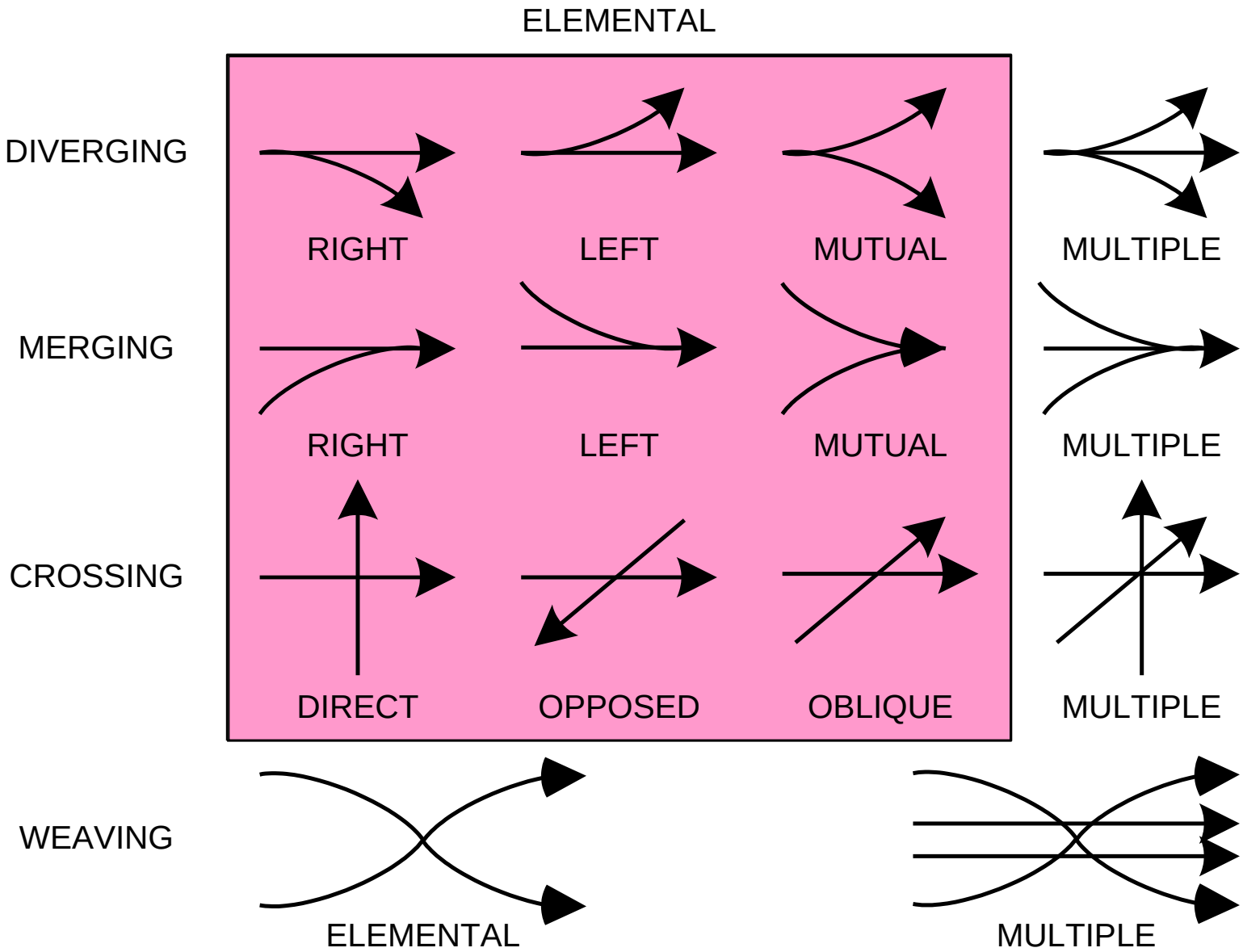

At-Grade Intersection

Types of Intersection Maneuvers

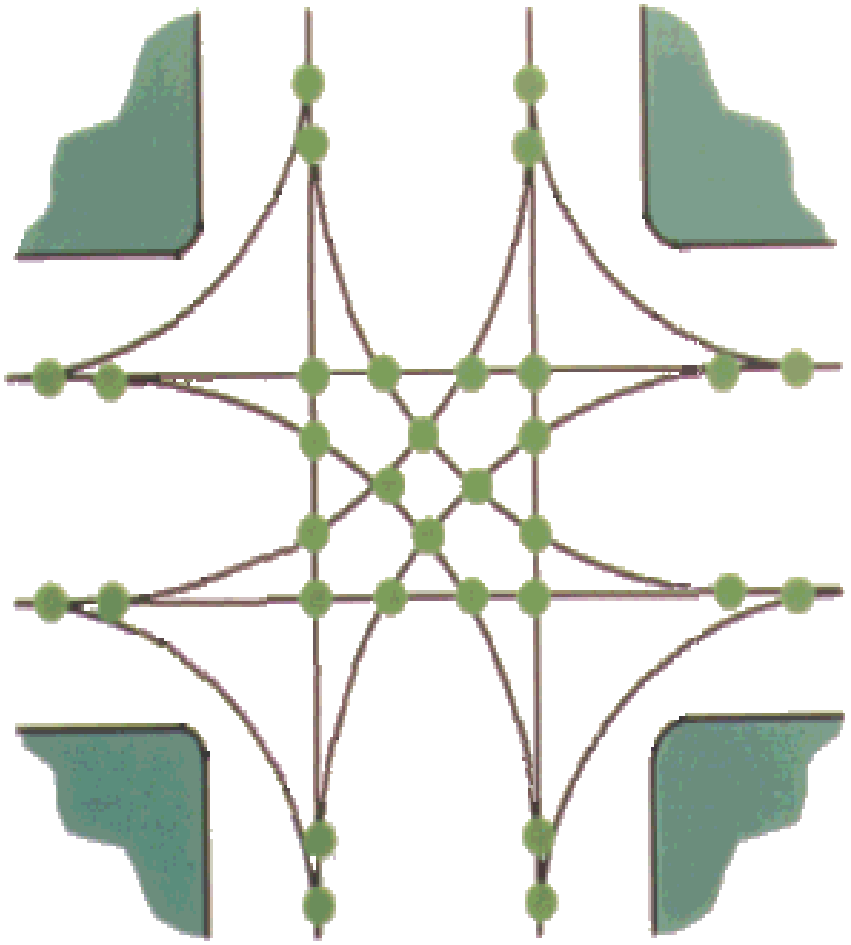


4-way Intersection

32

conflict points

- ➔ **High speed impacts**
- ➔ **High angle impacts**



Roundabout

8

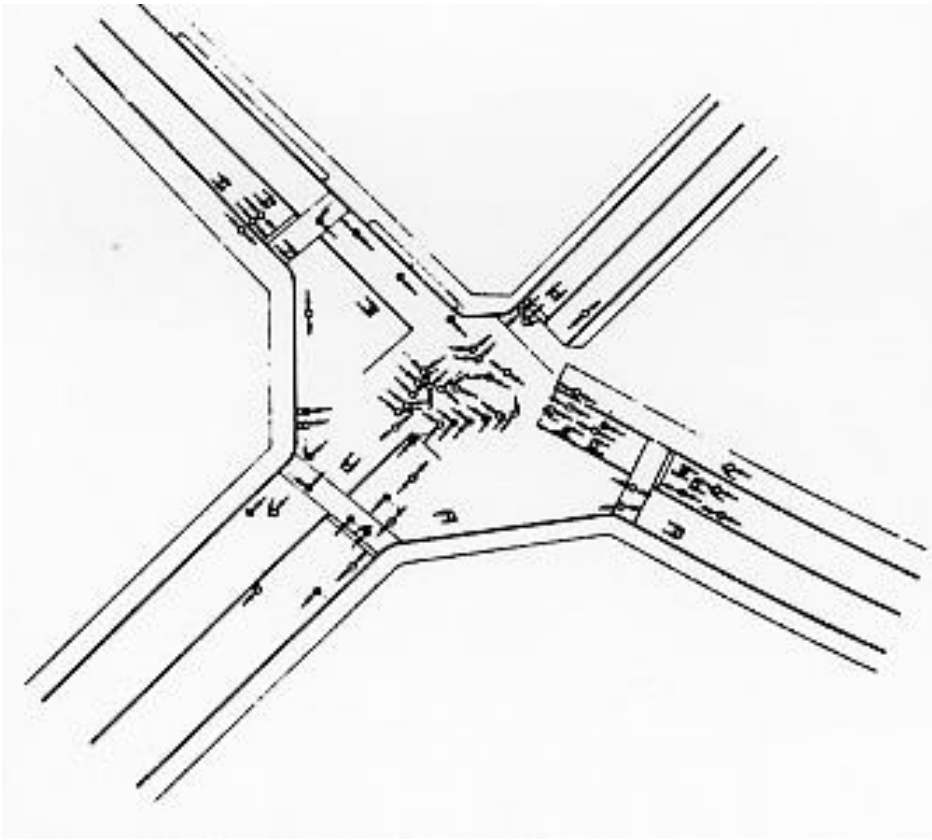
conflict points

75% reduction in Motor Vehicle conflicts

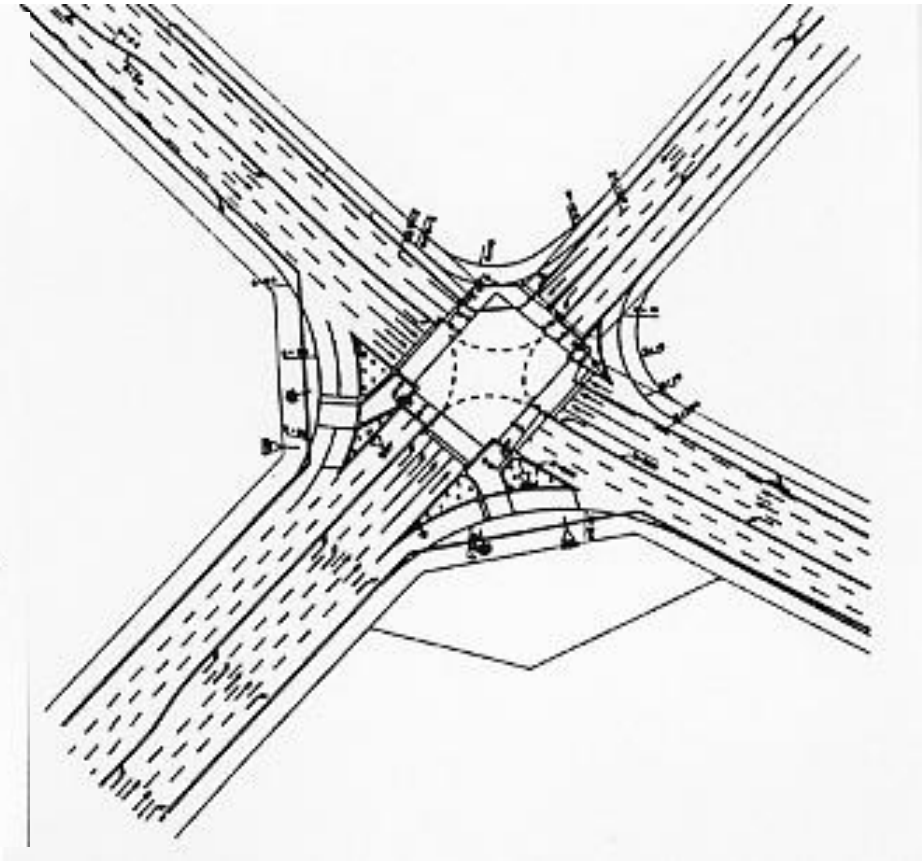
- ➔ ***Low*** **speed impacts**
- ➔ ***Low*** **angle impacts**



BEFORE



AFTER



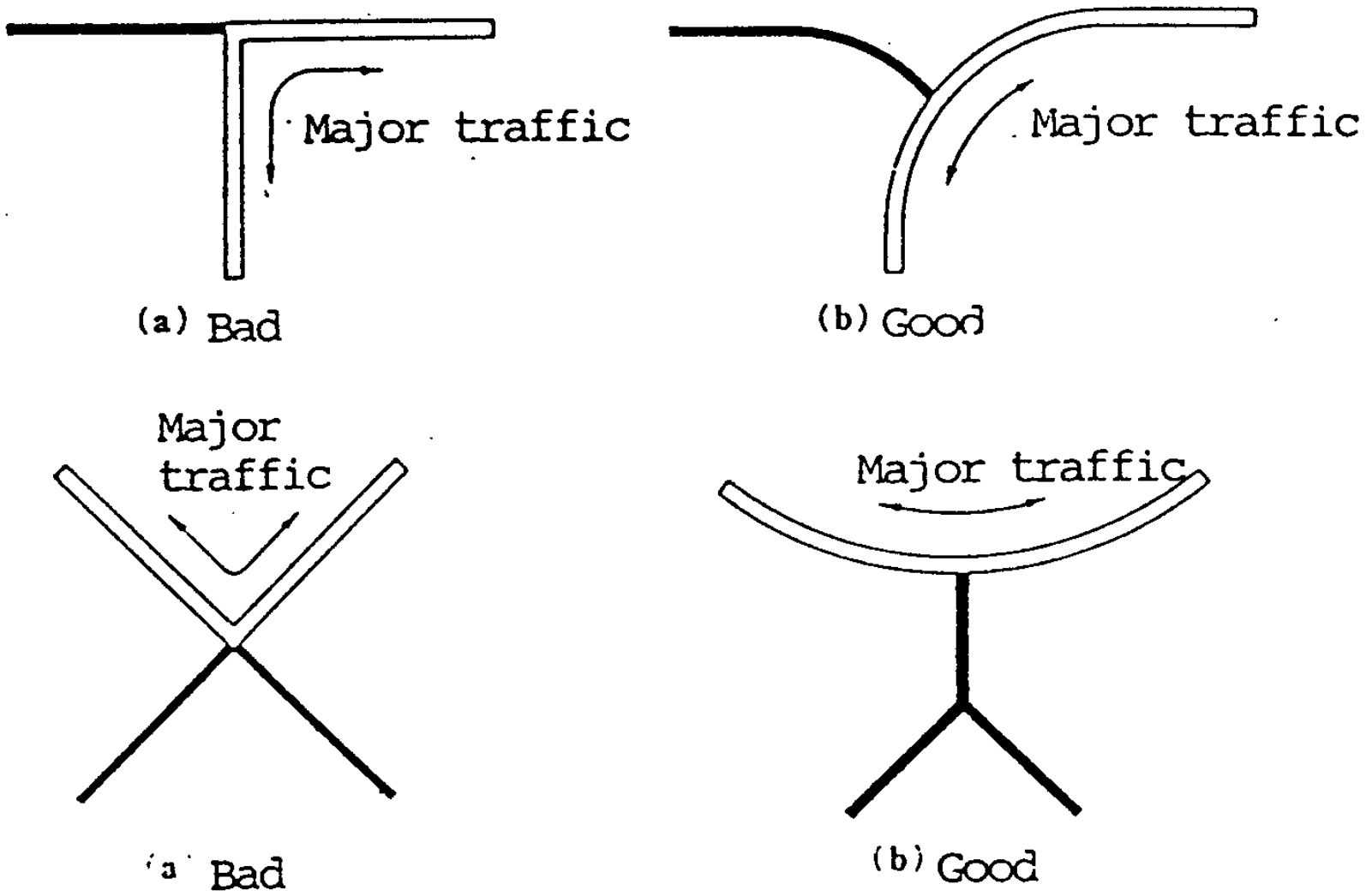
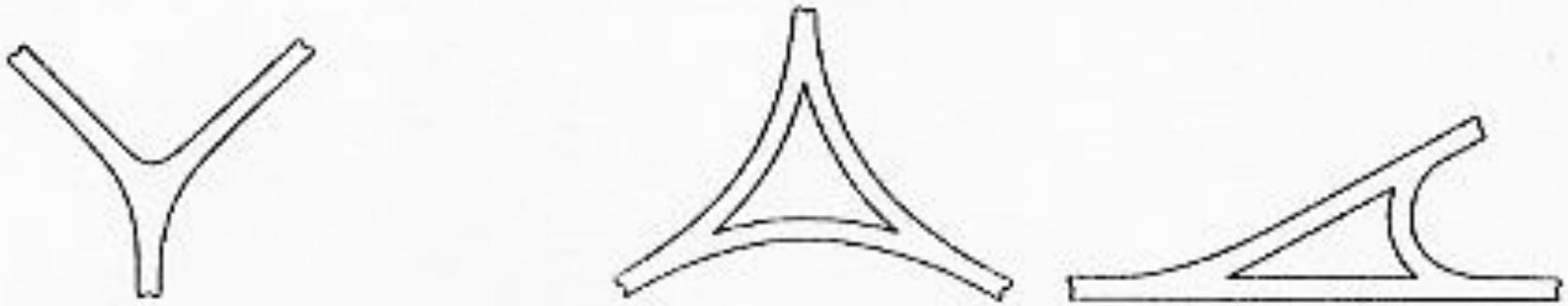


Fig.A.10.1 Example Showing Methods for Correcting Irregular Intersection Configurations

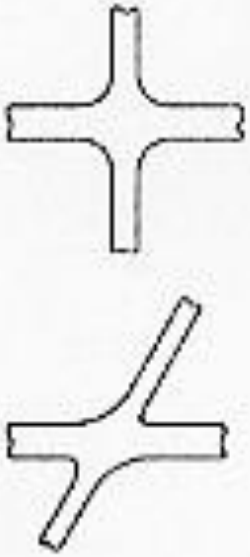


Unchannelized T Flared T T with turning roadways

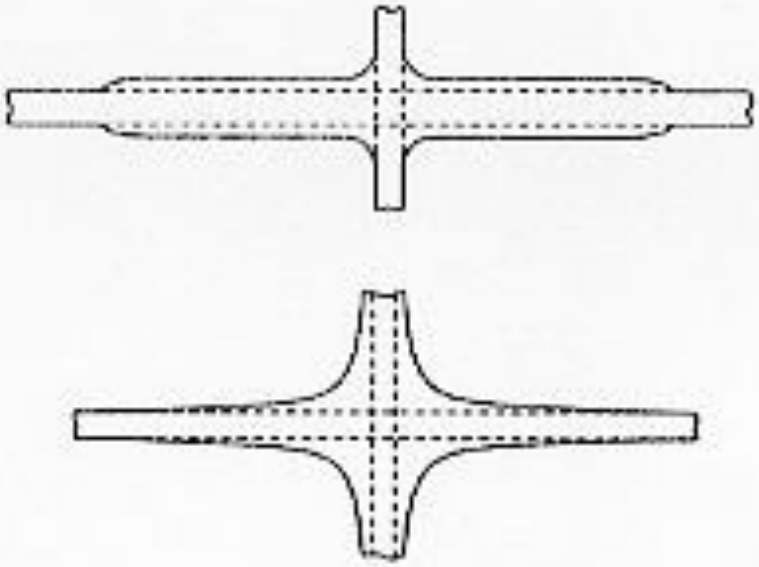


Unchannelized Y Y with turning roadways

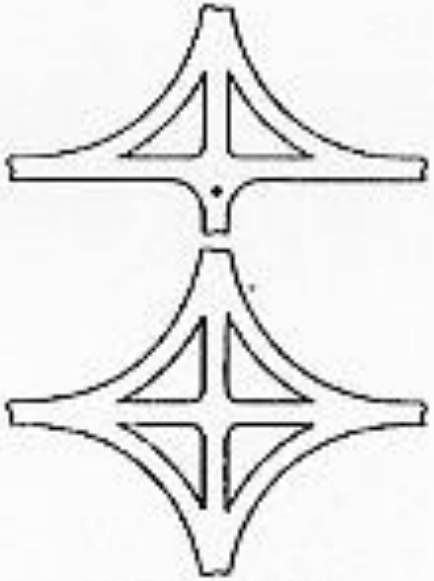
3-Leg Intersections



Unchannelized

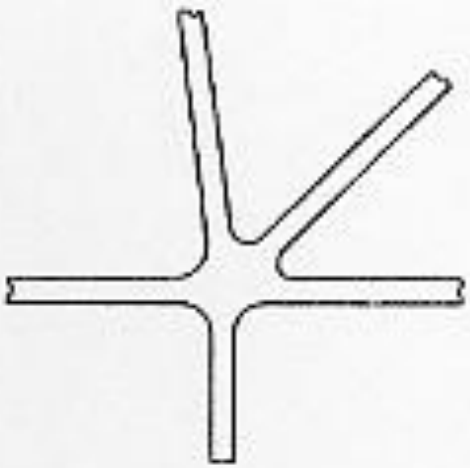


Flared

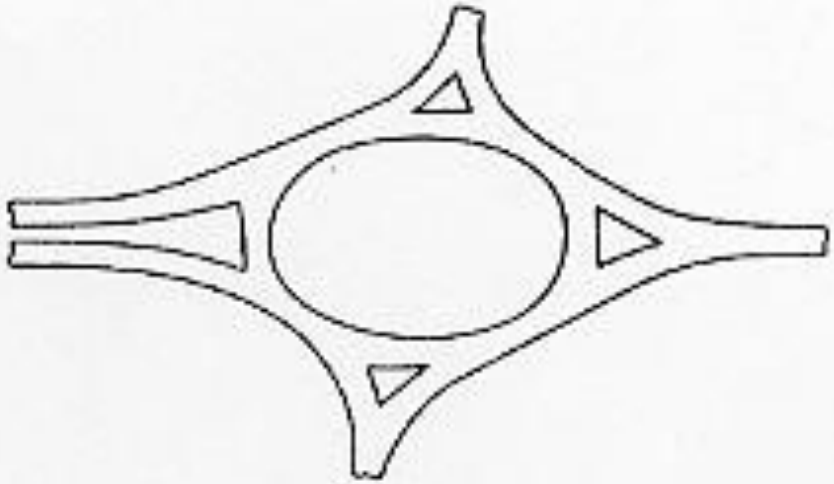


Channelized

4-Leg Intersections



Multileg Intersection



Roundabout

Figure 8-1 Examples of At-Grade Intersections.

