TRAFFIC STUDY REPORT

Of

Traffic Study of the Proposed Mixed-Use Development on Plot Bearing Gut no.61/1/1, Gut No. 61/1/2,3,4, 61/2/1,2,3 of Village Chitalsar, Manpada, District Thane.

Prepared for

M/s Acme Housing India Pvt. Ltd.

May – 2023

ttec
TRANSPORTATION AND TRAFFIC ENGINEERING CONSULTANTS

Traffic Study of the Proposed Mixed-Use Development on Plot Bearing Gut no.61/1/1, Gut No. 61/1/2,3,4, 61/2/1,2,3 of Village Chitalsar, Manpada, District Thane.

May 2023

Developer : **M/s. Acme Housing India Pvt. Ltd.**
Building No.10, 5th Floor, Solitaire Corporate Park, Guru Hargovindji Road, Chakala, Andheri (E), Mumbai-400093.

Traffic Consultants: **M/s Transportation and Traffic Engineering Consultants (TTEC)**
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Chapter 1

Introduction

1.0 INTRODUCTION

1.1 Project Background

M/s. Acme Housing India Pvt. Ltd. plans to develop a Mixed-use development at Manpada, Thane. The proposed development comprises of Residential component comprising of **1751 units** having flat configuration of 2 BHK, 2.5 BHK, 3 BHK and 4 BHK. Moreover, additional **2448** number of 1RK units of **MMRDA** and a **commercial** component i.e. shops/gala of total **1958.56 sqm** carpet area are also planned within the proposed development.

The multiple ingress and egress to the proposed mixed-use development is provided through both the roads i.e. Khewra Circle Marg and Existing narrow road to be widened 10m wide as per Development Plan (DP) to the West of the proposed development.

Recognizing the need for traffic engineering advice **M/s. Acme Housing India Pvt. Ltd.** has appointed ***M/s Transportation and Traffic Engineering Consultants*** to undertake the preparation of traffic study of the proposed development.

This report presents the results and findings of the traffic study.

1.2 Scope of Work

The scope of our work during this study report covers the following aspects related to Traffic study:

- Initial overview and comments on any current master plan layouts and surrounding roads and identification of potential traffic issues and concerns
- Assessment of existing traffic conditions in the vicinity of the site; which includes site surveys and analysis of the surrounding road network
- Future Traffic forecast: Traffic surveys to quantify existing flows and trip rates for this type of development
- Traffic Assignment: This involves the pattern in which the generated traffic will be distributed on the surrounding roads. The outcome of the traffic surveys & the existing and future road connectivity will be the inputs for the traffic assignment.
- Traffic Impact Analysis: Assessment of the impact of the vehicles coming to the proposed development on the surrounding road network in the immediate vicinity of the proposed development
- Assessment of the adequacy of existing road system capacity in the vicinity of the site to take the traffic generated from the proposed development.

- Traffic management measures to mitigate the traffic impact if any impact is significant.
- Ingress/egress points to the development site.
- Advise the team on pick-up, drop-off points, locations and design of pick-up and drop-off points etc.
- Overview of the internal traffic circulation at ground level and at different parking levels: This involves removing/reducing the conflicting vehicular movements at different levels
- Development of traffic management scheme, layout proposals, design of external junctions (if required), signal design (if required) etc.
- Comments on the road widths of the internal roads based on the projected traffic generation.
- Swept path analysis: Checking the turning radius of different vehicles types (i.e. cars.) at critical locations with the help of AUTOTRACK software
- Comments on the ramp system (i.e. circular ramps, straight ramps, the turning radius etc.)
- Review of the parking layouts. Analyzing the areas of concern inside the car parks
- Optimization of car parking bays inside the car park, comments on the aisle
- Preparation of a report on traffic issues and recommendations.

1.3 Structure of this Report

Following this introduction **Chapter 1**, this report is divided into the following chapters;

Chapter 2 Existing Conditions; which describes the existing road network and the prevailing traffic conditions in the vicinity of the development site.

Chapter 3 General Development Layout

Chapter 4 Traffic Generation & Impact Analysis

Chapter 2

Existing Conditions

2.0 EXISTING CONDITIONS

2.1 Existing Development Site Conditions

The proposed development project site location map and the surrounding road network as per the existing conditions is presented in **Figure 2.1(a) and Figure 2.1(b).**

The main roads surrounding the proposed development site are Khewra Circle Marg and Existing narrow road to be widened 10m wide as per DP. The multiple ingress and egress to the proposed development are provided through both the roads.

As per the existing condition, the area surrounding the proposed development includes some Commercial and Residential developments.

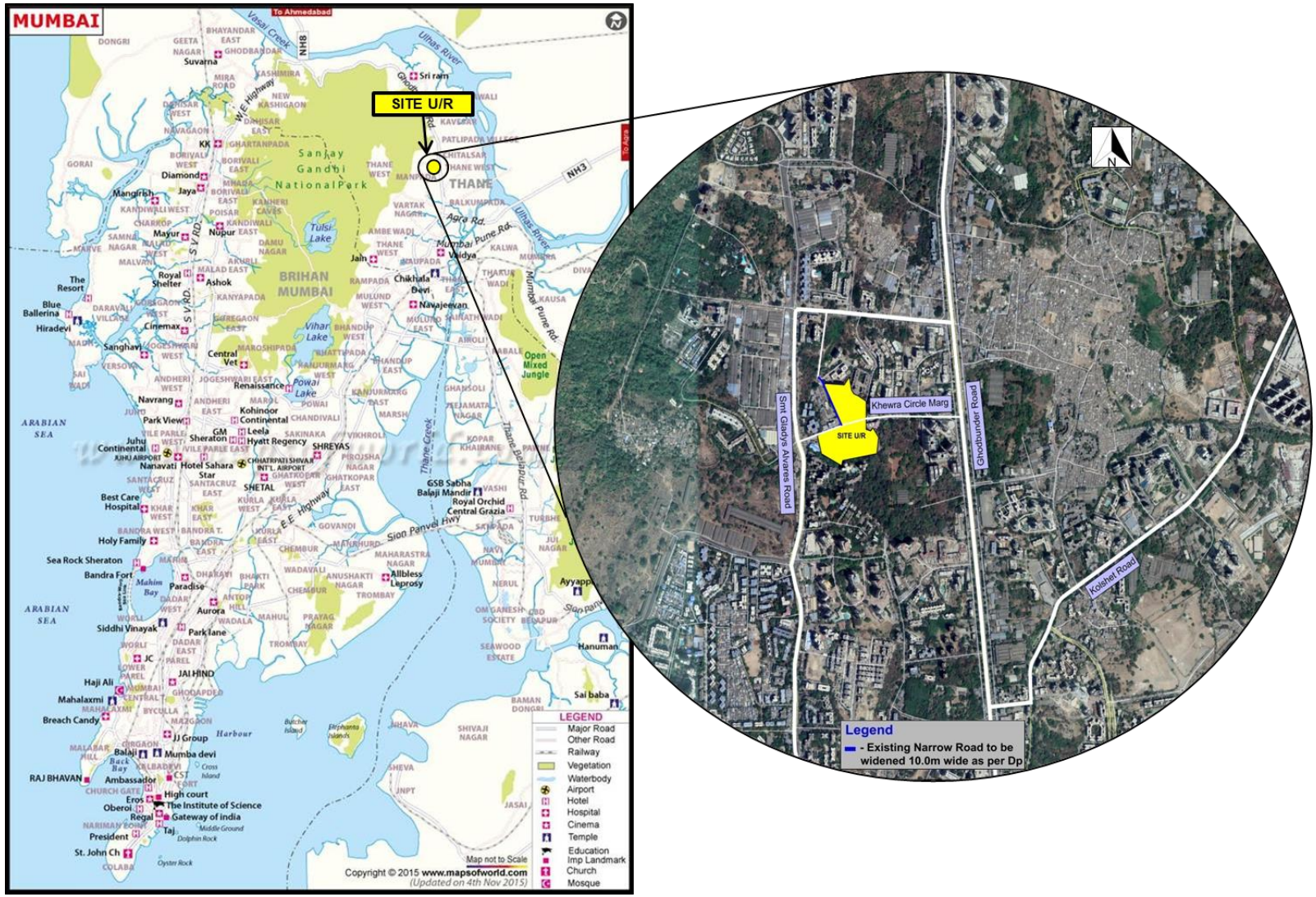


Figure 2.1(a): Location Map

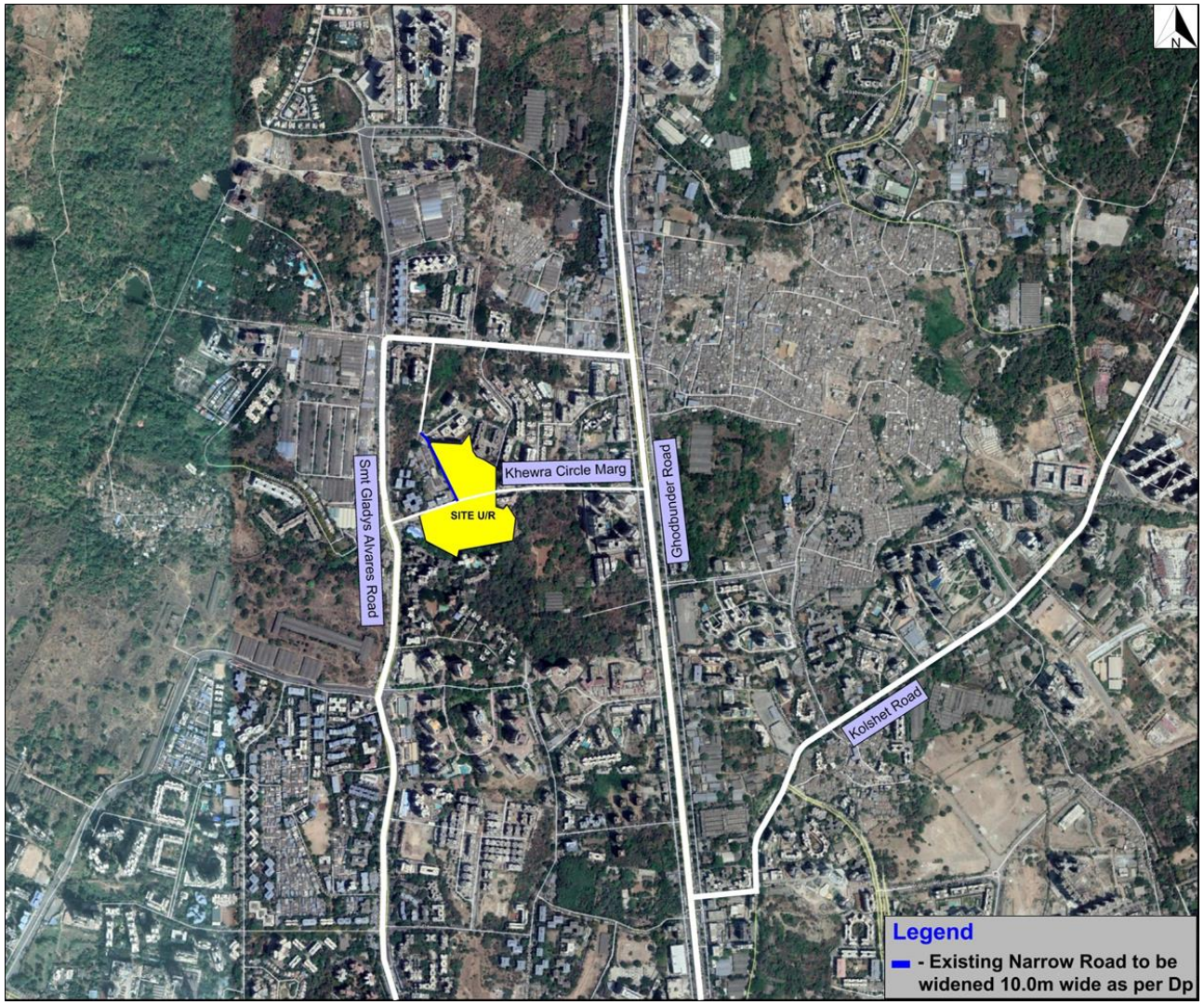


Figure 2.1(b): Google Map of the Surrounding Road Network

2.2 Surrounding Road Network

The surrounding road network to the proposed development are Khewra Circle Marg and Existing DP road to be widened to 10m.

2.2.1 Khewra Circle Marg (near to the proposed development)

It is a 4-lanes, 2-way undivided road in front of the proposed development. The traffic on this road is moderate during peak hours. There is a problem of on-street parking throughout the day on this road. Entry/Exit to the proposed development is provided through this road.

Figure 2.2 shows the existing condition of this road. **Figure 2.3** presents a typical cross section of this road based on the existing conditions.



Figure 2.2: Existing conditions of Khewra Circle Marg (near the proposed development)

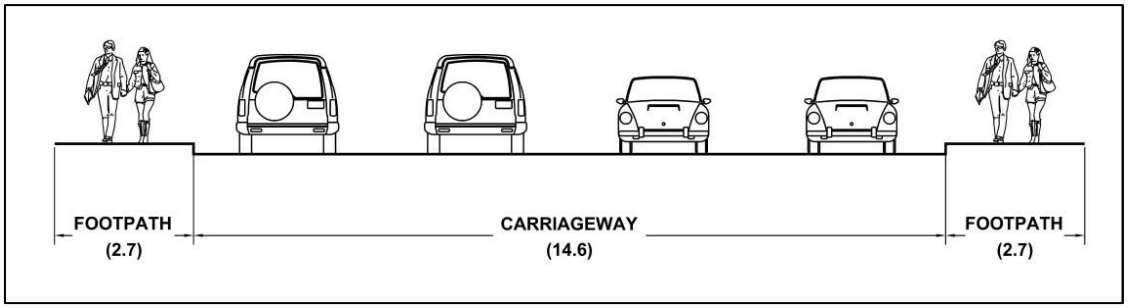


Figure 2.3: Typical Cross-Section of Khewra Circle Marg (Near the proposed development)

2.2.2 Existing narrow road to be widened 10m wide as per DP

It is a local road, Existing width of the road is 4 to 4.5m, it operates as two way undivided road west of the proposed development. It carries less traffic during peak hours. This road is to be widened 10 m wide as per DP. Entry/exit to the proposed development is provided through this road.

Figure 2.4 shows the existing condition of narrow Road. **Figure 2.5** presents a typical cross section of this road based on the existing conditions.



Figure 2.4: Existing conditions of Existing narrow road to be widened 10m wide

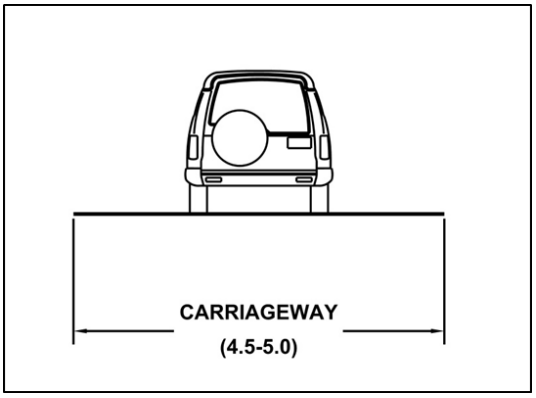


Figure 2.5: Cross-Section of Existing narrow road to be widened 10m wide

2.3 Travel Pattern to Entry & Exit the Site

Figure 2.6 & Figure 2.7 presents the travel pattern to access the proposed development from different directions**.**

Figure 2.6 presents the travel pattern to enter the proposed development while **Figure 2.7** presents the travel pattern to exit the proposed development.

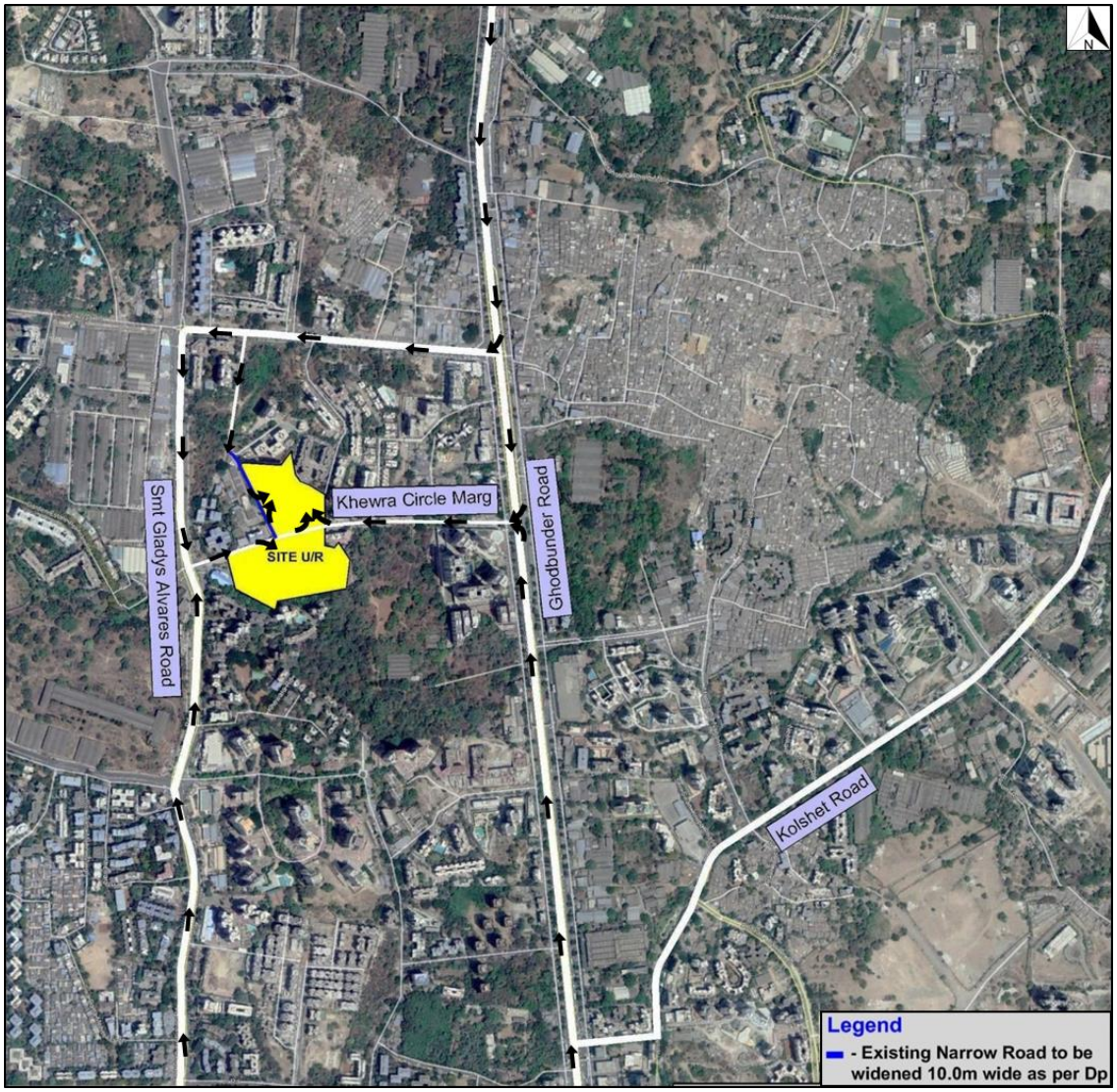


Figure 2.6: Existing Travel pattern to access the proposed development

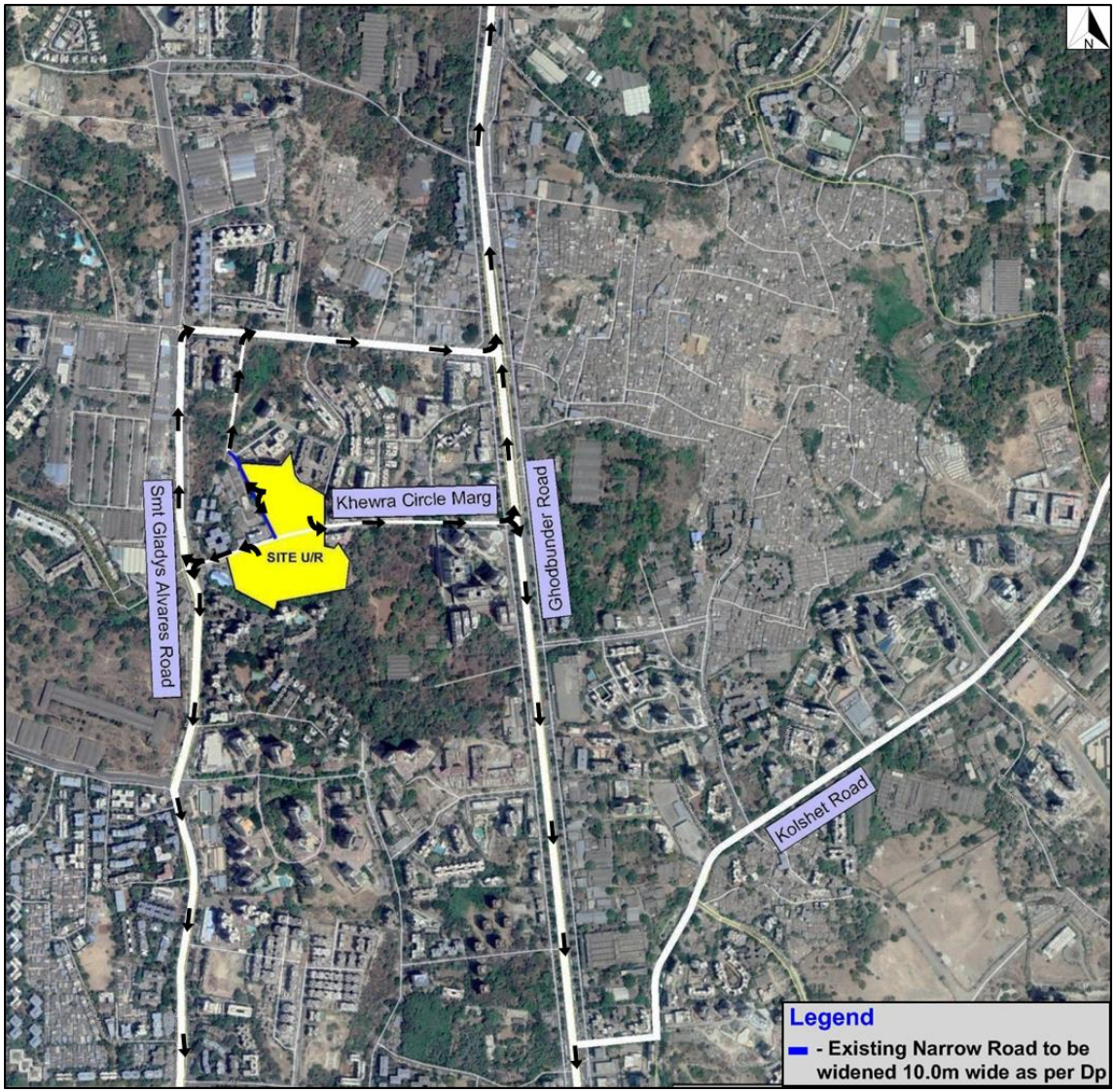


Figure 2.7: Existing Travel pattern to exit the proposed development

2.4 Connectivity to the Public Transport

The proposed Development is located around 8 Km from **Thane Railway Station.** Proposed Manpada metro station is located around 980m from the Development, Proposed Tikuji Ni Wadi Metro station is located around 1.3Km from the Development and Proposed Kapurbawdi Metro Station is located 1.5 km from the development

Figure 2.8 shows the connectivity of proposed development to public transport.

