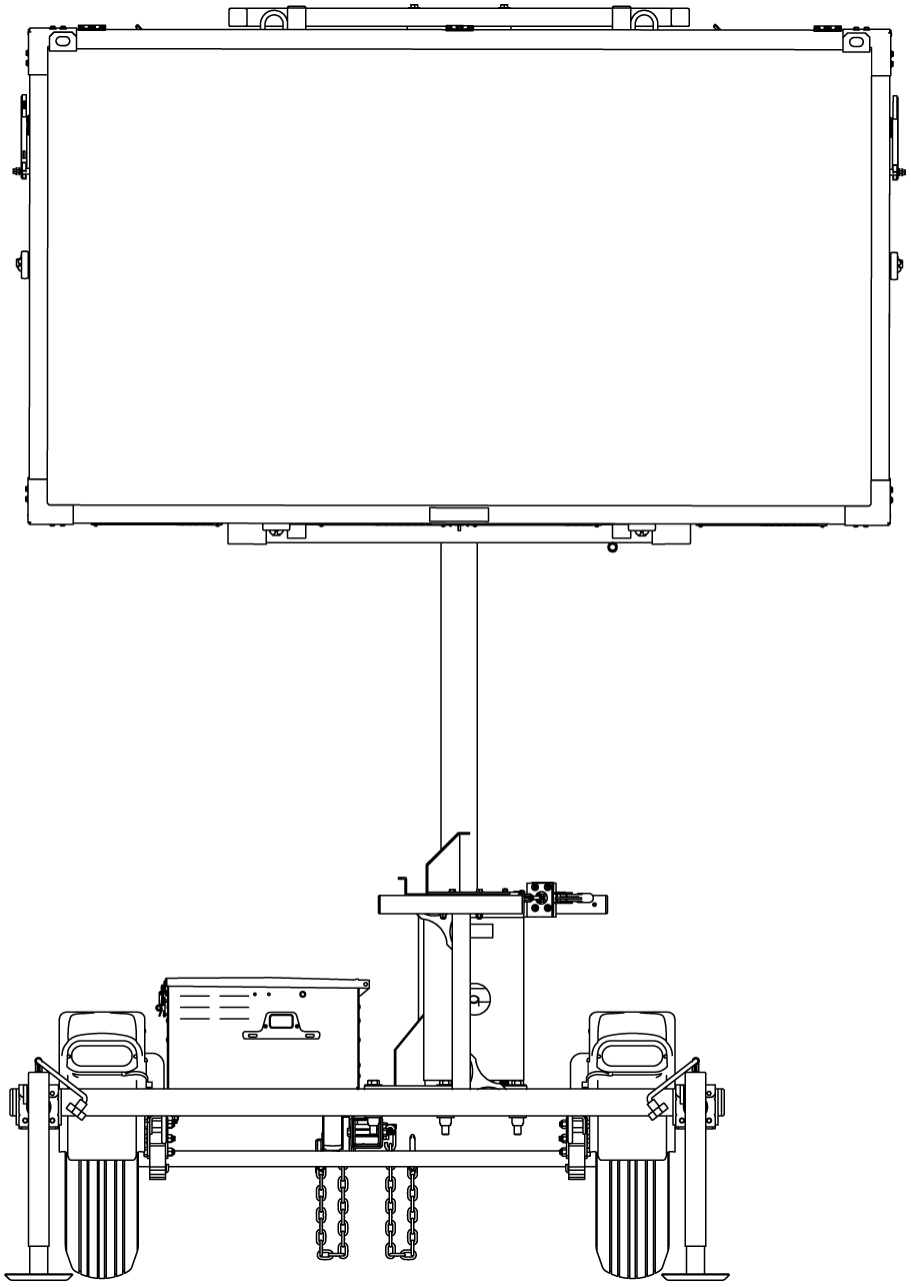
MINI MATRIX MESSAGE SIGNS

MODEL WVTM
PRODUCT SPECIFICATIONS | FEBRUARY 2022



1. SYSTEM

1.1. Description

Wanco® message signs provide information to the public on a large, legible LED display. These signs are portable and self-powered, requiring no permanent installation or wiring. Wanco Mini Matrix Signs are a compact version of Wanco's full-size variable message signs, about 30% smaller, making them highly maneuverable and easy to deploy.

The full-matrix display can present messages as text, graphics, or a combination of both. Messages are programmed using a self-contained onboard controller, making a laptop or external controller unnecessary. Signs come configured with preprogrammed standard messages, and users can create custom messages easily.

For optimal positioning, the sign rotates independent of the trailer and its height is fully adjustable. Jack-legs and optional outriggers provide adjustability and stability. The trailer is easy to maneuver and deploy, and can be towed by most vehicles.

Power is provided by batteries, which are charged by an automated solar charging system.

