

A Study on Traffic Survey at Tezpur Town of Assam, India

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ABSTRACT

This work is a case study based on a traffic survey done to know the current traffic scenario in Tezpur town of Assam, India. Four manual studies-Traffic volume study, on-street parking study, off-street parking study and spot speed study have been done at five junctions of the town to know the existing condition of vehicular traffic and several recommendations are put forward to sort out the problem faced by the public daily and make a smooth flow of traffic as far as possible.

Keywords – manual counts, off-street parking, on-street parking, spot speeds, traffic volume study

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I. INTRODUCTION

Traffic is a socio-economic issue having enormous importance. Traffic evolves because of the need to move people and goods from one location to another. The movement is initiated by people to transport themselves or others from one location to another in order to participate in activities or to move goods from one place to another. For the safety as well as the smooth flow, traffic management is very important. Traffic management refers to the planning, controlling, organization and supervision of all vehicular or non-vehicular traffic including pedestrians around a particular traffic zone. To have a well organized and well-functioning traffic management, there is also need for organizations or centres that may help in acquiring the necessary information in any situation. Traffic management helps in guiding and managing the traffic on various roads. Due to the advancement of technology and infrastructure, many traffic management techniques have been developed to prevent congestion, increase efficiency, increase the safety of traffic flow, ensure better traffic facilities and safeguard the environment. The optimization of available traffic management strategies requires monitoring of the current situation of the traffic flow and also studying the future scopes. For effective traffic management various traffic analysis and studies have to be taken into consideration. Many studies have been done on traffic volume study, pedestrian study of different cities in India as well as in other countries across the globe. Through these

studies many problems have been identified related to traffic flow and so to rectify them so that new ideas may come up and successfully implemented. But there are very less reports available on such types of studies from major cities of the Northeast region of India particularly in cities of Assam like Guwahati, Tezpur, Jorhat, Dibrugarh etc. So, the present work is aimed to do a survey on the traffic volume, parking and spot-speed in the different junctions of Tezpur (Sonitpur) and compare their values at different times of the day and to provide suitable recommendations regarding it.

II. STUDY AREA

Tezpur, the cultural hub of Assam and the administrative headquarters of the Sonitpur district is located between 26.6528° N latitude and 92.7926°E longitude at an elevation 48 m (157 ft) from the mean sea level with 40 km² area. With a glorious past, clean green surroundings and availability of all amenities for a modern day economic life, Tezpur is a fast growing city on the northern bank of the river Brahmaputra and is the largest of all districts of North Assam with a population of 102,505 as per Census 2011. The average temperature in summer is around 36 °C (97 °F) while the average winter temperature is around 13 °C (55 °F). Tezpur is easily accessible by road, rail and air with rest of the country. The study site includes the main road of Tezpur town where five locations are selected having a higher concentration of daily traffic. These five locations include: Kanaklata Civil Hospital

point (location-1), near UCO bank Chariali (location-2), Borgola Chariali (location-3), near Tezpur Sadar Thana (Police Station) (location-4) and near District Court Tezpur (location-5).



Fig. 1 Study site (Courtesy: Google Maps)

III. WORKING METHODOLOGY

Since the inception of the work, extensive literature survey was done to get an idea of the previous work being done in different places of India. Most of amount of as well as knowing the level of service. But in a congested town like Tezpur, where there is a heavy accumulation of both public and private owned vehicles at different stretches of the road in the main town area, a systematic approach to make the people aware about the prevailing traffic condition and how traffic snarls could make things worse in future if precautionary measures are not taken in time. So, in the present survey, manual traffic volume study, off-street parking using license plate method, manual on-street parking and spot speeds of different vehicles were determined and several recommendations have been suggested.