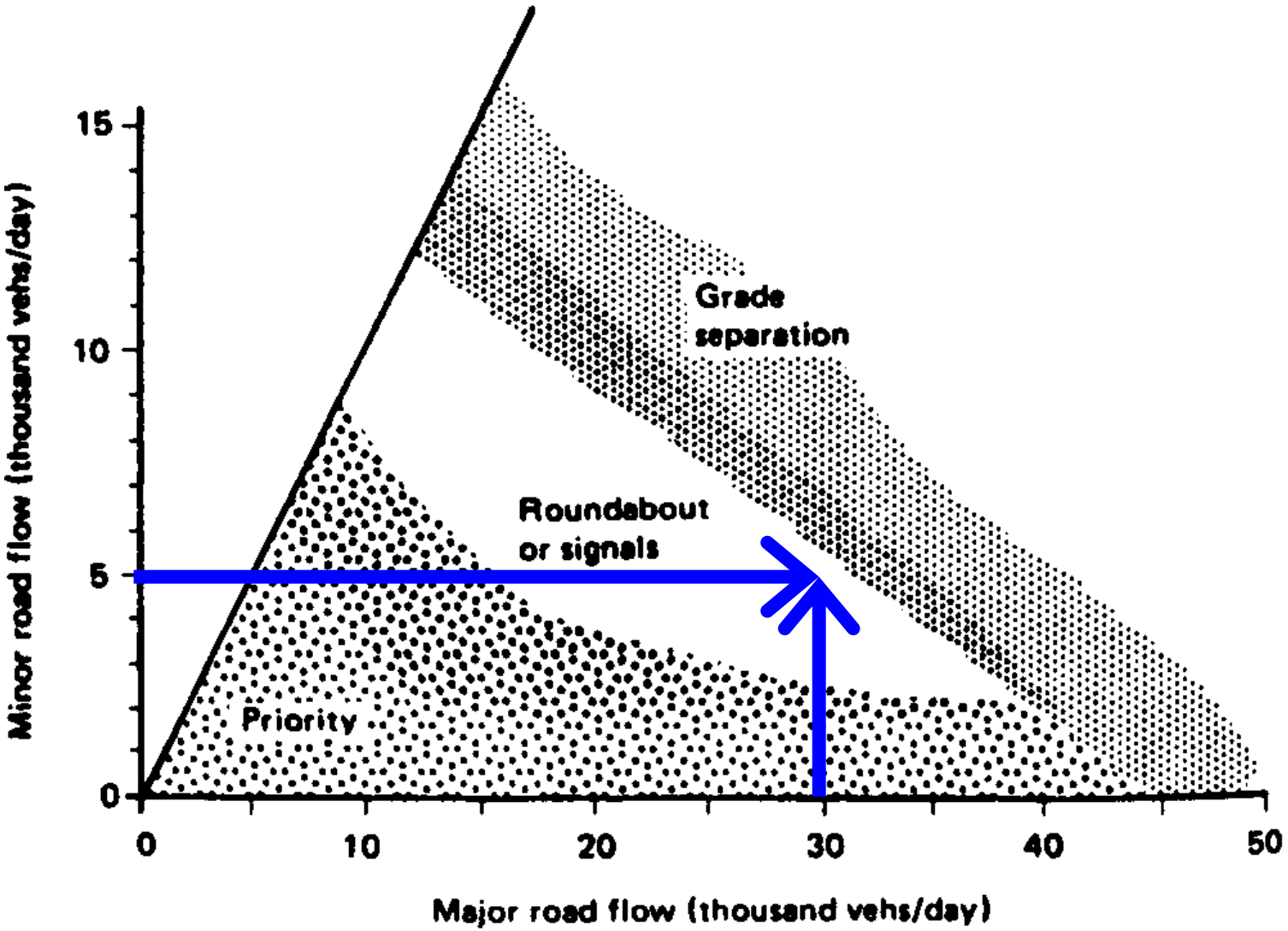


Fig 4.69

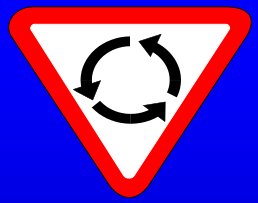
UK practice for intersection selection based on different combinations of traffic flows in urban conditions

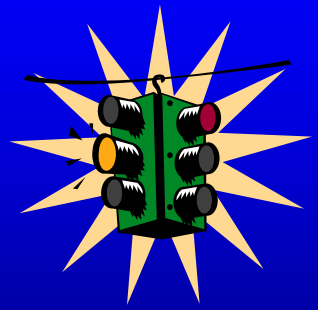
Intersection Control Hierarchy

- No Control (Basic Rule)
- Yield Sign
- Stop Sign – *normal control method*
- All-Way Stop
- Roundabout
- Traffic Signal
- Grade Separation







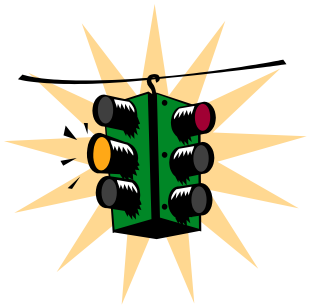


Traffic Signals

Advantages

- Orderly movement of traffic
- Reduces certain types of crashes
- Interrupts heavy flows for minor movements
- Promotes driver confidence
- Provides gap for minor movements

Traffic Signals



Disadvantages

- Increases total delay, especially off-peak
- Increases fuel consumption
- Increases crashes
- Induces road users to less appropriate routes
- Unnecessary delay if not properly located
- Bad timing, bad engineer!

GRADE SEPARATION

- High flows
- Minimal delays
- Expensive





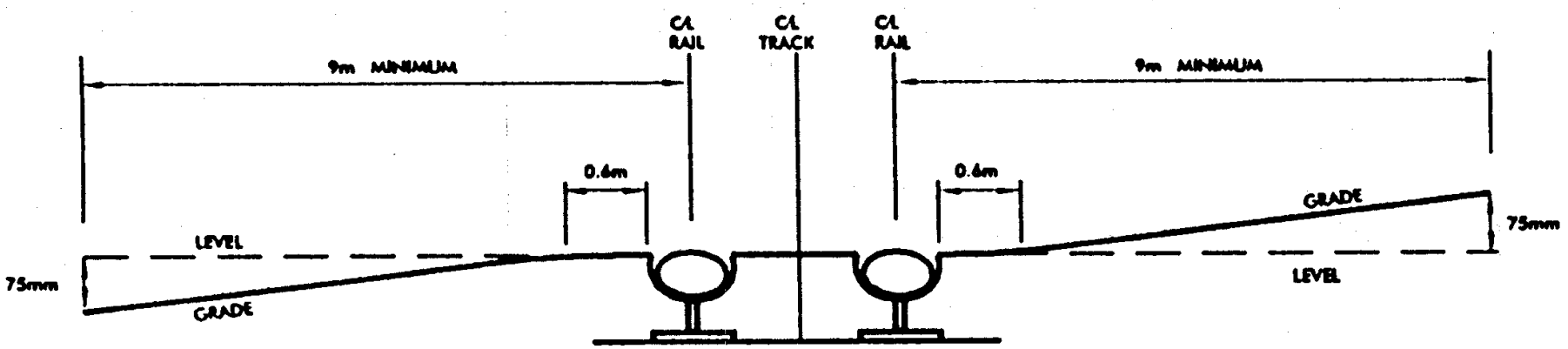
At-Grade Railway Crossings

Horizontal alignment

- Intersection at right angle on a tangent section
- No other nearby intersections

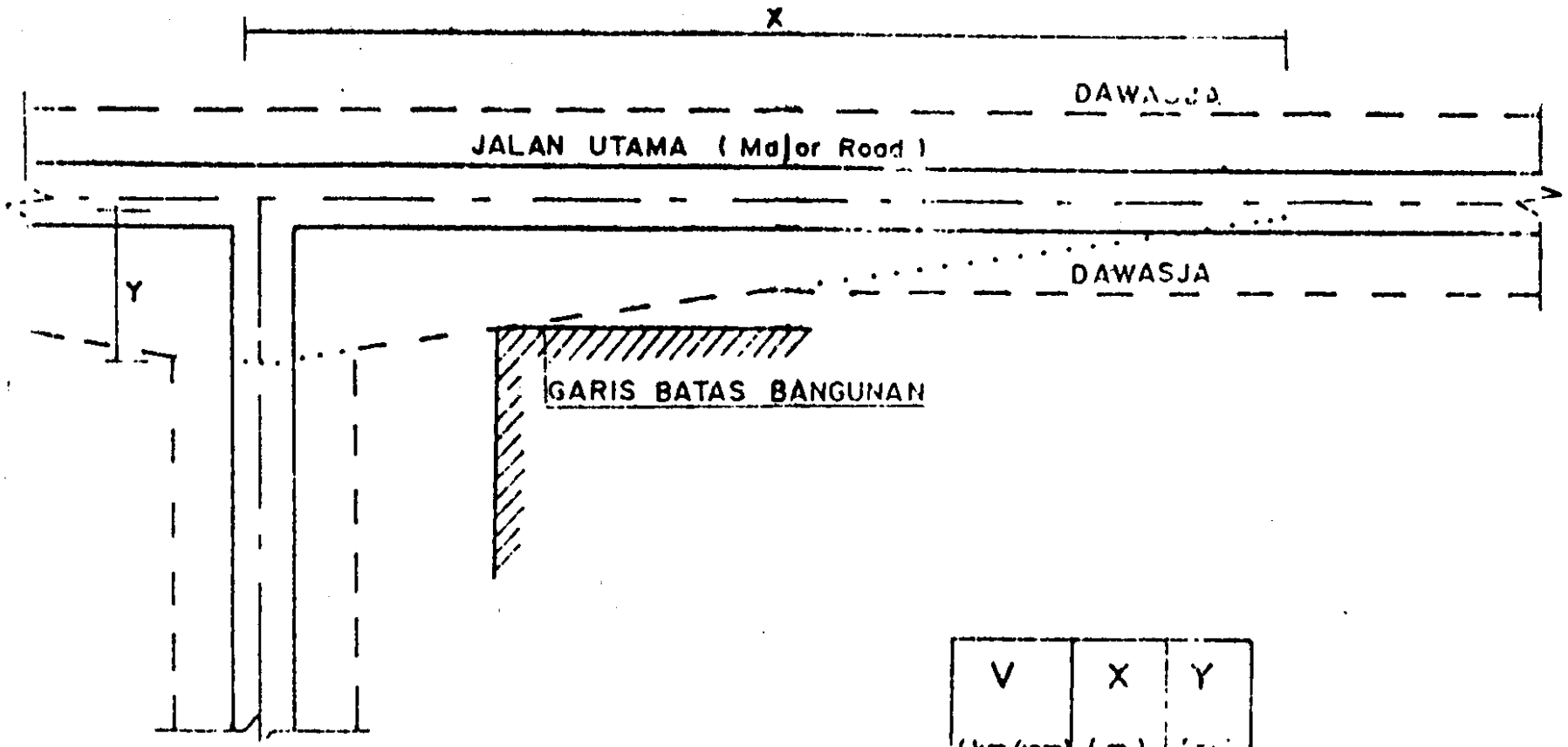
Vertical alignment

- Intersection as level as possible
- Adequate view of crossing
- Vertical profile should prevent vehicles with low clearance from being caught on the track (see below)

