Research Article	Volume 7 Issue No.6

Parking Problems in Central Business District (CBD) Area of Vadodara: A Detailed Survey

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Abstract:

In India, Parking is one of the major problems that is created by the increasing road traffic and its control is primarily an issue in relatively densely populated area where the demand /supply situation for parking spaces makes parking facilities difficult. It is an impact of transport development. The availability of less space in urban areas has increased the demand for parking space especially in areas like Central business district (CBD) where land is expensive and therefore parking space is at a premium, there are parking lots for vehicles where the driver leaves the keys to the vehicle with an attendant who arranges vehicles so as to maximize the number of vehicles that can be parked in the lot. Before taking any measures for the betterment of conditions, data regarding availability of parking space, extent of its usage and parking demand is essential. Parking surveys are intended to provide all these information. Since the duration of parking varies with different vehicles, several statistics are used to access the parking need. This research aims to find out the efficiency of the parking lot in a different time by method of In-out survey and license plate survey technique and workout the alternate layout of parking lot to accommodate the maximum nos. of vehicles in such a way that where demand/supply situation have been fulfilled.

Keywords: Parking, Survey, Management, Demand / Supply, CBD area etc.

I. INTRODUCTION

It is roughly estimated that out of 8,760 hours in a year, the car runs on an average for only 400 hours, leaving 8,360 hours when it is parked. Every car owner would wish to park the car as closely as possible to his destination so as to minimize his walking. This results in a greet demand for parking space in the CBD and other areas where the activities are concentrated. With the growing population of motor vehicles, the problem of parking has assumed serious proportions.

A systematic study of the parking characteristics and demand and regulatory measures that are possible for controlling parking is of great help to a traffic engineer as well as a town planner. One of the serious ill-effect of parking is the loss of street space and the attendant traffic congestion. The capacity of the street is reduced, the journey speed drops down and the journey time and delay increase.

The operational cost of vehicles is thereby increased, causing serious economic loss to community. While on-street parking and its regulations will be an important aspect of the overall parking policy of a town, one way of ensuring that future development of land-use and building activity adequately takes care of parking needs is to promulgate zoning ordinances whereby all new or remodelled buildings will be required to have within their cartilage a prescribed parking space.

The advantages of zoning and land-use controls for parking safe and efficient traffic have been well recognized parking demand is a function of the land-use, through variations can exist within the same land-use not with standing the difficulties that arise in prescribing a uniform parking space

requirement standard for all communities, it is possible to prescribe minimum standard based on extensive experience.

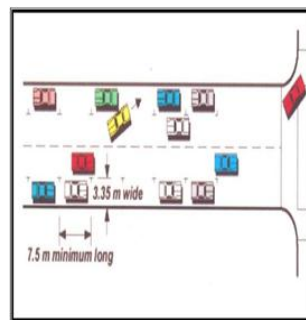**Design standards for on-street parking facilities:**
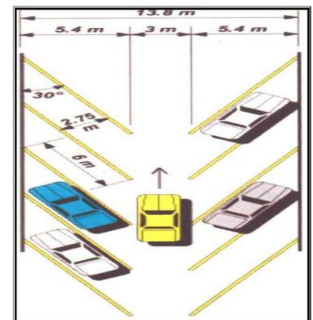

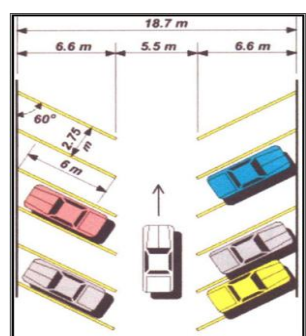**Figure.1. Parallel Parking**

Figure.2. 30⁰ Angle Parking

Figure.3. 450 Angle Parking
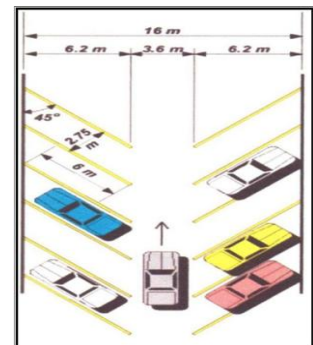
Figure.4. 60⁰ Angle Parking

Figure.5. Right Angle Parking

Parking Survey:

Need: Parking is one of the serious problems that confront the urban planner and the traffic engineer. Before any measures for the betterment of the conditions can be formulated basic data pertaining to the availability of parking space, extent of its usage and parking demand are essential.

