

RW/RMP-22013/2/87

Dated the 15th September, 1987

To

All Chief Engineers of States

Subject : Paper on Mobile Inspection Unit

In continuation to Ministry's letter No. RW-RMP-4(1)/83 dated the 11th June, 1987 a paper on Mobile Bridge Inspection Unit is enclosed herewith for information and necessary action.

NOTE ON MOBILE BRIDGE INSPECTION UNIT

1. General

Ministry of Surface Transport, since last 7-8 years had been trying to procure an equipment, which would be suitable for the inspection under sides of the bridges. In this connection, the manufacturers throughout the world were asked to give the details of their equipment. Based on the literature received, it was decided to import one such equipment, operate and maintain it under the ownership of the Ministry. It is ideal equipment for the routine and periodical in-depth inspection of bridges.

The States were also requested to procure such equipment, from their own resources, as has already been done by Govt. of Maharashtra. The equipment now being imported by the Ministry is mounted on an imported chassis, but it could be done on Indian chassis, which may be the first step towards indigenisation of the equipment. It is hoped that some Indian manufacturer may come forward for manufacturing this equipment, if there is sufficient demand of the equipment.

2. Brief Details of the Equipment

Maharashtra Government have purchased in the year 1986 one Bronto-Skylift Mobile Bridge Inspection Unit model 13/10-4. This model is capable of covering a distance of 13 M vertically downward from the surface of the road, 10 M horizontally from the centre of the vehicle underneath the bridge, and has got four booms and a cage at the end of 4th boom. The equipment is mounted on a Mercedes Benj chassis and the power for entire operation of the equipment is from main engine of the vehicle. The equipment has got controls both at the turn table, as well as in the cage, which is capable of carrying 350 kg. of load. The movement of the boom is controlled hydraulically, and it is possible to reach almost every point underneath complicated 4 lane bridge like Thane Creek, which has got side railing foot-path, and additional railing on the side for the electrical telephone wires, bearings and beams. The main vehicle on which the equipment is mounted can be driven at a slow speed i.e. about 5 km. per hour, when the cage is underneath the bridge. The equipment has also got four out-riggers, two of which are extended on the side of the inspection. The systems are so interlinked that unless the outriggers are properly placed on the surface the booms cannot be operated. It has got built in safety devices, and an auxillary engine for the operation of the booms in case of failure of the main engine. The equipment has the facility to be connected to 220 volt AC supply for the operation of electrical tools/equipment needed for the repairs etc. of the bridge. It has also got pneumatic hoses for the operation of the pneumatic tools from the cage. The unit has costed about Rs 92.00 lakhs inclusive of custom duty etc.

b) Being Procured by the Ministry

This unit is of model 1610/5-3 and has got 3 no. booms. This is capable of covering 16 M vertically upwards 10 M vertically downwards and 5 M horizontally underneath the bridge, from the centre of the vehicle and has got 3 booms and a cage at the end of 3rd boom. The equipment will be mounted on British Leyland Comet chassis. The capacity of the cage is 260 kgs. The body work of the machine is sturdy box frame which is fastened to the chassis with bolts. The hydraulically powered outriggers are fixed at both ends of this box frame. The turn table is mounted on a sturdy rotating ring with bearings on the machined upper surface of the frame.

The other features of the equipment are as under

Working Cage and Levelling : The levelling system keeps the cage horizontal in all boom positions.

Safety Devices : The hydraulic cylinders are fitted with built in lock valves to prevent the working cage from lowering or the outriggers from retracting in case a pipe or hose brakes. Operation of booms and rotations is prevented by means of electrical limiting switches, until the outriggers have reached sufficient support width and touch the ground hard enough.

Retracting of the outriggers is automatically prevented as soon as the booms have been lifted up from their transport position. This fully assures the stability of the vehicle during the operation.

Emergency Operation : Back up system for the hydraulics with combustion engine driven pump is fitted as a standard feature to be used in case of failure in the main hydraulic circuit or vehicle engine.

Overload Alarm : Red signal lights on the turntable and working cage control panels and sound signals indicate if the permitted cage load is exceeded. Simultaneously all movements stop.

3. **Cost of the Equipment :** The equipment being purchased by the Ministry will be Rs 75.00 lakhs including custom duty etc. Two nos. sketches showing the working of the equipment and that reaches which can be achieved and enclosed as per sketch I & II.

