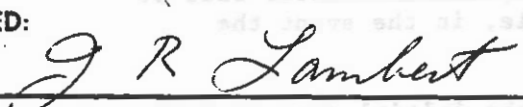


TO:		ENGINEERING INSTRUCTION	
Final Plan Review Bureau RECD: AUG 13 1990		NEW YORK STATE DEPARTMENT OF TRANSPORTATION	
SUPERSEDED BY <u>ET 92-032</u> EFFECTIVE 10/22/92		SUBJECT: SOLAR CHARGED FLASHING ARROWBOARDS (EXPERIMENTAL)	
		Subject Code: 7.27-1-619	
Distribution: 30 Main Office 32 Regions 34 Special		Code: <u>EI 90-29</u> Date: <u>7/25/90</u> Supersedes:	
APPROVED:  J. R. LAMBERT Deputy Chief Engr. Fac. Design Division 405-5			

Attached is a special specification for item numbers 91619.0301, Solar Charged Flashing Arrowboard (Calendar Days) and 91619.0303, Solar Charged Flashing Arrowboard (Lump Sum). These units are powered by batteries which are continually charged by solar panels. These arrowboards cannot be used under existing items 15619.0301 and 15619.0303 of the 1985 Standard Specifications and 619.0303 of the 1990 Standard Specifications since the specification for those items requires the arrowboard to be powered by self contained engine driven generator systems.

The Solar Charged Flashing Arrowboards offer several advantages over conventional diesel powered units. Since they do not use fuel, they are non flammable. The solar charged units make virtually no noise and are far less likely to generate complaints when used in residential areas. Maintenance efforts and costs are much less than for a conventional arrowboard since there are no moving parts. Manufacturers of these devices claim that, in the long run, solar charged units are more cost effective than conventional units.

The manufacturers claim that the solar charged units can run for extended periods of time as long as there is enough sun to keep the battery bank charged. We are, however, concerned about their reliability in northern climates and during the early spring and fall as well as winter months. For this reason, these products will be permitted on a trial basis while The Traffic Engineering and Safety Division monitors their performance. These devices may be used this construction season by means of no cost change orders on selected projects. The Construction Division will be writing an Engineering Bulletin to provide guidance to any Region wishing to use a change order on an on-going project. A self addressed form letter will be included in proposals containing these items and with the Engineering Bulletin for on-going projects so that EICs can document their experience with the solar charged flashing arrowboard during this trial period. The Traffic Engineering & Safety Division will also be contacting some of the EICs on projects where these items are included in the contract.

Subject: SOLAR CHARGED FLASHING ARROWBOARDS

It should be noted that the specification requires the Contractor to have a replacement arrowboard readily available in the event that the EIC is not satisfied with the performance of an arrowboard supplied under this item. Also, the Contractor will be required to reschedule work where possible, in the event the arrowboard fails in service.

Since these items are experimental, and the initial cost is more than for a conventional arrowboard, designers are encouraged to specify these items under the following conditions:

1. Where it is expected to be used long enough for the savings in fuel to offset the greater initial cost, and
2. In conjunction with conventional arrowboard(s) in case its performance is not satisfactory.
3. Where noise reduction is either mandatory or desirable.
4. To limit any problems associated with unsatisfactory performance of these devices, each Region will be allowed to use this item once during the 1990 construction season. Additional uses will be considered upon favorable recommendation of the Traffic Engineering and Safety Division. Before specifying this item, the Designer should contact Chuck Riedel of the Safety Capital Projects Bureau at (518) 457-3537.

Copies of these experimental specifications can be obtained from the Safety Capital Projects Bureau for inclusion in the PS&E package.