If it is proposed to implement a system of parking charges it will also be necessary to know how much to charge and what will be the effect of the pricing policy on parking. Parking surveys are intended to supply all this kind of information.

Types of parking surveys:-

The type of parking survey to be conducted for formulating a comprehensive parking plan for an area can be very detailed in scope. The data collected and the degree of sophistication employed depend upon the funds available. Detailed manuals for conducting such a survey give general guidance.

The following are the types of parking surveys usually conducted:

(1)   Parking space inventory.

(2)   Parking usage survey by patrol.

(3)   Questionnaire type parking usage survey.

(4)   Cordon count.

II.   SITE SELECTION AND DATA COLLECTION

There are a number of parking lot in Vadodara city, which vary with respect to geometric design and operating conditions. It is practically impossible to cover all these parking lot for analyses. First of all, it is necessary to carry out a reconnaissance survey to assess the suitability of different parking lot to collect data pertaining to in and out of vehicles as well as license plate no of vehicles and also to make selection of suitable sites to place video camera as well as manually and record the data and Finally we have to select the parking lot near Nyay Mandir Padmavati Shopping Centre, Vadodara in such a way that maximum problem arising out of others.
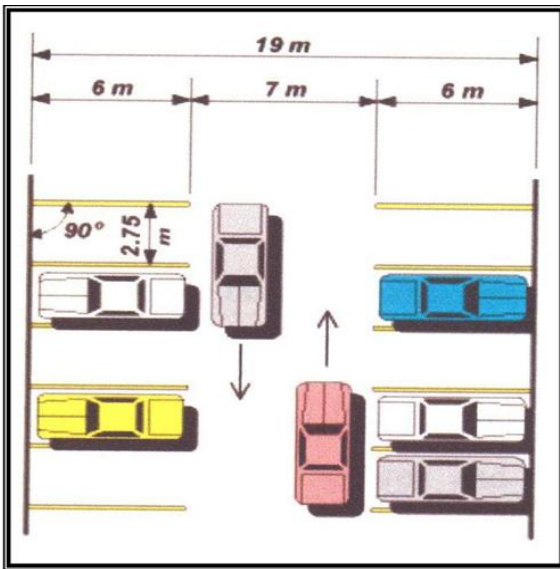

Figure.6. Photograph of parking lot near Padmavati shopping centre, Vadodara

After the finalized of location, the next step is to draw the existing layout of parking lot with their dimension which sketch are as follows:
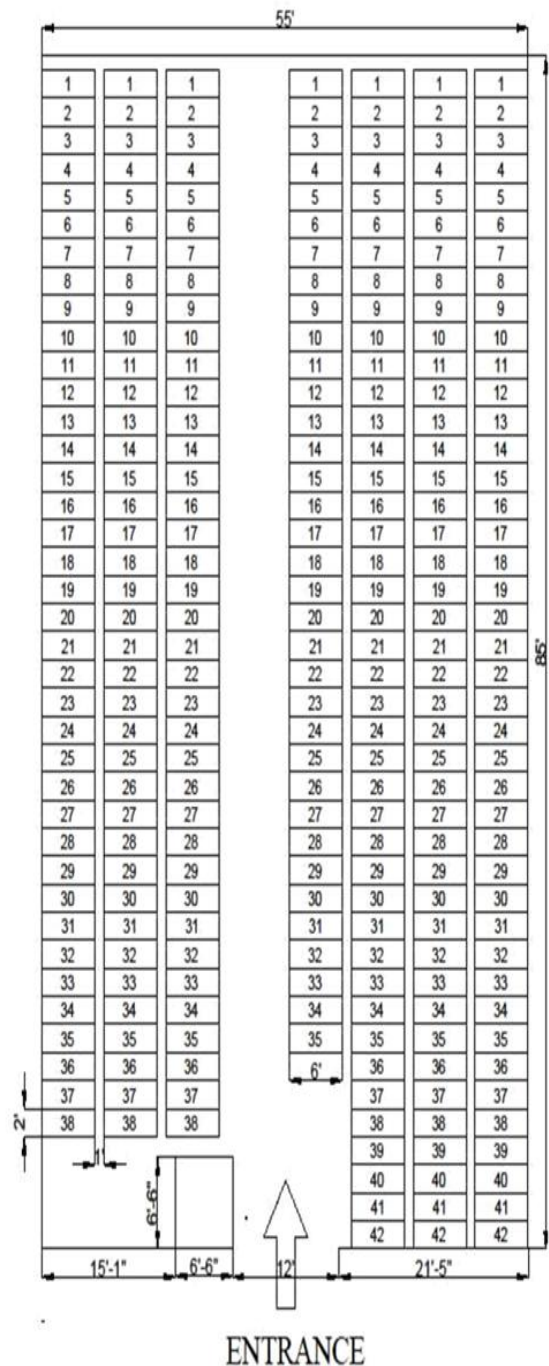
Figure.7.   Layout of Parking Lot in Padmavati Shopping Complex