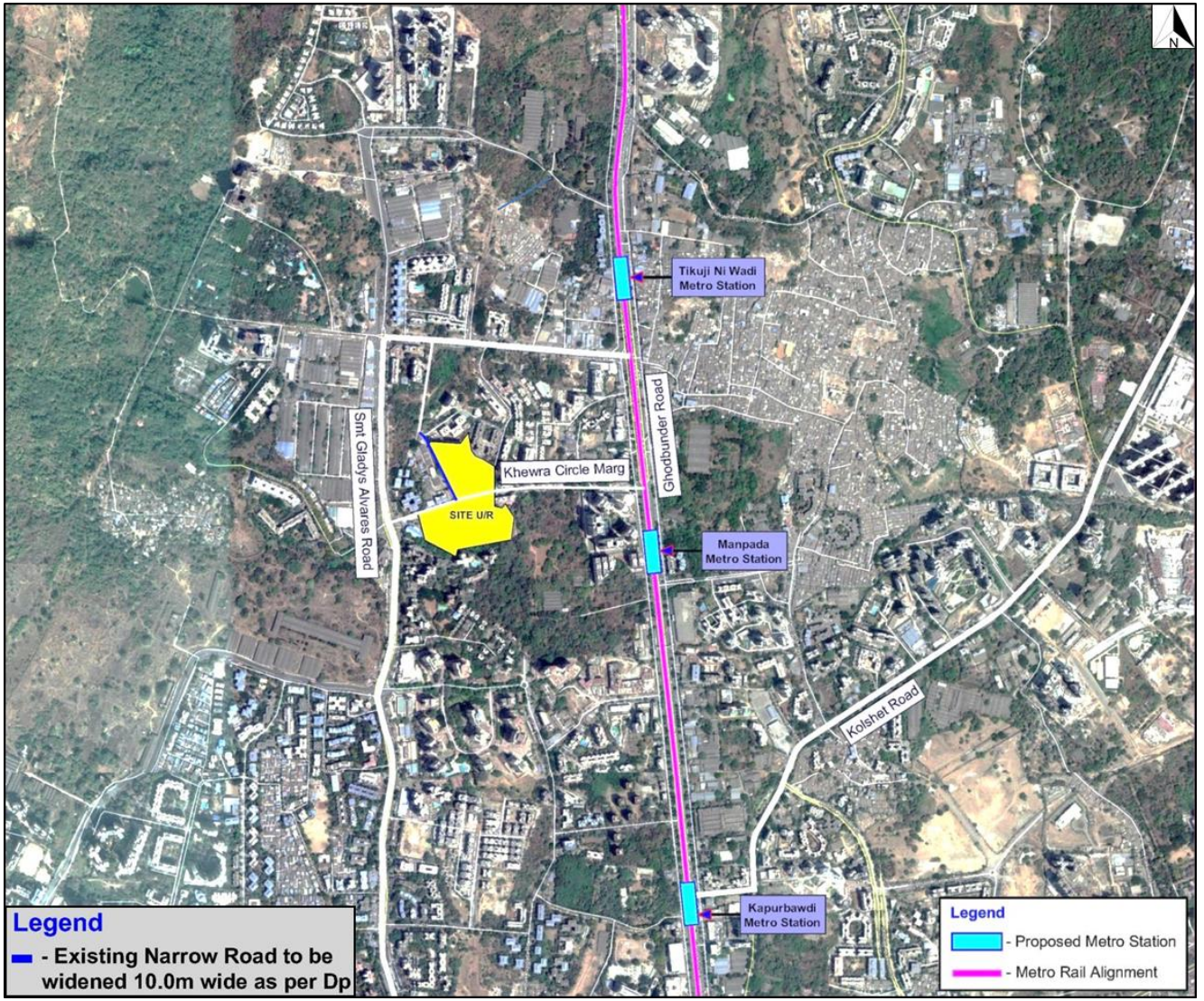


Figure 2.8: Connectivity of Proposed Development to the Public Transport

2.5 Existing Traffic Conditions

In order to quantify the traffic conditions and also to understand the impact of the proposed development traffic, following traffic surveys were carried out:

- ✓ Weekday Classified Turnig Movement Traffic Count surveys at Khewra Circle Marg X Existing narrow road to be widenend 10m wide
- ✓ Photographic Survey
- ✓ Road Inventory Surveys
- ✓ Site Reconnaissance Survey

The location of the traffic surveys is shown in **Figure 2.9.**

Note: The surveys were carried out for 12 hours on 24th January, 2023, a typical weekday (i.e. Tuesday). The traffic volume count survey was carried out to quantify the traffic flow on the important road in the surrounding area of the proposed development in order to understand the residual capacity of the road.

Passenger Car Unit (PCU) – Urban roads are characterized by mixed traffic conditions, resulting in complex interaction between various kinds of vehicles. To cater to this, it is usual to express the capacity of urban roads in terms of a common unit. The unit generally employed is the 'Passenger Car Unit' (PCU).

The PCU values of different modes are based on the interference caused by one mode to the other traffic.



Figure 2.9: Location of Traffic Surveys

2.6 Summary of Traffic Survey

2.6.1 Classified Turning Movement Traffic Volume Count Survey

A Classified Turning Movement Traffic Volume count survey was carried out near the proposed development on Khewra Circle Marg Road.

The results of the traffic surveys and analysis show that the peak hour traffic inflow of the Morning peak occurs from **12:00 A.M to 01:00 P.M** The total traffic inflow to the junction is **1231 PCU/ Hr.** and Evening peak occurs from **6:00 P.M to 7:00 P.M**. The total traffic inflow to the junction during Evening peak hour is **1232 PCU/ Hr**. The vehicular composition is **23.25% Cars, 4.20% Taxis, 33.24% Auto-rickshaws, 33.03% MTW, 1.18% Bus, 1.29% Mini-Bus, 2.42% LCV and 0.12% HCV**

Figure 2.11 shows the analysis of mid-block classified traffic volume count of Existing narrow road to be widened 10m wide.

Figure 2.12 shows the analysis of mid-block classified traffic volume count of Khewra Circle Marg (Towards Ghodbandar Road).

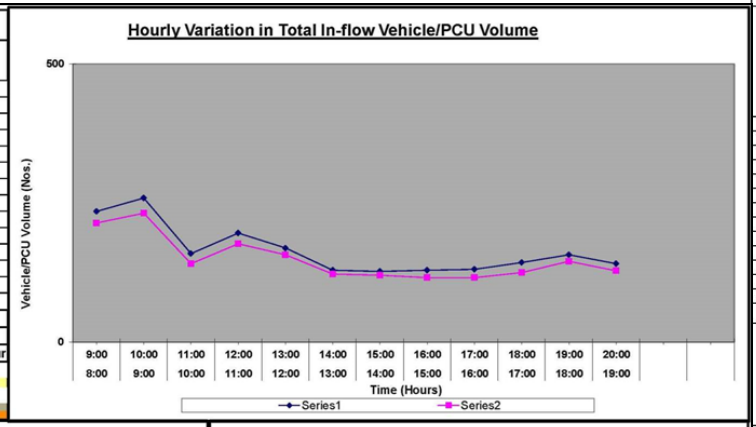
Figure 2.13 shows the analysis of mid-block classified traffic volume count of Khewra Circle Marg (Towards S.G Alvares Road).

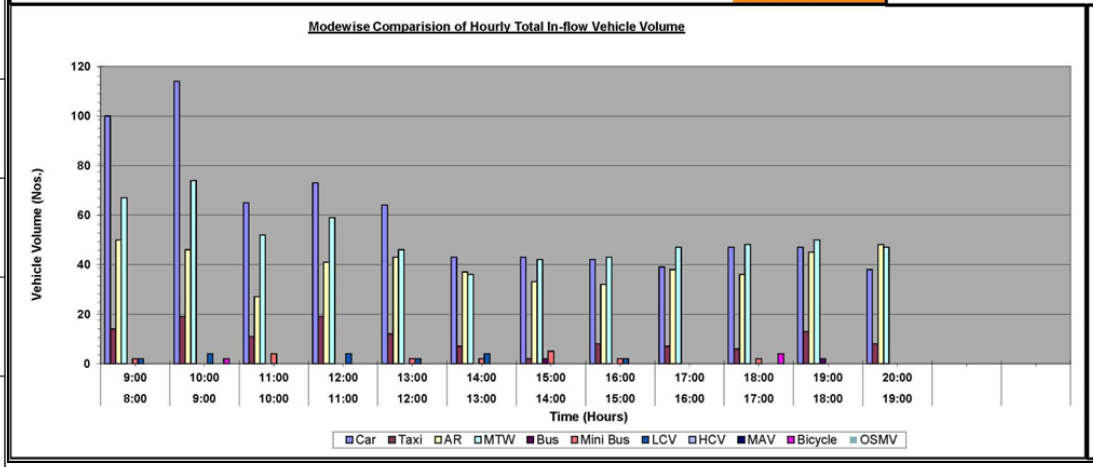
Figure 2.14 & Figure 2.15 presents the existing morning and evening peak hour directional traffic flow respectively.

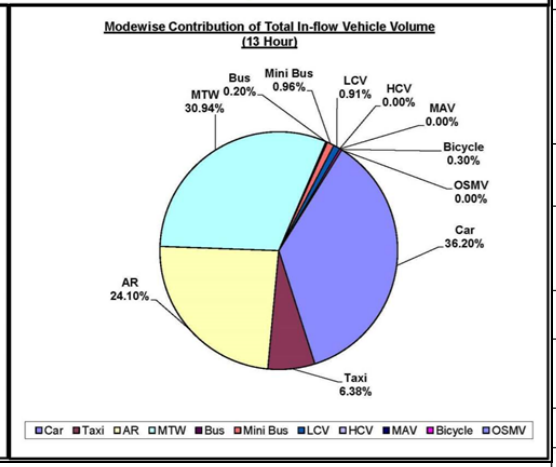
TOTAL CLASSIFIED IN-FLOW VOLUME

Time From	Time To	Car	Taxi	AR	MTW	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Hourly Vehicles	Hourly PCU
PCU Factor		1	1	1.2	0.5	3	1.5	1.5	3	4.5	0.4	3		
8:00	9:00	100	14	50	67	0	2	2	0	0	0	0	235	214
9:00	10:00	114	19	46	74	0	0	4	0	0	2	0	259	232
10:00	11:00	65	11	27	52	0	4	0	0	0	0	0	159	141
11:00	12:00	73	19	41	59	0	0	4	0	0	0	0	196	177
12:00	13:00	64	12	43	46	0	2	2	0	0	0	0	169	157
13:00	14:00	43	7	37	36	0	2	4	0	0	0	0	129	122
14:00	15:00	43	2	33	42	2	5	0	0	0	0	0	127	120
15:00	16:00	42	8	32	43	0	2	2	0	0	0	0	129	116
16:00	17:00	39	7	38	47	0	0	0	0	0	0	0	131	116
17:00	18:00	47	6	36	48	0	2	0	0	0	4	0	143	125
18:00	19:00	47	13	45	50	2	0	0	0	0	0	0	157	145
19:00	20:00	38	8	48	47	0	0	0	0	0	0	0	141	128
Total		715	126	476	611	4	19	18	0	0	6	0	1975	1793

Peak Period	Veh/hour	PCU/hour
Morning Peak	259	232
Evening Peak	157	145







DRG.NO.

REVISION

NO. DATE. SUBJECT DESCRITION

KEY PLAN

M/s Transportation and Traffic Engineering Consultants (TTEC) F-61, Shagun Arcade, Opp. HDFC Bank, Gen. A.K. Vaidya Marg Malad (E) Mumbai - 400097,
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PROJECT :-
Acme Ozone Project

OWNER :-
M/s. Acme Housing India Pvt. Ltd.

DRG.TITLE :-
Total Inflow near the proposed development

REVISION	DATE:-		
FILE :-	DETAIL BY: PS	CHECKED BY: MS	APPROVED BY:

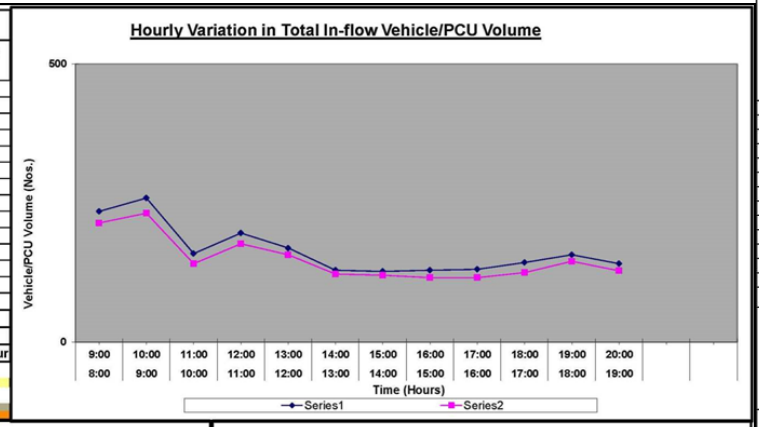
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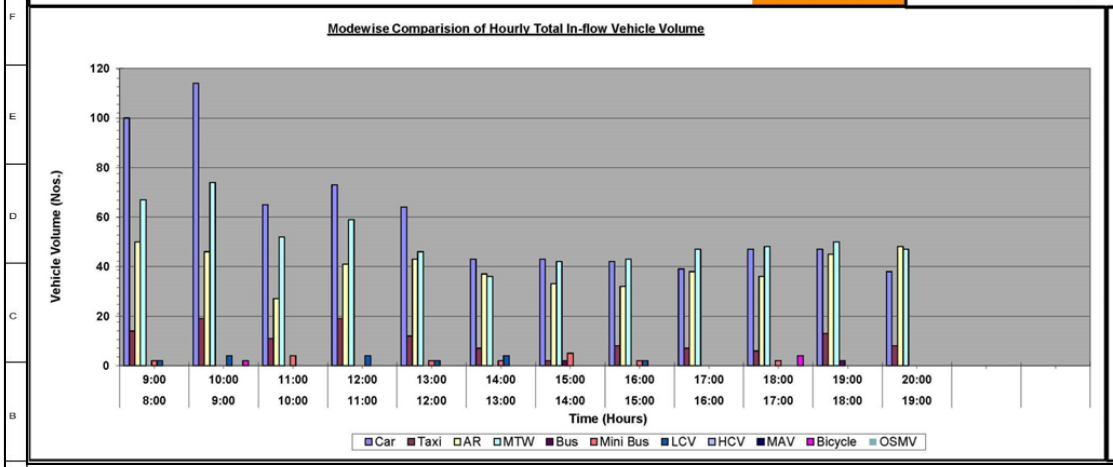
Figure 2.10: Classified Movement Traffic Volume Count Analysis (DP Road widened 10m wide X Khewra Circle Marg)

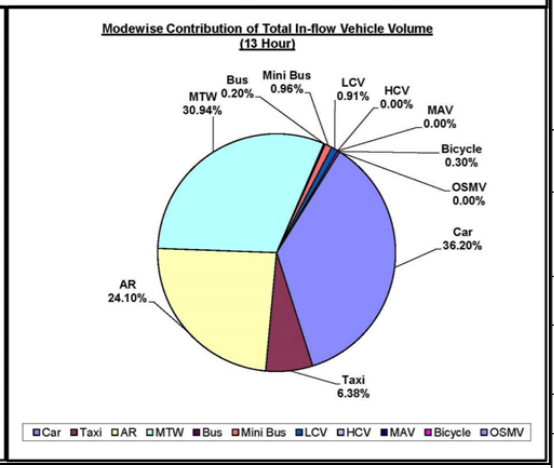
TOTAL CLASSIFIED IN-FLOW VOLUME

Time From	Time To	Car	Taxi	AR	MTW	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Hourly Vehicles	Hourly PCU
PCU Factor		1	1	1.2	0.5	3	1.5	1.5	3	4.5	0.4	3		
8:00	9:00	100	14	50	67	0	2	2	0	0	0	0	235	214
9:00	10:00	114	19	46	74	0	0	4	0	0	2	0	259	232
10:00	11:00	65	11	27	52	0	4	0	0	0	0	0	159	141
11:00	12:00	73	19	41	59	0	0	4	0	0	0	0	196	177
12:00	13:00	64	12	43	46	0	2	2	0	0	0	0	169	157
13:00	14:00	43	7	37	36	0	2	4	0	0	0	0	129	122
14:00	15:00	43	2	33	42	2	5	0	0	0	0	0	127	120
15:00	16:00	42	8	32	43	0	2	2	0	0	0	0	129	116
16:00	17:00	39	7	38	47	0	0	0	0	0	0	0	131	116
17:00	18:00	47	6	36	48	0	2	0	0	0	4	0	143	125
18:00	19:00	47	13	45	50	2	0	0	0	0	0	0	157	145
19:00	20:00	38	8	48	47	0	0	0	0	0	0	0	141	128
Total		715	126	476	611	4	19	18	0	0	6	0	1975	1793

Peak Period	Veh/hour	PCU/hour
Morning Peak	259	232
Evening Peak	157	145







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KEY PLAN

M/s Transportation and Traffic Engineering Consultants (TTEC) F-61, Shagun Arcade, Opp. HDFC Bank, Gen. A.K. Vaidya Marg Malad (E) Mumbai - 400097,
E : ttec.ms@gmail.com
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PROJECT :-
Acme Ozone Project

OWNER :-
M/s. Acme Housing India Pvt. Ltd.

DRG.TITLE :-
Midblock Traffic volume count at Arm 1

REVISION	DATE:-		
FILE :-	DETAIL BY: PS	CHECKED BY: MS	APPROVED BY:

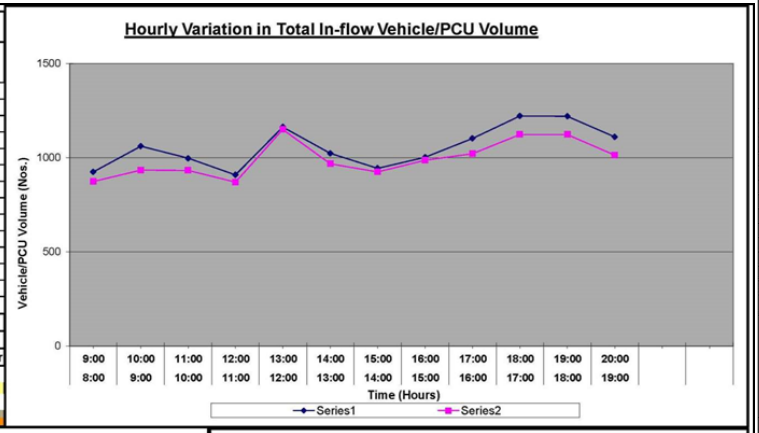
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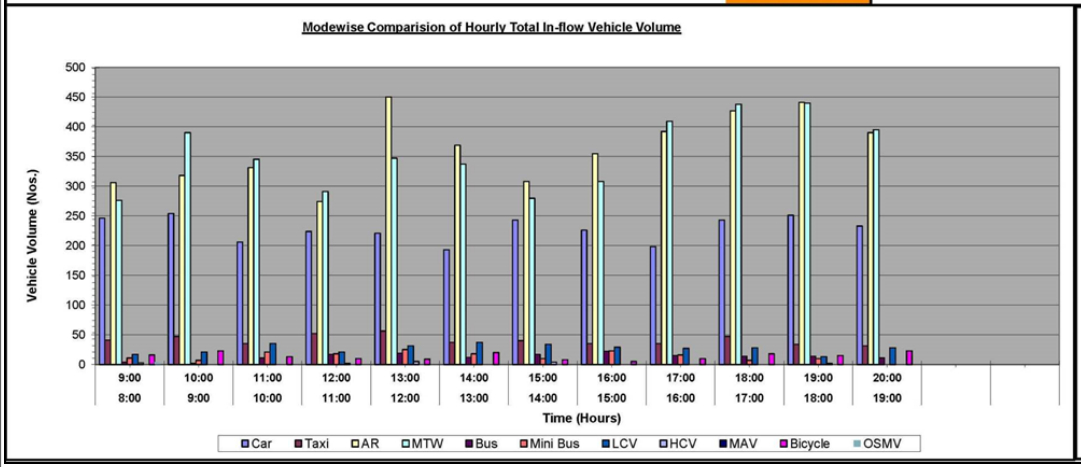
Figure 2.11: Arm 1 - Existing narrow road to be widened 10m wide

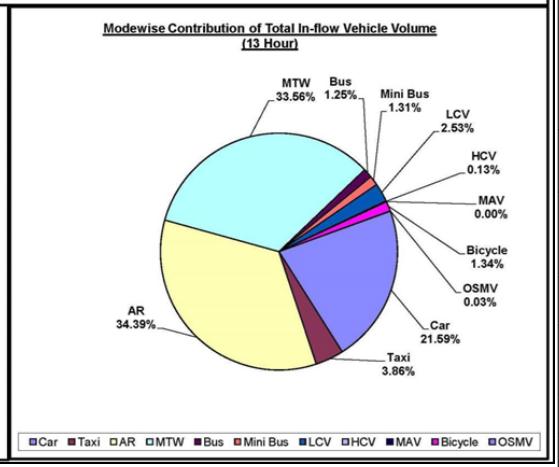
TOTAL CLASSIFIED IN-FLOW VOLUME

Time From	Time To	Car	Taxi	AR	MTW	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Hourly Vehicles	Hourly PCU
PCU Factor		1	1	1.2	0.5	3	1.5	1.5	3	4.5	0.4	3		
8:00	9:00	246	41	306	276	4	11	17	3	0	16	4	924	874
9:00	10:00	254	47	318	390	2	7	21	0	0	23	0	1062	935
10:00	11:00	206	35	331	345	11	21	35	0	0	13	0	997	933
11:00	12:00	224	52	274	291	17	18	21	2	0	10	0	909	870
12:00	13:00	221	56	450	347	19	25	31	5	0	9	0	1163	1151
13:00	14:00	193	37	369	337	12	18	37	0	0	20	0	1023	968
14:00	15:00	243	40	308	280	17	10	34	4	0	8	0	944	925
15:00	16:00	226	35	355	308	22	23	29	0	0	5	0	1003	987
16:00	17:00	198	35	392	409	15	16	27	0	0	10	0	1102	1022
17:00	18:00	243	47	427	438	14	7	28	0	0	18	0	1222	1124
18:00	19:00	251	34	441	440	14	10	13	2	0	15	0	1220	1123
19:00	20:00	233	31	390	395	11	0	28	0	0	23	0	1111	1014
Total		2738	490	4361	4256	158	166	321	16	0	170	4	12680	11926

Peak Period	Veh/hour	PCU/hour
Morning Peak	1163	1151
Evening Peak	1222	1124







DRG.NO.

