

CHAPTER 4 EXISTING TRAFFIC CONDITIONS

4.1 TRAFFIC SURVEYS UNDERTAKEN

Table 4.1-1 shows outline of traffic surveys undertaken.

TABLE 4.1-1 OUTLINE OF TRAFFIC SURVEYS

Surveys	Method	Survey Stations	Implement Period
12-hour Traffic Counts	Manual count by direction and vehicle type. Recorded at every one hour.	40 stations (Figure 4.1-1)	From 06:00 to 18:00, 4-21 Nov. 2003 (weekday)
24-hour Traffic Counts*	Manual count by direction and vehicle type. Recorded at every one hour.	6(+4) stations (Figure 4.1-1)	From 06:00 to 06:00 next morning, 6-18 Nov. 2003 (weekday)
24-hr OD Survey*	Roadside driver interview. For taxi, jeepney and bus, passengers were also interviewed.	6(+4) stations (Figure 4.1-1)	From 06:00 to 06:00 next morning, 6-25 Nov. 2003 (weekday)
Terminal Survey	Terminal layout plan, number of bays, parking capacity, bus jeepney / routes, number of bus/jeepney for each route, facilities for waiting passengers, etc.	7 terminals (Figure 4.1-1)	From 06:00 to 18:00, 7-24 Nov. 2003 (weekday)
Travel Time Survey	Floating car method for car and truck. For a jeepney and a bus, surveyor rode on a bus/jeepney to measure travel time.	10 routes (Appendix 4.1-1)	3 times (morning, noon, and after noon) per day 4-20 Nov. 2003 (weekday)

* 3-more Traffic Counts and OD Survey were conducted at Cagayan de Oro (Lumbia) Airport, and Cagayan de Oro Seaport (Main & Agola Gates for Cargo Vehicles, and Main & Passenger Gates for Passenger), in addition to Roadside Traffic Counts & OD Survey, to obtain necessary data for other transport related facilities. And OD Survey in the Central Business District (City Proper) of Cagayan de Oro City was also conducted to obtain the reference data for person trip tendency in urban center as trial case, which was not carried out in other Study Area in Metro Iloilo and Metro Bacolod.

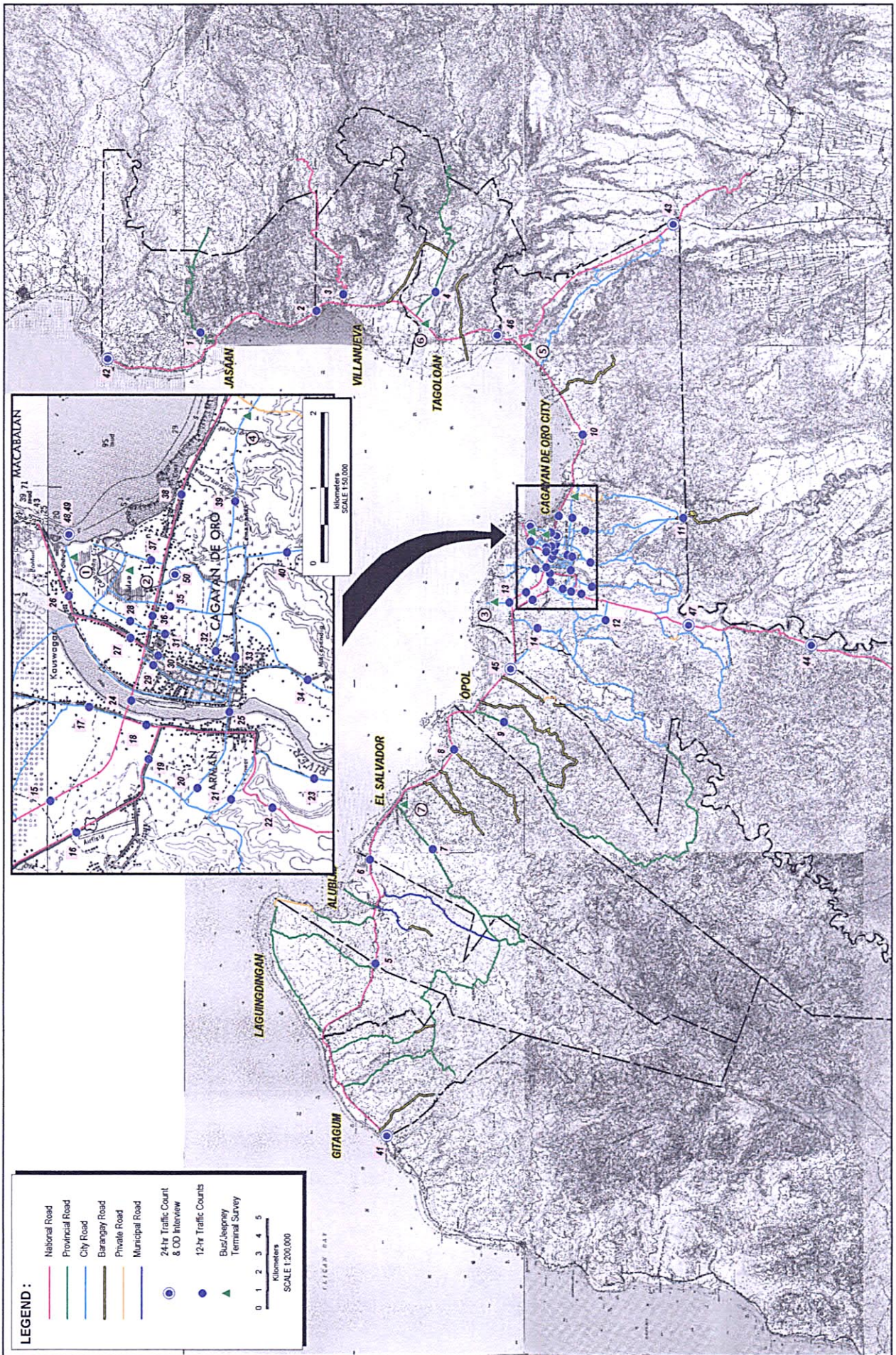


FIGURE 4.1-1 TRAFFIC SURVEY POINT (METRO CAGAYAN DE ORO)

Table 4.1-2 shows sampling rate at all OD survey stations.

TABLE 4.1-2 SAMPLING RATE OF ROADSIDE & TERMINAL OD SURVEY

Type of Survey	Station No.	*Total Traffic Volume		No. of Sample Interviewed		Average Sampling Rate (%)	
		Vehicle / Driver	Passenger	Vehicle / Driver	Passenger	Vehicle / Driver	Passenger
Roadside OD	41	3,876	4,111	1,249	1,816	32.2	44.2
	42	2,643	9,308	1,404	1,999	53.1	21.5
	43	5,032	7,722	2,261	2,998	44.9	38.8
	44	599	2,842	466	1,954	77.8	68.8
	45	10,728	3,269	1,159	2,483	10.8	76.0
	46	9,809	14,669	2,730	2,537	27.8	17.3
	Total / Average	32,688	41,921	9,269	13,787	28.4	32.9
Passenger Terminal OD	A.P.	1,980	5,357	-	1,336	-	24.9
	S.P.(Main)	-	2,415	-	2,005	-	83.0
	S.P.(Pax)	-	946	-	856	-	90.5
	Total / Average	1,980	8,718	-	4,197	-	48.1
Cargo Terminal OD	S.P.(Main)	2,712	-	1,566	-	57.7	-
	S.P.(Agora)	917	-	301	-	32.8	-
	Total / Average	3,629	-	1,867	-	51.4	-
Overall	Total / Average	38,297	50,639	11,136	17,984	29.1	35.5
C.B.D. OD	Total / Average	96,316	314,975	424	2,874	0.4	0.9

Remarks Vehicle / Driver : Estimated AADT for Roadside Stations (excluding Tricycle, Motorbike, and Special Equip.),
Observed Traffic Volume for Airport and Seaport Stations (Except Pax Gate of CDO Port)
Passenger : Estimated from Observed Average Occupancy for Roadside Stations (excluding Driver), or
Estimated from A.T.O. & P.P.A. Statistical Data for Passenger Terminal Stations
A.P. : Cagayan de Oro Airport
S.P. : Cagayan de Oro Seaport
C.B.D. : Cagayan de Oro City Proper (Central Business District)

4.2 TRAFFIC CHARACTERISTICS

4.2.1 Present OD Pattern

1) Traffic Volume on Cordon Line

Table 4.2-1 and Figure 4.2-1 shows traffic volume at all 24-hr stations (cordon line) in the Metro Cagayan de Oro Area. Total traffic volume along outer cordon line at the both eastern and western sides of the Study Area was estimated as around 8 thousand vehicles per day. In addition, that of along middle cordon line at the point of entrance and/or exit to/from the south of the Cagayan de Oro City was around 7 thousand vehicles per day. In contrast, that of along inner cordon line at the points located both sides of Cagayan de Oro City was accumulated as around 26 thousand vehicles per day.

TABLE 4.2-1 TRAFFIC VOLUME ON CORDON LINE IN THE METRO CAGAYAN DE ORO

Section	Station No.	Type of Vehides						Total
		Car	Taxi	Jeepney	Bus	Truck	Others	
Cordon Line	41	2,238	43	414	399	762	637	4,492
	42	1,154	29	434	265	737	1,094	3,712
	Outer	3,392	72	847	664	1,498	1,730	8,205
	43	2,298	64	804	357	1,473	1,318	6,314
	44	262	16	177	8	136	363	961
	Middle	2,560	80	981	366	1,609	1,681	7,276
	45	5,272	856	2,809	447	1,299	2,298	12,982
	46	4,367	364	2,719	320	1,987	3,179	12,937
	Inner	9,639	1,221	5,528	767	3,286	5,478	25,919
	Total	15,591	1,373	7,356	1,797	6,168	8,889	41,174

Note: Sta. 41 Iligan-Cagayan-Butuan Rd. (Eastern & Outer Side)
 42 Iligan-Cagayan-Butuan Rd. (Western & Outer Side)
 43 Tagoloan-Bukindon Rd. (Sayre Highway)
 44 Cagayan-Talakag Rd.
 45 Iligan-Cagayan-Butuan Rd. (Eastern & Inner Side)
 46 Iligan-Cagayan-Butuan Rd. (Western & Inner Side)

2) Present OD Pattern

Figure 4.2-2 and Figure 4.2-3 shows present OD pattern for passenger and cargo traffic in the Metro Cagayan de Oro Area, respectively. The figure for passenger indicates that there is tight connection within Cagayan de Oro City. On the other hand, the figure for cargo indicates that there is tight connection within, especially east side of Cagayan de Oro City, where Cagayan de Oro Port located.

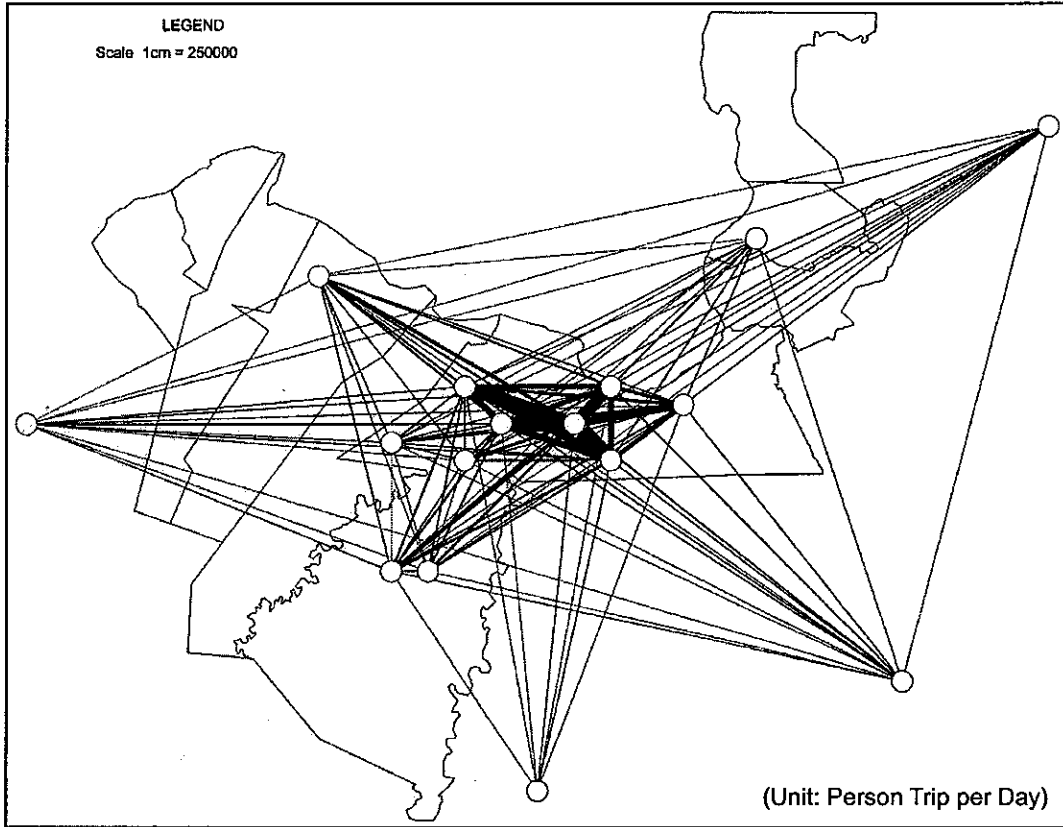


FIGURE 4.2-2 PRESENT DESIRED LINE (PASSENGER TRIP)

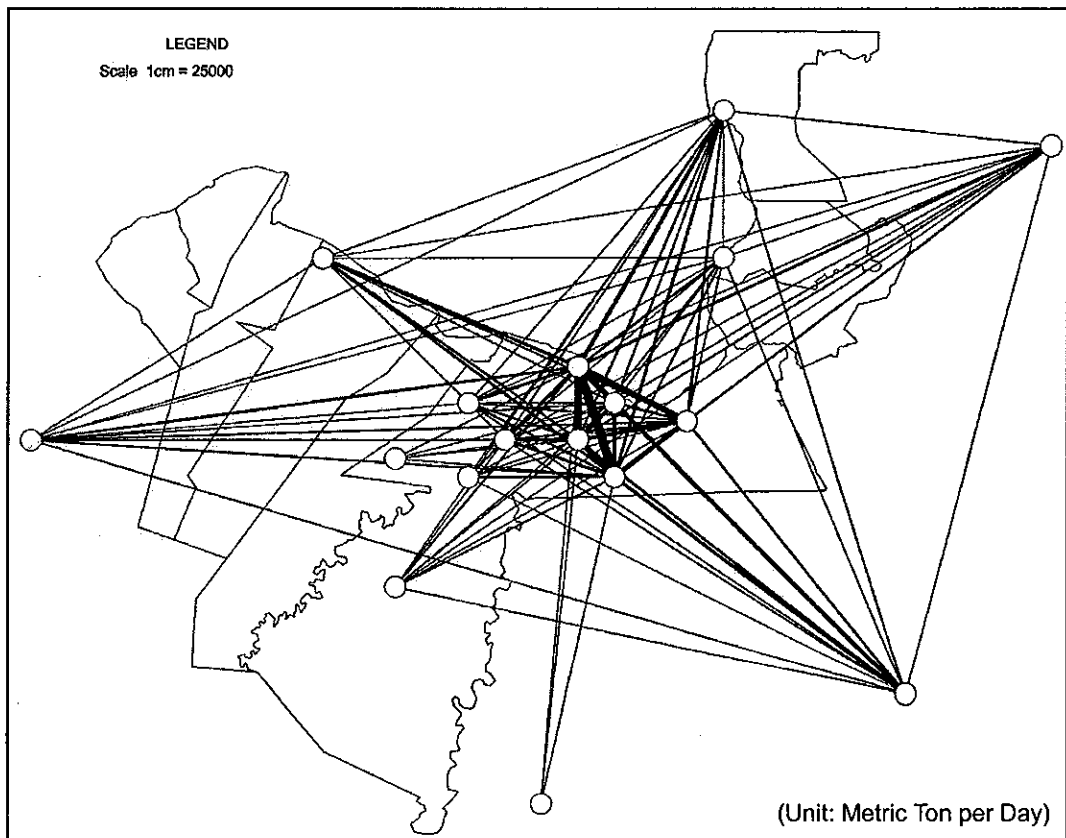


FIGURE 4.2-3 PRESENT DESIRED LINE (CARGO TRIP)

3) Trip Purpose of Passengers

Table 4.2-2 shows passenger trips by purpose based on the roadside OD surveys in the Metro Cagayan de Oro Area. It is noted that share of trip purpose of “business” are relatively high among the trip purposes to/from Metro Cagayan de Oro as well as Cagayan de Oro City, which followed by “private” trips, except “to home” for outbound direction at either station located at Metro Cagayan de Oro or Cagayan de Oro City boundaries.

