CHAPTER - 5

TRAIN OPERATION

5.1 Operation Philosophy

The underlying operation philosophy is to make the MRT System more attractive and economical, the main features being:

- Selecting the most optimum frequency of train services to meet sectional capacity requirement during peak hours on most of the sections

- Economical & optimum train service frequency not only during peak period (2.5 minutes Headway), but also during off-peak period (15 minutes headway),

- A short train consist (3 coaches) with high frequency service to be suitably increased to 6 coaches as the transport demand picks up. Basic unit selected is Two Motor coach and one Trailer coach.

- Multi-tasking of train operation and maintenance staff.

- Safety and Punctuality

5.2 Stations

Ahmedabad Metro System consists of two lines. Line 1 - North South Line (APMC/Vasana – Akshardham) is of the length of **32.65 kms** with **31 stations** and Line 2 – East West Line (Ahmedabad – Thaltej) is of the length of **10.90 kms** with **11 stations**. Lists of stations for Line-1 and Line-2 are given in **Table 5.1 & Table 5.2**.

TABLE 5.1

APMC Vasna ⇆ Akshardham

Sr. No.	Station Name
1	APMC/ Vasna
2	Vasana
3	Narayan Nagar
4	Paldi
5	Madalpur
6	Nava Gandhigram
7	Navrangpura
8	Aayakar Bhavan
9	Usmanpura
10	Vadaj
11	Gandhi Ashram

Sr. No.	Station Name
12	Subhash Circle
13	Sabarmati
14	Shankarpur
15	Acher
16	Motera
17	Motera Village
18	Amiyapur
19	Sughad
20	Narmada Canal
21	Koba Circle
22	Koba
23	Pore
24	Kudasan
25	Dhuala Kuva
26	Infocity
27	Indroda Circle
28	Sector 7
29	ST Depot
30	Sachivalaya
31	Akshardham

TABLE 5.2
Ahmedabad ⇆ Thaltej

Sr. No.	Station Name
1	Ahmedabad
2	Prem Darwaja
3	Delhi Darwaja
4	Shahpur Darwaja
5	Aayakar Bhavan
6	SP Stadium
7	Commerce Circle
8	Gujarat University
9	Gurukul
10	Doordarshan Kendra
11	Thaltej

5.3 TRAIN OPERATION PLAN

The salient features of the proposed train operation plan are:

- Running of services for 19 hours of the day (5 AM to Midnight) with a station dwell time of 30 seconds,
- Make up time of 5-10% with 8-12% coasting.
- Scheduled speed of 35 kmph.
-

5.3.1 Traffic Demand

Peak hour peak direction traffic demands (PHPDT) for different years for the purpose of planning are indicated in the **Table 5.3 & Table 5.4**.

TABLE 5.3
Peak hour peak direction traffic (PHPDT) Demand

LINE – 1	YEAR		
	2010	2025	2035
APMC Vasna – Akshardham	11,356	20,940	33,312

TABLE 5.4
Peak hour peak direction traffic (PHPDT) Demand

LINE – 2	YEAR		
	2010	2025	2035
Ahmedabad – Thaltej	14,228	19,539	26,668

The above demand precludes use of Light Rail Vehicle. Considering the future expected population increase in a city like Ahmedabad, the use of Mass Rapid Transit Rail Vehicle of medium capacity has been considered.

5.3.2 Train formation

To meet the above projected traffic demand, the possibility of running trains with composition of 3 car and 6 car with different headway of 2 minutes to 15 minutes has been examined.

The basic unit of 3 car train comprising of DMC-TC-DMC has been selected because of following considerations: -

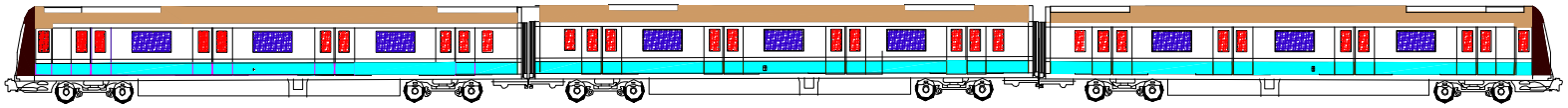
(I) Availability of Standard design with proven performance.

(II) Matching of varying hourly traffic demand with Passenger Carrying Capacity of Trains having 3 car or 6 car composition for different headways.

5.3.3 Composition

Car compositions adopted for years 2010, 2025 and 2035 are given in **Fig 1 and Fig 2**.

DMC : Driving Motor Car
MC : Motor Car
TC : Trailer Car



DMC TC DMC

3 Car Composition

Fig. 1

DMC TC MC MC TC DMC

6Car Composition

Fig. 2

3Car Train Composition DMC + TC + DMC
6 Car Train Composition DMC + TC + MC + MC + TC + DMC

5.3.4 Capacity

DMC : 253 passenger (Sitting - 43, Crush Standing –210)
TC /MC : 280 passenger (Sitting - 50, Crush Standing –230)
3 Car Train ; 786 passenger (Sitting -136,Crush Standing –650)
6 Car Train : 1626 passenger (Sitting- 286, Crush Standing –1340)

The above capacities are @ 6 standees per square metre.

5.3.5 Train Operation Plan

Based on the above consideration, the Train operation plan (headway and train composition) for the year 2010, 2025 and 2035 are given as under-

Line - 1

- **Year 2010**
  The operation on Line 1- APMC Vasna - Akshardham Corridor is planned with **3-car trains at 5** minutes headway the first year of operation i.e. **2010** with Peak Hour Peak Direction Capacity of 9432 (Graph-1). The capacity planned is less than the peak demand. This optimum capacity decided might slightly cause over crowding on few inter station section, but will avoid excessive under loading on most of the sections.

- **Year 2025**
  The operation on Line 1- APMC Vasna - Akshardham **Corridor** is planned with **3-car trains at 3 minutes** headway for the year of operation i.e. **2025** with Peak Hour Peak Direction Capacity of 15,720 (Graph-2). The capacity planned is less than the peak demand. This optimum capacity decided might slightly cause over crowding on few inter station sections, but will avoid excessive under loading on most of the sections.

- **Year 2035**
  The operation on Line 1- APMC Vasna - Akshardham Corridor is planned with **6 - car trains at 3 minutes** headway for the year of operation i.e. **2035** with Peak Hour Peak Direction Capacity of **32,520** (Graph-3). The capacity planned is less than the peak demand. This optimum capacity decided might slightly cause over crowding on some inter station sections, but will avoid excessive under loading on most of the balance sections.