1.2. Models

1.2.1. WVTM(A) Mini matrix message sign with hydraulic lift

1.2.2. WVTM(B) Mini matrix message sign with hand-operated winch

1.3. Temperature limits

Operating	–29 to 165°F (–34 to 74°C)
Storage	–40 to 185°F (–40°C to 85°C)

1.4. Standards

Compliant in accordance with:

NTCIP Version 2

NEMA TS 4-2005 Section 2 for ambient temperature, vibration, shock, electro-static discharge (ESD), and radio interference

2. FEATURES

2.1. Setup

- Hydraulic lift or winch with cable raises sign display on tower
- Tower rotates 360 degrees for optimal positioning
- Single disk brake holds display in place during operation, while a cradle supports and holds display in travel position

2.2. Operation

- Self-contained onboard control system, no laptop required
- Full-color touchscreen controller with high-resolution display
- Multi-level password protection restricts access to control software
- Preprogrammed text messages, symbols and graphics
- Easily center each line of text
- Internal clock facilitates built-in schedule programming
- Multiple alphanumeric fonts
- Control box can be locked to prevent unauthorized access
- Optical lenses and sunshades increase visibility and performance

- Cooling fans protect sign cabinet from overheating
- Optional outriggers widen footprint for added stability
- NTCIP compliant

2.3. Power system

- Battery powered and solar charging
- Energy-efficient operation results in long run times
- Solar panels charge batteries automatically without intervention
- Charging system shuts down when batteries are fully charged, preventing damage
- Power system allows battery charging with solar panels or commercial power
- Cooling fan protects battery charger from overheating
- 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:

- Roadwork zones
- Traffic calming
- Road closures
- Emergency response
- Public events

3. DISPLAY

3.1. Cabinet

3.1.1. Description

Weather-resistant cabinet contains display modules and related electronics. Hinged door with full-size display window protects electronics and provides access for maintenance. Clasps hold door closed during operation and can be locked with user-supplied padlock.

Cabinet face is tapered five degrees downward (it is deeper at the top than at the bottom) to face traffic, reducing glare.

3.1.2. Size

96" x 55" x 12" (244 x 140 x 30cm)

3.1.3. Material

Aluminum sheet, 5052-H32, 0.062" (1.575mm) thick

3.1.4. Construction

Panels are riveted together, with internal ribs to add lateral strength

3.1.5. Door

Cabinet door is aluminum extruded frame with sheet metal corner brackets. Stainless steel butt hinges are bolted to top of cabinet and door.

Window is anti-glare Lexan® solar-grade polycarbonate, 0.150" (3.81mm) thick. Bulb-type weather seal ensures tight fit and seal between window and door frame.

When sign is in stored position, door fully opens to service the sign cabinet interior. Telescoping prop-slides, one on each side of the cabinet, hold door open.

3.1.6.	Finish		Cabinet and door are coated with oven-baked, flat-black, powder-coat finish to ensure durability and corrosion protection. Assemblies are high-pressure phosphate-washed prior to finish coat.
3.1.7.	Wiring		Wiring service loop from control box to display cabinet is routed inside liquid-tight loom and P-clamped to trailer frame. Service loop length is designed to allow 360-degree sign rotation. All wiring connectors and procedures are per CSA standards.
3.1.8.	Ventilation		Two cooling fans located at the top of the display cabinet circulate air into, through, and out of the cabinet to cool electrical components. A duct is located at the top of the cabinet to ensure even airflow. It is proven that electronic components, including LEDs, degrade in conditions of extreme heat. Without the cooling fans the display cabinet can reach over 200 degrees Fahrenheit. A temperature sensor is mounted on the photocell PC board inside the cabinet to control fan operation. Each fan has its own thermal settings, adjustable with the onboard computer, to optimize battery power usage.
3.1.9.	Storage		When lowered for storage and transport, the display cabinet rests in two support cradles, parallel to the trailer length, no locking pins required
3.2.	Display matrix		
3.2.1.	Description		The display matrix is comprised of a series of display modules laid out in a grid across the inside of the display cabinet. Each module has a matrix of LEDs installed on its face, which light up to show a portion of the configured message. Each module features the necessary electronics and coatings to ensure outstanding performance and durability.
3.2.2.	Display modules	Modular design	Allows any display module to be installed in any position in the matrix without repositioning DIP switches
		Wiring	Modules have quick-connect electrical connectors for easy servicing. All wiring terminates at a single terminal strip inside the display cabinet.
		Replacement	Each module can be exchanged in less than two minutes. The only tool needed is a 5/16-inch nut driver socket or slotted screwdriver After a new module is installed, a one-step initialization process causes each module to sense its position in the full-matrix display. Initialization is accomplished using the sign's controller.
		Size	14.2" (36.0cm) wide by 16.0" (40.6cm) high, nominal
		Material	FR4 glass-reinforced epoxy laminate, double-sided, black solder mask with white silkscreen Board thickness, 0.094" (2.388mm) Copper size, 1 oz (28.4g)