TABLE 4.2-2 TRIP PURPOSE OF PASSENGERS IN METRO CAGAYAN DE ORO

Location	Direction	To Work	To School	Business	Private	To Home	Total
Metro Cagayan de Oro	Inbound	3,297	1,273	13,903	7,321	13,505	39,298
		8%	3%	35%	19%	34%	100%
(Sta.41,42)	Outbound	2,280	523	14,185	5,385	16,808	39,180
		6%	1%	36%	14%	43%	100%
	Total	5,577	1,795	28,088	12,706	30,312	78,478
		7%	2%	36%	16%	39%	100%
Cagayan de Oro City	Inbound	10,764	4,598	28,903	21,659	20,210	86,132
		12%	5%	34%	25%	23%	100%
(Sta.43,44, 45,46)	Outbound	6,268	1,697	26,520	10,948	35,341	80,772
		8%	2%	33%	14%	44%	100%
	Total	17,031	6,295	55,422	32,606	55,550	166,904
		10%	4%	33%	20%	33%	100%

(Unit: Person Trip per Day)

4) Passenger Trip Generation/Attraction by Zone

Figure 4.2-4 shows passenger trip generation and attraction by zone, which was crossing the Cordon Line. About one-half of trips was generated from and/or attracted to Eastern or Western Municipalities in the Metro Cagayan de Oro Area. And one-third of trips were from/to Cagayan de Oro City. Remaining one-sixth was from/to outside the Study Area.

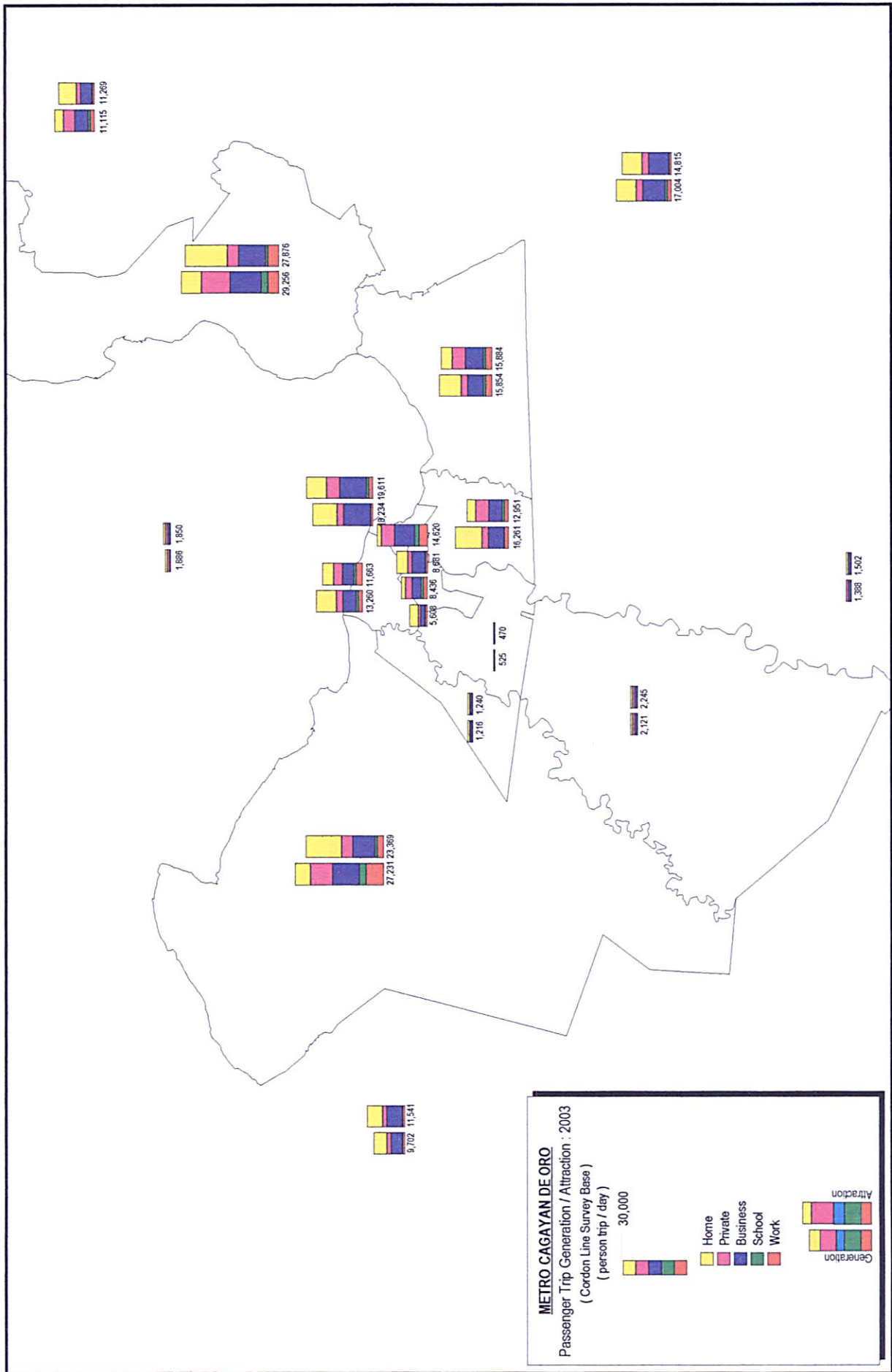


FIGURE 4.2-4 PASSENGER TRIP GENERATION / ATTRACTION BY ZONE

5) Type of Commodity

Table 4.2-3 shows cargo volume by item based on the roadside OD surveys in the Metro Cagayan de Oro Area. Total share of “agro-products” was the highest for inbound movements with 57% or 47% at Metro Cagayan de Oro or Cagayan de Oro City boundaries. On the other hand, “manufactured products” was the highest for outbound movements with 45% or 42% at same boundaries

TABLE 4.2-3 TYPE OF COMMODITY IN METRO CAGAYAN DE ORO

Location	Direction	Agro-Products	Manufact'd Products	Forest,Min ing,Mineral	Construc'n Materials	Container & Empty	Total
Metro Cagayan de Oro	Inbound	5,684	1,650	813	982	631	9,759
		58%	17%	8%	10%	6%	100%
	Outbound	1,666	2,918	686	1,019	183	6,471
		26%	45%	11%	16%	3%	100%
(Sta.41,42)	Total	7,349	4,568	1,498	2,001	813	16,229
		45%	28%	9%	12%	5%	100%
Cagayan de Oro City	Inbound	8,764	5,196	976	2,446	1,079	18,460
		47%	28%	5%	13%	6%	100%
	Outbound	4,970	5,529	833	1,473	436	13,240
		38%	42%	6%	11%	3%	100%
(Sta.43,44, 45,46)	Total	13,733	10,724	1,808	3,919	1,515	31,699
		43%	34%	6%	12%	5%	100%

(Unit: Metric Ton per Day)

6) Cargo Trip Generation/Attraction by Zone

Figure 4.2-5 shows cargo trip generation and attraction by zone, which was crossing the Cordon Line. It is noted that eastern side of Cagayan de Oro City, together with Cagayan de Oro Seaport, generates and attracts relatively high volume of commodities.

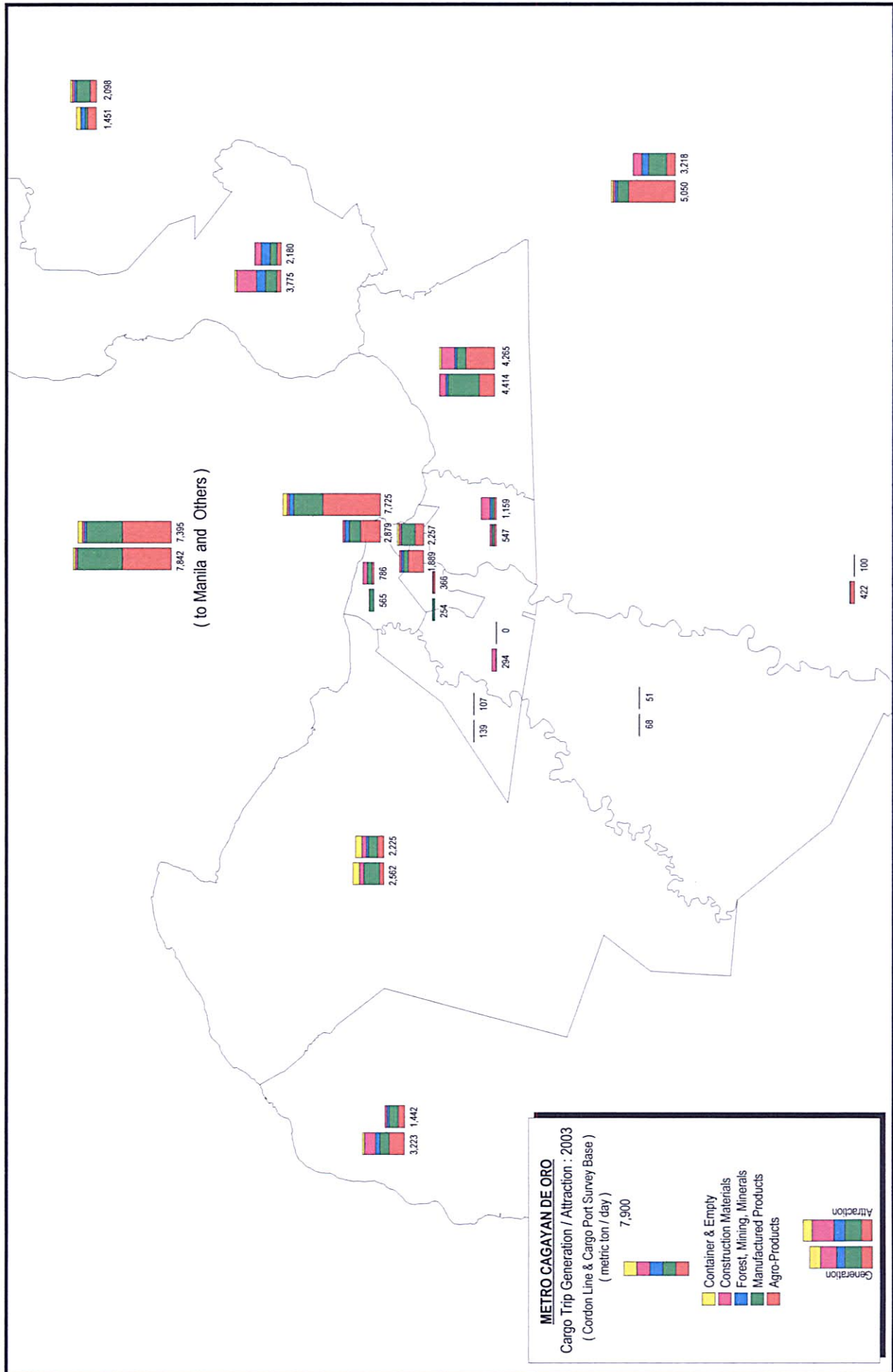


FIGURE 4.2-5 CARGO TRIP GENERATION / ATTRACTION BY ZONE

4.2.2 Traffic Volume on Major Roads

1) Survey Result

(a) Traffic Volume and Vehicle Compositions

Table 4.2-5 and Figure 4.2-6 shows traffic volume and its vehicle composition on major roads in the Metro Cagayan de Oro Area.

TABLE 4.2-5 TRAFFIC VOLUME AND VEHICLE COMPOSITIONS ON MAJOR ROADS IN THE METRO CAGAYAN DE ORO AREA

Section	Sta.	Section	Car	Jeepney	Bus	Truck	Others	Total
Cagayan de Oro City Top 10	13	Saarenas St.	3,527 22%	11,190 69%	553 3%	173 1%	706 4%	16,149 100%
	19	Calamansi St. (East)	11,498 54%	6,460 31%	30 0%	780 4%	2,394 11%	21,162 100%
	15	ICBR (Kauswagan, CDO)	13,065 59%	3,772 17%	49 0%	2,116 10%	3,147 14%	22,149 100%
	18	Carmen-Kauswagan Rd. (South)	12,594 55%	6,279 27%	85 0%	1,229 5%	2,714 12%	22,901 100%
	10	ICBR (Cuguman, CDO)	9,912 43%	6,991 30%	656 3%	3,119 13%	2,457 11%	23,135 100%
	30	A. Velez St.	13,476 52%	9,225 36%	25 0%	327 1%	2,897 11%	25,950 100%
	36	ICBR (Nazareth Church, CDO)	14,893 53%	8,791 31%	46 0%	1,861 7%	2,742 10%	28,333 100%
	38	ICBR (Lapasan, CDO)	15,401 49%	8,894 28%	677 2%	3,767 12%	2,933 9%	31,672 100%
	25	Carmen Bridge	16,092 42%	14,610 38%	1 0%	20 0%	7,531 20%	38,254 100%
	24	ICBR (Maharlica Bridge, CDO)	25,409 61%	7,073 17%	83 0%	3,209 8%	5,800 14%	41,574 100%
Metro CDO Cordon Line	41	ICBR (Gitagum / Libertad)	2,281 51%	413 9%	399 9%	783 17%	637 14%	4,513 100%
	42	ICBR (Jasaan / Jampason)	1,183 32%	434 12%	265 7%	761 20%	1,094 29%	3,737 100%
CDO City Cordon Line	43	CBDR (Sayre Highway)	2,363 37%	804 13%	358 6%	1,510 24%	1,317 21%	6,352 100%
	44	Cagayan-Talakag Rd. (South)	278 29%	177 18%	8 1%	136 14%	363 38%	962 100%
	45	ICBR (CDO / Opol)	6,127 47%	2,809 22%	446 3%	1,345 10%	2,299 18%	13,026 100%
	46	ICBR (CDO / Tagoloan)	4,731 36%	2,719 21%	320 2%	2,039 16%	3,180 24%	12,989 100%

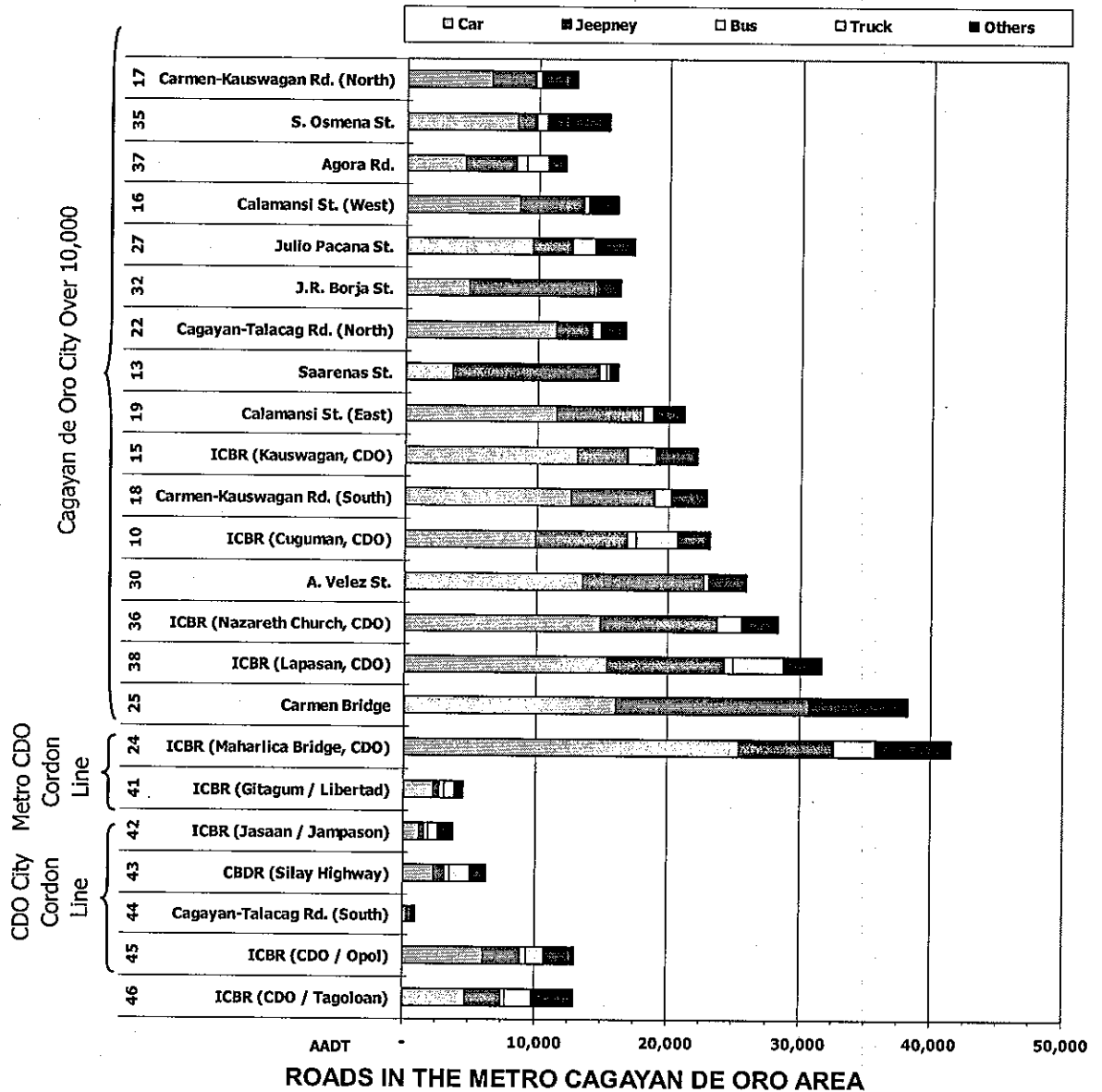
At the boundary of Metro Cagayan de Oro, including Sayre Highway and Cagayan - Talakag Road, the total traffic volume was around 15,600 vehicles per day, of which 39% was small cars, followed by motorbike with 22%.