1. In-Out Parking Survey Data:

Table .1. Worksheet For In-Out Survey method

10:00 To 12:00 AM		
Time Interval :- 10 Min. Total number of Bays :- 275 Initial Vehicle:- 18		
Time	**In**	**Out**
10:10	8	
10:20	8	
10:30	9	
10:40	7	
10:50	7	1
11:00	5	-
11:10	16	1
11:20	15	2
11:30	10	2
11:40	10	3
11:50	7	2
12:00	9	3

Table. 2. Worksheet For In-Out Survey Method

5:00 To 7:00 PM		
Time Interval :- 15 Min. Total number of Bays :- 275 Initial Vehicle:- 98		
Time	**In**	**Out**
5:15	6	0
5:30	3	2
5:45	9	2
6:00	2	2
6:15	6	4
6:30	10	6
6:45	11	8
7:00	10	6

Table .3. Worksheet For In-Out Survey Method

11:00 To 12:00 AM		
Time Interval :- 15 Min. Total number of Bays :- 275 Initial Vehicle:- 139		
Time	**In**	**Out**
11:15	**33**	**19**
11:30	**33**	**18**
11:45	**38**	**19**
12:00	**42**	**25**

Table .4. Worksheet for In-Out Survey Method

5:00 To 6:00 PM		
Time Interval :- 15 Min. Total number of Bays :- 275 Initial Vehicle:- 223		
Time	**In**	**Out**
5:15	29	26
5:30	34	31
5:45	36	39
6:00	30	28

2. Licence Plate Parking Survey Data:
Table .5. Worksheet for Licence Plate Survey Method

Licence Plate Parking Survey Method

10:00 To 12:00 AM

Time interval :- 10 Min.   Total Number of Bays :- 275

Line	10:10	10:20	10:30	10:40	10:50	11:00	11:10	11:20	11:30	11:40	11:50	12:00
A)	5225	5225	5225	5225	5225	5225	5225	5225	5225	5225	5225	5225
	7187	7187	7187	7187	7187	7187	7187	7187	7187	7187	7187	7187
	540	540	540	540	540	540	540	540	540	540	540	540
	7127	7127	7127	7127	7127	7127	7127	7127	7127	7127	7127	7127
	5021	5021	5021	5021	5021	5021	5021	5021	5021	5021	5021	5021
	-	3457	3457	3457	3457	3457	3457	3457	3457	3457	3457	3457
	-	911	911	911	911	911	911	911	911	911	911	911
	-	9132	9132	9132	9132	9132	9132	9132	9132	9132	9132	9132
	-	-	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070
	-	-	7860	7860	7860	7860	7860	7860	7860	7860	7860	7860
	-	-	3437	3437	3437	3437	3437	3437	3437	3437	3437	3437
	-	-	6615	6615	6615	6615	6615	6615	6615	6615	6615	6615
	-	-	-	5212	5212	5212	5212	5212	5212	5212	5212	5212
	-	-	-	8205	8205	8205	8205	8205	8205	8205	8205	8205
	-	-	-	5345	5345	5345	5345	5345	5345	5345	5345	5345
	-	-	-	3183	3183	3183	3183	3183	3183	3183	3183	3183
	-	-	-	-	5207	5207	5207	5207	5207	5207	5207	5207
	-	-	-	-	5287	5287	5287	5287	5287	5287	5287	5287
	-	-	-	-	-	8799	8799	8799	8799	8799	8799	8799
	-	-	-	-	-	3501	3501	3501	3501	3501	3501	3501
	-	-	-	-	-	5321	5321	5321	5321	5321	5321	5321
B)	7582	7582	7582	7582	7582	7582	7582	7582	7582	7582	7582	7582
	7433	7433	7433	7433	7433	7433	7433	7433	7433	7433	7433	7433
	2458	2458	2458	2458	2458	2458	2458	2458	2458	2458	2458	2458