MEMORANDUM
DEPARTMENT OF TRANSPORTATION

TO: E. P. Lesswing, Safety Capital Projects Bureau, 5-314

FROM:

DATE:

EVALUATION OF SOLAR CHARGED FLASHING ARROWBOARD
ITEMS 91619.0301 AND 91619.0303

Region: _____

Contract: D _____

EIC: _____

Phone Number: _____

Contractor: _____

Name and Manufacturer of Arrowboard: _____

Approximate dates (months) the arrowboard was in use: _____

Approximate % of sunny days: _____25% _____50% _____75%_____

How frequently did it require external recharging? _____

Did it perform adequately? _____

Comments:

ITEM 91619.0301 SOLAR CHARGED FLASHING ARROWBOARD (CALENDAR DAYS)
ITEM 91619.0303 SOLAR CHARGED FLASHING ARROWBOARD (LUMP SUM)

Description

General. Under these items the Contractor shall furnish, install maintain and remove solar charged flashing arrowboard warning devices in accordance with the plans, this specification, New York State Manual of Uniform Traffic Control Devices, or the directions of the Engineer. Flashing arrowboards are intended for use as temporary advance warning devices during the construction and obstruction periods.

Solar Charged Flashing Arrowboards (Calendar Days). Under this item the Contractor shall provide the number of flashing arrowboards at the locations indicated, and for the time period specified, in the contract documents.

Solar Charged Flashing Arrowboards (Lump Sum). Under this item the Contractor shall provide flashing arrowboards made necessary by his operations. The number required shall be the number necessary in accordance with the criteria given below, to satisfactorily guide traffic through the construction. The actual number will depend on the Contractor's sequence of operations.

Materials

The flashing arrowboard shall be a transportable self contained unit with a flashing symbol consisting of flashing amber lights arranged on a panel to form an arrow or other required symbol. The arrow panel shall consist of a 4 foot high by 8 foot wide rectangular solid panel finished in non-reflective black, and shall be mounted so that, when in operation, the bottom of the panel is a minimum of 7 feet above the roadway.

The arrow indication shall cover the entire area of the panel and be composed of 15 lamp units with 5 lamps in the arrowhead and 5 lamps in the shaft. Lamps shall be arranged and controlled to provide the following symbols (modes); left arrow, right arrow, two way arrow, and caution. In the three directional modes, the lamps in the shaft next to the arrow point shall not illuminate. The "Caution" mode shall consist of four or more lamps arranged in a pattern which will not indicate direction. The rear face of the arrow panel shall contain one or more lamps (preferably amber) to indicate that the arrowboard is operating properly. Arrow panel operation controls shall be mounted in a locked, weather and vandal resistant enclosure.

The arrow panels shall meet the visibility requirements in the NYSMUTCD for Type C arrow panels, ie. be visible at a minimum distance of one mile from all approaching travel lanes on a bright sunny day or a clear night. The lamps shall flash at a

rate of not less than 25 nor more than 40 flashes per minute with a minimum lamp "on time" of at least 50 percent of the cycle. The lamps shall be recess mounted or alternatively equipped with an upper hood of not less than 180 degrees.

The arrow panel shall be capable of approximately 50 percent dimming from the rated lamp output. The controller shall be equipped with an automatic photo cell controlled dimming switch which is activated at a level of approximately 5 foot-candles. The photo cell shall be either located or equipped with a delay so as to prevent undesirable actuation from car headlights or other transient or temporary sources of light. Manual bright and dim settings shall also be provided.

The arrow panel shall be trailer mounted, or with the permission of the Engineer, truck mounted.

The flashing arrowboard shall be powered by batteries which are continually charged by the solar panels in the presence of sunlight. All components of the power supply shall be contained within the unit. The batteries shall provide enough power to provide for continuous 24 hour operation during typical weather conditions throughout the construction season in New York State. External recharging shall only be needed during extended periods of unfavorable environmental conditions such as cloudy or cool weather.

The batteries, when fully charged, shall be capable of powering the arrowboard for 12 continuous days with no sunlight. The batteries shall be deep cycle batteries connected to provide a 24 volt system. The batteries shall not freeze. A means of readily determining the state of battery charge or a low voltage warning light shall be provided. Protection shall be provided to prevent the overcharging of the batteries, whether charging is by solar or AC power. A low voltage disconnect or other means shall be provided to prevent a damaging battery discharge. A 24VDC/120VAC 20 amp. solid state battery charger shall be included in the unit. The battery bank shall be stored in a locked, weather and vandal resistant box.