At the boundary of Cagayan de Oro City along Iligan-Cagayan-Butuan Road (ICBR), there are two main entrance/exit points, from/to municipalities of Tagoloan, Villanueva, and Jasaan on the East, or Opol, El Salvador, Laguindingan, and Gitagum on the West. The total traffic volume from/to Cagayan de Oro City was around 26,000 vehicles per day, of which 42% was

small cars, followed by jeepneys with 21% in average, and volume from/to the west and the east are almost even, although the compositions of them are different.

For the traffic from/to the west, almost half of them are small cars, followed by jeepneys, motorbikes, and cargo trucks, with share of 22%, 18%, and 10%, respectively. On the other hand, for the traffic from/to the east, small cars share drops by 36%, followed by motorbikes, jeepneys, and cargo trucks, with share of 24%, 21%, and 16%, respectively.

FIGURE 4.2-6 TRAFFIC VOLUME AND VEHICLE COMPOSITIONS ON MAJOR



As for the traffic inside the Cagayan de Oro City, the largest traffic volume was observed at the Maharlica Bridge, which connects both west and east sides of the Metro Cagayan de Oro. The traffic volume at this station was reaching about 41,500 vehicles per day, of which 61% was small cars, followed by jeepneys with 17%.

The second largest traffic volume was observed at Carmen Bridge, which connects the Poblacion on the east and Carmen on the west. This bridge has only 2-lane, although approach roads on both sides are 4-lane. The total traffic volume at this station was remarkably around 38,000 vehicles per day, of which 42% was small cars, and 38% was jeepneys.

The traffic in the most divisions of the Cagayan de Oro City CBD is characterized by the high volume and high composition rates of small cars and jeepneys.

(b) Hourly Variation on Major Roads

Figure 4.2-7 (1) ~ (3) shows the typical hourly variations of traffic volume on major roads in the Metro Cagayan de Oro Area.

Metro Cagayan de Oro Cordon Line (i.e. Sta.43 / Sayre Highway)

The traffic for each direction showed almost same tendency and volume at this station. As a whole, a morning peak occurred between 10:00 and 11:00, and an afternoon peak occurred around 14:00 and 16:00 to 17:00.

The peak hour traffic volume at this station was around 500 vehicles per hour, with peak ratio of 9.5% to the daily traffic, which was recorded between 10:00 and 11:00, and 24/12-hr ratio is 1.32.

Cagayan de Oro City Cordon Line (i.e. Sta. 45 / ICBR / Cagayan-Opol Section)

The traffic for each direction at this station also showed almost same tendency and volume. As a whole, a morning peak occurred between 07:00 and 08:00, and an afternoon peak occurred around between 15:00 to 16:00.

The peak hour traffic volume at this station was around 1,000 vehicles per hour, with peak ratio of 9.5% to the daily traffic, which was recorded between 07:00 and 08:00, and 24/12-hr ratio is 1.31.

Main Roads in Cagayan de Oro City (i.e. Sta. 24 / Maharlica Bridge)

Most of the main roads in Cagayan de Oro City had similar characteristics in hourly traffic variation. Basically, morning peak occurred on inbound traffic flow, and afternoon peak occurred on outbound traffic flow.

At the Maharlica Bridge, where the highest volume was recorded, the inbound traffic had a morning peak between 07:00 and 09:00. On the other hand, the outbound traffic had a morning peak around 11:00 to noon. After lunch-time off-peak, the traffic flow showed almost the same tendency and volume for both directions and afternoon peak occurred around 16:00 to 17:00. As a whole, a morning peak occurred between 07:00 and 08:00, and an afternoon peak occurred between 16:00 and 17:00. The peak hour ratio to the daily traffic was 9.5% with 3,100 vehicles per hour, which was recorded between 16:00 and 17:00.

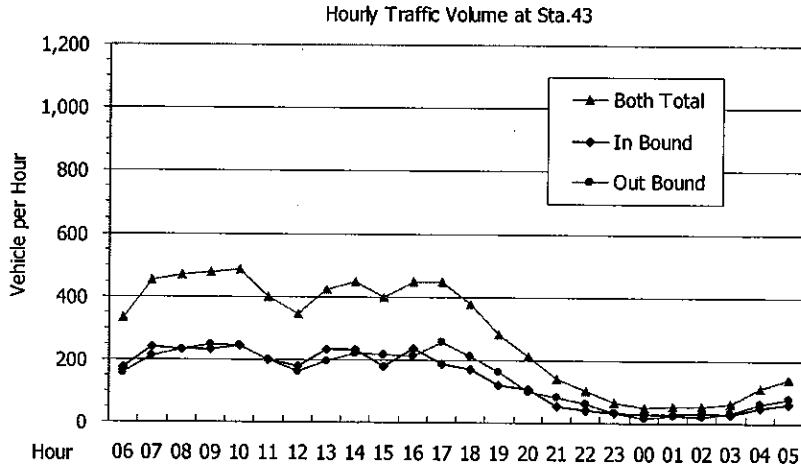


FIGURE 4.2-7 (1) HOURLY VARIATION ON MAJOR ROAD ALONG METRO CAGAYAN DE ORO CORDON LINE [SAYRE HIGHWAY]

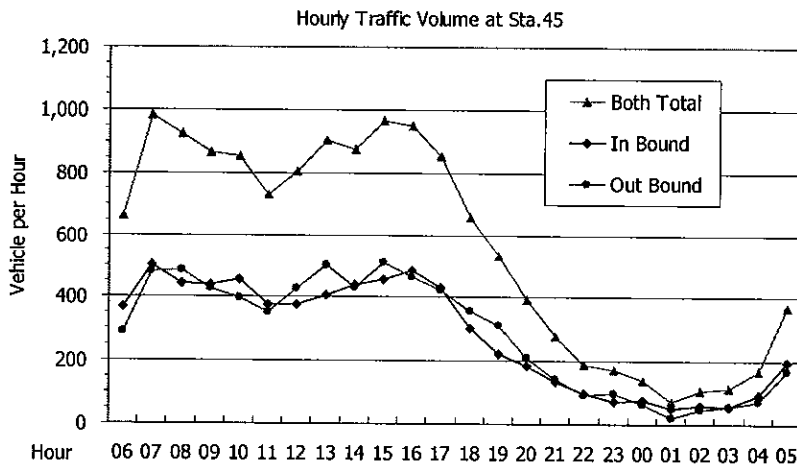


FIGURE 4.2-7 (2) HOURLY VARIATION ON MAJOR ROAD ALONG CAGAYAN DE ORO CITY CORDON LINE [ILIGAN-CAGAYANBUTUAN ROAD (CDO/OPOL SECTION)]

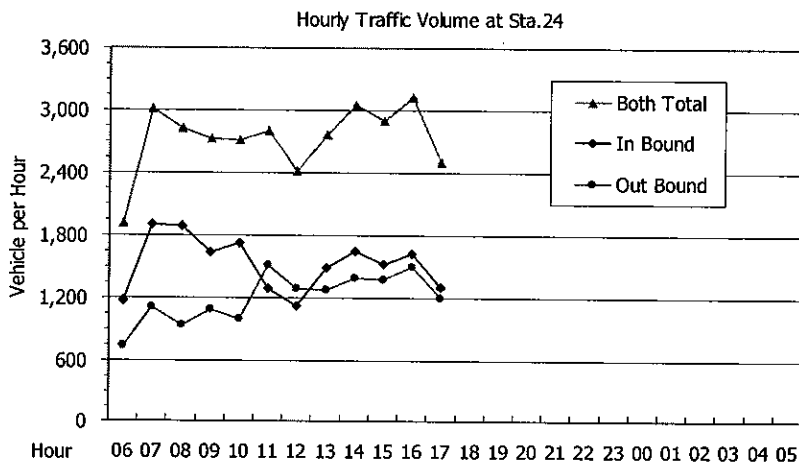


FIGURE 4.2-7 (3) HOURLY VARIATION ON MAJOR ROAD IN CAGAYAN DE ORO CITY CBD [MAHARLICA BRIDGE]

(c) Vehicle Passenger Occupancy

Table 4.2-6 shows average passenger occupancy obtained from the roadside OD survey.

TABLE 4.2-6 AVERAGE OCCUPANCY RATE

Vehicle Type	Average Passenger Occupancy
Car	2.53
Jeepney	13.51
Bus	27.90
Truck	2.55

(Unit: Passenger per Vehicle, including Driver)

(d) Loading Volume

Table 4.2-7 shows average loading volume and empty vehicle ratio obtained from the roadside OD survey. Among the heavy vehicles, the trucks with 4-axles or more have the heaviest tonnages with approximately 11.1 tons per vehicle-trip in terms of gross average (including empty trucks).

The overall average loading volume is estimated as 6.1 tons per vehicle-trip in terms of net average (excluding empty trucks), and 4.8 tons per vehicle-trip in terms of gross average taking into account the empty truck ratio of about 21%.

TABLE 4.2-7 AVERAGE LOADING VOLUME

Code	Main Commodity	Pick-up, Van	Truck w/ 2-axle	Truck w/ 3-axle	Truck w/ 4- axle or more	Truck Average
01	Unprocessed Agro-Products	0.35	3.44	15.67	17.44	9.25
02	Sugar Cane		10.20	13.51	17.47	13.67
03	Processed Agro-Products	0.76	7.85	11.54	25.51	13.29
04	Manufactured Foodstuff	0.34	3.29	11.65	18.76	8.44
05	Manufactured Goods	0.43	4.07	15.92	19.09	9.43
06	Forestry Products		3.98	12.10	9.09	6.02
07	Mining & Mineral Oil Products	0.16	2.43	10.71	14.13	5.75
08	Construction Materials	0.31	5.10	15.95	21.71	9.95
09	Producers Goods	0.25	6.35	13.31	17.49	11.16
00	Container & Empty	0.00	0.22	0.97	1.43	0.56
Average Loading Volume (Gross)		0.01	1.97	7.85	11.05	4.82
Empty Vehicle Ratio		0.11	0.21	0.26	0.14	0.21
Average Loading Volume (Net)		0.01	2.48	10.62	12.82	6.09

(Unit: Metric Ton per Vehicle)

2) Traffic Assignment Result**

(a) Daily Traffic Volume

Figure 4.2-8 shows traffic demand and volume-capacity (v/c) ratio on present road networks in the Metro Cagayan de Oro Area as well as Cagayan de Oro City. In general, the traffic volume is higher, as the location of road section is closer to City Proper in Cagayan de Oro City.

** Traffic Volume together with Volume-Capacity Ratio (VCR) indicated in this section is provided by the JICA-STRADA (System for Traffic Demand Analysis) packages. Therefore, indices in the figures are not always matching with exact values obtained from the traffic surveys.

It is also pointed out that the traffic demand is concentrating into District of Poblacion on the east bank and District of Carmen on the west bank of Cagayan de Oro River. And only two bridges, namely Maharlica Bridge located at downstream and Carmen Bridge located upstream of Cagayan de Oro River, connecting both banks, became bottlenecks of the traffic flow coming into as well as going out from the Cagayan de Oro City.

The highest traffic volume of 54,400 pcu per day is found on the Maharlica Bridge along Iligan-Cagayan-Butuan Road, and 35,800 pcu per day is seen on the Carmen Bridge, after the condition of opening 4th bridge on the upstream side of Cagayan de Oro River.

Even after the opening of 4th bridge, still the Carmen Bridge will be remaining as a bottleneck of the City, and adjacent section of road networks at both side of river bank will be still suffering serious traffic problem, such as v/c ratios exceeding 1.0.

(b) Average Travel Speed

Average travel speed by different type of cars along major radial roads as well as major streets in the Cagayan de Oro City CBD is shown in Table 4.2-8

With regard to the J. R. Borja Extension (R6) and General Capistrano - Corrales St. (R10), the travel speed becomes less than 10 km/hr due to over-concentration of the traffic as mentioned above.

TABLE 4.2-8 AVERAGE TRAVEL SPEED

Road No.	Road Name	Length (km)		Travel Speed (km/hr)							
				Car				Jeepney			
				am	noon	pm	ave.	am	noon	pm	ave.
R1	ICBR (Jct. Puerto-Jasaan/Balingasag Bdry.)	25.0	29.6	51.2	52.5	49.7	51.1	44.7	41.9	40.6	42.4
R2	ICBR (Opol/CDO Bdry.-Gitagum/Initao Bdry.)	32.2	33.7	52.9	56.0	52.2	53.7	42.7	43.1	41.8	42.5
R3	Puerto- CDO/Bukidnon Bdry.	12.6	13.3	44.5	47.5	42.6	44.9	48.4	45.4	46.8	46.8
R4	CDO City-Talakag	27.9	27.6	39.7	38.1	37.2	38.3	36.0	36.5	35.3	35.9
R5	CDO City-Puerto	20.0	20.7	24.7	23.2	22.3	23.4	21.9	23.5	22.9	22.7
R6	J.R.Borja Extension	4.2	1.1	7.9	8.1	7.4	7.8	8.4	9.2	7.7	8.4
R7	Jct. Bulua-Jct. Carmen-Kauswagan Road	3.2	3.3	29.1	32.4	24.4	28.6	23.3	24.0	24.1	23.8
R8	A. Velez-Pier	3.5	3.2	13.0	10.4	11.0	11.5	12.1	12.6	11.9	12.2
R9	CDO City-Bonbon	5.4	4.3	15.1	13.2	14.2	14.2	12.8	13.8	13.0	13.2
R10	Gen. Capistrano-Corrales St.	3.0	1.3	7.6	7.8	7.4	7.6	7.2	6.6	5.9	6.6

Road No.	Road Name	Length (km)		Travel Speed (km/hr)							
				Dumprtruck				Bus			
				am	noon	pm	ave.	am	noon	pm	ave.
R1	ICBR (Jct. Puerto-Jasaan/Balingasag Bdry.)	25.0	29.6	48.3	49.6	47.2	48.3	52.6	52.3	49.9	51.6
R2	ICBR (Opol/CDO Bdry.-Gitagum/Initao Bdry.)	32.2	33.7	51.6	53.5	51.0	52.1	52.9	52.9	51.2	52.3
R3	Puerto- CDO/Bukidnon Bdry.	12.6	13.3	42.2	45.4	42.0	43.2	46.3	49.0	45.6	47.0
R4	CDO City-Talakag	27.9	27.6	38.7	36.9	36.4	37.3	-	-	-	-
R5	CDO City-Puerto	20.0	20.7	24.7	22.7	21.8	23.1	24.9	23.4	22.7	23.7
R6	J.R.Borja Extension	4.2	1.1	-	-	-	-	-	-	-	-
R7	Jct. Bulua-Jct. Carmen-Kauswagan Road	3.2	3.3	25.6	30.1	22.7	26.1	-	-	-	-
R8	A. Velez-Pier	3.5	3.2	11.8	9.3	10.6	10.6	-	-	-	-
R9	CDO City-Bonbon	5.4	4.3	14.2	12.9	13.8	13.6	-	-	-	-
R10	Gen. Capistrano-Corrales St.	3.0	1.3	7.3	7.5	7.1	7.3	-	-	-	-