Line – 2

- **Year 2010**
  The operation on Line 2- Thaltej-Thaltej Corridor is planned with **3-car trains at 5** minutes headway the first year of operation i.e. **2010** with Peak Hour Peak Direction Capacity of 9432 (Graph-4). The capacity planned is less than the peak demand. This optimum capacity decided might slightly cause over crowding on few inter station sections, but will avoid excessive under loading on most of the sections.

  Year 2025
  The operation on Line 2- Thaltej-Thaltej Corridor is planned with **3-car trains at 3 minutes** headway for the year of operation i.e. **2025** with Peak Hour Peak Direction Capacity of 15,720 (Graph-5). The capacity planned is less than the peak demand. This optimum capacity decided might slightly cause over crowding on few inter station sections, but will avoid excessive under loading on most of the sections.

- **Year 2035**
  The operation on Line 2- Ahmedabad -Thaltej Corridor is planned with **3 - car trains at 2.5 minutes** headway for the year of operation i.e. **2035** with Peak Hour Peak Direction Capacity of **18,864** (Graph-6). The capacity planned is less than the peak demand. This optimum capacity decided might slightly cause over crowding on some inter station sections, but will avoid excessive under loading on most of the balance sections.

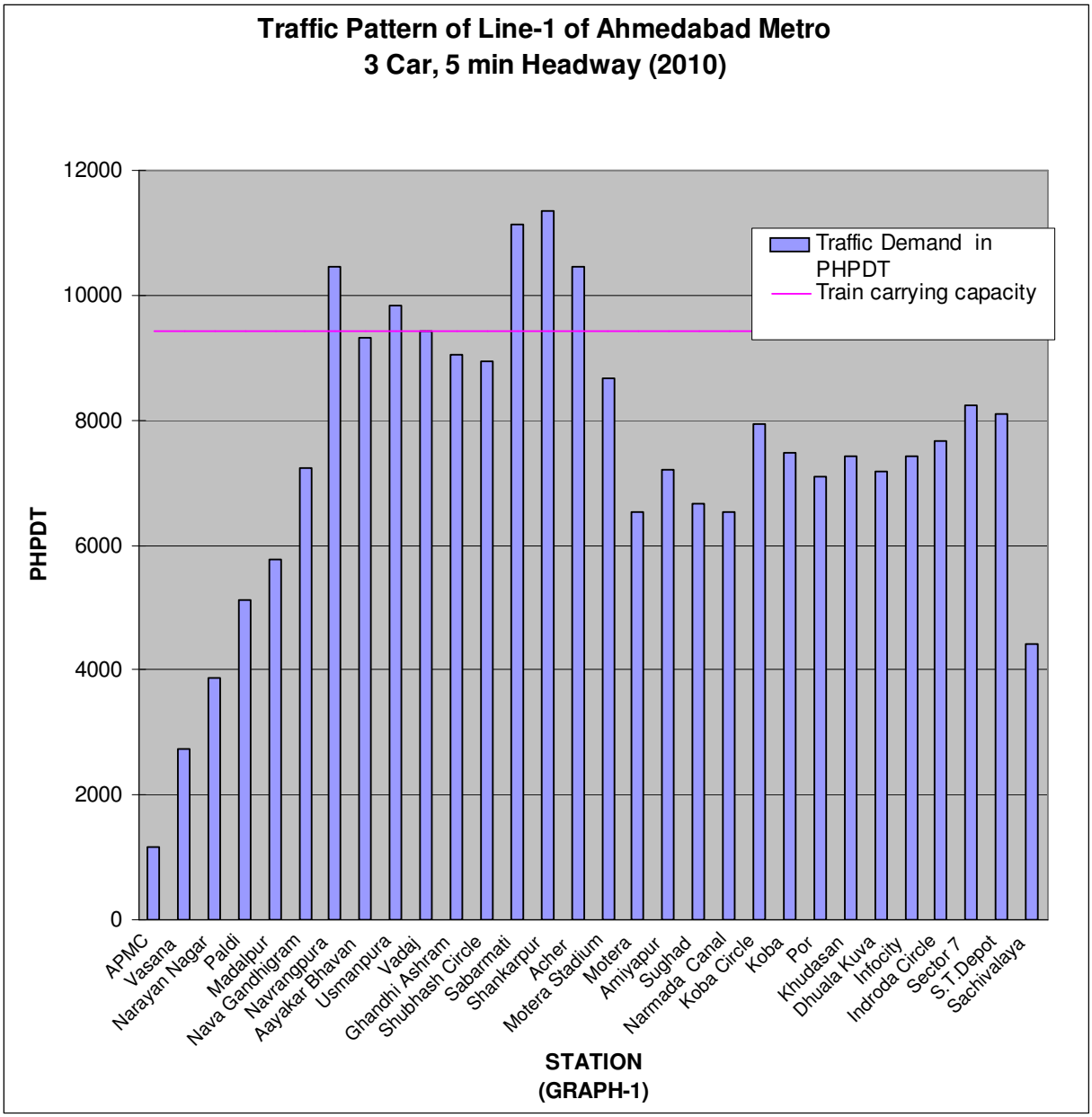
In case of any mismatch in the capacity provided and the actual traffic, the capacity can be moderated suitably by either varying the rake composition or adjusting the Headway .The PHPDT capacity provided on both the corridors in different years is given in **Table 5.5 & Table 5.6**

