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Community Parking-Parking for Whole Community (Planning & Designing)

Smit Bhatt[1], Srinath Karli[2]

[1]M.E.Transportation semester-3rd student, Hasmukh Goswami College of Engineering
[2]Srinath Karli, Assistant Professor, Hasmukh Goswami College of Engineering

Abstract **— Automobile growth & population growth, it is observed that the Basement parking is effective solution in residential scheme over the surface parking, where the parking space is major problem. And a second thing is that there is no strong implementation policy from the government regarding the parking, where ever it is surface or basement parking. This basement parking has scope in future or we can say that it is the only option regarding to parking problem in India. Second problem in cities is parking on street. So, Main aim of this project is to reduce the traffic in streets and also clear ROW. Problem of traffic generates on streets is wrong, uneven parking on street. For that the parking lot or community parking is one option. Lot of money is used for road not for parking on streets or in front of shops or malls. City was become attractive but when road becomes clear for driving and traffic was well maintain. So to avoid this problem community Parking System project is implemented. In developing the parking area plan, several important details should be considered. First and for most in the mind of the developer may be providing the maximum parking capacity in the available space while ensuring convenience and safety. As we have to understand that all the necessary transport facilities are not provided for roadside parking so these type solution will be helpful to reduce the road side parking and may also decrease the road accidents and improve the road users safety.**

Keywords- *Community, Parking, Off-street Parking, Parking Lot, At-grade Parking*

I. INTRODUCTION

1.1: WHAT IS PARKING? In simple language parking is a particular space consume by the vehicle at the time of when vehicles are in not action. Parking is the act of stopping and disengaging a vehicle and leaving it unpoccupied.it include indoor and outdoor private property belonging to a house, the side of the road. Parking is the space at which a vehicle can stop and park at the time when vehicles are non-functional.

1.2: WHY IT REQUIRED? Parking is the most essential part of the transportation engineering. Transportation without parking is just like Humans without oxygen. Parking areas are an important component of many transportation facilities such as safety rest areas, park and ride lots, and viewpoints. The parking area is often the first thing users see upon entering the facility, creating an important first impression. The optimum design for a parking area is not necessary one that provides the maximum number of parking spaces. It is the one that provides safe pedestrian and vehicular circulation, with ample stall and aisle width s, adequate turning radii, reasonable gradients, a pleasing appearance, visual access for law enforcement surveillance, provision for handling and treating storm water runoff, fits the site, is easy to maintain, and is in close proximity to the facility it serve. Parking is not only space of vehicles but the parking is safe, secured and convenient space for vehicles. Parking lots can be seen almost everywhere, from shopping centers to offices buildings to schools/collages to government and commercial buildings. Parking makes any particular building or any space functionable because without parking facility, not single building or spaces fulfill its function.

According to data from Ahmedabad RTO average increase in automobile (2w and 4w) in particular year is near to 4.5 to 6%.Total population of Ahmedabad according to last censes is near to 65.6 lac +, so near to 27200 + vehicle avg. increases every year. So basically increase in population will directly affect the number of vehicles. So we have to adjust for park this extra number of vehicles in same land.

II. Methodology

With the previously stated achievements, will provide a community parking which has its parking range of at least 400mt radius from it as center. This community parking zone (CPZ) should has capacity to park at least 60 to 65% vehicle of its peak parking hour. CPZ should capable for two wheeler parking as well as cars. Solution should solve the problem of road side parking at project area.

For the Methodology/Flow: It follows below mansion steps like Site Selection, Site Investigation, Field Surveys, Define Problems, Data Collection, Data Analysis, and Design

Table: 1. Methodology of Research

1) Site Selection It is the very first stage of the project in which we will find some places where road side parking resulted into crucial problem than most problematic will be chosen.
2) **Site investigation** In this stage general profile of site is known and it is first step to know how project should be.
3) **Field surveys** In this stage general surveys and technical surveys conducted and know what present trend is regarding to project. It is also helps to know what ground reality is.
4) **Define problems** In this stage of project what are the problems and how they affects the project is known and it give general knowledge about solutions.
5) **Data collection** In this stage data is collected for different problems regarding the project and how the solution should be is known. Governmental regulation and state authority regulation can be taken as the data if particular special type of data is not available for any problem. Data can be collected from authorities, public, practical details and other existing national and international project.
6) **Data analysis and solution** Here in this stage data is manipulated and solutions are generated to the problems. From the all solutions a feasible, practicable and environmentally safe solution is generated.
7) **Design of CPZ** It is last stage of the project in which that one solution is practically applied and then it applied at project site.