Note: — Jeepney

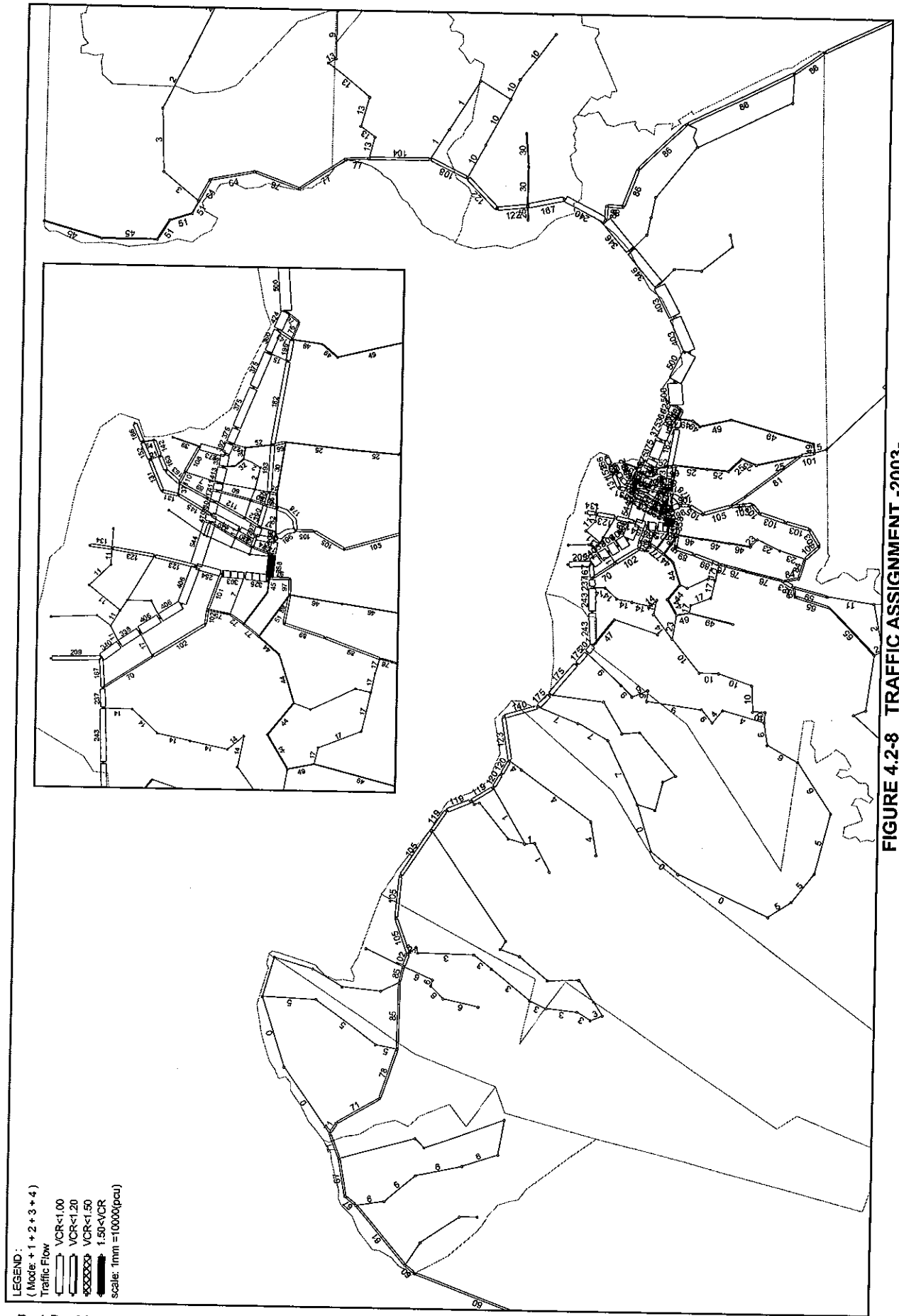


FIGURE 4.2-8 TRAFFIC ASSIGNMENT -2003-

4.2.3 Airport and Seaport Related Traffic***

1) Airport

The present Cagayan de Oro Airport is located at the south side of the Cagayan de Oro City, on the west plateau area with a runway length of 1,800 meters. The Cagayan de Oro Airport is serving for the flight from/to Manila, Cebu, and General Santos operated by Philippine Airlines (PAL), Cebu Pacific Air (CPA), Air Philippines, and other minor operators as well as some military and general aviation.

(a) Passengers and Cargo Volume

Table 4.2-9 and Figure 4.2-9 show the number of passengers and cargo handled by the Cagayan de Oro Airport in recent five years, obtained from Air Transport Office, DOTC. According to these records, the average number of passengers and cargo volume were reaching around 1,600 persons and 35 metric tons per day in recent years, respectively.

TABLE 4.2-9 PASSENGERS AND CARGO HANDLED BY CAGAYAN DE ORO

Departure / Arrival Total	98	99	00	01	02	Ave.Growth ('98~'02)
Passengers						
Annual Total	421,460	487,160	472,730	457,610	468,880	1.5%
Daily Average	1,400	1,620	1,580	1,530	1,560	
Cargo						
Annual Total	9,200	10,100	11,700	10,500	10,200	2.5%
Daily Average	30.7	33.7	39.0	35.0	34.0	

AIRPORT

(Data Source: Air Transport Office, Cagayan de Oro Airport, DOTC)

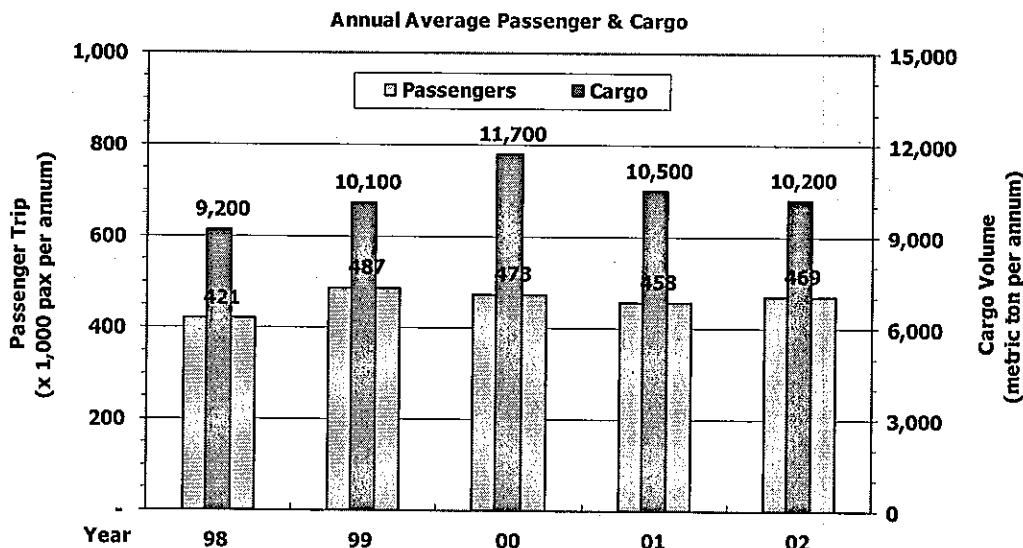


FIGURE 4.2-9 PASSENGERS AND CARGO HANDLED BY CAGAYAN DE ORO AIRPORT

(b) Airport Related Traffic Demand

As shown in Table 4.2-10, the total number of airport related traffic is estimated

*** Daily average figures indicated in this section are estimated from the following formula taking account of the cancellation of the flights/voyages that occur several times during the year due to critical weather conditions and/or malfunction of the aircrafts/vessels. [Daily Average = Annual Total / 300]

around 2,100 vehicles and 5,400 persons per day based on the traffic counting survey at the Cagayan de Oro Airport.

The main mode is private cars, which consists of around 95%. Origin and/or destination of the airport users are illustrated in Figure 4.2-10. Cagayan de Oro City and outside the Study Area are absorbing almost half each of the airport related vehicle and passenger traffic, and only 5% of demand having its origin and/or destination in eastern or western municipalities in the Study Area.

TABLE 4.2-10 AIRPORT RELATED VEHICLE & PASSENGER TRAFFIC GENERATION & ATTRACTION

GA Traffic	Vehicle/Day	Share
Car	1,994	94.8%
Jeepney	-	0.0%
Bus	1	0.0%
Truck	42	2.0%
Others	67	3.2%
Total	2,104	100.0%

GA Traffic	Persons/Day	Share
Car	5,128	95.7%
Jeepney	-	0.0%
Bus	40	0.7%
Truck	98	1.8%
Others	91	1.7%
Total	5,357	100.0%

ATTRACTION

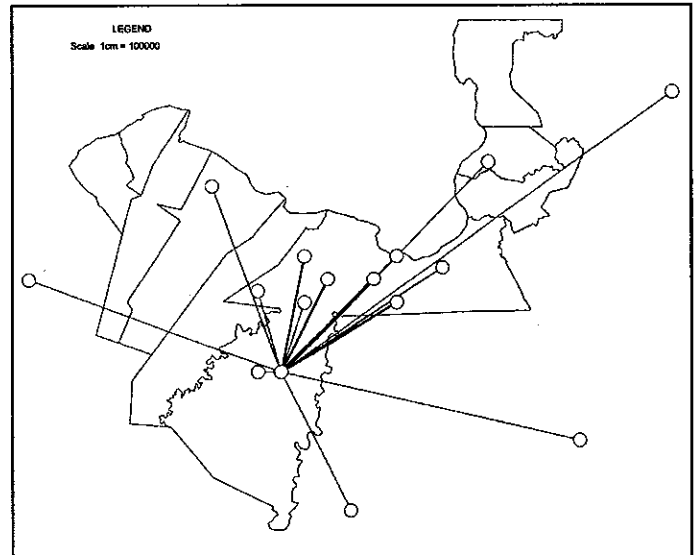


FIGURE 4.2-10 PRESENT DESIRED LINE FOR AIRPORT RELATED TRAFFIC

2) Seaports

The Cagayan de Oro Seaport (categorized as PPA Base Port) is located at east side of Macabalan Point at Cagayan de Oro River mouth, which facing to the Macajalar Bay. This port handled passengers as well as cargo (bulk and container). Passenger ferry going to and/or coming from Manila and Cebu stops over this port daily basis. Mean while, cargo ships going to and/or coming from Manila as well as other major ports in and/or out of Philippines also anchor this port. The other port, namely MICP (Mindanao International Container Port) in Tagoloan, is now under construction, and will be in operational from 2004. There are some more private ports scattering along the shore line, mainly eastern side of the bay, operated by private factory such as Del Monte, Philippine Sinter, etc.

(a) Passengers and Cargo Volume

Table 4.2-11 and Figure 4.2-11 show the number of passengers and cargo handled by the Cagayan de Oro Seaports in recent five years, obtained from Philippines Port Authority. According to these records, the average number of passengers and cargo volume were reaching around 4,700 persons and 14,400 metric tons per day in 2002, respectively.

TABLE 4.2-11 PASSENGERS AND CARGO HANDLED BY CAGAYAN DE ORO PORT

Embark / Disembark Total	1998	1999	2000	2001	2002	Ave. Growth ('98~'02)
Passengers (persons)						
Annual Total	1,375,200	1,280,700	1,273,200	1,269,300	1,407,900	0.8%
Daily Average	4,580	4,270	4,240	4,230	4,690	
Cargo (metric tons)						
Annual Total	3,759,400	3,953,900	3,856,600	3,995,900	4,327,400	3.7%
Daily Average	12,530	13,180	12,860	13,320	14,420	

(Data Source: Annual Statistical Report, Philippine Port Authority)

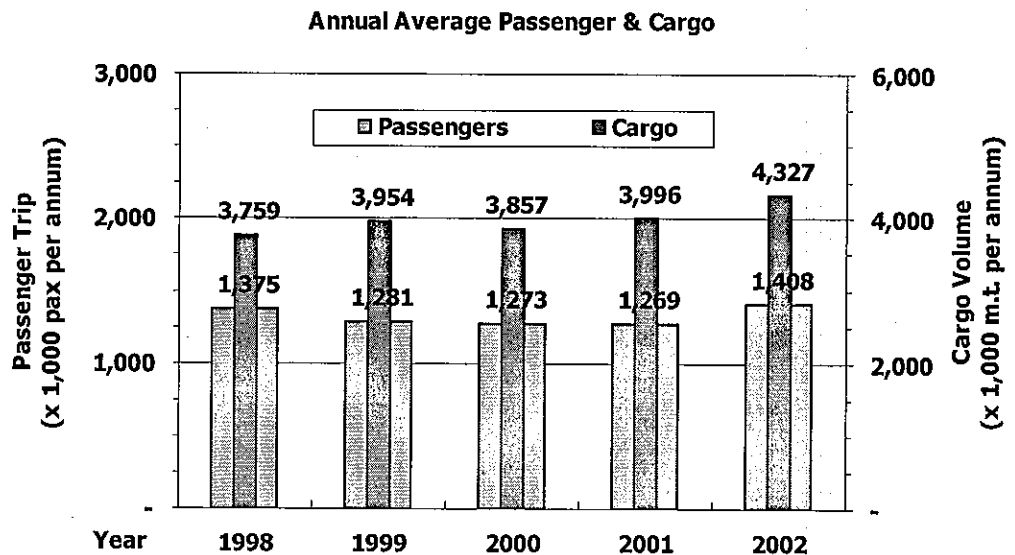


FIGURE 4.2-11 PASSENGERS AND CARGO HANDLED BY CAGAYAN DE ORO PORT

(b) Seaports Related Traffic Demand

TABLE 4.2-12 SEAPORTS RELATED VEHICLE & PASSENGER TRAFFIC GENERATION ATTRACTION

GA Traffic	Vehicle/Day	Share
Car	1,249	31.5%
Jeepney	8	0.2%
Bus	4	0.1%
Truck	1,758	44.3%
Others	946	23.9%
Total	3,965	100.0%

GA Traffic	Persons/Day	Share
Car	5,668	49.6%
Jeepney	125	1.1%
Bus	153	1.3%
Truck	2,779	24.3%
Others	2,713	23.7%
Total	11,438	100.0%

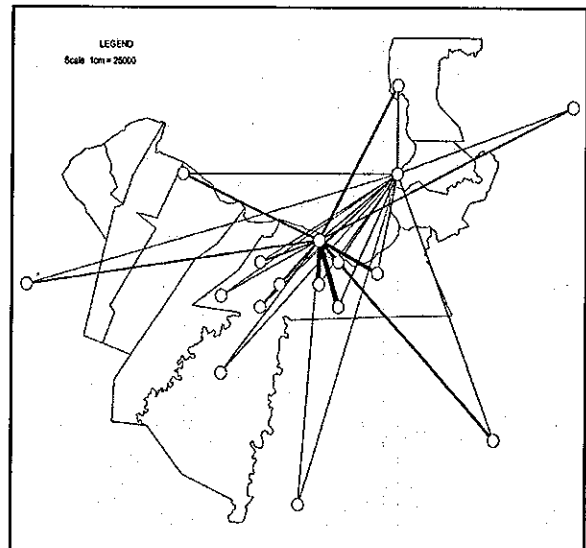


FIGURE 4.2-12 PRESENT DESIRED LINE FOR SEAPORT RELATED TRAFFIC

As shown in Table 4.2-12, the total number of seaports related traffic demand is estimated around 4,000 vehicles and 11,500 persons per day based on the traffic counting survey at the Cagayan de Oro Seaports. Major sub-mode of seaports users, except truck drivers, is private car and other vehicle, such as tricycle or pedal-cabs. Details are described in following section.

The main origin and/or destination of the seaports related traffic is illustrated in Figure 4.2-12. Cagayan de Oro City is absorbing almost half of the seaport related passenger traffic, and more than 85% of the vehicle traffic.

3) Trip Production

Table 4.2-13 shows the number of embarked/disembarked passengers as well as volume of cargo loaded/unloaded at airport and seaport on the day of survey. According to this table, trip production rate of vehicles and persons who send off and/or welcome those embarked/disembarked passengers at airport is smaller than that of which observed in Metro Iloilo and Metro Bacolod, due to ban of jeepney entering into airport parking lot in Cagayan de Oro Airport at Lumbia. For cargo truck, average loading weight is quite different from that of which observed at cordon line survey¹.

TABLE 4.2-13 AIRPORT & SEAPORTS RELATED TRAFFIC

Terminal	Embarked / Disembarked Passengers		Observed Traffic		Trip Production Rate	
			Vehicles	Passengers	Veh/Pax	Pax/Pax
A.P.	1,440	pax	2,062	5,259	1.43	3.65
S.P.	2,667	pax	2,207	8,659	0.83	3.25

Terminal	Loaded / Unloaded Cargo		Observed Traffic		Trip Production Rate	
			Vehicles		Veh/m.t.	m.t./Veh
A.P.	28.6	m.t.	42		1.47	0.68
S.P.	13,731	m.t.	1,758		0.13	7.81

4.2.4 Bus/Jeepney Routes and Terminals

Table 4.2-14 shows number of arrival and departure, as well as on stand-by in peak hour with capacity of each bus/jeepney terminal in the Metro Cagayan de Oro Area.

According to this observation report, most of bus/jeepney terminals are able to handle present demands of arrival and departure, except terminals in Tagoloan and El Salvador. On the other hand, stand-by space for most of jeepney terminals are not sufficient, when cumulative number of jeepneys in the terminal was calculated from the number of arrival and departure. Especially jeepney terminals at Carmen and Tagoloan seemed to be required immediate actions to provide enough spaces for standing-by jeepneys, since present peak demands are already exceeding more than triple of provided capacities (number of stand-by bay).

¹ In the traffic forecast stage, traffic generated from and/or attracted to the airport and seaports are calculated from these trip production rates indicate in the table multiplied by estimated future passenger and cargo demands.