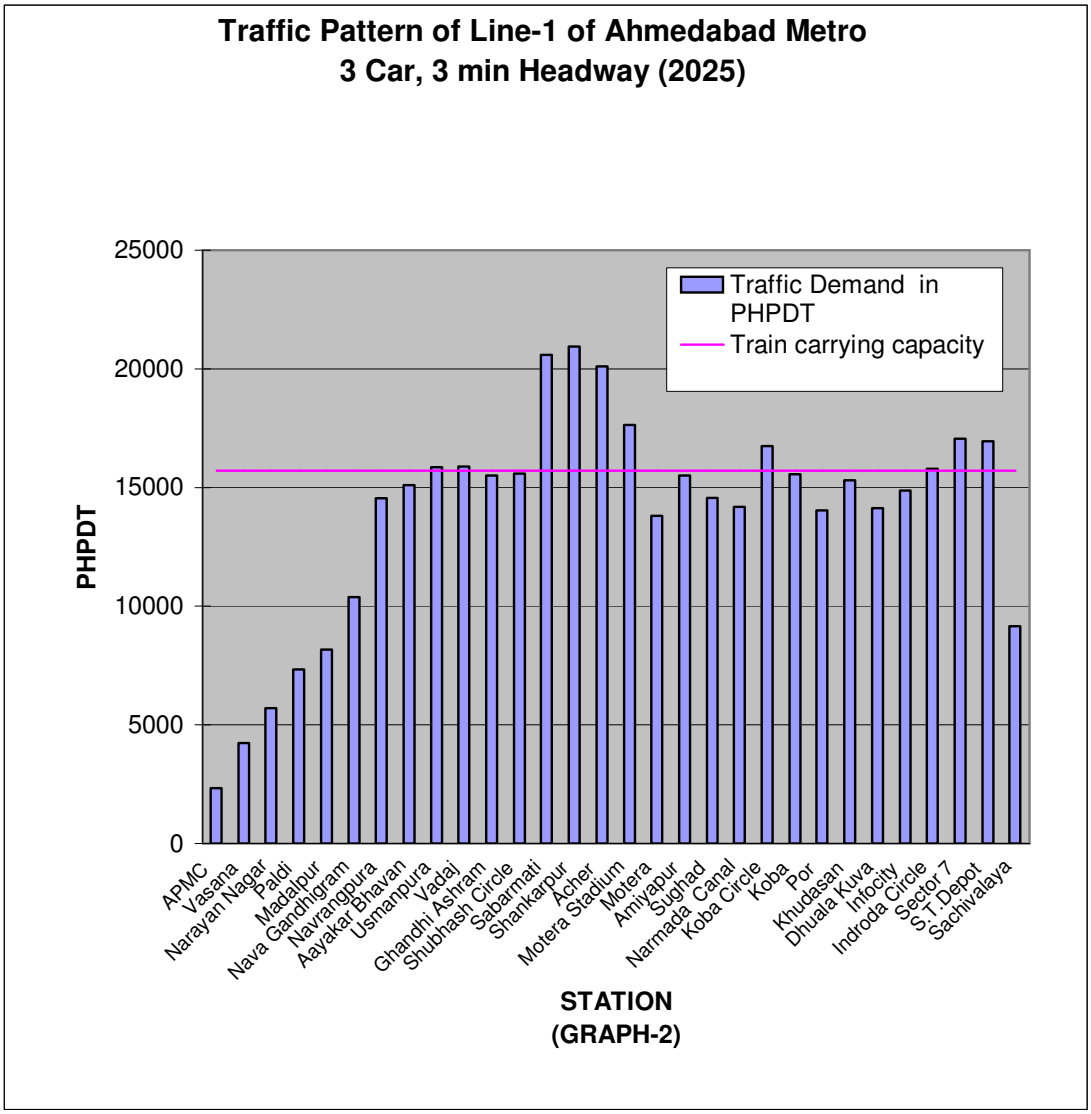
TABLE 5.5
CAPACITY PROVIDED
Line 1 (APMC Vasna- Akshardham Corridor)

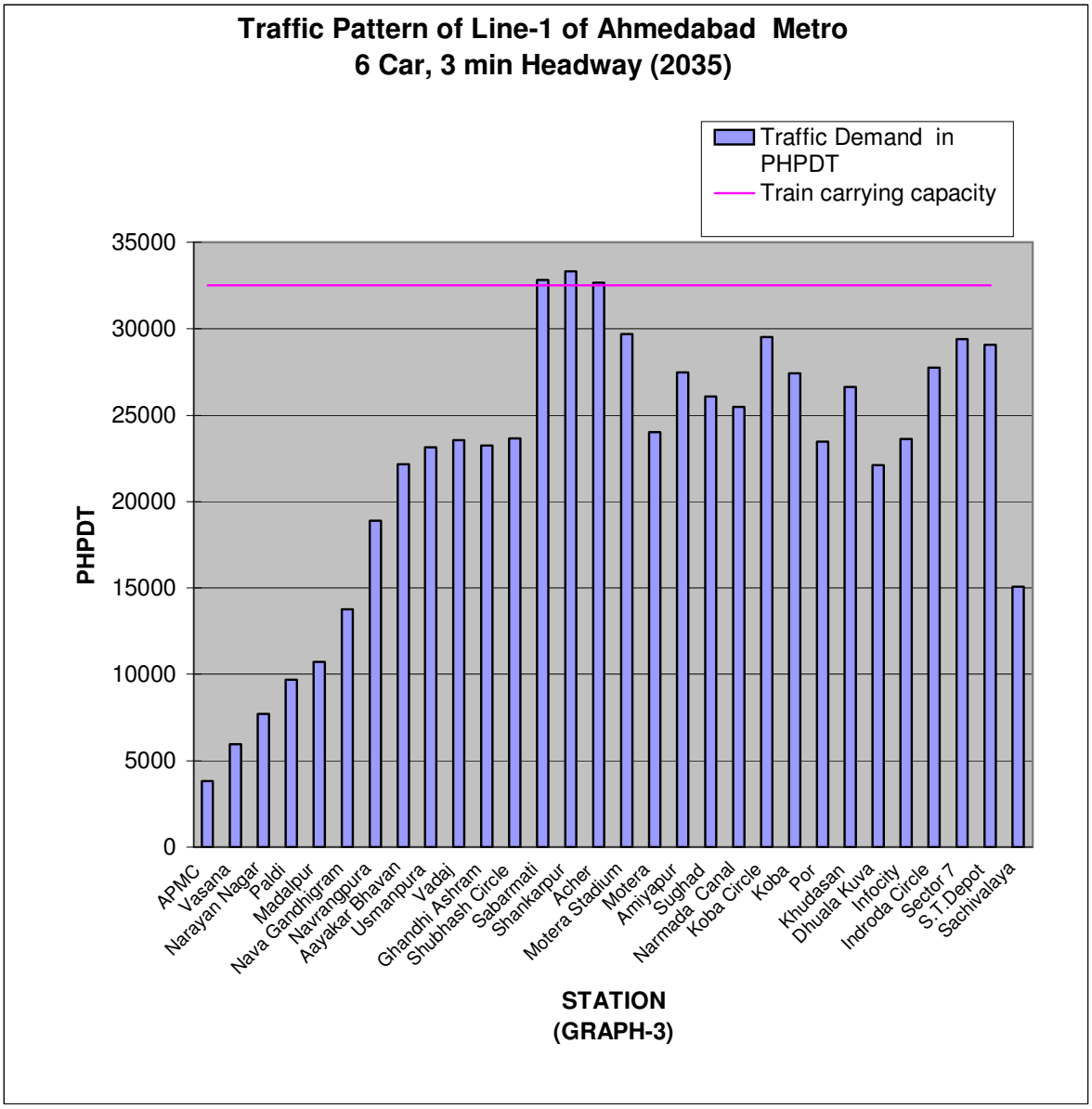
Year	**2010**	**2025**	**2035**
Cars/trains	**3**	**3**	**6**
Head way (Minutes)	**5**	**3**	**3**
PHPDT Demand	**11,356**	**20,940**	**33,312**
PHPDT Capacity Available	**9,432**	**15,720**	**32,520**