IV. FINDINGS OF THE STUDY

4.1 Traffic volume study

This study is being conducted to determine the number, movements, and classifications of roadway vehicles at a given location [1]. In the present study, manual traffic volume counts is being done at five junctions of Tezpur town, by classifying the different vehicles into fast and slow moving vehicles and counting their numbers for 12 hours a day (8 A.M. to 8 P.M.) for a period of two weeks. The vehicle counts were then converted to their corresponding PCU values by taking proper equivalent factors into consideration as per IRC: 106-1990. In course of the study, it was found that at all the five locations, there is an hourly variation in the concentration of vehicles coming in and going out of the town. One-way traffic regulation is enforced from 8 A.M to 8 P.M. from the Kanaklata Civil Hospital point till Tezpur Sadar Thana point. Moreover, due to and fro movement of vehicles

from the collector streets to the main road, pedestrians sometimes find it inconvenient while tending to use the road. This problem mainly arises due to the non-availability of shoulders along the collector streets. Based on such existing conditions, the dimensions of the meeting roads at all the five junction points were determined and the results are enumerated below:

Table 1: Dimensions of the roads at location 1

Road Name	Direction	Pavement Width	Shoulder Width
Civil Hospital Road	North	9 m	1.5 m
Hatipilkhana Road	East	10.5 m	1.5 m
Mahatma Gandhi Road	South	11 m	1.5 m
Hatipilkhana Road	West	7.5 m	1.5 m

Table 2: Dimensions of the roads at location 2

Road Name	Direction	Pavement Width	Shoulder Width
M.G. Road	North	9 m	1.5 m
A.S.E.B. Road	East	7.5m	1.5 m
M.G. Road	South	7 m	1.5 m
A.S.E.B. Road	West	6.2 m	1.5 m

Table 3: Dimensions of the roads at location 3

Road Name	Direction	Pavement Width	Shoulder Width
M.G Road	North	8 m	1.5 m
N.C Road	East	6.8 m	1.5 m
M.G Road	South	8 m	1.5 m
N.C Road	West	8.2 m	1.5 m

Table 4: Dimensions of the roads at location 4

Road Name	Direction	Pavement Width	Shoulder Width
M.G Road	North	9.2 m	1.5 m
M.G Road	South	9.2 m	1.5 m
Jonaki Cinema Road	West	6 m	1.5 m

Table 5: Dimensions of the roads at location 5

Road Name	Direction	Pavement Width	Shoulder Width
M.G Road	North	8 m	1.5 m
Main Road	East	6.8 m	1.5 m
M.G Road	South	8 m	1.5 m
Main Road	West	8.2 m	1.5 m

After knowing the dimensions of the roads, the traffic count was done for 12 hours a day for a period of two weeks. The average traffic count in all five locations is given in tabular form below:

Table 6: Average vehicle counts in all locations

Vehicle type (↓)	L 1	L 2	L 3	L 4	L 5
2-wheeler	5326	5017	4723	3816	4292
3-wheeler	439	74	61	62	169
Car	2612	1630	1669	813	1182
Bus	0	0	0	0	3
Truck	0	1	3	6	3
Tractor	0	0	3	0	0
Bicycle	4773	2028	921	1241	937
Hand-cart	180	14	66	63	86
E-rickshaw	2	0	0	100	226

*L: Location

The traffic volume data so obtained was converted to their respective Passenger Car Unit (P.C.U.) values [8] taking suitable equivalent factors as per IRC: 106-1990. Different values of PCU/hr thus obtained are recommended for knowing the existing vehicular flow pattern, which includes crossing, merging and diverging. The highest PCU values are thus shown graphically for all the five study locations:

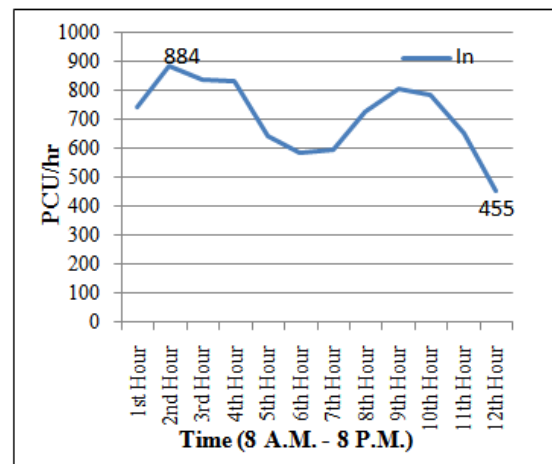


Fig 2: Maximum and minimum PCU values of vehicles in location 1 towards Tezpur town

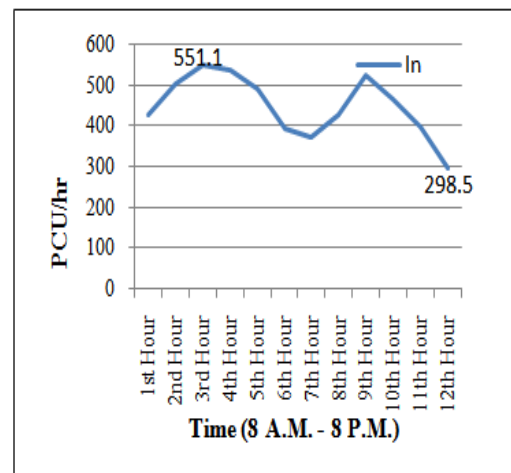


Fig 3: Maximum and minimum PCU values of vehicles in location 2 towards Tezpur town

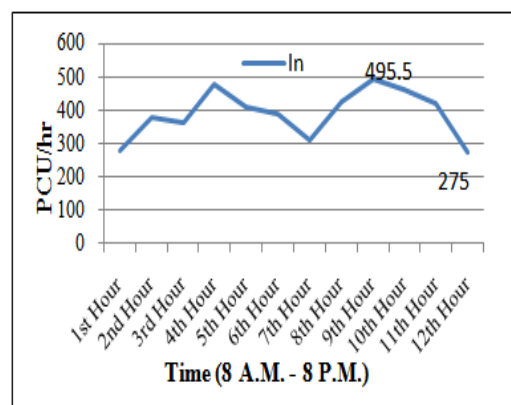


Fig 4: Maximum and minimum PCU values of vehicles in location 3 towards Tezpur town

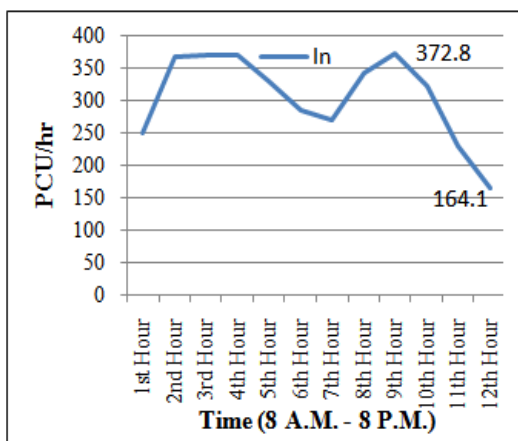


Fig 5: Maximum and minimum PCU values of vehicles in location 4 towards Tezpur town

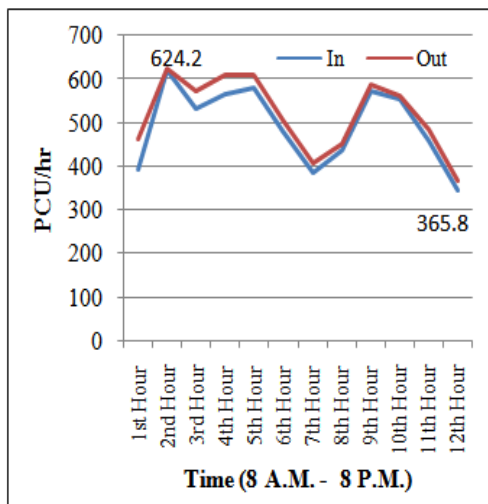


Fig 6: Maximum and minimum PCU values of vehicles in location 5 coming towards and going out from Tezpur town