		Coating	5-mil, military-spec, low-VOC, silicone conformal coating (Dow Corning 1-2577) provides long-term protection against moisture and other atmospheric contaminants, resists corrosion and shorts due to high humidity
		Vibration mounts	All display modules are mounted on rubber vibration-isolation mounts, decreasing risk of physical shock during transport and isolating characters from chassis ground
		Humidity limits	Conformal coating rated to 95% relative humidity
3.2.3.	Pixels	Four LEDs form a “pixel”	
		Pixel size	0.75" x 0.75" (19 x 19mm)
		Full matrix	48 x 27 pixels (W x H), 1296 pixels total
		Display module	8 x 9 pixels (W x H), 72 pixels total
		Pixel pitch	47mm, horizontal and vertical
3.2.4.	LEDs	Technology	AlInGaP II (aluminum indium gallium phosphide) technology, T-1¾ size, through-hole auto-insertion
		Color range	Amber, 589.5 to 592 nm
3.2.5.	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 message sign to operate with approximately half the power consumption of other message signs. As a result, the system is fully functional using fewer solar panels and batteries, while providing outstanding brightness and readability in all lighting conditions, and 30-day battery autonomy without sun. Reducing the number of solar panels and batteries also lowers the trailer weight and reduces maintenance costs.	
3.2.6.	Visibility	At least 1 mile (1.6km)	
3.2.7.	Legibility	Word recognition with default font, 611 to 702 ft (186 to 214m)	
3.2.8.	Viewing angle	Total viewing area with optical lenses, 44.2 to 48.8 degrees	
3.2.9.	Brightness	Factory preset for optimal viewing and power consumption	
3.2.10.	Auto dimming	Two photocells detect ambient light on the message sign; the message sign computer adjusts the brightness of the LEDs accordingly, dimming display brightness in darkness, increasing to full brightness in daylight Photocells are mounted inside the sign cabinet, one facing rear and one facing front	

3.2.11.	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, preventing the message from shifting due to an individual module failure.
		Pixel test	Each module is equipped with individual pixel failure notification
3.2.12.	Fonts	12 fonts	
		See Exhibit A for font samples and additional font information	
		Default size	5 x 7 pixels (W x H), 8.85" x 12.55" (225 x 319mm)
			3 lines of 8 characters per line, maximum
		Smallest size	4 x 5 pixels (W x H)
		Largest size	11 x 23 pixels (W x H)
		Other sizes	See Exhibit A

4. CONTROL SYSTEM

4.1.	Description	Self-contained onboard computer, comprised of a power control unit (PCU), located behind display modules inside the message sign display cabinet; and a display control unit (DCU), located inside control box on the back of the message sign display cabinet.
4.2.	Control box	
4.2.1.	Size	12.3" x 11.7" x 5.3" (31.2 x 29.7 x 14.4cm) W x H x D
4.2.2.	Material	0.08" aluminum
4.2.3.	Mounting	Securely fastened to the sign cabinet with six mounting screws
4.2.4.	Door	Front-panel is a door, hinged on the left, which opens fully
4.2.5.	Latch	Two quarter-turn latches on front of control box door keep hinged door closed. Both latches are keyed and can be locked.
4.2.6.	Finish	Cabinet and door are coated with oven-baked, equipment-white, powder-coat finish to ensure durability and corrosion protection. Assemblies are high-pressure phosphate-washed prior to finish coat.

4.3.	Control panel		
4.3.1.	Touchscreen	Display	Full color, backlit, 7-inch display
			Capacitive touch panel
			800 x 480 pixels, W x H
			Display automatically shuts off after 10 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
4.3.2.	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	
4.3.3.	Data port	One USB port for uploading custom messages, updating message sign software, and downloading data from the optional traffic data collector (if installed; see “Options and Optional Equipment”)	
4.4.	PC boards		
4.4.1.	Coating	100% coated with military-spec, low-VOC, silicone conformal coating to provide long-term protection against moisture and other atmospheric contaminants. Resists corrosion and shorts due to high humidity.	
4.4.2.	Humidity limits	Conformal coating rated to 95% relative humidity	
4.5.	Serviceability	Four plunger panel latches allow the control panel to be removed, providing access to internal components inside control box; PCU is accessible by removing display modules inside message sign display cabinet.	
		All wiring connections have quick-connect plugs.	
4.6.	Controller software		
4.6.1.	Standards	Fully NTCIP-compliant	
4.6.2.	Security	Three levels of password protection	
4.6.3.	Message programming	Instant access to program new messages	
		Extremely easy to program	
		WYSIWYG (What You See Is What You Get) while programming	

4.6.4.	Message types	Quick-message	Easy quick-message activation
		Permanent	Over 90 preprogrammed permanent messages, including arrows and FHWA standards
		Changeable	250 changeable messages stored in NV flash
		Blank	Easy sign blanking/power off
4.6.5.	Text alignment	Selectable: left, center, or right; and top, middle, or bottom	
4.6.6.	Fonts	Selectable: see Exhibit A	
4.6.7.	Blinking	Each character can individually blink	
		Individual lines of a multi-line message can blink	
		The entire message can blink	
		Adjustable timing and duty cycle	
4.6.8.	Message pages	Maximum 12 sequential “pages” per message, sequencing speed from 0.1 to 25.5 sec.	
4.6.9.	Scheduling	Real-time clock and calendar with DST control	
4.6.10.	Arrow board functions	Sign can display any of the following 12 full-size arrow functions	
		Modes	Flashing left or right arrow Flashing double arrow Flashing four-corner warning Flashing caution-bar warning Sequencing left or right stem arrow Sequencing left or right walking arrow Sequencing left or right chevron arrows Alternating diamonds (for samples, see Exhibit B)
		Bold graphics	Each arrow and bar is 5 pixels wide
4.6.11.	Configuration	Menus provide access to all message sign configuration settings	
4.6.12.	Troubleshooting	System status on main screen, detailed status and diagnostic menus provide additional message sign information to assist in troubleshooting	

