Paper No. 544

FAIZABAD INTERCHANGE (CONCEPT)

BY

Engr. E.I. JOHRI

FAIZABAD INTERCHANGE ISLAMABAD

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I. INTRODUCTION

Faiazabad intersection is at the junction of Lahore - Islamabad and Rawalpindi - Murree highways. Another leg joins the junction from Peshawar Pirwadhai Road.

Presenly there is lot of confusion and delay of vehicle movements at this particular point. Traffic is interrupted and delays occur.

Capital Development Authority Islamabad is very keen to improve present situation at Faizabad and Consultants have been asked.

a) To prepare a comprehensive plan
b) O-D survey be carried out and facility be designed for 30 year design life.
c) The proposal should be cost effective.

2. ELEMENTS IN ANY TRAFFIC PROBLEM

To develop a comprehensive plan we must look into various elements involved.

Motor vehicles travel the roads under the control of individual operators. If highways are to be designed and operated on a rational basis, the abilities and limitations of driver, vehicle and road individually and in combination must be appraised and taken into account. Generally elements involved in any traffic problem would be :-

- Human
- Vehicles
- Road

Various important sub-elements of these elements which need to be considered, are :-

Human (Drivers and Pedestrians)

i) Physical limitations
ii) Faculty actions

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* Technical Director, E.G.C.,
Formerly Managing Director Turkpak International
Formerly Vice President Nespak
Retired S.E. Punjab, C&W Deptt.

iii) Personal desires

Vehicles (Cars, Trucks, Buses etc.)

i) Design limitations

ii) Maintenance

iii) Performance

Roads (Streets, Terminals)

i) Road design features

ii) Terminal facilities

iii) Control devices

HUMAN

The drivers and pedestrians using the right of way and roadway should use the facility according to their priority. Motorists and public in general are required to know their rights and limitations while on a roadway. Education and training for a good and safe behaviour of the road users are required at national and local level.

VEHICLES

Presently owners are supposed to keep their vehicles in good condition so that these are road worthy.

ROAD

Lahore Islamabad is a 4-lane divided highway. Similarly Rawalpindi - Murree road is a 4-lane highway with a small median. Pirwadhi road is a two lane road and is carrying a lot of traffic to this intersection. All the intersection points are signal controlled.

Presently we are looking at various problems being faced at the junction of Faisabad. It has bottlenecks and vehicular traffic is frequently disrupted and delayed.

3. TRAFFIC FLOW CHARACTERISTICS

Traffic flow at Faizabad depends on numerous factors peculiar to this site. The traffic varies by hours of the day, days of the week and months of the year. Similarly traffic character and pattern changes i.e. the percentage of trucks and buses is the function of both the time of day and the contributing area It is not economically sound to have interchange congestion free every hour throughout the year. It is therefore common practice

to design an interchange for 30th hour volume for the stated future year. In our case it is Year 2022.

Origin and destination surveys (O&D) are being arranged to update the previous data. However to determine the future requirement of Faizabad Interchange at this initial stage, the PCU observed by NTRC Islamabad in 1990 are adopted as the basis. Estimated growth rates have been applied for the next 30 years and total PCU calculated at this junction.

The PCU are shown in different directions in the attached table. The hourly volumes change a lot, but guidance has been obtained from NTRC literature. We are assuming highest 30th hour at this site as 10% of ADT.

Results are shown in the attached table (Annexure A).

It would be observed that there is substantial traffic in all the directions and therefore site needs special treatment. Flow line diagram is attached as annexure B.

4. LEVEL OF SERVICE

Keeping in view the volumes and requirement of having uninterrupted traffic flow at a speed of 50 kph, criteria have been developed and is attached as annexure C. We are aiming to achieve level of service C.

5. PROBLEMS

There is lot of confusion. Delays occur. To obviate these conditions and have uninterrupted traffic flow, it is proposed to have a grade-separated INTERCHANGE. Lahore - Islamabad is 4 lane divided highway. Similarly Pindi - Murree road is 4 lane divided highway.

For various aesthetic and environmental reasons, Lahore - Islamabad highway is proposed to be at grade and Pindi - Murree highway would be elevated. A 2 lane road joins the site from Pirwadhai.