REVISION

NO.	DATE.	SUBJECT
		DESCRITION

KEY PLAN

M/s Transportation and Traffic Engineering Consultants (TTEC) F-61, Shagun Arcade, Opp. HDFC Bank, Gen. A.K. Vaidya Marg Malad (E) Mumbai - 400097,
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T : +91 222407769
: +91 2240109571

PROJECT :-
Acme Ozone Project

OWNER :-
M/s. Acme Housing India Pvt. Ltd.

DRG.TITLE :-
Midblock Traffic volume count at Arm 2

REVISION	DATE:-		
FILE :-	DETAIL BY: PS	CHECKED BY: MS	APPROVED BY:

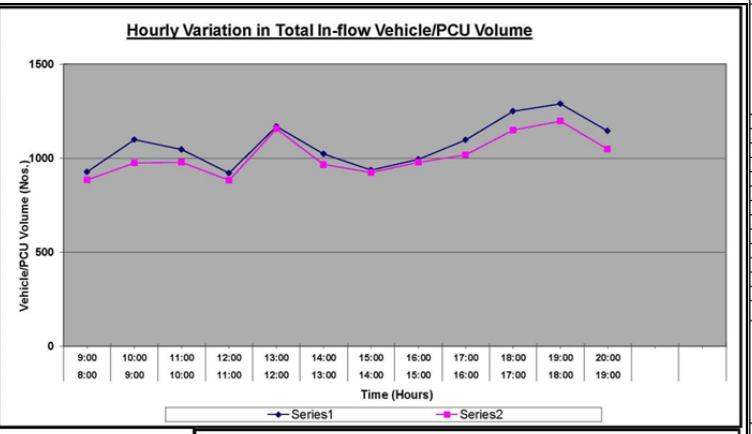
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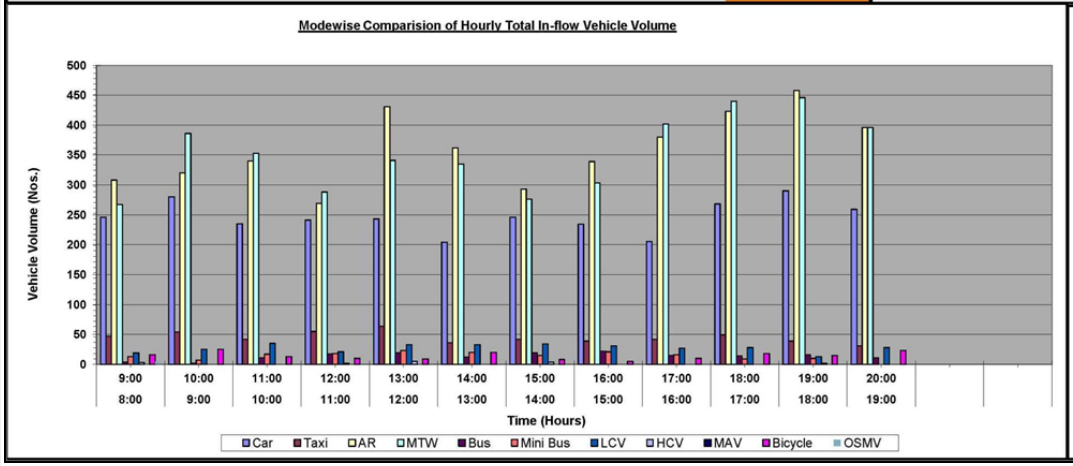
Figure 2.12: Arm 2 - Khewra Circle Marg (Towards Ghodbandar Road)

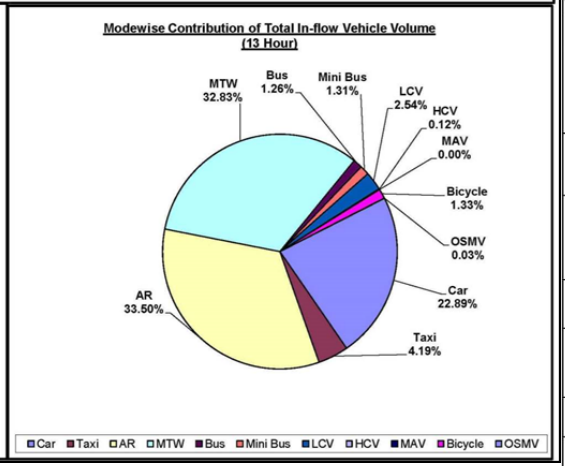
TOTAL CLASSIFIED IN-FLOW VOLUME

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PCU Factor		1	1	1.2	0.5	3	1.5	1.5	3	4.5	0.4	3		
8:00	9:00	246	47	308	267	4	13	19	3	0	16	4	927	884
9:00	10:00	280	54	320	386	2	7	25	0	0	25	0	1099	975
10:00	11:00	235	42	340	353	11	17	35	0	0	13	0	1046	978
11:00	12:00	241	55	269	288	17	18	21	2	0	10	0	921	883
12:00	13:00	243	64	431	341	19	23	33	5	0	9	0	1168	1155
13:00	14:00	204	36	362	335	12	20	33	0	0	20	0	1022	966
14:00	15:00	246	42	293	276	19	15	34	4	0	8	0	937	924
15:00	16:00	234	39	339	303	22	21	31	0	0	5	0	994	978
16:00	17:00	205	42	380	402	15	16	27	0	0	10	0	1097	1018
17:00	18:00	268	49	423	440	14	9	28	0	0	18	0	1249	1150
18:00	19:00	290	39	458	446	16	10	13	2	0	15	0	1289	1197
19:00	20:00	259	31	396	396	11	0	28	0	0	23	0	1144	1048
Total		2951	540	4319	4233	162	169	327	16	0	172	4	12893	12156

Peak Period	Veh/hour	PCU/hour
Morning Peak	1168	1155
Evening Peak	1289	1197







DRG.NO.

REVISION

NO. DATE. SUBJECT DESCRIPTION

KEY PLAN

M/s Transportation and Traffic Engineering Consultants (TTEC) F-61, Shagun Arcade, Opp. HDFC Bank, Gen. A.K. Vaidya Marg Malad (E) Mumbai - 400097.
E : ttec.ms@gmail.com
W : www.ttec.co.in
T : +91 2228407769
: +91 2240109571

PROJECT :-
Acme Ozone Project

OWNER :-
M/s. Acme Housing India Pvt. Ltd.

DRG.TITLE :-
Midblock Traffic volume count at Arm 3

REVISION	DATE:-		
FILE :-	DETAIL BY: PS	CHECKED BY: MS	APPROVED BY:

SIGNATURE & SEAL OF TRAFFIC CONSULTANT :-

Figure 2.13: Arm 3 - Khewra Circle Marg (Towards S.G Alvares Road)

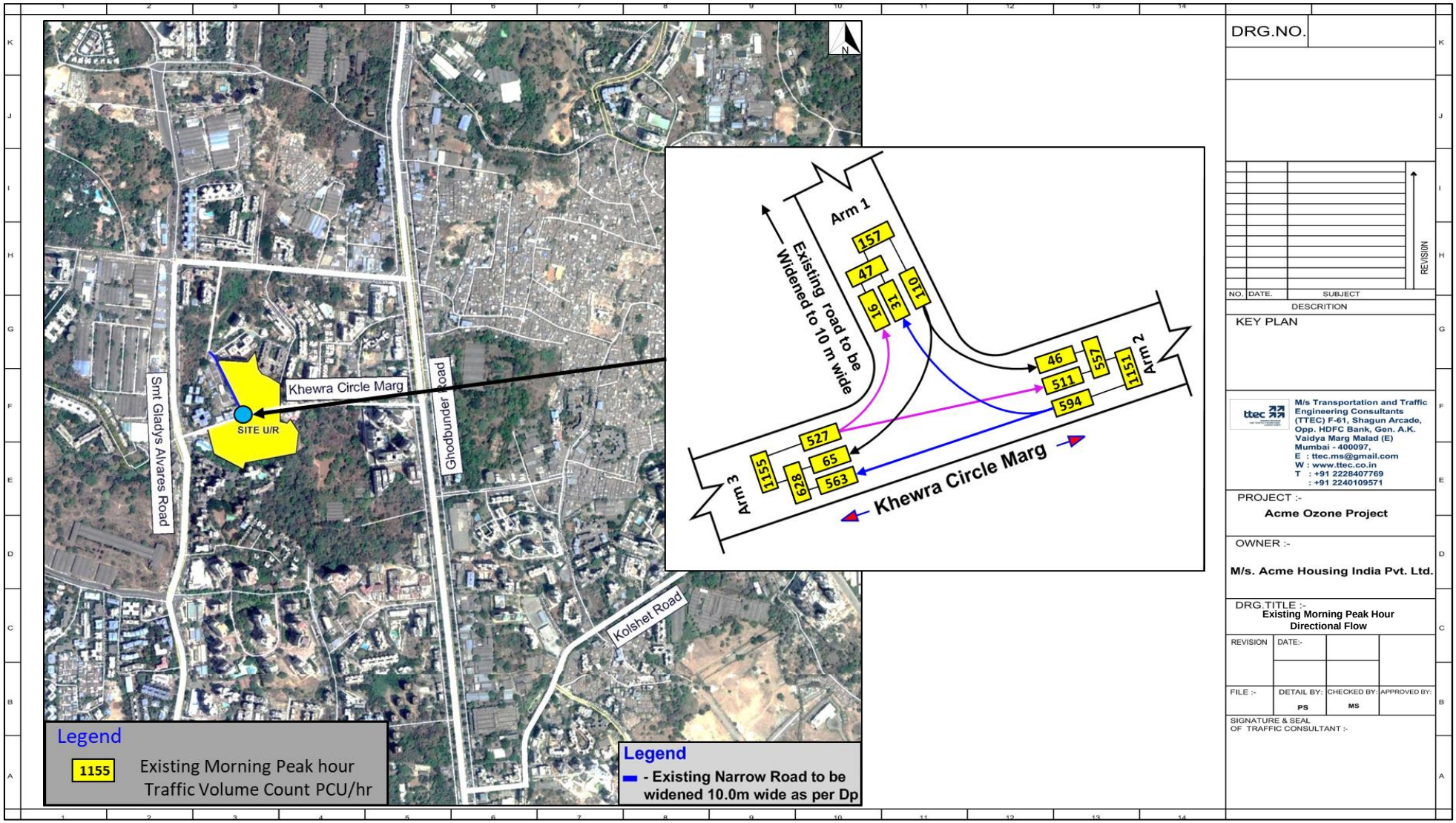


Figure 2.14: Existing Morning Peak Hour Directional Flow (PCU/Hr.)

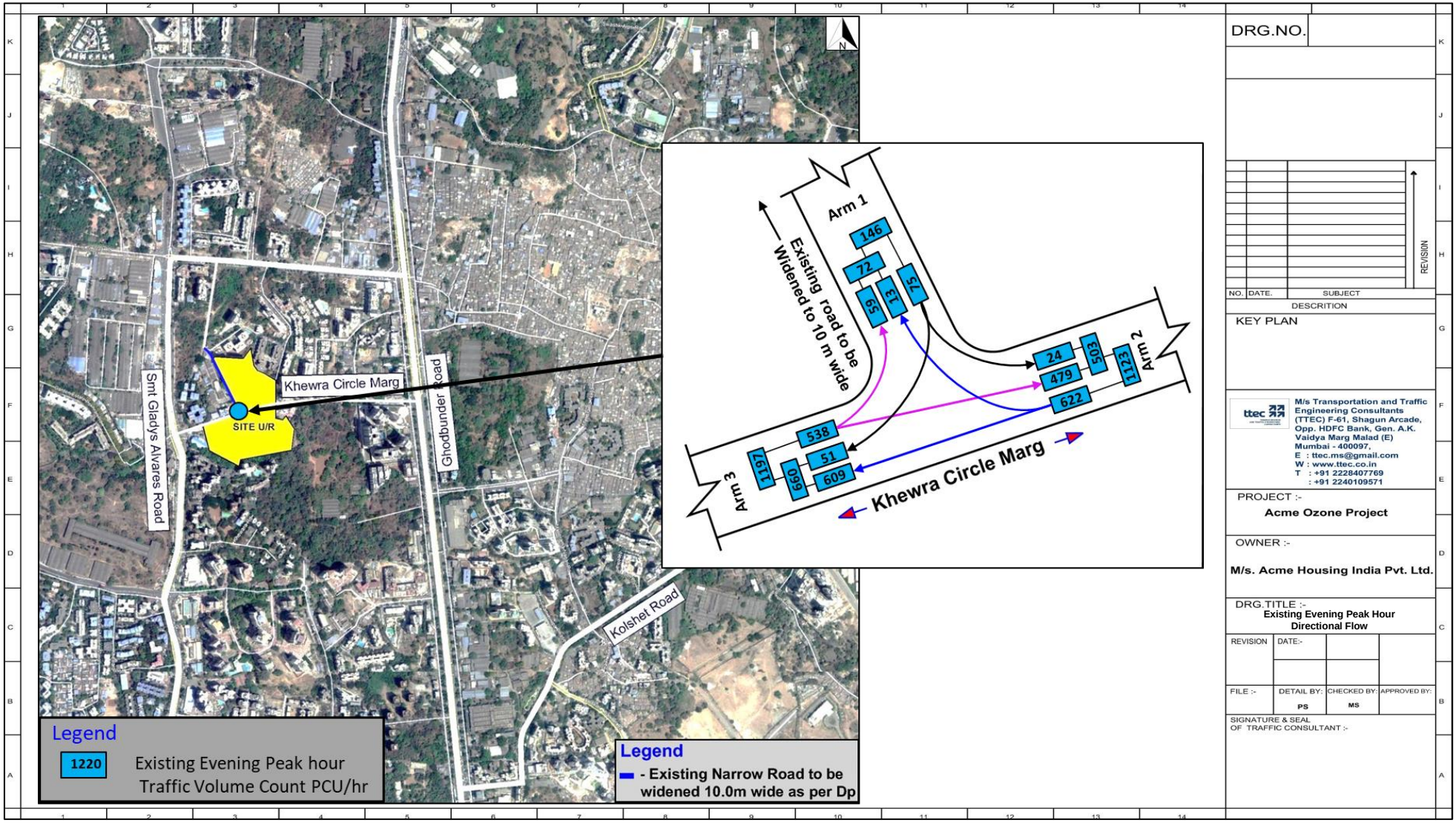


Figure 2.15: Existing Evening Peak Hour Directional Flow (PCU/Hr.)

Chapter 3

General Development Layouts

3.0 GENERAL DEVELOPMENT LAYOUT

3.1 Background

M/s. Acme Housing India Pvt. Ltd. plans to develop a Mixed-use development at Manpada, Thane.

The proposed development comprises of-

- Sale Residential Component - **1751 apartments** (2 BHK, 2.5 BHK, 3 BHK and 4 BHK Units)
- Residential Component of **MMRDA - 2448 apartments** (1RK units)
- Commercial component (i.e. shops/gala) – **1958.56 SQM** carpet area.

3.2 Development Layout

The multiple ingress and egress to the proposed mixed-use development is provided through both the roads i.e. Khewra Circle Marg and Existing narrow road (to be widened 10m wide as per Development Plan).

- Total number of parking provided to the proposed development of plot A is **2130** car parking bays and plot B is **397**car parking bays.

3.3 Development Schedule

The parking statement of the proposed development of Plot A and Plot B is shown in **Table 3.1 and Table 3.2.**

Table 3.1: Parking Statement of Proposed Development - Plot A

Parking Statement A+B+C+D+G+H												
Floor	5 Level Puzzle Parking Bays (2.65M X 5.50M)	2 Stack Parking Bays (2.65M x 5.50M)	2 Stack Parking Bays (2.50M x 5.50M)	2 Stack With Pit Parking Bays (2.50M x 5.50M)	Small Stack Parking Bays (2.40M x 4.50M)	4 Level Puzzle Parking Bays (2.50M x 5.50M)	Tandem Big Parking Bays (2.50M x 5.50M)	Tandem Small Parking Bays (2.30M x 4.50M)	Tandem Puzzle Parking Bays (2.50M x 5.50M)	Single Parking Bays (2.50M x 5.50M)	Single Parking Bays (2.65M x 5.50M)	Total
Ground Floor	54 X 5 = 270	46 X 2 = 92	74 X 2 = 148	-	34 X 2 = 68	64	5 (10)	-	18 (36)	-	-	688
Podium P1 Floor	-	12 X 2 = 24	9 X 2 = 18	-	-	-	32 (64)	25 (50)	-	109	39	304
Podium P2 Floor	-	-	-	67 X 2 = 134	-	-	40 (80)	18 (36)	-	156	67	473
Stilt Floor Plan	-	-	-	-	29 X 2 = 58	-	-	-	-	38	-	96
Total	54 X 5 = 270	58 X 2 = 116	83 X 2 = 166	67 X 2 = 134	63 X 2 = 126	64	77 (154)	43 (86)	18 (36)	303	106	1561

Parking Statement E + F			
Floor	Big Single Parking Bays	Small Single Parking Bays	Total
Ground Floor	66	20	86
Basement B1 Floor	61	50	111
Basement B2 Floor	64	49	113
Podium P1 Floor	40	12	52
Podium P2 Floor	70	29	99
Podium P3 Floor	54	54	108
Total	355	214	569

GRAND TOTAL	Parking Statement A+B+C+D+G+H = 1561	Parking Statement E + F = 569	TOTAL = 2130

Table 3.2: Parking Statement of Proposed Development - Plot B

Parking Statement	
Floor	Car Parking
Ground Floor	151
Podium P1	111
Podium P2	103
Stilt Floor	32
Total	**397**

Figure 3.1 presents the Ground Floor Plan (Entry/Exit) of plot A. **Figure 3.2** and **Figure 3.2(a)** shows the Basement B1 & B2 Level plan of plot A. **Figure 3.3(a), Figure 3.3(b)** presents the parking layouts of Podium P1**, Figure 3.4** presents the parking layouts of Podium P2 and **Figure 3.5** presents the parking layouts of and Stilt level of plot A.

Figure 3.6 presents the Ground Level of Plot B. **Figure 3.7 to Figure 3.9** present the parking layouts of Podium P1 Floor Plan (Entry/Exit), Podium P2 and Stilt Level of plot B respectively.