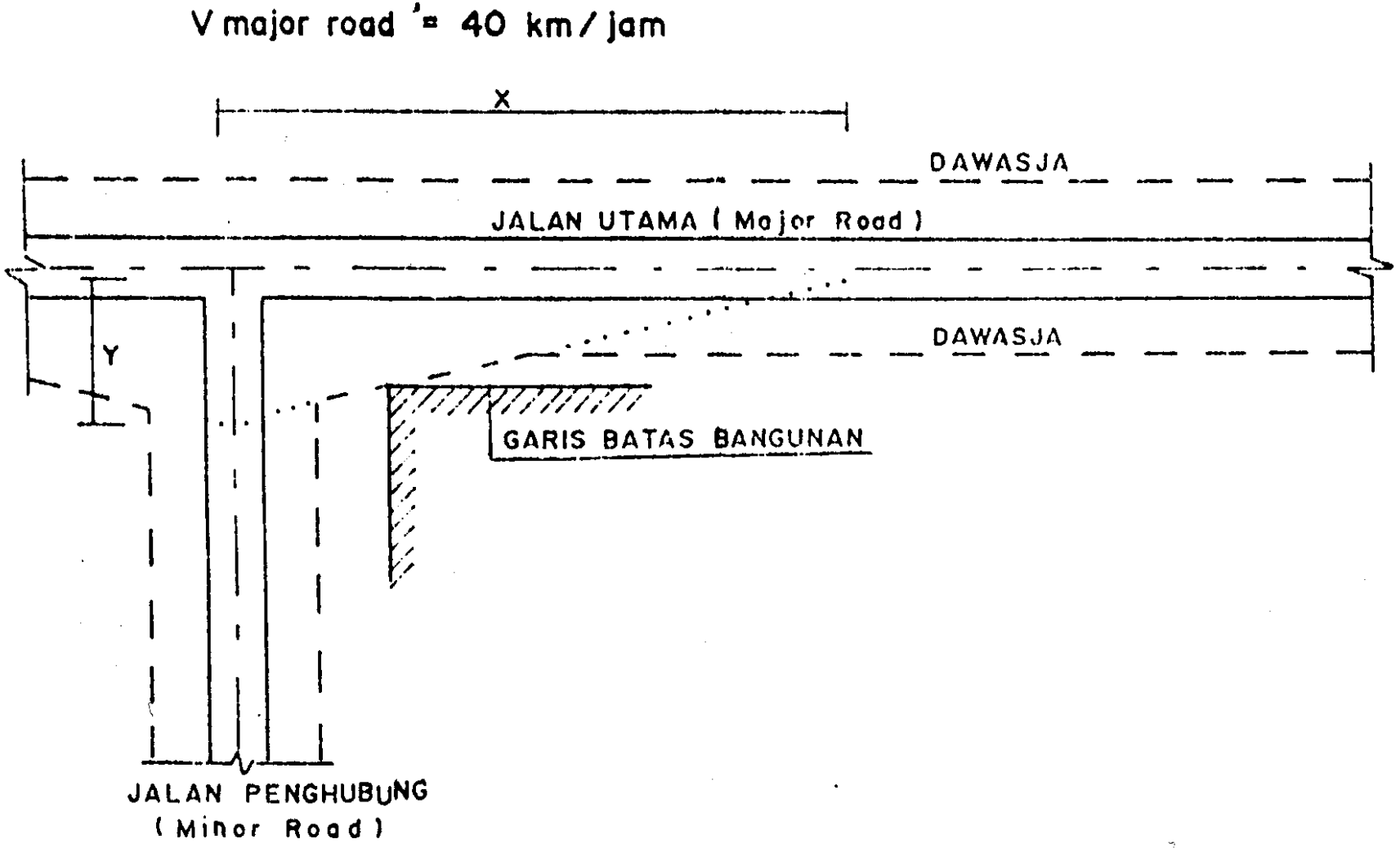


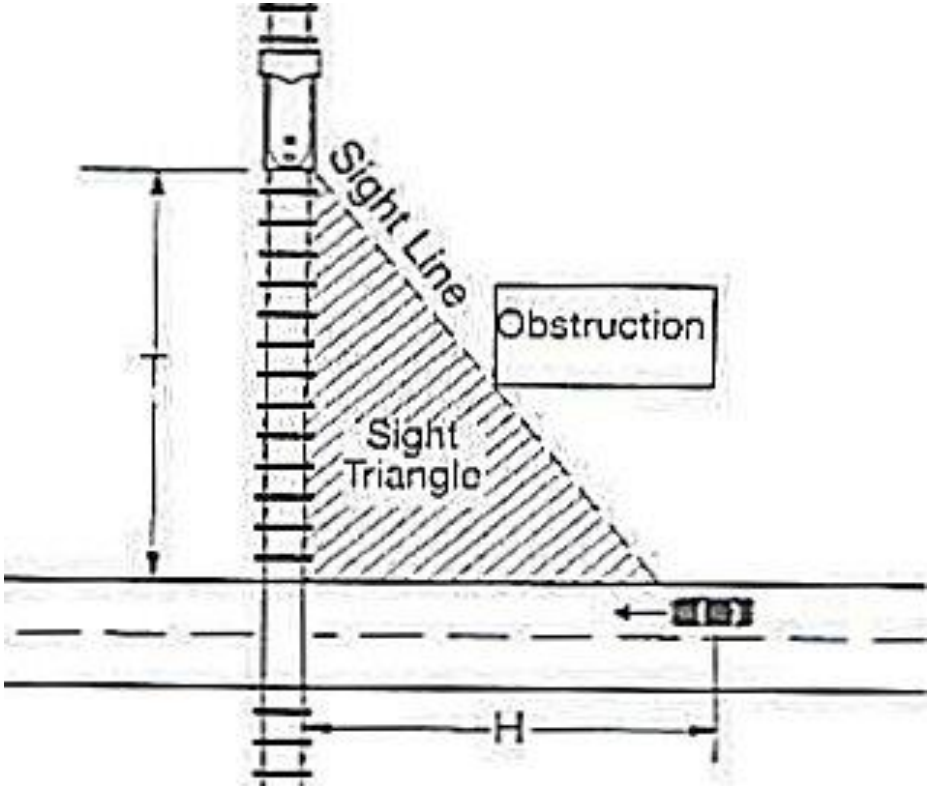
F. JARAK PANDANG BEBAS

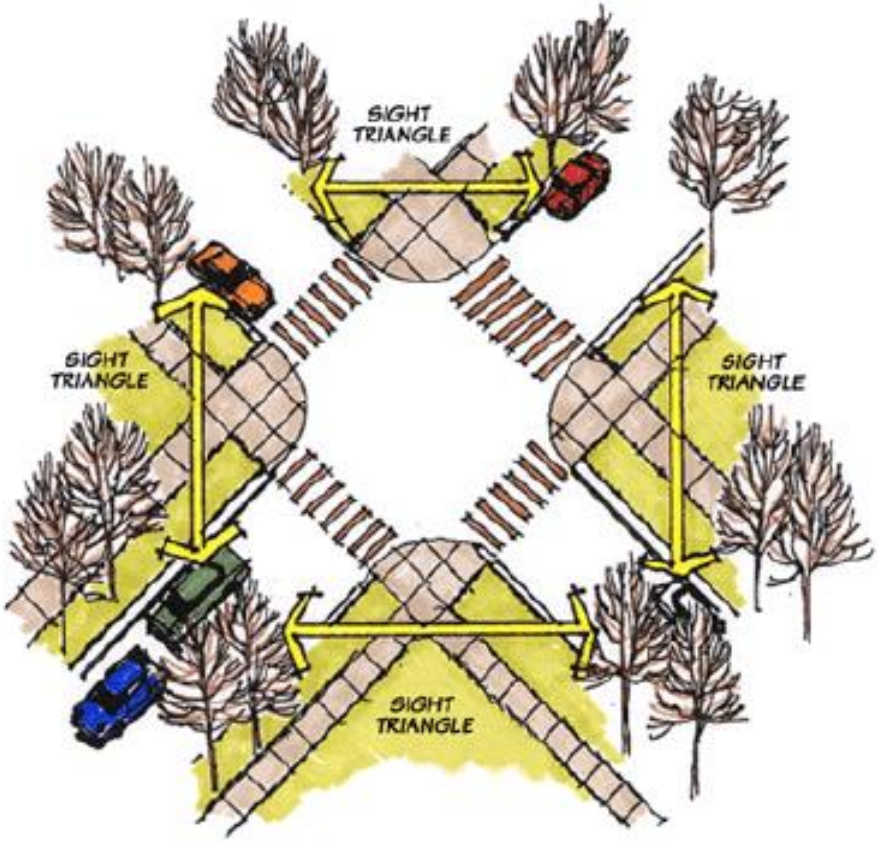
V major road = 60 km / jam

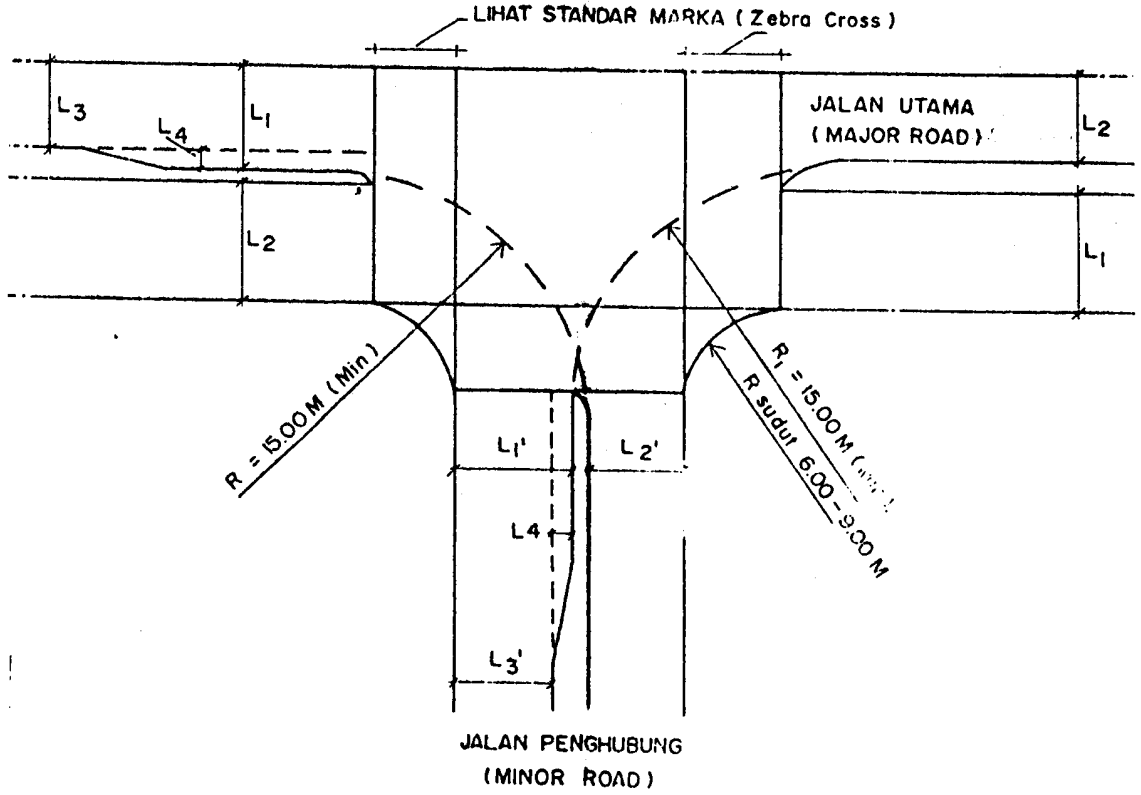


V (km/jam)	X (m)	Y (m)
60	105	16
40	70	16


V major road = 40 km / jam
X
DAWASJA
JALAN UTAMA (Major Road)
DAWASJA
Y
GARIS BATAS BANGUNAN
JALAN PENGHUBUNG
(Minor Road)


Sight Line
Obstruction
Sight
Triangle
H


SIGHT
TRIANGLE
SIGHT
TRIANGLE
SIGHT
TRIANGLE
SIGHT
TRIANGLE



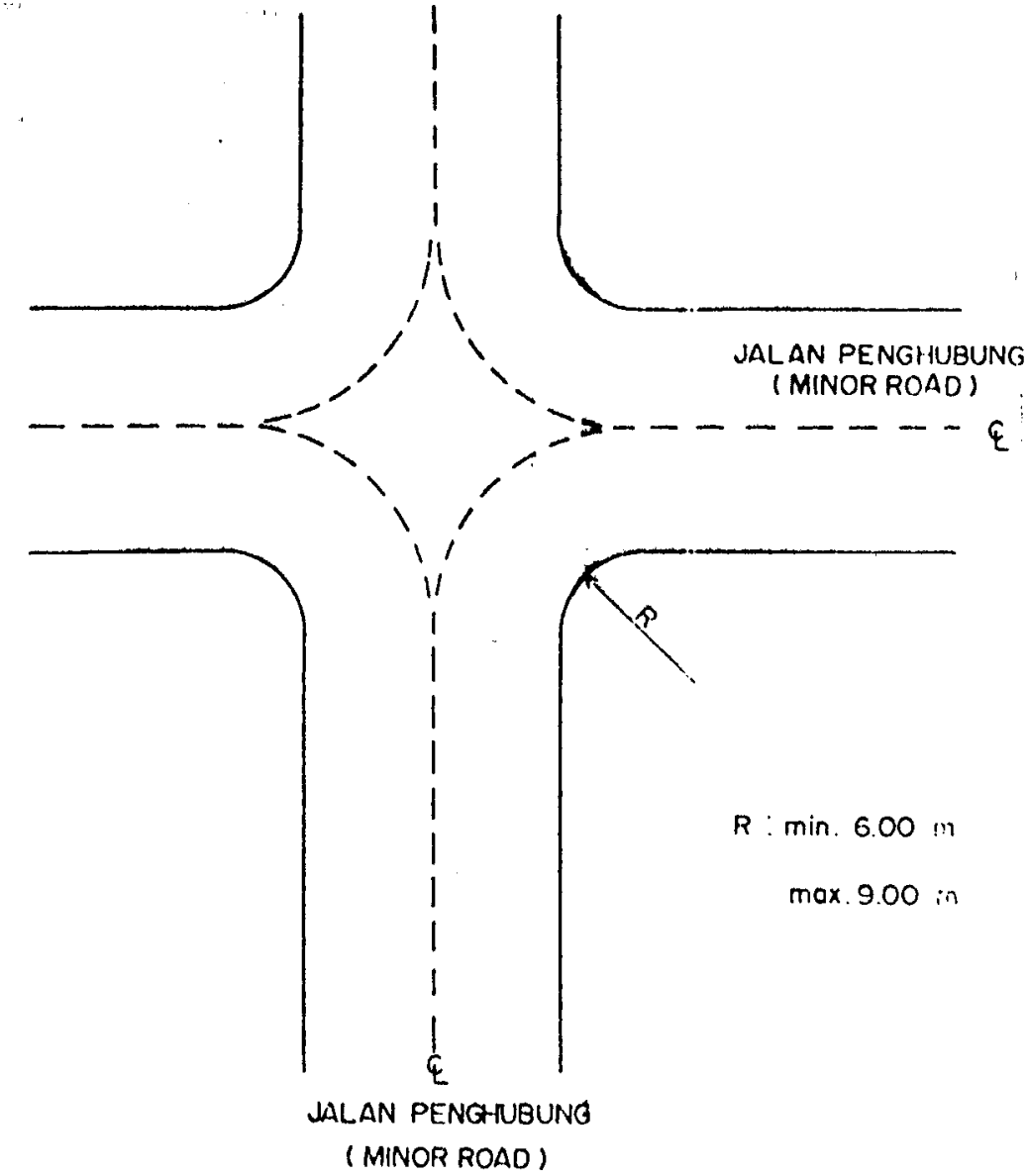
Catatan :

- Lebar L_1 untuk pertigaan tanpa lampu lalu lintas ditentukan oleh kapasitas lalu lintas dari pertigaan dan untuk pertigaan dengan lampu lalu lintas ditentukan oleh perhitungan kapasitas lampu lalu lintas.
- Lebar L_2 tidak kurang dari lebar rencana yang ditentukan atau tidak kurang dari L_2
- Lebar absolut minimum untuk L_4 = 2,75 m

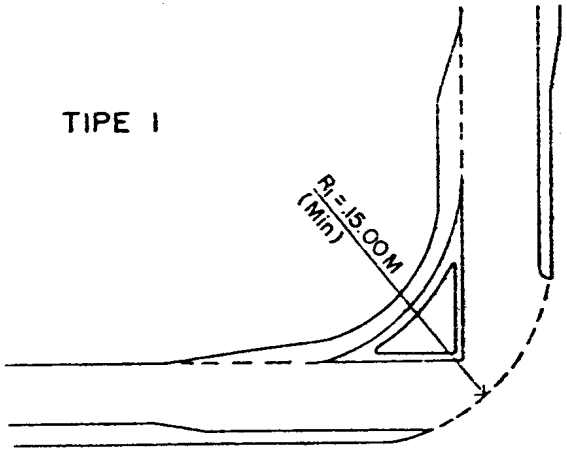
  atau : $L_4 = L_1 - L_3 \geq 2{,}75$ m

  $L_4 = L_1 - L_3 \geq 2{,}75$ m

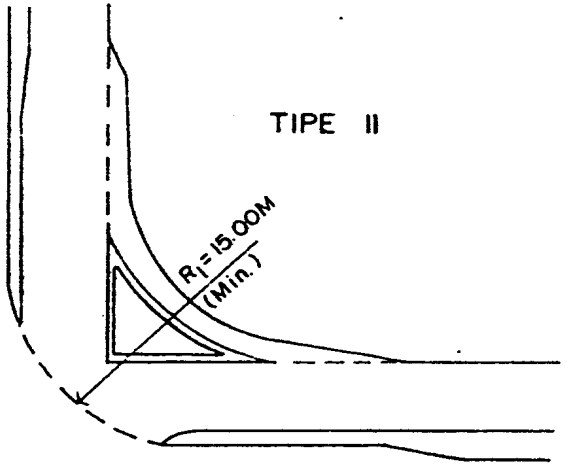
TANPA JALUR PERLAMBATAN / PERCEPATAN



TIPE I



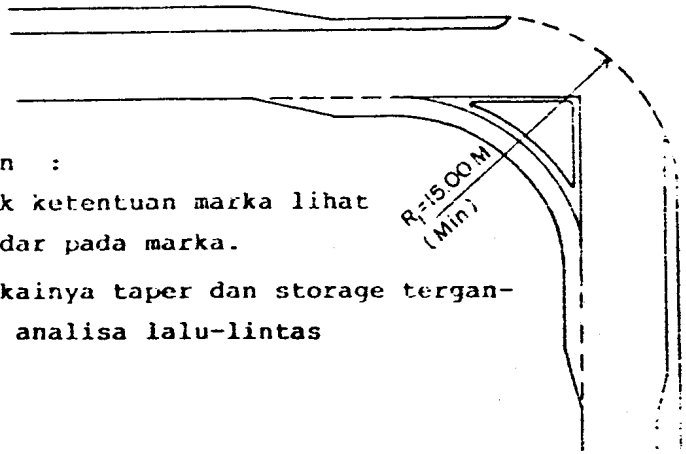
TIPE II



C. TYPICAL SUDUT PEREMPATAN (INTERSECTION)

DENGAN JALUR PERLAMBATAN / PERCEPATAN

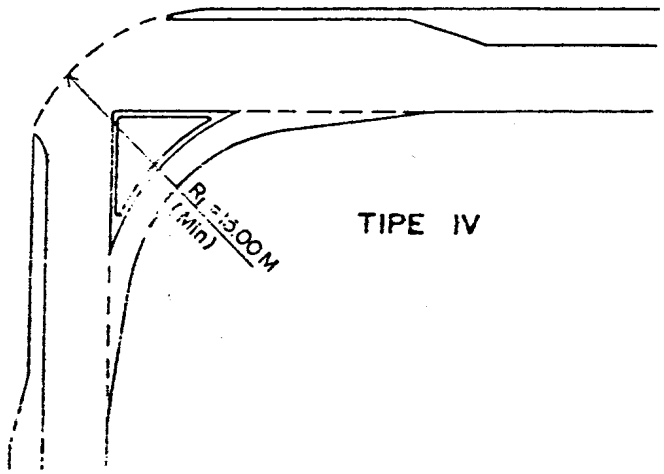
TIPE III



Catatan :

- untuk ketentuan marka lihat standar pada marka.
- dipakainya taper dan storage tergantung analisa lalu-lintas

TIPE IV



Traffic Lane



Auxiliary Lanes



Auxiliary Lanes

Auxiliary lanes:

- remove accelerating or decelerating vehicles from the through lanes
- store turning vehicles
- increase road capacity

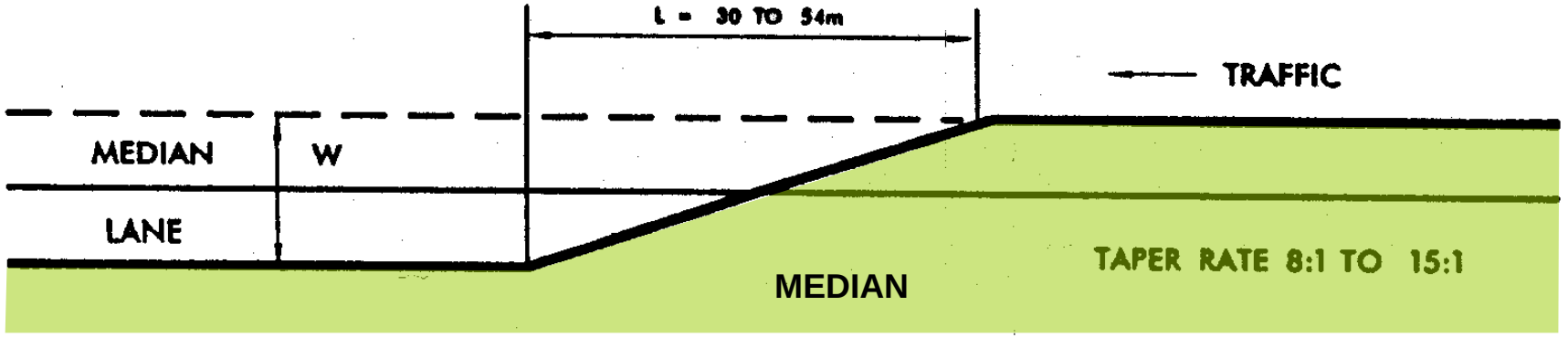
Types of acceleration or deceleration lanes

parallel lanes

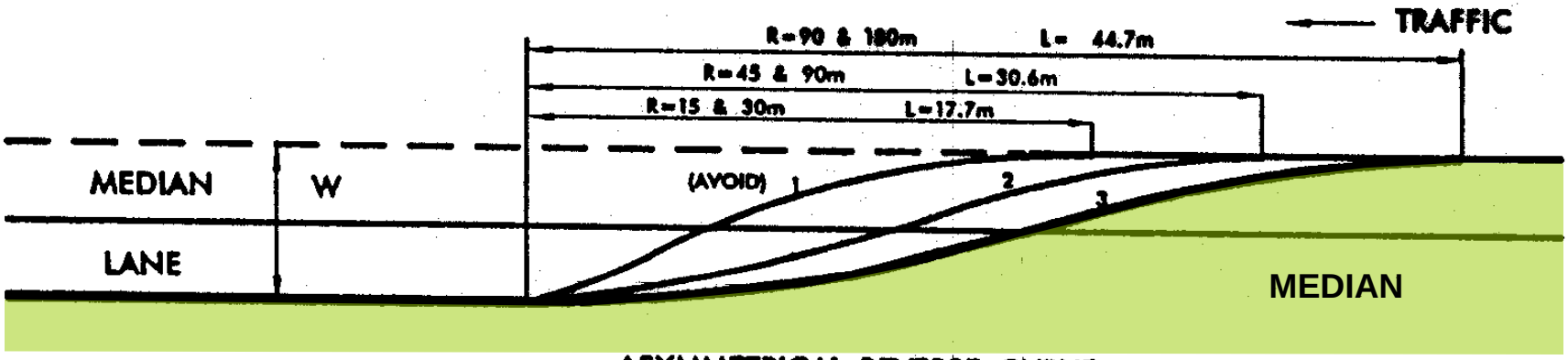
directional lanes (tapers)

Auxiliary Lanes

Tapers



STRAIGHT LINE TAPER



ASYMMETRICAL REVERSE CURVE

Lane Shift

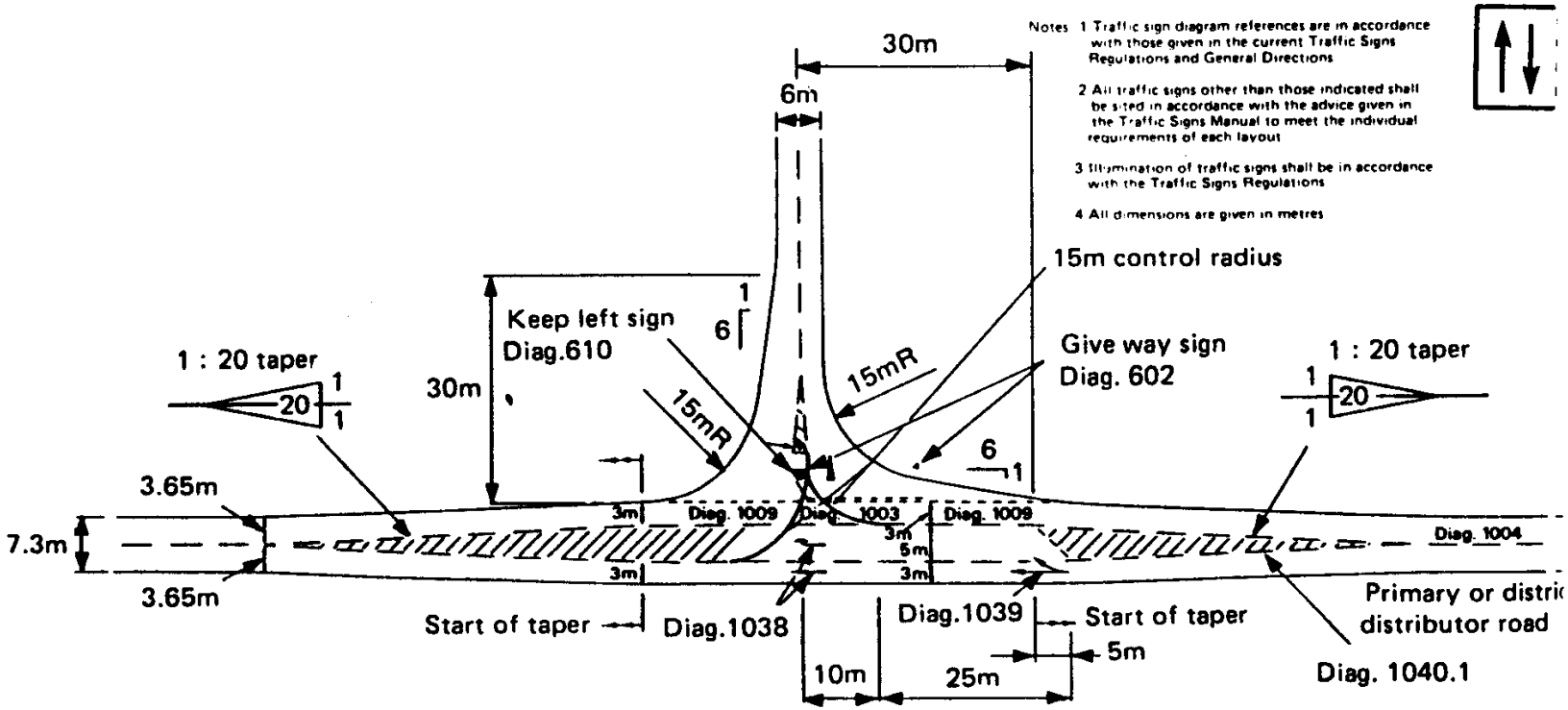
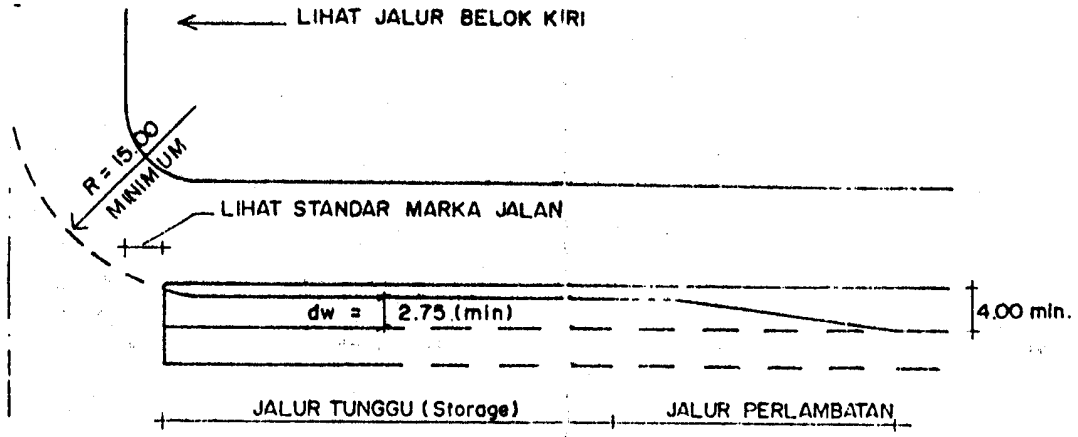


Fig 4.70

Dimensions for typical urban priority T-junction as used in UK (ref 1).