6. SCHEMATIC PROPOSALS

Keeping in view the various factors affecting the movements of vehicular traffic six schematic proposals were developed for examination. The proposal approved by CDA was taken up for detail designing. Details of six proposals are discussed below :-

6.1 Full Clover-leaf and Pirwadhai Traffic Diverted

Clover-leaf is a good solution when two divided highways intersect. It provides

uninterrupted movement of traffic on both highways in all directions. However it takes lot of area, for turning, 270 degree movement is involved, controls and information at entry and exit will have to be very clear and strong.

In the given situation area is available and thus clover-leaf seems to be viable for having smooth movement of turning and through traffic without creating conflicts.

Clover-leaf interchange caters for four legs only. When fifth leg is there, which is Pirwadhai road in this case, junction improvement, is possible either adopting a rotary interchange or a three levels interchange.

Pirwadhai is presently two lane road and is congested. It interferes with the junction at an odd angle and its meeting point is very close to the junction. Thus it can not be adjusted in a clover-leaf.

Pirwadhai road is mostly being used for intercity traffic and considering the regional developments pattern of traffic will not continue to be as at present. Therefore presently the channelization of Pirwadhai road is very expensive. New regional developments include dualization of Islamabad Highway and Kashmir Highway, Construction of Lahore Pindi Motorway and Pindi Peshawar Motorway, dualization of Lahore Peshawar GT road, Pindi ring road and other local improvements. We therefore suggest that for the present traffic from Pirwadhai be diverted to Stadium road. Accordingly clover-leaf suggested earlier will be sufficient for the requirements of the junction at Faizabad. Annexure 'D' gives the diagramatic interpretation of the proposal.

Improvements required to divert this traffic include provision of a proper T junction at Murree Road - Stadium Road inter-section and Pirwadhai Road - Stadium Road inter-section to chanalize the diverted traffic.

6.2 Rotary Inter-change

When there are more than four legs at a junction Rotary interchange is very viable. A rotary interchange is a solution. Faizabad have five legs including Pirwadhai Road. Therefore a rotary interchange has been developed with proper ramps having exits and entrances. A rotary interchange would give uninterrupted traffic flow conditions if the traffic on different legs strictly adhere to priority system. If priority of traffic on a rotary is not adhered to there would be conflict and traffic tends to slow down. Therefore a rotary interchange is one of the recommended solutions. The schematic plan giving necessary details is attached.

There would be small sections of round-about which tend to have conflicts. Those are when traffic is turning to Pirwadhai from Pindi and having through traffic as well. The flow

of traffic tends to be disrupted with the left turn and through traffic. These would be minimized by fixing priorities in a round-about. Traffic would be uninterrupted if the priority is given to the vehicles already present in the round-about. Rotary interchange would take considerable traffic and is a good solution for existing situation, and details are shown in Annexure 'E'.

6.3 Rotary Interchange with Special Under-passes

Rotary inter-change with special under-passes for Pindi Islamabad traffic has been proposed. Islamabad highway would be at grade, Murree Road and Pirwadhai Road would be raised and would join an elevated rotary. Maximum traffic has been observed between the following points :

Islamabad - Lahore.

Pindi - Islamabad.

To avoid delays on a round-about separate under-passes are suggested for Pindi Islamabad and Islamabad Pindi traffic. The details are shown in the attached drawings, as annexure 'F'.

6.4 Full Clover-leaf with Special Treatment to Pirwadhai Traffic

The Islamabad - Lahore Highway would be at grade and Pindi - Murree Road would be elevated. Full clover leaf would be provided for necessary turnings. The loops would also be there for left turns. The clover-leaf is sufficient for all traffic movements to Pindi - Murree, Lahore and Islamabad. The traffic from Pirwadhai has been given a special treatment. Special under-passes have been provided to avoid conflicting situations. The Lahore bound traffic would be going on the loop as shown in the plan. The traffic from Lahore would come through a parallel loop. The turning from Pindi to Pirwadhai and Murree to Pirwadhai has to be through rotational system as shown in annexure 'G'.

6.5 Full clover-leaf with Pirwadhai Lahore movement through clover-leaf

The clover-leaf would take all the movements of major roads whereas travel from Pirwadhai to Murree/Lahore would be through the clover-leaf. All the other movement are through loops, as shown in annexure 'H'.

6.6 Full clover-leaf with independent loops for traffic on Pirwadhai

In this proposal the independent circular loop has been avoided and independent grade separation bridge for Murree - Pirwadhai has been proposed, and details shown in annexure 'K'.

