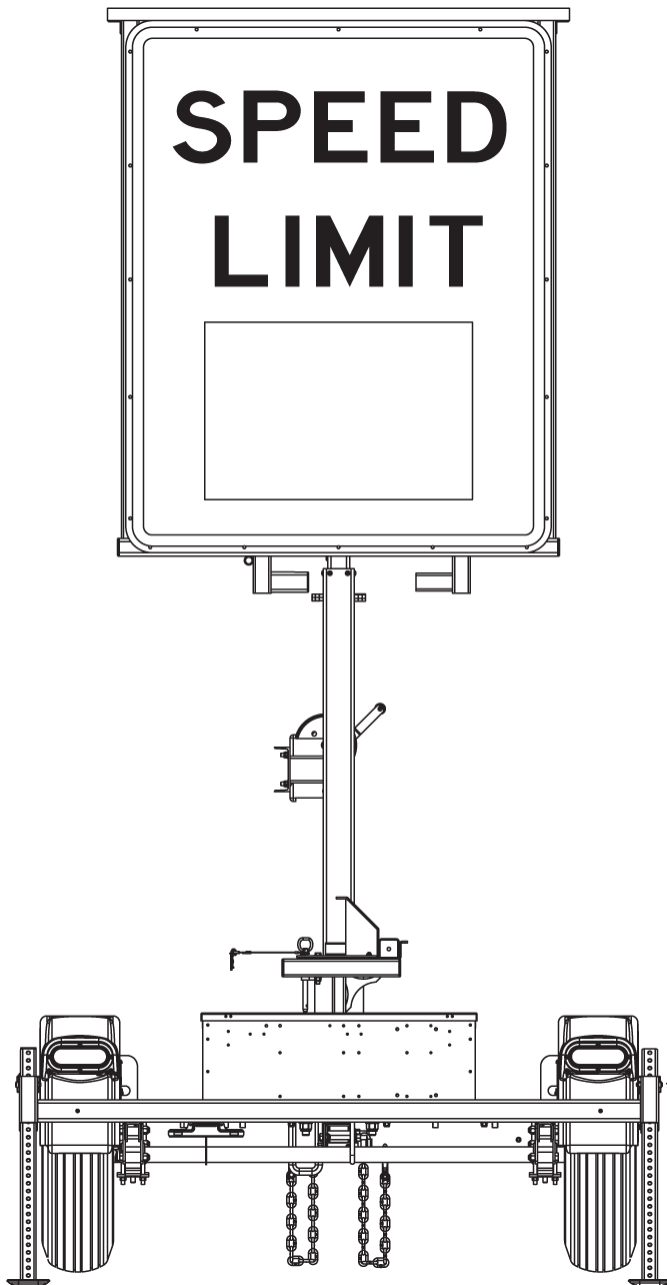


# VARIABLE SPEED-LIMIT TRAILERS

MODEL WVSL  
PRODUCT SPECIFICATIONS | DECEMBER 2019



## 1. SYSTEM

- 1.1. Description
- Variable speed limit signs provide dynamically changeable speed limit notification to motorists on a brightly lit, highly visible display panel. Wanco Variable Speed Limit Trailers add flexibility to this strategy, being both portable and self-powered. They are easy to deploy and require no permanent installation or wiring.
- Wanco Variable Speed-Limit Trailers display a changeable speed limit on a sign that mimics the look of a regulatory speed limit sign. A large LED display panel substitutes for static speed limit numbers. The display is capable of showing white numbers on a black background and black numbers on a white background.
- When deployed on highways and other high-speed arterials as a component of an active traffic management (ATM) system, the transportation department can change the displayed speed to accommodate changes in conditions due to weather, incidents, work zone activity, and other traffic events. Speed limits can be either regulatory or advisory. Broadcast capability is built in.
- The display panel remains vertical at all times, raised and lowered on a vertical tower that allows the display to be rotated for orienting toward traffic without moving the trailer. When the tower is lowered for transport or storage, the display panel rests in a cradle that keeps it secure.
- Power is provided by batteries, which are charged by an automated solar charging system.
- 1.2. Model
- 1.2.1. WVSL-36 Variable speed-limit trailer with 36x48-inch regulatory sign
- 1.2.2. WVSL-48 Variable speed-limit trailer with 48x60-inch regulatory sign
- 1.3. Temperature limits Operating temperature, -40 to 212°F (-40 to 100°C)
- 1.4. Standards Compliant in accordance with:
- |                         |   |
|-------------------------|---|
| MUTCD, December 2009    | §2A.18, Mounting Height   |
| ITE Standard, June 2007 | §5.82, Nighttime Dimming; §6.4.3, Environmental Tests; §6.4.6.3, Electronic Noise |
| FCC                     | Title 47, Part 15 (47 CFR 15)   |