	-	5838	5838	5838	5838	5838	5838	5838	5838	5838	5838	5838
	-	9086	9086	9086	9086	9086	9086	9086	9086	9086	9086	9086
	-	7337	7337	7337	7337	7337	7337	7337	7337	7337	7337	7337
	-	8838	8838	8838	8838	8838	8838	8838	8838	8838	8838	8838
	-	498	498	498	498	498	498	498	498	498	498	498
	-	-	8568	8568	8568	8568	8568	8568	8568	8568	8568	8568
	-	-	5845	5845	5845	5845	5845	5845	5845	5845	5845	5845
	-	-	4391	4391	4391	4391	4391	4391	4391	4391	4391	4391
	-	-	-	1213	1213	1213	1213	1213	1213	1213	1213	1213
	-	-	-	7527	7527	7527	7527	7527	7527	7527	7527	7527
	-	-	-	-	1667	1667	1667	1667	1667	1667	1667	1667
	-	-	-	-	1945	1945	1945	1945	1945	1945	1945	1945
	-	-	-	-	1996	1996	1996	1996	1996	1996	1996	1996
	-	-	-	-	4487	4487	4487	4487	4487	4487	4487	4487
	-	-	-	-	-	-	8140	8140	8140	8140	8140	8140
	-	-	-	-	-	-	7389	7389	7389	7389	7389	7389
	-	-	-	-	-	-	4319	4319	4319	4319	4319	4319
	-	-	-	-	-	-	9798	9798	9798	9798	9798	9798
	-	-	-	-	-	-	1999	1999	1999	1999	1999	1999
	-	-	-	-	-	-	6672	6672	6672	6672	6672	6672
	-	-	-	-	-	-	-	820	820	820	820	820
	-	-	-	-	-	-	-	7081	7081	7081	7081	7081
	-	-	-	-	-	-	-	-	2591	2591	2591	2591
	-	-	-	-	-	-	-	-	-	4821	4821	4821
	-	-	-	-	-	-	-	-	-	4900	4900	4900
	-	-	-	-	-	-	-	-	-	5777	5777	5777
	-	-	-	-	-	-	-	-	-	-	-	3506
	-	-	-	-	-	-	-	-	-	-	-	4206
C)	-	-	9416	9416	9416	9416	9416	7484	7484	7484	7484	7484
	-	-	7312	7312	7312	3454	3454	3454	3454	9418	9418	9418
	-	-	-	5445	5445	5445	5445	5445	5445	5445	5445	6233