4. Staff Required for the Unit and Training of the Personnel

This unit may have one Officer of the rank of AEE(Mech.)/SDO(Mechanical) as Officer Incharge at site. The movement and planning of the unit may be monitored by the Officer of the rank of EE/Divisional Engineer of the State stationed centrally at State Headquarters. Apart from these Officers, it may have officers of the rank of AEE (Bridges)/SDO(Bridges) as Bridge Inspector.

A) Staff for Operating the Unit

Minimum 3 persons are required in Skilled category and two persons as Labourers/helpers.

- (a) Driver in the cabin
- (h) Operator of cage in the cage
- (c) Third as extra to communicate safety/caution to instruct the cage man and driver controlling to and fro movement of vehicle when the cage is under Bridge.
- (d) Two helpers or mazdoor to shift base plates under outrigger and to control traffic and to clean the surface of road under base plate etc.

B) For Maintenance

One Sr. Mechanic, One Electrician, Two helpers are required with more helpers, when it is done for repairs.

C) Training

In the case of Maharashtra, firm had trained their two Engineers at their works i.e. at Finland and the training to the other operating staff was imparted by the firm's Representative and the State Officer trained by the firm at the site of the unit. In case of Ministry's equipment also, firm has agreed to train two Engineers at their works and the training to staff will be provided in India. This facility can be availed of by the State also in case of the equipment purchase by them.

5. Scope of the Equipment for Inspection and Maintenance of the Bridges

There are about 6200 bridges (except on National Highways under the administrative control of BRDB) on National Highways. A quick condition survey of all bridges on National Highways was got done in the year 1986 and the results reveal that : —

- (a) About 21% of the bridges are under serious distress.
- (b) About 35% of the bridges are under non serious distress.

While conducting the above condition survey, a major constraint was experienced in the form of lack of Means of Access. Most of our bridges cross wide stream/rivers and creeks with an average height above bed/water much more than 6 m. In such a situation the actual condition of the deck as observed from a distance can not be proper for making correct assessment of the structure. The approximation in such assessment may lead to some irreparable mistakes at a later date. In fact, the lack of proper means of access for such high deck bridges has been one of the important obstacles which has been dissuading the Engineers from carrying out proper inspection of bridges.

The mobile bridge inspection unit fills such a void to a great extent. The unit will be placed on the top of the deck and bridge inspectors may safely be moved to underside of the bridge where they may have a close visual assessment of the underside of the deck and to portion of piers/bearings. Various non-destructive methods of testing may also be applied/used. In this way, a correct assessment of structures may be made which is vital for safety. However, employment of qualified and trained bridge inspectors for bridge inspection cannot be over emphasized. Proper traffic control need to be made during the placement of mobile bridge inspection unit on the bridge.

The unit is also made use of for maintenance and repairs of the underside of deck, bearings, top portion of piers, which are difficult to approach in normal manner.

It may be pointed out that India has a long coastline and the bridges located in the aggressive environment of coastal regions are highly susceptible to distress caused by corrosion of Steel. In order to assure safety of bridges in these regions, all such bridges must be regularly inspected in a proper manner and repaired (if required) expeditiously.

6. Financing

As already indicated above, the equipment depending upon the model may cost between Rs 75.00 lakhs to Rs 95.00 lakhs. In addition to that, the initial spares to the extent of 5 to 10% of the cost will also be needed.

The running expenses including pay and allowance of the crew of inspection unit and the POL etc. for the running and maintenance of the inspection unit may be about Rs 3.00 lakhs per year. Since there is paucity of funds, it will not be possible for the Ministry to purchase such equipment and supply to the States. Ministry may however assist in drawing the specifications etc. of the equipment and release all foreign exchange in case the State come up for the purchase of the equipment.

7. Infra Structure Facilities

- (a) Apart from the Mobile Bridge Inspection unit the inspection team need a light commercial vehicle for the movement of the crew and carriage of POL/Spare parts etc. for the normal repairs maintenance of the machines. The van may cost approximately Rs 2.00 lakhs. The running expenditure to the extent of Rs 50,000/- for the crew and repair maintenance of the van may be needed during one year.
- (b) Stocking of initial spare parts etc. at suitable location within the State will have to be arranged.
- (c) For major repairs to the machine repair facility either departmentally or through outside agency may be needed. For this purpose also, State will have to arrange for the necessary spares indigenously/imported available with proper planning in advance.

