Chapter 6: Road Signages

6.1 Introduction

In February 2006, the Chief Minister (CM), Delhi desired that the entire city of Delhi should have state of the art road signages with appropriate structural system for the forthcoming CWG 2010. A presentation was made by 3M India Limited before the CM on the signage system to be developed in Delhi. In keeping with the CM's direction, a stretch of road was selected between Tilak Marg and Raj Ghat and a feeder road going up to Delhi Secretariat for a pilot project in April 2006 at an estimated cost of ₹ 1.77 crore. The pilot project was taken up (May 2008) using ASTM[1] Type XI retro-reflective (RR) sheets and was completed in December 2008 by the authorised converters of 3M India Limited and Avery Dennison, the two leading manufacturers of RR sheets of type-IX and XI.

GNCTD accorded in principle approval, in March 2009, for the work of installation of RR signages using type-IX (based on pilot study of NDMC using Type IX Retro Reflective sheet), though the pilot study by PWD was conducted using Type-XI sheeting. The type of support structure (M.S. Pipes/Tubes) and colour of signages (blue coloured sheet with white letters) was also decided.

The improvement brought to the look of Delhi by the consistent implementation of the road signages project and the aesthetic and utilitarian upgrade by the use of these signages is commendable.

Cantilever mounted signage

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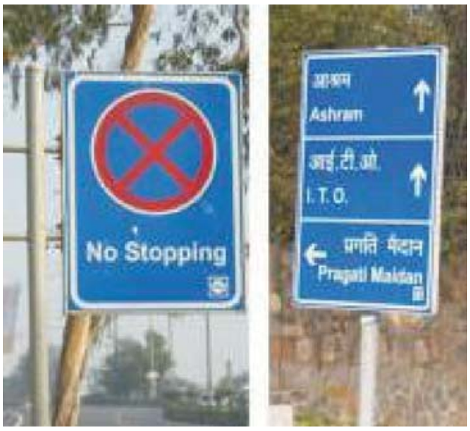
[1] American Society for Testing and Materials

Road name – double arrow signage



Cautionary and directional shoulder

The road signages work was carried out by NDMC and PWD in their own areas. PWD divided its work in three zones for separate tendering and awarded them in October 2009 at a total contract amount of ₹ 53.13 crore. As on 5 August 2011, the works were not completed and an amount of ₹ 40.52 crore was paid which included provisional payment of ₹ 7.61 crore for extra/substituted items under three zones, against the accepted extra items of ₹ 11.89 crore. NDMC undertook the work of signages in seven separate packages between February 2009 and October 2009 at a total contract cost of ₹ 19.52 crore.

6.2 Restrictive conditions in tendering

The department was aware that there were only two manufacturers of RR sheet and that the component of RR sheet formed about 33 *per cent* of the total project cost. Yet, the following restrictive eligibility conditions were included in the NIT, finalised on the basis of discussion between Pr. Secretary to C M, Pr. Secretary (PWD) and Pr. Chief Engineer

- The bidder shall either be a RR sheet manufacturer or shall have an exclusive Memorandum of Understanding (MoU) with the manufacturer of RR sheet in the case of a firm or Joint Venture (JV).
- Out of the three packages of road signage works, not more than two packages shall be awarded to any one RR sheet manufacturer.
- The sequence of bid opening was stated with the financial bid of Zone M1 to be opened after the other two zones (M2 and M3).

Thus, inclusion of above conditions resulted in the following:

- It enabled the RR sheet manufacturers either to collude to split the order among themselves or to consistently bid high in all the bids, knowing that no party would take all the bids.

- It presented a situation for both the sheet manufacturers to charge a premium for their association/exclusive MoU as they were an indispensable component of the bidding process.
- It was ensured that at least one zone each would be awarded to both the sheet manufacturers irrespective of the competitiveness of their bids.

