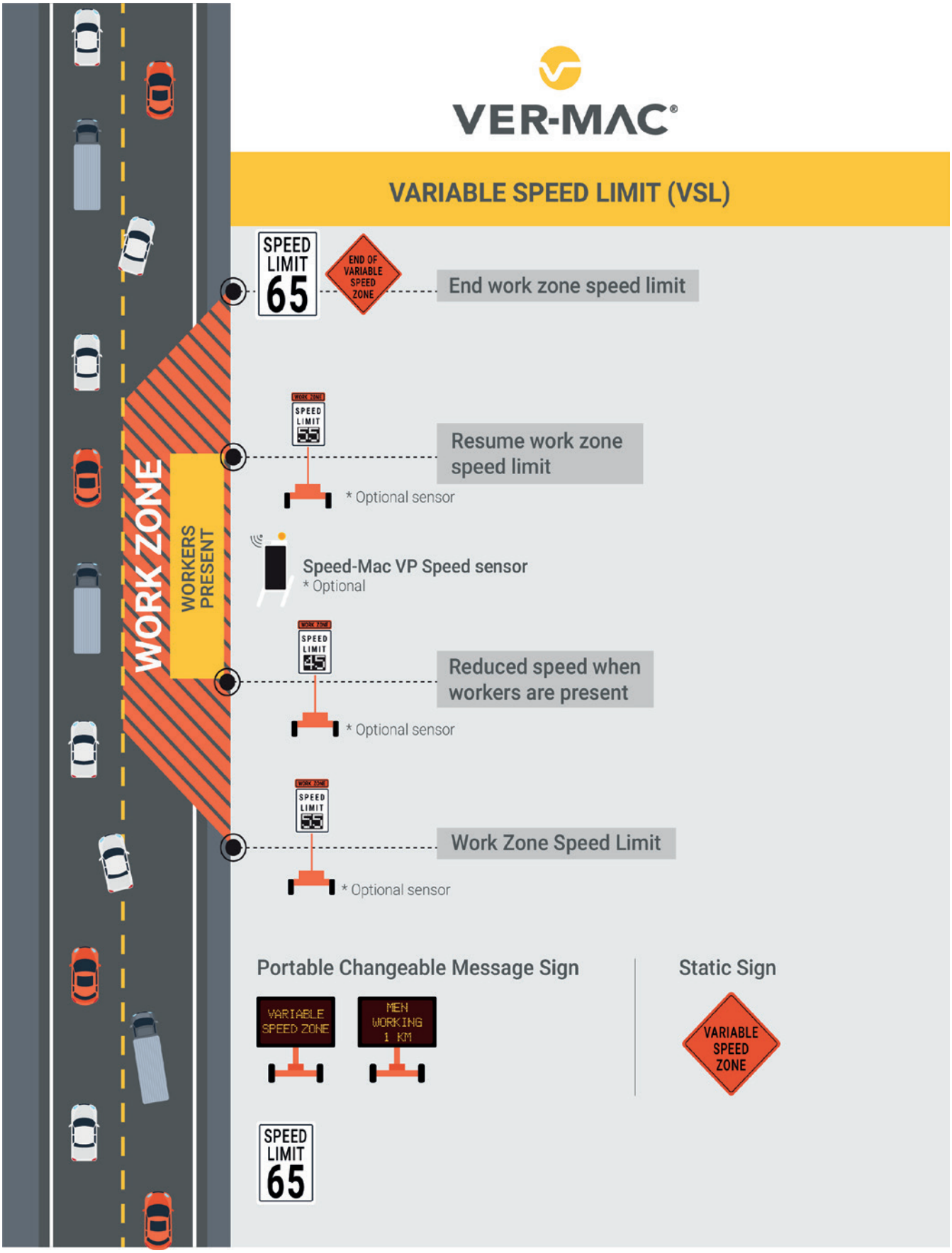
- Any multi-lane highway or interstate work zone without robust barrier between motoring public and workers
- Asphalt resurfacing projects
- Any applications where a lane is taken intermittingly for construction

VSL FEATURES

- Two-digit 18-in. white LED display
- 48 x 60 MUTCD compliant Speed Limit Sign
- Speed-Mac VP Portable Sensor
- JamLogic Software provides history of date, time, GPS location, speed and beacon activation.

