

## Attachment 1 Scope of Work

**GENERAL:** It is the intent of this specification to describe a FULL MATRIX SOLAR ASSISTED portable variable message board powered by batteries and solar panel assisted. Materials used shall be at least minimum standards and of a quality used commercially, conforming to current engineering and manufacturing practices. All components of this portable variable message board shall be of proper design to safely withstand maximum stresses imposed. Any attachments, accessories, tools or other components normally furnished as standard equipment and necessary to the efficient operation of this portable variable message board shall be furnished. The portable variable message board shall meet or exceed the following specifications.

**PRIMARY APPLICATION:** The primary application of these message boards is to allow CDOT to supply safety messages to the traveling public in all locations with or without Communications with the board. These units will be expected to fully operate day or night for periods of 30 - days with out direct sunlight. During times that the board is not in operation it must have the capability of maintaining a full charge in the batteries; this may be with a supplemental AC charger or with the solar panels. This is so that the batteries do not freeze during the extreme cold of the Colorado Winters and the boards and ready for use at all times. These units will be expected to operate in extreme weather conditions and temperatures of -60 to 140 degrees Fahrenheit with wind speed of 95 Miles per Hour and gust to 110 Miles per hour at all elevations from 3000 to over 11,000 feet above sea level within Colorado.

**NOTE:** For evaluation purposes, any line item left blank will be considered as non-responsive and will cause bid to be rejected due to our inability to do a fair evaluation without the requested information. The "required data" spaces are critical. The information requested in the spaces provided is required to evaluate and confirm compliance. Therefore, all requested information must be entered in the space provided. Failure to provide any requested information will cause the bid to be rejected as non-responsive. Alternate items may be pre-qualified by CDOT Purchasing prior to the bid opening. Approved pre-qualifications are authorized for this bid only and must be resubmitted with each subsequent bid proposal.

**CLEARLY INDICATE IN THE COMPLIANCE COLUMN (Y) es complies, (N) o does not comply, OR (A) lternate. ALL ALTERNATE ITEMS BID SHALL BE LISTED ON A SEPARATE PAGE REFERENCING THE TABLE NUMBER, ITEM NUMBER AND MUST MEET OR EXCEED THE SPECIFICATION. THE ADDITIONAL PAGE SHALL DESCRIBE THE ALTERNATE IN DETAIL AND SHOULD INCLUDE LITERATURE DESCRIBING THE ITEM BID. CDOT SHALL SOLELY DETERMINE EQUIVALENT.**

	<b>WARRANTY (Table 1)</b>	<b>Complies (Y/N/A)</b>
1.	The warranty plan shall cover parts and labor for a minimum of 2 year from the in-service date as established by CDOT and shall be provided with your bid proposal.	Y
2.	Vendor shall provide a plan to reimburse CDOT at the rate of \$55.00 per hour for work performed on site by CDOT. Any warranty work performed by CDOT on site will not void the warranty. <b>NOTE THIS IS CDOT SHOP RATE.</b>	Y
3.	Plans shall consist of total unit and be broken out to separate plan for each warranty item if applicable, such as engine warranty plan, transmission warranty plan, etc.	Y
4.	Warranty work shall be accomplished within a reasonable length of time and shall be coordinated with an authorized CDOT representative.	Y
5.	During the entire warranty period, if necessary, the vendor shall be responsible for transport of the unit to their facility for repair.	Y
6.	Warranty start date shall be the accrual date the receiving Region places the unit in service after all required CDOT up fits. This date shall be sent to the award vendor in a letter from the receiving region within Five days of placing the unit in service. If the vendor does not receive said letter the Warranty start date shall be the delivery date that the unit was received at CDOT New Equipment Delivery.	Y

	<b>GENERAL (Table 2)</b>	<b>Complies (Y/N/A)</b>
1.	The portable variable message board shall be Full matrix arrangement, shall be furnished as a device fully self-contained, mounted on a portable trailer, licensed for normal highway travel, and shall include four leveling and stabilizing jacks. <b>Letter Arrangement: Full matrix arrangement, 48 pixels wide X 27 pixels high (1296 total pixels)</b>	Y
2.	The board shall be stable in sustained winds of 95-MPH, plus gusts of up to 110-MPH.	Y
3.	Shall be capable of being elevated by an electro/hydraulic method to a height of seven feet from the bottom of the board to the ground, with a manual pump and release for use as a backup system.	Y
4.	Shall be equipped with a locking device to ensure the display panel will remain in the raised position.	Y
5.	Shall be capable of 360-degree rotation with a safety lock to secure it against movement in any position.	Y
6.	Shall lock parallel to the direction of towing while in transport to reduce wind loading.	Y
7.	Shall be painted standard Colorado Department of Transportation orange color. The paint shall conform in color to Martin Senour Fleet Finishes, PRISM Low VOC Acrylic Urethane 3.5 Single Stage "Omaha Orange"	Y