	-	-	-	-	2520	2520	2520	2520	6267	6267	6267	6267
	-	-	-	-	-	1535	1535	1535	2100	2100	2100	2100
	-	-	-	-	-	-	2020	2020	2020	2020	2415	2415
	-	-	-	-	-	-	2578	2578	2578	2578	2578	2578
	-	-	-	-	-	-	4487	4487	4487	4487	7337	7337
	-	-	-	-	-	-	-	1698	1698	1698	1698	1698
	-	-	-	-	-	-	-	7817	7817	7817	7817	7817
	-	-	-	-	-	-	-	7153	7153	7153	7153	7153
	-	-	-	-	-	-	-	8007	8007	7527	7527	7527
	-	-	-	-	-	-	-	-	6267	6267	6267	6267
	-	-	-	-	-	-	-	-	6138	6138	6138	2415
	-	-	-	-	-	-	-	-	9272	9272	2520	2520
	-	-	-	-	-	-	-	-	7528	7528	7528	7528
	-	-	-	-	-	-	-	-	-	7243	7243	7243
	-	-	-	-	-	-	-	-	-	4590	4590	9213
	-	-	-	-	-	-	-	-	-	-	6736	6736
	-	-	-	-	-	-	-	-	-	-	-	3247
	-	-	-	-	-	-	-	-	-	-	-	753
	-	-	-	-	-	-	-	-	-	-	-	1908
D)	-	-	-	-	-	-	3275	3275	3275	3275	3275	3275
	-	-	-	-	-	-	8085	8085	8085	8085	8085	8085
	-	-	-	-	-	-	2153	2153	2153	2153	2153	2153
	-	-	-	-	-	-	2103	2103	2103	2103	2103	2103
	-	-	-	-	-	-	2081	2081	2081	2081	2081	2081
	-	-	-	-	-	-	2273	2273	2273	2273	2273	2273
	-	-	-	-	-	-	5303	5303	5303	5303	5303	5303
	-	-	-	-	-	-	-	4350	4350	4350	4350	4350
	-	-	-	-	-	-	-	8609	8609	8609	8609	8609
	-	-	-	-	-	-	-	5656	5656	5656	5656	5656
	-	-	-	-	-	-	-	2108	2108	2108	2108	2108
	-	-	-	-	-	-	-	2531	2531	2531	2531	2531
	-	-	-	-	-	-	-	2273	2273	2273	2273	2273
	-	-	-	-	-	-	-	8472	8472	8472	8472	8472
	-	-	-	-	-	-	-	4350	4350	4350	4350	4350
	-	-	-	-	-	-	-	-	8136	8136	8136	8136
	-	-	-	-	-	-	-	-	1525	1525	1525	1525
	-	-	-	-	-	-	-	-	3831	3831	3831	3831
	-	-	-	-	-	-	-	-	-	8744	8744	8744
	-	-	-	-	-	-	-	-	-	7312	7312	7312
	-	-	-	-	-	-	-	-	-	4268	4268	4268
	-	-	-	-	-	-	-	-	-	-	3540	3540
	-	-	-	-	-	-	-	-	-	-	8498	8498
	-	-	-	-	-	-	-	-	-	-	3203	3203
	-	-	-	-	-	-	-	-	-	-	-	554
	-	-	-	-	-	-	-	-	-	-	-	7372

Table .6. Worksheet for Licence Plate Survey Method

Licence Plate Parking Survey Method
5:00 To 7:00 AM
Time Interval :- 15 Min.
Total Number of Bays :- 275

LINE	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00
B	2557	2557	2557	2557	1601	1601	1601	1601
	6683	6683	6683	1607	1607	9979	9979	9979
	9606	9606	9608	9608	9608	9608	6468	6468
	-	1444	1444	8439	8439	8439	8439	9533
	-	9479	9479	9479	9479	4442	4442	4442
	-	1993	1993	1993	1993	1993	1993	1993
	-	-	4147	4147	4147	4147	4147	4147
	-	-	3197	3197	3197	3197	3197	3197

-	-	-	-	1164	1164	1164	4137
-	-	-	-	-	1181	1181	1181
-	-	-	-	-	-	4038	4038
-	-	-	-	-	-	3841	3841
-	-	-	-	-	-	-	3641
C	7351	7351	1537	1537	1537	4431	4431	4431
	1071	1071	1071	1071	1931	1931	1931	6221
	1008	1008	1008	1008	1008	1008	7171	7171
	-	-	2597	2597	2597	2597	2597	2597
	-	-	1979	1979	1979	1979	4491	4491
	-	-	1880	1880	1880	1880	1484	1484
	-	-	6318	6318	6318	1578	1578	1578
	-	-	8106	8106	8106	8106	8106	8106
	-	-	-	-	1404	1404	1404	8181
	-	-	-	-	3917	3917	1148	1148
	-	-	-	-	8137	8137	8137	8137
	-	-	-	-	-	2615	2615	2615
	-	-	-	-	-	1553	1553	4801
	-	-	-	-	-	3197	4196	1897
	-	-	-	-	-	9417	9417	9417
	-	-	-	-	-	1553	1553	5134
	-	-	-	-	-	-	4131	9728
	-	-	-	-	-	-	1017	1083
	-	-	-	-	-	-	8109	8109