## 2. FEATURES

- 2.1. Setup
- Portable system is easy to transport and deploy
  - Heavy-duty hand-winch with safety brake allows one person to raise display panel
  - Tower with speed-limit sign rotates for optimal positioning
  - Lock-pin holds tower in place during operation
  - Stabilizer legs raise tires off the ground to provide stability in high wind

- 2.2. Operation
- Large regulatory speed limit sign with electronic speed display
  - Electronic display features high-output bright white LEDs
  - Displayed speed can be either white on black or black on white
  - Visors and shades over LEDs produce superior visibility
  - Electronic display has automatic dimming
  - Remote and local control
  - Selectable speed limit
  - Internal clock facilitates built-in schedule programming
  - Full-color touchscreen controller with high-resolution display
  - Controller mounted to display panel frame for eye-level programming
  - Weather-resistant control box cover has lockable latches
  - See-through design puts pedestrians in view
  - Meets MUTCD
- 2.3. Power system
- Battery powered and solar charging
  - Energy-efficient operation results in long run times
  - Solar panel charges batteries automatically without intervention
  - Charging system shuts down when batteries are fully charged, preventing damage
  - Unique system allows battery charging with solar panel or commercial power
  - Battery box can be locked to prevent unauthorized access
- 2.4. Maintenance
- Individual display modules can be replaced easily
  - Standard trailer tires
  - Heavy-duty bolt-on fenders can be replaced if damaged
  - Durable powder-coat finish resists the elements
- 2.5. Application
- Common applications include:
- Highways and other high-speed arterials
  - Frequently congested areas
  - Areas with managed lanes and other ATM implementations
  - Integration with existing traffic management systems
  - Roadwork zones

### 3. DISPLAY

- 3.1. Speed display
- Shows either white numbers on a black background, or black numbers on a white background
- One, two or three digits, from 5 to 140 in increments of 5
- Format and numbers are selectable
- One font, 6" x 18" (16 x 47cm), W x H

### 3.2. Cabinet

- 3.2.1. Description                    Display cabinet contains all electronics and controls  
Door on front of cabinet provides access to interior  
Hinged control-console door on back provides access to controls
- 3.2.2. Size                            36" x 36" x 5" (91 x 91 x 12cm)
- 3.2.3. Height                        When deployed, 84" (213cm) from ground to bottom of regulatory sign
- 3.2.4. Material                      Aluminum alloy sheet, 0.06" (1.58mm) thick
- 3.2.5. Construction                Forms wrap around top, side, back and bottom of cabinet
- 3.2.6. Door                            Rigid door frame, hinged at top and latched at bottom, stays opens for easy maintenance;  
latches accept user-supplied padlocks
- 3.2.7. Finish                        Oven-baked, white powder-coat finish to ensure durability and corrosion protection.  
Assemblies are bead-blasted and then run through a five-stage, high-pressure phosphate-wash prior to application of the finish coat.
- 3.2.8. Window                      Polycarbonate resin thermoplastic window installed in door frame, UV-resistant,  
0.156" thick
- 3.2.9. Location                      Mounted to welded steel frame on tower, behind speed limit sign

### 3.3. Display matrix

- 3.3.1. LEDs                        Technology                      AlInGaP II (aluminum indium gallium phosphide) technology,  
T-1 $\frac{3}{4}$  size, through-hole auto-insertion
- Color                                White
- Current                            100 mA peak-pulsed forward current
- 3.3.2. Pixels                        Description                      Two LEDs form a "pixel"
- Viewable matrix                22 pixels wide by 15 high, 294 pixels total
- Pixel size                        0.5" x 0.5" (12.7 x 12.7mm)
- Pixel pitch                        34mm, horizontal and vertical
- 3.3.3. Lenses and visors        Each pixel has a snap-in optical lens over the LEDs, enhancing the brightness and  
angularity of each pixel while reducing power consumption.
- A polycarbonate visor shades each row of pixels to eliminate glare caused by direct sun  
exposure. The sunshades snap onto the display module without tools. The lenses snap  
into the sunshades.
- These enhancements enable the speed display to conserve power and operate with high  
efficiency.