4.2 Off-Street parking study

Off-street parking refers to parking of vehicles at some allotted space within the vicinity of the urban area at some distance away from the main stream of traffic. This technique of parking is mainly resorted to reduce the burden of unnecessary traffic snarls which consume a portion of the carriageway and create inconvenience to the moving traffic as well as the pedestrians. Off-street parking space may be provided either above the ground or underground if sufficient space is not available to bear the traffic load. In the Tezpur main town area, with the massive increasing concentration of vehicles plying on the city roads, an off-street parking area have been built adjacent to the M.G.Road near the Kanaklata Civil Hospital.



Fig 7: Off-street parking space in Tezpur town

This space has been utilized for parking by filling up earth upon an old existing pond (Lechu Pukhuri). By this parking technique, a reasonable number of traffic accidents in the town have been reduced. But from scientific point of view, it is essential to know the efficiency of operation of the parking lot. So, in this survey an extensive study has been done to evaluate different parameters involved in off-street parking. For this, license-plate technique [8] has been resorted. This technique involves constant monitoring of the movement of vehicles entering and going out of the parking lot for an interval of every 15 minutes duration for 1 hour by noting the registration number of the vehicle. The parking status in every bay is coded first. If a vehicle occupies that bay completely for the study period, it is allotted a code 1 but if the vehicle leaves before completion of the study period, it is allotted a code 0. From the parking survey data, average occupancy, average turnover, parking load, parking capacity and efficiency of the parking lot is calculated.

Turnover is computed as the number of vehicles present in that bay for that particular hour. For example- if a vehicle is present in the first bay for 1-hour then its turnover is 1 but if there is change of vehicles in an hour then turn over is equal to number of vehicle change in that hour and so on. Average turn-over is the sum of turn over divided Total number of bays.

Accumulation for a time interval is the total of number of vehicles in the bays.

Parking volume is the sum of the turn-over in all the bays.

Average duration is the average time for which the parking lot was used by the vehicles. It can be calculated as sum of the accumulation for each time interval \times time interval divided by the parking volume

Occupancy for that time interval is accumulation in that particular interval divided by total number of bays. Average occupancy is found out as the average of total number of vehicles occupying the bay for each time interval. It is expressed in percentage.

Parking capacity = number of bays × number of hours

Parking load = total number of vehicles accumulated at the end of each time interval × time

Efficiency = Parking load / Total number of bays

By applying these formulae, it is found that,

Average turnover = 1.31

Parking volume = 97 vehicles

Average vehicle duration = 40.82 minutes/vehicle

Average occupancy = 89.19%

Parking capacity = 74 vehicle hours

Parking load = 66 vehicle hours

Efficiency = 89.19%

The results of off-street parking study are given in a systematic format in Table 8.

4.3 On-Street parking study

On-street parking involves parking of vehicles on the sides of the street itself. This system of parking is based on the angle of inclination of the vehicle parked with respect to lining of the road [9]. In the present survey, on-street parking study was conducted on a stretch of the city road extending from Kanaklata Civil Hospital point to District Court. Here most of the vehicles are seen to resort to parallel parking or 90° parking on both sides of the road. Though the 90° parking is suitable for the two-wheelers which account for majority of the vehicular traffic in the study area, yet its increasing volume is creating inconvenience to pedestrians off and on as revealed from the findings. Due to the narrow width of the city road, two-wheelers along with bicycles, handcarts and e-rickshaws ply continuously which often create traffic jams during the peak hours (10:00 A.M to 1 P.M.). Jams also occur sometimes due to the inexperience on part of overall driving of four-wheelers by the budding drivers, specially while reversing the vehicle from the parking lot.