Table.7. Worksheet for Licence Plate Survey Method

Licence Plate Parking Survey Method 11:00 To 12:00 AM				
Time Interval :- 15 Min				
Total Number of Bays :- 275				
BAY	11:15	11:30	11:45	12:00
1	4477	4477	4477	4477
2	2168	2168	2168	2168
3	2821	2821	2821	2821
4	9434	9434	9434	9434
5	6778	6778	6778	6778
6	2433	2433	2433	2433
7	8733	8733	8733	8733
8	4428	4428	4428	4428
9	2918	2918	2918	2918
10	3053	3053	3053	3053
11	8090	8090	-	-
12	7066	7066	7066	7066
13	5139	5139	5139	5139
14	7512	7512	7512	7512
15	9001	9001	9001	9001
16	7376	7376	7376	-
17	4215	4215	4215	4215
18	7281	7281	7281	7281
19	2510	2510	2510	2510
20	6238	6238	6238	6238
21	6764	6764	6764	6764

22	8073	8073	8073	8073
23	9276	9276	-	-
24	684	684	684	684
25	6340	6340	6340	6340
26	5838	5838	5838	5838
27	8361	8361	8361	8361
28	8197	8197	8197	8197
29	259	259	259	259
30	5237	5237	5237	5237
31	3188	3188	3188	3188
32	2557	2557	2557	2557
33	8181	8181	8181	8181
34	-	1845	1845	1845
35	-	2137	2137	2137
36	-	7469	7469	7469
37	-	1021	1021	1021
38	-	5825	5825	5825
39	-	7753	7753	7753
40	-	4209	4209	4209
41	-	3599	3599	3599
42	-	3310	3310	-
43	-	3670	3670	3670
44	-	1556	1556	1556
45	-	6361	6361	6361
46	-	4600	4600	4600
47	-	72	72	72
48	-	2593	2593	2593
49	-	2271	2271	-
50	-	5441	5441	-
51	-	5081	5081	5081
52	-	8214	8214	8214
53	-	4229	4229	4229
54	-	1372	1372	1372
55	-	9782	9782	9782
56	-	8581	8581	8581
57	-	8124	8124	8124
58	-	4809	4809	4809
59	-	2292	2292	2292
60	-	120	120	120
61	-	7409	7409	7409
62	-	4655	4655	4655
63	-	5643	5643	5643
64	-	2789	2789	2789
65	-	7778	7778	7778
66	-	1623	1623	1623
67	-	-	572	572

68	-	-	5240	5240
69	-	-	541	541
70	-	-	8374	8374
71	-	-	9708	9708
72	-	-	5805	5805
73	-	-	4347	4347
74	-	-	9899	9899
75	-	-	3644	3644
76	-	-	3490	3490
77	-	-	7408	7408
78	-	-	2590	2590
79	-	-	5820	5820
80	-	-	8609	8609
81	-	-	8684	8684
82	-	-	2863	2863
83	-	-	2498	2498
84	-	-	2369	2369
85	-	-	5477	5477
86	-	-	5155	5155
87	-	-	5990	5990
88	-	-	4884	4884
89	-	-	6729	6729
90	-	-	6637	6637
91	-	-	1639	1639
92	-	-	5758	5758
93	-	-	2485	2485
94	-	-	520	520
95	-	-	52	52
96	-	-	8062	8062
97	-	-	1782	1782
98	-	-	3124	3124
99	-	-	4984	4984
100	-	-	3831	3831
101	-	-	6142	6142
102	-	-	2155	2155
103	-	-	9225	9225
104	-	-	9213	9213
105	-	-	-	5686
106	-	-	-	3572
107	-	-	-	3928
108	-	-	-	4345
109	-	-	-	6328
110	-	-	-	1229
111	-	-	-	4520
112	-	-	-	1655
113	-	-	-	2178

114	-	-	-	3128
115	-	-	-	4477
116	-	-	-	2336
117	-	-	-	7170
118	-	-	-	2552
119	-	-	-	2307
120	-	-	-	2566
121	-	-	-	8687
122	-	-	-	6154
123	-	-	-	7380
124	-	-	-	3894
125	-	-	-	580
126	-	-	-	8872
127	-	-	-	5614
128	-	-	-	8990
129	-	-	-	6761
130	-	-	-	7086
131	-	-	-	505
132	-	-	-	9919
133	-	-	-	3310
134	-	-	-	2257
135	-	-	-	622
136	-	-	-	8391
137	-	-	-	4966
138	-	-	-	8809
139	-	-	-	6513
140	-	-	-	254
141	-	-	-	2946
142	-	-	-	9552
143	-	-	-	4509
144	-	-	-	9219
145	-	-	-	6020
146	-	-	-	4835