<b>COMPUTER CONTROL (Table 3)</b>		<b>Complies (Y/N/A)</b>
1.	The unit shall be equipped for on-site programming and operation.	Y
2.	Shall have a self-contained operating computer with a PC compatible 104, within a weather tight sealed console.	Y
3.	Shall be password protected.	Y
4.	Shall include a low battery voltage warning, prior to system disconnect.	Y
5.	Shall include internal clock and scheduled programming.	Y
6.	Shall include a laminated operator's manual within the console.	Y

<b>MESSAGE BOARD (Table 4)</b>		<b>Complies (Y/N/A)</b>
1.	Shall be minimum 138" Long x 74" high, board should have a minimum 5 degree taper top to bottom to help reduce glare.	Y
2.	Shall meet MUTCD requirements, with a light emitting diode (LED) legend on flat black background, and ITE amber/orange in color (587.4 to 592 nanometers). The panel shall display a minimum of four, fourteen character lines, or one single line with seven letters. During Three line messages operation each message line shall provide for a nominal 16-inch character height with the ability for each character to display any of the 26 letters of the alphabet and any of the ten numbers from 0 to 9. Operating features shall include the ability to change and display board messages and graphics features such as chevron heads, dynamic arrows, etc.	Y
3.	The panel shall be visible from one half mile under both day and night conditions. The message shall be legible a minimum of 1000-feet. The panel shall automatically adjust its light source to meet the 1000-foot legibility requirement under various lighting conditions. The board controls shall provide for automatic dimming of messages for night operations. In the event of the detection of low battery power, the board shall display default message or warning symbols.	Y
4.	The control panel shall have the capability to create, store and view a minimum of 50 user-programmed messages in addition to preprogrammed messages, and be able to retain messages during non-power conditions. The control panel shall display a representative message that will be displayed on the board panel. It shall be possible to store 25 user-programmed sequences of up to six, three lined messages per sequence. It shall be possible to program and utilize the on-board time clock to automatically display different message sequences at different times during the day.	Y
5.	The flash rate shall be adjustable in the board controller from 1 to 10-seconds. The controller shall also have the ability to display a diagnostic message on the	Y

	board for self-tests. Controls shall be enclosed in a locked console to prevent unauthorized manipulation.	
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<b>TABLE 4 - MESSAGE BOARD - CONTINUED</b>		
6.	Shall be equipped with minimum of two cooling fans to maintain temperature below 200 degrees Fahrenheit inside the message board cabinet. These fans shall provide circulation through out the entire cabinet.	Y
7.	Each fan shall be independently thermo on board computer controlled so as not to waste battery power when not needed.	Y
8.	The Sign cabinet shall be manufactured from sheet Aluminum 5052-H32 0.062 thick.	Y
9.	All panels shall be riveted together and have internal ribs added for added lateral strength.	Y
10.	All panels shall be powder coated inside and out for added corrosion protection.	Y
11.	Door shall be of a single sheet of aluminum hinged at top for easier service.	Y
12.	All hinges shall be stainless steel butt style. Bolted to the top off cabinet and door.	Y
13.	Shall be equipped with door props on each side of the sign to hold door open for service.	Y
14.	Window shall be Lexan solar grade polycarbonate minimum 0.150" thick. Shall have a bulb type weather seal to ensure a tight fit and seal between window and extrusion.	Y
15.	When the sign is in the stored position, the door shall fully open to allow service of the sign.	Y
16.	Vibration isolators shall be used on each letter character to decrease any physical shock to the letter module.	Y
17.	Character shall be isolated from chassis ground.	Y
18.	All harnesses shall be modularized to allow easy service.	Y
19.	All connectors and procedures shall be Per CSA STANDARDS.	Y
20.	All characters shall have quick disconnect connectors for easy service.	Y
21.	All letters shall be identical so that they may be moved from one location to another.	Y

<b>SOFTWARE AND HARDWARE (Table 5)</b>		<b>Complies (Y/N/A)</b>
1.	Software supplied with the board shall be licensed to CDOT for operation of up to a minimum of ten separate computers at any given time. Software shall not be externally key-protected. Software shall be provided on standard CD. At least two copies of the written software documentation shall be provided with the board with the rights to make additional copies as required.	Y

2.	Shall include an IP Digital Modem.	Y
3.	All communications to the Variable Message Board shall support the National Transportation Communications for ITS protocol or NTCIP.	Y
4.	Shall utilize all solid state electronics thru out the unit. <b>NO RELAYS</b>	Y
5.	All PC and Power board shall be protected from corrosion and 95% relativity humidity.	Y
6.	The communications software shall be compatible with digital modem with IP incorporating MNP5 error correction data compression.	Y