D. JALUR BELOK KANAN DARI JALAN BERMEDIAN



KECEPATAN V (KM/J)	JALUR PERLAMBATAN MIN* (M)	PANJANG MIN. TAPER* L = V x dw/6 m
40	15	20
60	30	30

Panjang jalur tunggu : $L_S = 2 \times M \times S$ m tanpa lampu L.L.

$L_S = 1.5 \times N \times S$ m dengan lampu L.L.

M : Jumlah rata-rata kendaraan belok kanan/menit

N : Jumlah rata-rata kendaraan belok kanan/putaran (cycle)

S : Jarak antara kendaraan (m)

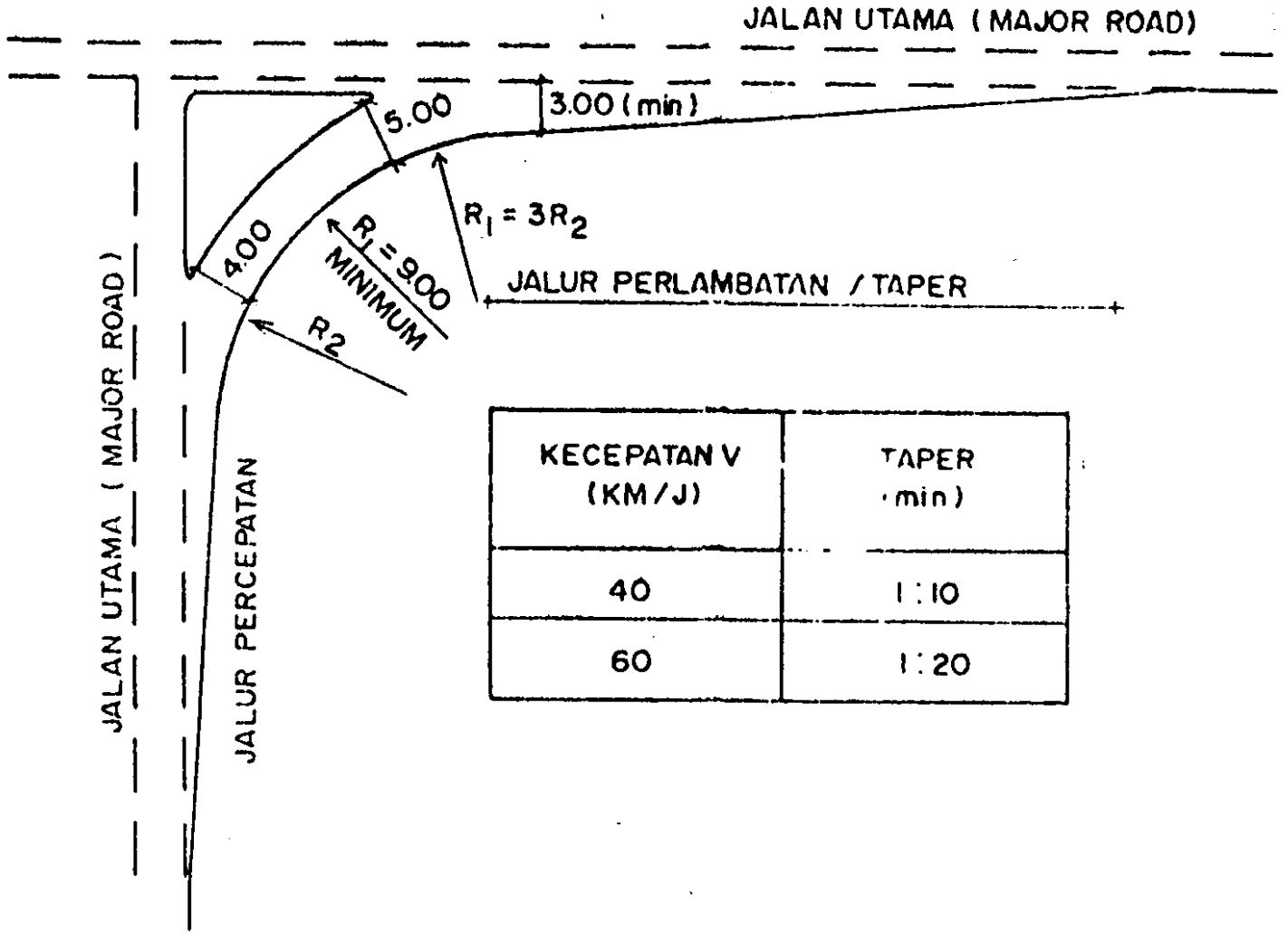
Catatan : - Ketentuan marka, lihat standar marka jalan

* Bila panjang taper > dari jalur perlambatan marka panjang taper dianggap sebagai jalur perlambatan

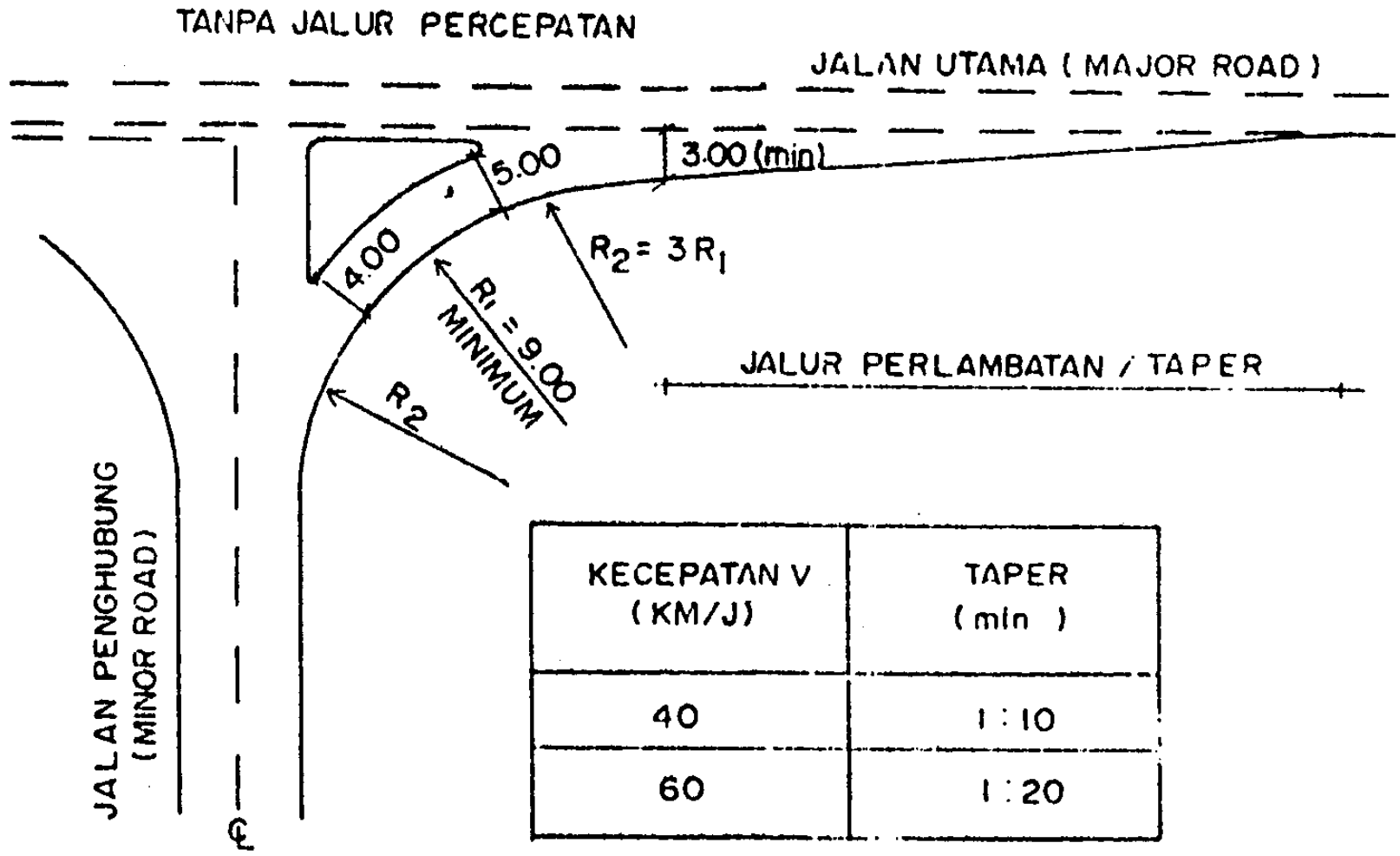
E. JALUR BELOK KIRI

1. JALUR PERLAMBATAN TANPA JALUR TUNGGU (Storage)

DENGAN JALUR PERCEPATAN



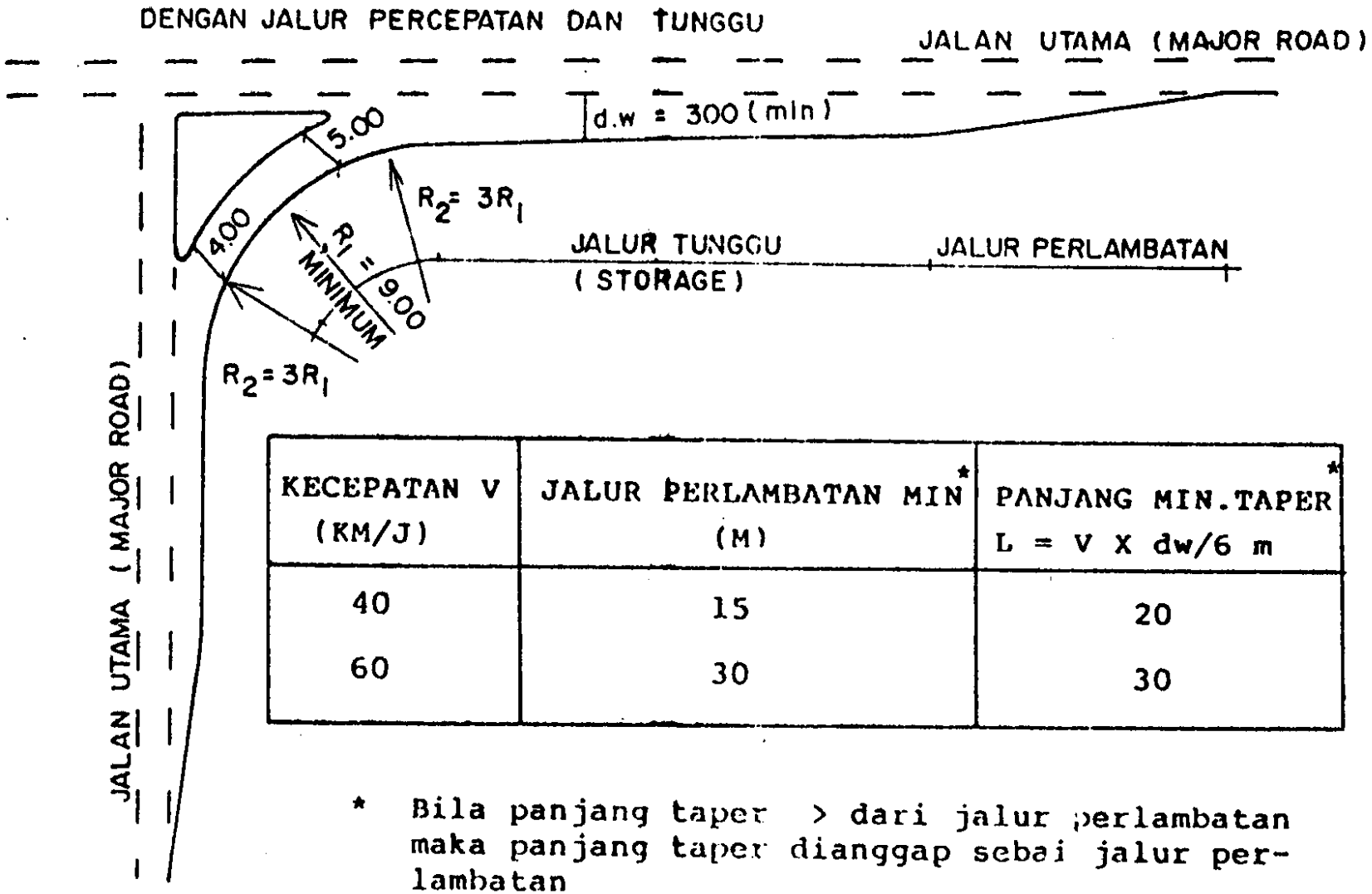
KECEPATAN V (KM/J)	TAPER (min)
40	1 : 10
60	1 : 20



KECEPATAN V (KM/J)	TAPER (min)
40	1 : 10
60	1 : 20

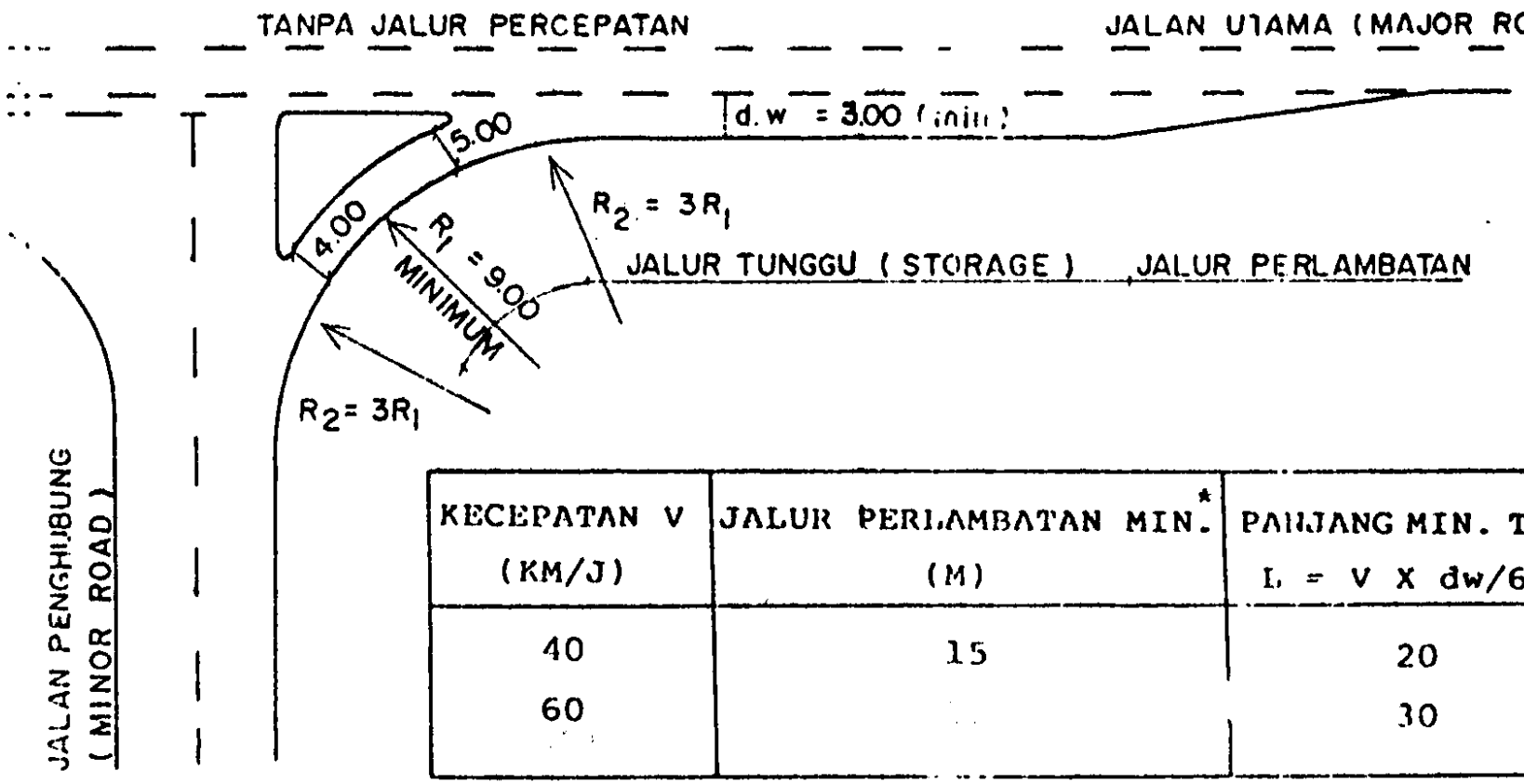
- Penentuan R min. ditetapkan berdasarkan Single Unit Truck
- Untuk perencanaan khusus periksa Peraturan Perencanaan Geometrik.