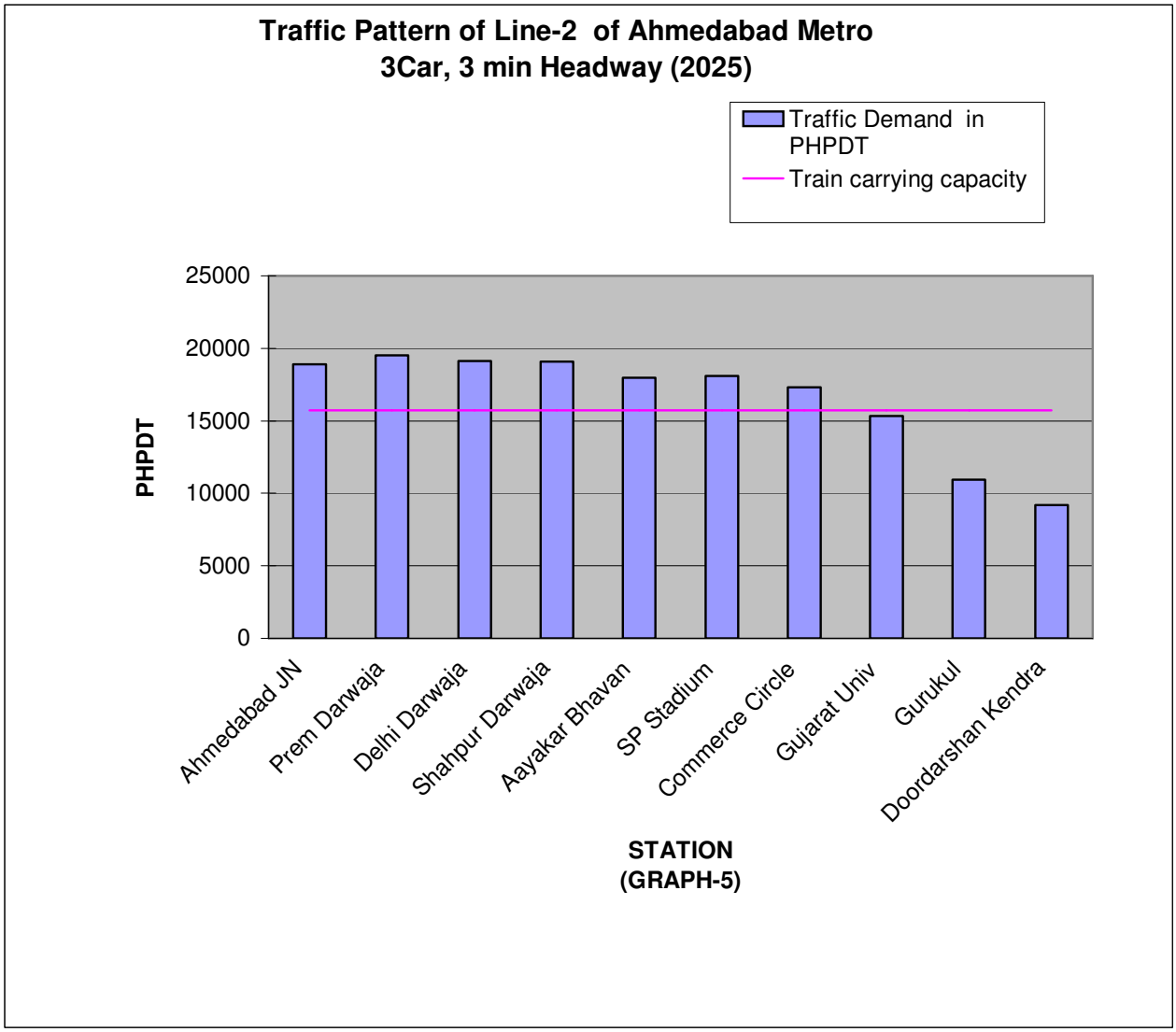
TABLE 5.6
CAPACITY PROVIDED
Line 2 (Ahmedabad-Thaltej Corridor)

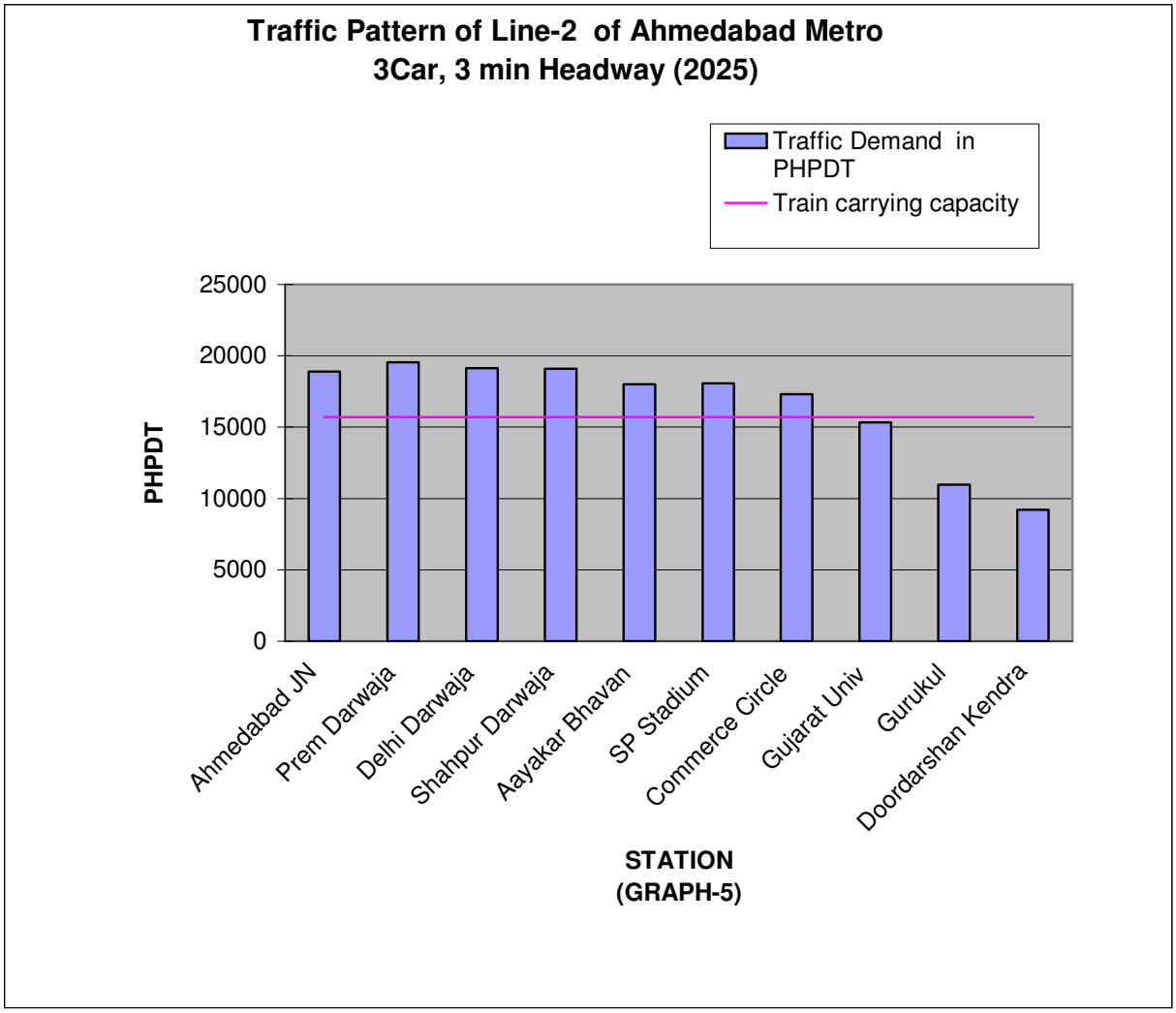
Year	2010	2025	2035
Cars/trains	3	3	3
Head way (Minutes)	5	4	2.5
PHPDT Demand	14,228	19,539	26,668
PHPDT Capacity Available	9,432	15,720	18,864