5. TRAILER

5.1.	Frame	
5.1.1.	Construction	All welded structural steel
5.1.2.	Tie-downs	One on each corner of frame
5.1.3.	Finish	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.
5.2.	Fenders	Round, full wheel coverage, bolted to trailer frame, removable and replaceable
5.3.	Axle assembly	2000 lb (907kg) capacity, 5 on 4.5" B.C. idler hub
5.4.	Springs	Double-eye leaf springs
5.5.	Tires	ST205/75D15 steel-belted trailer tires, load rating B
5.6.	Drawbar	
5.6.1.	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.
5.6.2.	Material	Square tubing, 3" x 3/16" wall (7.62cm x 0.476cm wall)
5.6.3.	Jack	Top-wind swivel, 800 lb (363kg) capacity with caster wheel to make moving trailer easier
5.6.4.	Tow hitch	Standard 2-inch ball coupler tow-hitch, SAE Class 2, 3500 lb (1588kg) capacity. Bolts to drawbar, removable and replaceable. See “Options and Optional Equipment” for tow-hitch options.
5.6.5.	Tow chains	Two high-test proof coil chain assemblies, with “latching” S-hooks for towing. Chains attached to drawbar with quick connectors. Material diameter 0.406" (10.3mm) Working load limit 5400 lb (2450kg) Breaking force 16,200 lb (72kN)
5.7.	Stabilizer jacks	Four swivel jacks, each with 2000 lb (907kg) capacity, mounted on corners of trailer frame See “Options and Optional Equipment” for outriggers
5.8.	Wind resistance	In the deployed position, the maximum sustainable wind speed before overturning, when supported by the standard jack stands with tires off the ground, is 72 mph (115km/h)

5.9.	Wiring		
5.9.1.	Description	Wiring to connect tow vehicle and trailer for trailer taillights is installed inside drawbar, with pigtails and connectors at both ends; no crimping required	
5.9.2.	Trailer plug	A sealed, molded, 4-square connector plugs into harness under trailer	
5.9.3.	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	
5.9.4.	Protection	All trailer wiring encased in UV protective loom, and attached with P-clamp riveted to trailer frame; no exposed wires	
5.10.	Taillights	Two oval-shaped, sealed, LED, combination stop, turn and taillights integrated with fenders	
5.11.	License plate	Lighted license plate light holder	
5.12.	Reflectors	Sides of trailer have amber reflectors near front and red reflectors near rear See “Options and Optional Equipment” for reflective tape	
5.13.	Tower assembly		
5.13.1.	Function	Sign cabinet is raised and lowered on a telescoping tower	
5.13.2.	Tower construction	Two sections of square steel tubing with the inner section telescoping inside the outer 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.	
5.13.3.	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.	
5.13.4.	Finish	Winch model	Tower sections and swivel base are treated for corrosion resistance
		Hydraulic lift model	Tower sections and swivel base are fully galvanized
5.13.5.	Height	At fully deployed height, 84" (213cm) from ground to bottom of display cabinet	
5.13.6.	Height lock	Winch model	Spring-loaded locking pin prevents tower from falling if the winch or cable were to fail. Also locks tower when fully lowered into travel position.
		Hydraulic lift model	Locking pin inserted through the tower in the up position prevents the tower from falling if the hydraulics were to fail. Replaces spring-loaded locking pin.

5.13.7.	Winch assembly (winch model only)	Function		Hand-operated winch raises and lowers sign cabinet
		Capacity		1500 lb (680kg)
		Brake		Safety friction-brake prevents display cabinet from falling if operator loses grip on winch handle
		Cable		1/4" (6.35mm) diameter galvanized aircraft cable
5.13.8.	Hydraulic lift (hydraulic model only)	Function		Raises display cabinet with a hydraulic power unit that pressurizes a cylinder; lowered by controlled gravity return. Control switch for hydraulic lift is located on battery box. Switch cover accepts small padlock.
		Hydraulic cylinder		Single stage hydraulic, rated to 1500 psi, bottom end cap is keyed to prevent cylinder from rotating
		Hydraulic power unit	Type	Electric motor driven See “Options and Optional Equipment” for hand pump
			Voltage	12Vdc
			Flow rate	1.5 gpm
			Pressure rating	Factory set to 950 psi
			Mounting	Installed vertically on bracket that is mounted to swivel base
			Fluid	AW-32 hydraulic oil
			Tank capacity	1.2 gal. total, 0.766 gal. usable capacity
			Cover	Sheet metal cover protects power unit from vandalism and environmental contaminants. Security screws fasten cover to power unit.
5.13.9.	Rotation	Sign rotates by hand, pivoting 360 degrees on tower		
5.13.10.	Rotation lock	Sign rotation is locked with an adjustable lever that operates a mechanical friction caliper and disk brake. The ½-inch thick, round, zinc-plated brake disk is bolted to the outer tower section.		
5.13.11.	Sight tube	A sight tube for aiming the message sign in desired direction is mounted to tower mast		