2. JALUR PERLAMBATAN DENGAN JALUR TUNGGU (Storage)



KECEPATAN V (KM/J)	JALUR PERLAMBATAN MIN* (M)	PANJANG MIN.TAPER* L = V X dw/6 m
40	15	20
60	30	30

* Bila panjang taper > dari jalur perlambatan maka panjang taper dianggap sebai jalur perlambatan

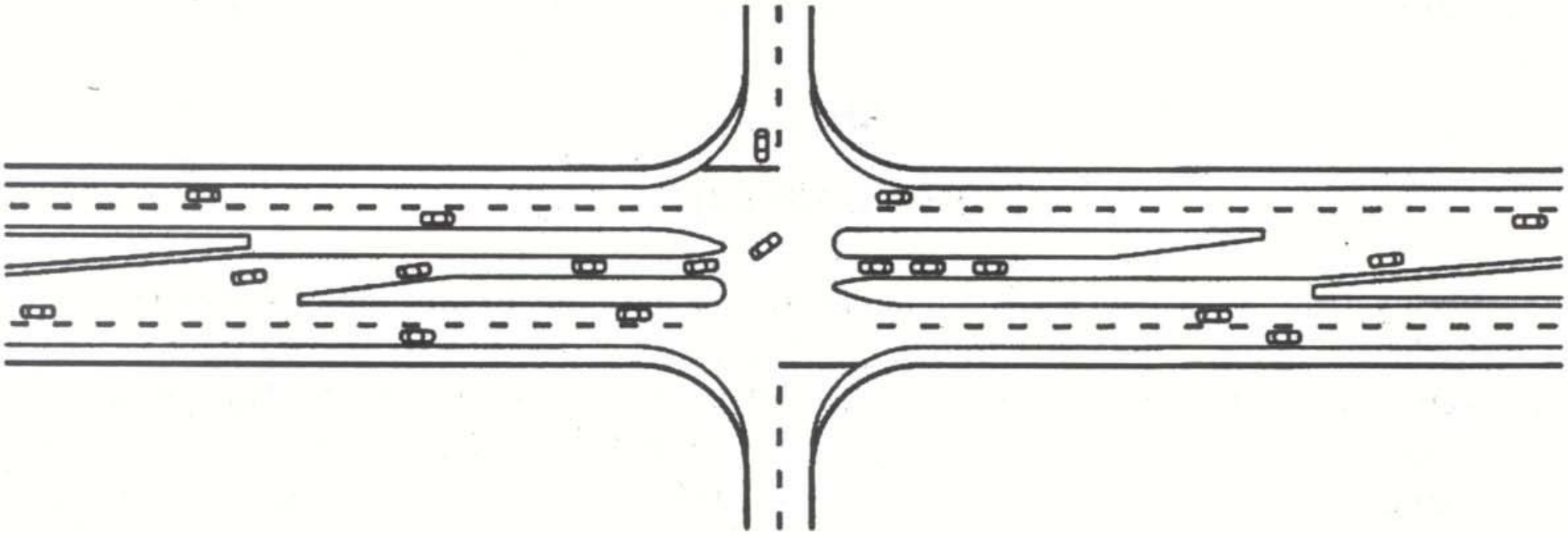


KECEPATAN V (KM/J)	JALUR PERLAMBATAN MIN.* (M)	PANJANG MIN. TAPER* L = V X dw/6 m
40	15	20
60		30

* Bila panjang taper > dari jalur perlambatan maka panjang taper dianggap sebagai jalur perlambatan

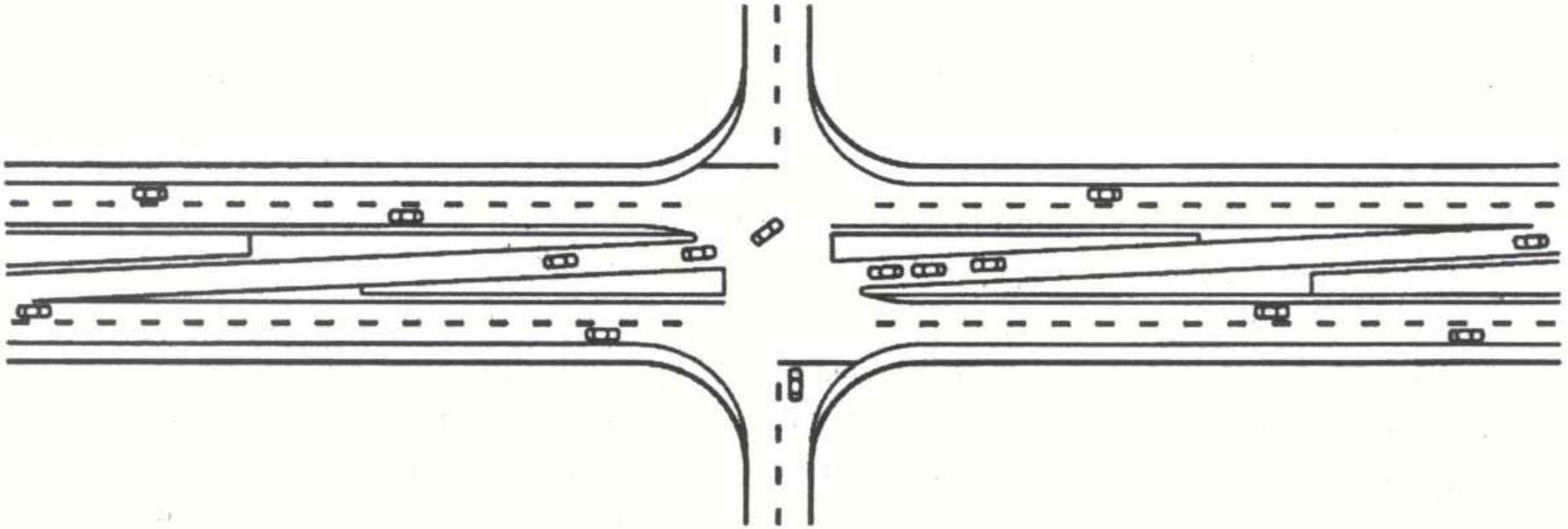
CATATAN :
- Ketentuan marka, lihat standar marka jalan
- Penentuan R min, ditetapkan berdasarkan Single Unit Truck

Offset Left-Turn Lanes



-A- PARALLEL

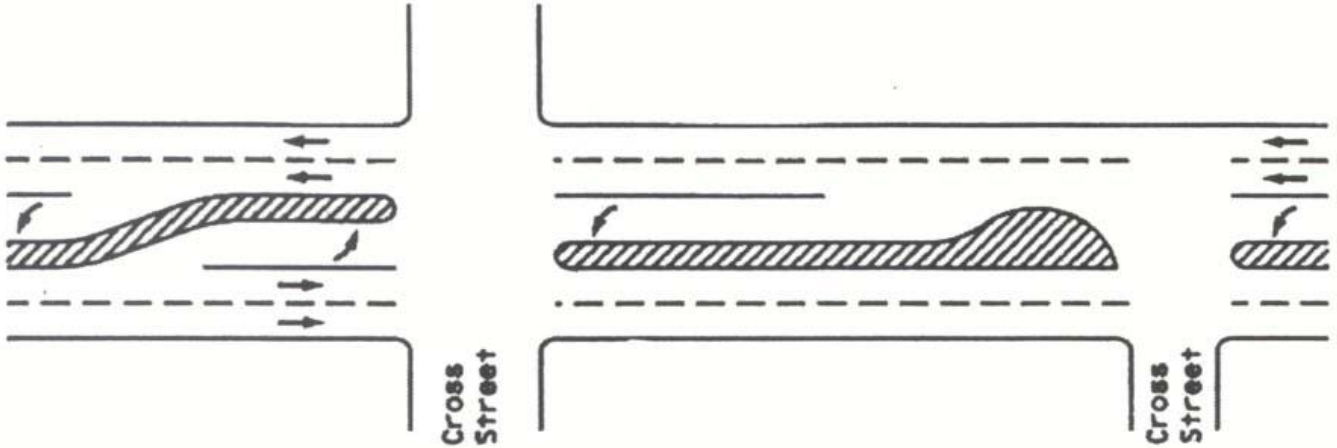
Offset Left-Turn Lanes



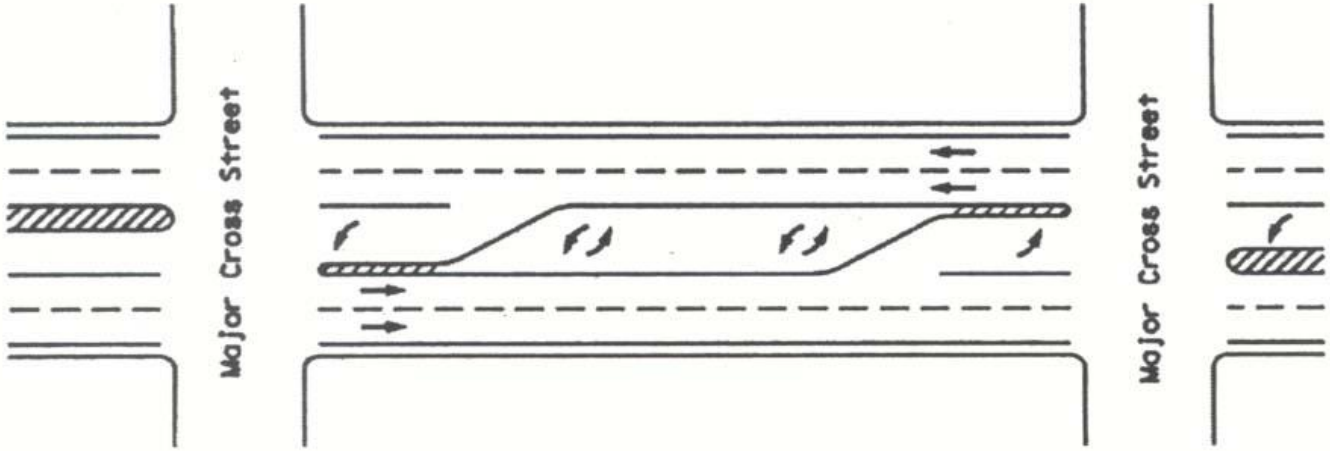
-B- TAPERED

Exhibit 9-98. Parallel and Tapered Offset Left-Turn Lane

Continuous Left-Turn Lanes



(a) Typical multilane highway with painted left turn lane channelization into cross streets.

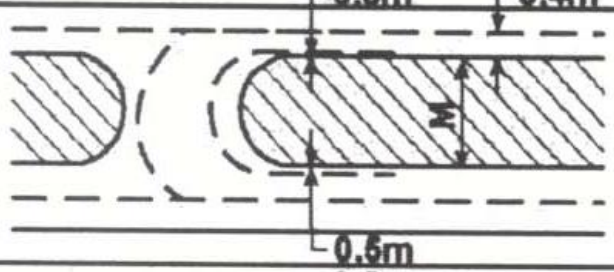
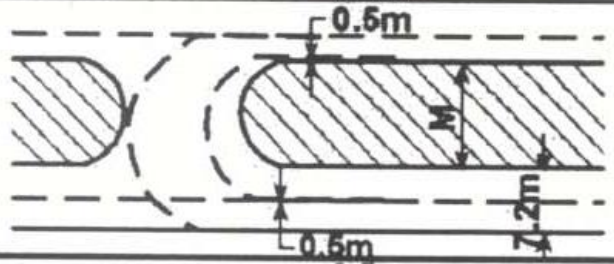
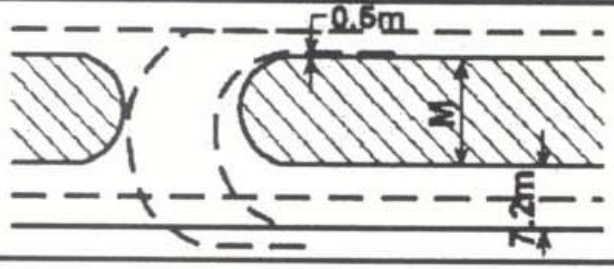


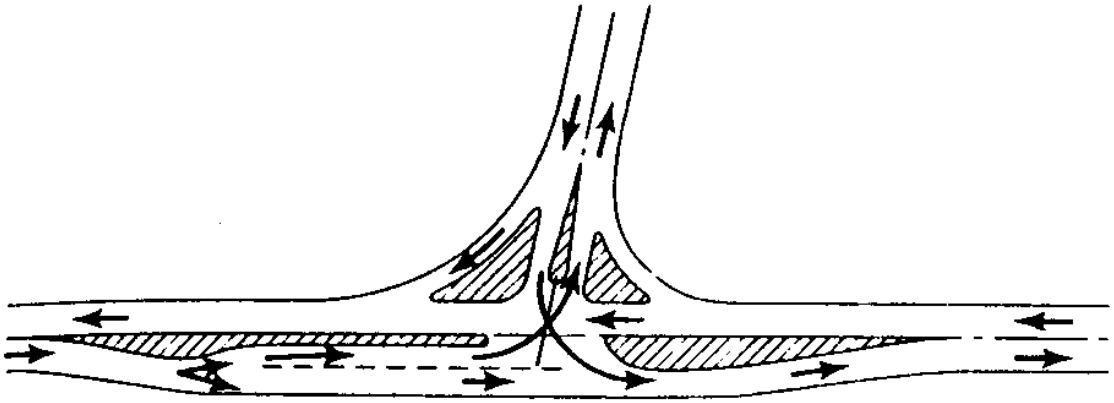
(b) Typical multilane highway with flush or transversable lane at midblock.

Exhibit 9-94. Flush or Traversable Median Lane Markings

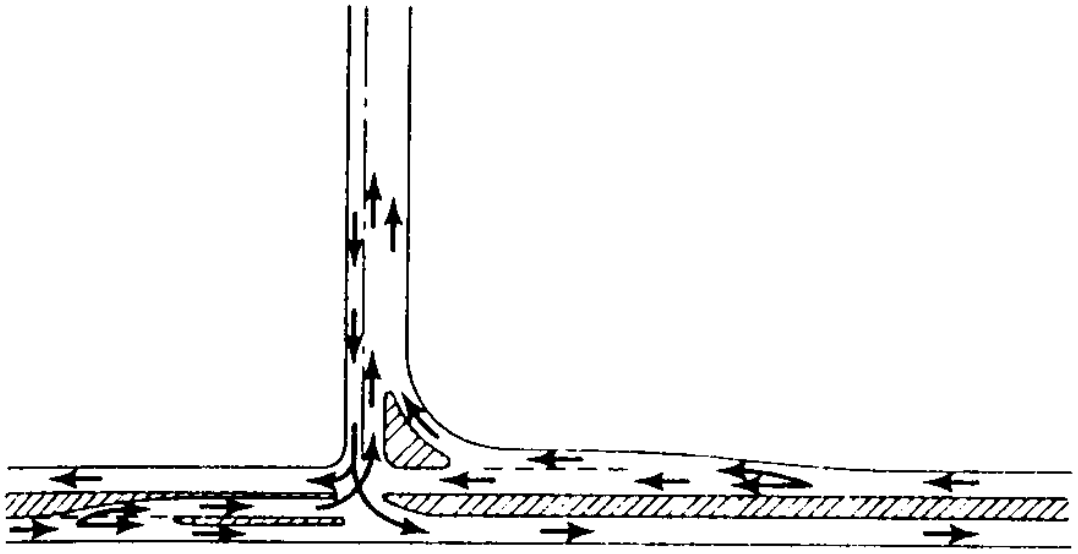
Minimum Design for U-Turns

Exhibit 9-92

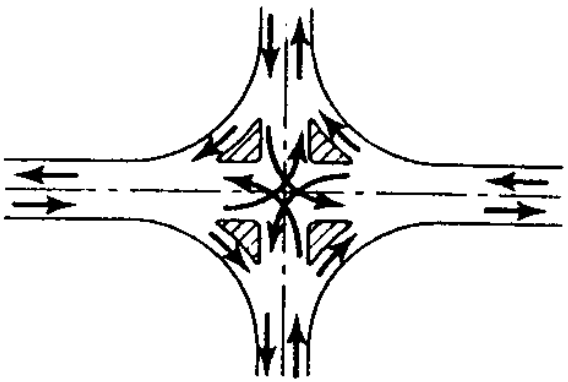
TYPE OF MANEUVER		M - MIN. WIDTH OF MEDIAN (m) FOR DESIGN VEHICLE						
		P	WB-12	SU	BUS	WB-15	WB-18	TDT
		LENGTH OF DESIGN VEHICLE (m)						
		5.7	15.0	9.0	12.0	16.5	19.5	35.4
INNER LANE TO INNER LANE		9	18	19	19	21	21	30
INNER LANE TO OUTER LANE		5	15	15	15	18	18	27
INNER LANE TO SHOULDER		2	12	12	12	15	15	24

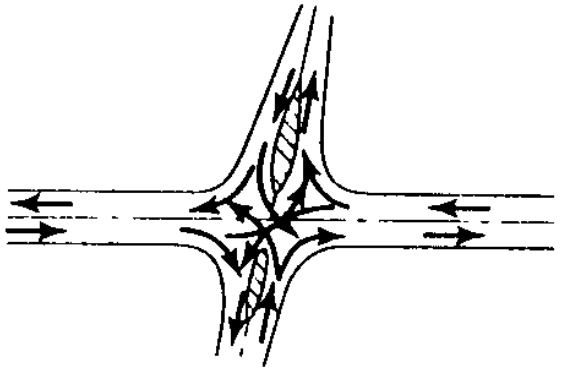


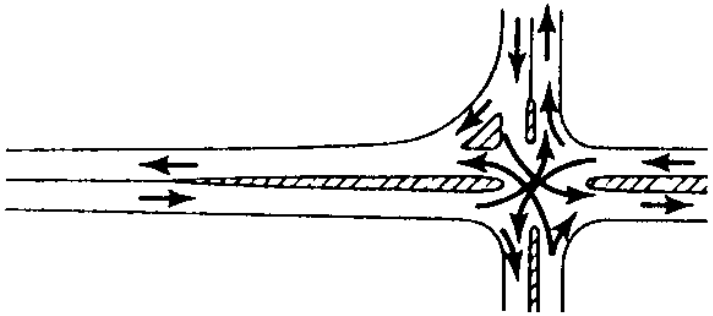
(a)



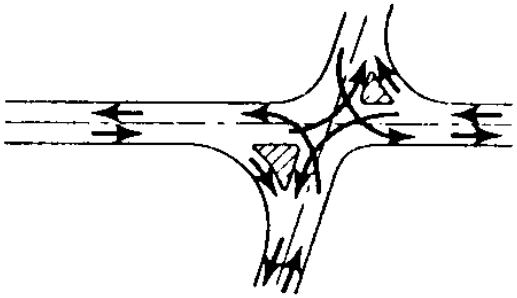
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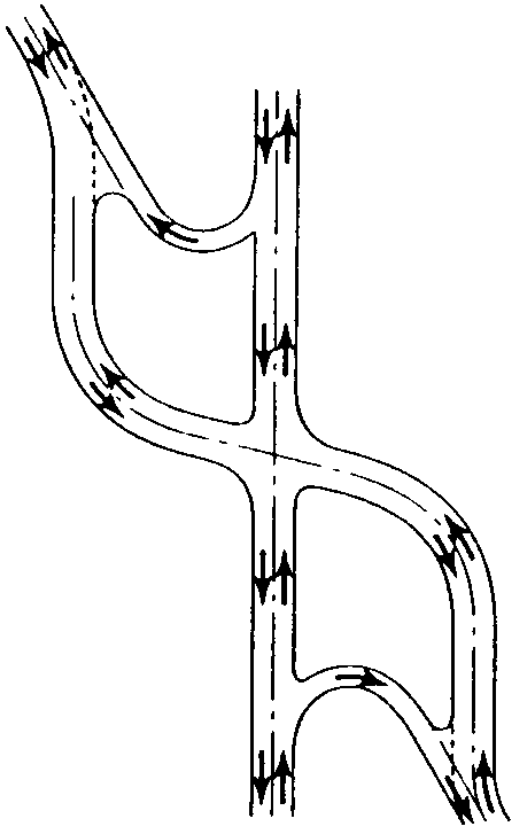




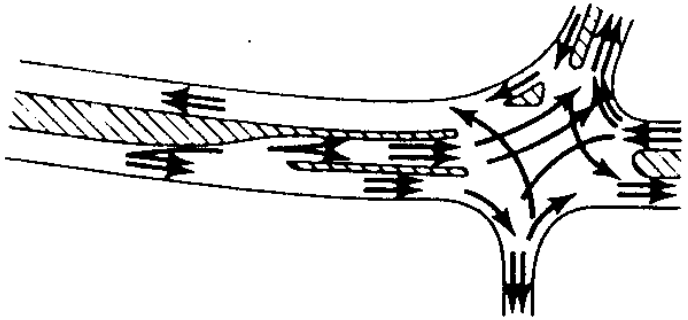


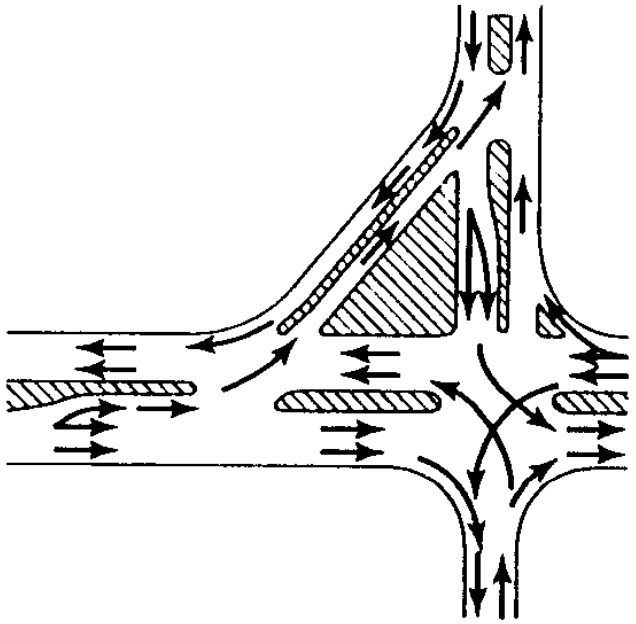
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(c)