SOME CASES:

FIGURE 1: PARKING ISSUES AND TRAFFIC ISSUES AT SHIVRANJANI, AHMEDABAD

FIGURE 2: MOST CRUCIAL TRAFFIC PROBLEM AT RAMBAUG, AHMEDABAD

From fig.1 this image we clearly identify that 30% to 35 % of road width is consumed by road side parking due to this traffic problem get crucial. From fig.2 shows the most crucial traffic problem at Rambaug where over 50% of total width of road is covered by vehicle parking.

III. SITE DETAILS

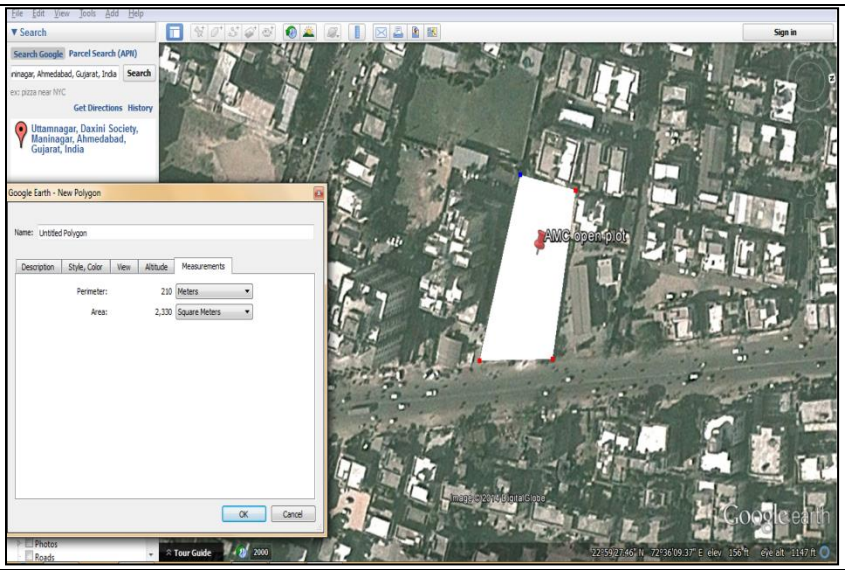
Figure 3: GOOGLE EARTH IMAGE OF SITE AREA & PLOT

Geographical Location of Parking Area

AMC plot, Beside Mihir tower,
Near Anant Society,
And Uttamnagar garden,
Maninagar
Ahmedabad -380008

22^0 59' 29.97" N and **72^0 36' 13.37" E**

Figure 4: IMAGE OF AMC OPEN PLOT



Total periphery of plot is 210 mt. and total area of plot according to the AMC plan data sheet is 2329.875 sq. mt. and total area of plot according to Google Earth is 2330 sq. mt.

Figure 5: AMC PLOT AREA AND PERIMETER

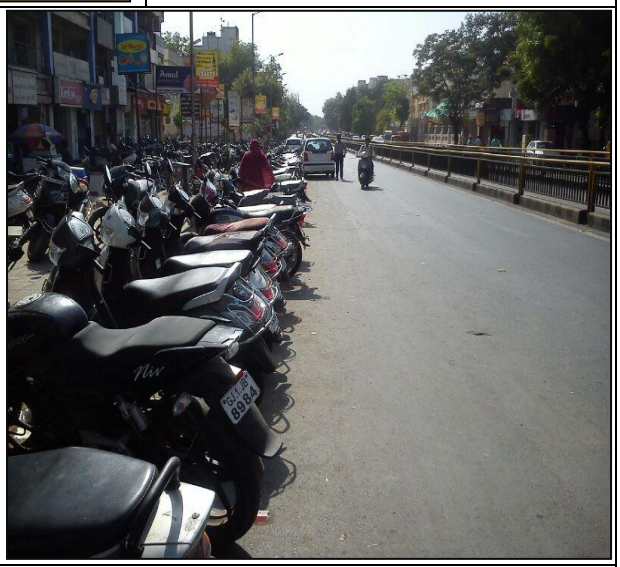


Figure 6: ROAD SIDE PARKING AT UTTAMNAGAR

IV. SURVEYS AND DATA COLLECTION

1) ROAD SIDE VEHICLE SURVEY (Vehicle Volume)