VSL BENEFITS:

- **IMPROVED SAFETY** - Smoother transition to reduce speed differential – less shock waves and work zone intrusions
- **REDUCED SPEEDS** - Tests have shown that motorists see the work zone variable speed limit sign and slow down. (up to 7 mph avg. speed reduction)
- **ENHANCED VISIBILITY** - Two-digit white LED display provides positive behavior from motoring public


VER-MAC®
VARIABLE SPEED LIMIT (VSL)
SPEED LIMIT 65
END OF VARIABLE SPEED ZONE
End work zone speed limit
WORK ZONE
WORKERS PRESENT
SPEED LIMIT 55
Resume work zone speed limit
* Optional sensor
Speed-Mac VP Speed sensor
* Optional
SPEED LIMIT 45
Reduced speed when workers are present
* Optional sensor
SPEED LIMIT 55
Work Zone Speed Limit
* Optional sensor
Portable Changeable Message Sign
VARIABLE SPEED ZONE
MEN WORKING 1 KM
Static Sign
VARIABLE SPEED ZONE
SPEED LIMIT 65

DYNAMIC AUTOMATED QUEUE WARNING (AQW)

ASK FOR A QUOTE

Ver-Mac, as part of the TTI End of Queue Warning Evaluation, has developed a portable, dynamic, automated queue warning system. Featuring the NCHRP 350 crash-tested Speed Mac VP, an Automated Queue Warning System can be set up quickly for short term or for longer term Queue Warning Applications. The Speed Mac VP receives real-time traffic data that, via Ver-Mac's JamLogic Software, automates Queue Warning Messages on Portable Messages Signs positioned upstream of the queue.

AQW OBJECTIVES:

- Improve worker & motorist safety
- Decrease motorist speeds approaching work zones
- Reduce work zone rear-end collisions
- Provide real-time information to motoring public

AQW APPLICATIONS

- Highway night time paving and bridge closures
- Daily Highway maintenance lane closure
- Long term highway lane closure where frequent queues are projected to occur
- Ramp backup onto highway off-ramp
- Special Event backup

SPEED-MAC VP FEATURES

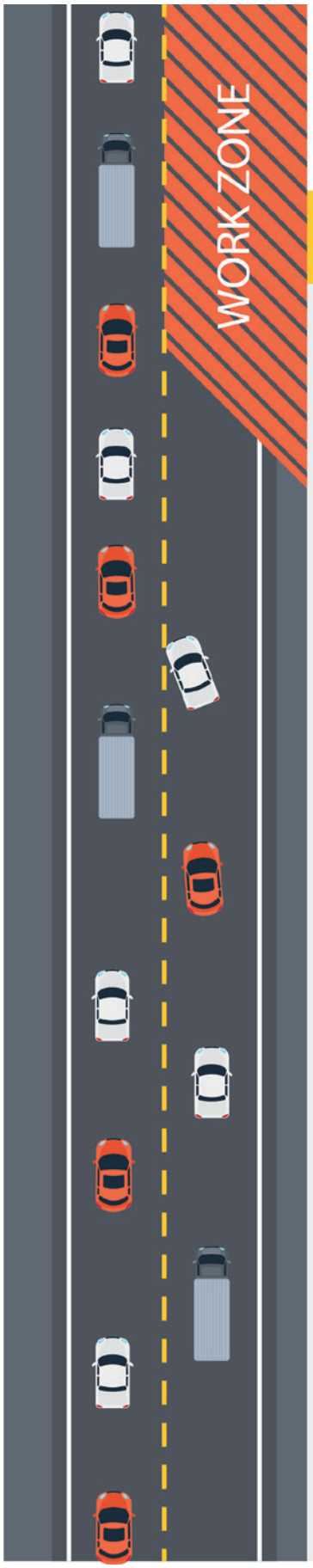
- Integrated radar, 4G modem with GPS, lithium battery & solar regulator packaged in barricade light
- Complete autonomous system
- Autolocates with other Speed-Macs*
- NCHRP 350 crash tested
- Proven radar technology for accurate speed & count
- Can pick up speeds from vehicles on up to 3 lanes
- Microwave sensors can be integrated into the system