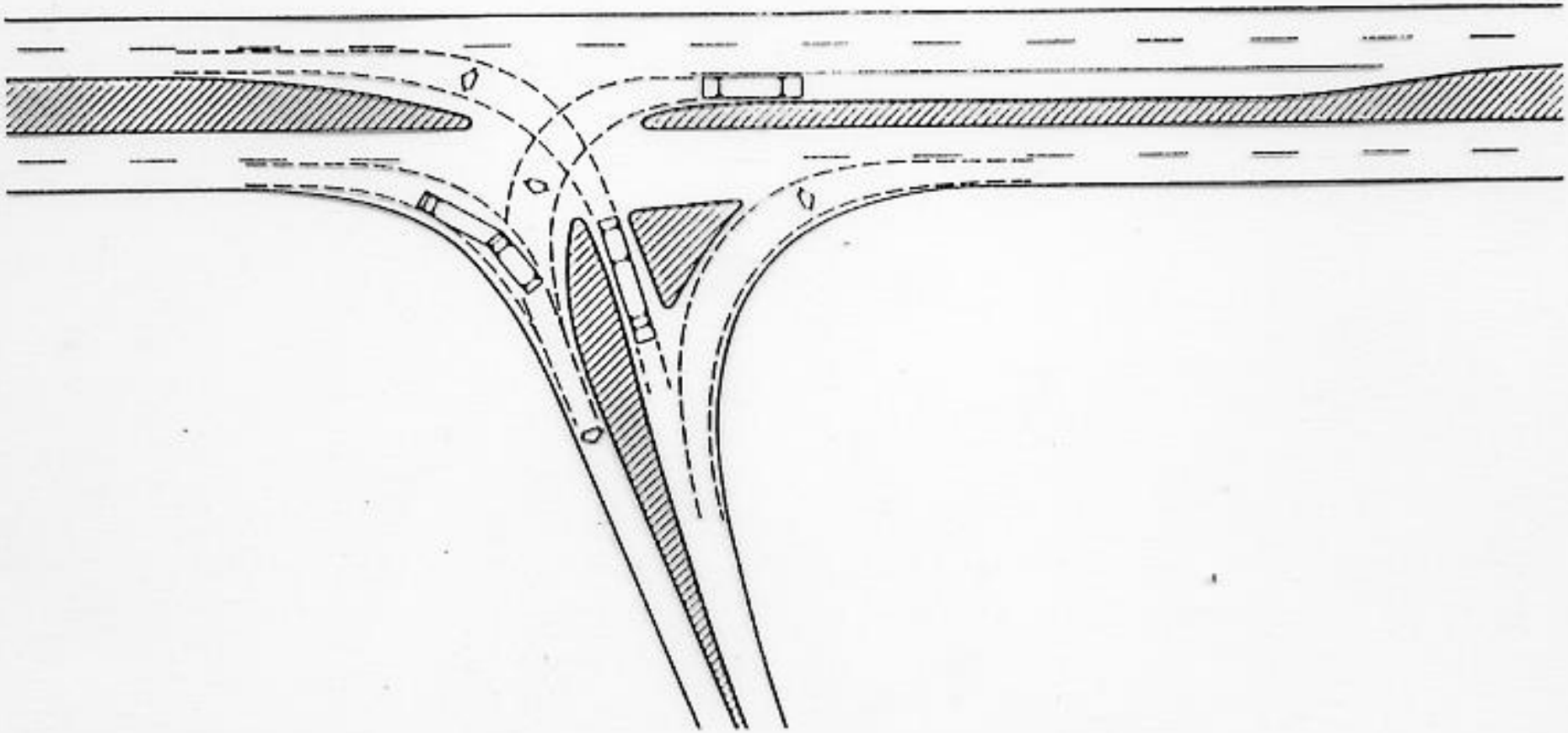




(e)

Objectives of Channelization and Design Elements to Achieve Them

Design Elements	Objectives of Channelization								
	Prohibitions of Movements	Definition of Vehicle Paths	Promotion of Safe Speeds	Separation of Conflicts	Angles of Cross and Merge	Facilitation of High Priority Movements	Facilitation of Traffic Control	Accomodation of Slow or Decelerating Vehicles	Safe Refuge for Pedestrians
Traffic Lanes						●	●	●	
Traffic Islands	●	●		●	●		●		●
Median Dividers	●	●		●	●		●		●
Corner Radii	●	●	●			●			●
Approach Geometry	●	●	●	●	●	●			
Pavement Tapers or Transitions		●	●		●			●	
Traffic Control Device	●			●		●	●		●



Design of all median elements must consider the natural paths of design vehicles. (From Transportation Research Board [2.14].)

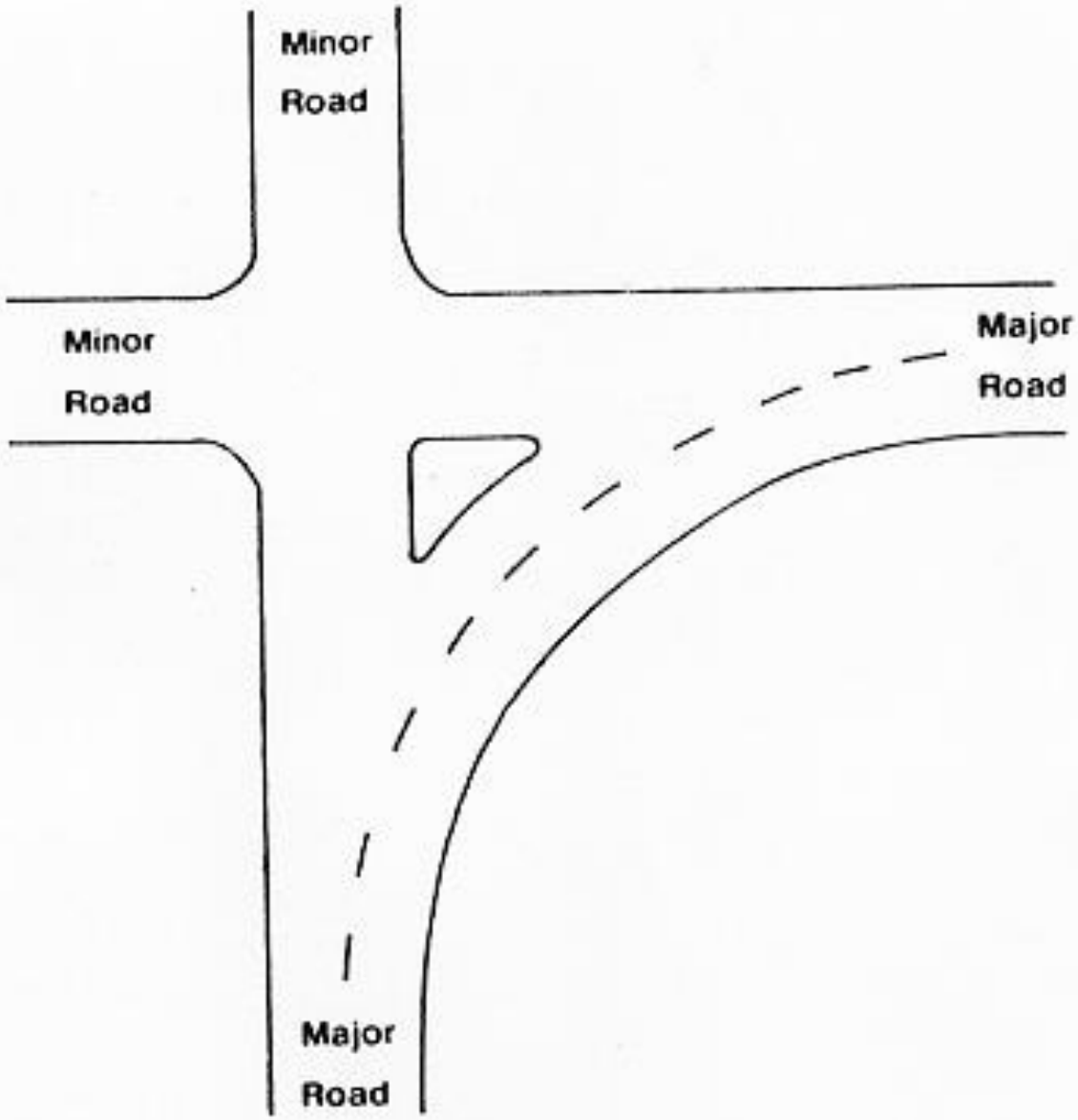


Figure 10.18 *An existing intersection to be improved (source: Fry, 1971, Figure 5)*

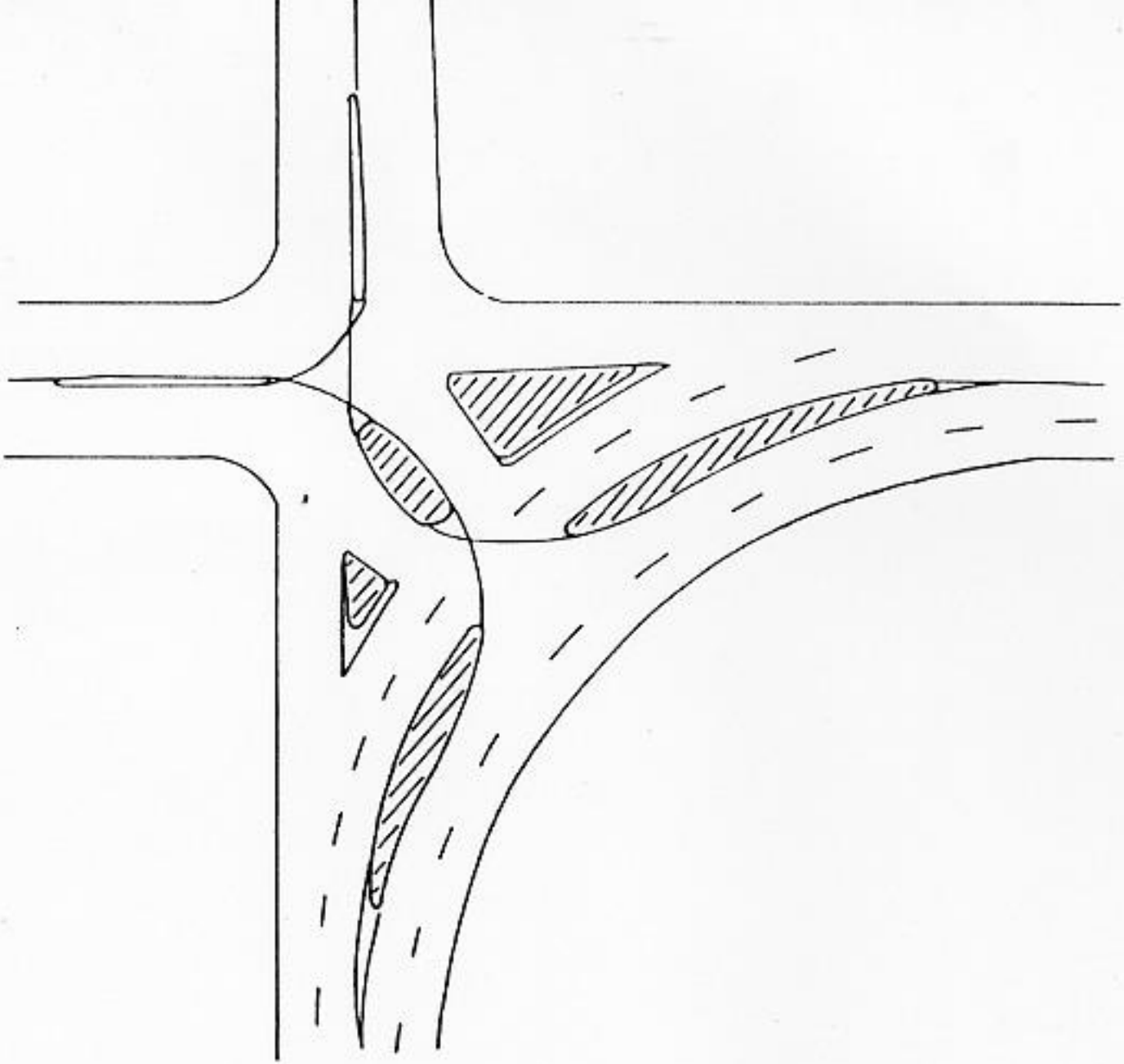


Figure 10.22 *The adopted intersection layout (source: Fry, 1971, Figure 9)*

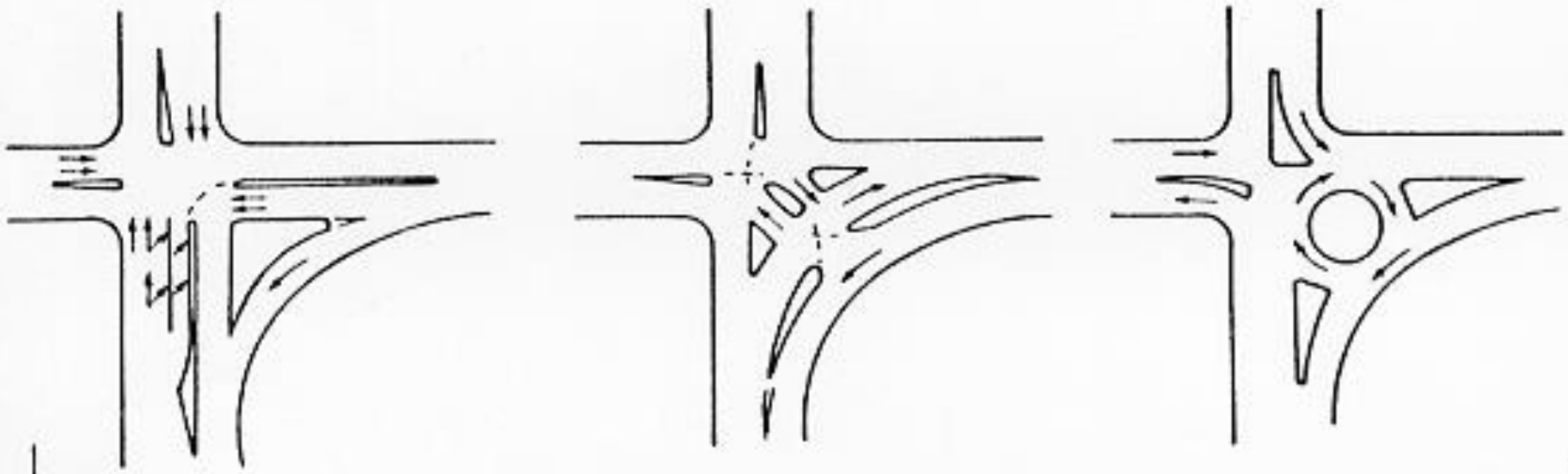
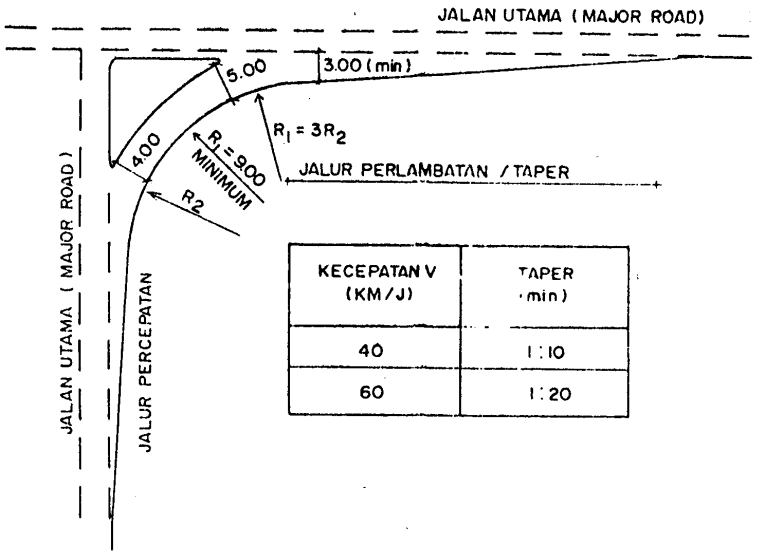


Figure 10.19 *Possible alternative intersection layouts (source: Fry, 1971, Figure 6)*

E. JALUR BELOK KIRI

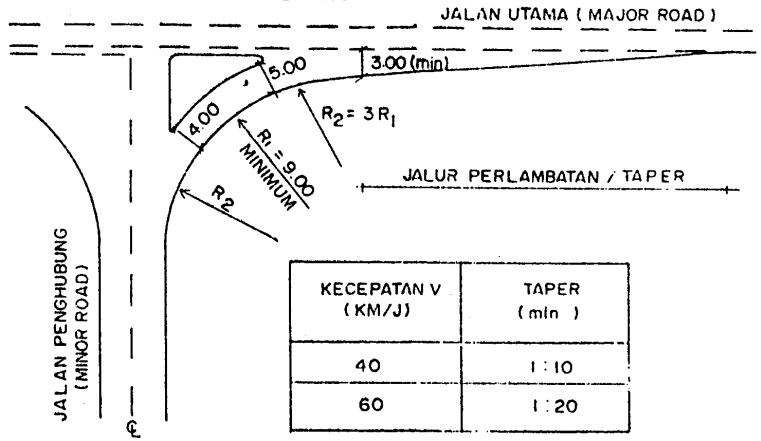
1. JALUR PERLAMBATAN TANPA JALUR TUNGGU (Storage)

DENGAN JALUR PERCEPATAN



KECEPATAN V (KM/J)	TAPER (min)
40	1 : 10
60	1 : 20

TANPA JALUR PERCEPATAN

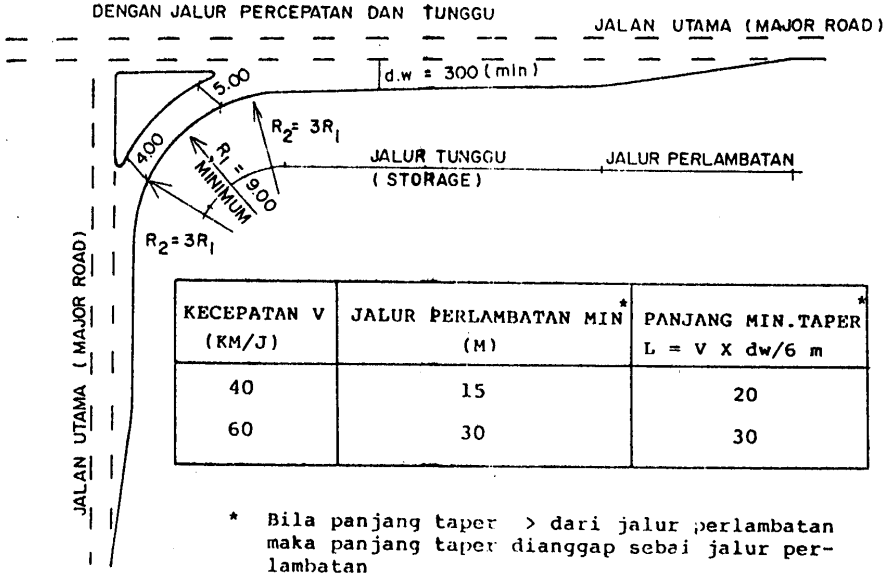


KECEPATAN V (KM/J)	TAPER (min)
40	1 : 10
60	1 : 20

- Penentuan R min. ditetapkan berdasarkan Single Unit Truck
- Untuk perencanaan khusus periksa Peraturan Perencanaan Geometrik.