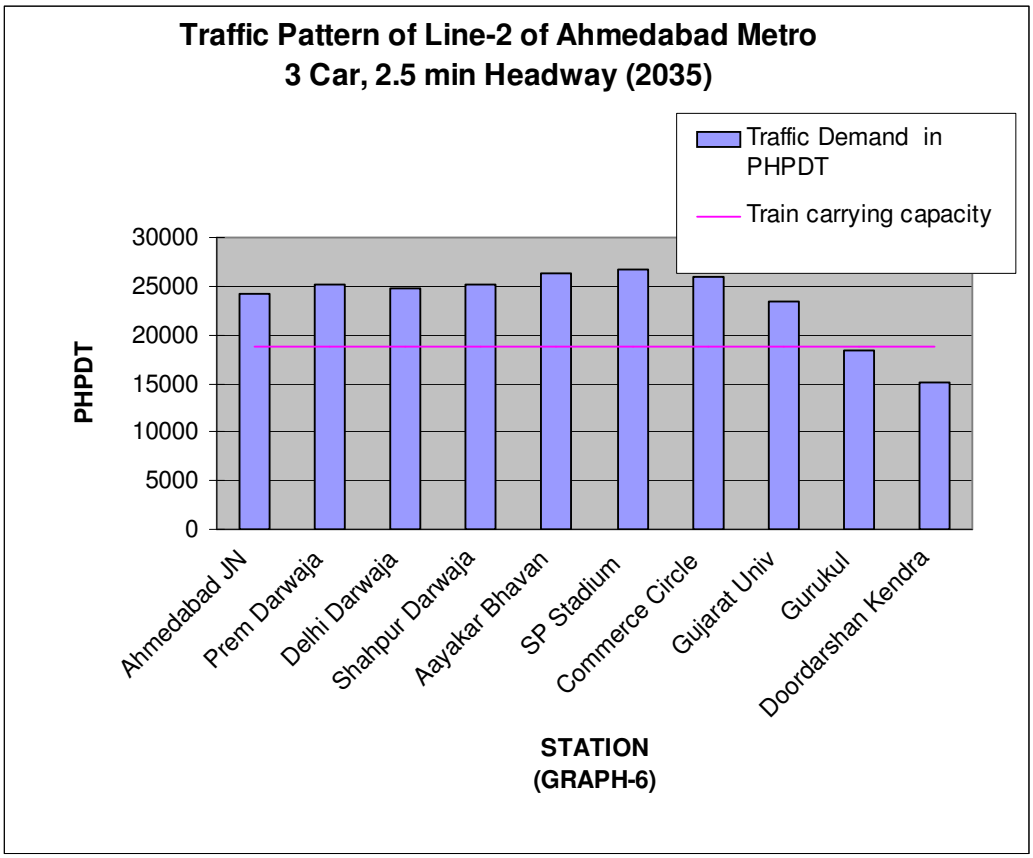



Traffic Pattern of Line-1 of Ahmedabad Metro
3 Car, 3 min Headway (2025)
PHPDT
25000
20000
15000
10000
5000
0
Traffic Demand in PHPDT
Train carrying capacity
APMC
Vasana
Narayan Nagar
Paldi
Madalpur
Nava Gandhigram
Navrangpura
Aayakar Bhavan
Usmanpura
Vadaj
Ghandhi Ashram
Shubhash Circle
Sabarmati
Shankarpur
Acher
Motera Stadium
Motera
Amiyapur
Sughad
Narmada Canal
Koba Circle
Koba
Por
Khudasan
Dhuala Kuva
Iniocity
Indroda Circle
Sector 7
S.T.Depot
Sachivalaya
STATION
(GRAPH-2)


Traffic Pattern of Line-1 of Ahmedabad Metro
6 Car, 3 min Headway (2035)
Traffic Demand in PHPDT
Train carrying capacity
PHPDT
35000
30000
25000
20000
15000
10000
5000
0
APMC
Vasana
Narayan Nagar
Paldi
Madalpur
Nava Gandhigram
Navrangpura
Aayakar Bhavan
Usmanpura
Vadaj
Ghandhi Ashram
Shubhash Circle
Sabarmati
Shankarpur
Acher
Motera Stadium
Motera
Amiyapur
Sughad
Narmada Canal
Koba Circle
Koba
Por
Khudasan
Dhuala Kuva
Infocity
Indroda Circle
Sector 7
S.T.Depot
Sachivalaya
STATION
(GRAPH-3)


Traffic Pattern of Line-2 of Ahmedabad Metro
3Car, 3 min Headway (2025)
Traffic Demand in PHPDT
Train carrying capacity
PHPDT
25000
20000
15000
10000
5000
0
Ahmedabad JN
Prem Darwaja
Delhi Darwaja
Shahpur Darwaja
Aayakar Bhavan
SP Stadium
Commerce Circle
Gujarat Univ
Gurukul
Doordarshan Kendra
STATION
(GRAPH-5)