Audit observed that the bidders backed by Avery-Dennison won the contracts in zones M2 and M3. However, in zone M1 the financial bid of the Avery-Dennison backed vendor (Prakash Reflective Devices) was rejected on the grounds that the turnover of the other partner (other than lead partner) of JV did not fulfill the minimum proportionate turnover criteria individually. Such extreme interpretation of the clause was not explicitly stated in the NIT or EoI, and has not been so interpreted in similar evaluation of other works in PWD such as in Streetlighting project. Consequently, in zone M1, the department was forced to accept the sole technically qualified bid of 3M-Bajaj consortium, by negotiating down the quoted rate by 15.95 *per cent* of quoted amount, but still at higher rates than M2 and M3. The estimated value of work of M1 was similar to the sum of works for M2 and M3.

The impact of the restrictive clauses was that the works in the three zones of PWD were awarded at rates higher than the three works of NDMC awarded in the same period (October, 2009). The cost of major comparable items of RR sheet and a Very High Strength Bond (VHB) tape, a proprietary product of M/s 3M-Bajaj, was higher by 21 to 73 *per cent* respectively, in PWD when compared with NDMC.

Department stated (February, 2011) that after the execution of pilot project, it was learnt that there were at least two parties (M/s 3M & Avery Dennison, both based in America) who were manufacturers of RR sheets conforming to ASTM standards. As the department was not sure of any other manufacturers of RR sheets in the world other than these two, so NIT conditions were designed in such a way that only RR sheet manufacturers (conforming to type IX ASTM standards) are permitted to participate in the bid in the form of JV/consortium. The tender cannot be called a restrictive tender in the strict sense because participation by minimum two numbers of parties competing with each other with their known background since years would ensure competitiveness in any tender.

The reply is not acceptable because competition could have been ensured by continuing with calling for authorized converters to bid as was in the case of pilot project after specifying the standards.

The lack of competition in PWD resulted in higher tender rates and consequent loss to government. In case of M-1 Zone as not more than two works would be awarded to one sheet manufacturer, only 3M-Bajaj-CBM consortium was technically qualified. 3M-Bajaj-CBM consortium quoted 8 *per cent* above estimated cost. In fact, in all the three zones, the 3M consortium quoted varying rates, and each time higher than its competitor. The department negotiated the bid of 3M-Bajaj-CBM consortium down by ₹ 4.75 crore. The work was finally awarded to the consortium at 9.2 *per cent* below estimated cost, which was still 5.1 *per cent* higher than the rates for other two zones. Thus the acceptance of single tender at higher rate due to restricted competition resulted in a minimum loss of ₹ 1.40 crore to government.

GNCTD replied that NIT conditions were designed in this manner for faster execution and to ensure that a single agency did not take up the entire signage work for all the three zones, so that if one agency failed, the other agency could be used to counter the failure.

It was further stated that a conscious decision was taken to use type IX RR sheet in signages and make RR sheet manufacture (of type IX sheet) a party in tender participation by way of a JV or consortium as RR Sheet is the key element of signage, there were chances of short supply of RR sheet type IX due to major work in progress in Delhi before CWG 2010.

Reply is not acceptable as recourse to awarding the work to another agency in case of failure by the selected agency was always available and PWD ensuring that both the agencies were awarded a share of the work led to reduced competition.

6.3 More expensive design and execution in PWD vis-à-vis NDMC

Audit compared the cost of three similar types of signages executed by NDMC. The rates were compared with that of PWD and found that the cost of execution in PWD was substantially higher than that in NDMC. The difference in cost is both due to a higher cost of the input material and a more expensive design, consuming more of the input material. NDMC used structure of stainless steel while PWD used mild steel structures to fix the signages. The cost comparison with and without structure was worked out as tabulated below:

Table 6.1 Unit cost of signages (without structure)

(in ₹)

Signage Type	NDMC	PWD
Place Identification	31,178	56,809
Cautionary	10,029	21,510
Road name-Double arrow	18,739	42,437

Table 6.2 Unit cost of signages (with structure)

(in ₹)

Signage Type	NDMC	PWD
Place Identification	51,129	61,544
Cautionary	25,400	24,513
Road name-Double arrow	35,827	45,336

The cost incurred by PWD for various signages excluding structure work, was substantially higher by 82 to 127 *per cent* than NDMC. This indicated inefficient and expensive design and procurement.