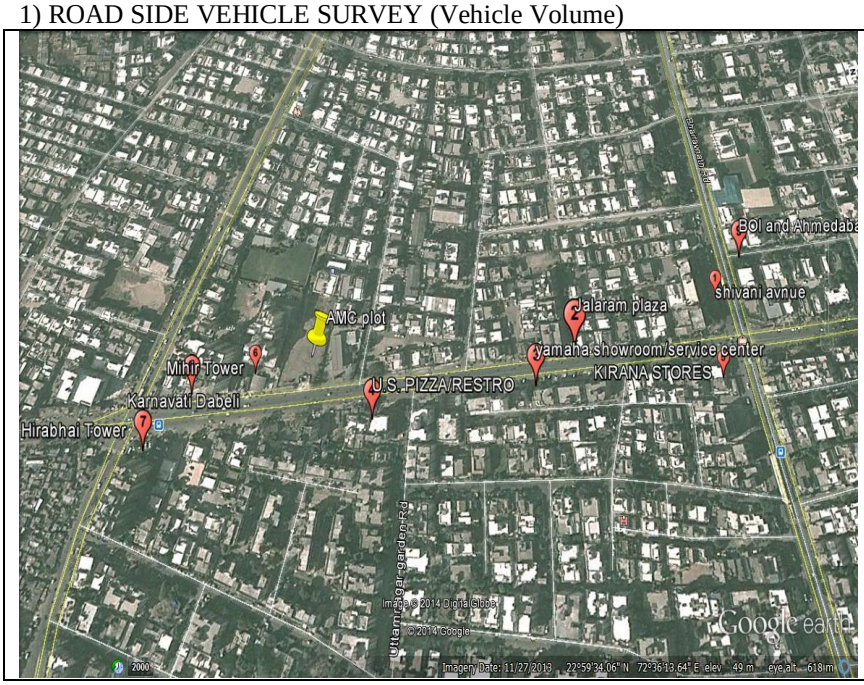


Figure 7: GOOGLE EARTH IMAGE SHOWING SURVEY POINTS

For this survey we establish some points near to CPZ. We hourly surveyed total number of vehicle parked at this point for 10 days and we find their relative peak parking times.

These Survey points are listed below: Shivani Avenue, Jalaram plaza, Yamaha showroom, US pizza/Restro, Kirana store, Mihir tower, Hirabhai tower, Karnavati Dabeli, BOI and Ahmedabad Mercantile bank.

In this survey we counted all two wheeler vehicles and cars around the area of project site than we find peak vehicle parking timing for all 9 points. Different points have different peak hour because every point doesn't have same priority at same time.i.e. Point 1 has its peak hour on Sundays and Saturdays but point 9 which are banks which does not remain open on Sundays. We have taken data from these 1-8 points in between 5 PM to 10 PM because peak of these 1-8 points lies between 5 PM to 10 PM and for last point 9 peak times is between 10 AM to 1 PM. (**Two wheeler + Cars**)

Table: 2. Survey Results

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	96+14	119+19	143+22	175+26	166+20	132+16	175+26
2	106+12	127+17	147+24	186+27	157+29	122+11	186+29
3	90+9	117+14	158+24	198+35	173+32	148+26	198+35
4	79+13	119+16	172+26	209+39	187+33	153+29	**209+39**
5	89+8	123+18	167+18	179+19	166+24	142+26	179+24
6	92+7	136+21	156+20	169+20	182+27	157+17	182+27
7	103+9	132+20	147+17	178+24	161+31	124+24	178+31
8	94+15	129+15	155+19	181+23	153+19	139+11	181+23
9	102+12	126+24	141+21	174+19	149+26	121+15	174+26
10	83+11	112+16	139+19	177+32	191+28	141+24	191+32

POINT: 1
(SHIVANI AVENUE)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	77+6	91+11	109+17	119+18	98+14	78+13	119+18
2	85+10	96+9	95+14	107+12	102+11	81+12	107+14
3	72+7	76+8	87+12	92+13	79+9	67+8	92+13
4	64+4	69+10	80+10	84+8	67+5	55+6	84+10
5	82+8	103+13	121+21	138+28	109+19	87+11	**138+28**
6	89+7	94+15	113+19	121+21	97+15	79+13	121+21
7	75+9	88+9	109+20	117+23	91+13	89+14	117+23
8	77+11	79+4	98+17	108+14	88+6	81+11	108+17
9	82+7	97+8	81+16	131+19	99+9	72+13	131+19
10	69+5	71+2	69+8	81+13	73+13	62+9	81+13