- 3.3.4. Viewing angle Total viewing area with optical lenses, 50 degrees
- 3.3.5. Brightness Factory preset for optimal visibility and power consumption
- 3.3.6. Auto dimming Two photocells detect ambient light on the speed display; the system automatically adjusts the brightness of the LEDs accordingly, dimming display brightness in darkness, increasing to full brightness in daylight  
  
Photocells are mounted inside the display cabinet, one facing rear and one facing front  
  
Auto dimming is unaffected by temporary light sources such as vehicle headlights
- 3.3.7. Software design
  - Driver LEDs controlled through 30mA pulse-width modulation design
  - Addressing Each display module address is selected through a software command; no DIP switches are used. The address does not change until reprogrammed.

#### 4. SPEED LIMIT SIGN

- 4.1. Description Speed limit sign mimics the appearance of standard R2-1 regulatory sign  
  
Cutout in reflective coating accommodates electronic display
- 4.2. Sign size Sign size dependent on trailer model
  - Small 36" x 48" (91 x 122cm), W x H
  - Large 48" x 60" (122 x 152cm), W x H
- 4.3. Cutout size 30" x 20" (76 x 51cm), W x H
- 4.4. Material Aluminum sheet, 0.080" (2mm) thick, with high-intensity reflective coating
- 4.5. Location Mounted to welded steel sign frame, in front of electronic display

#### 5. LOCAL CONTROL SYSTEM

- 5.1. Description Self-contained onboard computer, comprised of a power control unit (PCU), located behind display modules inside the electronic display cabinet; and a display control unit (DCU), located inside control box on the back of the electronic display cabinet.
- 5.2. Control box
  - 5.2.1. Size 12.3" x 11.7" x 5.3" (31.2 x 29.7 x 14.4 cm) W x H x D
  - 5.2.2. Material 0.08" aluminum
  - 5.2.3. Door Front-panel is a door, hinged on the left, which opens fully
  - 5.2.4. Latches Two quarter-turn latches on front of control box door keep hinged door closed. Both latches are keyed and can be locked.

5.2.5.	Finish	Control box and door are coated with oven-baked, equipment-white powder-coat finish to ensure durability and corrosion protection. Assemblies are run through a five-stage, high-pressure phosphate-wash prior to application of the finish coat.	
5.2.6.	Rating	Weather-resistant, comparable to IP55	
5.3.	Control panel		
5.3.1.	Touchscreen	Display	Full color, backlit, 7-inch display Capacitive touch panel 800 x 480 pixels, W x H Display automatically shuts off after 20 minutes of inactivity
		Interface	Menu-based structure, accessed with virtual buttons on the touchscreen display, provides access to all sign functions including programming messages Virtual keyboard appears when required for text entry Multi-level password protection restricts access
5.3.2.	LED indicators	Indicates the following status conditions: Solar charging system is charging batteries System power shutdown occurred Programmed schedule is active Power to optional radar device is on	
5.3.3.	Data port	1 USB port for local downloading of data from optional traffic data collector (if installed) and software updates See “Options and Optional Equipment” for data collector	

## 6. REMOTE COMMUNICATIONS

6.1.	Purpose	Enables the variable speed limit display to be controlled from remote locations away from the sign, using an Internet-connected computer, tablet, or smartphone	
6.2.	Interface		
6.2.1.	TMS	Can be integrated with existing DOT or other traffic management systems	
6.2.2.	Wanco Fleet Manager	Description	Internet browser interface for managing remote controlled equipment; web-based application, no software installation