Fig 8: Present parking scenario in Tezpur town

In course of the present work, number of vehicles is being counted at a continuous interval of 15 minutes for 1 hour in the morning (10 A.M. to 11 AM) and evening (5 P.M. to 6 P.M.) on both sides of the road and noted down. It is seen that from location 1 to location 2 and also from location 2 to location 3 vehicles are more at both sides of the road

in the evening hours than in the morning hours. But from location 3 to location 4 and also from location 4 to location 5, vehicles are more in the morning hours only. This gives an idea regarding the duration for which a particular vehicle was parked on street. The chart plotted shows the parking volume and the time interval of parked vehicles.

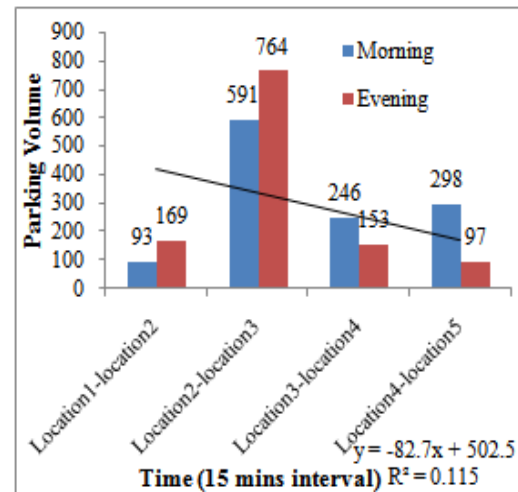


Fig 9: Variation of left hand sided on-street parked vehicles during morning and evening at every 15 minutes interval

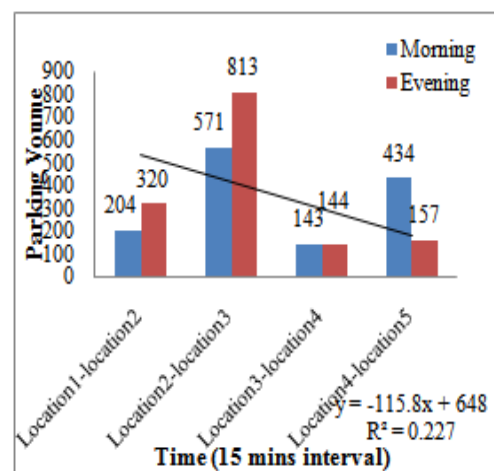


Fig 10: Variation of right hand sided on-street parked vehicles during morning and evening at every 15 minutes interval

4.4 Spot-Speed study

Spot speed is the instantaneous speed of a vehicle at a particular place at a particular point of time. Spot-speeds of different categories of vehicles are measured by calculating the time required by a vehicle to cross a definite distance usually less than 90 m (here a distance of 40 m is adopted). Spot speed studies are useful to know the speed distribution of a traffic stream at a specific location [1]. The data gathered in spot speed studies are used

to determine vehicle speed percentiles, which are useful in making many speed-related decisions. For knowing the spot speeds of vehicles in Tezpur main town, the spot selected was at M.G. Road near the coveted Sohum shopping complex, where vehicles ply at an optimum speed in view of the daily traffic. From the survey, it was found that in all the five study locations, during the peak hours, three vehicles was dominant among other- Four wheeler (Passenger car), Two-wheelers (Scooty and Motorcycles) and Bicycles. A stretch of 40 m distance was selected and 10 vehicles were selected at random and the time taken to cross 40 m distance was calculated. The speed was thus obtained by dividing the distance by the time. The average spot speeds of two-wheelers and four wheelers were obtained as 15 km/hr and that of the bicycles were 10 km/hr.

