

Viability Analysis of the Operationability of Parking Contract – A Case Study

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Abstract: Viability analysis of the operation of pay and park contract is demonstrated with a case study. The viability is evaluated based on the basis of the details collected on the congested street in the residential area near the upcoming Navi Mumbai international airport (NMIA) in Ulwe node. This analysis provides the base for the evaluation of viability for such contract. The analysis is based on the survey conducted on the stretch of Ulwe node witnesses with high commercial establishment and institutes and is found to be operationally viable for the contract.

Keywords: Viability analysis, parking contract.

1. Introduction

Navi Mumbai is a twin city across the Harbor of Mumbai. The city consists of 14 fragmented clusters or ‘nodes’ of dense, self-sufficient neighbourhoods. Ulwe, one of the ‘nodes’ in Navi Mumbai is particularly significant as many major infrastructure projects such as Navi Mumbai International Airport, Special Economic Zones etc., are planned in its vicinity. This resulted in a tremendous surge in investments in Ulwe and therefore completely transforming its landscape in a very short span with limited access to the major arterial in the current scenario.

This urban sprawl creates heavy traffic congestion especially on the Major entry network of the Ulwe node. This major access road provides connectivity to nodes and are also flooded with residential as well as the commercial development in and around this arterial network. Even though there is Suburban Rail Corridor were getting connected to this node, the frequency of the operation in the peak hour is less in the current scenario compared to the other Suburban Rail corridors in Navi Mumbai and which leads to heavy congestion on this arterial entry network due to over dependence on the road-based traffic.

A long-term solution to address this issue is to increase the frequency of operation of rail services and provide additional connectivity to the nodes. As a short-term solution to this problem, some traffic management measures can be adopted to reduce the congestion.

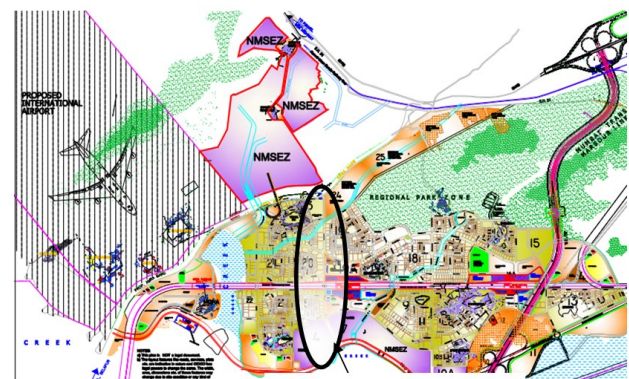
One of the major issues noticed is the hazards parking on the streets which reduced the capacity of the roads. As this area is high involvement of commercial activities of public requirements, the possibility of any restrictive measure may not help much as the enforcement mechanism is not strong in this

area. Due to lack of confined area of parking, general public parks the vehicle on the street, and considering the same it will be better to regularise the parking in the area by appointing some operating authority.

In this study a viability analysis is carried out identify the operationability of the contract and accordingly the same can be conveyed to concern authority for consideration of the implementation of this proposal.

2. Study Area and Data Collection

Ulwe node is considered as the study area and is located in Navi Mumbai and it is emerged as a fast-growing real estate market in recent years due to the proximity of the upcoming Navi Mumbai international Airport, Navi Mumbai Special Economic Zone etc. In the current Scenario there is only one major entry to the Ulwe Node for giving access to the node and the area near this major network is with high commercial development and retail out let which includes general merchandise, food retailing, services retailing, institutes etc creating hazardous parking and impacts on the movement of the vehicle.



Main entry to the node
Fig. 1. Selected case study area

Accordingly, this nodal entry is considered as the study area for assessment of parking and its viability. Parking details were not available in this area, which warrants the requirement of a fresh parking surveys to analyse the data. The survey was conducted in April 2023 and collected data for a normal and

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weekly variant day. Saturday and Sunday were generally reported as weekly variant days. A 16 hr parking survey from 7AM to 11 PM was conducted including the peak hour period for a working day and a holiday. Time period selection is based on the opening hours of these institution and retail outlets.

