OVERHEAD MAINTENANCE COSTS

1. Introduction

As ever, arriving at costs is a matter of judgement particularly as accountancy has been described as an Art not a Science. For a start you need to decide what to include or exclude. Some expenditures are clearly capital and you would need to amortise the cash cost over the expected life of the asset. A totally new route or major extension such as that proposed into Stanley Park Vancouver would fall into that category. At the other extreme the replacement of a defective line hangar here and a broken span wire there are clearly maintenance and can be written off immediately. There can be a grey area in between in respect of major renewals. For example what is the correct treatment if you renew several km of running wire on a particular route and spend say $500,000? Is that capital or is it maintenance? On a large system like Vancouver's where there is a regular programme of such renewals and where the amount of each renewal is small in relation to the size of the whole system, it is probably correct to regard such renewals as maintenance not capital.

Please also note that I am not talking here about depreciation, which is an accounting provision made over the life of an asset for its replacement,

Finally, when comparing different types of vehicle, I believe cost per service hour is the fairest method of comparing costs. Having said that, the comparison in Hong Kong may be fairer in that the most intensive routes which would convert to trolleybus are currently operated by diesels so accurate figures for both types would be available on a cost per km basis.

I have concentrated on cost per km simply because the published figures are available in that format. But where possible I have converted to cost per service hour.

2. Fixed and Variable Costs

Likely overhead maintenance costs depend on the ratio of fixed and variable costs. By its very nature a trolleybus overhead system has a high proportion of fixed costs. These costs arise whether you run a single km of trolleybus service or not. Obvious fixed costs are the labour cost of regular inspection of the whole system to ensure the overhead is safe from falling into the road and that switches are properly functioning. These have to be incurred irrespective of whether you run a half-hour frequency or a 2-minute frequency. Broadly speaking (but see later) you are going to have a fixed number of crew and tower wagons depending on the physical size of the system. Equally some maintenance costs also arise through effluxion of time e.g. tarnishing of fittings. So for example the replacement of steel span wires is dependent on their age not the number of etbs that have run past.

There are, however, bound to be some variable costs too. The actual running wires will become more worn depending on how much you increase the service. Similarly if you increase the frequency of service there will be more wear on special work which will mean extra expenditure on components and

labour. It is in this respect that the size of your maintenance crew is not entirely fixed. Beyond a certain point of intensity of service you might well need to take on an extra crew and tower wagon.

3. Impact on Unit Costs

What do these observations mean in practice? Well, if overhead costs were entirely fixed it would mean that by doubling the frequency of service and therefore the annual Kms run, you would halve the cost per vehicle/km. As I said above, it isn't quite that simple because increasing the level of service will increase wear and tear and the amount of variable cost. But the impact of the increased variable costs will be far outweighed by halving of the fixed cost element. It is impossible to predict without having access to detailed system records but continuing my example of a notional doubling of service on an existing system, it would be surprising if maintenance costs per vehicle/km did not reduce to at least 75% of the previous costs. This trend is borne out by the comment made that Edmonton's overhead cost per vehicle/km was much lower when they ran greater mileages on the system. This is on of my great concerns with a lot of operators in both N.A and Europe. They will often blithely operate huge mileages of diesel substitution failing to appreciate that not only are they incurring the variable cost of running diesels but wasting the fixed costs of the trolley system. This trend ultimately leads to unnecessarily high unit costs for etb operation. The motto must be that once you have paid for an etb system you should, subject to passenger demand, run as much mileage by etb as possible.

If you calculate costs per service hour a similar effect is felt. If you double the service hours run under the fixed system, the cost per service hour will halve. And so on…

4. Canadian experience and possible Impact in Hong Kong

The first point to make is that you need to be careful in deducing costs in one country based on those in another. For a start a substantial part of maintenance costs will be labour. To arrive at meaningful figures you would need to arrive at labour hours per km of overhead in Canada and then apply local Hong Kong labour costs to that. There may be greater affinity of costs on the component side

The reports that I have seen have quoted these costs for overhead maintenance in Canada:

CITY	YEAR	COST PER VEH/KM	NOTES
Edmonton	?	US$ 0.36	
Vancouver	1987	Can$ 0.16	From 1993 BC Transit Report on possible ETB Expansion
Vancouver	2000	Can$ 0.28	From Budget

Clearly Vancouver's consistently lower unit cost is because it runs a much more intensive service on its system. Labour and component costs will be broadly similar in the two cities.

It is not clear why there has been such a large rise in Vancouver's maintenance costs in the last 13 years. This year's current cost is based on the projected mileage and planned expenditure on the overhead system of approximately Can$3.6m. However this does not seem unreasonable in relation to the size of the Vancouver system (309km) or the capital value of the network which is estimated at Can$184m. These figures equate to only $11,650 per annum per km of route. And in relation to capital value the budgeted value for maintenance is only 2% of the capital value of the system. Again this seems reasonable, if anything rather low. My overall impression is that given the intensity of the service provided on the Vancouver system, its efficiency is as high as any other N. American system. There is scope for further lowering unit cost by the proposed improvement of frequencies on some of the heaviest routes. Implementation of a mixed diesel express and local etb service on Route 41 could also bring a "quick win" by better utilising the fixed equipment on 41st Avenue.

Having always believed that cost per service hour is the fairest method of comparing vehicle types I have been able to derive an overhead maintenance cost. Based on planned service hours of 925,000 and planned maintenance of $3.6m the overhead maintenance cost per service hour is $3.90 (NB that means a service speed of about 14km/hr)

What does all this mean for Hong Kong? Given the high level of fixed costs, trolleybuses are ideally suited to intensively utilised routes. In most cities these tend to be short or medium length with high passenger demand. Economies can be achieved if there is at least a central trunk or trunks each shared by several routes, which then diverge to different destinations. If as suggested Hong Kong plans to use trolleybuses at a rate of up to 180 per hour on the main central routes then it should be able to achieve economies of scale at least as good as Vancouver. On the other hand if Hong Kong traffic speeds are lower than Vancouver, mileages run will be lower and therefore cost per km will tend to be higher. But depending on the relative labour costs, Hong Kong ought to be able to achieve costs per service hour at least as good as Vancouver's provided a sufficiently intensive service is run.

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