TABLE 4.2-14 CONDITION OF BUS/JEEPNEY TERMINALS

#	Terminal	Peak Hour						Capacity	
		Arrival	VCR	Departure	VCR	Stand-by	VCR	On & Off	Stand-by
1a	West Integrated Bus Terminal	71 (7)	-	65 (7)	-	45	**	15	15
1b	West Integrated Jeepney Term.	17 (2)	-	15 (2)	-	37	-	20	38
2	East Integrated Jeepney Term.	313 (31)	-	333 (33)	-	93	**	34	42
3	Agora Integrated Bus Terminal	28 (3)	-	26 (3)	-	29	***	11	9
4	Carmen Jeepney Terminal	24 (2)	-	20 (2)	-	43	***	8	6
5	Puerto Jeepney Terminal	22 (2)	-	24 (2)	-	15	**	10	6
6	Tagoloan Jeepney Terminal	40 (4)	*	40 (4)	*	32	***	2	6
7	El Salvador Jeepney Terminal	87 (9)	***	85 (9)	***	4	*	2	3

Remarks : Volume-Capacity Ratio (VCR) is calculated as follows;

On & Off : Maximum Arrival & Departure in 5-min (assumed 1/10 of Peak-Hour Demand) vs On & Off Spaces

Stand-by : Maximum Stand-by In Any Hour vs Stand-by Spaces

*** : VCR>3.0 ** : VCR>2.0 * : VCR>1.0 - : VCR<1.0

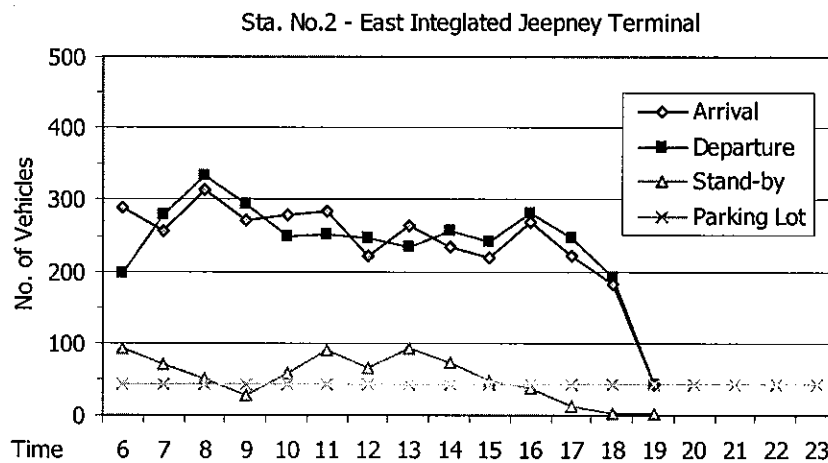


FIGURE 4.2-14 DEMANDS OF JEEPNEY TERMINAL IN CAGAYAN DE ORO CITY (EIJT)

As show in Figure 4.2-14, the East Integrated Jeepney Terminal in Cagayan de Oro City remarkably handled around 200~300 jeepneys every hours during the daytime, it equivalents around 20~30 units every 5-minute. It is also pointed out that this terminal seemed to be saturated and will not be able to handle any further demands, unless expanding its facilities together with improvement of access road and traffic signal system, installed on National Highway (Iligan-Cagayan-Butuan Road), is secured.

Figures 4.2-15 shows jeepney routes within the central part of Cagayan de Oro City. Several routes of those are concentrating on to the particular streets in the CBD, and most of routes are passing through both or either major public markets located in Poblacion at east side and/or Carmen at west side of Cagayan de Oro River. It is also indicated that one of the reason why the over concentration of the traffic on to the only two bridges, namely Maharlica Bridge and Carmen Bridge, is occurred, might be caused by these routes arrangements, even after the City authorities counter actions, such as construction of the "Integrated Jeepney & Bus Terminal" for eastbound and westbound jeepneys, are carried out.

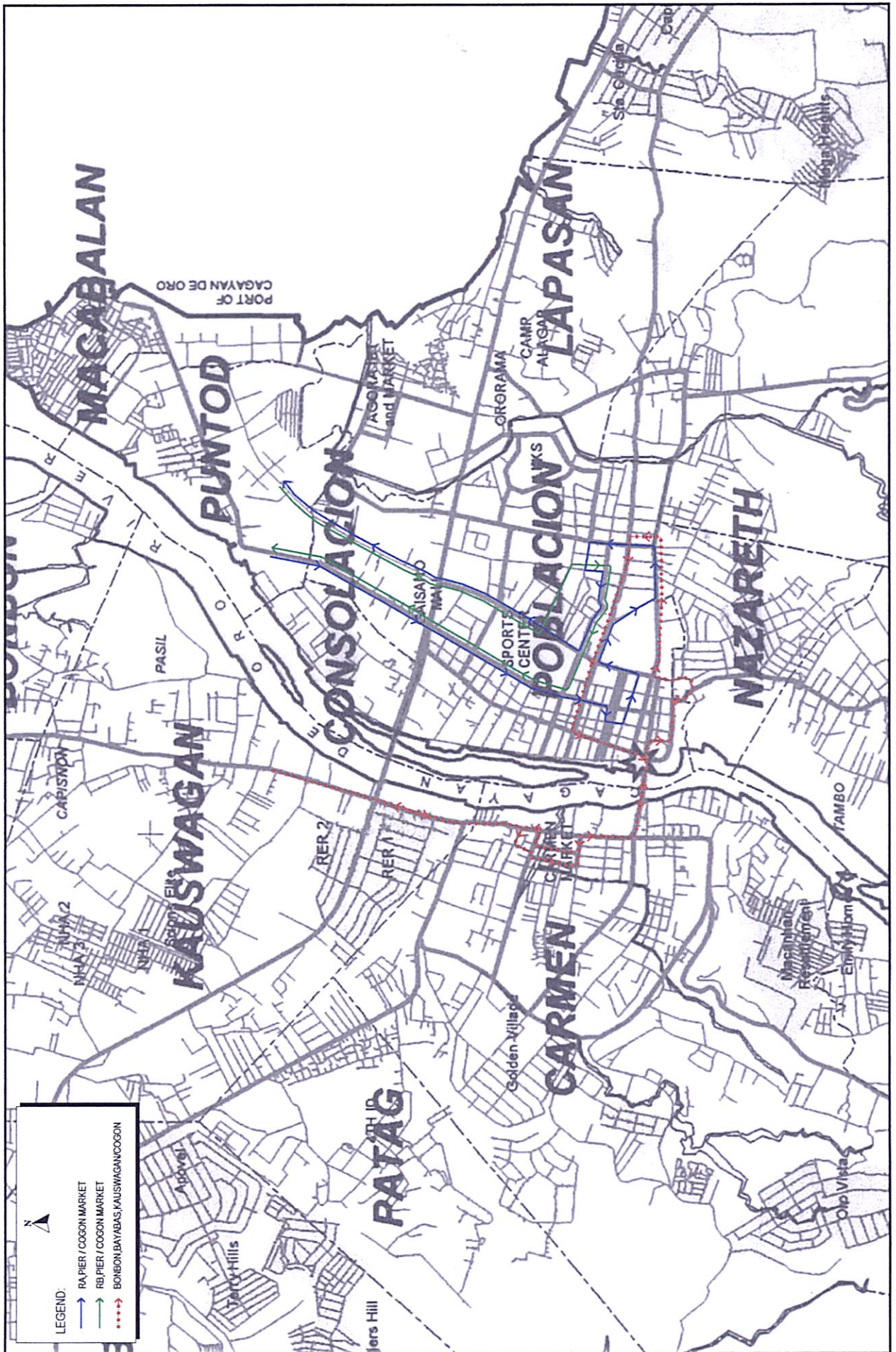


FIGURE 4.2-15 EXISTING ROUTES OF PUJ'S IN CAGAYAN DE ORO CITY (NORTHBOUND PUJ'S)

4.3 TRAFFIC MANAGEMENT IN METRO CAGAYAN DE ORO AREA

4.3.1 Introduction

This section presents the existing traffic and traffic management conditions in the study area of Metropolitan Cagayan de Oro as noted from observations, surveys, references and meetings with various parties during the site visit. These are the groundwork for the formulation of the recommendations. A summary of the key issues and recommendations on the improvement measures are also given at the end of the section.

4.3.2 Existing Conditions

1) Road Network

The study area locates at the northern shoreline of Mindanao Island and surrounds Macabalan Bay. It consists of Cagayan de Oro City and the towns of Gitagum, Laguindingan, Alubijid, El Salvador, Opol, Tagoloan, Villanueva and Jasaan along the coast with the City at the center. The study area is mostly hilly but flat land are found only along the shoreline. Even within the City, the flat area is limited and a plateau extends from the hinterland where Lumbia Airport is located. The Cagayan River runs from south to north into the bay creating a valley, dividing the central area of the city into two parts. Another plateau exists at the southeast part of the study area through which a national highway leading to Davao City on the southern coast of the island passes.

A road network also follows the geographic shape. A national highway (Iligan-CDO-Butuan Road) runs along coast line and connects Cagayan de Oro City with Iligan City in the west and Butuan City in the east. Except Cagayan de Oro City premises, only small roads branch out from the national highway into inland area. Within the city, the road network has been developed on both sides of the river. Although area is not big, a grid pattern road network is formed at the CBD on the east. On the west side, the road network is more irregular with most of the area used as residential purpose. There are only two bridges that connect east and west parts of the city across the river, Maharlika Bridge (formerly Marcos Bridge) along ICB Road and Carmen Bridge near City Hall.

Because of the geographic conditions, the land use and the road network do not show concentric pattern. Developments are made on the flat land available in the study area and even within the city commercial and residential developments are separated by the river, swamps and hills. Thus focus area of the study can be divided into four separate areas in terms of traffic characteristics:

- Central Area
- Outer central area
- Suburbs
- Area along national highway

Central Area

There are two central areas in the city, each on both sides of the river. The western central area is small with Carmen Market and neighboring Gaisano

Mall at its center. Many small retail shops surround these facilities. On the other hand, the eastern central area is large with several core facilities like Cogon Market, Divisoria, Lim KetKai Complex, Gaisan City Mall, government institutions around MacArthur Park and Don Gregorio Pelaez Sports Center. An east part of the central area used to be a swamp but it was filled; the Lim KetKai Complex was developed extending the central area to the east.

Roads in the eastern central area forms quasi-grid pattern with the ICB Road on the northern boundary with Gaerlan Street and Hayes Street on the southern boundary. Many minor streets run in east-west direction between these two roads with relatively short intervals. One way system is introduced to these streets with alternative direction. J. R. Borja Street, one of the east-west roads has been widened to 4-lane road east of Cogon Market, extends toward the east passing near East Bound Terminal and connects with the ICB Road near the city boundary. There are several arterial streets in north-south direction like Capistrano Street, Velez Street, Corrales Ave, and Osmena Street. Last three streets extend north beyond the ICB Road, toward a port area.

Except ICB Road, which has six to eight lanes, other roads are narrow. In addition, road width varies along the same street. For example, Velez is a two-lane road at the south end with Gaerlan. The width gradually increases and the road has 4 lanes at the intersection with the ICB Road. Generally, sidewalks are very narrow even along arterial streets and does not exist at some sections.

The western central area connects through an access road with Vamenta Blvd., which runs along the western bank of the river and is sole arterial road in north-south direction on the west side. Vamenta Blvd. itself is also narrow with narrow 4 lanes without sidewalk at several sections.

These two central areas are connected each other through two bridges across the Cagayan River. Maharlika Bridge is a concrete bridge with 4 lanes while old Carmen Bridge has only two lanes with the load limit of 10 tons. These two bridges are the heaviest bottleneck in the study area.

Outer Central Area

Outer Central Area does not surround the central area in Cagayan de Oro City due to the geographic condition. On the east side of the river, suburbs are found north of the central area toward the port, where lands of mixed use of residential and industrial estate spreads. Old residential area with narrow roads is found at Barangay Macabalan located at the mouth of Cagayan River. The narrow strip between Capistrano Street and the river is also a residential area where old houses still stand. The small area, south of the central area, is also a residential area and new development is being made further south on the hill. Roads are narrow and not straight. Its road density is naturally lower than the central area.

On the west side of the river, large residential areas are found north and north-west of the central area on both sides of the ICB Road. Middle and low income housing including the subdivision made by National Housing Authority spreads north of the highway, where newly constructed West Integrated Bus Terminal exists. South side of the highway is a middle income

housing. Commercial establishments are found only along Vamenta Blvd. and Calamansi Street. A road network is less dense compared with the central area and most of the roads have only two lanes in both directions. Only ICB Road, Calamansi Street and Vamenta Blvd. are arterial streets in the area. Many residents in the west are expected to commute to the east side of the river using these roads and through two bridges over the Cagayan River.

Suburbs

There is not much development in the suburbs in the study area because most of the outer area is hilly or mountainous. The southern area on the plateau is rapidly developing with the newly constructed shopping mall (SM City), educational institutions and a golf course. The area is connected with the central area only through a winding and steep Masterson Ave. Limited access to the central area will become a problem with more development and the increased number of vehicles in the future.

Sub-divisions are also found at San Agustin Valley Homes and other housing estates southwest of the central area and the west areas of Iponan River near the boundary of the city. These sub-divisions in the suburbs are connected with the central area through the very limited number of small roads.

The ICB Road Area

The ICB Road runs along the coastal line in east-west direction. Land use along the national highway is, however, different on the east and west sides of the city. On the west side, towns along the national highway are all small and concentration of population at town proper is not high. Thus there is small traffic volume on provincial and barangay roads in these areas creating no traffic management problem.

Industrial estates have been developed along the national highway on the east of the city; large factories like Delmonte, Nestle, Kao Philippines and Philippine Sinter Corporation operate there. In addition, there is a national road (Syre Highway) going to Davao that branches off from the ICB Road near the boundary with Tagoloan. Traffic volume along the ICB Road on the eastern side of the city is, therefore, much larger than on the western side. Large trucks carrying goods to and from the factories and southern area of the island occupying large share in the traffic composition.

The ICB Road takes a form of semicircle arc along the bay and provincial and barangay roads emanate out from the ICB Road toward mountains, which are narrow and carry very small traffic. Only the ICB Road will be considered in the review of traffic management in the area.

2) Intersections Layout

An intersection is a place where conflicting movements share the same space. Road capacity is often limited by the capacity at the intersection. Thus the operation at the intersection is critical for the smooth and safe traffic movement. Comments relating to the layout of intersections are highlighted as follows.

a. Uncontrolled / Priority / Give Way

The priority / give way intersection is the basic intersection type when two or more roads intersect. This is the predominant intersection type in the study area including signalized intersections but with malfunctioned signal. General characteristics of the existing intersections are:

- Many intersections are formed by intersecting roads without traffic engineering design.
- Priorities are not defined on the approaches although there is a written rule.
- Pavement is in deteriorated condition and pavement making is not applicable.
- Stop line, lane line and directional arrow are not drawn at intersection approaches.
- Relies on traffic taking avoiding action to avoid collisions.
- Lack of left turn pockets results in delays to through traffic movement.
- Sidewalks are extremely narrow at many intersections even in central area thus the movement of vehicles and pedestrians is not segregated and the sight of crossing street is limited

A typical example of the intersection without engineering design is found at Vamenta Blvd. – Calamansi Street intersection on the west side of the City and Velez Street and Gaerlan Street intersection on the east side of the City.

b. Roundabout

There is no roundabout in Metro Cagayan de Oro area.

c. Signalized intersection

Conflicts between intersecting traffic streams are regulated by traffic signal which defines the use of the intersection for conflicting movements. There are two groups of signals in Cagayan de Oro. First group consisting of 12 signals was installed in late 80's under the Regional Cities Development Project. Unfortunately only three (3) signals are operating and other nine signals are defective beyond repair after more than 10 years of operation. Two new signals were recently installed at the intersection of the ICB Road and the access roads to East and West Bus Terminals.

- Evidence of poor maintenance as many signals are not working
- Inflexible fixed signal timings, which are not related to traffic demand
- Signal operation relies on manual operation by traffic police with a long cycle time
- Modern traffic engineering principles such as lane widening and left turn pocket is not applied
- Pedestrian is not considered in the design and operation of signal
- Two new signals are provided with loop detector and operate with actuated control with adequate timing.

4.3.3 Traffic Operation

1) Traffic Volume Count

Traffic volume count survey was conducted at 50 survey stations throughout the study area, the 24-hour count was conducted at 10 locations while the 12-hour count was conducted at the remaining 40 locations.

The traffic volume (total of both directions) in 12 hours (6:00 -18:00) in vehicle inside the city center is shown in Figure 4.3-11. The 12-hour total volume of 12,000 to 20,000 vehicles run on north-south streets in the central area with the largest volume found on Velez Street. On the other hand, the traffic volume on the east-west streets is smaller than those on the north-west streets. This is due to the fact that main road to the central area is two roads, National Highway and Gaerlan Street, located at north and south boundary of the central area. Although J. R. Borja has 4 lanes east of Quirino Street, area along the street is not much developed.