<b>SPECIAL AND MISCELLANEOUS (Table 6)</b>		<b>Complies (Y/N/A)</b>
1.	The board shall be capable of automatic fault monitoring (i.e., the board will notify the operator in the event of a failure by originating a call to a predetermined telephone number).	Y
2.	The photo volt A/C shall be designed to provide 30 days of continuous operations without sun, at or below 15 - degrees Fahrenheit, at maximum board load with no performance loss. The manufacturer shall provide test data to CDOT showing the board will meet this specification.	Y
3.	Automatic recharging of the power supply batteries shall be provided, including battery overcharge protection.	Y
4.	In addition to the on-board solar power supply the board shall be capable of recharging the batteries, operating on 120VAC commercial electrical service or a portable generator. To meet this requirement the boards shall have a built-in battery charger.	Y
5.	Message boards shall be capable of maintaining all required operations under adverse winter weather conditions at elevations up to 11,000 feet above sea level.	Y
6.		Y

<b>TRAILER (Table 7)</b>		<b>Complies (Y/N/A)</b>
1.	Frame shall be constructed of rectangular steel tubing 2" x 3" x 3/16th wall minimum.	Y
2.	Frame shall be fully welded.	Y
3.	Shall include steel tie down loops on each corner.	Y
4.	Shall be equipped with a lockable trailer coupler for connection to a standard two-inch hitch ball on removable adjustable height bracket in 2" increments (12.5 total).	Y

5.	Shall be wired with a 7 round pin electric plug for the brake/turn/running light wiring system. "Cole Hersee" seven-pole trailer connector Model No. 1222 or equivalent will be acceptable. RV type connectors are not acceptable.	Y
6.	Shall be equipped with safety chains minimum 3/8 x 36" long.	Y
7.	Shall have sealed Stop, Tail and Turn LED light assemblies.	Y
8.	Shall be equipped with electric trailer brakes.	Y
9.	Shall include telescoping outriggers. Independently certified for 110 MPH wind gust and 95 MPH sustained winds	Y

<b>BATTERY (Table 8)</b>		<b>Complies (Y/N/A)</b>
1.	Shall be equipped with 4D AGM batteries and solar panels.	Y
2.	15 Amp AC charger with shut down protection once batteries are fully charged.	Y

<b>SOLAR ARRAY (Table 9)</b>		<b>Complies (Y/N/A)</b>
1	Shall be 130 W minimum.	Y

<b>PARTS (Table 10)</b>		<b>Complies (Y/N/A)</b>
1	Since the continuous operation of this unit is of the utmost importance and sometimes of an emergency nature, it is necessary that the successful bidder be in position to render prompt parts and service. The successful bidder shall maintain and/or have access to parts inventory within State of Colorado. Said parts inventory shall be of sufficient size and variety to offer a level of parts availability of 95% within 48 hours from time of order by customer. Availability of normal maintenance items such as filters, belts, hydraulic lines, and hoses shall not exceed 24 hours. NOTE: Warranty parts to be supplied within 24 hours at no extra charge to CDOT.	Y

**REQUIRED INFORMATION**

Shall attach a list with this bid proposal of authorized vendors for parts and service availability within the State of Colorado.

<b>TRAINING (Table 11)</b>		<b>Complies (Y/N/A)</b>
1.	The successful bidder shall demonstrate the capabilities and provide complete training for the operation and maintenance of the message board bid. The training shall include a minimum two hours of operational training for the message board software using local input, (computer or keyboard) at the message board. Additionally, a minimum of two hours will be provided for remote operation.	Y
2.	Training shall be conducted within 2-weeks after delivery of the new unit.	Y
3.	Shall be on-site within the requesting CDOT Region and coordinated with a representative from that Region.	Y

<b>DELIVERY (Table 11)</b>		<b>Complies (Y/N/A)</b>
1.	All nits ordered by CDOT shall be delivered to CDOT New Equipment Delivery, 18500 E. Colfax Ave. Aurora CO 80011	Y
2.	Successful bidder shall provide 2 each parts, shop, service, and operator's manuals per unit at time of delivery. Payment for the complete unit shall be withheld until such has been delivered.	Y
3.	Shall be new and of the manufacturers most current model unless otherwise authorized by the Department of Transportation.	Y
4.	Shall meet all State and Federal regulations.	Y
5.	Successful bidder shall provide a minimum 8 hour operation and maintenance training at a mutually agreed upon location and time within the requesting CDOT Region.	Y
6.	Shall be assembled, serviced and ready to be placed in service when delivered.	Y

<b>OPTIONS (Table 13)</b>		<b>\$</b>
1.	Additional Operator's manual.	25.00
2.	Additional Parts manual.	25.00
3.	Additional Service Manual.	25.00
4.	Tandem Towing Capability. To include all electrical plugs and brake controls.	N/A
5.	Height adjustable Pintle type hitch.	270.00
6.	Solar Assisted Standard Three Line Trailer Message Board. <b>(With NTCIP Standard)</b>	-200.00
7.	Optional larger solar array size: 390 watt	985.00
8.	Radar – Radar detector integrated in system to display traffic speed on VMS display.	1,200.00