Sl No.	Spot speed (km/hr.)		
	2-wheeler	4-wheeler	Bicycle
1	19	18	11
2	10	14	12
3	13	14	7
4	34	9	8
5	13	22	8
6	12	11	9
7	7	17	13
8	12	13	13
9	10	19	11
10	16	13	10
Average	15	15	10

Table no. 7: Results of spot speed study

V. CONCLUSION

From all the four studies conducted on the locations, it is evident that traffic in the Tezpur town area is heterogeneous in nature. Due to the narrow width of all approaching roads leading to the town and day to day increasing concentration of different vehicles and commercial establishment the town seems to be expanding in a haphazard manner with least concern among the civic authorities and the general public. This is evident from the traffic volume and parking studies so far conducted in this survey. The vehicles are parked here and there beside the main road and the collector streets along with the presence of temporary vendors occupying a side portion of the carriageway which make it inconvenient to different vehicle owners to smoothly drive on the road. Reluctance of the public to traffic rules is also a cause of concern as it was found that some drivers lack the ABC of driving and unintentional impact between two vehicles is also a common sight during the peak traffic hours when it comes to overtaking, merging and diverging

manoeuvre. Although one-way traffic regulation has been in effect from 8 A.M. till 8 in the evening, still the efforts are not fruitful. Moreover, the loading and unloading of goods from trucks is permitted during the early morning hours (before 8 A.M.), but it is seen that some trucks unload the goods during the noon hours which create massive traffic jams in the town. In the recent years, the off-street parking facility has come up which is highly effective (89.19% efficiency) in eliminating the woes of the traffic. The parking facility has got 74 bays to accommodate four-wheelers (passenger cars) but its management is not at all efficient and proper maintenance is required in this regard. Thus, in order to have a smooth traffic flow, it is recommended to prohibit on-street parking of any kind of vehicle (especially two-wheelers) on both sides of the roads of Tezpur town. Vendors selling goods on the footpaths of the town is to be evacuated and proper alternative space should be allocated to them so that the footpaths of the town are meant only for pedestrian movement. There is no road markings which create problems during night driving and so proper markings indicating 'right turn', 'left turn', 'stop' as well as zebra crossing must be provided. Manual control of traffic by the concerned traffic personnel is a mere wastage and so it is highly recommended to install three automatic traffic signal points, first near Kanaklata Civil Hospital point where most vehicle tend to enter the town from all corners the second one at Borgola Chariali point where the concentration of people and vehicles is maximum and the third one near the District Court premises where four roads meet although the traffic personnel must be assigned to control the traffic and nothing goes against the traffic rules. This system will reduce the intensity of traffic jams and accidents to a great extent as well as keep a check on speed control by different drivers of vehicles. Last, but not the least, everything is vested upon the general public to co-operate well with the concerned authorities and make own-self as well others conscious in eradicating the present traffic woes and thus make Tezpur the best well planned city so as to have better connectivity with the rest of North-East and other states of India.

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Table 8: Results of the off-street parking survey

Bay	Time (min) & Vehicle Registration No.				Weight age at every 15 minutes				Turn over
	0-15	15-30	30-45	45-60	0-15	15-30	30-45	45-60	
1	2951	2951	2951	2951	1	1	1	1	1
2	2826	2826	2826	2826	1	1	1	1	1
3	7090	7090	7090	7090	1	1	1	1	1
4	2333	2333	---	4847	1	1	0	1	2
5	--	--	--	2535	0	0	0	1	1
6	2043	2043	911	911	1	1	1	1	2
7	3811	3811	3811	3811	1	1	1	1	1
8	7575	7575	4450	4450	1	1	1	1	2
9	3933	2715	2715	2715	1	1	1	1	2
10	2025	2025	2025	2025	1	1	1	1	1
11	5753	5753	5753	5753	1	1	1	1	1
12	5354	5354	5354	5354	1	1	1	1	1
13	1328	1328	1328	1328	1	1	1	1	1
14	7493	7493	7493	7493	1	1	1	1	1
15	3546	3546	3546	----	1	1	1	0	1
16	----	----	5655	5655	0	0	1	1	1
17	5218	7258	7258	7258	1	1	1	1	2
18	5161	3771	3759	3759	1	1	1	1	3
19	7146	7146	7416	-----	1	1	1	0	1
20	2460	2460	2460	2460	1	1	1	1	1
21	5541	5541	822	822	1	1	1	1	2
22	3598	3598	6197	6197	1	1	1	1	2