		Features	Add or remove equipment to/from groups for quick access, ideal for managing contractor rentals or entire projects  Map GPS locations of entire fleet of signs simultaneously  Record vital information from signs, such as speed limit changed by user and date, battery and solar voltages, and equipment alarms  Mass broadcast capability
		Requirements	Modern standards-compliant Web browser with JavaScript enabled  A platform (computer or mobile device) that supports such a browser  Internet connection
6.3.	Modem		Compact industrial 4G LTE modem with GPS  See "Options and Optional Equipment" for modem options
6.4.	Cellular plan	Plan	Wanco Cellular Service  See "Options and Optional Equipment" for optional plans
		Description	Cellular service through Wanco. No activation charges, monthly payments, or overage charges. User makes a single payment annually to Wanco.
		Carrier	Verizon

## 7. TRAILER

7.1.	Frame		
7.1.1.	Construction		All welded structural steel
7.1.2.	Tie-downs		Two tie-down loops at the front corners of the trailer frame One tie-down loop centered at rear of trailer frame
7.1.3.	Finish		Frame is coated with oven-baked, safety-orange powder-coat finish to ensure durability and corrosion protection. Assemblies are bead-blasted and then run through a five-stage, high-pressure phosphate-wash prior to application of the finish coat.  See "Options and Optional Equipment" for color options.
7.2.	Fenders		Round, full wheel coverage, bolted to trailer frame, removable and replaceable
7.3.	Axle assembly		Tubular, 2000 lb (907.2kg) capacity, 5 on 4.5" B.C. idler hub
7.4.	Springs		Double-eye leaf springs, 1200 lb. (544.3kg) capacity for each spring
7.5.	Tires		ST205/75D15 steel-belted trailer tires, load rating B

- 7.6. Drawbar
  - 7.6.1. Construction Telescopes inside receiver sleeve welded under trailer frame. Removable for shipping and for added theft protection if needed. Secures with two 1/2-inch diameter bolts.
  - 7.6.2. Material 3" (7.62cm) square steel tubing, 3/16" (0.476cm) wall
  - 7.6.3. Jack Top-wind swivel, 2000 lb (907kg) capacity, steel footpad, 10" (25cm) total travel
  - 7.6.4. Tow hitch Standard 2" ball coupler tow-hitch, SAE Class 2, 3500 lb (1588kg) capacity, bolted to drawbar, removable and replaceable  
  
See "Options and Optional Equipment" for tow-hitch options
  - 7.6.5. Tow chains Two high-test proof coil chain assemblies with clevis slip hooks for towing. Chains attached to drawbar with quick connectors.  
  
Material diameter 0.406" (10.3mm)  
  
Working load limit 5400 lbs. (2450kg)  
  
Breaking force 16,200 lbs. (72kN)
- 7.7. Stabilizer legs
  - 7.7.1. Description Four stabilizers, one on each corner of trailer frame, extend downward from front and rear of trailer at an angle, increasing footprint size when deployed
  - 7.7.2. Adjustment Stabilizers slide up and down in sleeves, adjustable in 1" (2.54cm) increments, held in place by 3/8" (0.95cm) wire lock pin. A lanyard ties each pin to the trailer frame.
  - 7.7.3. Material
    - Leg Perforated 1¾" sq. steel tube, 12ga wall, zinc plated
    - Footpad 4" x 6" (10 x 15cm) steel, zinc plated, all edges turned up
- 7.8. Wiring
  - 7.8.1. Description Wiring to connect tow vehicle and trailer for trailer taillights is installed inside drawbar, with pigtailed and connectors at both ends; no crimping required
  - 7.8.2. Trailer plug A sealed, molded, 4-square connector plugs into harness under trailer
  - 7.8.3. Tow-vehicle plug Two-piece assembly with 4-flat molded connector on harness plugs into tow vehicle  
Meets SAE J1239  
  
See "Options and Optional Equipment" for tow-vehicle plug options
  - 7.8.4. Protection All trailer wiring encased in UV protective loom, and attached with P-clamp riveted to trailer frame; no exposed wires
- 7.9. Taillights Two oval-shaped, sealed, LED, combination stop, turn and taillights integrated with fenders