AQW BENEFITS

- **IMPROVED SAFETY** - Motorists see real time queueing information and slow down approaching queue
- **ENHANCED MOBILITY** - Smoother transition to reduce speed differential.
- **REDUCED REAR-END COLLISIONS** – TTI Report shows 45% reduction in rear-end crashes

Speed-Mac VP

Speed-Mac VPs are dynamic and can be moved around without affecting the logic. Ver-Mac's JamLogic software will automatically recognize the new location of the Speed-Mac VPs.



VER-MAC®

AUTOMATED QUEUE WARNING (AQW) SYSTEM

Typical equipement:
4 portable Speed-Mac sensors
and 1 Intelligent PCMS + Doppler

System:
Web-Based Remote Queue
Warning Server

Speed-Mac speed sensor

.5 miles

Speed-Mac speed sensor

.5-1 mile

Portable Changeable Message Sign with sensor

Speed-Mac speed sensor

* Optional.

1 mile

Speed-Mac speed sensor

1 mile

Optional Portable Changeable Message Sign.

* Optional sensor for max queue alerts.

TYPICAL AWQ MESSAGING

	FREE FLOW	SLOW ≤ 45 mph	STOPPED ≤ 20 mph
Speed-Mac speed sensor		≤ 45 mph	≤ 20 mph
Speed-Mac speed sensor		≤ 45 mph	≤ 20 mph
Portable Changeable Message Sign with sensor	ROAD WORK AHEAD LANE CLOSED AHEAD	SLOW TRAFFIC AHEAD BE PREPARED TO STOP	STOPPED TRAFFIC AHEAD BE PREPARED TO STOP
Speed-Mac speed sensor		≤ 45 mph	≤ 20 mph
Optional Portable Changeable Message Sign.	ROAD WORK AHEAD LANE CLOSED X MILES	SLOW TRAFFIC X MILES BE PREPARED TO STOP	STOPPED TRAFFIC X MILES BE PREPARED TO STOP

DYNAMIC LATE MERGE (ZIPPER MERGE)

ASK FOR A QUOTE

In 2004, Minnesota DOT, Ver-Mac's JamLogic division and a Consulting Engineering Company analyzed the benefits of Dynamic Late Merge (Zipper Merge) applications. The system is designed to have motorists use all lanes approaching the merge point and then alternate into one lane at the merge point. Utilizing portable sensors before a lane reduction, the system analyzes speed and occupancy of each lane before the merge. Based on the traffic flow data (Free Flow traffic, Slow traffic, or Stopped traffic), the system will provide specific real-time lane messages to motorists upstream to even the flow of traffic through the merge. The Zipper Merge is often used in combination with an AQW System to provide a more robust solution.

DYNAMIC LATE MERGE OBJECTIVES:

- Improve worker & motorist safety
- Reduce length of queues entering work zones
- Increase throughput of interstate lane closures
- Reduce work zone rear-end collisions
- Reduce driver rage

DYNAMIC LATE MERGE APPLICATIONS

- Any multi-lane highway and interstate work zone with lane closure
- Expected daily queues of a ¼ mile or more
- Routes with high-truck traffic
- Routes where topography will limit visibility of approaching queue