23	9347	9434	703	703	1	1	1	1	3
24	--	--	1328	1328	0	0	1	1	1
Bay	Time (min) & Vehicle Registration No.				Weight age at every 15 minutes				Turn over
	0-15	15-30	30-45	45-60	0-15	15-30	30-45	45-60	
25	1683	1683	1683	1683	1	1	1	1	1
26	--	3574	3574	3574	0	1	1	1	1
27	6360	6360	6360	6360	1	1	1	1	1
28	3896	3896	--	6898	1	1	0	1	2
29	5813	5813	5813	5813	1	1	1	1	1
30	5377	5377	5377	5377	1	1	1	1	1
31	1971	--	110	110	1	0	1	1	2
32	3525	3525	6391	6391	1	1	1	1	2
33	5977	5977	5977	5977	1	1	1	1	1
34	3432	3432	3432	3432	1	1	1	1	1
35	7077	7077	7077	7077	1	1	1	1	1
36	6856	6856	6856	1411	1	1	1	1	2
37	2070	2070	2070	---	1	1	1	0	1
38	2351	2351	2351	2351	1	1	1	1	1
39	2656	2656	7783	7783	1	1	1	1	2
40	422	6961	6961	6961	1	1	1	1	2
41	6170	6170	6170	6170	1	1	1	1	1
42	6115	6115	6115	6115	1	1	1	1	1
43	9300	9300	9300	9300	1	1	1	1	1
44	6919	6919	6919	6919	1	1	1	1	1
45	6457	6457	6457	6457	1	1	1	1	1
46	2684	2684	2684	2684	1	1	1	1	1
47	2572	--	8752	8752	1	0	1	1	2
48	5209	5209	5209	5209	1	1	1	1	1
49	1114	1114	1114	1114	1	1	1	1	1
50	7339	7339	7339	7339	1	1	1	1	1
Bay	Time (min) & Vehicle Registration No.				Weight age at every 15 minutes				Turn over
	0-15	15-30	30-45	45-60	0-15	15-30	30-45	45-60	
51	8079	8079	8079	8079	1	1	1	1	1
52	5209	5209	5290	5290	1	1	1	1	2
53	--	--	5999	5999	0	0	1	1	1
54	---	265	265	265	0	1	1	1	1
55	--	--	--	2128	0	0	0	1	1
56	2920	2920	2920	2920	1	1	1	1	1
57	1001	1001	1001	1001	1	1	1	1	1
58	--	--	8428	8428	0	0	1	1	1
59	--	--	5122	5122	0	0	1	1	1
60	--	--	8079	8079	0	0	1	1	1
61	8435	--	928	928	1	0	1	1	2
62	5479	5479	5479	5479	1	1	1	1	1

63	2903	2903	2903	--	1	1	1	0	1
64	7786	7786	7786	--	1	1	1	0	1
65	2603	2603	8777	8777	1	1	1	1	2
66	7963	--	--	2706	1	0	0	1	2
67	2927	2927	2927	2927	1	1	1	1	1
68	3788	3788	3788	3788	1	1	1	1	1
69	1737	1737	1737	1737	1	1	1	1	1
70	8600	8600	8600	8600	1	1	1	1	1
71	4016	4016	2875	2875	1	1	1	1	2
72	4333	4333	4333	4333	1	1	1	1	1
73	7168	7168	7168	7168	1	1	1	1	1
74	3898	3898	3898	3898	1	1	1	1	1
Accumulation					64	62	69	69	97
Occupancy					86.48	83.78	93.24	93.24	

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