Traffic Pattern of Line-2 of Ahmedabad Metro
3Car, 3 min Headway (2025)
Traffic Demand in PHPDT
Train carrying capacity
25000
20000
15000
10000
5000
0
PHPDT
Ahmedabad JN
Prem Darwaja
Delhi Darwaja
Shahpur Darwaja
Aayakar Bhavan
SP Stadium
Commerce Circle
Gujarat Univ
Gurukul
Doordarshan Kendra
STATION
(GRAPH-5)



5.3.6 Train frequency

Line - 1

a) The train operation plan provides for 5-minute headway during peak hours and 15 minutes headway during lean hours to keep the services attractive in the year 2010.

b) In the year 2025, train headway is planned at 3 minutes during peak hours and 12 minutes during lean hours.

c) In the year 2035, train headway is planned at 3 minutes (6 car Train) during peak hours and 10 minutes during lean hours.

d) No, services are proposed between 00.00 hrs. to 5.00 hrs. which are reserved for maintenance of infrastructure and rolling stock.

Line - 2

a) The train operation plan provides for 5-minute headway during peak hours and 15 minutes headway during lean hours to keep the services attractive in the year 2010.

b) In the year 2025, train headway is planned at 3 minutes during peak hours and 12 minutes during lean hours.

c) In the year 2035, train headway is planned at 2.5 minutes during peak hours and 10 minutes during lean hours.

d) No, services are proposed between 00.00 hrs. to 5.00 hrs. which are reserved for maintenance of infrastructure and rolling stock.

5.3.7 Hourly Train Operation plan

Line – 1

The hourly distribution of daily transport capacity is presented in **Table 5.7, 5.8 and 5.9** for years **2010, 2025 and 2035** respectively.

Line – 2

The hourly distribution of daily transport capacity is presented in **Table 5.10, 5.11 and 5.12** for years **2010, 2025 and 2035** respectively.

- **Hourly capacity**

Based on daily train operation plan, figures of Peak Hour Peak direction capacity have been worked out for every hour of the day for operation in year 2011, 2021 and 2031. Peak Hour Peak direction capacity have been indicated for every hour of day for line **1** in **Table 5.13, 5.14 & 5.15 and** for **line 2** in **Table 5.16, 5.17 & 5.18.**

TABLE 5.7
Ahmedabad Metro (Line - 1)
Hourly Train operation plan
(YEAR – 2010)
5 Minutes Headway

Time of Day	Headway in Minutes	No. of Trains per day	
		UP	DN
5 to 6	12	5	5
6 to 7	10	6	6
7 to 8	**6**	**10**	**10**
8 to 9	**5**	**12**	**12**
9 to 10	**5**	**12**	**12**
10 to 11	**5**	**12**	**12**
11 to12	**6**	**10**	**10**
12 to 13	10	6	6
13 to 14	10	6	6
14 to 15	10	6	6
15 to 16	10	6	6
16 to 17	**6**	**10**	**10**
17 to 18	**5**	**12**	**12**
18 to 19	**5**	**12**	**12**
19 to 20	**5**	**12**	**12**
20 to 21	**6**	**10**	**10**
21 to 22	10	6	6
22 to 23	12	5	5
23 to 24	15	4	4
Total No. of trains per direction per day		**162**	**162**

TABLE 5.8
Ahmedabad Metro (Line - 1)
Hourly Train operation plan
(YEAR – 2025)
3 Minutes Headway

Time of Day	Headway in Minutes	No. of Trains per day	
		UP	DN
5 to 6	12	5	5
6 to 7	10	6	6
7 to 8	**5**	**12**	**12**
8 to 9	**4**	**15**	**15**
9 to 10	**3**	**20**	**20**
10 to 11	**4**	**15**	**15**
11 to12	**5**	**12**	**12**
12 to 13	6	10	10
13 to 14	6	10	10
14 to 15	6	10	10
15 to 16	6	10	10
16 to 17	**5**	**12**	**12**
17 to 18	**4**	**15**	**15**
18 to 19	**3**	**20**	**20**
19 to 20	**4**	**15**	**15**
20 to 21	**5**	**12**	**12**
21 to 22	6	10	10
22 to 23	10	6	6
23 to 24	12	5	5
Total No. of trains per direction per day		**220**	**220**

TABLE 5.9
Ahmedabad Metro (Line - 1)
Hourly Train operation plan
(YEAR – 2035)
3 Minutes Headway

Time of Day	Headway in Minutes	No. of Trains per day	
		UP	DN
5 to 6	10	6	6
6 to 7	6	10	10
7 to 8	**5**	**12**	**12**
8 to 9	**4**	**15**	**15**
9 to 10	**3**	**20**	**20**
10 to 11	**4**	**15**	**15**
11 to12	**5**	**12**	**12**
12 to 13	6	10	10
13 to 14	6	10	10
14 to 15	6	10	10
15 to 16	6	10	10
16 to 17	**5**	**12**	**12**
17 to 18	**4**	**15**	**15**
18 to 19	**3**	**20**	**20**
19 to 20	**4**	**15**	**15**
20 to 21	**5**	**12**	**12**
21 to 22	6	10	10
22 to 23	10	6	6
23 to 24	10	6	6
Total No. of trains per direction per day		**226**	**226**

TABLE 5.10
Ahmedabad Metro (Line – 2)
Hourly Train operation plan
(YEAR – 2010)
5 Minutes Headway

Time of Day	Headway in Minutes	No. of Trains per day	
		UP	DN
5 to 6	12	5	5
6 to 7	10	6	6
7 to 8	6	**10**	**10**
8 to 9	5	**12**	**12**
9 to 10	5	**12**	**12**
10 to 11	5	**12**	**12**
11 to12	6	**10**	**10**
12 to 13	10	6	**6**
13 to 14	10	6	6
14 to 15	10	6	6
15 to 16	10	6	6
16 to 17	6	**10**	**10**
17 to 18	5	**12**	**12**
18 to 19	5	**12**	**12**
19 to 20	5	**12**	**12**
20 to 21	6	**10**	**10**
21 to 22	10	6	6
22 to 23	12	5	5
23 to 24	15	4	4
Total No. of trains per direction per day		**162**	**162**

TABLE 5.11
Ahmedabad Metro (Line – 2)
Hourly Train operation plan
(YEAR – 2025)
3 Minutes Headway