6. POWER SYSTEM

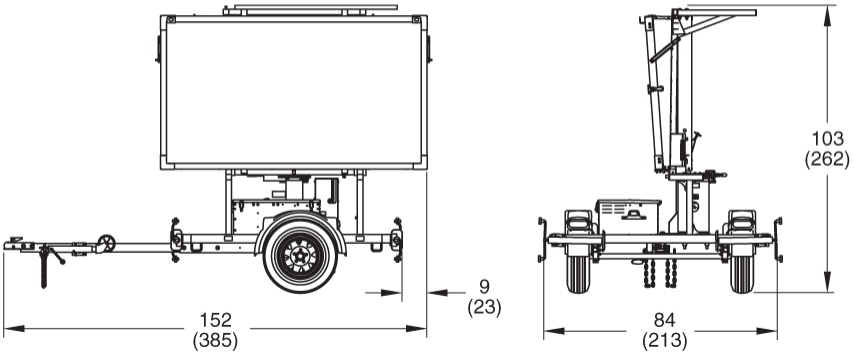
6.1.	Description	Electronics powered by batteries, which are charged automatically with integrated solar charging system
6.2.	Battery box	
6.2.1.	Function	Holds batteries and remote charger See “Options and Optional Equipment” for heavy-duty secure battery box
6.2.2.	Construction	Riveted all-steel construction All parts powder-coated before assembly Divider panel inside box separates batteries from electronics Louvers provide ventilation Latches keep cover closed and can accept user-supplied padlocks
6.2.3.	Location	Centered over axle on left side of trailer, bolted to trailer frame
6.3.	Batteries	
6.3.1.	Description	Four deep-cycle golf-cart-type batteries, wired in parallel and series for a 12-volt system See “Options and Optional Equipment” for battery options
6.3.2.	Voltage	6Vdc each
6.3.3.	Weight	Approx. 60 lb (26kg) each
6.3.4.	Capacity	430 Ah total capacity @ 12Vdc
6.3.5.	Low-voltage disconnect (LVD)	To protect batteries from full discharge, the LVD system automatically shuts down power when battery voltage drops to preset level, and re-engages power when battery charge returns to optimum
6.4.	Remote charger	
6.4.1.	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
6.4.2.	Type	12-volt battery charger
6.4.3.	Location	Inside battery box, mounted to divider panel on opposite side from batteries
6.4.4.	Output capacity	15A
6.4.5.	Output voltage	13.2Vdc range “float” mode 13.6Vdc range “absorption” mode 14.2Vdc range “bulk” mode

6.4.6.	Input voltage	105 to 135Vac, standard three-prong plug
6.4.7.	Input frequency	50 to 60 Hz
6.4.8.	Cooling	Automatic fan cooling
6.4.9.	Protection	Automotive-style replaceable fuses
6.5.	Solar	
6.5.1.	Panels	One high-efficiency multi-crystal photovoltaic solar module
6.5.2.	Location	Behind message sign, over tower. Solar panel array lies flat; rises and rotates with message sign. No shadowing effect on any trailer component.
6.5.3.	Power output	85W See “Options and Optional Equipment” for solar power options
6.5.4.	Current	9.5A max. system current 10.3A open short-circuit current
6.5.5.	Voltage	17.9Vdc max. 21.8Vdc open short-circuit voltage
6.5.6.	Regulation	Solar panels regulated by message sign control system
6.5.7.	Security	Solar panel array bolted to message sign frame with security screws and special security nut. Tool for security screws mounted inside battery box.

7. DIMENSIONS & WEIGHT

7.1. Dimensions *inches (cm)*

Travel Position



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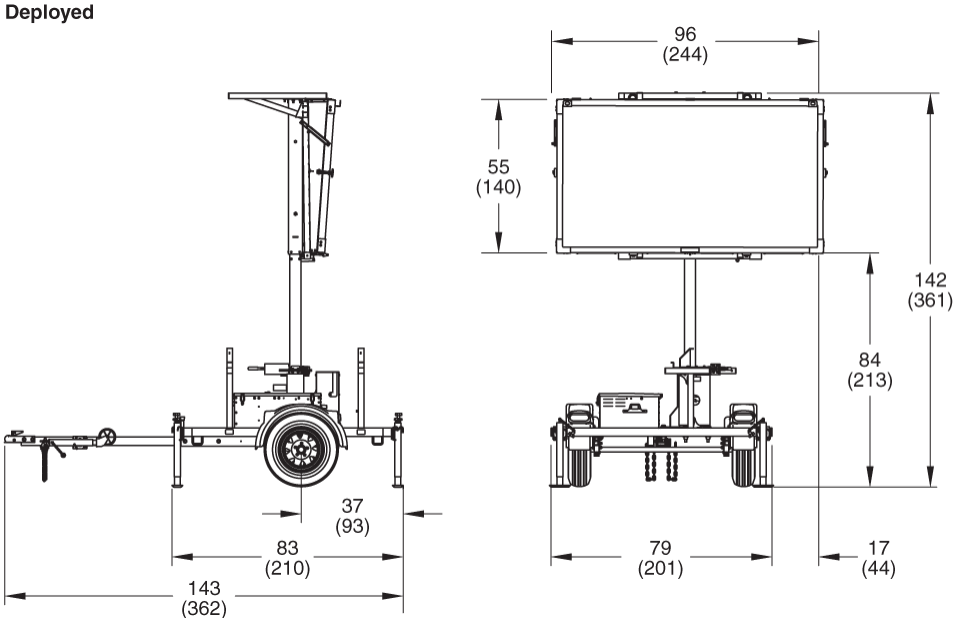


7.2. Weight

7.2.1. Winch model Approx. 1580 lb (717 kg)

7.2.2. Hydraulic model Approx. 1800 lb (817 kg)

8. OPTIONS AND OPTIONAL EQUIPMENT

8.1. Tow hitch

Combo-hitch for pintle hook and 2-inch ball hitch

Heavy-duty lunette ring, 2½" ID x 1⅝" cross-section

8.2. Tow-vehicle plug

Many types of plugs available, prewired at the factory; contact factory for details

8.3. Outriggers

Telescoping outriggers (jack extensions), one at each corner of the trailer, expand trailer width when deployed, for extra wind-load resistance

Width of trailer with outriggers extended: 131" (333cm)

8.4. Hand pump

A mechanical hand pump can raise the sign if hydraulic lift fails to operate (hydraulic model only). Pump handle is stored inside battery box.