Table. 8. Worksheet for Licence Plate Survey Method

Licence Plate Parking Survey Method 05:00 To 06:00 PM			
Time Interval :- 15 Min			
Total Number of Bays :- 275			
BAY	11:15	11:30	11:45	12:00
1	3025	3025	3025	3025
2	1189	1189	1189	1189
3	666	666	666	666
4	6383	6383	6383	6383
5	2147	2147	2147	2147
6	8081	8081	8081	8081
7	3340	3340	3340	3340

8	7879	7879	7879	7879
9	7517	7517	7517	7517
10	599	599	599	599
11	5496	5496	5496	5496
12	5441	5441	5441	5441
13	2520	2520	2520	2520
14	7183	7183	7183	7183
15	8795	8795	8795	8795
16	2138	2138	2138	2138
17	6405	6405	6405	6405
18	2128	2128	2128	2128
19	2080	2080	2080	2080
20	2846	2846	2846	2846

21	2354	2354	2354	2354
22	577	577	577	577
23	4532	4532	4532	4532
24	8682	8682	8682	8682
25	6923	6923	6923	6923
26	8198	8198	8198	8198
27	313	313	313	313
28	5780	5780	5780	5780
29	5369	5369	5369	5369
30	-	1805	1805	1805
31	-	306	306	306
32	-	7106	7106	7106
33	-	845	845	845
34	-	2121	2121	2121
35	-	3039	3039	3039
36	-	7612	7612	7612
37	-	4230	4230	4230
38	-	4156	4156	4156
39	-	8931	8931	8931
40	-	88	88	88
41	-	6384	6384	6384
42	-	5601	5601	5601
43	-	9307	9307	9307
44	-	9719	9719	9719
45	-	8412	8412	8412
46	-	8285	8285	8285
47	-	2980	2980	2980
48	-	7473	7473	7473
49	-	9455	9455	9455
50	-	4966	4966	4966
51	-	8252	8252	8252
52	-	9195	9195	9195
53	-	4181	4181	4181
54	-	3097	3097	3097
55	-	7368	7368	7368
56	-	5374	5374	5374
57	-	8878	8878	8878
58	-	755	755	755
59	-	5651	5651	5651
60	-	2712	2712	2712
61	-	8767	8767	8767
62	-	1913	1913	1913
63	-	7322	7322	7322
64	-	-	1271	1271
65	-	-	5701	5701
66	-	-	5191	5191

67	-	-	3389	3389
68	-	-	31	31
69	-	-	5547	5547
70	-	-	1732	1732
71	-	-	8974	8974
72	-	-	9982	9982
73	-	-	8087	8087
74	-	-	9159	9159
75	-	-	7088	7088
76	-	-	4308	4308
77	-	-	3150	3150
78	-	-	1380	1380
79	-	-	9939	9939
80	-	-	7870	7870
81	-	-	7823	7823
82	-	-	1836	1836
83	-	-	4699	4699
84	-	-	5927	5927
85	-	-	8667	8667
86	-	-	2771	2771
87	-	-	6208	6208
88	-	-	8639	8639
89	-	-	5521	5521
90	-	-	840	840
91	-	-	6957	6957
92	-	-	3967	3967
93	-	-	7716	7716
94	-	-	7819	7819
95	-	-	582	582
96	-	-	5459	5459
97	-	-	6807	6807
98	-	-	6534	6534
99	-	-	6103	6103
100	-	-	-	8075
101	-	-	-	4161
102	-	-	-	2215
103	-	-	-	91
104	-	-	-	1561
105	-	-	-	2716
106	-	-	-	2916
107	-	-	-	174
108	-	-	-	6158
109	-	-	-	5226
110	-	-	-	8432
111	-	-	-	7510
112	-	-	-	2536

113	-	-	-	669
114	-	-	-	1859
115	-	-	-	9345
116	-	-	-	8941
117	-	-	-	8025
118	-	-	-	7995
119	-	-	-	2989
120	-	-	-	6228
121	-	-	-	8195

