CHAPTER 23

Road Signages

The Chief Minister of Delhi desired in February 2006 that the entire city of Delhi should have state of the art road signages with appropriate structural system for the forthcoming Commonwealth Games 2010. A pilot project was taken up by PWD in May 2008 through authorised converters of 3M Limited and Avery Dennison (the two leading manufacturers of the retro reflective sheets).

The department did not facilitate healthy competition, but merely ensured sharing of signage work between the two major sheet manufacturers, 3M and Avery-Dennison. Instead of calling a single tender for the complete work, the project work was divided among three PWD Zones for separate tendering and execution, with two restrictive conditions :

- *The Sheet manufacturer would necessarily be a part of the bidding party, and have an exclusive MoU, and*
- *not more than two out of three works relating to the three PWD zones would be awarded to any one sheet manufacturer.*

This led to only two valid bidding parties in PWD, with work automatically getting distributed between them.

The anti-competitive bidding conditions led to:

- *Work of one zone being awarded at least Rs. 1.40 crore above the corresponding cost in the other two zones.*
- *Higher overall costs of procurement in PWD, as compared with NDMC (where there were no such restrictive conditions of the manufacturer to be a part of the bidder).*

Negotiation to the tune of Rs 4.75 crore had to be done in case of the final bid, indicating lack of competition in the bidding process.

Subsequent to the award of work, the designs for the signages were substantially revised, leading to large number of extra and substituted items of dubious utility. These were approved under the recommendation of the advisor to PWD, primarily based on the designs submitted by one of the contractors.

We are of the view that the design modifications were of little utility; the manner of implementation was also uneconomical, leading to higher cost of execution. These extra and substituted items led to an additional avoidable expenditure of Rs 14.88 crore.

23.1 Introduction

In February 2006, the Chief Minister of Delhi desired (February, 2006) 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 Rs.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 Limited and Avery Dennison, the two leading manufacturers of retro reflective sheets of type-IX and XI.

GNCTD accorded in principle approval in March 2009 for the work of installation of retro reflective 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.

Cantilever mounted signage

[1] *American Society for Testing and Materials*

Road name – double arrow signage

Cautionary and directional shoulder

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

Instead of calling a single tender for the complete work, the project work was divided among three PWD Zones for separate tendering and execution, purportedly on grounds of administrative convenience. In our opinion, a single tender would have facilitated greater competition.

Though the pilot project was decided upon in April 2006, there were inexplicable delays in executing it (2008), with the main works finally being awarded only in October 2009, with a stipulated period of completion of 6 months, at a total contract amount of Rs. 53.13 crores.

As of December 2010, the works were in progress and an amount of Rs. 25.06 crore was paid which included provisional payment of Rs.2.83 crore for extra items under two zones (M2 & M3), against the accepted extra items of Rs. 7.88 crore. The details of execution and payment for extra items in M1 were not available, but are likely to be similar as the nature of work is similar in all zones.

NDMC also undertook the work of signages of NDMC roads. The work was executed in seven separate packages between February 2009 and October 2009 at a total contract cost of Rs 19.52 crore.

We found better competition and costs obtained by NDMC, and this has been used as a benchmark in evaluating the signage work undertaken by PWD.

23.2 Restrictive conditions in tendering

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

- The bidder shall either be a retro-reflective (RR) sheet manufacturer or shall have an exclusive 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 following:

- It was ensured that at least one zone each would be awarded to both the sheet manufacturers, irrespective of the competitiveness of their bids.
- 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 bidding process.

We found 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 incorrectly rejected by an extreme interpretation of the clause for turnover criteria. 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 percent 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 work 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 VHB[2] tape was higher by 21 to 73 percent respectively, in PWD when compared with NDMC.

The lack of competition in PWD resulted in higher tender rates and consequent loss to government.

In zone M1, although the bid of Avery Dennison backed vendor was incorrectly rejected, the bid was in any case not to be considered as the department had already stipulated that not more than two work would be awarded to one sheet manufacturer. This left 3M-Bajaj-CBM consortium as the only technically qualified bidder. 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.

[2] *Very High-strength Bond Tape, a proprietary product of 3M*

The department negotiated the bid of 3M-Bajaj-CBM consortium down by Rs. 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 has resulted in a minimum loss of Rs. 1.40 crore to government.

PWD 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.

We do not accept this argument, as such recourse to awarding the work to another agency in case of failure by the selected agency was always available, and PWD need not have ensured that both the agencies were awarded a share of the work for this purpose, which led to reduced competition.

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

We compared the cost of three similar types of signages executed by NDMC with that of PWD and found that the cost of acquisition 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 by us, and is tabulated below.

Table 23.1 – Unit Cost (Rs) of Signages (Without Structure)

(In Rs. Crore)

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

Table 23.2 – Unit Cost (Rs) of Signages (With Structure)

(In Rs. Crore)

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.

23.4 Execution of extra and substituted item leading to cost escalation

We noticed that in two zones (M2 and M3), identical extra items valuing Rs. 7.88 crore (28 per cent of contract amount of Rs. 28.12 crore) were accepted by the department, while in zone M1 the value of extra item is estimated to be approximately Rs. 7 crore on the same basis.