7. RECOMMENDATION

Proposed No. 6 (Annexure 'K') has been adopted by CDA.

FAIZABAD INTERCHANGE
TRAFFIC COUNT (PCUS PER DAY) & FORECAST

Annexure 'A'

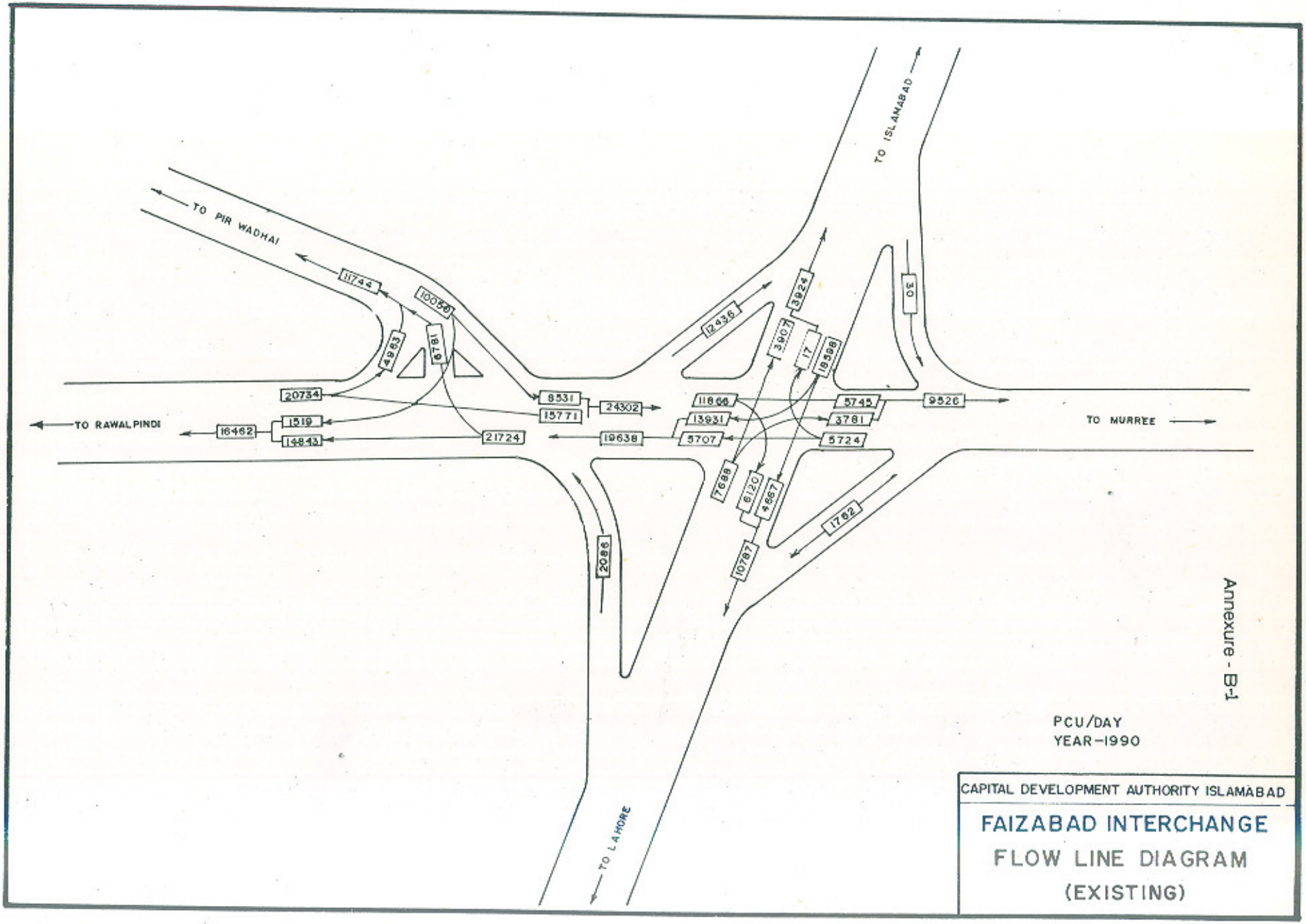
SCREEN LINE	1990	* 2022	DIR.	ROUTES	1990	%	* 2022	ROUTES	1990	%	* 2022	D.H.V
A. ISLAMABAD (ISL)			ST	ISL - LHR	4.667	5	13.087	LHR - ISL	3,907	5	10,956	1,202
			R	ISL - RWP	13,931	5	39,066	RWP - ISL	12,436	5	34,874	3,697
			L	ISL - MUR	30	5	84	MUR - ISL	17	5	48	7
	34,988	98,115			18,628		52,238		16,360		45,878	4,906
B. MURREE (MUR)			ST	MUR - RWP	5,707	5	16,004	RWP - MUR	5,746	5	16,113	1,606
			R	MUR - ISL	17	5	48	ISL - MUR	30	5	84	7
			L	MUR - LHR	1,762	5	4,941	LHR - MUR	3,781	5	10,603	777
	17,043	47,793			7,486		20,993		9,557		26,800	2,390
C. LAHORE (LHR)			ST	LHR - ISL	3,907	5	10,956	ISL - LHR	4,667	5	13,087	1,202
			R	LHR - MUR	3,781	5	10,603	MUR - LHR	1,762	5	4,941	777
			L	LHR - RWP	2,086	7	8,747	RWP - LHR	6,120	7	25,661	1,720
	22,323	73,996			9,774		30,306		12,549		43,690	3,700
D. RAWALPINDI (RWP)			ST	RWP - MUR	5,746	5	16,113	MUR - RWP	5,707	5	16,004	1,606
			R	RWP - LHR	6,120	7	25,661	LHR - RWP	2,086	7	8,747	1,720
			L	RWP - ISL	12,436	5	34,874	ISL - RWP	13,931	5	39,066	3,697
	46,026	140,465			24,302		76,648		21,724		63,817	7,023
E. PIRWADHAI (PWH)			ST	NA	--	--	0	NA	--	--	0	0
			R	PWH - RWP	1,519	7	6,369	RWP - PWH	4,963	7	20,810	1,359
			L	PWH - MUR/LHR	8,531	7	35,771	MUR/LHR-PWH	6,781	7	28,433	3,210
	21,794	91,382			10.050		42,140		11,744		49,243	4,569