DYNAMIC LATE MERGE FEATURES

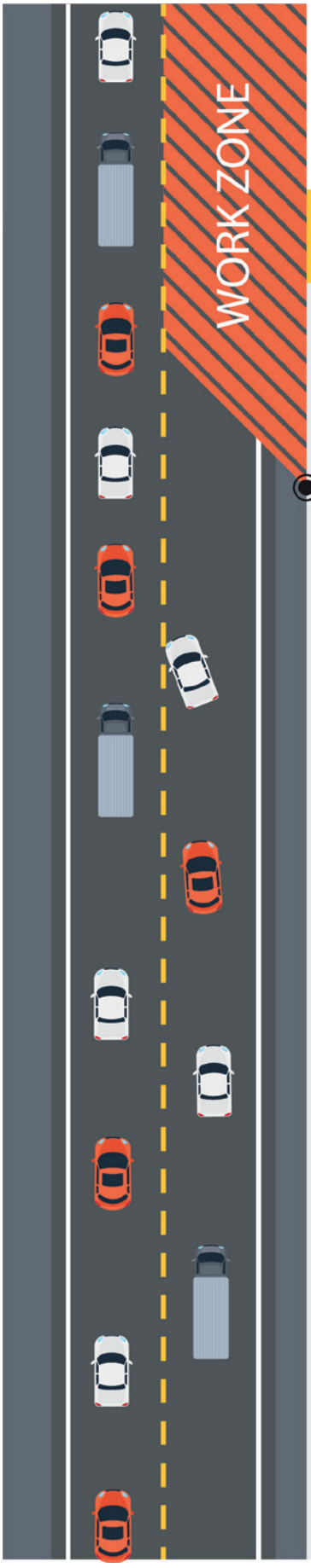
- Speed Mac VP sensor
- Portable Message Signs or Wig Wag Warning Trailers
- Microwave sensors can be integrated into the system

DYNAMIC LATE MERGE BENEFITS:

- **IMPROVED SAFETY** – Study found queues reduced up to 40%
- **ENHANCED MOBILITY** – Study found throughput increased up to 15%
- **REDUCED REAR END COLLISIONS** - Reduces the risk of rear-end collisions
- **LESS WORK ZONE INTRUSIONS** – Slower more orderly merging reduces work zone intrusions

Speed-Mac VP

Speed-Mac VPs are dynamic and can be moved around without affecting the logic. Ver-Mac's JamLogic software will automatically recognize the new location of the Speed-Mac VPs.



VER-MAC®

DYNAMIC LATE MERGE

TYPICAL LATE MERGE MESSAGING

	FREE FLOW	SLOW ≤ 45 mph	STOPPED ≤ 20 mph
Portable Changeable Message Sign with sensor		MERGE HERE / TAKE TURNS	MERGE HERE / TAKE TURNS
.5 miles			
Speed-Mac speed sensor		≤ 45 mph	≤ 20 mph
.5-1 mile			
Portable Changeable Message Sign with sensor	ROAD WORK / 1 MILE AHEAD	SLOW TRAFFIC AHEAD / USE BOTH LANES	STOPPED TRAFFIC AHEAD / USE BOTH LANES
1 mile			
Speed-Mac speed sensor		≤ 45 mph	≤ 20 mph
1 mile			
Optional Portable Changeable Message Sign. * Optional sensor for max queue alerts.	ROAD WORK / X MILES AHEAD	SLOW TRAFFIC X MILES / USE BOTH LANES	STOPPED TRAFFIC X MILES / USE BOTH LANES