POINT: 2
(JALARAM PLAZA)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	27+5	31+4	39+7	53+8	56+11	37+4	56+11
2	34+8	43+8	52+9	69+11	55+13	43+6	69+13
3	28+4	29+5	41+7	53+12	59+9	29+2	59+12
4	36+6	40+7	56+4	71+9	56+7	34+1	56+9
5	39+9	49+7	67+12	82+16	71+11	57+7	**82+16**
6	31+2	39+3	59+9	70+10	61+4	40+5	70+10
7	33+1	37+4	49+9	61+13	58+9	37+4	61+13
8	27+0	37+5	29+8	44+7	51+9	24+1	51+9
9	29+3	34+2	41+4	56+9	45+11	29+3	56+11
10	36+5	24+4	26+9	37+12	49+6	32+4	49+12

POINT: 3
(YAMAHA SHOWROOM)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	17+7	24+8	29+12	36+11	28+9	21+4	36+12
2	21+12	32+9	35+11	29+17	31+15	24+9	35+17
3	19+17	32+14	32+21	40+19	28+14	19+8	40+21
4	26+15	39+19	48+20	54+24	39+19	27+11	54+24
5	23+11	28+13	21+11	38+9	42+12	22+6	38+13
6	18+7	24+9	27+13	34+14	45+16	24+8	45+16
7	14+14	19+11	31+12	29+17	37+17	31+11	37+17
8	19+9	28+14	34+11	41+9	36+10	23+8	41+14
9	21+10	24+9	29+16	37+11	36+13	24+7	37+16
10	22+11	27+13	32+17	42+21	38+15	27+9	42+17

POINT: 4
(US PIZZA/RESTRO)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	26+3	31+5	42+7	58+9	51+9	29+2	58+9
2	17+6	26+9	34+7	47+8	44+7	21+3	47+9
3	26+7	38+9	51+7	63+11	49+13	32+5	63+13
4	29+4	31+4	42+10	56+9	38+11	24+5	56+11
5	31+6	34+6	47+9	41+10	45+9	27+7	47+10
6	19+2	29+4	37+3	46+4	52+6	31+1	52+6
7	24+8	37+9	45+7	52+3	40+9	27+3	52+9
8	27+4	29+2	38+4	45+3	50+6	33+0	50+6
9	29+3	36+7	29+9	54+6	37+4	28+4	54+9
10	32+7	38+6	41+5	49+9	59+4	24+3	59+9

POINT: 5
(KIRANA STORES)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	18+3	23+7	21+8	29+5	21+6	14+1	29+8
2	23+2	14+5	24+4	28+2	24+4	19+2	28+5
3	21+4	25+6	31+3	34+5	29+4	16+3	34+5
4	17+1	24+3	27+7	38+9	27+5	21+2	38+9
5	19+3	26+4	22+4	31+7	25+5	17+2	25+7
6	20+5	24+5	30+6	28+8	31+6	12+3	31+8
7	24+4	27+6	32+7	35+6	29+7	14+3	35+7
8	18+6	23+4	28+7	24+4	36+4	17+0	36+7
9	22+3	26+3	24+4	29+1	24+2	21+0	29+4
10	23+2	32+0	27+0	25+2	32+1	16+2	32+2

POINT: 6
(MIHIR TOWER)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	19+4	24+7	29+4	31+8	23+5	14+2	31+8
2	15+6	21+5	25+6	27+7	16+4	9+1	27+7
3	24+8	35+9	32+4	39+11	25+4	19+1	39+11
4	34+6	29+4	31+7	44+15	36+9	21+3	44+15
5	26+1	24+6	30+9	34+8	25+5	17+2	34+9
6	27+2	18+2	22+5	36+13	27+8	16+3	36+13
7	31+3	14+3	26+6	33+7	20+4	10+1	33+7
8	24+3	26+7	25+2	27+9	22+4	12+0	27+9
9	19+0	27+4	22+2	39+5	25+2	8+2	39+5
10	26+4	21+7	24+4	30+8	21+5	13+1	30+8