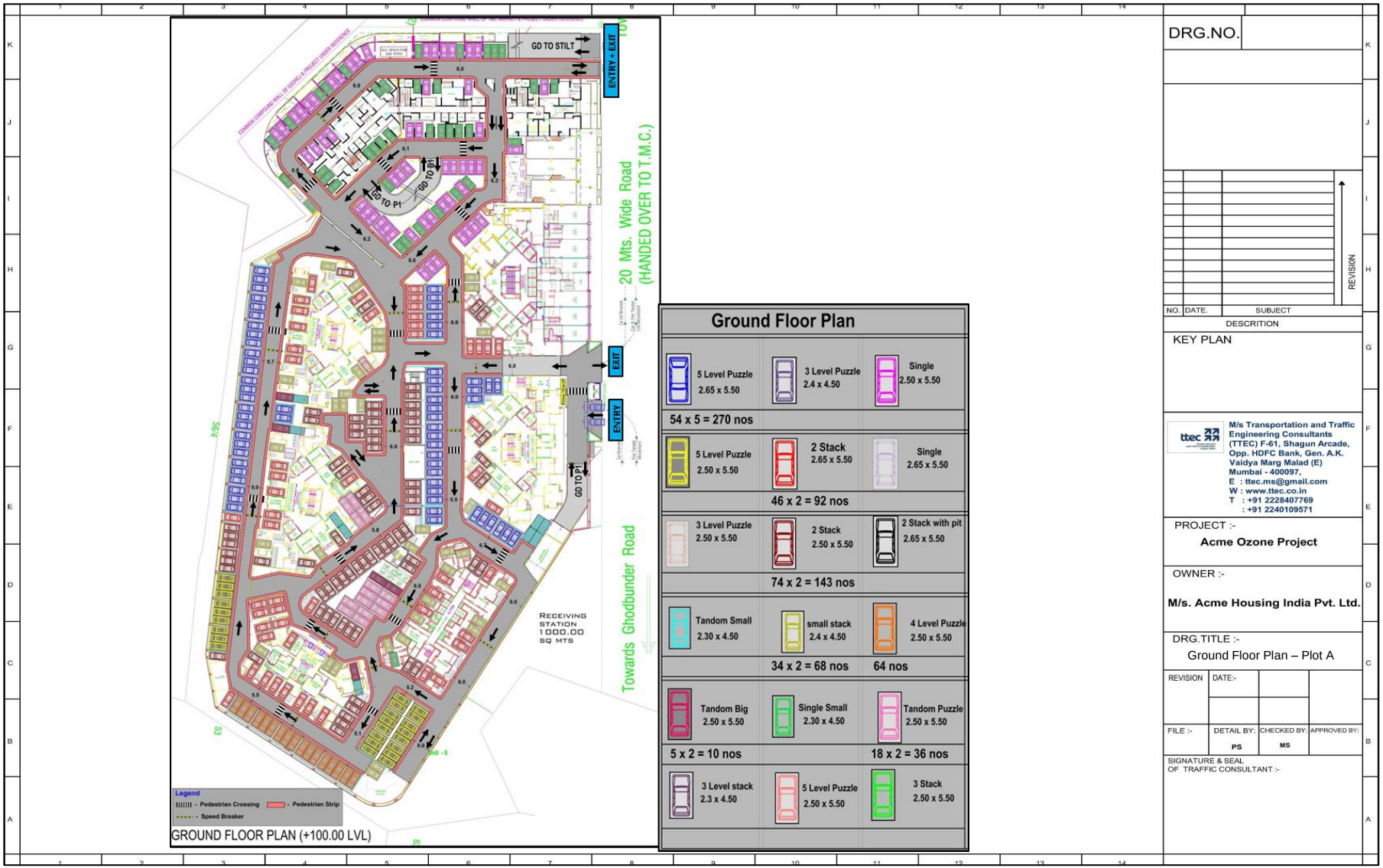


Figure 3.1: Ground Floor Plan (Entry/Exit) of plot A

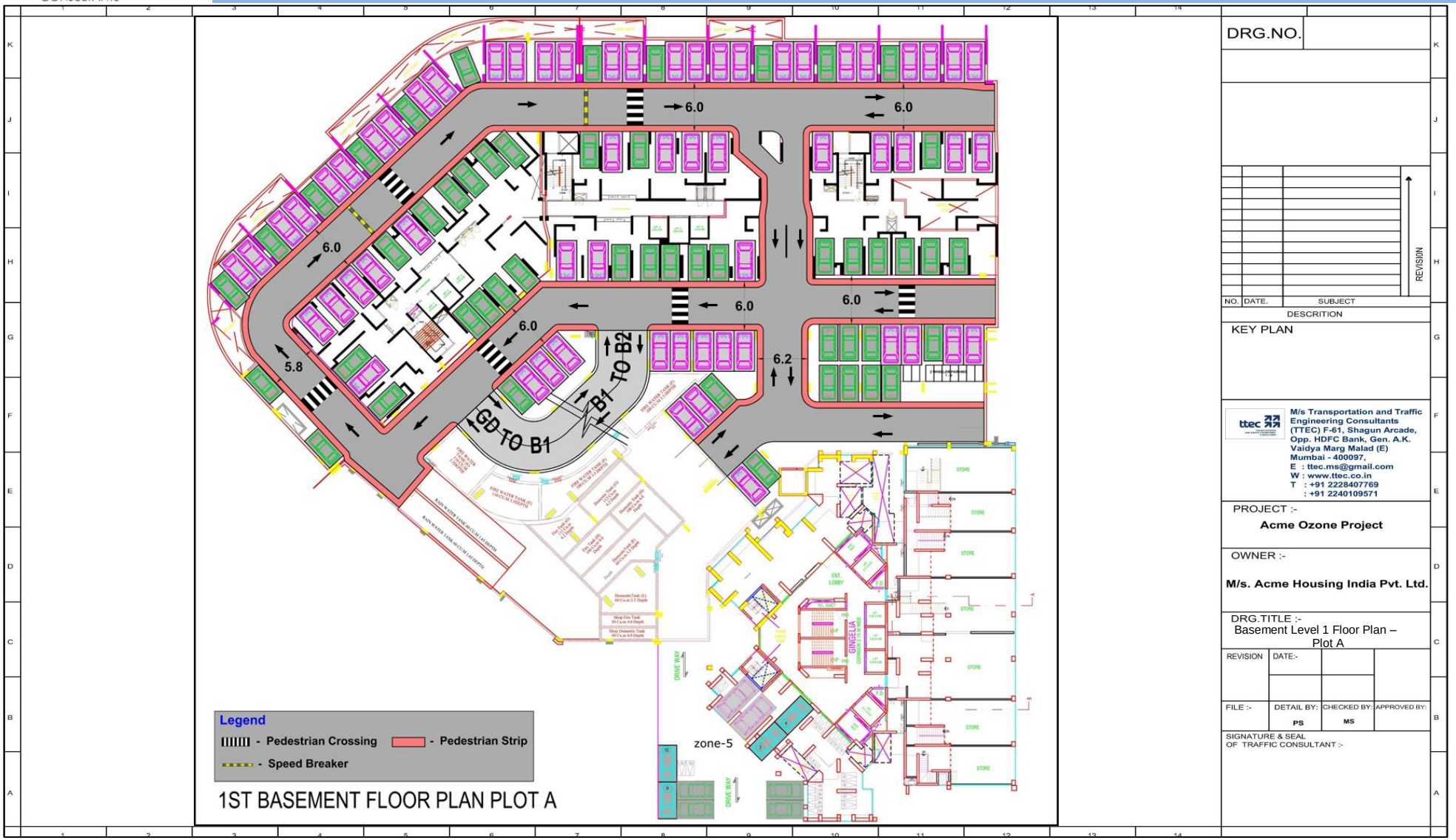


Figure 3.2: Basement B1 Floor Plan of Plot A

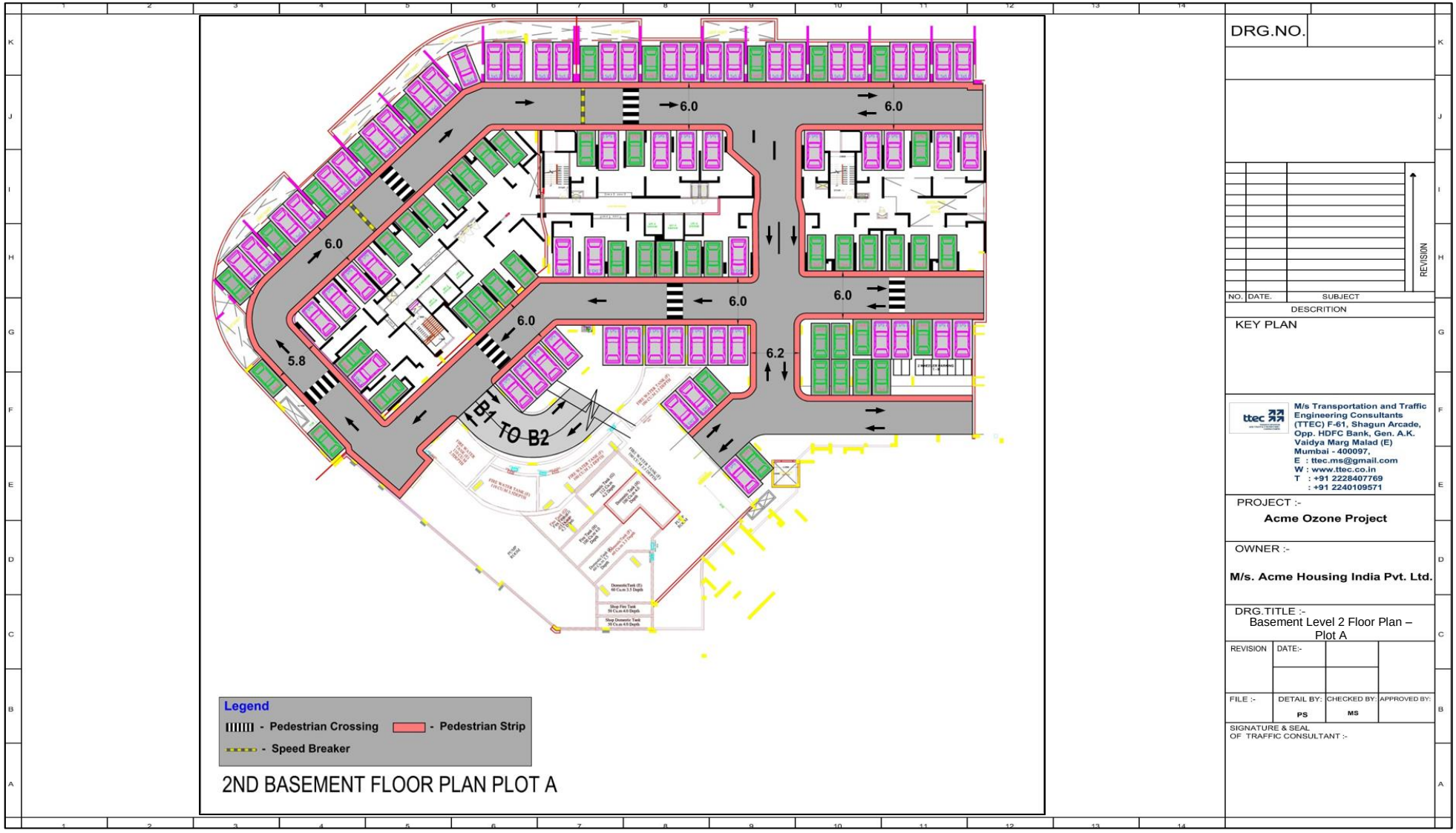


Figure 3.2(a): Basement B2 Floor Plan of Plot A

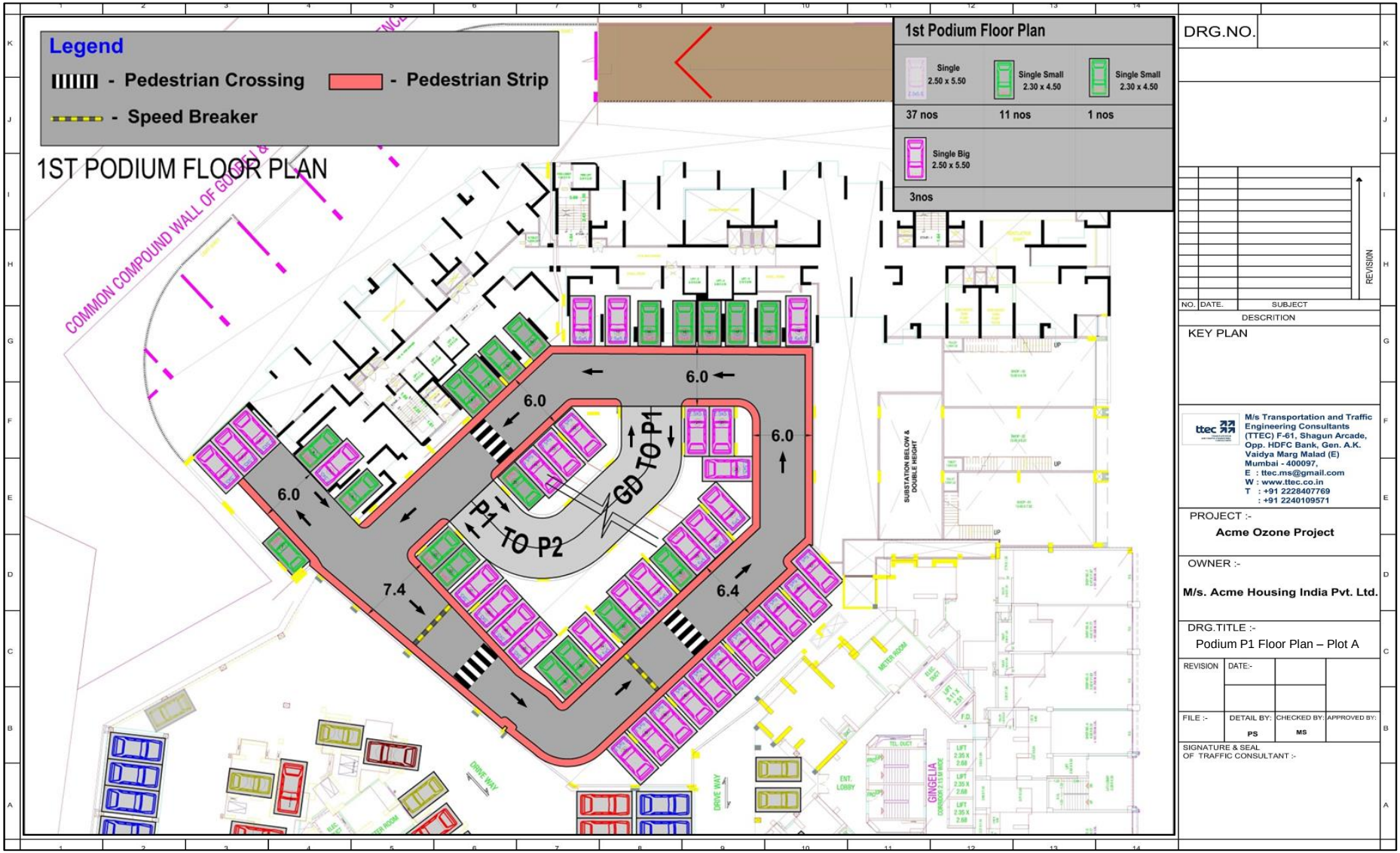


Figure 3.3(a): Podium P1 Floor Plan of Plot A

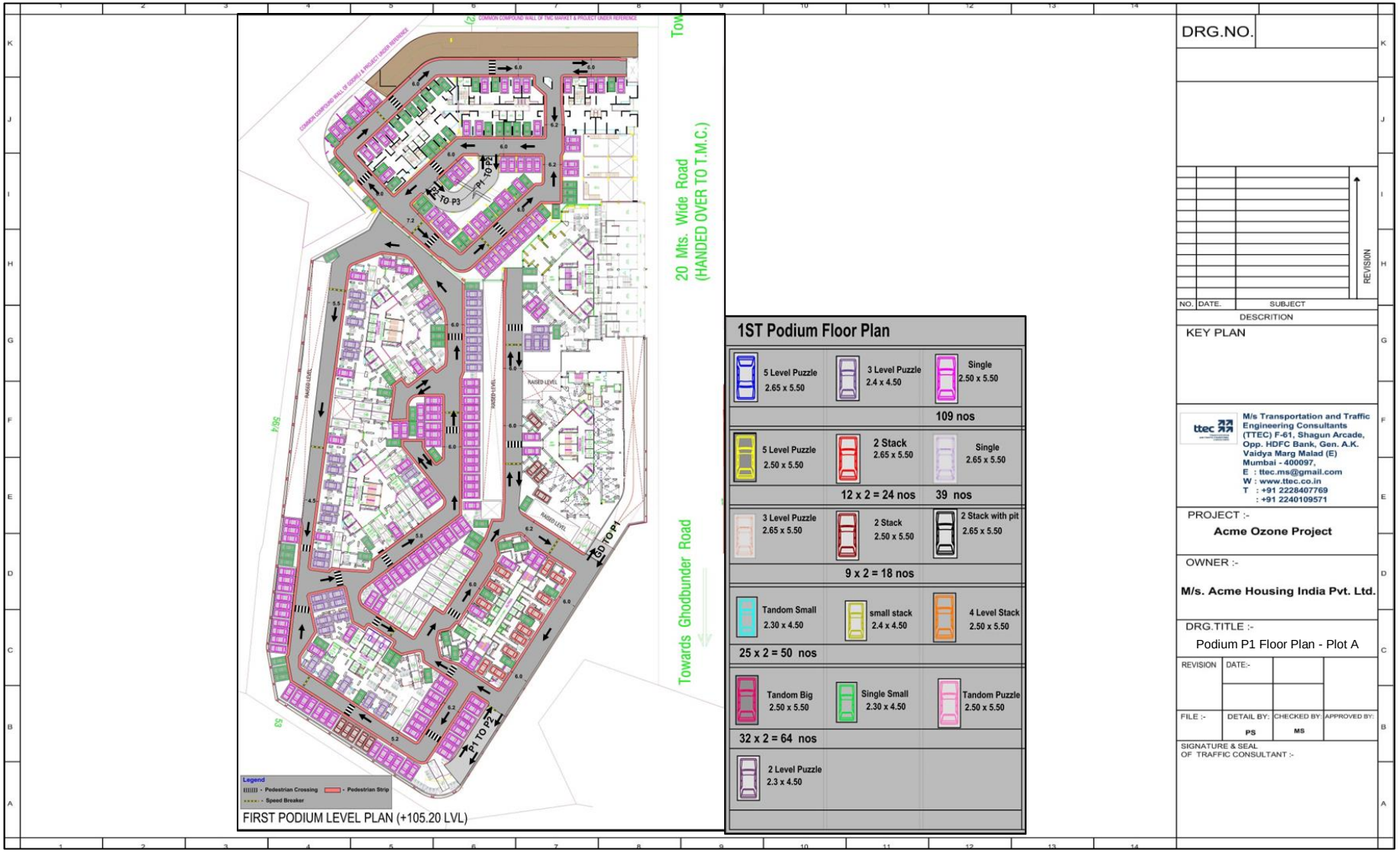


Figure 3.3(b): Podium P1 Floor Plan of Plot A

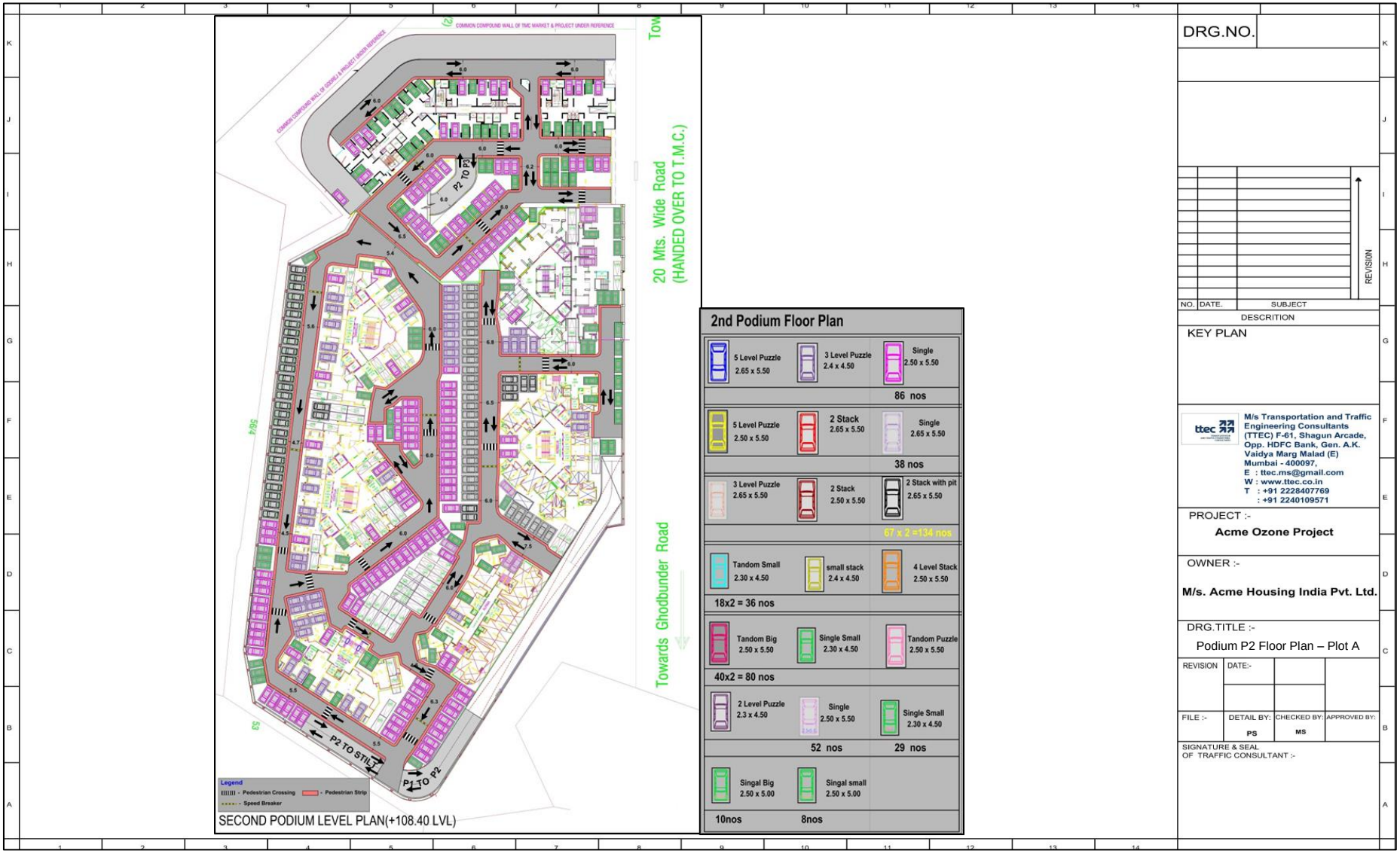


Figure 3.4: Podium P2 Floor Plan of Plot A

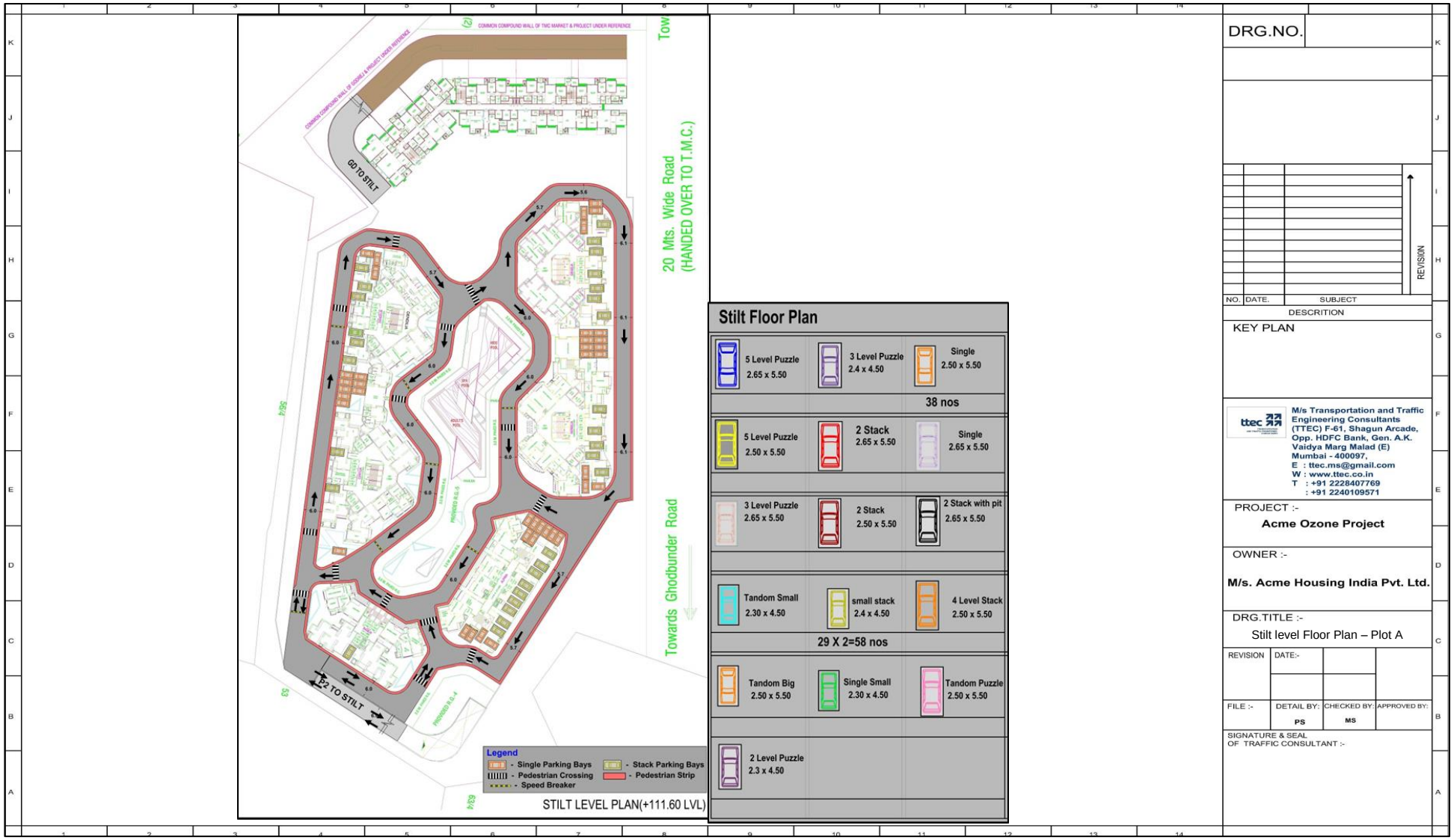


Figure 3.5: Stilt Level Floor Plan of Plot A

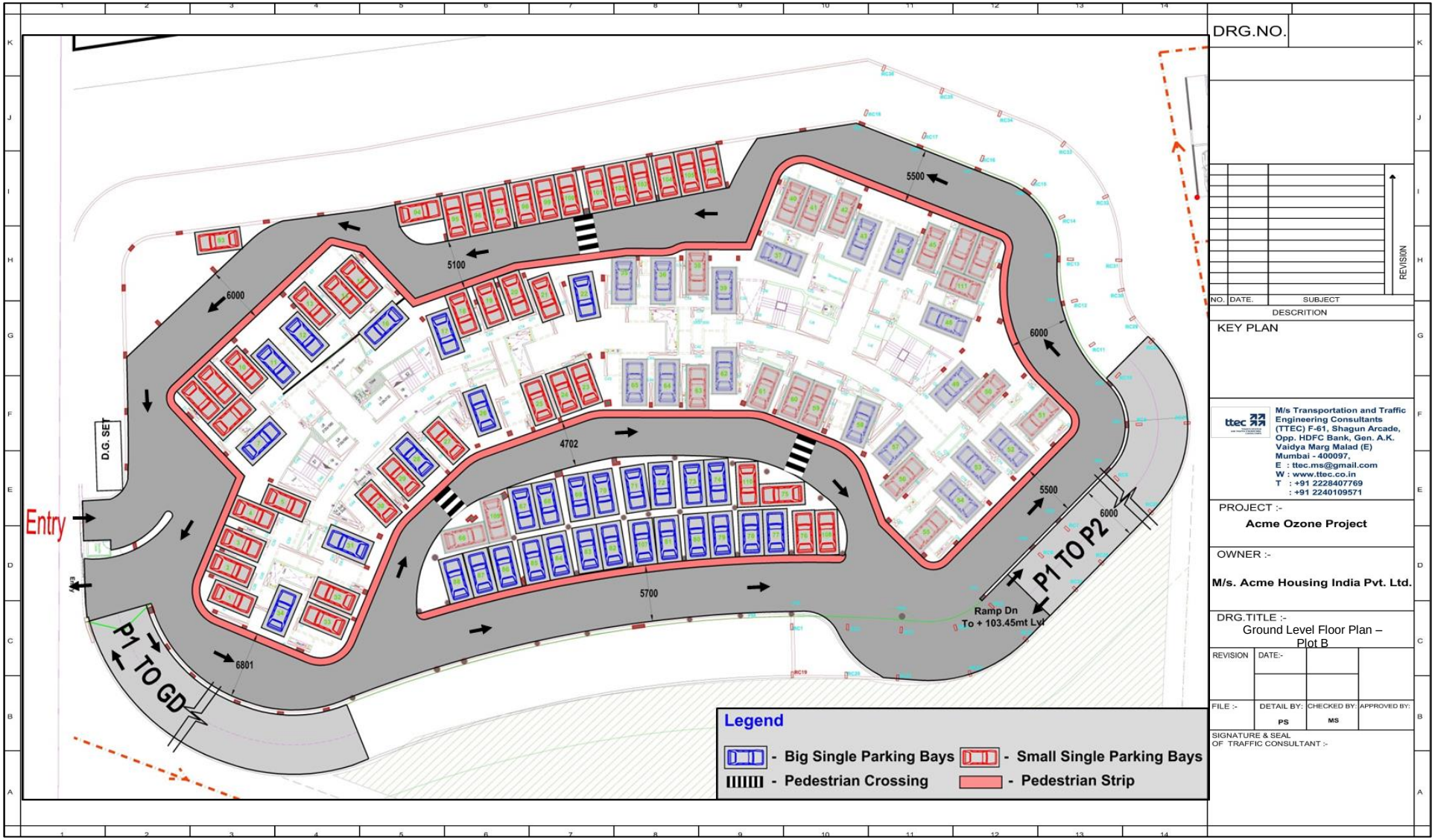


Figure 3.6: Ground Floor Plan of Plot B

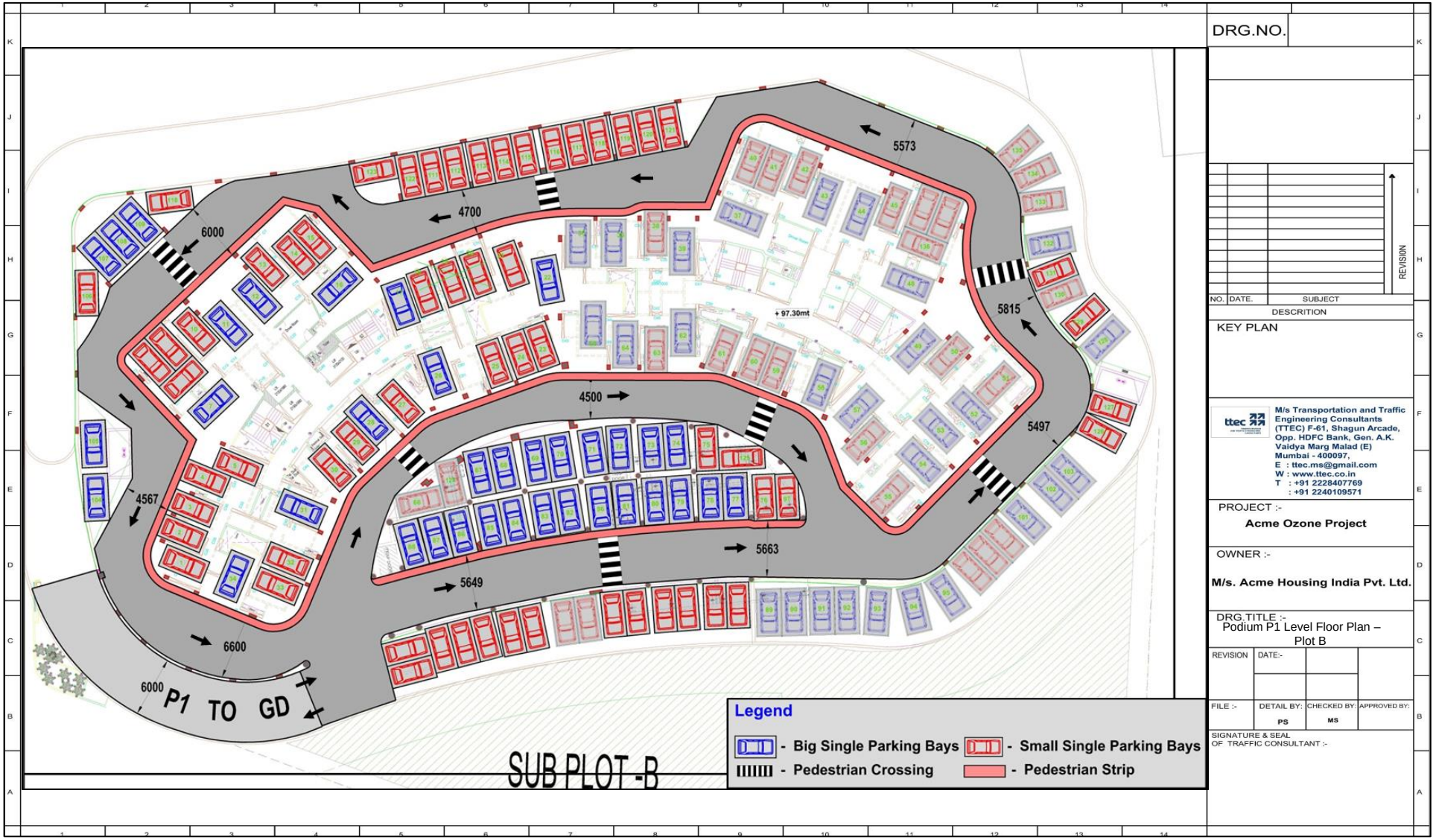


Figure 3.7: Podium P1 Floor Plan (Entry/Exit) of Plot B

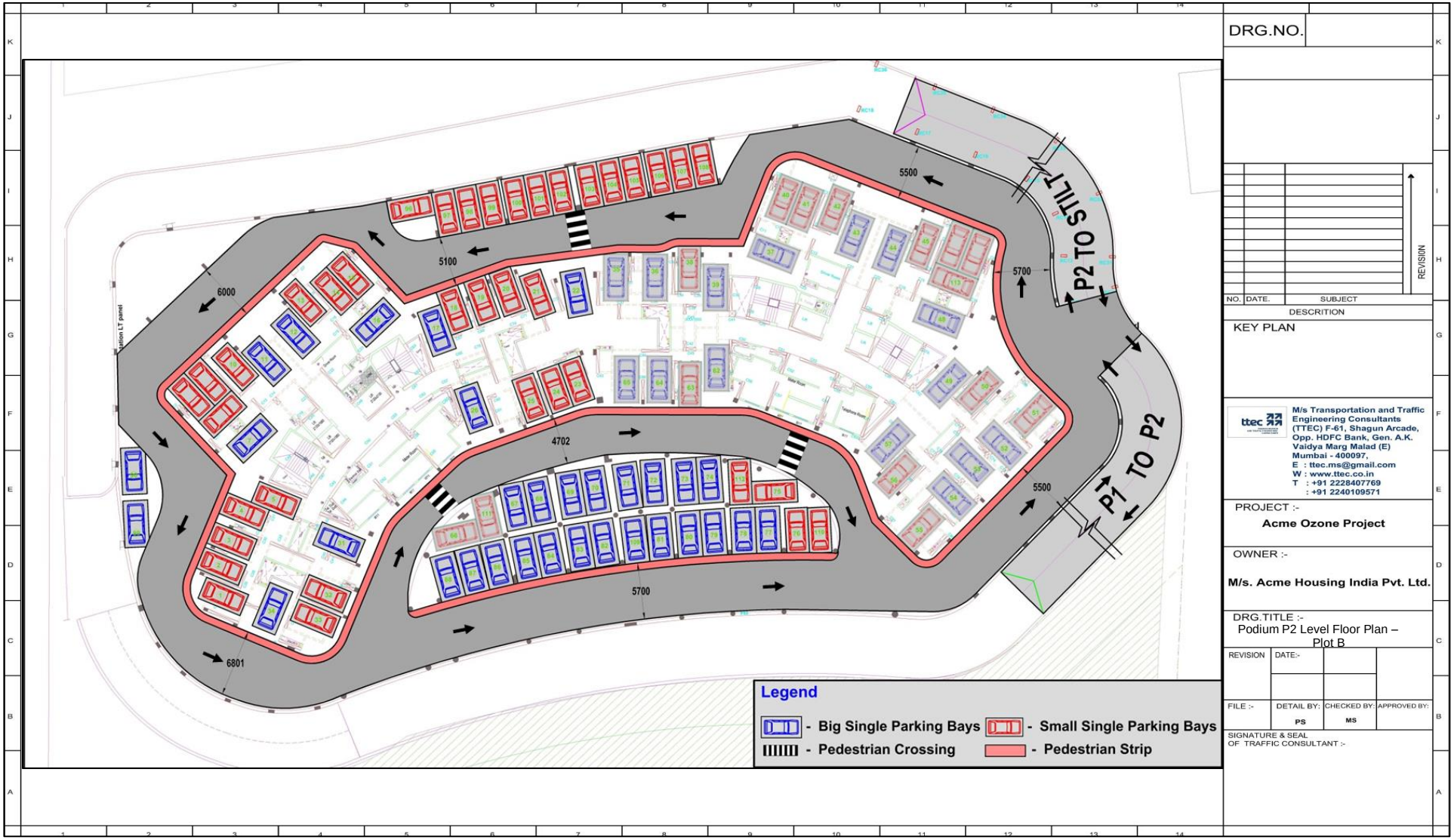


Figure 3.8: Podium P2 Floor Plan of Plot B

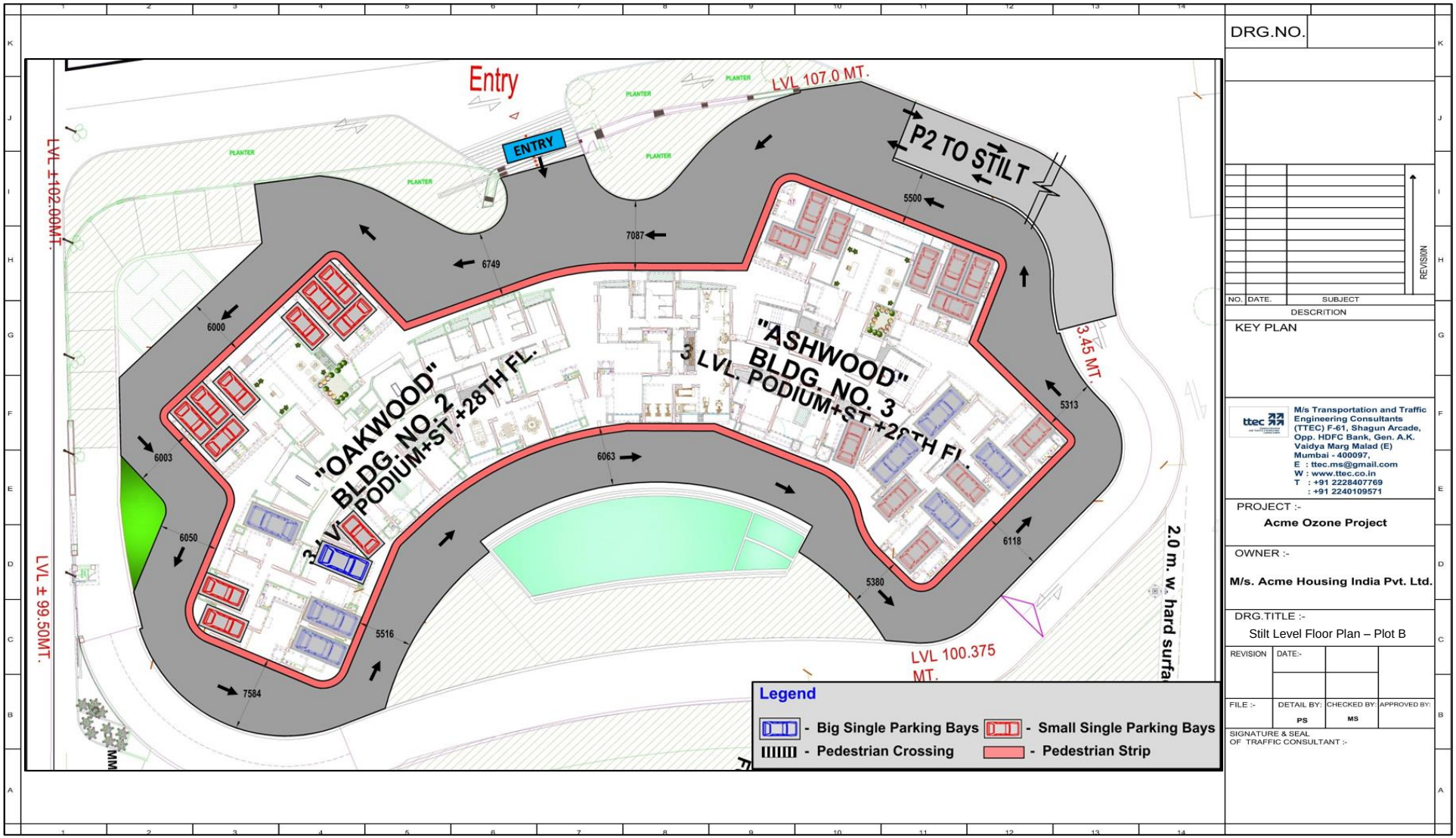


Figure 3.9: Stilt Level Floor Plan of Plot B

3.4 Evacuation Analysis

3.4.1 Evacuation Analysis (Plot A)

- Evacuation time is the time taken during emergency to evacuate entire parking lot.
- There is one entry gate, one exit gate and one entry + exit gates to the entire Plot A. The widths of the gates are 9m, 9m and 6m respectively.
- During emergency evacuation all gates will operate as exit gate only. Therefore, during emergency evacuation at least 8 lanes of exit will be available for emergency evacuation.
- The rate of exit per vehicle/lane from the exit point to the external road is assumed as 8 seconds on an average (i.e. assuming the capacity of exit lane as 450 PCU/hr./lane). This is assuming maximum obstruction to the vehicles joining the queue of exiting vehicles.
- In case of mechanized parking, the first 8 cars will take some time to reach the exit point. However, after the first 8 cars, there will be queue of vehicles exiting out simultaneously.

  Note: In case of mechanized parking, the cars at the ground level will exit out like conventional parking. However, the movement of cars from the other parking levels of the Mechanized parking particularly to the Ground level and the movement of cars from Ground level of the Mechanized parking to the exit point will happen simultaneously.
- During emergency evacuation, the evacuation of all Basement levels, Podium levels and Stilt level will happen simultaneously (i.e. Stilt to Podium P2, Podium P2 to P1, Podium P1 to ground level and so on). However, this is the worst scenario in terms of obstruction by one vehicle to other.