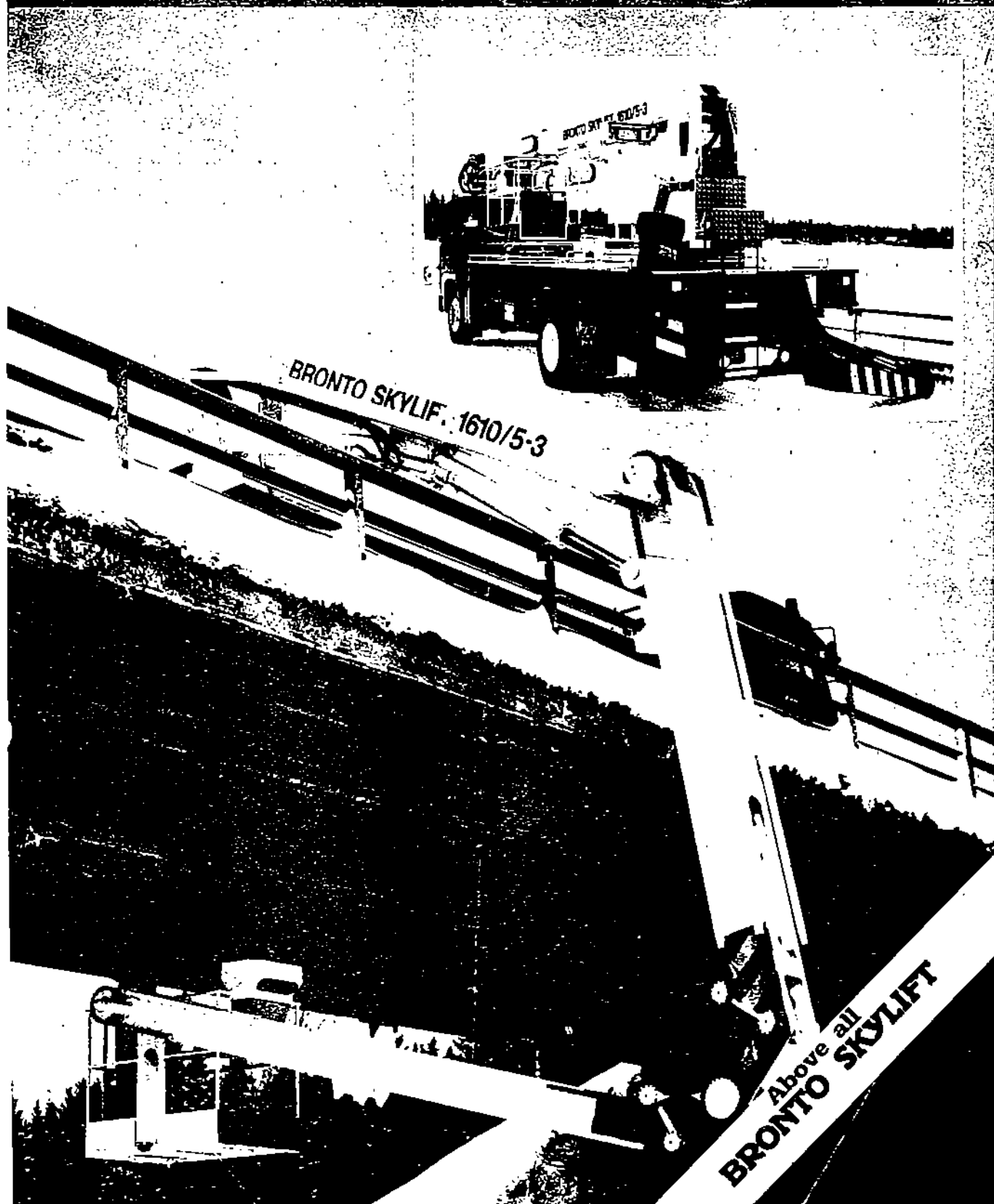
8. Procedure for Procurement

The equipment purchased by Maharashtra Government was by placing an order directly on the firm whereas the equipment being purchased by the Ministry is through DGS&D. The following are the important steps for procurement : —

- (i) Draw the specifications of the equipment.
 - (ii) Arranging of finance for the purchase of equipment.
 - (iii) Since the equipment is not being manufactured in the country, the clearance of DGTD is to be obtained for the import of machines.
 - (iv) The release of foreign exchange should be obtained from the Ministry of Finance, Department of Economic Affairs through Ministry of Surface Transport.
 - (v) Float global tenders by giving an advertisement in the newspapers circulating it to the Embassies etc.
 - (vi) Create posts as mentioned above and get them trained.
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BRONTO SKYLIFT

1610/5-3



BRONTO SKYLIFT 1610/5-3

MAX 260 KG