8.5. Power

8.5.1. 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

Options: Two additional 6Vdc deep-cycle batteries, 215Ah additional capacity

Four additional 6Vdc deep-cycle batteries, 430Ah additional capacity

8.5.2. 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 lb (72kg) each

8.5.3. Remote charger

When required for added battery charging capacity, replace standard remote charger with higher amperage charger

Options: 12-volt, 45-amp charger

12-volt, 75-amp 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

8.5.4.	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 Options include 130W, 170W, and 260W solar arrays; contact factory for details	
8.6.	**Secure battery box**	High-security battery box features heavy-gauge steel lid, hidden hinges, and heavy-duty hidden-shackle padlocks. Replaces standard battery box.	
8.7.	**Reflective tape**	Reflective red-and-white conspicuity tape across rear trailer frame for increased visibility	
8.8.	**Finish color**	Specify power-coat color and, if applicable, color scheme	
8.9.	**Radar-based speed monitoring system**		
8.9.1.	Description	Radar senses the largest, nearest mass moving toward it. The message sign conveys a user-selected message to the motorist.	
8.9.2.	Sensor	Microwave K-band, approach-only	
8.9.3.	Location	Radar head located on the bottom of the message sign display cabinet, just off-center, for maximum effectiveness regardless of which side of the road the trailer is being used	
8.9.4.	Enclosure	Radar head is sealed to withstand the elements	
8.9.5.	Standards compliance	FCC approved CE compliant	
8.9.6.	Distance range	1000 ft (305 m)	
8.9.7.	Speed range	5 to 138 mph (8 to 222 km/h)	
8.9.8.	Accuracy	±1 mph from 5 to 100 mph (±1.6 km/h from 8 to 161 km/h)	
8.9.9.	Electrical protection	Fused and reverse-polarity protected	
8.9.10.	Calibration	Calibration not required	
8.10.	**Cellular modem package**		
8.10.1.	Purpose	The remote communications package enables the message sign to be controlled from remote locations away from the message sign, using an Internet-connected computer, tablet, or smartphone. Includes all of the items described below.	
8.10.2.	Remote NTCIP central control software	Description	Easy-to-use program connects a computer to an individual message sign via an Internet connection. Used for changing messages, checking on trailer health status (such as battery voltages), viewing GPS locations, and setting message schedules.
		System requirements	Microsoft® Windows® (most versions) .NET framework Internet connection

8.10.3.	Web-based remote control	Description	Using a standard Web browser, allows connection to an individual message sign without software. Ideal for smartphone users.
		System requirements	Modern standards-compliant Web browser with JavaScript enabled A platform that supports one of these browsers (smartphone, tablet, or computer) Internet connection
8.10.4.	Wanco Fleet Manager	Description	Web-based application for managing even the most diverse message sign fleets
		Features	Add or remove equipment to groups for quick access, ideal for managing contractor rentals or entire projects all at once Map GPS locations of entire message sign fleet simultaneously Record vital information from signs, such as message changed by user and date, battery and solar voltages, and equipment alarms Mass broadcast capability, perfect for Amber Alerts and emergencies
		System requirements	Modern standards-compliant Web browser with JavaScript enabled A platform that supports one of these browsers (smartphone, tablet, or computer) Internet connection
8.10.5.	Cellular plans	User provided	User obtains cellular data plan from, and makes monthly payments to, service provider. Wanco programs modem according to user-provided specifications at time of modem purchase. Wanco tests modem setup.
		Wanco cellular service	Wanco provides Verizon® cellular service without activation charges, monthly payments, or overage charges. User makes a single payment annually to Wanco. For increased security, Wanco hosts the service on a virtual private network (VPN).
8.10.6.	Modem	Compact industrial 4G LTE cellular gateway with GPS Variety of models; contact factory for details	

8.11. Traffic Data Classifier System

8.11.1.	Design	Radar-based, nonintrusive, does not require loops or hoses, no disturbance of traffic flow during installation or use
8.11.2.	Direction	Registers both approaching and departing vehicles
8.11.3.	Traffic lanes	Most effective for 2-lane roads
8.11.4.	Traffic count	Can record data for up to 5 million vehicles in internal memory
8.11.5.	Data format	Speed, date, time, direction, length for each vehicle
8.11.6.	Units	English or metric
8.11.7.	Time stamp	Yr,Mo,Dy,Hr,Min,Sec.
8.11.8.	Speed range	5 to 138 mph (8 to 222 km/h)
8.11.9.	Sensor	Microwave K-band 24.125 GHz
8.11.10.	Power supply	Message sign batteries
8.11.11.	Power output	20 dbm (EIRP)
8.11.12.	Current	110 mA
8.11.13.	Internal memory	16GB
8.11.14.	Baud rate	9600, 8 bit, no parity
8.11.15.	Calibration	Calibration not required
8.11.16.	Regulatory rating	FCC part 15 class A, Canadian RSS-210
8.11.17.	Installation	Automatically positioned horizontally when trailer is level; adjustable bracket allows user to point toward traffic at a 45-degree angle
8.11.18.	Analytic software	Wanco Traffic Analyzer