A replacement arrowboard shall be available in the event that the batteries become discharged or the arrowboard does not perform to the Engineer's satisfaction. Until a replacement arrowboard is in place, the Contractor shall, if possible, reschedule the work such that the need for that arrowboard does not exist. The Engineer shall be the sole judge of the need to supply the standard arrowboard. No separate payment will be made for the replacement arrowboard.

Product acceptance will be based upon the manufacturer's certification that the product is in conformance with all provisions of this specification and the NYSMUTCD. The Engineer has the right to direct the removal of any arrowboard which does not perform to his/her satisfaction.

Construction Details

Flashing Arrowboards may be relocated or reoriented on a daily basis or more frequently as directed by the Engineer.

The Contractor shall be responsible for maintenance, repair, and continuous operation of the flashing arrowboard including the cleaning of the solar panel(s) until the progress of work no longer requires its use, as directed by the Engineer.

Solar Charged Flashing Arrowboards (Calendar Days). The flashing arrowboard shall be installed at the locations shown on the plans or as directed by the Engineer, and properly aligned to provide optimum viewing by approaching motorists.

Solar Charged Flashing Arrowboards (Lump Sum). The Contractor shall provide flashing arrowboards on multilane highways with operating speeds of 45 mph. and higher whenever a lane is closed to traffic and vehicles are required to merge with traffic in adjacent lanes. One flashing arrowboard will be required for each lane closed to traffic regardless of the duration. Flashing arrowboards shall also be provided where shown on the plans or where directed by the Engineer.

Flashing arrowboards will not normally be required where they would interfere with the operation of a 3 color signal or flasher or where there is an operation controlled by a signal or flagman. Flashing arrowboards will not normally be required for detours where the number of through traffic lanes is not reduced unless specifically indicated on the plans. In these cases, the deployment of flashing arrowboards may be directed by the Engineer in special circumstances.

Method of Measurement

Solar Charged Flashing Arrowboard (Calendar Days). When this work is specified to be measured as calendar days, it shall be measured by the number of calendar days each flashing arrowboard is used. A calendar day is defined as one flashing arrowboard in use for 24 consecutive hours or portion thereof exceeding one hour.

Solar Charged Flashing Arrowboard (Lump Sum). When this work is specified to be measured as lump sum, it shall be measured on a lump sum basis for the flashing arrowboards furnished, installed, maintained, and removed.

Basis of Payment

General. The price bid for this work shall include the cost of all material, equipment, labor, maintenance, and electrical power necessary to complete this work in a manner approved by the Engineer. If it becomes necessary to supply a replacement arrowboard, no separate payment will be made.

Failure of the Contractor to comply with the work specified under the Construction Details of these specifications shall be considered as unsatisfactory maintenance and protection of traffic with payment deductions made in accordance with "Subsection 619-5 BASIS OF PAYMENT, General", of the Standard Specifications.

Solar Charged Flashing Arrowboards (Calendar Days). The unit price bid for Flashing Arrowboards (Calendar Days) shall cover the cost of all work specified in "General" above as well as the cost of movement or relocation of the flashing arrowboard as required by the progress of the work or as directed by the Engineer.

Solar Charged Flashing Arrowboards (Lump Sum). The lump sum price bid for Flashing Arrowboards (Lump Sum) shall cover the cost of all the work specified in "General" above. After the first use of an arrowboard, progress payments will be made for this work in proportion to the total amount of contract work completed.

Payment will be made under:

<u>Item No.</u>	<u>Item</u>	<u>Pay Unit</u>
91619.0301	Solar Charged Flashing Arrowboard	Calendar Day
91619.0303	Solar Charged Flashing Arrowboard	Lump Sum