- 7.10. Reflectors Two red reflectors on rear trailer frame  
See "Options and Optional Equipment" for reflective tape
- 7.11. License plate Lighted license plate holder is mounted under rear of trailer frame
- 7.12. Tower assembly
- 7.12.1. Function Sign and electronic display are raised and lowered on a telescoping tower
- 7.12.2. Tower construction Multiple sections of square steel tubing with each section telescoping inside the next larger section.  
Nylon guide blocks keep the sections tight, eliminating the need for greasing the tower and preventing dirt from building up on the inner tower section. Dirt would cause performance problems and maintenance issues.
- 7.12.3. Swivel base A steel tubular weldment is bolted to the trailer frame. The outer tower section rotates on a thrust bearing and washers inside the swivel base, reducing rotating friction.
- 7.12.4. Finish Lower tower section and swivel base are coated with oven-baked, safety-orange powder-coat finish to ensure durability and corrosion protection. Assemblies are run through a five-stage, high-pressure phosphate-wash prior to application of the finish coat.  
Upper tower sections are zinc-plated for corrosion resistance.  
See "Options and Optional Equipment" for color options.
- 7.12.5. Height lock Locking pin inserted through the tower in the up position prevents the tower from falling if the winch cable were to fail
- 7.12.6. Winch assembly
- |          |  |
|----------|--|
| Function | Hand-operated winch raises and lowers tower  |
| Capacity | 1500 lb (680kg)  |
| Brake    | Safety friction-brake prevents tower from falling if operator loses grip on winch handle |
| Cable    | 1/4" (6.35mm) diameter galvanized aircraft cable   |
- 7.12.7. Rotation Tower and sign assembly rotates by hand, pivoting 360 degrees
- 7.12.8. Rotation lock Locking pin inserted into horizontal plate mounted to tower prevents tower from rotating
- 7.12.9. Sight tube A sight tube for aiming the sign in desired direction is mounted to the underside of the sign frame
- 7.12.10. Storage When lowered for storage and transport, the sign frame (with electronic display and speed limit sign attached) rests in a support cradle, parallel to the trailer length

## 8. POWER SYSTEM

- 8.1. Description Electronics powered by batteries, which are charged automatically with integrated solar charging system
- 8.2. Battery box
  - 8.2.1. Function Holds batteries and remote charger  
See “Options and Optional Equipment” for heavy-duty secure battery box
  - 8.2.2. Construction Riveted all-steel construction  
All parts phosphate-washed and powder-coated prior to assembly  
Divider panel inside box separates batteries from electronics  
Louvers provide ventilation  
Latches keep cover closed and can accept user-supplied padlocks
  - 8.2.3. Mounting Unobstructed location, centered over axle at rear of unit on structural deck
- 8.3. Batteries
  - 8.3.1. Type Group 24 deep-cycle batteries, wired in parallel and series for a 12-volt system  
See “Options and Optional Equipment” for battery options
  - 8.3.2. Quantity Four
  - 8.3.3. Voltage 6Vdc each
  - 8.3.4. Weight Approx. 60 lb (26kg) each
  - 8.3.5. Capacity 430 Ah total capacity @ 12Vdc
- 8.4. Remote charger
  - 8.4.1. Function Plugs into a standard commercial power source to recharge batteries if battery voltage drops due to lack of sun for automated solar charging system
  - 8.4.2. Type 12-volt battery charger
  - 8.4.3. Location Inside battery box, mounted to divider panel on opposite side from batteries
  - 8.4.4. Output capacity 15A
  - 8.4.5. Output voltage 13.2Vdc range “float” mode  
13.6Vdc range “absorption” mode  
14.2Vdc range “bulk” mode
  - 8.4.6. Input voltage 105 to 135Vac, standard three-prong plug

8.4.7.	Input frequency	50 to 60 Hz
8.4.8.	Protection	Automotive-style replaceable fuses
8.5.	Solar	
8.5.1.	Panels	One high-efficiency multi-crystal photovoltaic solar module
8.5.2.	Location	Above speed-limit sign, no shadowing effect on any trailer component. Solar panel lies flat; rises and rotates with display panel.
8.5.3.	Power	100W See “Options and Optional Equipment” for solar options
8.5.4.	Current	5.81A max. system current 6.39A open short-circuit current
8.5.5.	Voltage	17.2Vdc max. 21.6Vdc open short-circuit voltage
8.5.6.	Voltage regulation	Solar panels regulated by sign control system
8.5.7.	Security	Solar panel bolted to mounting frame with security screws and special security nut