POINT: 7
(HIRABHAI TOWER)

DAY	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Peak
1	29+4	24+3	35+4	43+4	32+1	17+2	43+4
2	27+2	19+2	25+3	36+5	29+4	23+1	36+5
3	31+1	24+1	32+4	47+6	37+5	21+2	47+6
4	28+0	26+2	38+3	51+6	43+7	26+3	51+7
5	19+3	23+1	31+3	40+5	31+4	22+1	40+5
6	26+1	24+2	36+1	42+4	25+1	19+0	42+4
7	24+2	28+3	33+2	36+5	29+2	17+2	36+5
8	21+3	24+2	28+4	39+7	31+6	15+2	39+7
9	18+1	23+4	25+3	29+2	26+0	21+1	29+2
10	28+2	24+3	30+4	41+6	34+3	26+2	41+6

POINT: 8
(KARNAVATI DABELI)

DAY	10 AM	11 AM	12 PM	1 PM	Peak
1	24+10	19+6	23+9	19+11	24+11
2	21+8	23+11	17+9	25+12	25+12
3	19+9	25+14	24+14	27+8	27+14
4	5+2	4+1	2+0	3+2	5+2
5	21+6	29+12	26+14	19+9	29+14
6	19+7	24+11	25+7	14+9	24+11
7	23+9	25+9	18+13	15+7	25+13
8	18+8	27+13	21+11	24+9	27+13
9	24+9	26+10	19+10	21+11	26+11
10	17+8	21+11	25+7	24+9	25+11

POINT: 9
(BOI AND AMB)

DELAY TIME SURVEY

Table: 3 Delay Survey Results

ROUTE	TIME (NO TRAFFIC)	TIME (NORMAL TRAFFIC)	TIME (HIGH TRAFFIC)	DELAY In MINUTES
Maninagar-Bheravnath	3 min 54 sec	5 min29 sec	9 min 53 sec	4 min 24 sec
Maninagar-Kankariya	6 min 18 sec	9 min 27 sec	15min 15 sec	5 min 48 sec
Maninagar-S.P.School	5 min 33 sec	7 min 49 sec	12 min 44 sec	4 min 55 sec
Maninagar-Rambaug	4 min 14 sec	7 min 29 sec	11 min 51 sec	4 min 22 sec
L.G.Hospital-Uttamnagar	6 min 07 sec	9 min 58 sec	17 min 18 sec	7 min 20 sec
Uttamnagar-Bheravnath	5 min 16 sec	8 min 11 sec	14 min 54 sec	6 min 43 sec

This all delayed is just because of road side vehicles parked at sides of road. Sometimes total width of road decrease to half in afternoon which results into vehicles need more turning area and if that is not available than traffic problem will arise.