2. JALUR PERLAMBATAN DENGAN JALUR TUNGGU (Storage)

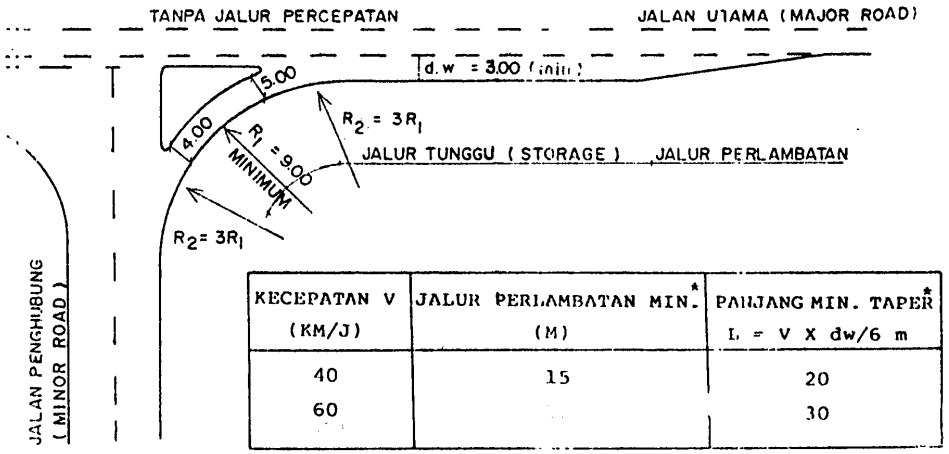
DENGAN JALUR PERCEPATAN DAN TUNGGU



KECEPATAN V (KM/J)	JALUR PERLAMBATAN MIN* (M)	PANJANG MIN.TAPER* L = V X dw/6 m
40	15	20
60	30	30

* Bila panjang taper > dari jalur perlambatan maka panjang taper dianggap sebai jalur perlambatan

TANPA JALUR PERCEPATAN



KECEPATAN V (KM/J)	JALUR PERLAMBATAN MIN.* (M)	PANJANG MIN. TAPER* L = V X dw/6 m
40	15	20
60		30

* Bila panjang taper > dari jalur perlambatan maka panjang taper dianggap sebagai jalur perlambatan

CATATAN :
- Ketentuan marka, lihat standar marka jalan
- Penentuan R min, ditetapkan berdasarkan Single Unit Truck

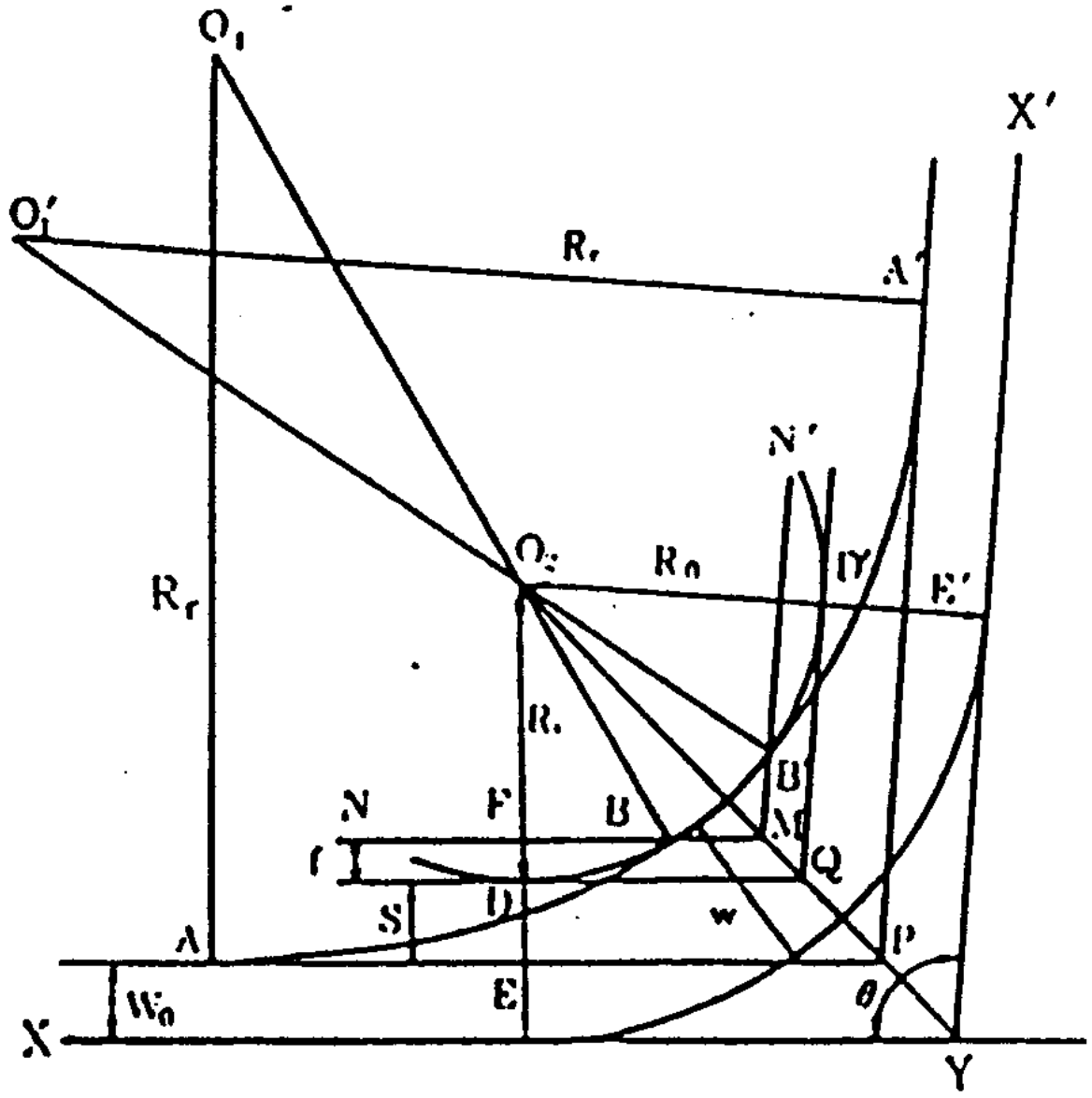
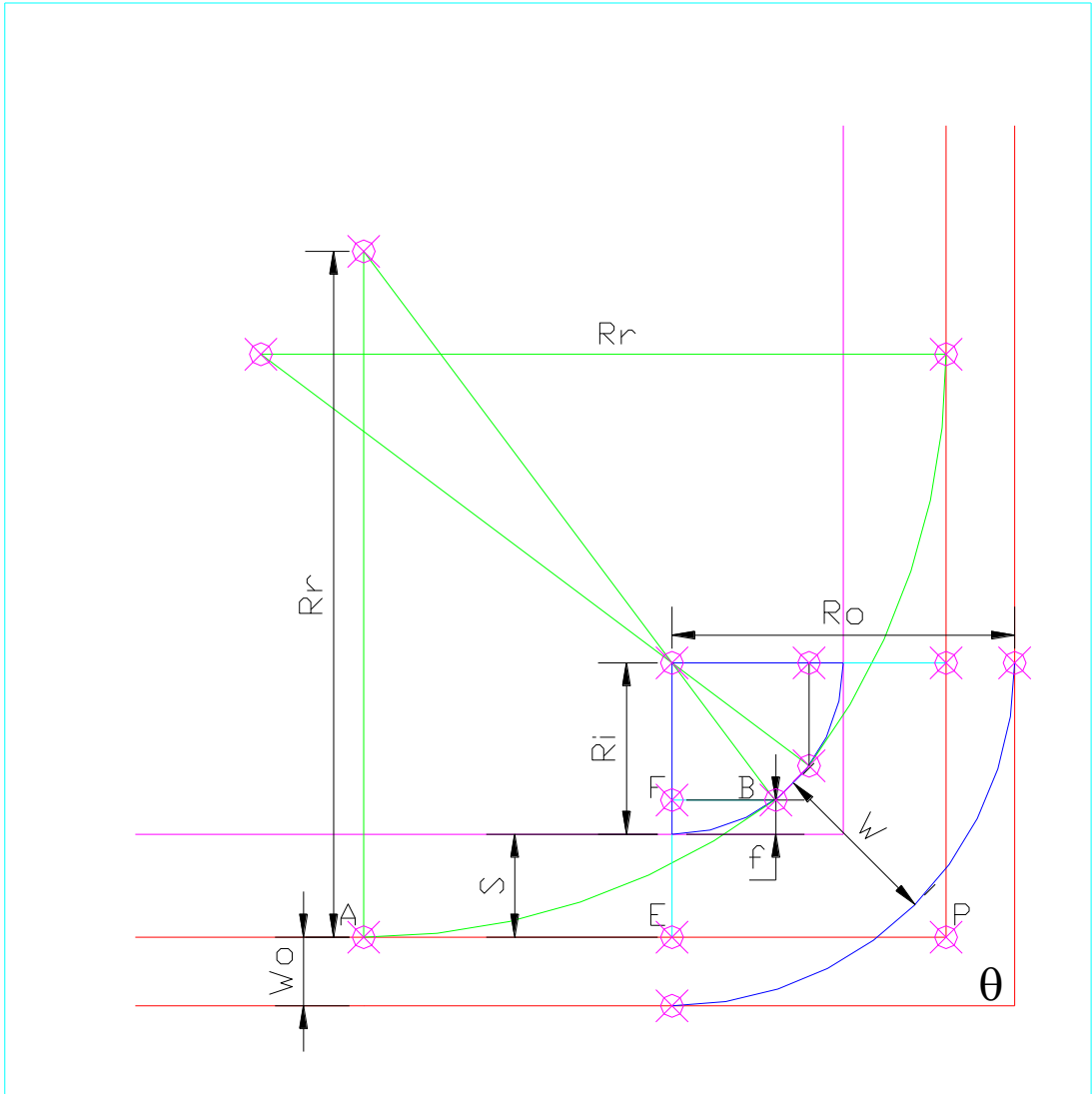
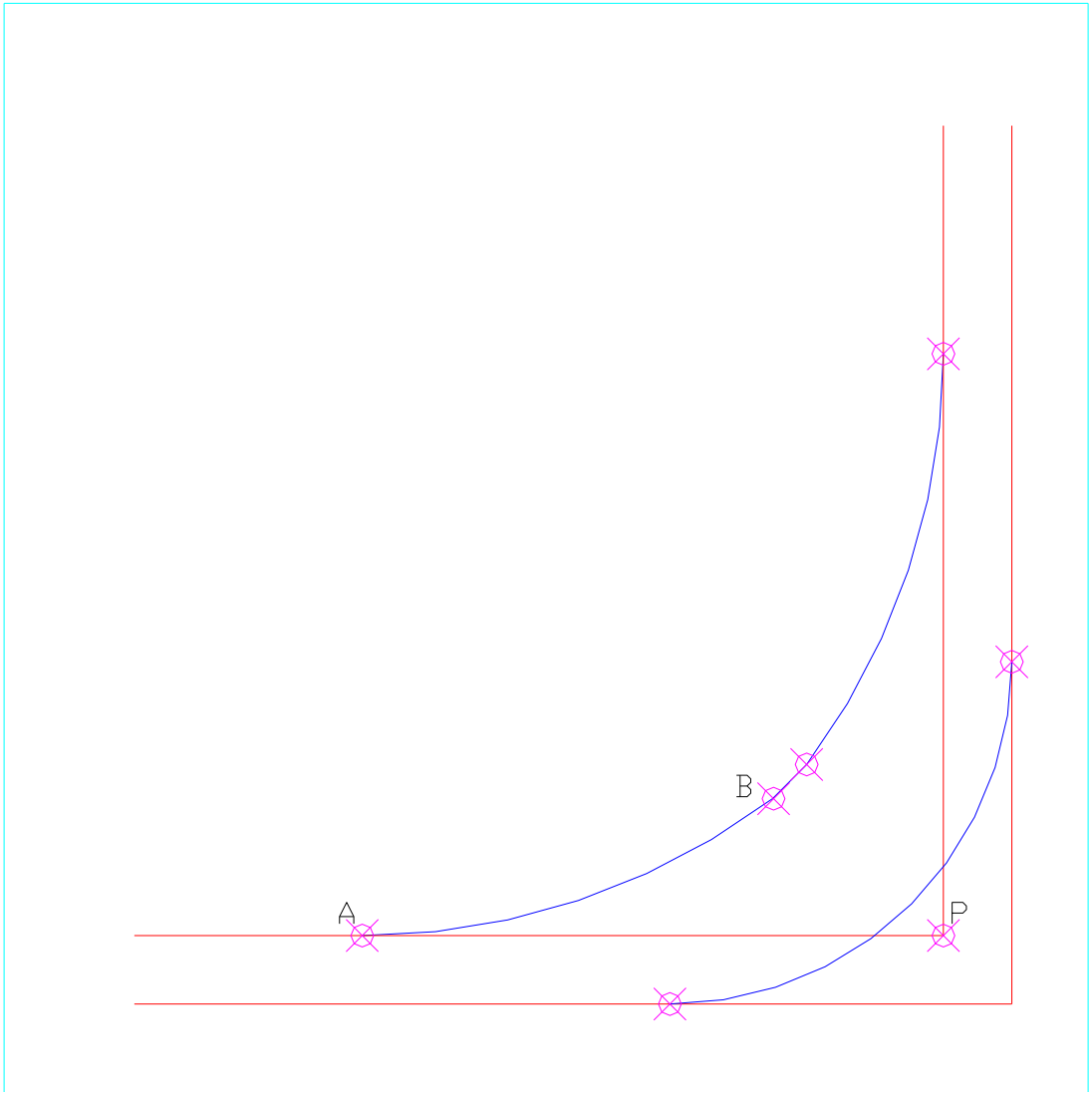