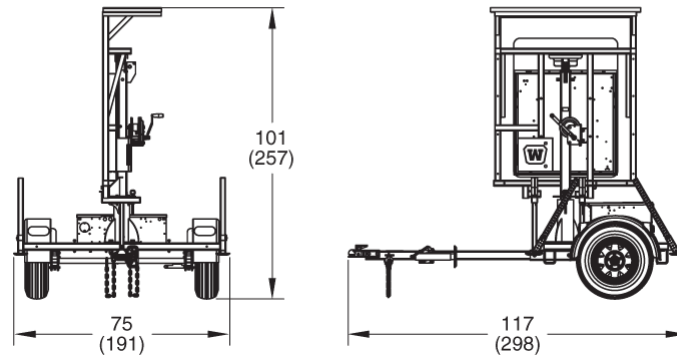
## 9. DIMENSIONS & WEIGHT

### 9.1. Dimensions

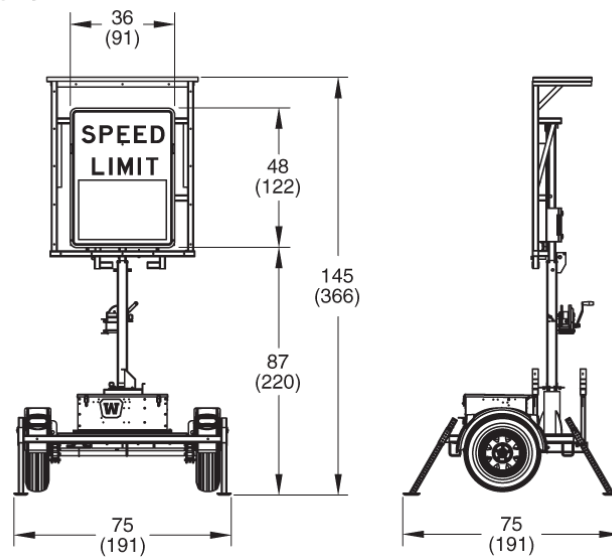
#### 9.1.1. Small sign

*inches  
(cm)*

##### Travel position



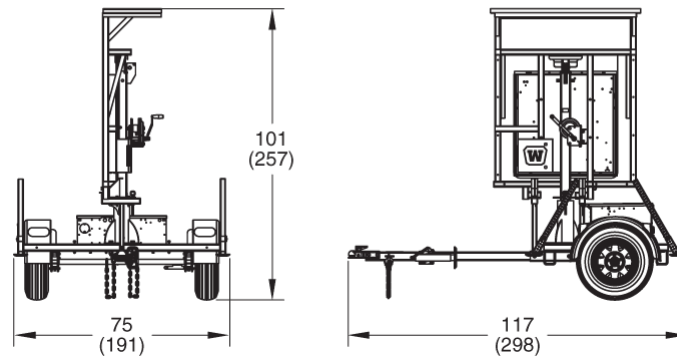
##### Deployed



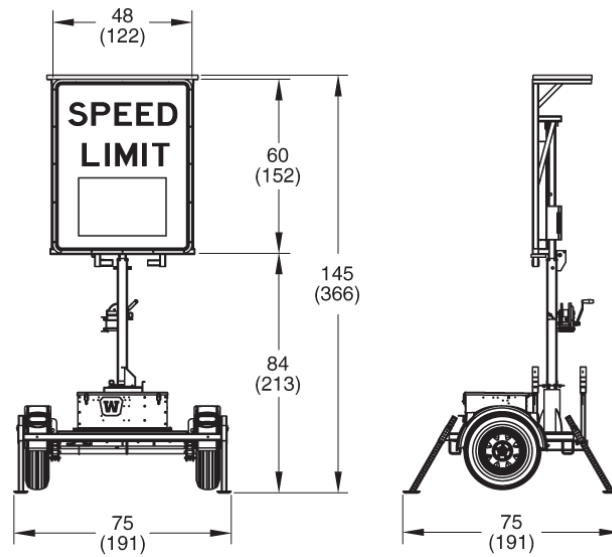
9.1.2. Large sign

inches  
(cm)