- Assuming some reaction time, the first eight vehicles will take around 2.0-2.5 minutes to evacuate. After these eight cars, there will be eight lanes of vehicles exiting out simultaneously.
- There are 2130 car parking bays provided at Ground level, basement levels, podium levels and Stilt level. Assuming 80% as peak hour occupancy, the number of cars exiting out from car parking will be 1704.
- The total time taken to evacuate the complete car park will be **1846 seconds/ 31 minutes** [i.e. 150 + (1704-8)*8/8)].

3.4.2 Evacuation Analysis (Plot B)

- Evacuation time is the time taken during emergency to evacuate entire parking lot.
- One entry gate and one exit gate is provided at ground level while one entry/exit gate is provided at stilt level. The widths of the gates are 4m, 6m and 8.8m respectively.
- During emergency evacuation all gates will operate as exit gate only. Therefore, during emergency evacuation at least 5 lanes of exit will be available for emergency evacuation.
- The rate of exit per vehicle/lane from the exit point to the external road is assumed as 8 seconds on an average (i.e. assuming the capacity of exit lane as 450 PCU/hr./lane). This is assuming maximum obstruction to the vehicles joining the queue of exiting vehicles.
- During emergency evacuation, the evacuation of all Podium levels and Stilt level will happen simultaneously (i.e. ground to podium 1, Podium P2 to P1, and so on). However, this is the worst scenario in terms of obstruction by one vehicle to other.
- Assuming some reaction time, the first five vehicles will take around 2.0-2.5 minutes to evacuate. After these 5 cars, there will be five lanes of vehicles exiting out simultaneously.
- There are 397 car parking bays provided at podium levels, Ground and Stilt level. Assuming 80% as peak hour occupancy, the number of cars exiting out from car parking will be 318.
- The total time taken to evacuate the complete car park will be **651 seconds/11 minutes** [i.e. 150+ (318-5)*8/5)].

Figure 3.10 to **Figure 3.15** presents the evacuation plan at different levels of Plot A while **Figure 3.16** to **Figure 3.19** shows the evacuation plan at different levels of Plot B.

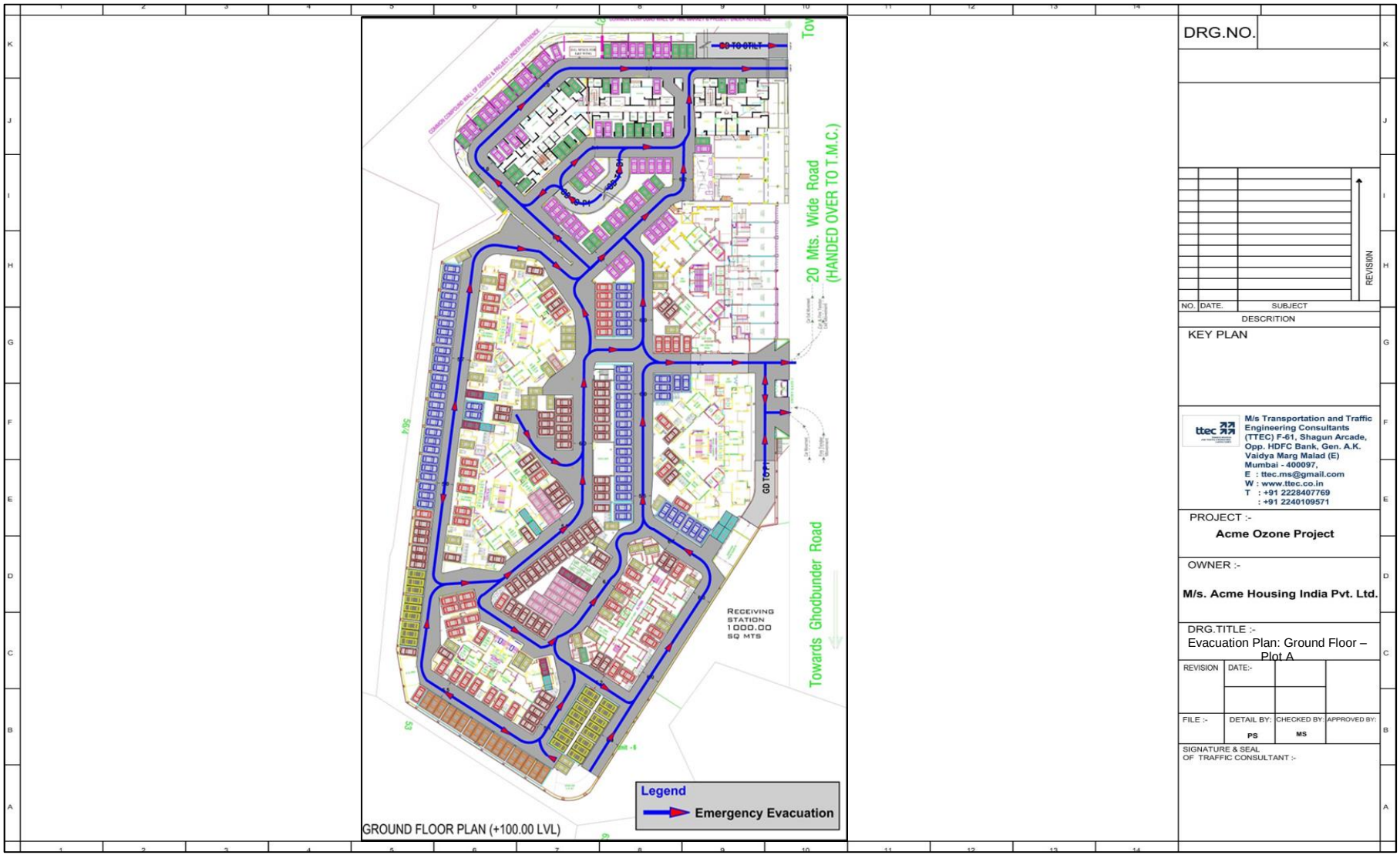


Figure 3.10: Evacuation Analysis Ground Floor Plan (Plot A)