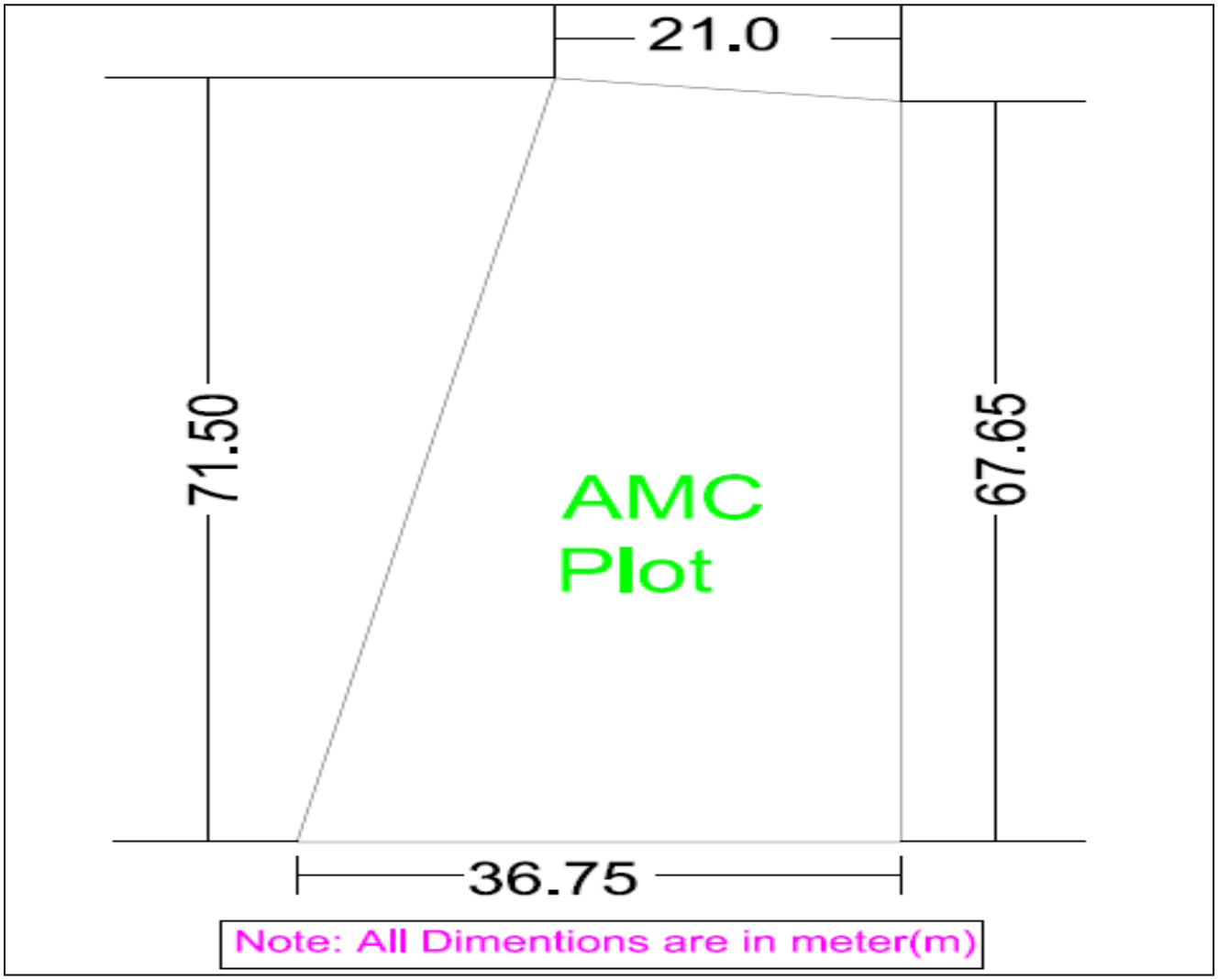
VEHICLE DIMENSION DATA

Company	Models	Class	Length(mm)	Width(mm)
AUDI	A4	Sedan	4586	1772
AUDI	Q5	Suv	4629	1880
BMW	3 SERIES	Sedan	4520	1817
BMW	5 SERIES	Sedan	4841	1902
BMW	7 SERIES	Sedan	4998	1901
CHEVROLET	AVEO	Sedan	4310	1710
CHEVROLET	BEAT	Hatch back	3640	1595
CHEVROLET	CAPTIVA	Suv	4660	1788
CHEVROLET	CRUZE	Sedan	4597	1495
CHEVROLET	SPARK	Hatch back	3495	1680
CHEVROLET	TRAVERA	Suv	4435	1705
FIAT	LINEA	Suv	4560	1730
FIAT	PALIO	Hatch back	3763	1620
FIAT	PUNTO	Hatch back	3987	1687
FORD	ENDEAVOUR	Suv	4958	1805
FORD	FIESTA	Sedan	4282	1686
FORD	FIGO	Hatch back	3795	1680
FORD	FUSION	Sedan	4020	1488
FORD	IKON	Sedan	4145	1632
HONDA	ACCORD	Sedan	4830	1820
HONDA	CIVIC	Sedan	4545	1750
HONDA	CR-V	Suv	4555	1780
HONDA	JASS	Suv	3900	1695
HONDA	CITY	Sedan	4310	1690
HYUNDAI	ACCENT	Sedan	4250	1670
HYUNDAI	ELANTRA	Sedan	4525	1725
HYUNDAI	GETZ	Hatch back	3825	1665
HYUNDAI	I 10	Hatch back	3565	1595
HYUNDAI	I 20	Hatch back	3940	1710
HYUNDAI	VERNA	Sedan	4310	1695
MAHINDRA	BOLERO	Suv	4260	1815
MAHINDRA	SCORPIO	Suv	4325	1700
MARUTI	ALTO	Hatch back	4345	1690
MARUTI	DZIRE	Sedan	4160	1690
MARUTI	OMNI	-	3370	1410
MARUTI	BALENO	Semi SUV	4050	1710
MARUTI	RITZ	Hatch back	3715	1680
MARUTI	SWIFT	Hatch back	3695	1690