GNCTD stated that the signages requirement of PWD roads is entirely different than that of NDMC roads. The PWD signages were bigger and more visible both from near and far and to slow moving and fast moving vehicles and NDMC sign boards were fixed at low height and were shoulder mounted. Further PWD signages were larger and heavier than NDMC signages and PWD signage pattern was different from NDMC. The reply is not convincing as the audit observation is just indicative of unit cost with respect to the purpose. It is apparent that the structures meant to serve the same purpose costed more in PWD than NDMC.

6.4 Execution of extra and substituted items leading to cost escalation

A large number of extra/substituted items after award of work, without documented technical reasons, raises doubt on their actual utility, especially when the designs finalised by Shri. D.S Sachdeva, Advisor (without specific authority) was based on the methodology submitted by Fibrefill, one of the executors of the signage work.

Inspite of design approved by the department well in advance, in all the three zones, identical extra items were accepted valuing ₹ 11.89 crore (22.38 *per cent* of contract amount of ₹ 53.13 crore).

As tenders for the work were invited on the basis of the pilot project carried out by the PWD wherein both the sheet manufacturers had participated, it was expected that the requirements for execution of project would be well known leaving minimum possibility for substitution of items or execution of new items. This was not the case. Further, there was no uniformity in the rates proposed/approved by different zones for these identical items. The accepted amount of ₹ 11.89 crore across the three zones on extra/substituted items was primarily on account of the following items:

Table 6.3 – Approved amount of major extra/ substituted items

(₹ in crore)

Nature of extra/substituted item	Approved Amount
Substitution of MS Angle with Square Hollow Section for making signage frame	1.51
Covering rear face of signages with ACM[2] as extra item	3.79
Use of Aluminium channel/Trim as extra item	4.06
Use of Pre cast bend , bolts and anchor plates as extra item	1.71

[2] Aluminium Composite Material

In reply to audit observations on extra and substituted items, GNCTD stated that after award of work, samples were prepared with due deliberations at various levels and the designs were fine-tuned within the ambit of basic frame work. PWD in consultation with Shri D.S. Sachdeva, Adviser (PWD) who was a former DG of CPWD finalized the detailing of signages for best use and utility befitting the city environment.

As explained in the following sections, the need for these extra and substituted items, which has substantially inflated the cost of the project was not convincing.

In an item wise scrutiny of impact of substituted items on overall cost of various types of signages, Audit observed that the cost per unit increased from 21.5 *per cent* to 71.9 *per cent.*

The details of the extra/substituted items leading to the stark increase in cost are given below. The avoidable expenditure includes estimates for zone M1 for which final payments are yet to be made (July 2011).

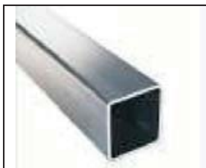
Table 6.4 – Increase in cost on account of substituted items

(Per unit cost in ₹)

Type of Signage	Agreement Cost	Executed Cost
Gantry mounted	5,52,399	8,87,201
Cantilever mounted	1,95,272	2,37,067
Directional shoulder mounted (DSM)	54,623	87,328
Cautionary signboard	15,482	26,597
Place identification signboard	40,092	48,690
Road name signboard: Double sided	23,479	28,985
Road name signboard: Single sided	23,479	37,851
Road name signboard: Double arrow, single sided	27,259	45,082

GNCTD stated that the executions of extra/substituted items were considered necessary in order to enhance the life of signages and to improve aesthetics by preventing percolation of water inside of boards, warping of the boards etc. and further stated that extra cost has only added longevity to the signages system apart from adding aesthetics to the city. The report of the committee to finalise extra/substituted items was getting finalised soon and accordingly the rates of items would be decided.

6.4.1 Substitution of Mild Steel (MS) Angle with Square Hollow Section (SHS)

	
Square Hollow Section (SHS)	***Mild Steel (MS) Angle***

During the pilot project for signages in PWD, the frame for fixing of RR sheet was constructed using MS Angle and the same was specified at the time of tendering. No questions regarding the frame were raised by any of the bidders during the pre bid conference.