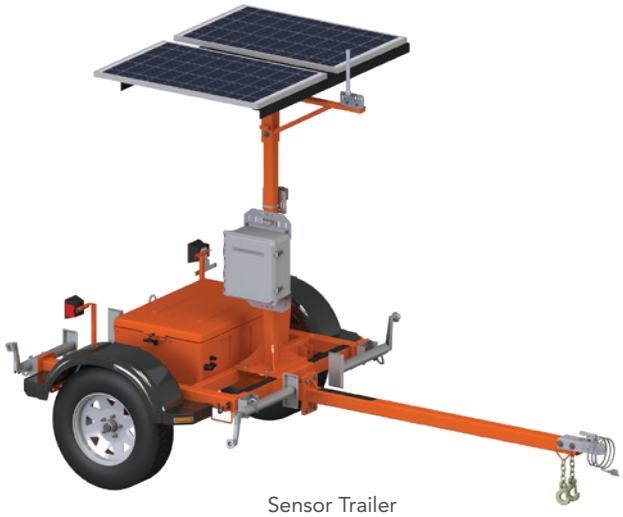
TRUCK ENTRY SYSTEM

ASK FOR A QUOTE

The Truck Entry Warning System alerts motorists of trucks that are about to merge into traffic. This automated system will detect, through a non-intrusive sensor, trucks that are off road and that are leaving the work zone to enter the roadway. The sensor transmits the information to a Portable Changeable Message Sign (PCMS) or a truck entry trailer with a static sign and flashing beacons, so that the message can be displayed to the motorists downstream.

TRUCK ENTRY SYSTEM OBJECTIVES:

- Improve worker & motorist safety
- To provide advance warning to motorists in work zones that a construction vehicle will be entering the work zone
- To reduce accidents with construction vehicles and rear-end collisions of abruptly stopped vehicles



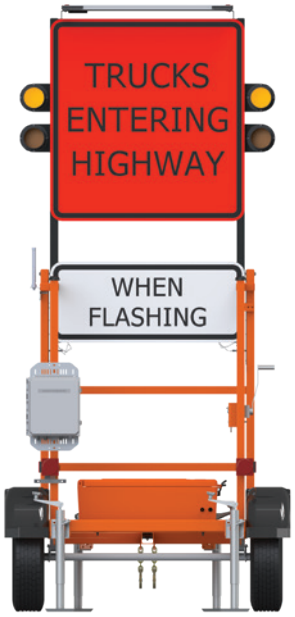
Sensor Trailer

TRUCK ENTRY SYSTEM APPLICATIONS

- Construction projects with concrete barrier with entry points for construction vehicles
- Construction projects with blind entrance of contruction vehicles
- Construction projects that do not have long enough entrance ramp for construction vehicles to get to work zone speed limit

TRUCK ENTRY SYSTEM FEATURES:

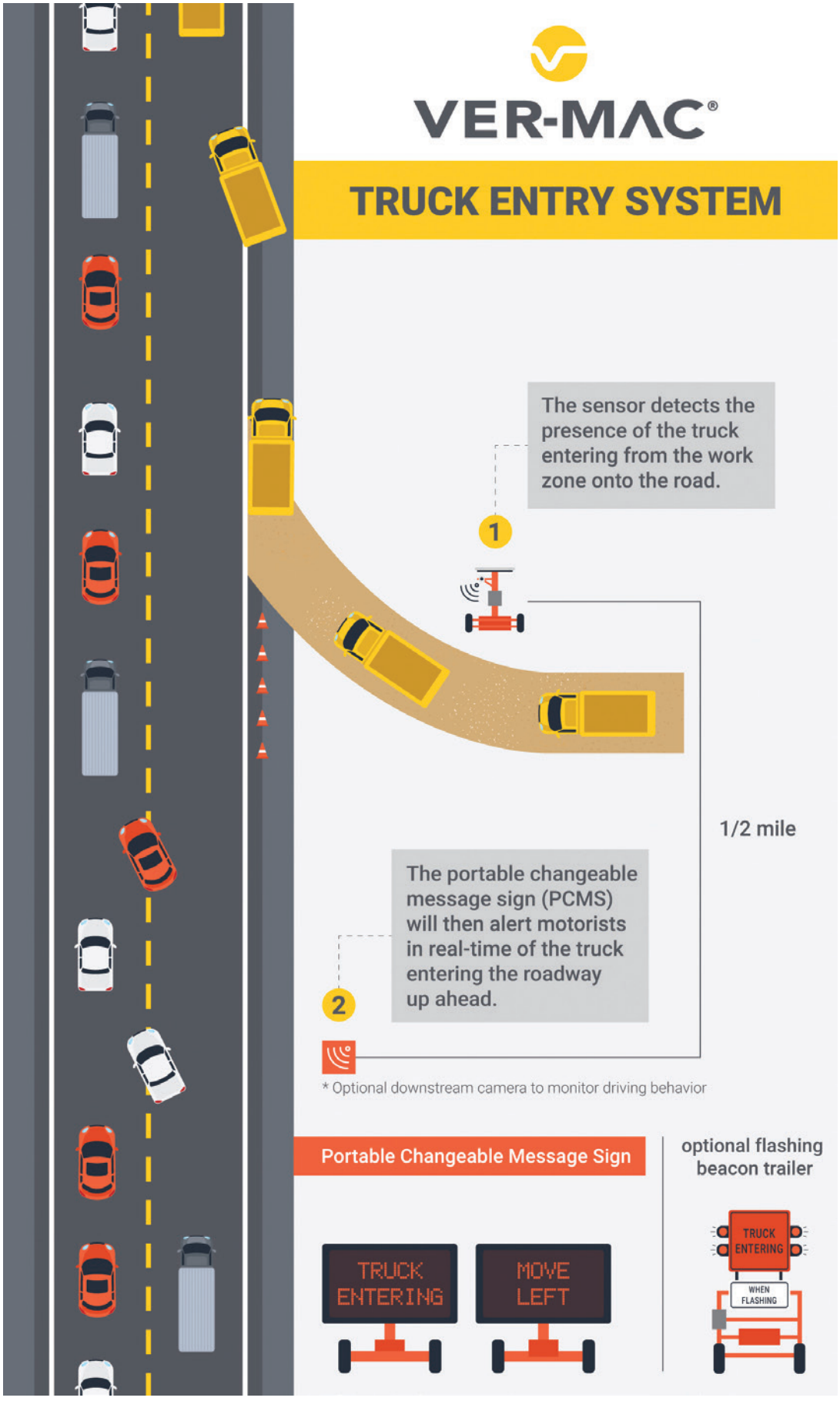
- Portable non-intrusive traffic sensors
- Fully automated system that detects construction Vehicles as they move into the acceleration lane of the highway
- Smart portable message board to alert motorist trucks entering the roadway
- Optional Flashing Beacon Receiver Trailer
- JamLogic software for system monitoring & reporting



Warning trailer

TRUCK ENTRY SYSTEM BENEFITS:

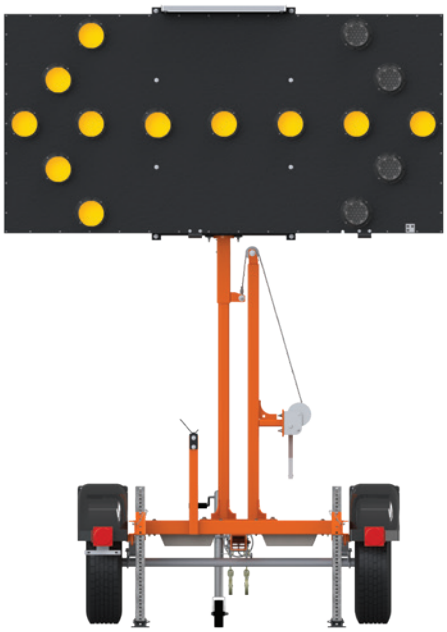
- **IMPROVED MOTORIST & WORKER SAFETY**
  Minimize rear-end collisions with construction vehicles and chain reaction collisions
- **ENHANCED MOBILITY**
  Motorists see the activated message and slow or move out of the entry lane
- **VALUE-ADDED INFORMATION**
  History of activation with date & time for DOT analysis


VER-MAC®
TRUCK ENTRY SYSTEM
The sensor detects the presence of the truck entering from the work zone onto the road.
1
1/2 mile
The portable changeable message sign (PCMS) will then alert motorists in real-time of the truck entering the roadway up ahead.
2
* Optional downstream camera to monitor driving behavior
Portable Changeable Message Sign
TRUCK ENTERING
MOVE LEFT
optional flashing beacon trailer
TRUCK ENTERING
WHEN FLASHING

SMART ARROWBOARD

ASK FOR A QUOTE

Ver-Mac has been working with key partners in the industry to develop a Smart Arrow Board to provide key lane closure information to government agencies and the motoring public. Short term lane closures are set up on highways everyday impacting traffic and motorists commute. The Smart Arrow Board will allow government agencies to be proactive instead of reactive to unexpected lane closures.