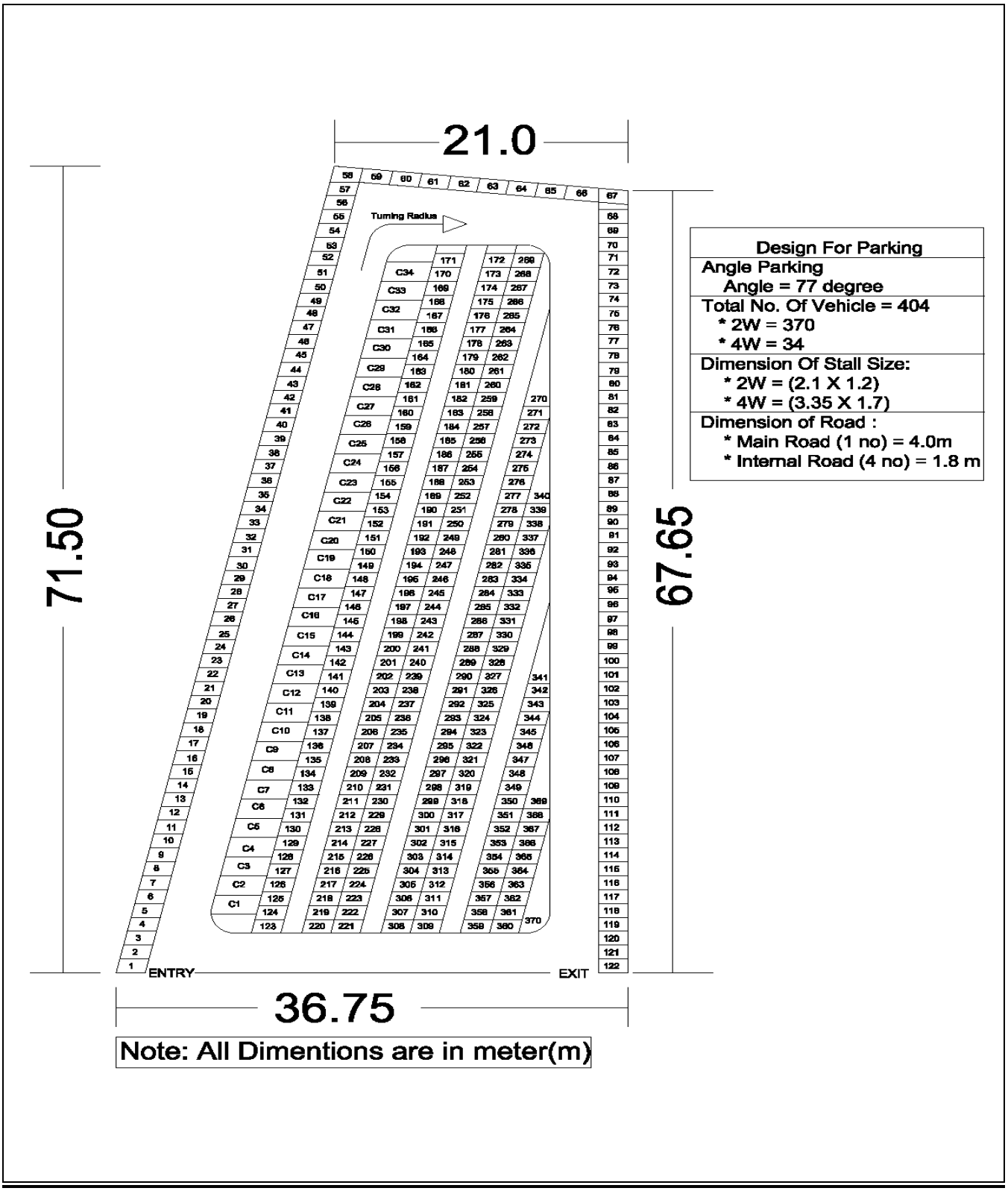
As stall size is designed from the data from vehicle size. Length and width both only dimension were taken in account. Dimension for some cars are listed below which are most common in India.