Audit observed that during issue of detailed drawing by PWD, which was done subsequent to the award of work, the item of MS frame using MS angle was substituted by SHS and contractor was paid for the difference in the rates between MS angle and SHS as extra item.

The use of costlier SHS has actually benefitted the contractor by way of reducing his fabrication cost, while increasing the cost of the project. This substitution of item would lead to avoidable expenditure of ₹1.51 crore, of which ₹ 1.07 crore[3] has already been paid by three zones as of 5 August 2011.

This also led to increase in weight of larger signage structures like gantry and cantilever, which runs counter to the reason given by the department in support of use of SHS.

GNCTD stated that payment will be made as per terms and conditions of agreement and uniformity will be kept in all zones after proper analysis in conformance of decision of the constituted committee and after approval of sanctioning authority. Difference in fabrication cost, shall be considered while finalizing the rates.

6.4.2 Sanction of work for covering rear face of signages with ACM as extra item

A successful pilot project was already complete based on which the NIT did not include in its scope of work a covering for the rear face of some of the signboards. However, during execution, the rear surfaces of signages were covered using 4mm thick ACM, which served no functional purpose and was done for the stated purpose of improved aesthetics. The execution of this extra

[3] M1- ₹. 0.35 crore, M2 ₹. 0.21 crore and M3 ₹. 0.51 crore = ₹. 1.07 crore.

item enhanced the cost of signage by ₹ 4926 per sqm leading to avoidable expenditure of ₹ 3.27 crore as of 5 August 2011.

Audit observed that since only the front portion of the signboard had information to be seen by the citizen/user, any expenditure on improving the aesthetics of the rear surface was wasteful.

Analysis of the cost components of ₹ 4926 per sqm for assessed value of work of covering the rear face with ACM, done on the basis of single quotation, revealed that the cost of VHB tape used for fixing ACM was ₹ 1666 per sqm (34 *per cent*) while ₹ 1259 per sqm (26 *per cent*) was for its routing, bending, making tray, fixing of VHB tape etc. In fact, the VHB tape used for bonding ACM with the MS frame is manufactured by 3M Limited, one of the sheet manufacturers.

Riveting of ACM to frame

Aluminium Trim peeling off from frame

During computation of cost for extra item of covering rear face of the signages with ACM, excess area (than required) was considered, causing a further loss of ₹ 0.22 crore to the government at the rate of ₹. 348.43 per sqm for 6672.67 sqm of item paid till 5 August 2011.

GNCTD stated that provision for covering the rear face of ACM has been made only for cautionary boards for concealing MS frame for aesthetic improvement and increasing the life of the signages and to avoid rusting of back cover etc. Regarding amount in escalation of cost, it was stated that final figure would be cleared after finalization of rates.

6.4.3 Wasteful expenditure on inclusion of aluminium channel/trim as extra item

The guidelines issued for execution after awarding works included an item of providing 2 mm thick Aluminium channel/ trim around the sides of RR boards for aesthetic reasons.

Consequently this item of aluminium trim was executed as an extra item. Audit observed that:

- The aluminium trim was to be fixed by using VHB tape (an expensive proprietary product of 3M), thereby exposing the trim to inevitable theft by peeling it off. It has been removed in some places, and in some other places, they are in the process of being removed.
- As the ACM sheet used in the board already had an aluminium layer as an integral part, the overlay by another aluminium layer as trim was wasteful.
- The aesthetic utility of aluminium trim on signboards mounted on gantries and cantilevers fixed at a height of above 6m, meant for vehicles running at substantial speed should have been foreseen before award of work.

Thus, the decision to use aluminium trims was unwarranted and has resulted in wasteful expenditure of ₹ 3.79 crore as of 5 August 2011. Further, an expenditure of ₹ 1.37 crore for this item was incurred by M1 and M2 zones without approval of rates by the competent authority.