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. The expenditure on extra/substituted items, estimated at Rs. 14.88 crore across the three zones, was primarily on account of the following items:

Table 23.3 – Expenditure on major extra/ substituted items

(In Rs. Crore)

Nature of Extra/Substituted item	Amount
Substitution of MS Angle with Square Hollow Section for making Signage frame	2.85
Covering back face of signages with ACM[3] as extra item	3.51
Use of Aluminium channel/ Trim as extra item	3.85
Payment for precast bend, bolts and anchor plates as extra item	0.93

Inclusion of 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.

In reply to our observations on extra and substituted items, PWD stated that decisions on execution of these were taken solely in the interest of work, for improved aesthetics or on technical grounds, after due deliberation under the guidance of Advisor (PWD) – a retired DGW/ CPWD.

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

In an item wise scrutiny of impact of substituted items on overall cost of various types of signages, we found the cost per unit increased from 21.5 per cent to 71.9 per cent as tabulated below:

Table 23.4 — Increase in cost on account of substituted items

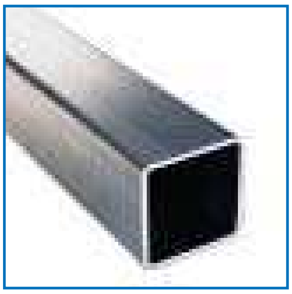
(Per unit cost in Rs.)

Type of Signage	Agreement Cost	Executed Cost
Gantry mounted	5,52,399	8,87,201
Cantilever mounted	1,95,272	2,37,067
DSM (Directional Shoulder Mounted)	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

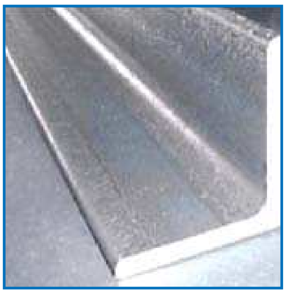
[3] *Aluminium Composite Material*

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.

23.4.1 Substitution of MS Angle with Square Hollow Section (SHS)



Square Hollow Shape (SHS)



Mild Steel (MS) Angle

During the pilot project for signages in PWD, the frame for fixing of retro reflective 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.

We found 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 has led to avoidable expenditure of Rs. 2.85 crore,** of which Rs. 0.75 crore has already been paid in two zones.

This has 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.

23.4.2 Needless sanction of work for covering back face of signages with ACM as extra item

The scope of work under agreement did not provide for covering the back face of some of the signboards. However, during execution, the back of signages were covered using 4mm thick ACM. Covering the back of the signboard served no functional purpose, and was done for the stated purpose of improved aesthetics. The execution of this extra item enhanced the cost of signage by Rs. 4926 per sqm leading **to avoidable expenditure of Rs. 3.51 crore** as of November 2010.

We are of the opinion 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 back surface was wasteful.

Riveting of ACM to frame

Analysis of the cost components of Rs. 4926 per sqm for assessed value of work of covering the back face with ACM, done based on single quotation, revealed that the cost of VHB tape used for fixing ACM was Rs. 1666 per sqm (34 per cent) while Rs. 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, one of the sheet manufacturers.

Even if the sheets had to be used, the whole cost of fixing ACM with VHB along with its routing and bending could have been dispensed with, by simply riveting the ACM sheets. In this process, the extra cost of covering the back face could have been reduced by Rs. 2.03 crore.

During computation of cost for extra item of covering back face of the signages with ACM, excess area (than required) was considered, causing a further loss of Rs. 0.25 crores to the government.

23.4.3 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 again, purportedly, aesthetic reasons.

Consequently this item of trim was executed as an extra item. We found that:

- The aluminium trim was to be fixed by using VHB tape (an expensive

Aluminium Trim peeling off from frame

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 actual 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 is also questionable.

Thus, the decision to use aluminium trims was unwarranted and has resulted in wasteful expenditure of Rs. 3.85 crore. Further, an expenditure of Rs. 0.42 crore for this item was incurred without approval of rates by the competent authority.

23.4.4 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 led to an additional cost of Rs. 0.40 crore.

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 were to be paid under the relevant item of steel work itself. However, we noted that the same was separately paid as extra item at the rate of Rs. 116.73 per kg instead of the agreement rate for steel work of Rs. 65 per kg, leading to inadmissible expenditure of Rs. 0.56 crore.

23.5 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. We found that the executed quantity of this item increased by 159 per cent, resulting in undue financial benefit of Rs. 0.24 crore to contractors, as of November 2010.

23.6 Non imposition of penalty

We noted that all the three works executed by PWD were delayed by 198 days as on 30 November 2010, but penalty of Rs. 5.26 crore for the delay was not levied on contractors.

23.7 Payment for work not recorded

In M3 zone, an amount of Rs. 4.50 crore was paid (July 2010) to the contractor without any measurement (progressive/ detailed) since the start of work (November 2009).

We consider this to be a serious financial irregularity, especially when the contractor was responsible for recording measurements.