8.12. Remote-Video Monitoring System

8.12.1.	Description	Monitor activity around the trailer remotely, using an integrally installed video camera and a computer with an Internet connection
8.12.2.	Specifications	Specifications for this option are provided in a separate document

8.13. Push-up pole

8.13.1.	Description	Extension pole mounted to back side of message sign cabinet allows for installation of accessory sensor equipment (see below)
8.13.2.	Rotation	Rotates 360 degrees for optimal positioning of installed accessory
8.13.3.	Size and height	Pole diameter: 2" (5.1cm) Manual push-up pole rises to 65" (165cm) above top of sign cabinet, or 18.67 ft (5.69m) above ground level, and locks in place with two heavy-duty pole clamps

8.14. Pole-mounted video camera kit

8.14.1.	Description	Remote-video camera installed on push-up pole; Ethernet switch and cellular modem installed inside message sign cabinet; requires push-up pole accessory (see above)	
8.14.2.	Camera	Model	Axis® P5654-E
			Domed style, day/night, pan-tilt-zoom (PTZ) autofocus camera for outdoor use
		Zoom	21X optical zoom and 12X digital zoom, total 256X zoom
		Resolution	1280x720 (HDTV 720) to 320x180
		Local storage	Support for SDHC UHS-I/SDXC UHS-I card up to 256 GB (card not included)
		Power	16W max., 8W typical
		Voltage	12Vdc input, switched via message sign touchscreen controller
		Wiring	Outdoor shielded Cat 5E cable in liquid tight loom
		Limits	Operating temperature: –22 to 122°F (–30 to 50°C)
			Humidity: 10 to 100% RH (condensing)
8.14.3.	Ethernet switch	10/100TX unmanaged industrial duty	
		Five RJ45 ports	
		Power consumption: 3W	
		Voltage: 12Vdc input	
		Operating temperature: –40 to 167°F (–40 to 75°C)	

8.14.4.	Cellular modem	Sierra wireless RV50X	
		4G LTE, Cat 6 (up to 50 Mbps upload)	
		Power consumption: 0.9W LTE idle power	
		Voltage: 7 to 36Vdc input	
		Antenna: Multi-function, 2X cellular 1X GPS	
		Operating temperature: –40 to 158°F (–40 to 70°C)	
8.14.5.	Cellular plan	User provided; minimum 20 GB per month recommended	
8.14.6.	System power	Camera system powered by message sign batteries	
		Additional solar and batteries recommended; contact factory for details	

8.15. Pole-mounted multi-lane radar sensor kit

8.15.1.	Description	Multi-lane radar sensor installed on push-up pole; Ethernet switch and cellular modem installed inside message sign cabinet; requires push-up pole accessory (see above)	
8.15.2.	Radar sensor	Model	Houston Radar SpeedLane® Pro
			True dual beam, side-fire FMCW traffic measurement radar
		Traffic count	Speed, lane and class for 1 million vehicles; per-lane counts in user-defined speed bins, length-based class in 8 user-defined bins, average speed, 85th percentile speed, occupancy, gap, headway for 3 last months
		Direction	Registers both approaching and receding vehicles
		Traffic lanes	16 user-defined lanes, maximum
		Beam angle	7 x 74 degrees
		Range	255 ft (79m) max.
		Sighting camera	1.3MP HD video (Ethernet only) or HD snapshots
		Power	2.2W max., 1.2W typical
		Voltage	9 to 28Vdc, switched via message sign touchscreen controller
		Wiring	Custom cable for outdoor Ethernet connection
		Temperature limits	Operating: –40 to 185°F (–40 to 85°C)

8.15.3.	Ethernet switch		10/100TX unmanaged industrial duty
			Five RJ45 ports
			Power consumption: 3W
			Voltage: 12Vdc input
			Operating temperature: –40 to 167°F (–40 to 75°C)
8.15.4.	Cellular modem		Sierra wireless RV50X
			4G LTE, Cat 6 (up to 50 Mbps upload)
			Power consumption: 0.9W LTE idle power
			Voltage: 7 to 36Vdc input
			Antenna: Multi-function, 2X cellular 1X GPS
			Operating temperature: –40 to 158°F (–40 to 70°C)
8.15.5.	Cellular plans		Standard: User provided
			Optional: 250 MB per month
8.15.6.	ITS option		ITS traffic service web-based software and data hosting are optional; contact factory for details
8.15.7.	System power		Camera system powered by message sign batteries