Department stated (February 2011) that fixing of trim was decided after lengthy deliberations at the level of the Advisor (PWD) who happens to be the former Director General CPWD and was also approved by the GNCTD while approving the sample. As regards non-acceptance of clarification by Audit on the ground that trim pasted with VHB can easily be peeled off and was not theft proof, the department added that theft has no limit. Few places were seen in Delhi where the trim has peeled off however about 6000 boards have been installed which reflects negligible damage. The chances of this type of happening always remain on running roads in such Metro cities. Continuous maintenance is the only solution for such incidents, which is being done simultaneously. Further, the expenditure on this item was quite nominal in comparison of utility and aesthetics etc. of the trim and the payment made against this item was provisional subject to final rates to be approved by the committee and the competent authority.

Reply is not convincing as the recommendations of the Advisor are not binding on the department, further, department has accepted the changes. While selecting ACM it was stated that it is less prone to theft hence the department considered this aspect of theft prior to tendering and not while deciding extra item.

Hence, to use costly Aluminium with VHB tape by exposing it to known risk, is application of item negating the reality. This led to enhanced maintenance cost.

GNCTD stated that the decision to provide aluminum channel was taken to protect edges of the board so as to prevent tampering with RR Sheet etc. Further, such items were not foreseen at the time of preparing estimate and while calling tenders and so were not included in the tender schedule.

6.4.4 Inadmissible payment for precast bend, bolts and anchor plates as extra item

The contract provided for welded bends for the tubular support structure. The department replaced welded bends with precast bend as an extra item, despite the clarification given in the pre-bid meeting that nothing extra would be payable on this account. This replacement on the grounds of improved aesthetics without any functional purpose would lead to an additional cost of ₹ 0.83 crore (under M2 and M3 zones) against overall approved amount of ₹ 1.10 crore for the item, of which ₹ 0.57 crore has already been paid by M3 zone (July 2011).

Further, as per the description of work, rate analysis of the item, drawings appended with agreement and CPWD specifications for steel works, the component of anchor bolts and anchor plates was to be paid under the relevant item of steel work itself. However, Audit observed that the same was separately paid as extra item at the rate of ₹ 116.73 per kg instead of the agreement rate for steel work of ₹ 65 per kg, leading to inadmissible expenditure of ₹ 0.31 crore[4]. On the basis of audit observation recovery has been made by M2 zone in March 2011.

6.5 Undue financial benefit to contractor for barricading work

During the pre bid meeting, the department clarified that the barricade can be retained by the contractor after completion of work. Audit observed that the executed quantity of this item increased by 172 *per cent*, resulting in undue financial benefit of ₹ 0.25crore[5] to contractors as of 5 August 2011.

Department stated that safety of the commuter on the road cannot be compromised. However due to wear and tear as well as continuous accidents etc. the barricading sheets can hardly be of any use except scrap after six months of their placement.

GNCTD stated (December 2011) that the quantities of barricading work actually required to ensure safety was much more than what was provided in the agreement and further stated that the cost involved in barricades is insignificant in view of the requirement of safety measures to avoid accident.

The reply is not tenable as the quantum of work of signage was not exceeded (as per paid amount), the site was available, time was agreed and the contractor had quoted rates accordingly. The time for installation and fixing was limited in case of signage. Thus, any inefficiency on the part of contractor was not to be compensated from public money.

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[4] M2 ₹. 19.05 lakh and M3 ₹.11.49 lakh = ₹. 30.54 lakh i.e ₹. 0.31 crore.

[5] M1 ₹. 10.63 lakh, M2 ₹. 13.02 lakh and M3 ₹.1.70 lakh = ₹. 25.35 lakh i.e ₹. 0.25 crore.

6.6 Non imposition of penalty

Audit noted that all the three works executed by PWD were delayed by 440 days as on 31 July 2011, but penalty of ₹ 5.31 crore for the delay was not levied on contractors.

GNCTD stated (December 2011) that Superintending Engineer concerned is the final authority, under the agreement and competent to grant EOT/levy compensation for delay and a judicious decision taken after hearing all the representations will be final and binding on both the parties of the agreement.