* Forecast (Projected for 30 years from 1992)

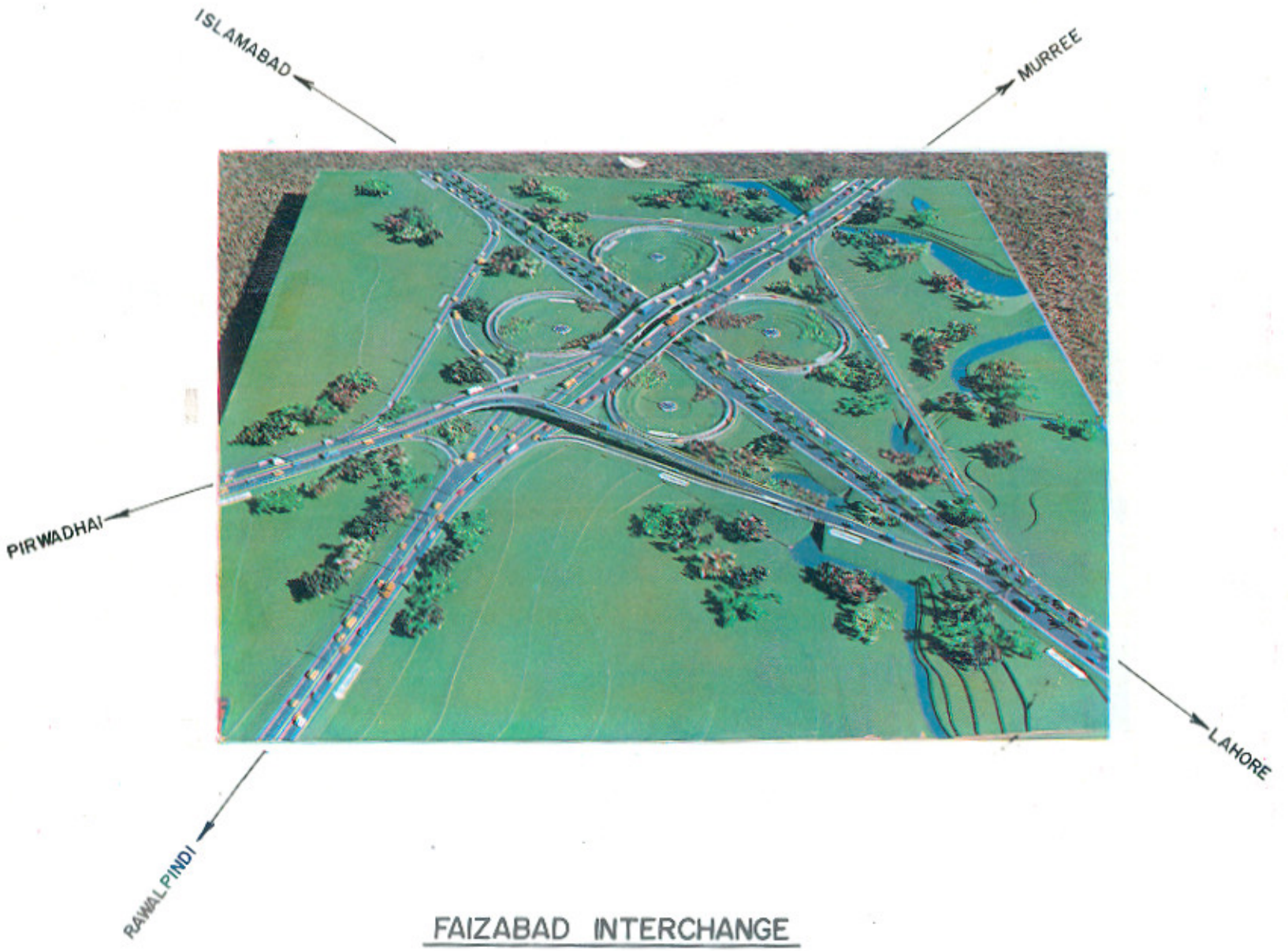
Note : Growth rate adopted :-

a) Trucks/Tankers/Trailers = 7% P.A. for 1st 10 years
= 3.5% for Next 20 years

b) All other traffic = 5% P.A. for 1st 10 years.
= 2.5% for next 20 years.


TO PIR WADHAI
TO ISLAMABAD
TO RAWALPINDI
TO MURREE
TO LAHORE
11744
10056
4963
1878
20734
1519
16462
14843
8531
15771
24302
21724
19638
12436
3924
3907
17
18398
30
11866
13931
5707
5745
3781
5724
9526
7698
6120
4667
10787
1762
2088
PCU/DAY
YEAR-1990
Annexure - B-1
CAPITAL DEVELOPMENT AUTHORITY ISLAMABAD
FAIZABAD INTERCHANGE
FLOW LINE DIAGRAM
(EXISTING)