Location Number	Two Wheelers	Four Wheelers	% Two Wheelers	% Four Wheelers
1	209	39	84.27	15.73
2	138	28	83.13	16.87
3	82	16	83.67	16.33
4	54	24	69.23	30.76
5	63	12	84.0	16.0
6	38	9	81.25	18.75
7	44	15	74.57	25.42
8	51	7	87.93	12.07
9	29	14	67.44	32.56
Total	**708**	**164**	**81.12**	**18.88**

V. DESIGN



This CADD drawing represents dimension of AMC plot which has the area of 2330 sq.mt.



CADD drawing showing vehicle parking arrangement of **370 bikes and 34 cars** with driveway

DESIGN POINTS

Community parking zone which we design is capable of parking of 370 bikes and 34 cars.

Total area for parking which available is 2329.875 sq.mt.

This community parking has one entry and one exit.

Angle of parking is 77^0

Dimension of stall size of bikes = 2.1 mt. * 1.2 mt.

Dimension of cars = 3.90mt. * 1.7 mt.

Width of main road = 4.0mt.

Width of internal road = 1.8mt.

Rate per hour per bike is 3 rs.

Rate per hour per car is 8 rs.

REVENUE COLLECTION & CALCULATION

We decided standard rate for parking of two wheeler is **3 RS/hour** and **8 RS/hour** for cars at CPZ.

Now here Community Parking Zone has capacity of **370 Bikes** and **34 Cars** according to case: 1 so charge taken from Bike per hour is 3 RS and from Car is 8 RS.

Total revenue collected from Bikes per hour assuming full capacity
= 370 * 3 RS =1110 RS
Total revenue collected from Cars per hour assuming full capacity
= 34 * 8 RS = 272 RS
Total Revenue = 1110 + 272 = 1382 RS/hour
Total Revenue collected per day = 1382 RS * 24 = **33168 RS/day**
Taking 65% full condition of CPZ so,
Total Revenue collected per day = 0.65 * 33168 = **21660 RS/day**
Total Revenue collected per month = 21660 * 30 = **649800 RS/month**

VI. CONCLUSION

After doing project on parking we concluded that this type of parking zone not only offers higher capacitive parking place but it also offers acceptable and feasible parking place to all vehicle users.
As we know automobile increases at the rate of 6.5% to 7.5% every year its show that near to 50000 vehicles increases every year but land will not increase, so we have to adjust in same amount of land. For that it is the best possible and practicable solution in India.We can concluded that roadside parking is never a good option at any place of Ahmedabad like Shivranjani, Law garden, Vijay cross road, Maninagar, etc. so need of finding a new option is generated.
We concluded that amount of vehicles parked at roadside should be moved at site of AMC open plot. This area is facing most crucial problem of roadside parking and so we concluded that this area fit to project of community parking. We found many of open plots or land at/near to maninagar area but this open plot of AMC (plot 64/4) has higher area for parking and higher feasibility over other plots. Survey no: 1: Road side Vehicle survey: its useful survey that we conducted to know how many total vehicles parked at sides of road or at any junction for particular hour. We conducted this survey for 10 days and we concluded peak parking hour and number of vehicles parked at the time of peak hour for all 9 points which are point: 1 peak hour is 8 pm and vehicles are 209 bikes and 39 car. Point: 2 peak hour is 8 pm and vehicles are 138 bikes and 28 cars. Point: 3peak hour is 8 pm and vehicles are 82 bikes and 16 cars. Point: 4 peak hour is 8 pm and total bike 52 and 24 cars. Point: 5 peak hours is 8 pm and vehicles are 63 bikes and 12 cars. Point: 6 peak hour is 8 pm and vehicles 38 bikes and 9 cars. Point: 7 peak hour is 8 pm and vehicles 44 bikes and 15 cars. Point: 8 peak hours is 8 pm and vehicles are 51 bikes and 7 cars. Point: 9 peak hours is 11 am and vehicles are 29 bikes and 14 cars.
Survey no: 2: Delay time survey: in this survey we define some route and count time taken by vehicles to travel on route in normal traffic condition and heavy traffic condition. For route 1: Delay in time is 4 min. and 24 sec. For route 2: Delay in time is 5 min. and 48 sec. For route 3: delay in time is 4 min. and 55 sec. For route 4: delay in time is 4 min. and 22 sec. For route 5: delay in time is 7 min. and 20 sec. For route 6: delay in time is 6 min. and 43 sec. Survey no: 3: in this survey we find dimensions of deferent and popular cars which usually used in India. From this survey we concluded standard vehicle stall size.

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