SMART ARROWBOARD OBJECTIVES:

- Provide government agencies with arrowboard lane closure information
- Provide record of arrowboard activation and history
- Provide GPS location of all arrowboards in field
- Provide more accurate information about closures to 3rd party data and connected vehicles

SMART ARROWBOARD APPLICATIONS

- Work zone that has a lane closure with arrowboard
- Utility and maintenance crews
- Rolling lane closures
- Nighttime asphalt paving & bridge closures

SMART ARROWBOARD FEATURES

MINIMUM REQUIREMENT

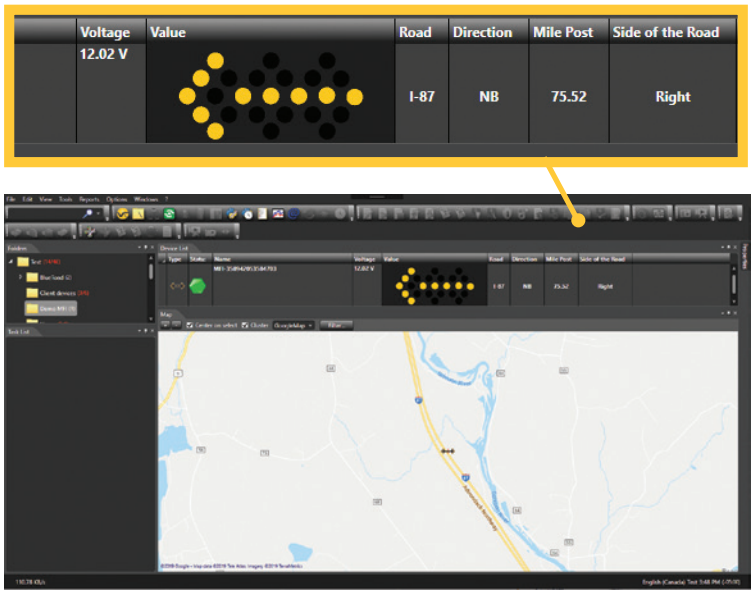
- Lane closure start location
- GPS location
- Position of the arrow sign (deployed or in transport mode)
- Direction of the Arrow sign
- Mode displayed on Arrow sign

VER-MAC ADVANCED FEATURES

- Road name where deployed
- Mile marker where deployed
- Direction of the traffic
- Side of the Road where deployed
- Activity log (where, which mode, on/off, deployed)

SMART ARROWBOARD BENEFITS:

- **IMPROVED SAFETY**
  Government agencies and TMC know where all closures are located to enhance safety
- **ENHANCED MOBILITY**
  Government agencies can proactively manage traffic conditions to the motoring public
- **TRANSPARENT TECHNOLOGY**
  Information can be sent to 3rd party data for enhanced travel information
- **WORK ZONE CLOSURE DATA**
  Government agencies have a history of work zone locations, direction (north/south bound, and duration)



WORK ZONE LOCATION SENSORS

ASK FOR A QUOTE

Ver-Mac has been working with key partners in the industry to develop a Work Zone Location Sensor System to provide the start and end of every work zone to government agencies and the motoring public. WZLS can be combined with Ver-Mac's Smart Arrow Board.