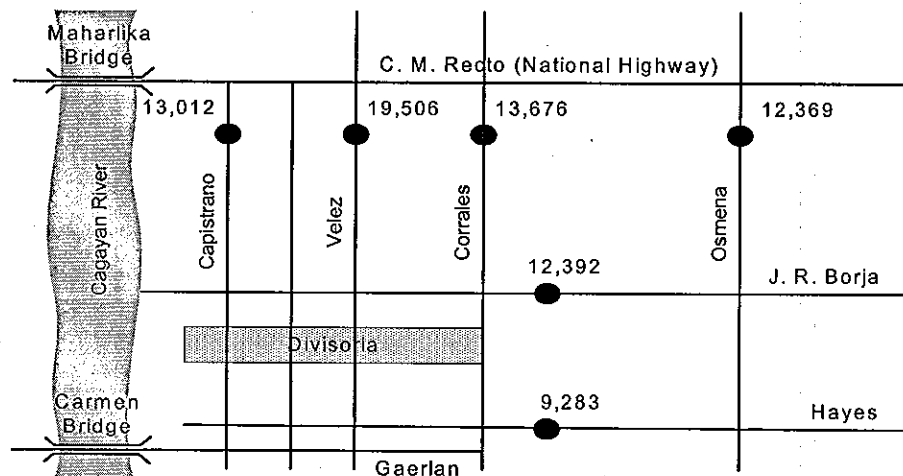


FIGURE 4.3-1 TRAFFIC VOLUME (BOTH DIRECTIONS FOR 12-HOUR IN VEHICLE) INSIDE CENTRAL AREA

No traffic count was conducted inside the west central area.

The traffic volume (12 hour volume in vehicle) on the access roads to the east and west central areas is shown in Figure 4.3-2 and Figure 4.3-3 for east and west central areas, respectively. All vehicles coming from the west side of the river have to take either Maharlika Bridge or Carmen Bridge. As a result, these bridges have large traffic volume. Maharlika Bridge has a total of 4 lanes while Carmen Bridge has 2 lanes. The capacity of the latter is, therefore, about half of the former. On the other hand, the traffic volume on Carmen Bridge is about 88 % that of Maharlika Bridge indicating heavy concentration and congestion on Carmen Bridge.

It is noted that National Highway (C. M. Recto) has dual functions of serving as an access road for the local traffic and at the same time being an arterial street along the northern coastal line of the island. Thus the traffic volume shown in the figure is the mixture of local traffic and through traffic passing through the city. Comparing the traffic volume from east (C. M. Recto and J. R. Borja) and that from west (Maharlika Bridge and Carmen Bridge), the volume from the west is more than double of that from the east. The fact indicates strong tie across the river. In fact, east side of the city has been

developed as a place center for commercial, social and educational activities while the west side is mainly used for residential purpose. Some educational institutions also exist on the west side.

Traffic volume between the central area and the northern area is as large as that of the east. The demand is created by the housings and industrial area (warehouse) in the area. There is also a bus terminal and a market along Agora. On the other hand, the traffic to and from the south is very limited reflecting the small concentration of population and activities.

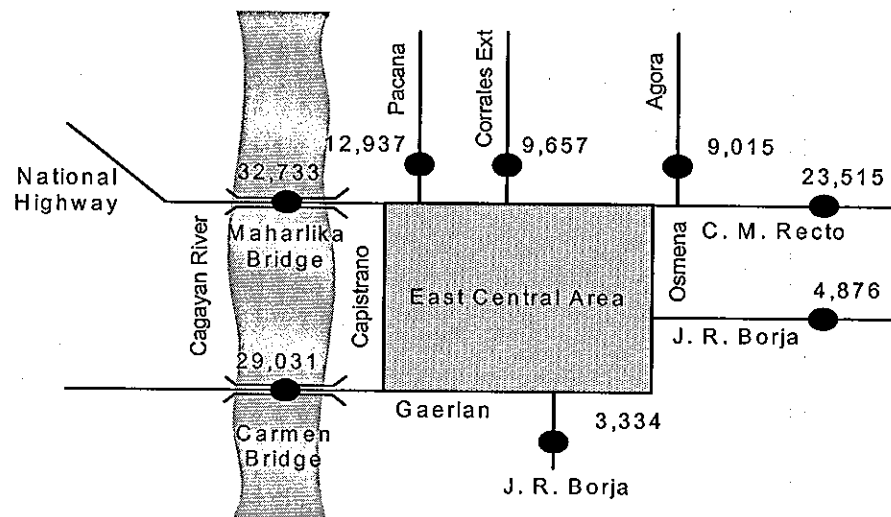


FIGURE 4.3-2 TRAFFIC VOLUME ON ACCESS ROAD TO EAST CITY CENTER

The west central area attracts less traffic than its counterpart, although the traffic volume count at location close to the central area is not available. It is estimated that large portion of the traffic on the national highway is either through traffic toward east side of the city or heading for east central area. On the other hand, traffic on Calamansi Street has either origin or destination in the west central area or near it.

Counterclockwise one-way loop is applied along Serina, Villarin, Zayas, and Vamenta streets for 7:00 – 9:00 am and 4:00 – 7:00 pm. Traffic volume on these roads shown in the figure include those vehicle diverted by one-way system. For example, vehicles heading toward the shopping mall on Masterson and Lumbia Airport from Vamenta Blvd and Carmen Bridge cannot go straight or turn left toward Masterson. They have to take Serina Street first and travel about 3/4 of a circle.

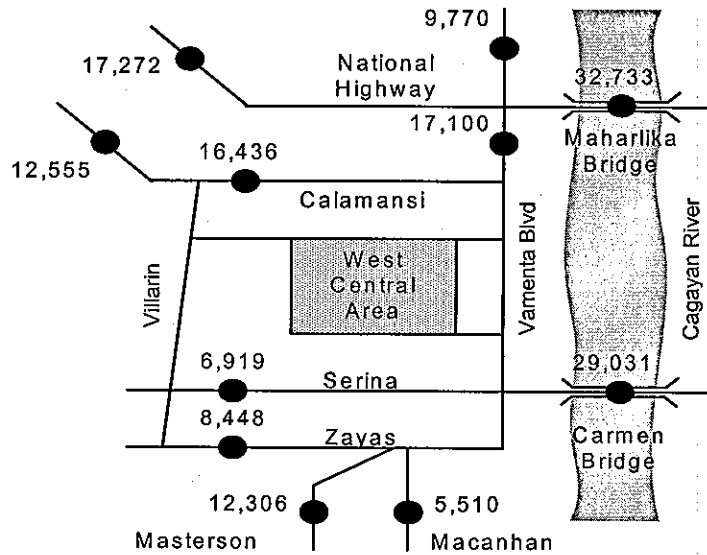


FIGURE 4.3-3 TRAFFIC VOLUME ON ACCESS ROADS TO WEST CITY CENTER

Traffic volume on the national highway within the study is shown in Figure 4.3-4. For the counting station where 24-hour count was conducted, 24 hour traffic volume in vehicle is also shown in parenthesis. The traffic volume count at the city boundary show almost same figure. Considering the distance from the city center, however, the volume is higher on the east side. This can be attributed to the traffic demand created by the industrial estates on the eastern side. Another factor is the national highway toward Davao branching near the eastern boundary of Cagayan de Oro City and Tagaloan

Traffic volume gradually decreases with the distance from the city center on both sides. Volumes on the branch road are all small. No traffic management problem exists on these roads.

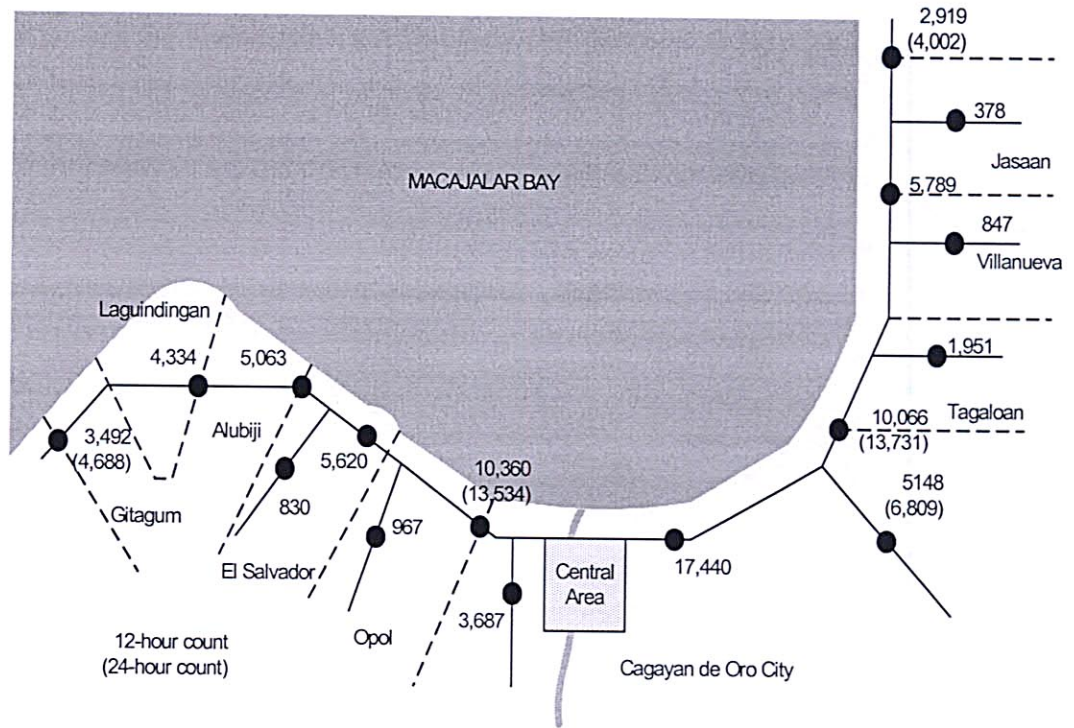


FIGURE 4.3-4 TRAFFIC VOLUME ON NATIONAL HIGHWAY

2) Vehicle composition

In general, public transport is the primary measures in the Philippines. In Metropolitan Cagayan de Oro, jeepney and motolera are key transport for the residents and there is no intra-city bus service. Motolera is a Cagayan de Oro version of a para-transit equivalent to tricycle in other parts of the Philippines. Two-wheel passenger box, which also covers driver and can accommodate six passengers, is drawn by motorcycle.



Motorela

Hence traffic count records show the high share of these two modes. According to the traffic volume count survey conducted by this study, the

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following ten (10) locations have the share of jeepney higher than 30% as shown in Table. Naturally, they are all located along the jeepney route in and around the city. There are two types of high jeepney share locations. Those with 12-hour traffic volume of more than 10,000 vehicles are located inside the city, while those with less than 10,000 vehicles are road in suburbs except Hayes Street.

TABLE 4.3-1 LOCATION WITH HIGH JEEPNEY SHARE

	Sta.	Location	Share	Volume (12h)
1	13	National Highway	68.8%	12,197
2	32	J. R. Borja	59.4%	12,392
3	40		58.4%	2,324
4	33	Hayes Street	46.7%	9,283
5	25	Carmen Bridget	38.9%	29,031
6	30	Velez Street	36.8%	19,506
7	23	Masterson Ave.	33.3%	5,510
8	37	Agora Road	32.9%	9,015
9	36	C. M. Recto Ave.	32.3%	21,133
10	10	C. M. Recto Ave.	31.0%	17,440

On the other hand, motorela is more prominent in two types of location, on roads around central area and on rural roads connecting national highway. The table below shows 11 highest motorela share locations with the share of more than 20.0 %. The first group of locations has relatively higher traffic volume, while the traffic volume of the latter is small. It is noted that crossing by motorela across Cagayan River is prohibited as per Section 656 of 1994 Codified Ordinance of the City of Cagayan de Oro. But traffic count data shows not a small number of motorela, 602 units in 12 hours, passed the bridge.

TABLE 4.3-2 LOCATION WITH HIGH MOTORELA SHARE

	Sta.	Location/Street	Share	Volume (12h)
1	7	El Salvador	51.4%	830
2	31	Corrales Ave.	48.4%	13,676
3	3	Villanueva	41.0%	847
4	29	Capistrano Street	39.5%	13,012
5	28	Corrales Extension	34.4%	9,659
6	2	Villanueva/Jasaan	31.4%	5,789
7	9	Opol	30.8%	967
8	20	Serina	30.1%	6,919
9	35	Osmena	28.7%	12,369
10	33	Hayes Street	20.6%	9,283
11	21		20.0%	8,448

Cagayan de Oro is a regional center for gathering and distribution of goods and cargo. Industrial estates on the east side of the city also generate cargo traffic. The traffic volume counting stations that show high truck share is listed in Table 4.3-. All high truck share locations locate along the national highway east, south east, south and west of the city indicating cargo movement into and out of the city. The traffic volume of these locations is generally low except station 46, which is located at the boundary of Cagayan de Oro City and Tagolan. It is noted that about 3,400 units out of 13,731 vehicles at station 46 is motorelas and motorcycles.

TABLE 4.3-3 LOCATION WITH HIGH TRUCK SHARE

	Sta.	Location/Street	Share	Volume (12h)
1	12	El Salvador	29.9%	425
2	42	Corrales Ave.	21.7%	4,002
3	43	Villanueva	21.3%	5,148
4	4	Capistrano Street	20.9%	1,951
5	41	Corrales Extension	18.4%	4,688
6	46	Cagayan de Oro / Tagoloan	16.9%	13,731
7	44	Opol	15.6%	813

4.3.4 Operation at Intersections

There are two main intersection types, unsignalized and signalized, categorized by their operating characteristics. No roundabout exists in the Study area. Findings through the observation of traffic operation at the intersection are presented hereunder for each type of intersection.

1) Uncontrolled / Priority / Give Way

Typical intersection forms are T-intersection or cross-roads and are the simplest form of intersection when two roads join. The general traffic rules require vehicles to give way to the right unless on the priority road as per Section 660 of 1994 Codified Ordinance of the City of Cagayan de Oro. General operational characteristics of existing intersections are:

- Traffic enters in a free-for-all manner
- System works on a first come first served basis
- No priority rule is observed
- Vehicles enter the intersection even exit is not clear and stays within intersection blocking other flows
- Jeepneys and motorelas tend to stop just before or after the intersection for loading and unloading
- Multiple paths of crossing vehicles increases congestion and risk, while reduces capacity

2) Signalized Intersection

Conflicts between opposing traffic streams are regulated by defining separate time periods for opposing streams. In terms of signal operation, there are three groups of signals; automatic with actuation function, automatic with fixed pattern and manual by traffic enforcer. It is observed that regardless of operation mode, vehicles generally observe the signals. New signal at the access road to east and west bus/jeepney terminals operates in an automatic mode and the actuation functions well. One of the three (3) functioning old signals located at Velez and Neri/Abejuela also operates in an automatic mode. The operation is at acceptable level due to one-way movement along Neri and Abejuela, which is separated by wide median or park.

Two signals at both ends of Maharlika Bridge are operated manually most of the time. They adopt approach base phasing in which straight, left turning and right turning vehicles from an approach are discharged at the same time. It is observed that cycle length is too long when operated manually and exceeds five (5) minutes causing unnecessary delay to the waiting vehicles. This is due to the wrong perception of traffic enforcers that traffic stream should not be interrupted even the flow rate has become much lower than

saturated flow. Better way is to terminate green signal as soon as the flow rate becomes lower than saturated rate. If this rule is applied, intersection operation will be more efficient.

4.3.5 Bottleneck and Congested Street

Based on the observations during the reconnaissance tour of the study area, hearing with the local officials and the reports of the previous studies, the bottleneck points in the city, where queue is often created, are identified as shown in Figure 4.3-6.

There are only two bridges across Cagayan River that cater for the large traffic demand between both sides of the river. Naturally, two bridges are the most serious bottleneck point in the city. In particular, Carmen Bridge has only one lane for each direction, while access road on both sides has 2 lanes for each direction. Thus congestion at the bridge is frequent and long lasting.

National Highway is an arterial road along the northern coastal line of the island. Long distance traffic demand is high along the road for the movement of people and goods between the cities and towns on the coastal line and even with Davao at the south. In addition, commercial development has been made along the national highway in the city, particularly on the east side of the river. Thus there is also high demand of local traffic along the road. The concentration of these two types of traffic is causing congestion in the area.

Divisoria area has a dense grid road network and the traffic condition should be better than other parts of the city. The situation is opposite. All streets are full of parked cars on both sides and road capacity is reduced to half. Vehicles concentrate at this area for business, shopping, delivery and leisure purposes. Jeepneys and motorelas frequently stop anywhere for loading and unloading. Vehicles enter into intersection even exit is not clear blocking crossing movements. Some signals are not working. All of these facts contribute to the chronic congestion in the area during peak hours.

Another congested area is around two markets, Cogon Market and Carmen Market. At both sites, market buildings are under construction and building tenants are now allowed to operate on the roads surrounding the market. At the moment the area is chaotic and the condition is expected to last until the new market building is completed and temporary shops on the road is accommodated in the new building. As the congestion is of temporary nature, no further analysis will be made in this study.