Time of Day	Headway in Minutes	No. of Trains per day	
		UP	DN
5 to 6	12	5	5
6 to 7	10	6	6
7 to 8	5	**12**	**12**
8 to 9	4	**15**	**15**
9 to 10	3	**20**	**20**
10 to 11	4	**15**	**15**
11 to12	5	**12**	**12**
12 to 13	6	10	10
13 to 14	6	10	10
14 to 15	6	10	10
15 to 16	6	10	10
16 to 17	5	**12**	**12**
17 to 18	4	**15**	**15**
18 to 19	3	**20**	**20**
19 to 20	4	**15**	**15**
20 to 21	5	**12**	**12**
21 to 22	6	10	10
22 to 23	10	6	6
23 to 24	12	5	5
Total No. of trains per direction per day		**220**	**220**

TABLE 5.12
Ahmedabad Metro (Line - 2)
Hourly Train operation plan
(YEAR – 2035)
2.5 Minutes Headway

Time of Day	Headway in Minutes	No. of Trains per day	
		UP	DN
5 to 6	10	6	6
6 to 7	6	10	10
7 to 8	4	**15**	**15**
8 to 9	3	**20**	**20**
9 to 10	2.5	**24**	**24**
10 to 11	3	**20**	**20**
11 to12	4	**15**	**15**
12 to 13	5	12	12
13 to 14	6	10	10
14 to 15	6	10	10
15 to 16	5	12	12
16 to 17	4	**15**	**15**
17 to 18	3	**20**	**20**
18 to 19	2.5	**24**	**24**
19 to 20	3	**20**	**20**
20 to 21	4	**15**	**15**
21 to 22	5	12	12
22 to 23	10	6	6
23 to 24	10	6	6
Total No. of trains per direction per day		**272**	**272**

TABLE 5.13
Ahmedabad Metro (Line – 1)
Hourly Capacity Provided
(YEAR – 2010)
3 CARS 5 Minutes Headway

Time of Day	No of Trains per Hour	PHPDT capacity Available
5 to 6	5	3930
6 to 7	6	4716
7 to 8	10	7860
8 to 9	**12**	**9432**
9 to 10	**12**	**9432**
10 to 11	**12**	**9432**
11 to12	**10**	**7860**
12 to 13	6	4716
13 to 14	6	4716
14 to 15	6	4716
15 to 16	6	4716
16 to 17	10	7860
17 to 18	**12**	**9432**
18 to 19	**12**	**9432**
19 to 20	**12**	**9432**
20 to 21	**10**	**7860**
21 to 22	6	4716
22 to 23	5	3930
23 to 24	4	3144

TABLE 5.14
Ahmedabad Metro (Line – 1)
Hourly Capacity Provided
(YEAR – 2025)
3 CARS 3 Minutes Headway

Time of Day	No of Trains per Hour	PHPDT capacity Available
5 to 6	5	3930
6 to 7	6	4716
7 to 8	12	9432
8 to 9	**15**	**11790**
9 to 10	**20**	**15720**
10 to 11	**15**	**11790**
11 to12	**12**	**9432**
12 to 13	10	7860
13 to 14	10	7860
14 to 15	10	7860
15 to 16	10	7860
16 to 17	12	9432
17 to 18	**15**	**11790**
18 to 19	**20**	**15720**
19 to 20	**15**	**11790**
20 to 21	**12**	**9432**
21 to 22	10	7860
22 to 23	6	4716
23 to 24	5	3930

TABLE 5.15
Ahmedabad Metro (Line - 1)
Hourly Capacity Provided
(YEAR – 2035)
6 CARS 3 Minutes Headway

Time of Day	No of Trains per Hour	PHPDT capacity Available
5 to 6	6	9756
6 to 7	10	16260
7 to 8	12	19512
8 to 9	**15**	**24390**
9 to 10	**20**	**32520**
10 to 11	**15**	**24390**
11 to12	**12**	**19512**
12 to 13	10	16260
13 to 14	10	16260
14 to 15	10	16260
15 to 16	10	16260
16 to 17	12	19512
17 to 18	**15**	**24390**
18 to 19	**20**	**32520**
19 to 20	**15**	**24390**
20 to 21	**12**	**19512**
21 to 22	10	16260
22 to 23	6	9756
23 to 24	6	9756

TABLE 5.16
Ahmedabad Metro (Line - 2)
Hourly Capacity Provided
(YEAR – 2010)
3 CARS 5 Minutes Headway

Time of Day	No of Trains per Hour	PHPDT capacity Available
5 to 6	5	3930
6 to 7	6	4716
7 to 8	10	7860
8 to 9	**12**	**9432**
9 to 10	**12**	**9432**
10 to 11	**12**	**9432**
11 to12	**10**	**7860**
12 to 13	**6**	**4716**
13 to 14	6	4716

14 to 15	6	4716
15 to 16	6	4716
16 to 17	10	7860
17 to 18	**12**	**9432**
18 to 19	**12**	**9432**
19 to 20	**12**	**9432**
20 to 21	**10**	**7860**
21 to 22	6	4716
22 to 23	5	3930
23 to 24	4	3144

TABLE 5.17
Ahmedabad Metro (Line - 2)
Hourly Capacity Provided
(YEAR – 2025)
3 CARS 3 Minutes Headway

Time of Day	No of Trains per Hour	PHPDT capacity Available
5 to 6	5	3930
6 to 7	6	4716
7 to 8	12	9432
8 to 9	**15**	**11790**
9 to 10	**20**	**15720**
10 to 11	**15**	**11790**
11 to12	**12**	**9432**
12 to 13	**10**	**7860**
13 to 14	10	7860
14 to 15	10	7860
15 to 16	10	7860
16 to 17	12	9432
17 to 18	**15**	**11790**
18 to 19	**20**	**15720**
19 to 20	**15**	**11790**
20 to 21	**12**	**9432**
21 to 22	10	7860
22 to 23	6	4716
23 to 24	5	3930

TABLE 5.18
Ahmedabad Metro (Line - 2)
Hourly Capacity Provided
(YEAR – 2035)
3 CARS 2.5 Minutes Headway

Time of Day	No of Trains per Hour	PHPDT capacity Available
5 to 6	6	4716
6 to 7	10	7860
7 to 8	15	11790
8 to 9	**20**	**15720**
9 to 10	**24**	**18864**
10 to 11	**20**	**15720**
11 to12	**15**	**11790**
12 to 13	**12**	**9432**
13 to 14	10	7860
14 to 15	10	7860
15 to 16	12	9432
16 to 17	15	11790
17 to 18	**20**	**15720**
18 to 19	**24**	**18864**
19 to 20	**20**	**15720**
20 to 21	**15**	**11790**
21 to 22	**12**	**9432**
22 to 23	6	4716
23 to 24	6	4716