Travel position



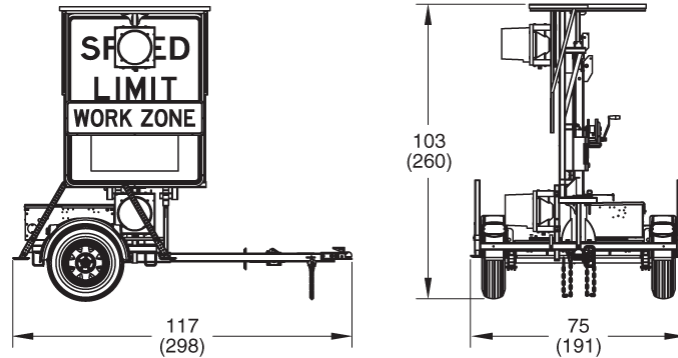
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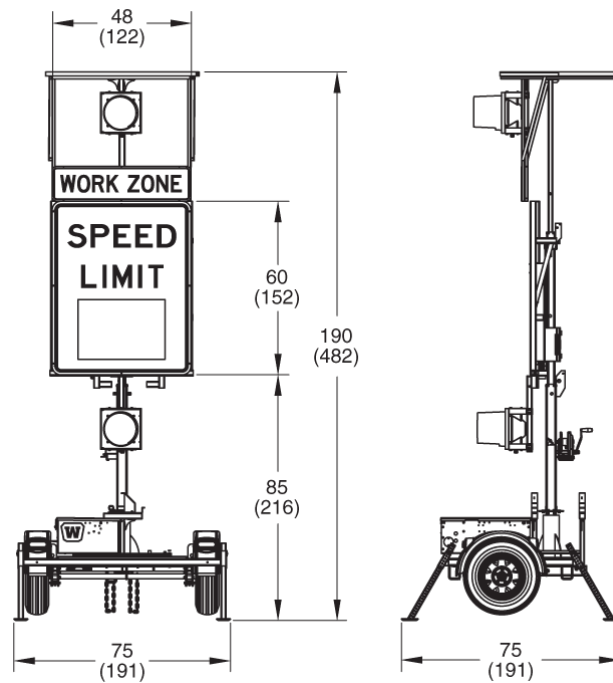
9.1.3. Large sign with top/bottom beacons

*inches  
(cm)*

Travel position



Deployed



9.2. Weight Approx. 1600 lb (726kg)

## 10. OPTIONS AND OPTIONAL EQUIPMENT

### 10.1. Remote communications

- 10.1.1. Modem Contact factory for latest available optional modems
- 10.1.2. Cellular plan User-provided cellular data plan replaces standard Wanco Cellular Service.  
User obtains data plan from service provider and makes payments to provider. Wanco programs modem according to user-provided specifications at time of modem purchase. Wanco tests modem setup.

### 10.2. Beacons

- Amber beacon lights flash when a vehicle approaches the sign
- Options Two 8" LED signal lights, side-mounted, one on each side of trailer; includes increased solar capacity to 200 watts
- Two 12" LED signal lights, side-mounted, one on each side of trailer; includes increased solar capacity to 200 watts
- Two 12" LED signal lights, one mounted above and one below regulatory signs; includes increased solar capacity to 200 watts
- One PAR 46 12Vdc LED rear-facing beacon

### 10.3. Additional signs

- Add signage to sign frame with speed limit sign and electronic display
- Examples: "WORK ZONE" and "\$250 FINE"
- Contact factory with requirements

### 10.4. Tow hitch

- 10.4.1. Combo hitch Combo-hitch for 2-inch ball and standard lunette ring for pintle hook, 2½" ID x 1" cross-section
- 10.4.2. Lunette ring Options Standard ring for pintle hook, 2½" ID x 1" cross-section  
Heavy-duty ring for pintle hook, 3" ID x 1⅝" cross-section

### 10.5. Tow-vehicle plug

- A variety of adapters are available to allow the standard connector to plug into nearly any tow vehicle receptacle. Contact factory for details.