Sidewalk is generally narrow even in the central area. Sidewalk pavement is not in good condition and vendors and obstacles are often occupy it making walking on sidewalk is not easy. Such pedestrian unfriendly conditions created habit of jaywalking causing additional side friction for vehicle traffic.

4.3.6 Traffic Control and Management Facilities

1) Signal Systems

Currently, there are a total of 14 signals in Cagayan de Oro City as shown in Table 4.3-4 and Figure 4.3-7 and no traffic signal exists outside of the city. Out of 14 signals, 12 signals were installed under Regional Cities Development Project in late 80's and two (2) signals were recently installed. The latest two signals are still in the testing and adjustment period and yet to be turned over to the city. Only three (3) old signals out of 14 signals and two (2) new signals are functioning as of February 2004. Another signal is being repaired and will be functional soon. No spare parts are in stock for old signals and malfunctioned signal was repaired by retrieving necessary parts from other signals. In this way, the number of operating signals gradually decreased and eventually all signals but three become inoperative

TABLE 4.3-4 TRAFFIC SIGNALS IN CAGAYAN DE ORO CITY

	Street 1	Street 2	Status	
1	National Highway	Agora Road	Not working	
2	National Highway	Osmena Street	- do -	
3	National Highway	Corrales Ave.	Under repair	
4	National Highway	Velez Street	Working	
5	National Highway	Vamenta Blvd.	- do -	
6	Corrales Ave.	Yacapin Street	Not working	
7	Corrales Ave.	J. R. Borja Street	- do -	
8	Velez Street	A. Luna Street	- do -	
9	Velez Street	Yacapin Street	- do -	
10	Velez Street	J. R. Borja Street	- do -	
11	Velez Street	Neri/Abejuela	Working	
12	Vamenta Blvd.	Serina Street	Not working	
13	National Highway	East Bus Terminal	Working	New signal
14	National Highway	West Bus Terminal	- do -	New signal

The two new signals are equipped with actuation control function and a loop detector is installed on the approach of cross street. Green period for the cross street is adjusted according to the actuation and the function was properly working at the time of site survey. According to a city official in charge of traffic signal the same type of signals will be installed if the new signals are found effective.

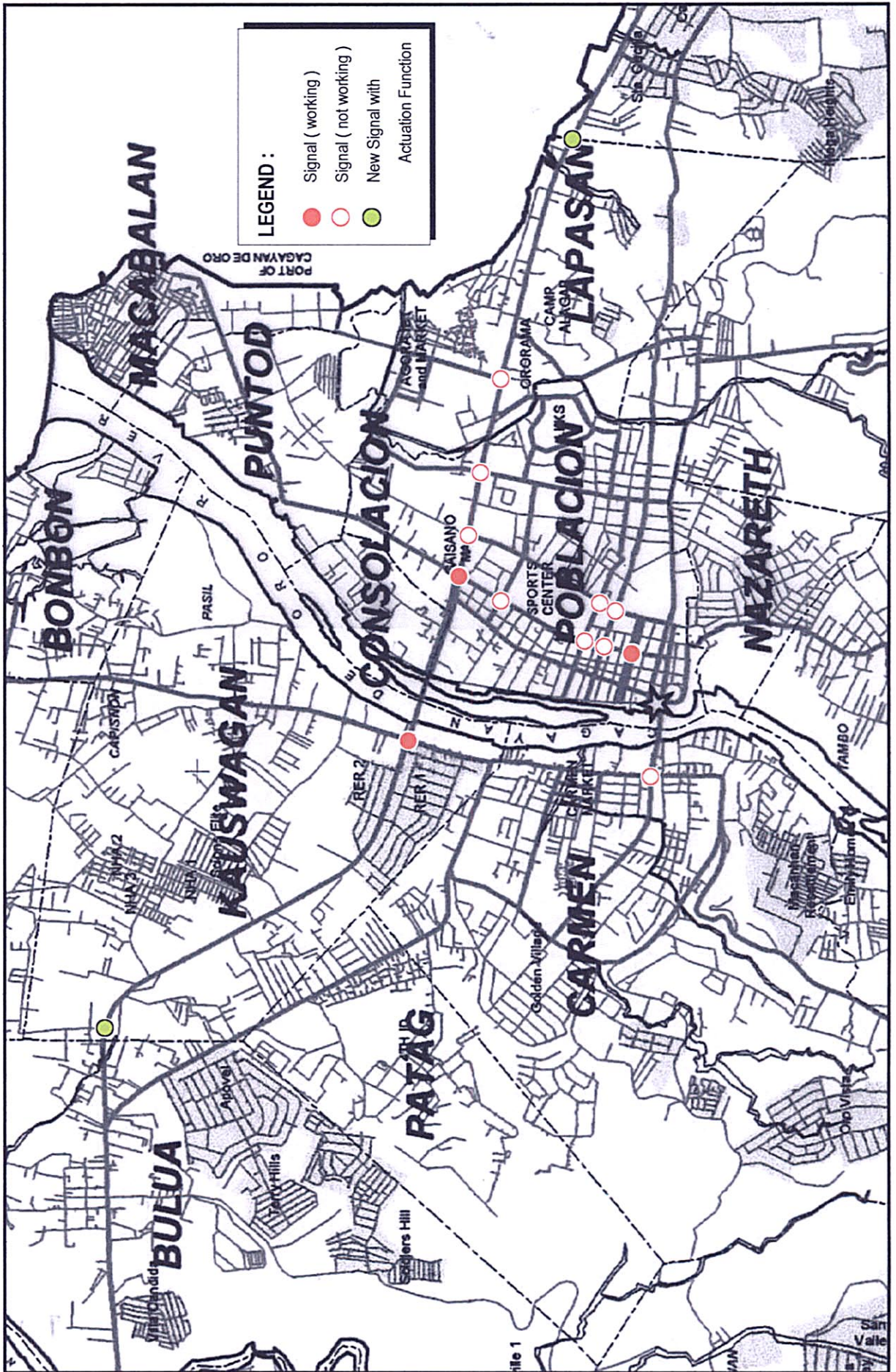


FIGURE 4.3-6 EXISTING TRAFFIC SIGNAL LOCATIONS

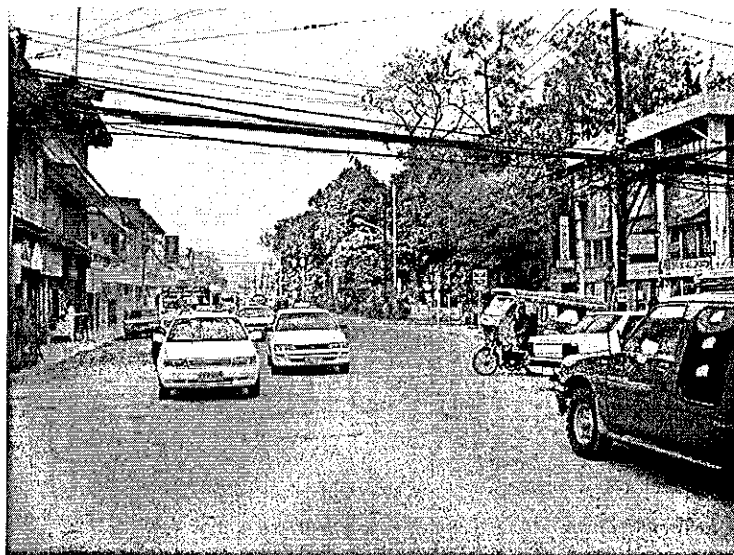
3) Traffic Signs and Pavement Markings

There are a moderate number of traffic signs showing such traffic regulation as no left turn or no parking. These signs are, however, non standard design made of plywood and bear the advertisement due to budget constraint according to a city official.



Non-standard No Left Turn Sign

Pavement marking is virtually non existent in the study area even along the arterials streets. This is also due to the lack of budget. Another problem is the bad pavement. Pavement is so damaged that pavement marking is not applicable without overlaying. Example of bad pavement and no pavement marking is shown in the photo below, which was taken at the intersection of Velez Street and Luna Street.



Deteriorated Pavement with no Pavement Marking

Other traffic control devices such as reflective stud, delineator, etc. are not found in the study area except the warning signs at curb along winding section of national highway. Some of them are however vandalized and only poles are left.

4) Median and barrier

Good median with vegetation and lighting is provided to the section of National Highway between Vamenta Intersection to Calamansi Intersection, west part of the city. Median with steel barrier is set up along C. M. Recto at intersection with Velez, Corrales, Osmena and Agora. But they are not continuous along the section so that crossing by pedestrian is possible at the mid block section.

Short and narrow median is provided to the approaches of Vamenta – Serina intersection. Same type of median is also provided Gaerlan – Capistrano intersection. These medians are effective to prevent vehicles from trespassing onto the opposite side or taking shortcut when making left turn. It also serves as refuge island for crossing pedestrians.

Other roads do not have median or center barrier as they are too narrow to accommodate them.

5) Pedestrian overpass

Pedestrian overpass is constructed at the number of locations along the national highway. Other roads are narrow to have pedestrian overpass. Private pedestrian overpass is being constructed across Capistrano between two campuses of Lourdes College.

6) Intersection Improvement

There is no clear sign of geometric improvement at intersections. Many intersections are too wide and provide too much flexibility to vehicles. For example, intersections along National Highway at Osmena, Corrales, Velez and Vamenta are all too wide. In fact, these intersections are accident-prone location. It is also very dangerous for pedestrians to cross it as there is no refuge island at the center.

4.3.7 Parking Management

1) Parking as critical issue

Although the road network in the central area is dense, all streets are full of parked cars and effective road capacity is reduced to less than half of the geometrical capacity. A report of Transport and Traffic Management Studies under Philippine Regional Municipal Development Project undertaken in 1999 pointed out the parking as the most serious traffic management problem in the city. List of parking control technique that would mitigate parking problem is provided in that report for consideration by the city and possible implementation. No measure seems to have been implemented and the situation is same since then.

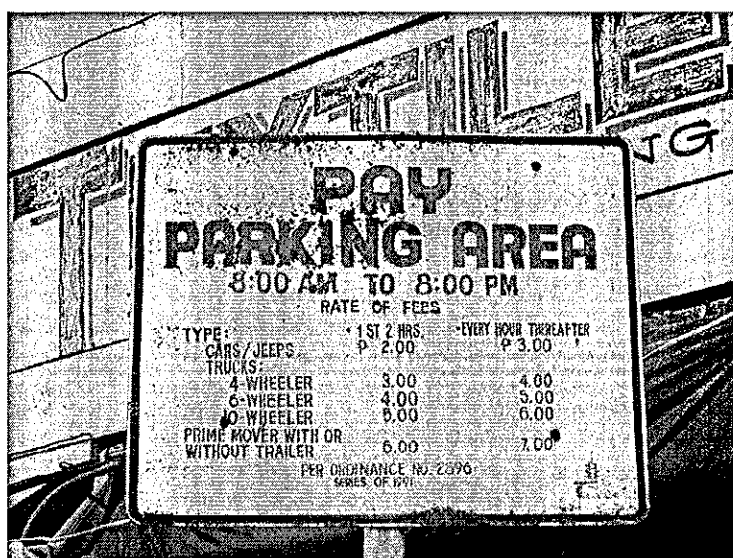
2) Parking space requirement

According to a city official, National Building Code or PD 1096 and City Building Regulation is applied regarding parking space requirement for building. However, many existing buildings in the central area do not have parking facilities except some recently developed establishment like Gaisano City and Lim KetKai Complex. To manage and regulate the parking demand

for those building without parking facility, the city government passed an ordinance No. 8470 – 2002, which designated certain streets in the central area as temporary parking space and authorized the building owners to temporarily use these streets as their parking space provided that they shall provide the lacking parking spaces within a period set by the City Building Official. Yacapin Street, Mabini Street, Montalvan Street, Rizal Street and Cayetano Pacana Street are designated as temporary parking space in the ordinance. The time limit mentioned in the ordinance is not known, however, and off street parking facility is not found around these streets.

3) Pay parking

The city implemented pay parking system in 1991 and roadside space along 15 streets in the central area were designated as pay parking area from 8:00 am to 8:00 pm. The sign shown in the photo was installed along these streets. The parking fees are shown in the Table 4.3-5.



Pay Parking Sign

TABLE 4.3-5 PARKING FEE

	1st 2 hours (Pesos)	Every succeeding hour (Pesos)
Car/Jeeps:	2.00	3.00
Trucks:		
4-wheeler	3.00	4.00
6-wheeler	4.00	5.00
10-wheeler	5.00	6.00
Prime mover with or without trailer	6.00	7.00

According to Roads and Traffic Administration Annual Report 2003, the city collected the amount show in the table below as parking fee in year 2003. According to the data, a total of 62,750 parking tickets were issued and a total fee of Pesos 125,000 was collected in 2003. It is not clear, however, where these fees were collected as no parking management activities were observed during the site survey. A city officer also said that parking fee collection is no longer active due to lack of staff and facilities.

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TABLE 4.3-6 PAY PARKING FEE COLLECTED IN 2003

Month	# of ticket issued	Amount collected
January	9,125	18,250
February	4,525	9,050
March	4,625	9,250
April	4,700	9,400
May	6,700	13,400
June	4,900	9,800
July	5,150	10,300
August	3,450	6,400
September	5,300	10,600
October	2,825	5,650
November	7,800	15,600
December	3,650	7,300
Total	62,750	125,000

4) Parking prohibition

Parking is prohibited at some sections of major streets in the central area and no parking sign is installed along the prohibited section. The city government is planning to adopt one-side parking system and an ordinance (No. 8878 – 2003) was already resolved but the implementation is pending. As the situation is flexible, complete list and map of restricted section is not prepared in this study.

4.3.8 Traffic Management Organizations

Cagayan de Oro City is one of the few or maybe only one local governments in the country that have a traffic authority responsible for engineering, education and enforcement of traffic management. In fact, traffic management policy and measures are more integrated and comprehensive compared with other LGUs. Existence of the codified ordinance also helps make the policy formation more sensible and rational. Regrettably, lack of resources is hampering the implementation of some measures.

1) Road and Traffic Administration (RTA)

Roads and Traffic Administration (RTA) was established as per City Ordinance No. 6535 – 1998 in 1998 when new mayor took office as the successor of Traffic Management and Enforcement Bureau (TMEB) created in 1994. RTA is under Office of Mayor and consists of Engineering Section, Education Section, Enforcement Section, Traffic Data Sections, Non-Government Offices and Administrative section. The main functions and responsibilities of RTA are:

- Traffic surveys and statistics gathering
- Rerouting, parking and other regulations
- Feasibility studies and traffic networks and system
- Engineering design and intersection management
- Traffic signs and pavement markings

- Enforcement of traffic rules and regulations
- Traffic education program and information dissemination

Currently RTA has 202 persons, of which only two persons are regular employees while the remaining 200 persons are casual employee. Because of the ceiling on the percentage of staffing cost in the city government budget, they cannot be made as regular employee. The employment contract of casual employee is renewed every six (6) months.

Two engineers from RTA including Administrative Officer – Designate attended the traffic management training course at National Center for Transportation Studies (NCTS) of University of the Philippines. They feel the course is useful and informative. It is hoped that similar facilities be established and the courses be held in Cagayan de Oro so that many persons can attend them. As the support for NCTS training course by JICA was terminated, trainees have to shoulder the half of the cost, which is a burden to the local government.

RTA has two (2) units of tow trucks (heavy and light), two (2) service vehicles, six (6) units of motorcycles used by Traffic Police, and one (1) unit of multipurpose vehicle (Suzuki utility van).

Two communication systems are used. RTA's own system consists of 31 units of portable radio and one base station located at RTA. Portable unit is capable of calling land line, group call, etc. Besides, RTA has two (2) units of portable radio which are connected to police communication system. Cagayan de Oro City has a consolidated communication system operated by MISOTEL, a government owned telecommunication company, which covers not only police but also other departments and agencies of the city government.

2) Traffic Police

Traffic Police is a section of RTA responsible for traffic regulation enforcement. As the chief of Traffic Police is concurrently the head of RTA, close coordination is maintained between traffic police and other sections. The number of traffic polices is 47 persons as shown on their deployment schedule.

Major units in the Traffic Police are Investigator Group and Operation Unit. The former consists of 11 police officers and works on three shifts. Police officers in the Operation Unit are deployed at critical and congested intersections along the national highway, Corrales and Velez streets during peak hours.

3) Enforcement

Traffic violation apprehended during the year 2002 is shown in table below. A total of 57,000 violations were apprehended and the total amount of fine reached 2.8 million Pesos.

TABLE 4.3-7 VIOLATION APPREHENSION RECORD (2003)

Month	# of apprehension	# of violation case filed	# of violation for case filing	# of violation paid fine	Amount collected
January	6,324	101	3,330	2,893	372,875
February	5,587	34	3,110	2,443	285,875
March	5,847	65	3,357	2,425	312,975
April	6,257	48	4,547	1,622	227,100
May	4,671	52	2,477	2,142	280,175
June	4,782	85	3,018	1,629	202,170
July	4,804	149	3,121	1,534	191,375
August	3,718	100	2,257	1,361	223,050
September	4,316	231	2,344	1,741	179,120
October	3,513	159	2,103	1,251	164,895
November	4,523	130	2,908	1,485	217,700
December	2,954	104	2,055	795	134,900
Total	57,296	1,258	34,627	21,321	2,792,210

Although main cause of accidents along National Highway is speeding, Traffic Police is not enforcing speeding due to lack of facilities. For the same reason, drunken driving is not enforced too.