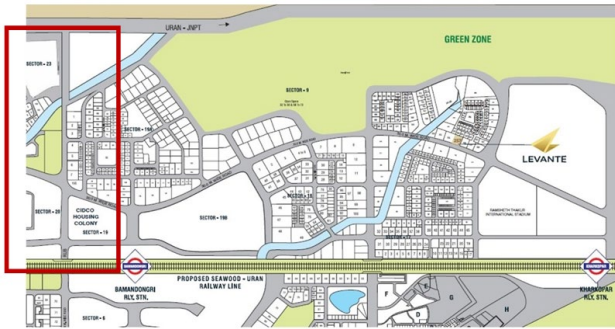


Fig. 2. Details of selected case study area

3. Methodology and Data Analysis

The existing road is of 6 lane configuration and due to hazardous parking during peak hour it is difficult utilize even two lanes. On street parking is proposed on the selected area. As per the guidelines the standard dimension for car for parking is considered as 5M x 2.5 M and for two wheelers it is considered as 1.2 x 2.5 M.

A survey was conducted to analysis for the study. The intension of conducting the study is to identify the stretch were the parking to be introduced based on the proximity of the various establishment and also to understand the duration of the parking where it can be assessed the turnover of the vehicle. By analyzing the data, it could make out that only 10 percent vehicles are parking for more than 6 hours, this is more visible to the near institute, 5% between 4 to 6 hrs and 10% 2 to 4 hrs. remaining 75% vehicle is parked within 2 hours. Due to highly hazarded parking number of vehicle parked is also high. It is anticipated that due to introduction of pay and park services, this numbers will get drastically reduced. Considering the same Instead of High capital-intensive parking like automated parking, simple on street parking is considered in the initial stage. The layout parking is decided giving priority for streamlining the parking and also increasing flexibility of the movement of vehicle rather than revenue.

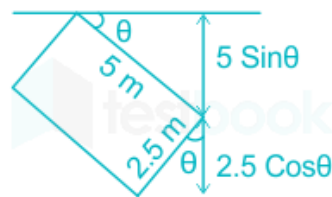
For on street parking, angle parking can accommodate more number parking along the length compared to parallel parking. Maximum vehicle parking can be done with 90-degree angle parking. However, it is difficult manoeuvre the vehicle and also required more space for reversal. As the basic intention of the proposal is to avoid hazardous parking and avoid the bottleneck creation due to hazardous parking, it is preferred to utilise minimum width of road and better manoeuvrability of vehicle and maximum utilisation of remaining area for the movement of vehicle.

A comparison of the width requirement for the 30-degree angle parking and 60-degree angle parking is indicated in figure 3. The width requirement for parallel, 30-degree, 45 degree, 60 degree angular parking is approximately 2.5m, 4.66 m, 5.32,

5.58 m respectively. Aisle distance will be more as the angle increases.

The number of parking can accommodate for a continuous stretch of 1km for parallel parking, 30degree, 45-degree, 60 degree and 90-degree parking is approximately 170, 200, 280, 345, 400 respectively.

The Road width is 30m. The condition considered for finalisation of the layout is that in the current 6 lane road at least 4 lane should have free flow of traffic compared to the current usage due of 2 lane unitisation accordingly capacity augmentation will be double with minimum capital investment. Considering the present cross section of road, manoeuvrability of vehicle and accommodate more number of parking, it is proposed to consider 30-degree angular parking and this arrangement can accommodate more number of parking compared to parallel parking.



$$\frac{W_{30}}{W_{60}} = \frac{(5 \sin 30 + 2.5 \cos 30)}{(5 \sin 60 + 2.5 \cos 60)} = \frac{4.66}{5.58} = 0.836$$

Fig. 3. Width requirement for parking in angular arrangement

Table 1

Illustration of 30-degree parking		
AB	= OB SIN30 (2.5 SIN 30)	= 1.25 M
CD	= DQ/SIN30(2.5/SIN30)	= 5.0M
EF	= EG COS30 (5 COS30)	= 4.33
L	= 5.55+(N-1)5 =0.55+5N	

After excluding the entry exit to main commercial establishment and junction area i.e., 100 m from junction to all legs, and considering that single lane parking on either side of the road, it is possible to accommodate approximately 240 Nos of Cars on the stretches considered for the parking.

As per the details collected from the study area it is noticed that approximately 75 percent of the vehicle parked is two wheelers. It is assumed that one car parking space can accommodate approximately 2 two wheelers. For the analysis a little more than 75 percent is considered for two-wheeler parking and accordingly 90 car parking space and 300 two-wheeler parking space is considered. Two-wheeler parking space is proposed near to junction and the entry area as the size of block of two-wheeler is 1.2*2.5M it will provide better manoeuvrability of the vehicle coming in the junction and entry exit to the plots.