### 10.6. Ballasted trailer deck

- Structural deck adds 370 lb (168kg) to overall weight at base of trailer, creating a low center of gravity and improving stability

### 10.7. Stabilizer jacks

- Four swivel jacks replace stabilizer legs, mounted on corners of trailer frame

### 10.8. Power system

- 10.8.1. Additional batteries For geographic locations with less solar charging potential or colder weather, and for applications that require year-round charging, add batteries for greater capacity
- Option Add two Group 24 deep-cycle batteries, 215Ah additional capacity

- 10.8.2. **AGM batteries** Replace deep-cycle batteries with top-of-the-line absorbed glass mat (AGM) batteries
- Features
    - 100% maintenance-free
    - Sealed and spill-proof
    - Faster recharge and greater freeze resistance than conventional batteries
    - Contains less lead than conventional batteries
  - Options
    - Two 4D AGM 12Vdc batteries, 400Ah total capacity
    - Three 4D AGM 12Vdc batteries, 600Ah total capacity
  - Weight
    - Approx. 160 lbs. (72kg) each
- 10.8.3. **Charger** When required for added battery charging capacity, replace standard remote charger with higher amperage charger
- Option
    - 12Vdc, 45A charger
  - Details
    - Output voltage
      - 13.4Vdc @ full load
      - 13.6Vdc standard float voltage
      - 14.2Vdc with dual-voltage jack installed
    - Input voltage
      - 108 to 132Vac, standard three-prong plug
    - Input frequency
      - 50 to 60 Hz
- 10.8.4. **Solar** For geographic locations with less solar charging potential or colder weather, and for applications that require year-round charging, additional solar power is available; contact factory for details
- 10.8.5. **Secure battery box** High-security battery box features heavy-gauge steel lid, hidden hinges, and heavy-duty hidden-shackle padlocks. Replaces standard battery box.
- 10.9. Reflective tape** Reflective red-and-white conspicuity tape across rear trailer frame for increased visibility
- 10.10. Finish color** Specify power-coat color and, if applicable, color scheme. Factory may require sample paint chip for color matching.
- 10.11. Traffic Data Classifier System**
- 10.11.1. **Design** Data collector uses side-fire radar to log vehicles passing the sign. Radar-based device is nonintrusive, requires no loops or hoses, and causes no disturbance of traffic flow during installation or use.
  - 10.11.2. **Direction** Registers both approaching and departing vehicles
  - 10.11.3. **Traffic lanes** Most effective for 2-lane roads
  - 10.11.4. **Traffic count** Can record data for up to 5 million vehicles in internal memory
  - 10.11.5. **Data format** Speed, date, time, direction, length for each vehicle



10.11.6.	Units	English or metric
10.11.7.	Time stamp	Yr,Mo,Dy,Hr,Min,Sec
10.11.8.	Speed range	5 to 138 mph (8 to 222 km/h)
10.11.9.	Sensor	Microwave K-band 24.125 GHz
10.11.10.	Power supply	Speed-limit trailer batteries
10.11.11.	Power output	20 dbm (EIRP)
10.11.12.	Current	110 mA
10.11.13.	Internal memory	16GB
10.11.14.	Baud rate	9600, 8 bit, no parity
10.11.15.	Calibration	Calibration not required
10.11.16.	Regulatory rating	FCC part 15 class A, Canadian RSS-210
10.11.17.	Installation	Automatically positioned when trailer is level; adjustable bracket allows user to point toward traffic at a 45-degree angle
10.11.18.	Analytic software	Wanco Traffic Analyzer

**10.12. Radar-based speed monitoring system**

10.12.1.	Description	Radar senses the largest, nearest mass moving toward it. Measured speeds can be viewed remotely using Wanco Fleet Manager.	
10.12.2.	Sensor	Microwave K-band, approach-only	
10.12.3.	Enclosure	Radar head located below electronic display cabinet is sealed to withstand the elements	
10.12.4.	Standards compliance	FCC approved CE compliant	
10.12.5.	Distance range	1000 ft. (305 m)	
10.12.6.	Speed range	5 to 138 mph (8 to 222 km/h)	
10.12.7.	Accuracy	mph	±1 mph from 5 to 40 mph ±2 mph from >40 to 100 mph
		km/h	±1.6 km/h from 8 to 64 km/h ±3.2 km/h from >64 to 161 km/h
10.12.8.	Electrical protection	Fused and reverse-polarity protected	
10.12.9.	Calibration	Calibration not required	