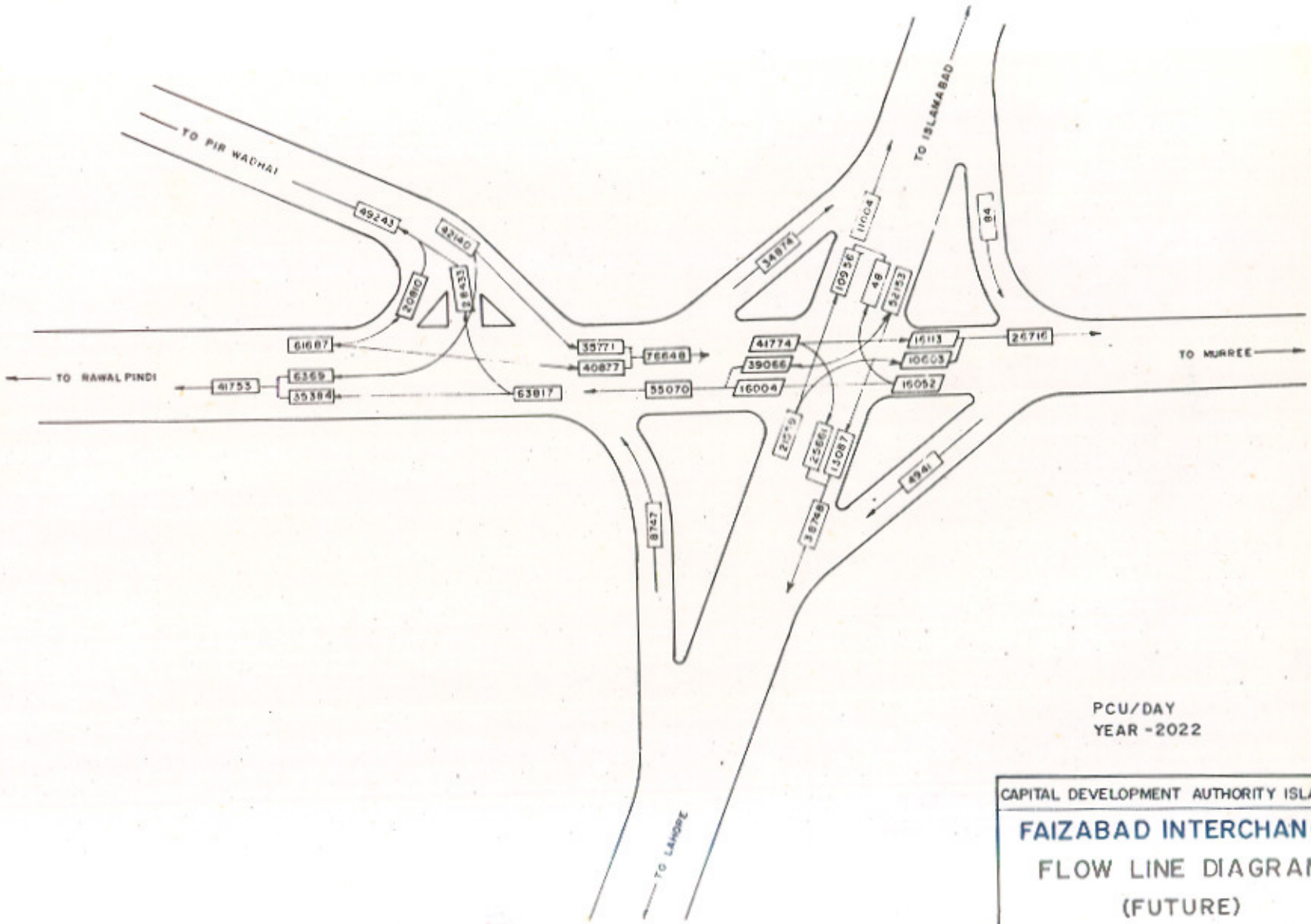




FAIZABAD INTERCHANGE



FAIZABAD INTERCHANGE


TO PIR WADHAI
TO ISLAMABAD
TO RAWAL PINDI
TO MURREE
TO LANDIPE
49243
42140
20860
61687
6369
41755
35384
63817
35771
40877
76648
55070
34874
11064
109.56
48
52153
84
41774
39066
16004
14113
10603
16052
26716
2579
2566
13087
4941
38749
8747
PCU/DAY
YEAR -2022
Annexure B-2
CAPITAL DEVELOPMENT AUTHORITY ISLAMABAD
FAIZABAD INTERCHANGE
FLOW LINE DIAGRAM
(FUTURE)



Annexure 'C'

Geometric Design Criteria For Faizabad interchange Islamabad

Sr. No.	ITEM			DESIGN SPEED (KPH)
	A) RAMPS			
1.	Design Speed		(kph)	50
2.	Minimum Radius of Horizontal Curve		(m)	50
3.	Minimum Rate of Super-elevation of Cross slope		(%)	2
4.	Maximum Rate of Super-elevation		(%)	6
5.	Maximum Grade			
i)	Loops :			
	a) Exist	(Up)	(%)	7
		(Down)	(%)	5
	b) Entrance	(Up)	(%)	5
		(Down)	(%)	8
6.	Vertical Curvature :			
i)	Minimum Radius of Crest Vertical Curve		(m)	440
ii)	Minimum Radium of Sag Vertical Curve		(m)	860
7.	Minimum Length of Vertical Curve		(m)	40
8.	Minimum Stopping sigh Distance		(m)	

9.	Width of Ramp :			
i)	Traffic Land		(m)	3.5
ii)	Shoulder :			
	a) Paved :			
	Outer	(Single Lane)	(m)	3.0
		9Two Lane)	(m)	1.0
	Inner		(m)	1.0
	b) Unpaved Verge :			
	Outer		(m)	0.5
	Inner		(m)	0.5

B) SPEED CHANGE LANES

10.	Minimum Length :	(m)	200
11.	Width	(m)	3.50

C) STRUCTURES

12.	Design Load	Class "AA" or "A" whichever severer.