5.3.8 Vehicle Kilometre

Based on above planning, after considering maintenance period and assuming 340 days in service in a year, Vehicle Kilometre for year 2011, 2021 and 2031 are given in **Table 5.19 and 5.20**

TABLE 5.19
Vehicle Kilometre
Line 1 (APMC/APMC Vasna – Gandhi Nagar Corridor)

Year	2010	2025	2035
Section Length	31.85	31.85	31.85
No of cars per Train	3	3	6
No of working Days in a year	340	340	340
Number of Trains per day each Way	162	220	226
Daily Train -KM	10319	14014	14396
Annual Train - KM (10^5)	35.09	47.65	48.95
Annual Vehicle - KM (10^5)	**105.26**	**142.94**	**293.68**

TABLE 5.20
Vehicle Kilometre
Line 2 (Ahmedabad – Thaltej Corridor)

Year	2010	2025	2035
Section Length	9.80	9.80	9.80
No of cars per Train	3	3	3
No of working Days in a year	340	340	340
Number of Trains per day each Way	162	220	272
Daily Train -KM	3175	4312	5331
Annual Train - KM (10^5)	10.80	14.66	18.13
Annual Vehicle - KM (10^5)	32.39	43.98	54.38

5.3.9 Year wise rake Requirement

Based on Train formation and headway as decided above to meet Peak Hour Peak Direction Traffic Demand in different years, Rake requirement has been tabulated in **Table 5.21 and Table 5.22** for Line-1 and Line-2 respectively.

Requirements of coaches for Line 1 (APMC Vasna-Akshardham) Section and for Line-2 (Ahmedabad-Thaltej) Section are calculated based on following assumptions-

Assumptions -

1. Train Composition planned as under
   3 Car Train Composition DMC + TC + DMC
   6 Car Train Composition DMC + TC + MC + MC + TC + DMC
2. Train Capacity DMC = 253 (Passengers)
   MC/ TC = 280 (passengers)
   3 Car Train = 786 passengers
   6 Car Train = 1626 passengers
3. Coach requirement has been calculated based on headway during peak hours.
4. Traffic reserve is taken as one/two train per section to cater to failure of train on line and to make up for operational time lost.
5. Repair and maintenance has been estimated as 8 % of total requirement (Bare +Traffic Reserve) based on IOH & POH interval.
6. The calculated number of rakes in fraction is rounded off to next higher number.

7. Schedule speed is taken as 35 Kmph for Line-1 (North-South corridor) and Line-2 (East-West corridor) because of presence of Sharp curves and steep gradients
8. Turn round time is taken as 3 min at terminal stations.

5.4 Cost Estimate

For estimation of cost per coach, cost of DMRC EMU has been taken as reference because the coach planned for Ahmedabad Metro is similar to DMRC. For DMRC, 60 coaches has been imported and 180 coaches are planned for assembling / manufacturing in BEML, Bangalore. Accordingly various venders for Electrical Systems, PA/PIS, Air conditioner etc are being developed. It is expected that with little investment BEML may become a Centre for assimilation of technology for design & manufacture of modern metro rolling stock and will be able to manufacture and supply coaches for future metros.

Accordingly cost for coaches of Ahmedabad metro has been worked out assuming that certain sub-system and assemblies will be manufactured indigenously in India and partial components will be imported. The average cost per car at **June 2004** price worked out to be **Rs 4.25 crores** without taxes and duties. The estimated cost for **120 cars** required in the year 2011 works out to be **510 crores**.

TABLE 5.21
Ahmedabad Metro
APMC Vasna-Akshardham
Rake Requirement

APMC/APMC Vasna-Akshardham
Schedule Speed 35 Kmph

Passenger Capacity @6 Persons/sqm - 3CarTrain 786
6CarTrain 1626

Year-2010

Section	DISTANCE KMS	Projected PHPDT Demand	Max. PHPDT Capacity Available	HEADWAY MIN	RAKE REQUIREMENT			TOTAL No of Rakes	RAKE CONSIST	NO OF CARS
					BARE	TRAFFIC RESERVE	R&M			
APMC Vasna-Akshardham	31.85	11356	9432	5	24	2	3	29	3CARS	87

Year-2025

Section	DISTANCE KMS	Projected PHPDT Demand	Max. PHPDT Capacity Available	HEADWAY MIN	RAKE REQUIREMENT			TOTAL No of Rakes	RAKE CONSIST	NO OF CARS
					BARE	TRAFFIC RESERVE	R&M			
APMC Vasna-Akshardham	31.85	20940	15720	3	39	2	4	45	3CARS	135

Year-2035

Section	DISTANCE KMS	Projected PHPDT Demand	Max. PHPDT Capacity Available	HEADWAY MIN	RAKE REQUIREMENT			TOTAL No of Rakes	RAKE CONSIST	NO OF CARS
					BARE	TRAFFIC RESERVE	R&M			
APMC Vasna-Akshardham	31.85	33312	32520	3	39	2	4	45	6CARS	270

TABLE 5.22
Ahmedabad Metro
Ahmedabad -Thaltej
Rake Requirement

Thaltej-Thaltej
Schedule Speed 35 Kmph

Passenger Capacity @6 Persons/sqm - 3CarTrain 786
6CarTrain 1626

Year-2010

Section	DISTANCE KMS	Projected PHPDT Demand	Max. PHPDT Capacity Available	HEADWAY MIN	RAKE REQUIREMENT			TOTAL No of Rakes	RAKE CONSIST	NO OF CARS
					BARE	TRAFFIC RESERVE	R&M			
Ahmedabad -Thaltej	9.85	14228	9432	5	8	2	1	11	3CARS	33

Year-2025

Section	DISTANCE KMS	Projected PHPDT Demand	Max. PHPDT Capacity Available	HEADWAY MIN	RAKE REQUIREMENT			TOTAL No of Rakes	RAKE CONSIST	NO OF CARS
					BARE	TRAFFIC RESERVE	R&M			
Ahmedabad -Thaltej	9.85	19539	15720	3	14	2	2	18	3CARS	54

Year-2035

Section	DISTANCE KMS	Projected PHPDT Demand	Max. PHPDT Capacity Available	HEADWAY MIN	RAKE REQUIREMENT			TOTAL No of Rakes	RAKE CONSIST	NO OF CARS
					BARE	TRAFFIC RESERVE	R&M			
Ahmedabad -Thaltej	9.85	26668	18864	2.5	16	2	2	20	3CARS	60