122	-	-	-	2807
123	-	-	-	389
124	-	-	-	7531
125	-	-	-	8131
126	-	-	-	748
127	-	-	-	4408
128	-	-	-	9352
129	-	-	-	8395

III. DATA ANALYSIS

Table.9. Summary of In-Out Parking Survey Method

Date	Period	Time interval	Average Occupancy in %	Parking load in Vehicle hour	Efficiency in %
22/2/2013	10:00 to 12:00	10 Min.	26.06	71.67	26.54
22/2/2013	05:00 to 07:00	15 Min.	41.41	114.00	41.45
10/4/2013	11:00 to 12:00	15 Min.	64.99	178.00	64.73
10/4/2013	05:00 to 06:00	15 Min.	82.64	227.25	82.64

Table .10. In-out Survey Technique

In-out Survey Technique
10:00 To 12:00
Time Interval :- 10 Min.
Total number of Bays :- 275
Initial Vehicle:- 18

Time	In	Out	Accumulation	Occupancy	Parking load
10:10	8	-	26	9.45	260
10:20	8	-	34	12.36	340
10:30	9	-	43	15.64	430
10:40	7	-	50	18.18	500
10:50	7	1	56	20.36	560
11:00	5	-	61	22.18	610
11:10	16	1	76	27.64	760
11:20	15	2	89	32.36	890

11:30	10	2	97	35.27	970
11:40	10	3	104	37.82	1,040
11:50	7	2	109	39.64	1,090
12:00	9	3	115	41.82	1,150
			860	312.72	8,600

Table .11. In-out Survey Technique method

Table .12. In-out Survey Technique

<table>
<tr><td colspan="6">In-out Survey Technique
<u>11:00 To 12:00</u>
Time Interval :- 15 Min.
Total number of Bays :- 275
Initial Vehicle:- 139</td></tr>
<tr><td>Time</td><td>In</td><td>Out</td><td>Accumulation</td><td>Occupancy</td><td>Parking load</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>11:15</td><td>33</td><td>19</td><td>153</td><td>56.67</td><td>2,295</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>11:30</td><td>33</td><td>18</td><td>168</td><td>61.09</td><td>2,520</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>11:45</td><td>38</td><td>19</td><td>187</td><td>68.00</td><td>2,805</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>12:00</td><td>42</td><td>25</td><td>204</td><td>74.18</td><td>3,060</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>712</td><td>259.94</td><td>10,680</td></tr>
</table>

<table>
<tr><td colspan="6">In-out Survey Technique
<u>5:00 To 6:00</u>
Time Interval :- 15 Min
Total number of Bays :- 275
Initial Vehicle:- 223</td></tr>
<tr><td>Time</td><td>In</td><td>Out</td><td>Accumulation</td><td>Occupancy</td><td>Parking load</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5:15</td><td>29</td><td>26</td><td>226</td><td>82.18</td><td>3,390</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5:30</td><td>34</td><td>31</td><td>229</td><td>83.27</td><td>3,435</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5:45</td><td>36</td><td>39</td><td>226</td><td>82.18</td><td>3,390</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>6:00</td><td>30</td><td>28</td><td>228</td><td>82.91</td><td>3,420</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>909</td><td>330.54</td><td>13,635</td></tr>
</table>

Figure.8. Photograph of the Parking Lot

Table.13. Summary of Licence Plate Parking Survey Method

Date	Period	Time interval	Average Occupancy in %	Parking load in Vehicle hour	Efficiency in %
22/2/2013	10:00 TO 12:00	10 Min.	19.94	54.83	19.94
22/2/2013	05:00 To 07:00	15 Min.	7.16	19.5	7.09
10/4/2013	11:00 To 12:00	15 Min.	31.00	85.25	31.00
10/4/2013	05:00 To 06:00	15 Min.	24.91	68.5	24.91

IV. CONCLUSION AND DISCUSSION

This research analyzed the parking problem in a lot by this two methods effectively. It is found that the measurement of efficiency is accurate by In-out survey method rather than using license plate survey method. By using the alternate layout of the parking lot, the efficiency will get increase as number of bays will increase. By Proper design, there can be a smooth conduction of Parking utilization of vehicles. If the problems increases in future to large extent then there is only one solution to be the best suited is Peripheral Parking Scheme. The whole problem will be eliminated and thus will get more space to the people using this stretch daily.

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