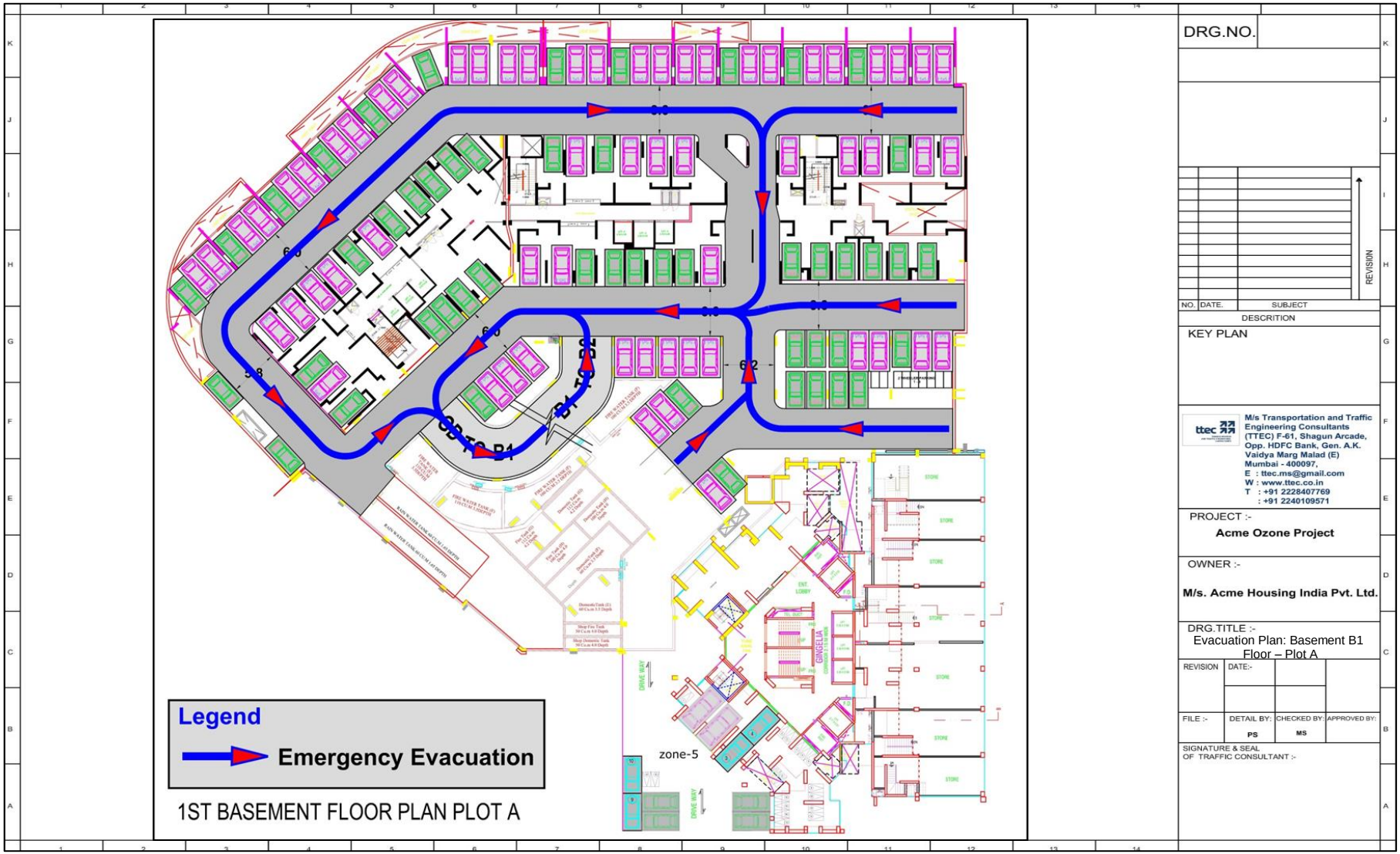


Figure 3.11: Evacuation Analysis Basement B1 Floor (Plot A)

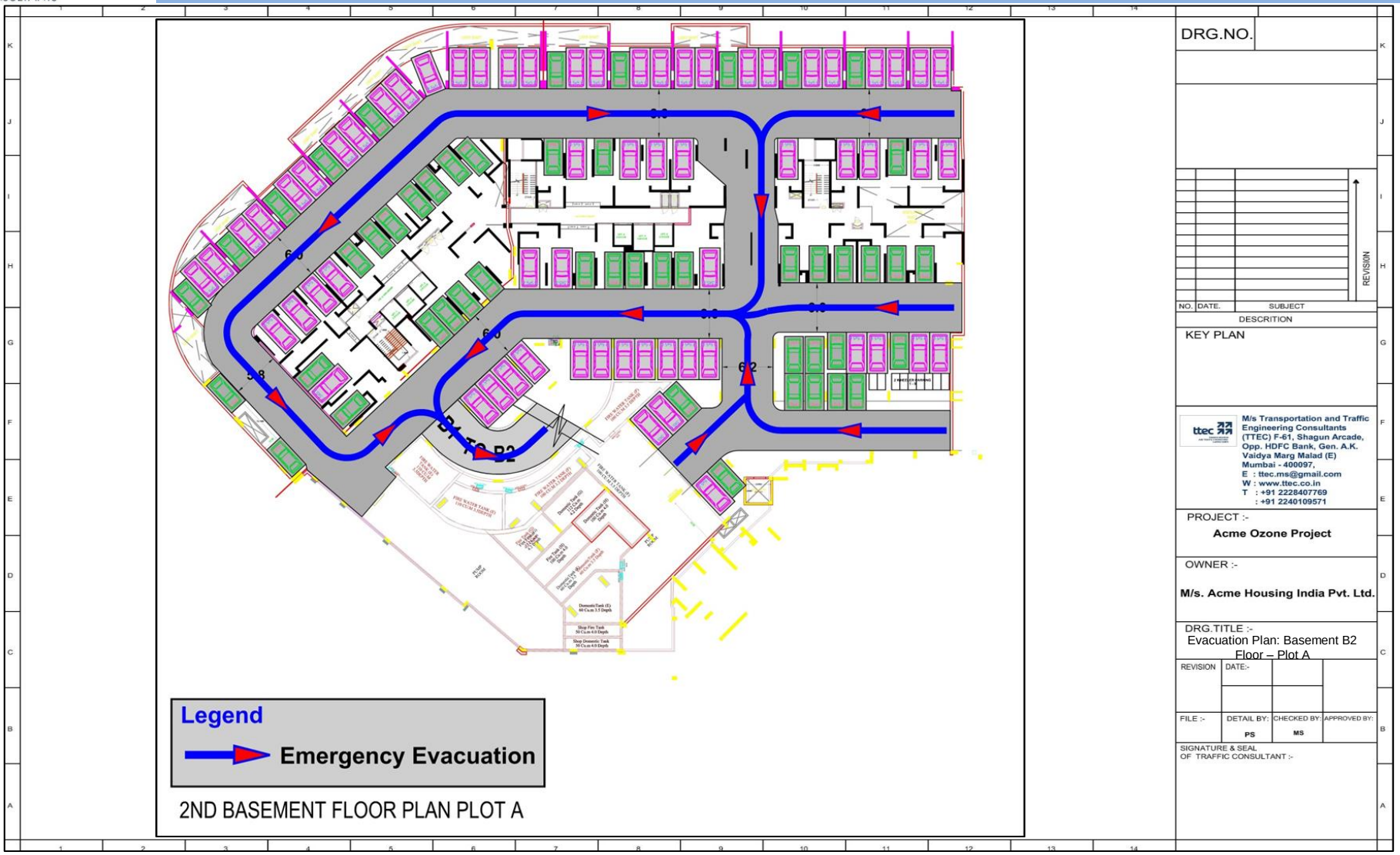


Figure 3.12: Evacuation Analysis Basement B2 Floor (Plot A)

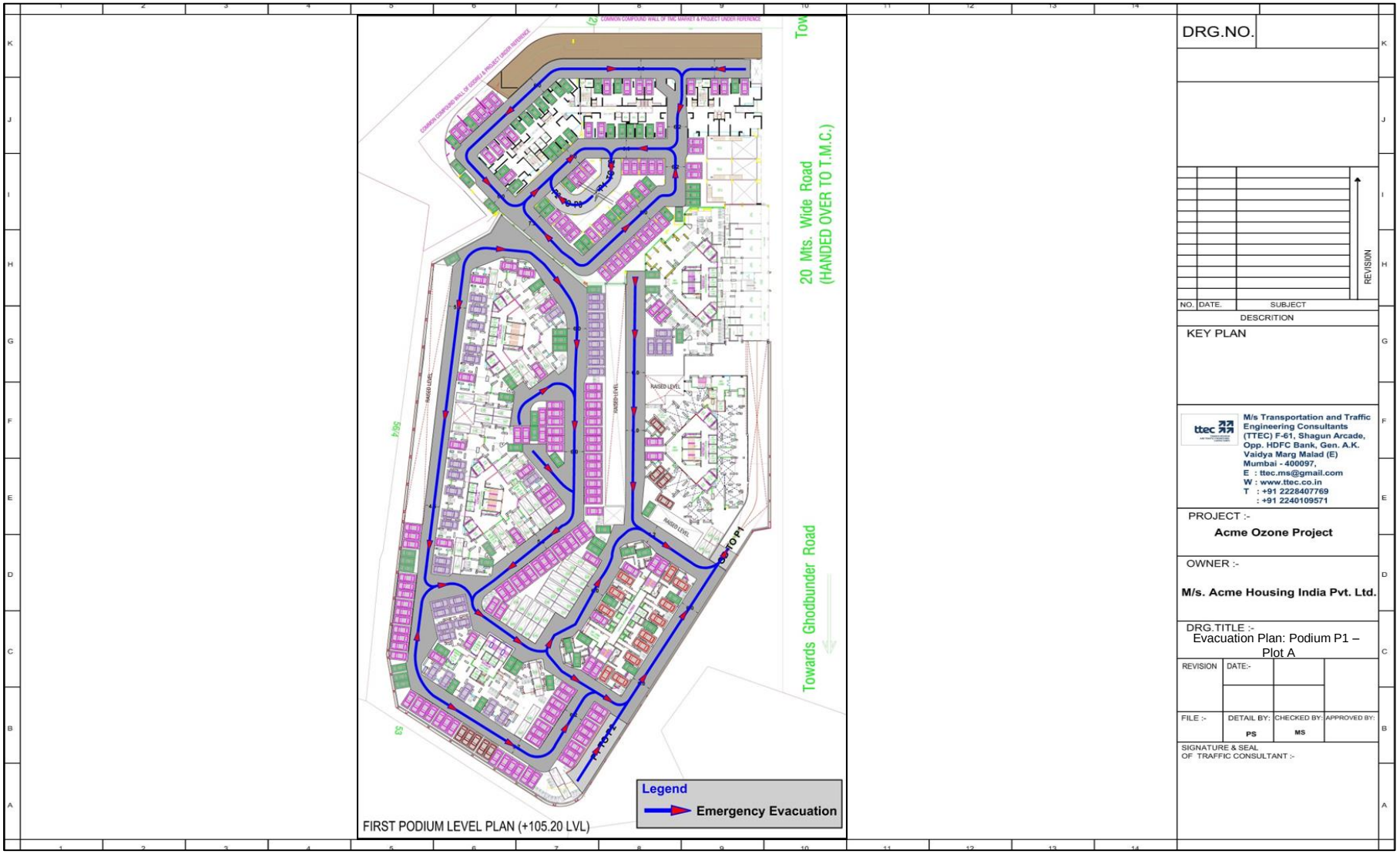


Figure 3.13: Evacuation Analysis Podium P1 Floor (Plot A)

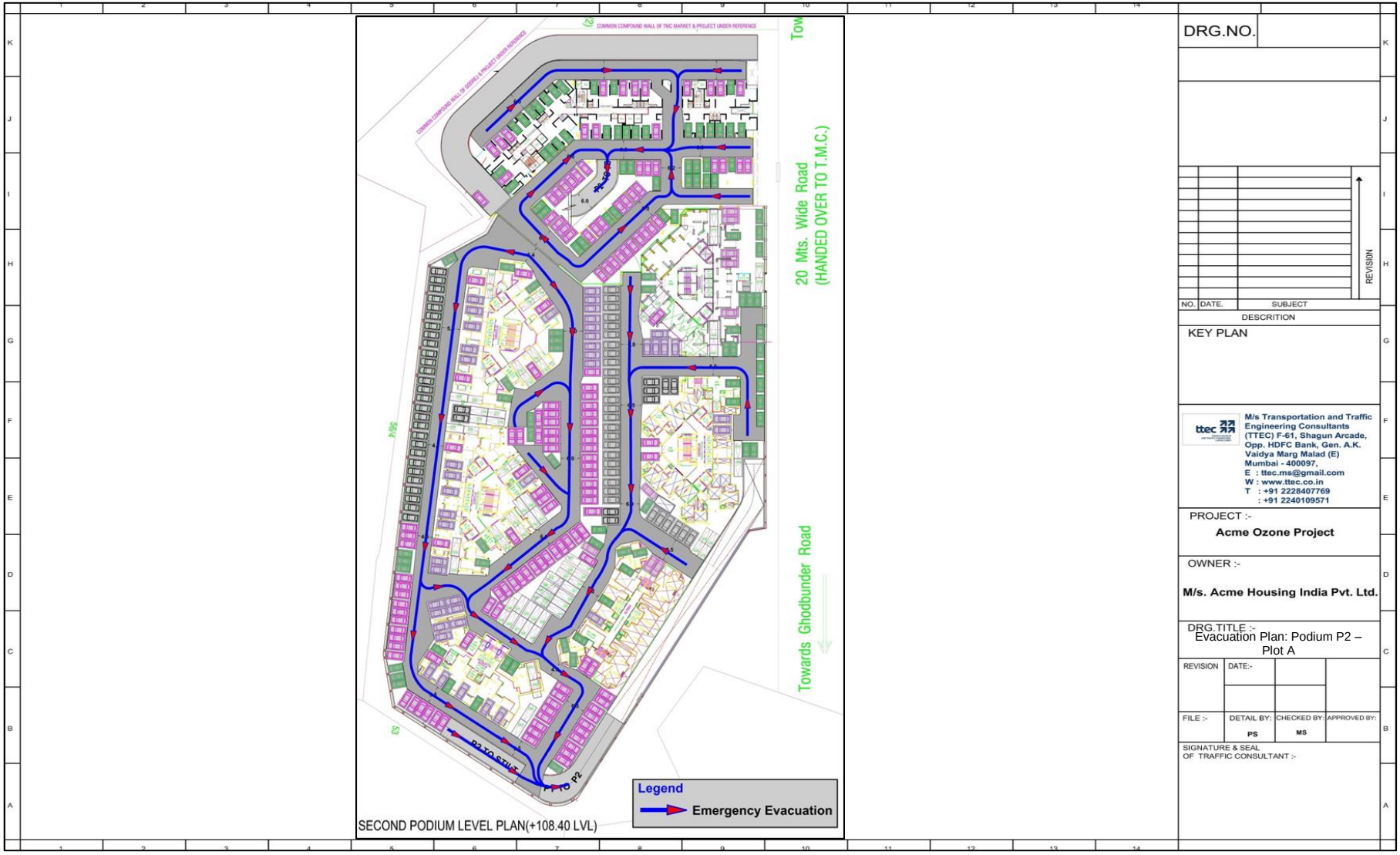


Figure 3.14: Evacuation Analysis Podium P2 Floor (Plot A)

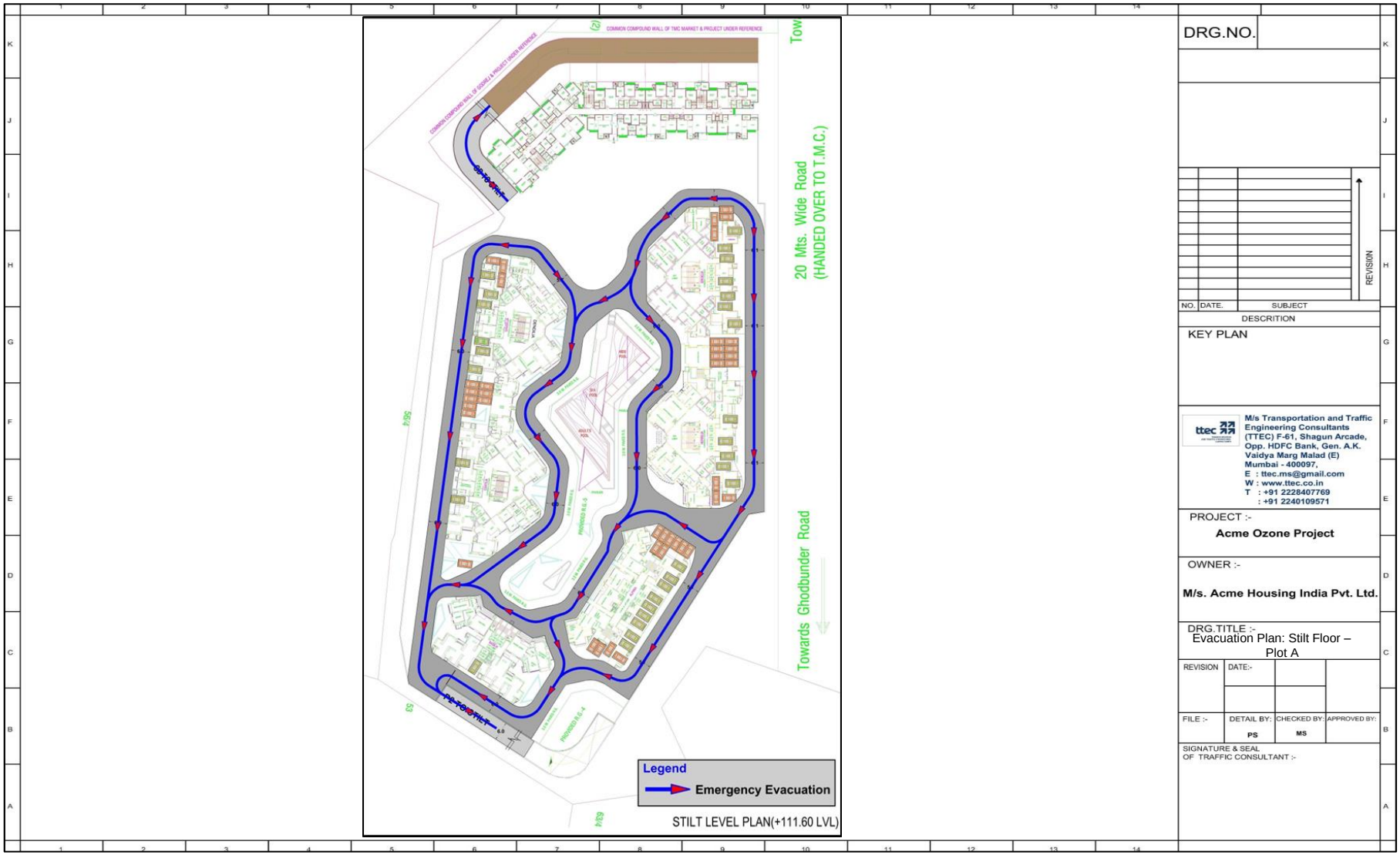


Figure 3.15: Evacuation Analysis Stilt Floor (Plot A)

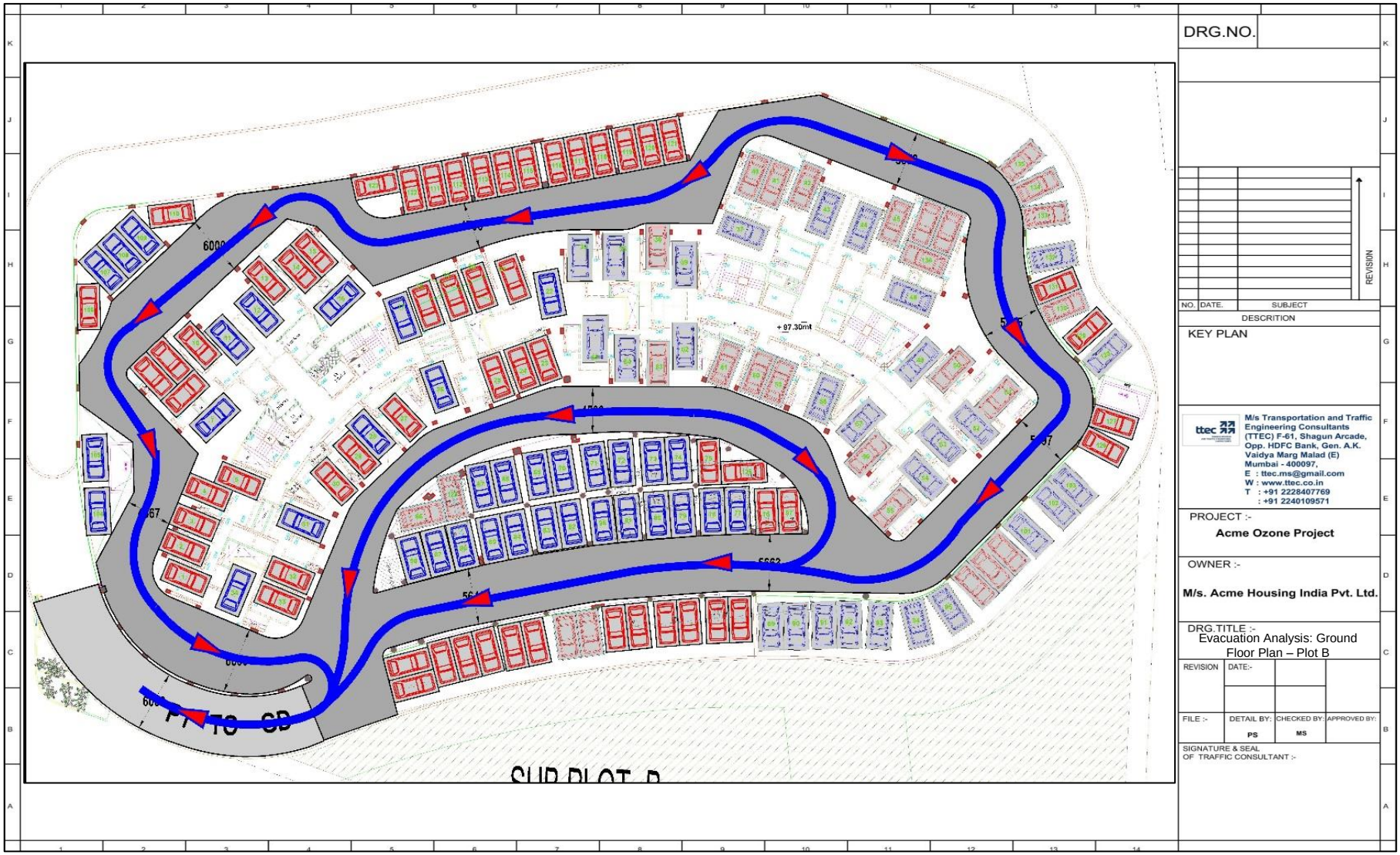


Figure 3.16: Evacuation Analysis Ground Floor Plan (Plot B)