WORK ZONE LOCATION SENSOR OBJECTIVES:

- To provide government agencies and TMC's accurate data of where work zones begin and end
- To provide GPS location, roadway name and roadway direction of traffic

WORK ZONE LOCATION SENSOR APPLICATIONS

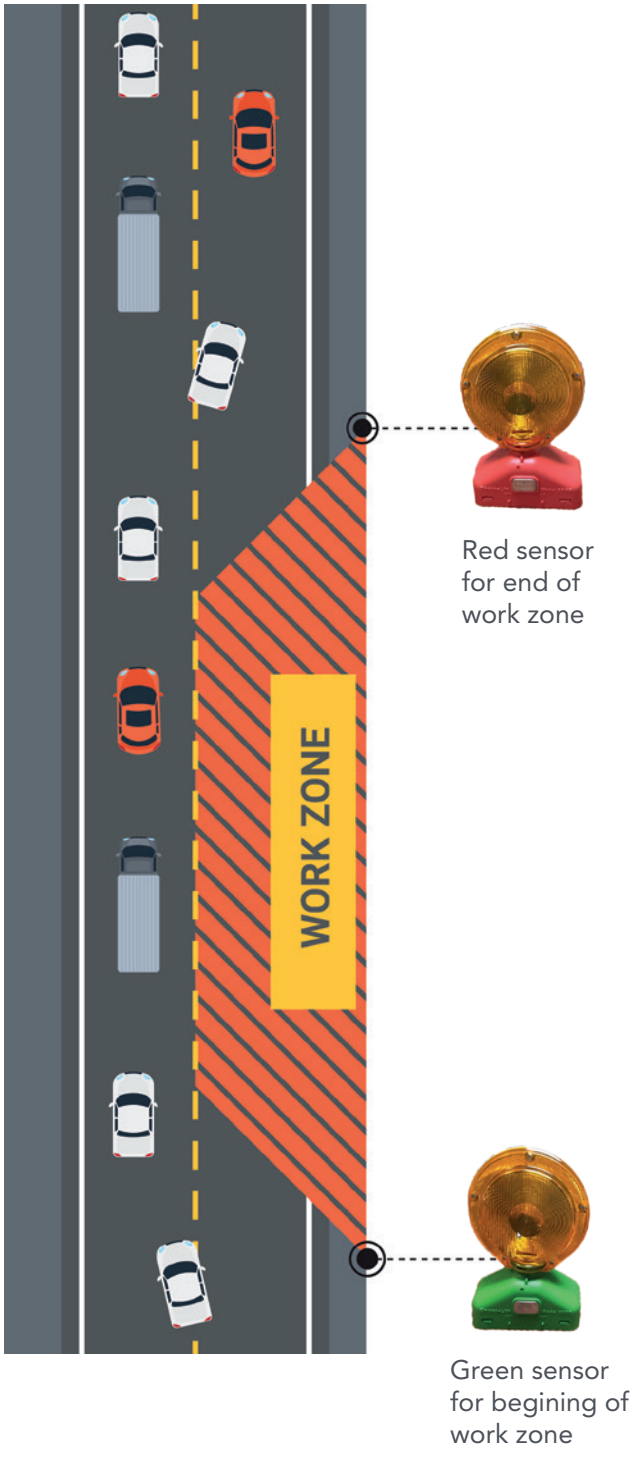
- Any work zone, short or long term
- Utility and maintenance crews
- Rolling lane closures
- Nighttime asphalt paving & bridge closures

WORK ZONE LOCATION SENSOR FEATURES

- Work Zone Start and End Location
- GPS Location
- Road name where the Work Zone Starts and Ends
- Mile marker where the Work Zone Starts and Ends
- Direction of the traffic

WORK ZONE LOCATION SENSORS BENEFITS:

- **IMPROVED SAFETY**
  Government agencies and TMC know the beginning and end of all work zones
- **ENHANCED MOBILITY**
  Government agencies can proactively manage traffic conditions to the motoring public
- **TRANSPARENT TECHNOLOGY**
  Information can be sent to 3rd party data for enhanced travel information
- **WORK ZONE CLOSURE DATA**
  Government agencies have a history of work zone locations, direction (north/south bound, and duration)
- **SMART ARROWBOARD COMPATIBLE**
  The Smart Arrowboard can be used as the Start of the work zone system or within the system to identify lane closures.



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CERTIFIED BNQ ISO 9001:2015 SYSTEM

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