4.3.9 Traffic Related Laws and Regulations

1) Introduction

Cagayan de Oro City has a consolidated city ordinance called 1994 Codified Ordinance of the City of Cagayan de Oro, which covers all ordinances at the time of compilation. Title XX Traffic and Transportation of the said ordinance is related to traffic management. The title consists of 27 chapters and covers all aspects of the traffic. Chapter titles are shown in Appendix.

Supplemental or additional city ordinances were issued since then to complement or modify the Codified Ordinances. Major city ordinances related to traffic resolved after 1994 Codified Ordinance are listed below.

**TABLE 4.3-8 CITY ORDINANCES RELATED TO TRAFFIC ISSUED AFTER 1994
CODIFIED ORDINANCE**

Ordinance	Title
No. 5216 – 96	An ordinance requiring the operators, owners and drivers of trucking services to provide with canvass cover all trucks loaded with sand and gravel, other aggregates and/or cargoes which may endanger the life and limbs of motorist and pedestrian when entering and using any road or street of Cagayan de Oro City and providing penalty for violation thereof
No. 5240 – 96	An ordinance establishing pedestrian crosswalks on certain streets of Cagayan de Oro, providing penalty for violation thereof and for other purposes
No. 6298 – 97	An ordinance regulating the entry of delivery/cargo trucks at certain hours and streets of the city and providing penalty for violation thereof
No. 6852 – 99	An ordinance decreasing and increasing the administrative fines imposed for certain parking violations under subsection (4), and subsections (2), (3) and (5), respectively, of section 722-A of ordinance 4373-94, also known as the codified ordinance, and penalizing the owner/operator of motor vehicles for violations in connection with equipment, parts, accessories and markings thereof, and for other purposes
No. 7287 – 2000	An ordinance amending ordinance No. 4795-95, so as to include therein private, government and public utility car, pick-up, van and all other vehicles operating within or passing city limits as among those prohibited to have tinted glass windows and windshields, provide administrative fine for violation thereof and for other purposes
No. 7518 – 2000	An ordinance providing for the modified vehicular traffic and rerouting of westbound vehicles on certain hours and days, providing penalty for violation thereof and for other purpose
No. 8185 – 2002	An ordinance regulating the installation and use of car stereos and similar devices inside public utility buses and jeepneys, motorelas and trisikads plying within Cagayan de Oro City, providing penalties for violation thereof, and for other purposes
No. 8330 – 2002	An ordinance providing for the policies and regulations governing the operations of the eastbound and westbound terminals and public market, and for other purposes
No. 8470 – 2002	An ordinance designating the herein enumerated streets within the commercial zone or business district of the city as parking areas of buildings with parking space deficiencies and for other purposes
No. 8878 – 2003	An ordinance providing for a one-way traffic scheme and one-side parking in the streets of the poblacion area and for other purposes

4.3.10 Traffic Regulation

1) One-way

One-way operation is effective in reducing conflicts at intersections. Figure 4.3-8 shows the one-way system in the study area. One-way system is extensively applied to the east central area where road network has a grid pattern and most of streets in east-west direction are set as one-way street.

Another one-way loop is applied to Serina, Villarin, Zayas and Vamenta streets located at west of Carmen Bridge. To prevent gridlock at the intersection of Vamenta and Serina caused by the queue extending from the bridge, counterclockwise one-way loop is enforced during peak hours of 7:00 am – 9:00 am and 4:00 pm – 7:00 pm. In addition crossing of Serina from Vamenta and opposite direction is prohibited so that there is no conflicting movement at the intersection.

Cagayan de Oro City has two large markets, Cogon Market and Carmen Market, where people and vehicle concentrate for delivery and shopping. In addition, most of jeepney routes pass by Congo Market and remaining routes pass by Carmen Market. One way system is applied around the markets and nearby streets.

2) Turning Restriction

Left turn is prohibited at several intersections along Velez and Corrales. The prohibition is indicated by non standard signs as shown in the photo of previous section. The restriction has been implemented on an ad-hoc basis and the city does not have comprehensive list or map of the left turn ban.

3) Truck Ban

The City Ordinance No. 6298 -97 stipulates the cargo truck ban around two markets from 7:00 am – 9:00 am and 5:00 pm – 7:00 pm. The restricted areas are:

- Cogon area: Area bounded by Recto, Burgos Street, Hayes Street, Pres. Roxas street, Yacapin Extension, Pres. Quirino Street and LimKetKai Drive
- Carmen area: Area bounded by Agoho Drive, Villarin Street, Masterson Ave. and Vamenta Blvd.

4) Parking Prohibition

As described in the section of parking management, pay parking and parking prohibition are not precisely implemented as stipulated in the related ordinances so that no comprehensive list or map of restricted streets are available.

5) Pedestrian Mall

Abejuela Street and Neri Street west of Velez Street up to Corrales Avenue in Divisoria area are closed to traffic on Friday and Saturday night. Tables and chairs are put on the street for free use by pedestrians, who can enjoy strolling, eating and chatting. The program was initially held as one-time event but it is made weekly event because of strong support by the people. Such activity must be praised as it helps promote the use of road for the purposes than vehicle passing.



FIGURE 4.3-7 (1) ONE-WAY STREETS

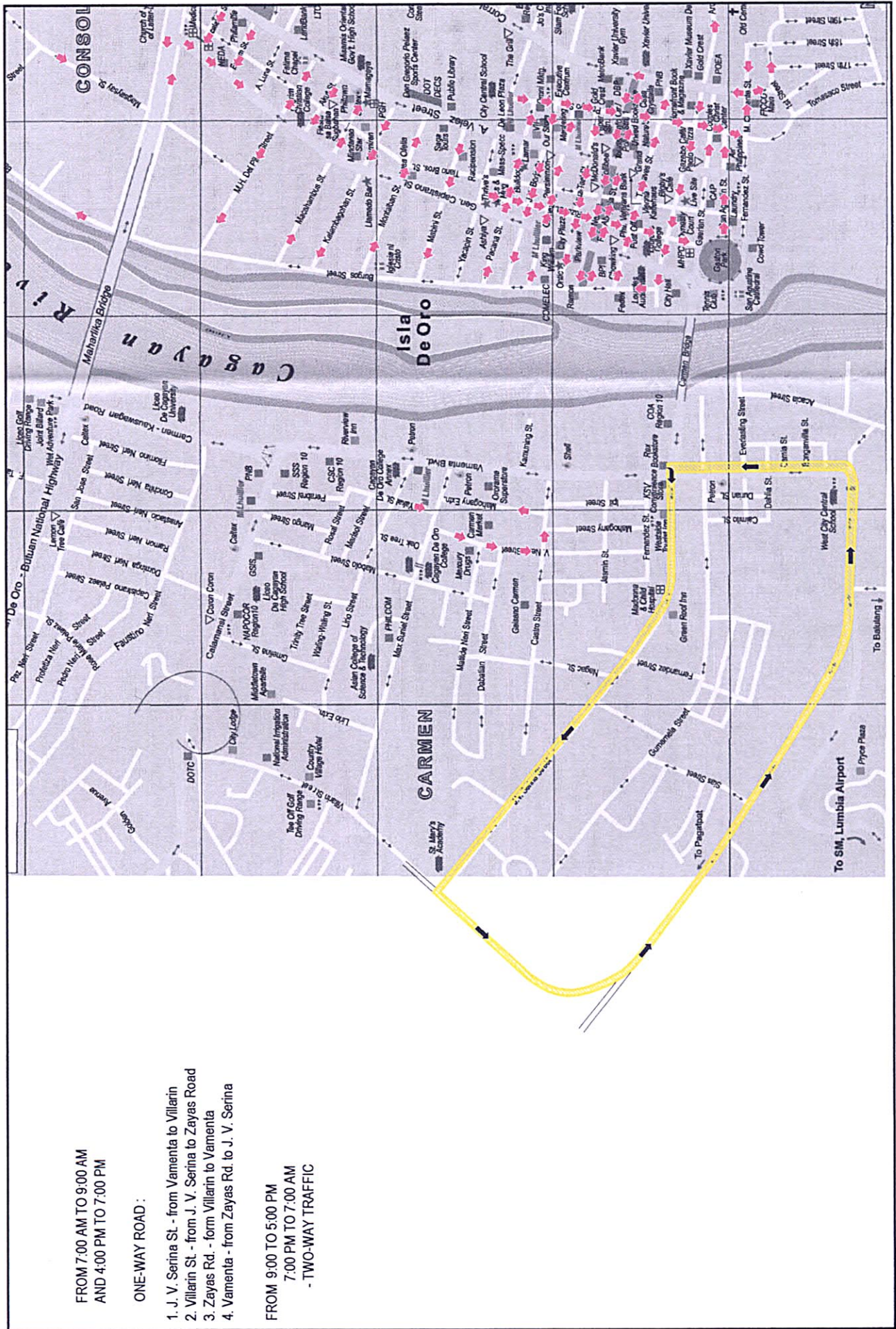


FIGURE 4.3-7 (2) ONE-WAY STREETS



Pedestrian Mall on Neri at Friday and Saturday Night

4.3.11 Traffic Safety

1) Traffic Accident Record

A total of 5,635 accident occurred in Cagayan de Oro City, and 44 persons killed and 1,210 persons injured during year 2003. The traffic accident data is shown in Table 4.3-9.

Majority of the accident is vehicle against vehicle. But the data of injuries and killed shows that pedestrians are more victimized in the accident. In fact, the number of vehicle vs. pedestrian accidents is about 1/10 of that of vehicle vs. vehicle accident. But more pedestrians are killed in vehicle vs. pedestrian accident and almost half of fatalities are pedestrians. The number of injured in vehicle vs. pedestrian accident is about half of the injured in vehicle vs. vehicle accident. Such tendency indicates lack of pedestrian safety facilities and poor pedestrian environment.

TABLE 4.3-9 TYPE AND NUMBER OF ACCIDENTS AND VICTIMS IN CAGAYAN DE ORO (2003)

Classification	# reported	Injuries	Killed
Vehicle vs. vehicle	4,653	720	13
Vehicle vs. pedestrian	460	388	20
Vehicle alone	93	1	1
Vehicle vs. f-object	148	6	2
Vehicle vs. tri-sicad	89	42	3
Vehicle vs. bicyclist	81	48	0
Vehicle vs. animal	5	0	0
Vehicle vs. hit & run	106	5	5
Total	5,635	1,210	44

2) Accident prone locations

According to the annual report of traffic police, 11 most accident prone intersections and road sections in 2003 are shown in Table 4.3-10. The worst four accident-prone locations are on the national highway with the distinctively high number of accidents at Kauswagan intersection located at the west foot of Maharlika Bridge.

TABLE 4.3-10 ACCIDENTS PRONE LOCATIONS (2003)

	Location	# of accidents
1	National Highway – Kauswagan	152
2	Recto (National Highway) - Velez	121
3	Recto (National Highway) - Osmena	98
4	Maharlika Bridge	98
5	Nazareth Subdivision	81
6	Kauswagan Highway	80
7	Gusa Highway	73
8	Recto (National Highway) - Corrales	73
9	Lapasan Highway	65
10	LKKS	60
11	Pelaez Blvd.	60

4.3.12 Traffic Management Issues

Based on the present conditions of traffic in the study as described above, issues related to traffic management can be summarized as presented below.

1) On street parking

City center is full of parked vehicles. On-street parking is a common practice and effective capacity is reduced to less than half. Sidewalk which is intended for use by pedestrians is often occupied by parked cars forcing pedestrians to walk on carriageway. Pay parking was once introduced but it not functioning well. Parking space requirement in zoning ordinance is not followed. The city has planned and tried measures that control and manage the parking but results are yet to be achieved.

2) Limited link across river

Only two bridges are serving traffic demand across Cagayan River. The demand exceeds the capacity of these two bridges resulting in perennial congestion. A new bridge is being constructed downstream of Maharlika Bridge. If completed, the new bridge will contribute to easing the congestion of the existing bridges. But the relief will be limited particularly for Carmen Bridge as it is located far from the new bridge under construction.

3) Mixed traffic along National Highway

With the commercial development along the national highway like Gaisano City and Ororama Mega Center, the national highway is becoming congested with the mixture of different types of traffic. Vehicles traveling long distance between cities and towns along the coastal line, vehicles to and from the city center, and vehicles heading for these commercial establishments concentrate on the national highway making section of national highway congestion prone location.

4) High accident rate on National Highway

National Highway is also an accident-prone road. The accident data shows that four intersections along the highway, Osmena, Corrales, Velez and Kauswagan intersections are the worst four locations. High design standard of the highway that allows speeding, inadequate intersection design, and loading and unloading activities near intersection are considered to be cause of many accidents.

5) Lack of traffic control devices

Basic traffic control devices such as pavement marking, delineator and stud are desperately lacking. Although traffic signs are adequately installed, they are of non-standard design. These devices seem not to have tangible effect on the traffic flow individually but if they are properly installed in combination, it will make traffic flow more orderly and safe and contribute to the efficient traffic operation.

Another main contributor to the traffic congestion in the city is traffic signal or lack of it. Only five signals out of 14 existing signals are functioning and congestion is found at the intersections with malfunctioned traffic signal and at the intersections where signal is warranted but no signal has been installed. Timing of working three old signals is not properly adjusted and they are operated manually, which is inherently not efficient,

6) Unfriendly environment for pedestrians

Importance of pedestrian environment is not properly recognized. All sidewalks are very narrow, occupied by vendors, cursed with obstacles, or used as parking space for shops fronting it. More attention must be given to pedestrians. To encourage walking as most convenient mode of transport, sidewalk must be kept in good condition and free from disturbance. In this sense, pedestrian mall held every Friday and Saturday night in Divisoria is a commendable attempt to create pedestrian friendly environment.

In conclusion, Cagayan de Oro City has an advantage of good organization that is responsible for engineering, enforcement and education of traffic management. Traffic regulations are also relatively well prepared and organized compared with other local government units. But there are still traffic management problems like congestion and accident as described above. Improvement measures are to be planned, designed and implemented, which requires resources of fund and staff with knowledge of traffic engineering. People's awareness about traffic problem must also be promoted.

4.3.13 Recommended Measures

In order to address the issues described above and to make traffic flow more efficient and safe, the measures listed below are recommended. For the central area of Cagayan de Oro City, in particular, comprehensive set of measures must be planned and implemented to reduce on street parking and restore the mobility. Congestion at two bridges cause by insufficient capacity can only be solved with additional bridges across the river.

1) Establishment of parking policy and its implementation

A parking management policy must be established, in which requirement of parking space for new building must be implemented strictly, parking on main streets must be prohibited, pay on-street or off-street parking must be developed and parking business by private sector is encouraged. Time limit for the building owner to provide their own parking space as per City Ordinance No. 8470 – 2002 must be strictly enforced. At the same time, a campaign aimed at modifying the perception of resident about parking must be held.

2) Installation of traffic control and safety device

Traffic signs of stop, no-parking, one-way, no entry, no left turn, no loading and unloading, etc. must be installed. The design of sign must conform to the national standards prepared by DPWH.

Pavement markings such as stop line, pedestrian crossing, center line, lane line, etc. must be installed on national roads and other arterial streets in the study area. The layout and color of pavement markings must conform to the national standards prepared by DPWH. The work must coordinate with the pavement improvement project as the existing pavement condition does not allow marking on it.

Others traffic control devices such as chatter bar, delineator, guardrail, reflector, pavement stud, etc. must be installed at locations where such devices are needed.

3) Restoration of existing signals and installation of new signals

Replacement of all old signals with new signal is recommended. New signal must have time-of-day (TOD) and actuation capability to cope with changing traffic condition. Local coordination must be established between signals in the central area, where distance between two signalized intersections is short.

4) Accident prevention measures

Traffic accident is a serious problem for Cagayan de Oro city. The number of fatalities (44 persons in 2003) is much higher than Bacolod (4 fatalities in 2000) and Iloilo (14 fatalities in 2002). National Highway is an accident-prone road. Accident records must be analyzed and necessary improvement measures such as geometric improvement, warning sign, pavement marking, street lighting, etc. must be implemented.

5) Enhancement of pedestrian environment

Removal of obstruction on sidewalk, restoring sidewalk used as parking area, decorated sidewalk pavement and planting of trees will be undertaken to create friendly environment for pedestrians. Pedestrian Mall being held every will can be expanded with more programs.

6) Training of staff engaged in traffic management

Training on traffic facility development and traffic operation will be provided to traffic police, traffic aides, city hall staff engaged in traffic management depending on their duties and responsibilities.