8.16. Pole-mounted travel time Bluetooth® sensor kit

8.16.1.	Description		Multi-lane radar sensor installed on push-up pole; Ethernet switch and cellular modem installed inside message sign cabinet; requires push-up pole accessory (see above)
8.16.2.	Radar sensor	Model	Iteris® BlueTOAD® Spectra
			Delivers travel time reporting and analysis using Bluetooth detection
		Detection	Scans and matches Bluetooth devices in both discoverable and non-discoverable modes
			Uses only a portion of the device MAC address, ensuring anonymity for the device owner
		Range	300 ft (91.4m) max. radius
		Power	0.25W max., 0.15W typical
		Voltage	9.5 to 50.0Vdc, switched via message sign touchscreen controller
		Wiring	Outdoor shielded Cat 5E cable in liquid tight loom
		Temperature limits	Operating: –40 to 185°F (–40 to 85°C)

8.16.3.	Ethernet switch	10/100TX unmanaged industrial duty
		Five RJ45 ports
		Power consumption: 3W
		Voltage: 12Vdc input
		Operating temperature: –40 to 167°F (–40 to 75°C)
8.16.4.	Cellular modem	Sierra wireless RV50X
		4G LTE, Cat 6 (up to 50 Mbps upload)
		Power consumption: 0.9W LTE idle power
		Voltage: 7 to 36Vdc input
		Antenna: Multi-function, 2X cellular 1X GPS
		Operating temperature: –40 to 158°F (–40 to 70°C)
8.16.5.	Cellular plan	User provided; minimum 1 GB per month recommended
8.16.6.	Database option	BlueARGUS™ database manipulation software is optional; contact factory for details
		BlueARGUS software provides:
		Interactive, real-time speed maps and XML
		Real-time signal, phase and timing (SPaT) and connected vehicle data
		Report scheduler
		Historical data reports including pair/route reports, comparison reports, travel-time reliability reports and enhanced origin & destination studies
8.16.7.	System power	Camera system powered by message sign batteries

EXHIBIT A: MESSAGE FONTS

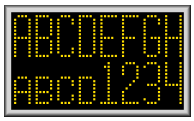
Font 1
5 x 7 pixels
Equivalent size: 8.85" x 12.55" (225 x 319mm)
Physical size: 8.15" x 11.85" (207 x 301mm)
Standard fixed-width font with lower-case letters
3 lines of 8 characters, maximum

Font 2
5 x 7 pixels
Equivalent size: 8.85" x 12.55" (225 x 319mm)
Physical size: 8.15" x 11.85" (207 x 301mm)
Fixed-width font with lower-case letters
3 lines of 8 characters, maximum

Font 3
6 x 9 pixels
Equivalent size: 10.70" x 16.25" (272 x 413mm)
Physical size: 10.00" x 15.55" (254 x 395mm)
Bold proportional font with 4x9-pixel capitals for lower-case letters
2 lines of 7 characters, typical

Font 4
6 x 11 pixels
Equivalent size: 10.70" x 19.95" (272 x 507mm)
Physical size: 10.00" x 19.25" (254 x 489mm)
Bold proportional font with lower-case letters and accented characters
2 lines of 6 characters, typical

Font 5
6 x 11 pixels
Equivalent size: 10.70" x 19.95" (272 x 507mm)
Physical size: 10.00" x 19.25" (254 x 489mm)
Bold proportional font with lower-case letters, accented characters, and increased spacing
2 lines of 6 characters, typical



Font 6
5 x 12 pixels
Equivalent size: 8.85" x 21.80" (225 x 554mm)
Physical size: 8.15" x 21.10" (207 x 536mm)
Tall fixed-width font with 5x8-pixel capitals for lower-case letters
2 lines of 8 characters, maximum

Font 7
7 x 12 pixels
Equivalent size: 12.55" x 21.80" (319 x 554mm)
Physical size: 11.85" x 21.10" (301 x 536mm)
Bold fixed-width font with 6x8-pixel capitals for lower-case letters
2 lines of 6 characters, maximum

Font 8
7 x 23 pixels
Equivalent size: 12.55" x 42.15" (319 x 1071mm)
Physical size: 11.85" x 41.46" (301 x 1053mm)
Large fixed-width font with 6x14-pixel capitals for lower-case letters
1 line of 6 characters, maximum

Font 9
11 x 23 pixels
Equivalent size: 19.95" x 42.15" (507 x 1071mm)
Physical size: 19.25" x 41.46" (489 x 1053mm)
Large bold fixed-width font, capitals only (no lower-case letters)
1 line of 4 characters, maximum

Font 10
4 x 5 pixels
Equivalent size: 7.00" x 8.85" (178 x 225mm)
Physical size: 6.30" x 8.15" (160 x 207mm)
Mini proportional font with limited lower-case
4 lines of 9 characters, typical
12 characters per line, maximum

Font 11
7 x 10 pixels
Equivalent size: 12.55" x 18.10" (319 x 460mm)
Physical size: 11.85" x 17.40" (301 x 442mm)
Large fixed-width font, capitals only (no lower-case letters)
2 lines of 5 characters, maximum

Font 12
9 x 14 pixels
Equivalent size: 16.25" x 25.50" (413 x 648mm)
Physical size: 15.55" x 24.81" (395 x 630mm)
Large bold fixed-width font, capitals only (no lower-case letters)
1 line of 4 characters, maximum

EXHIBIT B: ARROW BOARD FUNCTIONS

Flashing patterns

Flashing left or right arrow

Flashing double arrow

Flashing four-corner warning

Flashing caution-bar warning

Sequential patterns

Sequencing left or right stem arrow

Sequencing left or right walking arrow

Sequencing left or right chevron arrows

Alternating diamonds