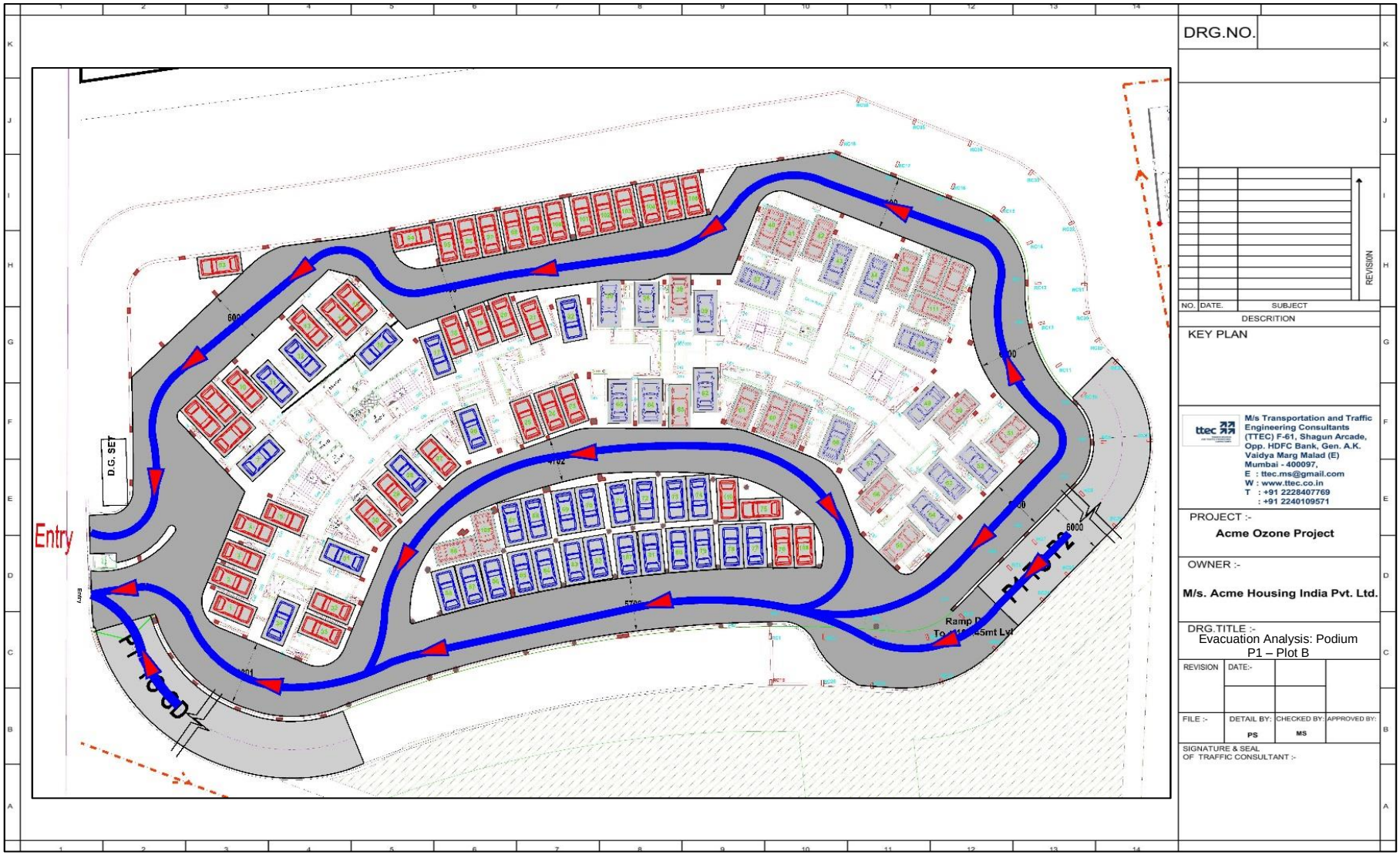


Figure 3.17: Evacuation Analysis Podium P1 Floor (Plot B)

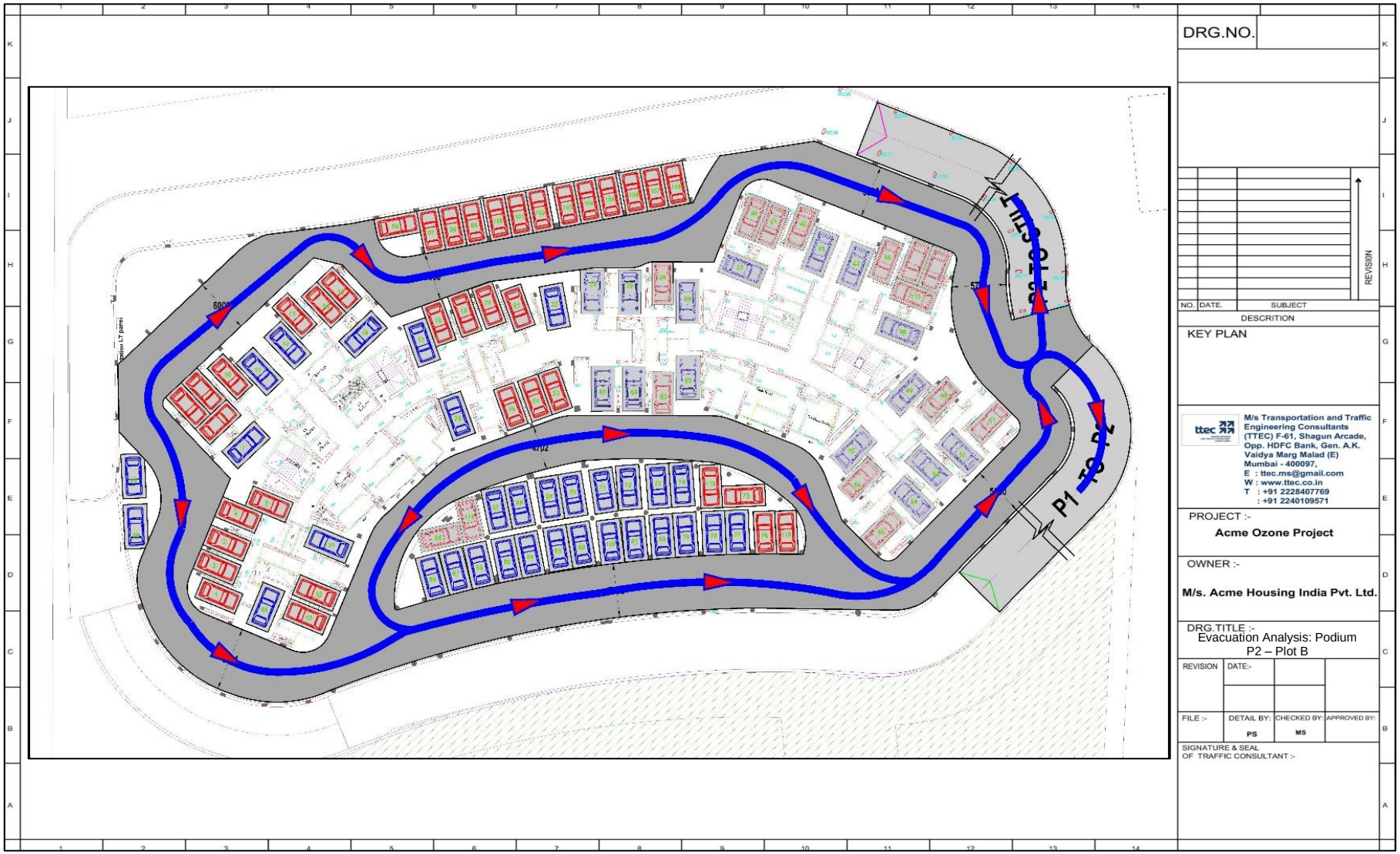


Figure 3.18: Evacuation Analysis Podium P2 Floor (Plot B)

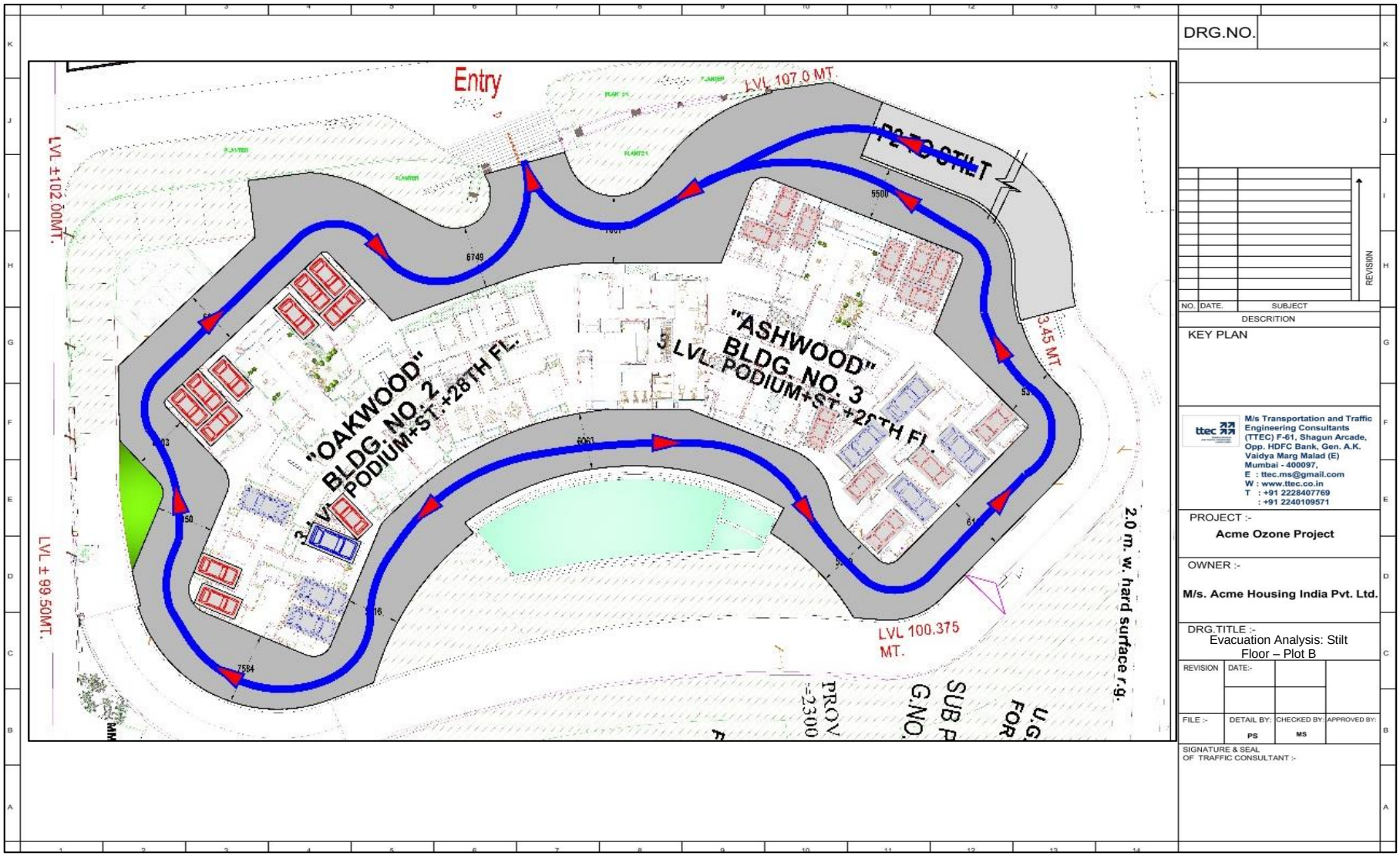


Figure 3.19: Evacuation Analysis Stilt Floor (Plot B)

3.5 Swept Path Analysis

A detailed swept path analysis was carried out using the "**AUTOTRACK**" software at critical locations within the entire parking layout. The analysis was carried for the large car sized vehicle (i.e. 5.3m long car) expected in the parking area of the proposed development.

Figure 3.20 shows the Swept Path Analysis at Ground Floor Plan.

Figure 3.21 and Figure 3.22 shows the Swept Path Analysis at Podium P1 and P2 respectively.

Figure 3.23 shows the Swept Path Analysis at Stilt Floor Plan.



Figure 3.20: Swept Path Analysis of Ground Floor (Plot A)

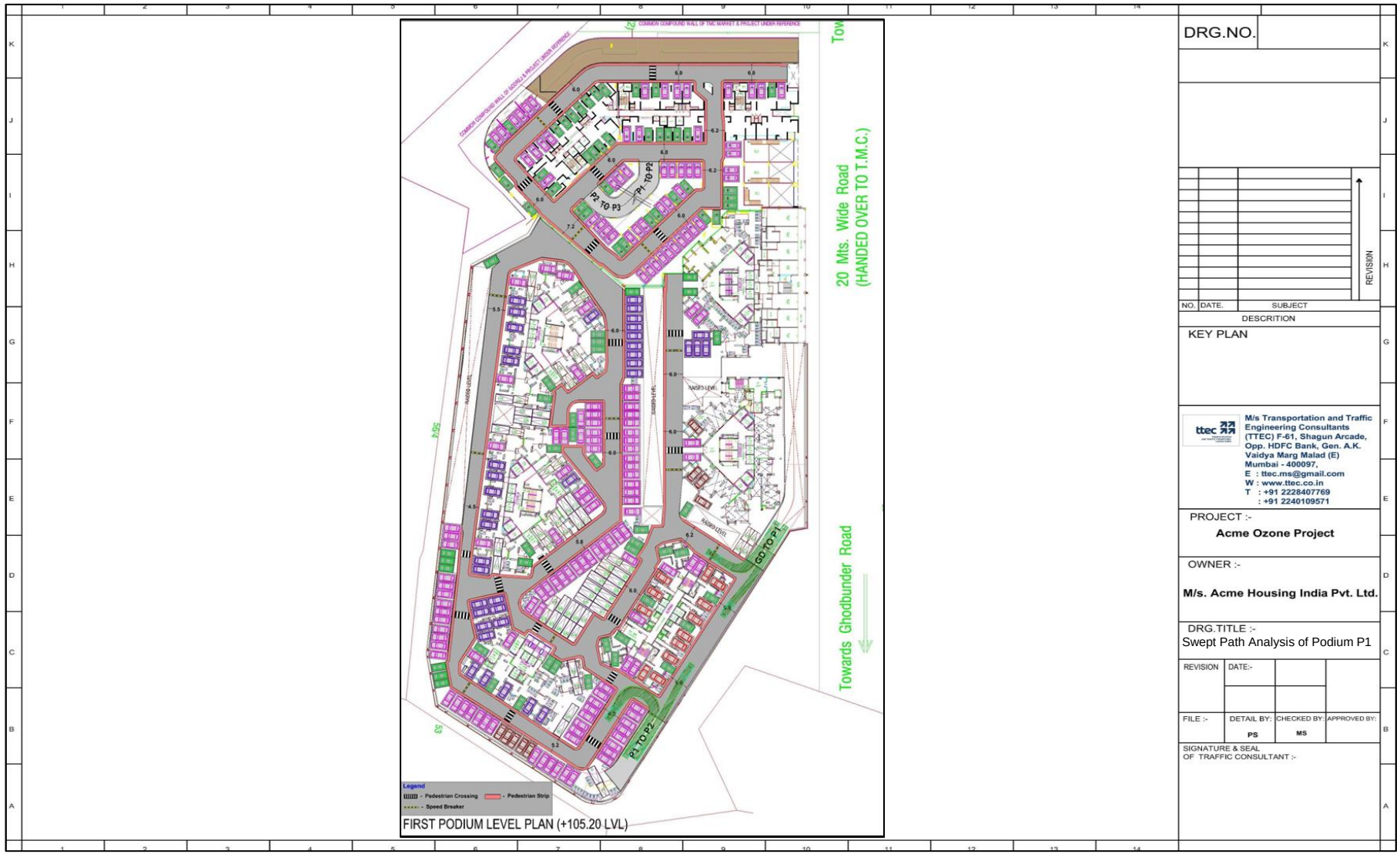


Figure 3.21: Swept Path Analysis of Podium P1 (Plot A)

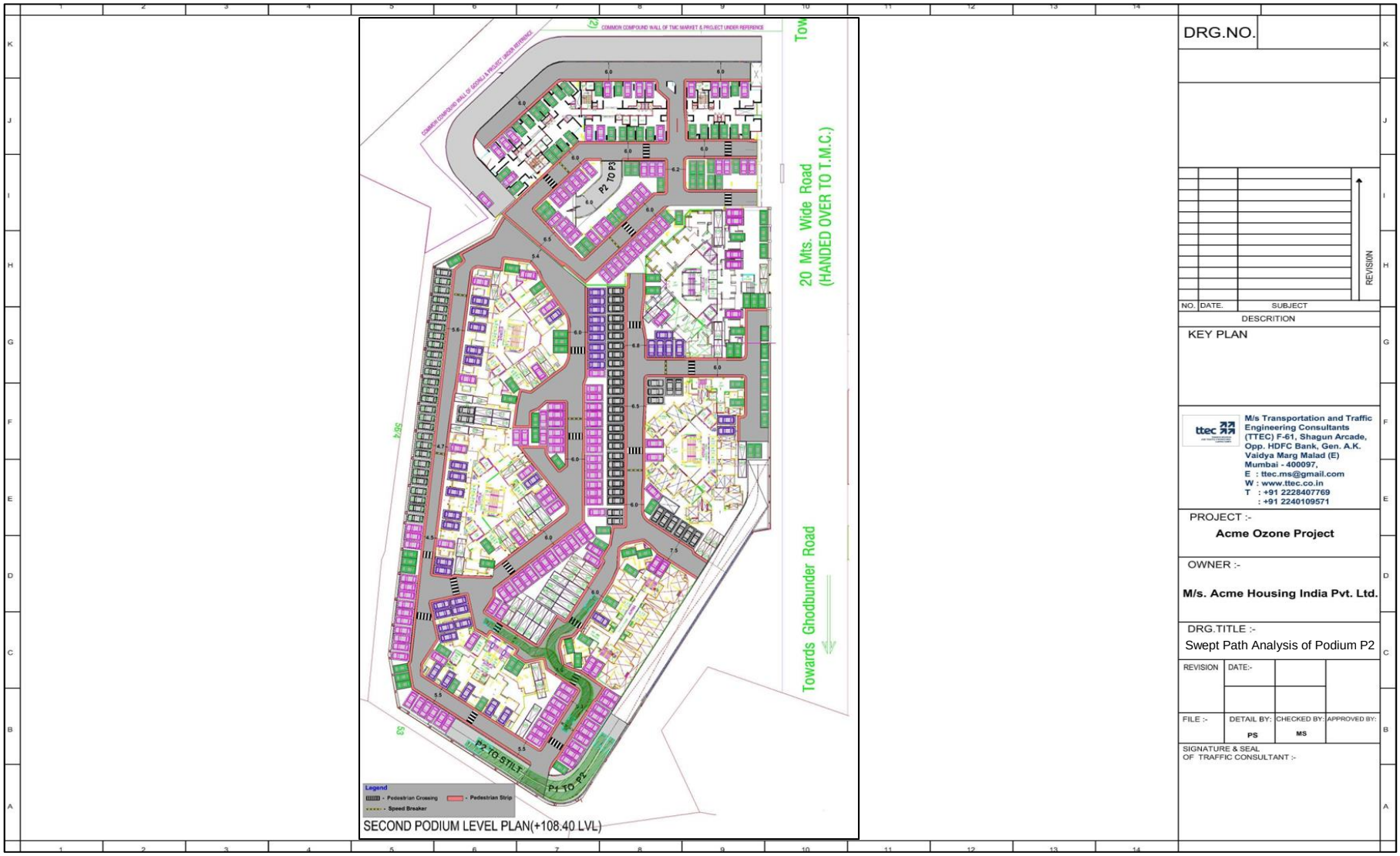


Figure 3.22: Swept Path Analysis of Podium P2 (Plot A)



Figure 3.23: Swept Path Analysis of Stilt Floor (Plot A)

Chapter 4

Traffic Generation & Impact Analysis

4.0 TRAFFIC GENRATION AND IMPACT ANALYSIS

4.1 Trip Generation Estimating Procedure

The process of estimating future traffic levels generated from the proposed Benchmark involves the identification of suitable trip generation/attraction rates obtained from the previous surveys and applying these to the proposed development.

Assumptions are then made regarding the likely external road routing(s) of this traffic to the development recognizing the final entry/exit arrangements. The net future development site traffic is then superimposed onto the existing traffic to provide an estimate of the future traffic conditions on the external roads serving the development.

4.2 Traffic Generation

Trip generation rates are different for each type of property use. Traffic generation vary depending on the size and behavior of the property.

The trip generation rates used to determine the expected traffic coming to the proposed development is taken from previously surveyed properties.

The process of developing valid trip generation rates involves surveying the number of vehicles entering and exiting the property throughout the day. In addition, the traffic generation surveys also take into account the traffic that is parked on the road in the immediate vicinity of the development. This is then divided by the number flats within the property or area of the surveyed property to give you the existing vehicle trip rate per hour.

To estimate the expected traffic generation to the property, these rates are then multiplied against the total number of flats within the proposed development or the area of the proposed development.

The Trip Generation Rates used for similar types of Residential properties in Thane are shown in **Table 4.1**. The traffic generation/attraction surveys in Thane reveals that Residential developments are normally low traffic generators.

Table 4.1: Residential Trip Generation Rates

Peak Hour	Vehicle Trips (PCU's/Apartment/Hr.)		
	Entry	Exit	Total
AM PEAK	0.21	0.20	**0.41**
PM PEAK	0.18	0.16	**0.34**

4.3 Traffic Generation and Impact Analysis

The estimated traffic generated/attracted from the proposed residential development is outlined below in **Table 4.2** respectively**.**

Table 4.2: Estimated Traffic Generation of the Proposed Residential Development

Peak Hour	Entry	Exit	Total
AM PEAK	741	706	**1447**
PM PEAK	635	565	**1200**

We anticipate that the peak hour traffic generation from the proposed Residential development will be around **1450-1450 PCUs** per hour. In addition, **15-20 PCU's** per hour will be generated from commercial component of the proposed development.

The projected morning and evening peak hour directional traffic flows on the surrounding road is presented in **Figure 4.1 and Figure 4.2.**

A line of comparison of the congestion index **(V/C ratio)** is drawn between the existing traffic conditions and the projected traffic conditions (when the proposed development will be in place). **Figure 4.3**, **Figure 4.4** and **Figure 4.5** show the traffic impact analysis/congestion indices for roads surrounding proposed development for **2023, 2028 and 2033** respectively. The same is shown in **Table 4.4.**

4.4 Total Peak Hour Flow/Capacity Analysis w.r.t a Single Two-way Ramp

The peak hour traffic generation & attraction for a Residential development depends on the total number of apartments and not on the total parking bays. The benchmarking study carried out on the similar type of developments shows the Traffic generation/ attraction rate as shown in **Table 4.1**

The total traffic generation and attraction from **996 apartments** corresponding to the Traffic generation/attraction rates obtained from the similar surveyed properties is given in the **Table 4.3**

Table 4.3: Estimated Traffic Generation of the Proposed Residential Development – 996 Apartment

Peak Hour	Entry	Exit	Total
AM PEAK	209	199	**408**
PM PEAK	179	159	**338**

The **Table 4.3** shows the peak hour traffic generation and attraction. The capacity of a two-way Ramp is around **1000 Cars/Hr.** The peak hour traffic flow generated & attracted from 996 apartments (from the **Table 4.3**) will be around **408 Cars/Hr.** Therefore One ramp will be adequate to serve the traffic attraction and generation from 996 apartments/1561 parking bays. The peak hour traffic flow will be less than 50% of the capacity of the ramp and therefore there will be no congestion.