During survey it is noticed that maximum period the vehicle parked is not more than two hours. In order to assess the amount to be collected from the user, initially an effort was made that any such revenue collection is carried out in and around the area by the authority. This is to avoid the public outrage and is proposed to fix rates in par with any such rate fixed by the authority. Accordingly, the rates for analysis is

Table 3

Sr. No.	Type of Vehicle	No. of Vehicle	Parking Charges	Revenue in Rs. Per day
1	Car	90	$= 0.75*90*20 *3.5 + 0.10*90*25 + 0.05*90*30 + 0.04*90*35 + 0.06*90*45$	5454
2	Two-Wheeler	360	$= 0.75*300*12 *3+ 0.10*300*20 + 0.05*300*25 + 0.04*300*30 + 0.06*300*35$	11415
TOTAL				16869
Monthly revenue considering 26 working days				438594

Table 4

Sr. No.	Description of monthly expenditure	Amount
1	For 14 Man power for parking collection charges (Rs. 615 per day per person)	258300
2	Printing tokens (per month)	10000
3	Insurance premium (per month)	5000
TOTAL		273,300

taken in par with the rates near commercial establishment fixed by the planning authority of the area for one of its floated tender and the details are given below.

Table 2

Car		Two-Wheeler	
Duration in Hrs	Fare in Rs	Duration in Hrs	Fare in Rs
0-2	20	0-2	12
2-4	25	2-4	20
4-6	30	4-6	25
6-8	35	6-8	30
8-12	45	8-12	35
>12	55	>12	40

As this is introduced for first time, period of contract is considered only for a year. In the survey it is noticed that institutional parking is less however retail out let parking is more than normal days. For revenue calculation average days in a month is considered as 26 days. More than 12-hour parking is not much noticed hence in the revenue calculation is not considered for the same. Maximum turnover is witnessed on the 0-2 duration approximately 3.5 turns. No turnovers were considered for other duration accounting the contingencies and other expenditure which is not accounted in the expenditure while calculating the same.

4. Revenue Calculation

Based on the number of vehicles and parking charges the revenue can be calculated as given in table 3.

Note: Based on the survey data, it is assumed that 75% cars and two are parked for 0-2 hrs. 10% for 2-4 hrs, 5% 4-6 hrs, 4 % 6-8 hrs, 6% 8-12 hrs, and above 12 hours are almost 0%. The revenue is calculated based on the holding capacity of the parking lot.

Average monthly revenue = Rs. 4,38,594/-

5. Expenditure Calculation

Major expenditure considered are Employees cost, GST, Insurance, Token Printing Charges for expenditure analysis. This being on street parking, cleaning and lane marking, informatory sign boards are expected to be taken care by the authority of the jurisdiction.

To collect the parking charges at least 14 people to be employed at site in two slots and the man power charger considered as per the PWD schedule of Rate for 2022-23 is Rs 615/per day.

6. Operational Viability

Net Estimated revenue = Average Revenue – (Expenditure)

= Rs. 438594 - Rs.273300 = Rs.165294/-

Contractor should Get at least a profit of 15% of Net revenue
= 15% of 122520/-
= 24795/-

Revenue after deducting contractor profit = Rs1,40450/-

In addition to the above if a tender is called by the authority than 18 % GST needs to be paid by the contractor on the committed revenue to authority.

Assume the above value is the committed revenue,

Maximum GST to be paid = 18% of 140450 = 25,281/-
Revenue after deducting GST = 140450-25281
= Rs. 1,15,169/-

Practically, 3 two wheelers can be accommodated in place of one car and more turnover can also be expected than the assumption. this will add to the revenue. However, for analysis, the minimum revenue anticipated is only considered.

7. Results, Discussions & Conclusion

Based on the various assumptions considered in the analysis, it is clear that the contract is operationally viable. This scenario can have brought out in the notice of the authority accordingly the process of appointment of agency for parking can be carried out. From this analysis it will give a clear idea to the authority about the expected revenue from this contract without spending much in in infrastructure and also authority can streamline the traffic by this traffic management measure. By doing this, ideally it will get free flow of traffic for 4 lanes instead of current 2 lanes presently witnessed at the site.

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