Note: In addition, a 7.5m wide ramp connects the ground & stilt level and is accessible for fire tender movement for all buildings in Plot A.

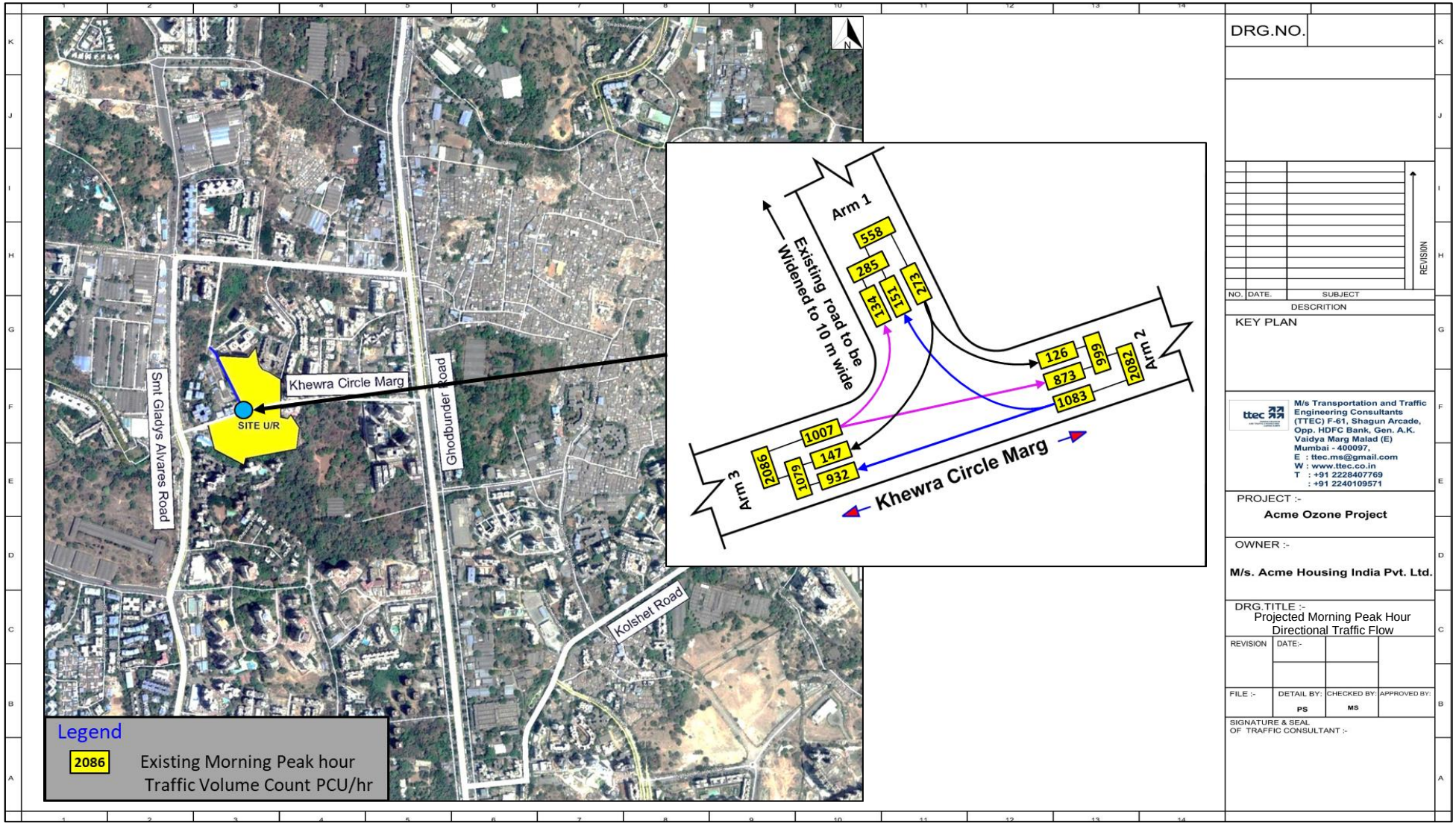


Figure 4.1: Projected Morning Peak Hour Directional Traffic Flow of Surrounding Roads

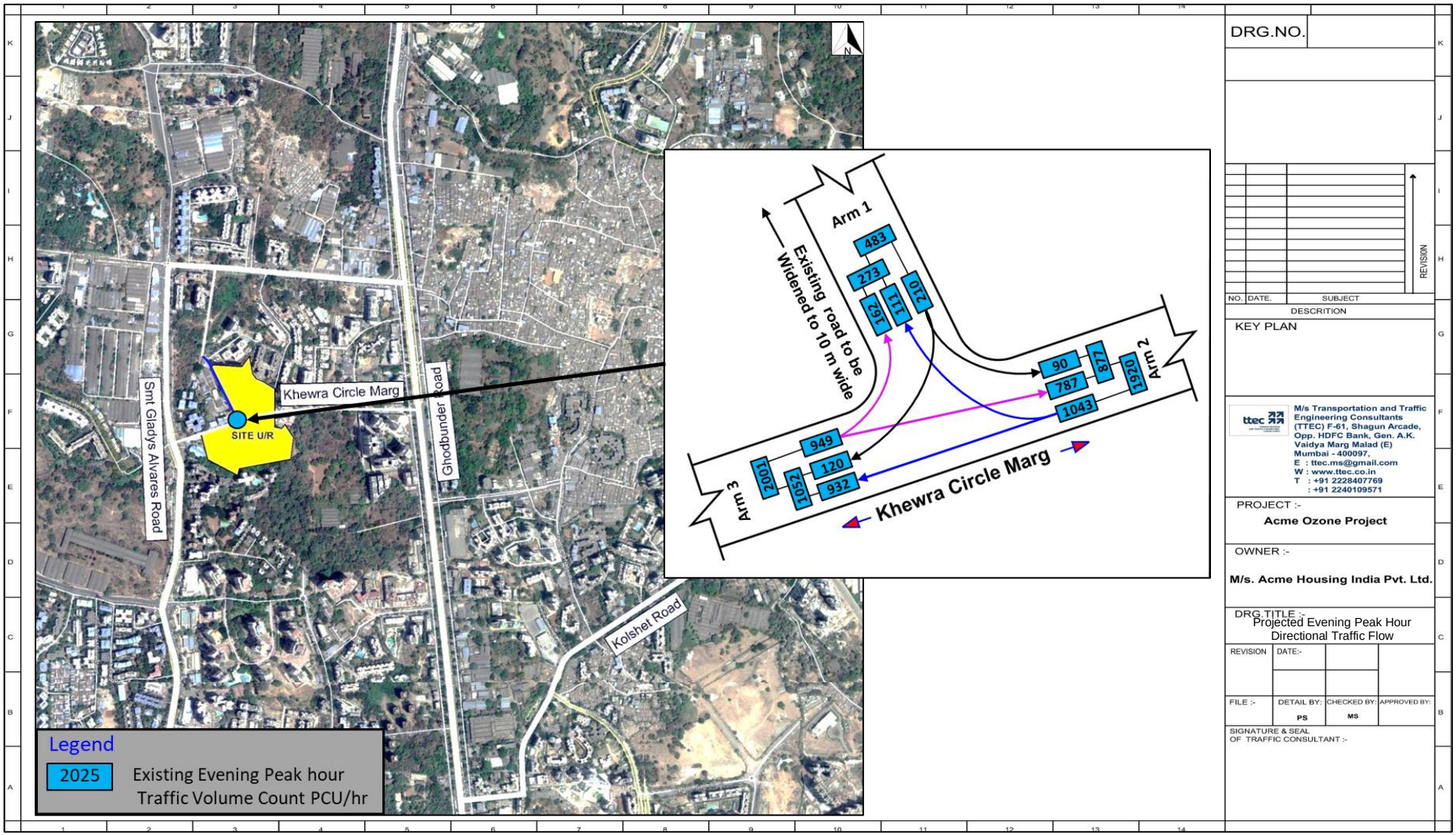


Figure 4.2: Projected Evening Peak Hour Directional Traffic Flow of Surrounding Roads

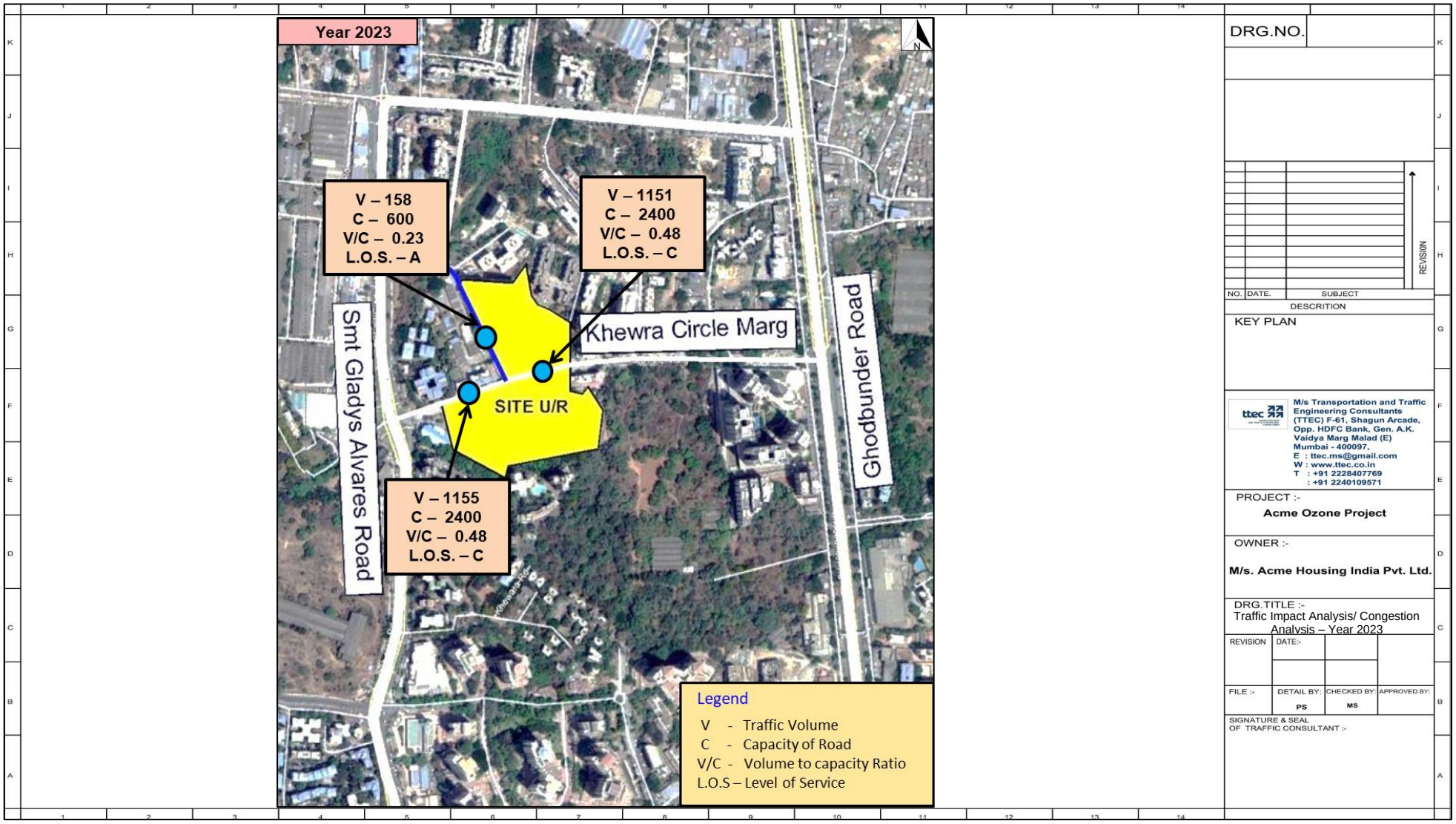


Figure 4.3: Traffic Impact Analysis/ Congestion Analysis for Existing Conditions (Year 2023)

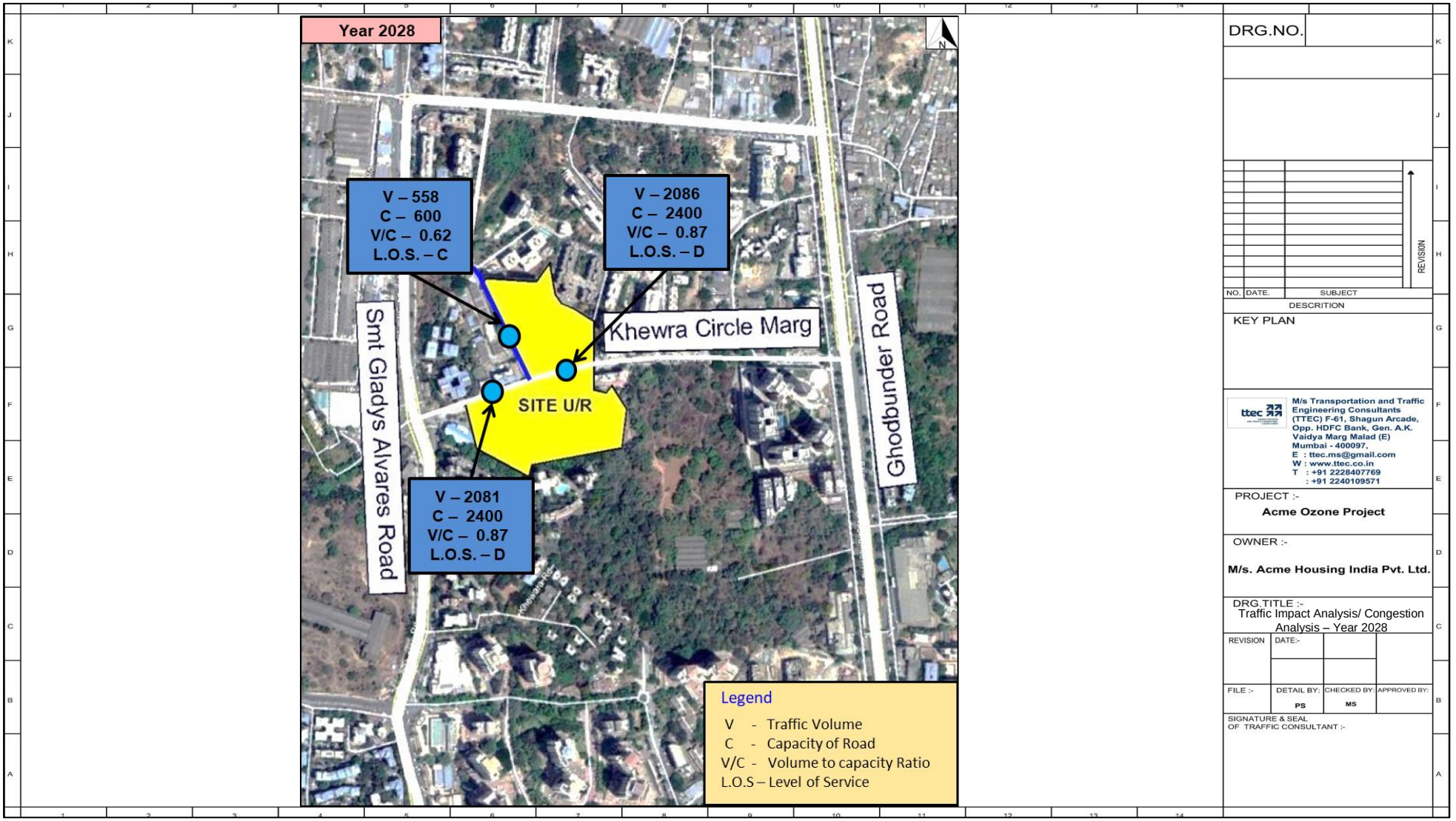


Figure 4.4: Traffic Impact Analysis/ Congestion Analysis for Projected Conditions (Year 2028)

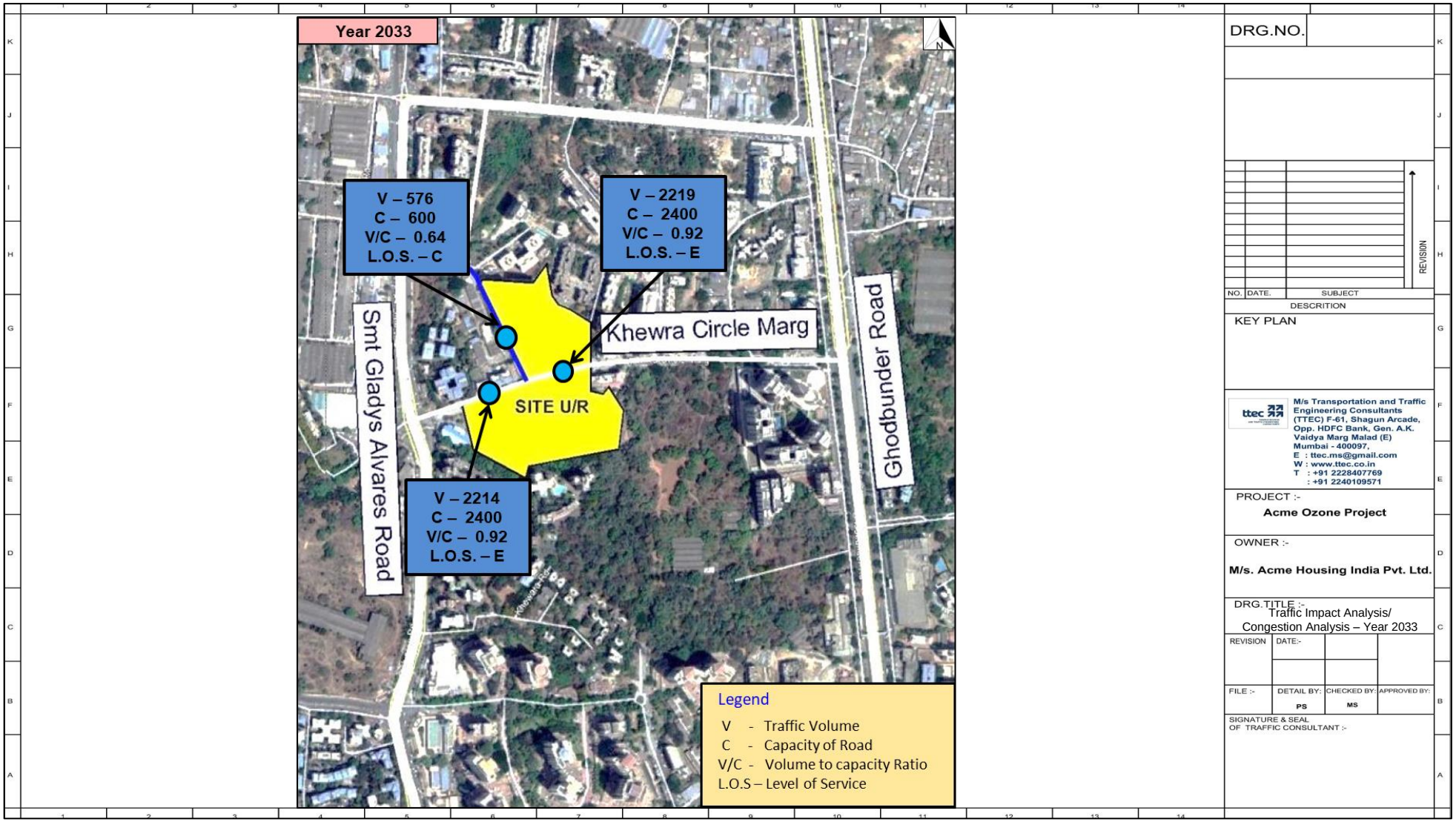


Figure 4.5: Traffic Impact Analysis/ Congestion Analysis for Projected Conditions (Year 2033)

Table 4.4: Comparison of Congestion Indices (V/C Ratio)

Road Name	Traffic Scenario	Volume (PCU's/Hr.)	Capacity (PCU's/Hr.)	V/C Ratio (Congestion Index)	Level of Service (LOS)
Arm 1 Existing Narrow Road to be widened 10m wide as Per DP Map	Existing Traffic Conditions	158	600	0.26	A
	Projected Traffic Conditions (Year 2023)	558	900	0.62	C
	Projected Traffic Conditions (Year 2028)	576		0.64	C
Arm 2 Khewra Circle Road (Towards Ghodbandar Road)	Existing Traffic Conditions	1151	2400	0.48	C
	Projected Traffic Conditions (Year 2023)	2081		0.87	D
	Projected Traffic Conditions (Year 2028)	2214		0.92	E
Arm 3 Khewra Circle Road (Towards S.G Alvares Road)	Existing Traffic Conditions	1155	2400	0.48	C
	Projected Traffic Conditions (Year 2023)	2086		0.87	D
	Projected Traffic Conditions (Year 2028)	2219		0.92	E

The operating condition of the road in terms of V/C as per **IRC 106-1990** shows in **Table 4.5.**

Table 4.5: Operating Condition of Road in terms of V/C as per Indian Roads Congress (IRC) - 106-1990

Level of Service	General Operating Conditions	Range of V/C
A	Free flow (traffic flows at or above speed limit and motorists have complete mobility between lanes)	<0.30
B	Reasonable flow (slightly more congested, with some maneuverability)	0.3 – 0.47
C	Stable flow (more congested than B, loads close to capacity)	0.48 – 0.68
D	Approaching unstable flow (speeds are some what reduced, example: busy corridor during middle of a weekday, or a functional urban highway during rush hour)	0.69 – 0.88
E	Unstable flow (flow becomes irregular, speed varies widely and rarely reaches speed limit)	0.88 – 1.00
F	Forced or breakdown flow (a constant traffic jam)	> 1.00

4.4 Mitigating Measures

Project Proponent/Developer:

Proper traffic control measures should be provided by the project proponent to regulate the flow of traffic/to streamline the traffic flow:

- Adequate traffic signs should be provided to notify the residents.
- Most of the junctions inside the premises are 3-arm junctions and the potential points of conflicts/cross movements are removed / minimized.
- Speed humps/Speed Breakers should be provided for traffic calming and restricting the internal vehicular speed to 10km/hr.
- Pedestrian facilities are provided like pedestrian strip and pedestrian crossing.
- Traffic wardens should be assigned to regulate the traffic flow during peak hours.

4.5 Conclusion

It is expected that the development will attract and generate around **1400 - 1450 PCU's/Hr.** of vehicular traffic during peak hours. In addition, **15-20 PCU's** per hour will be generated from Shop/Gala of the proposed development.

The projected traffic generation/attraction from the development will be loaded on Khewra Circle Marg Road and proposed 10m wide DP road to the west of the development.

Multiple entries and exits will distribute the traffic evenly.

Proper traffic management measures inside the development will ensure efficient and safe traffic circulation.

The result of the traffic impact analysis shows that the two roads have residual capacity to take the additional traffic that will be generated from the proposed development.