Fig.A.10.1 Left,-Turn Channel Design

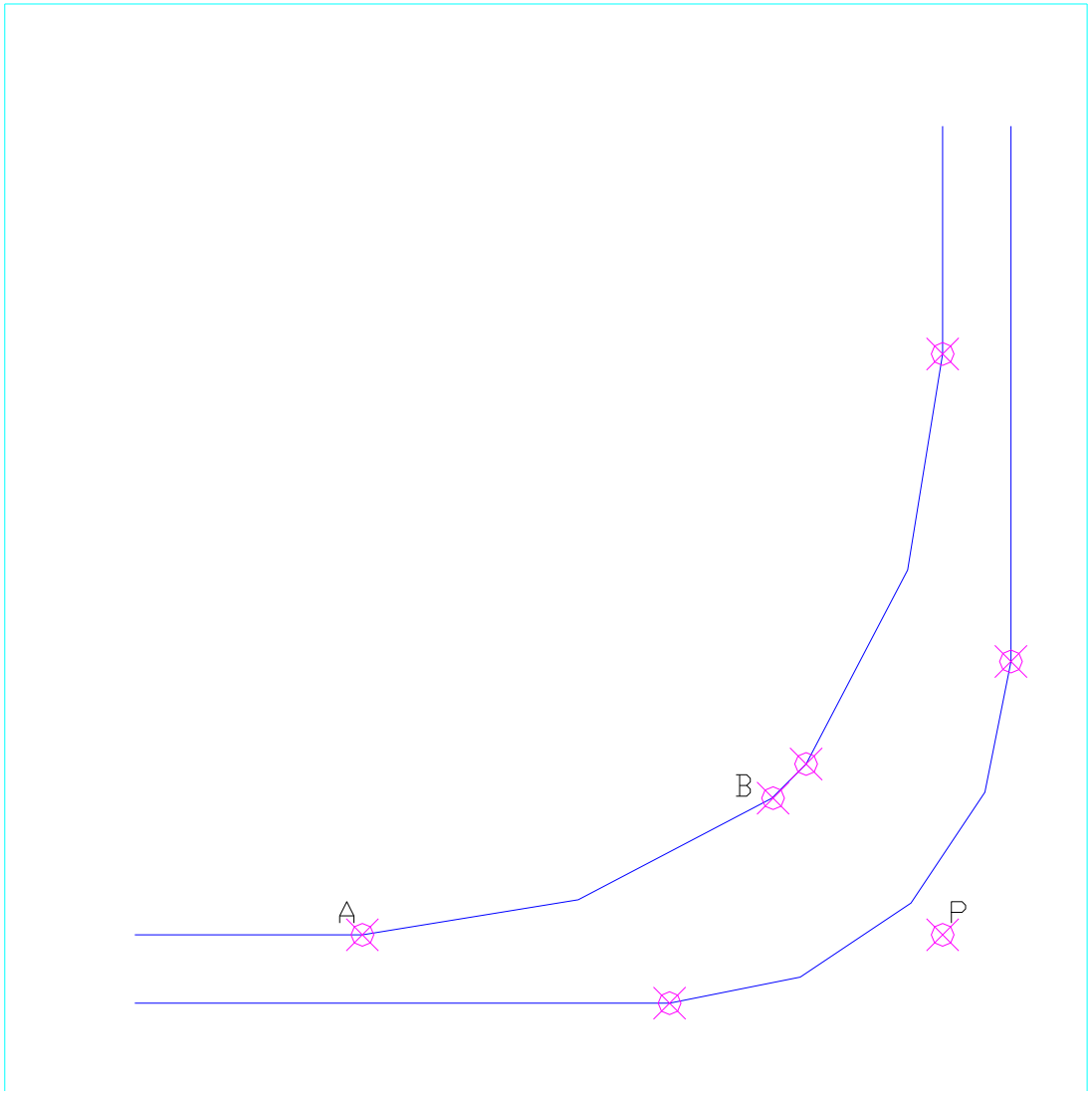
Design of Channelization



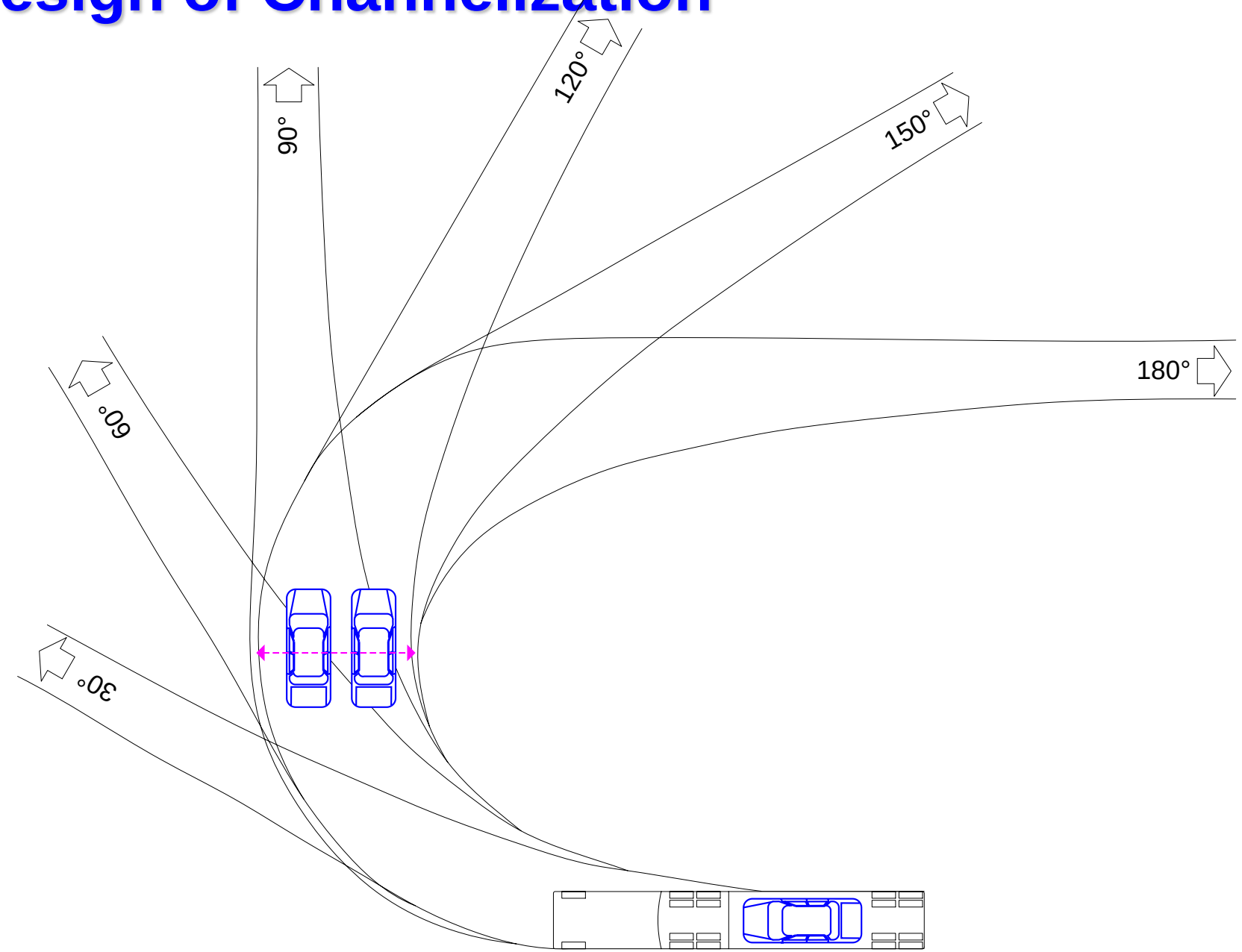
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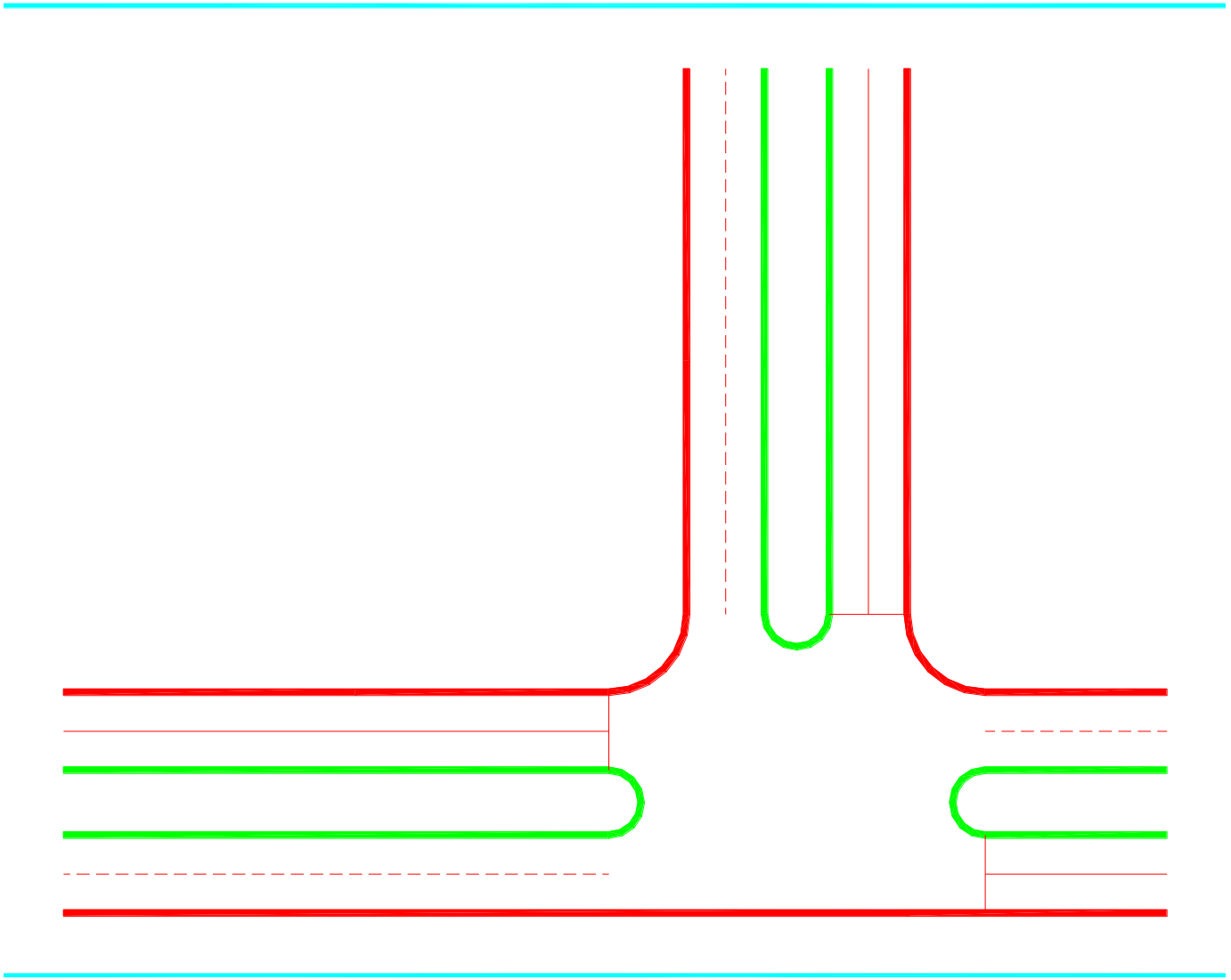
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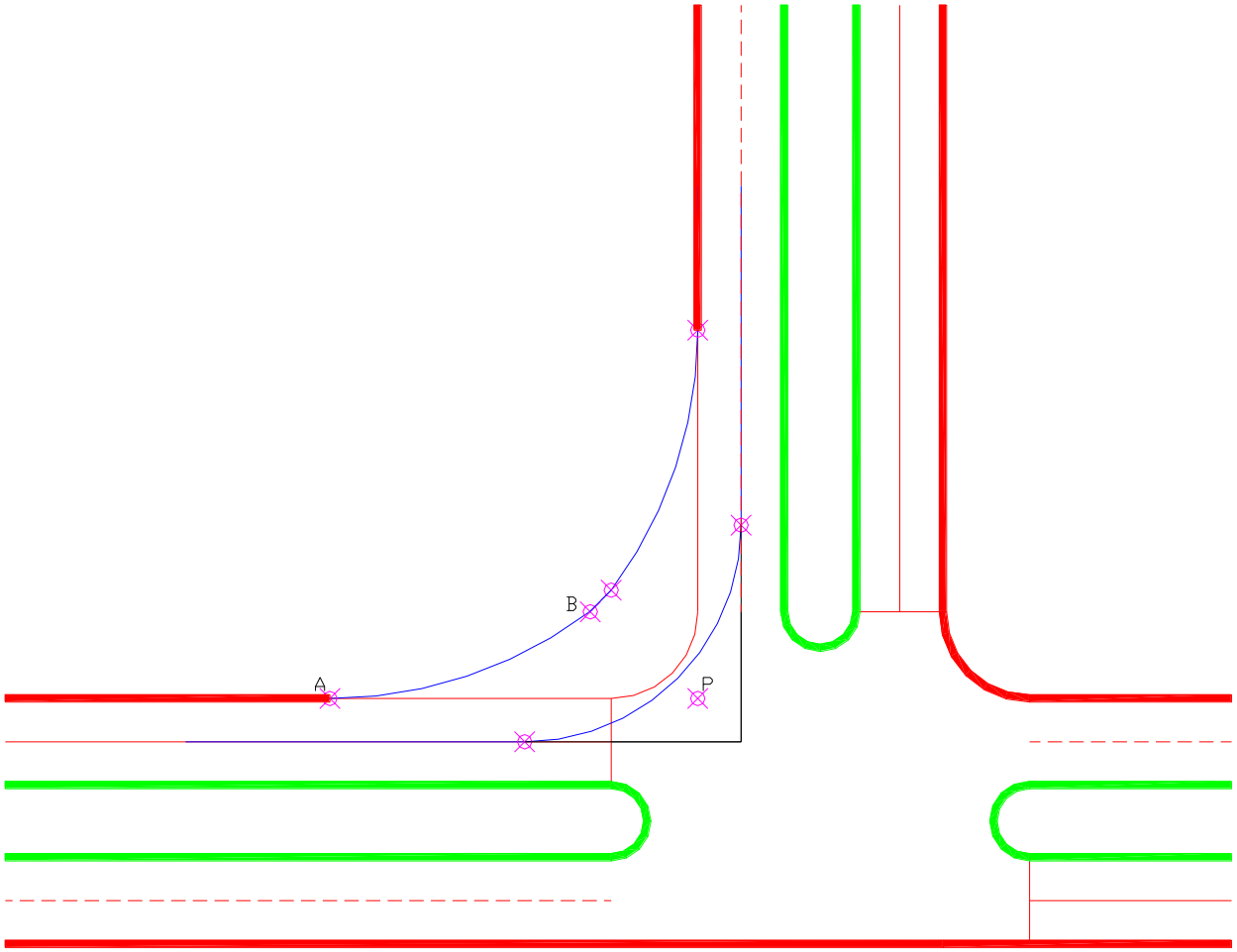
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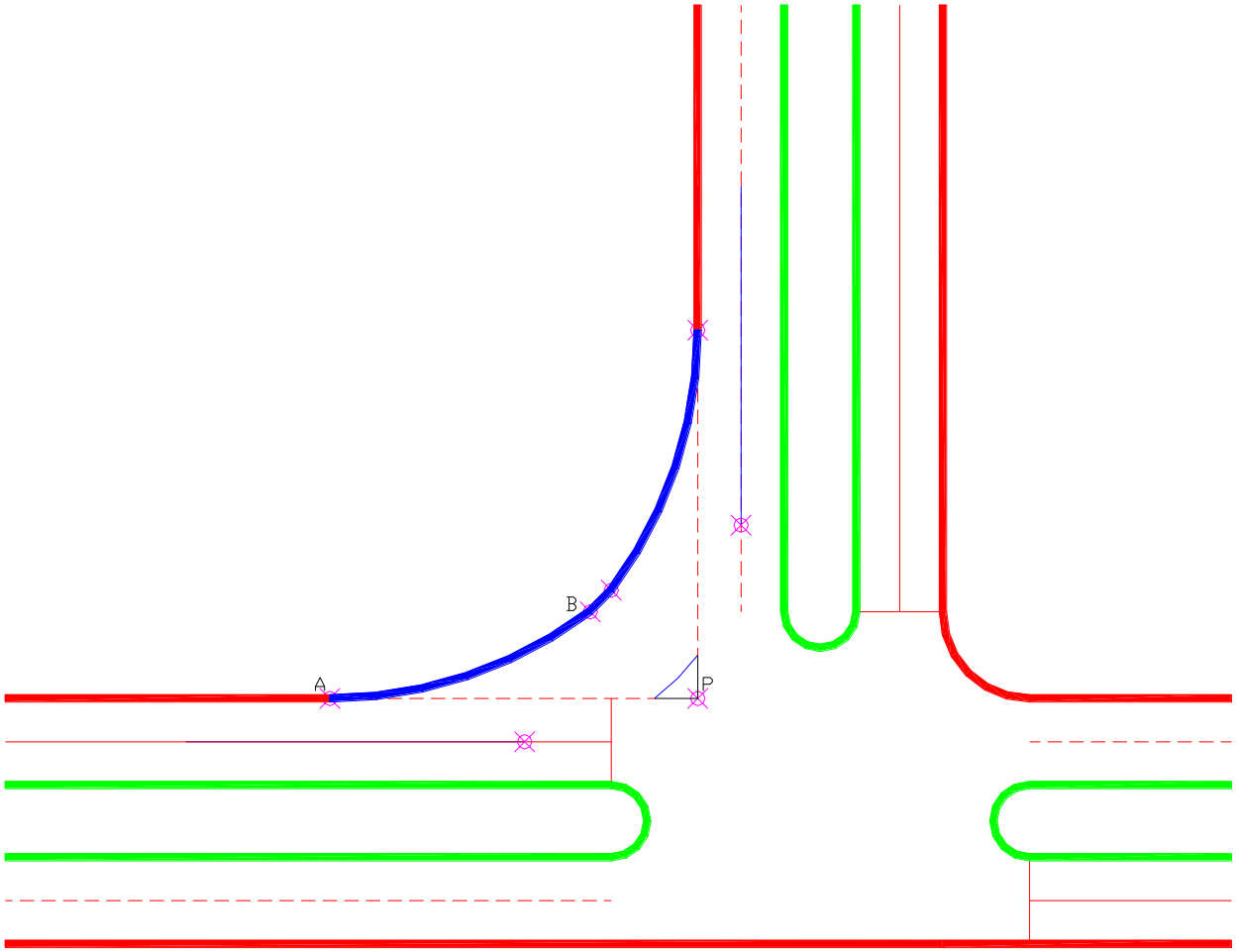
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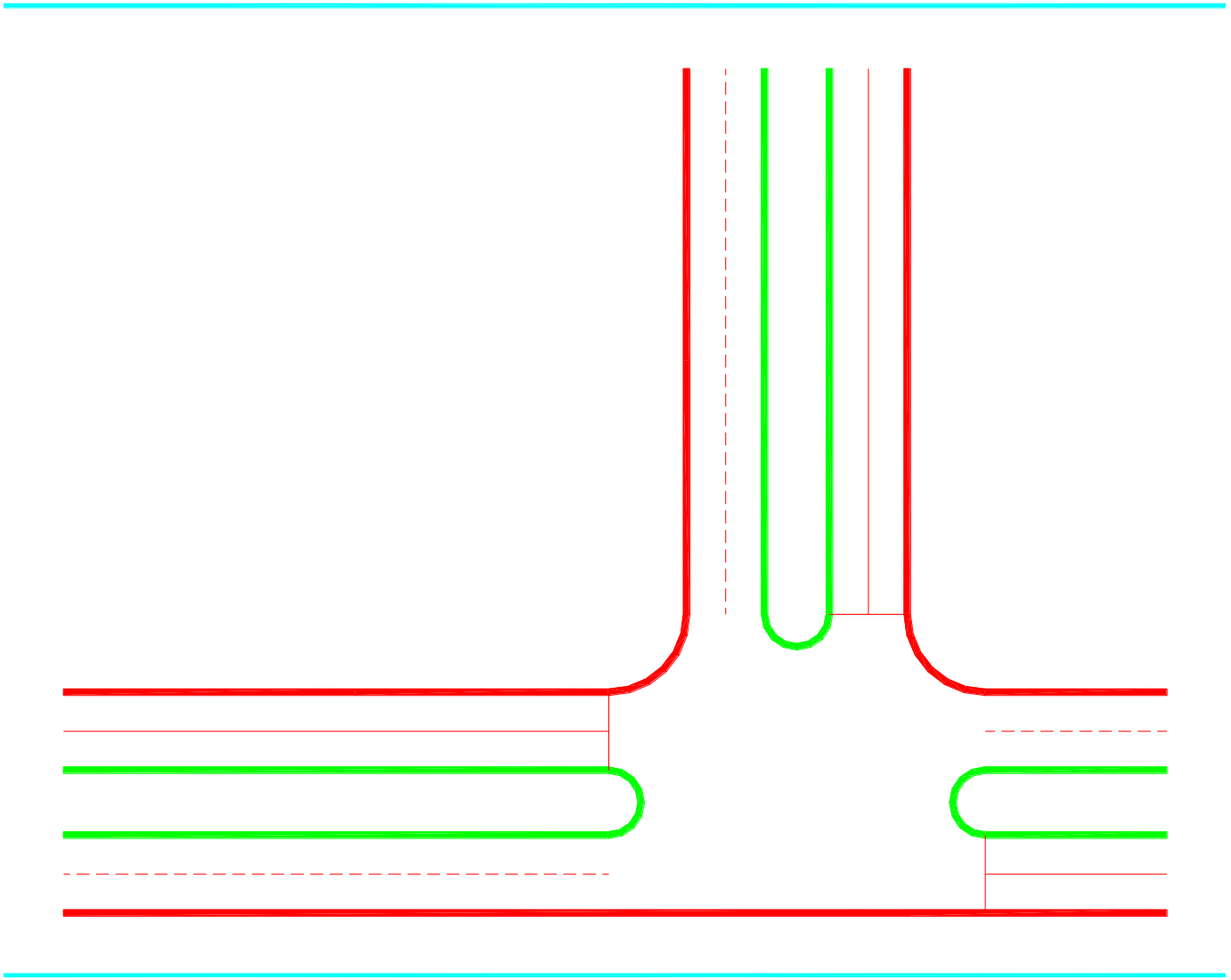
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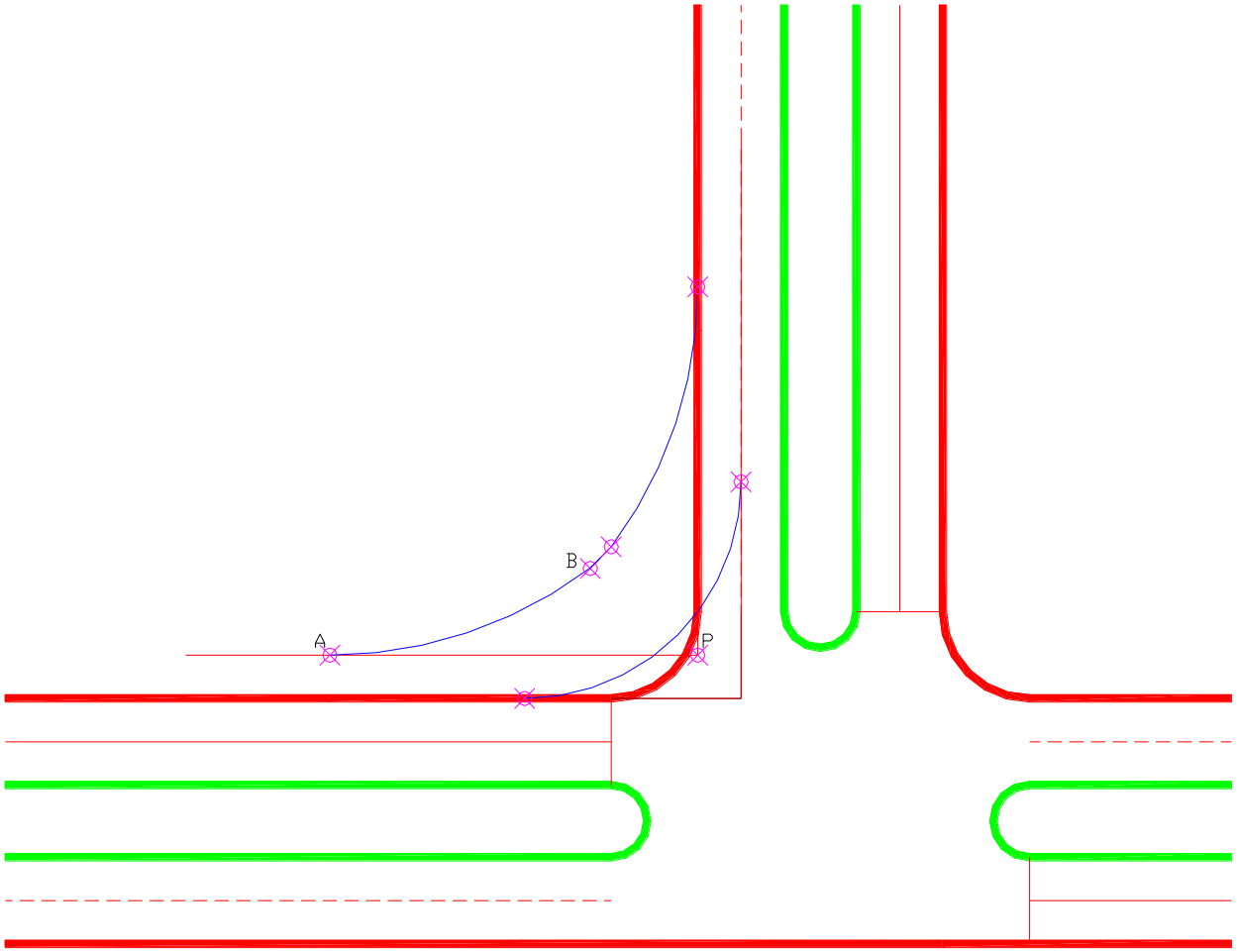
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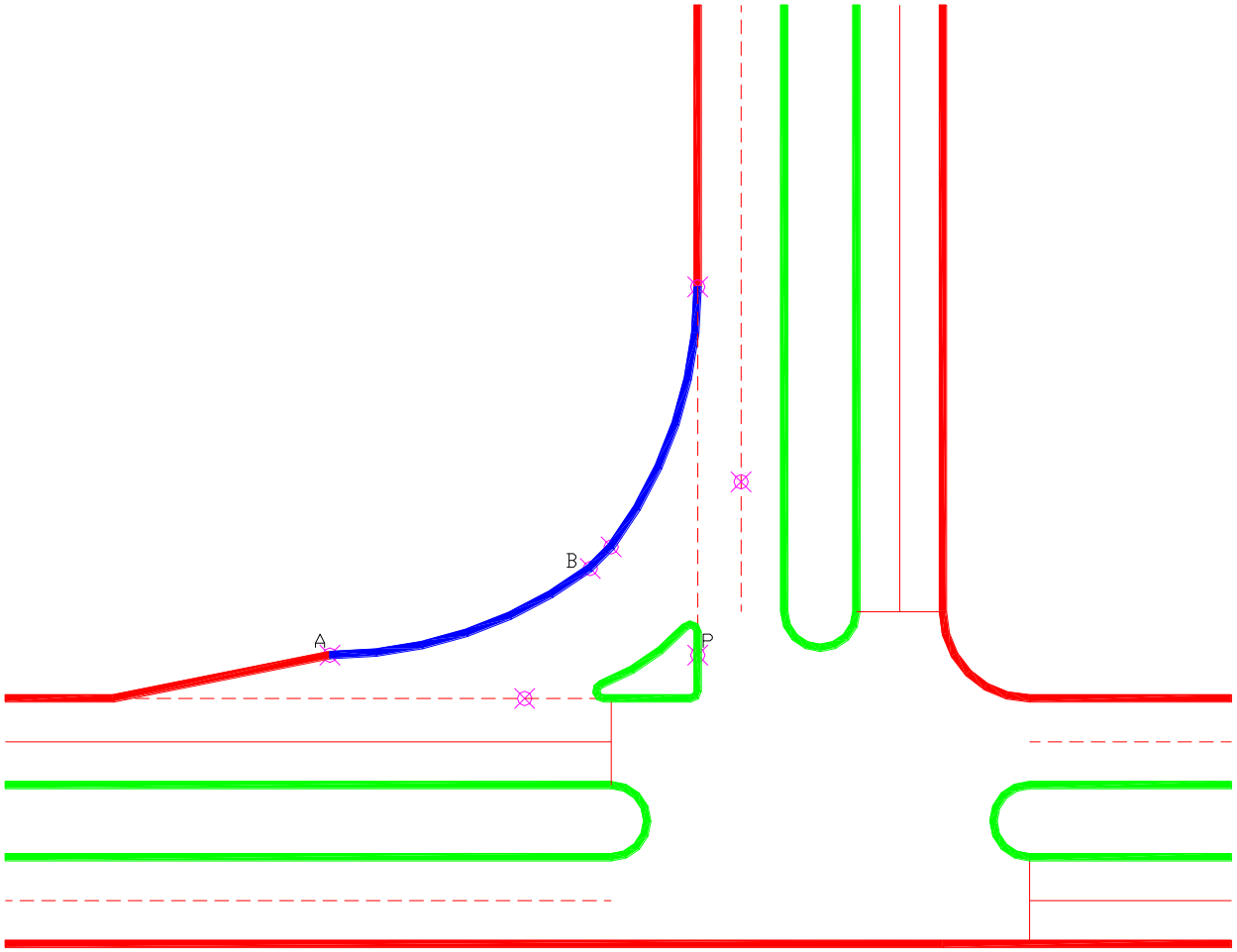
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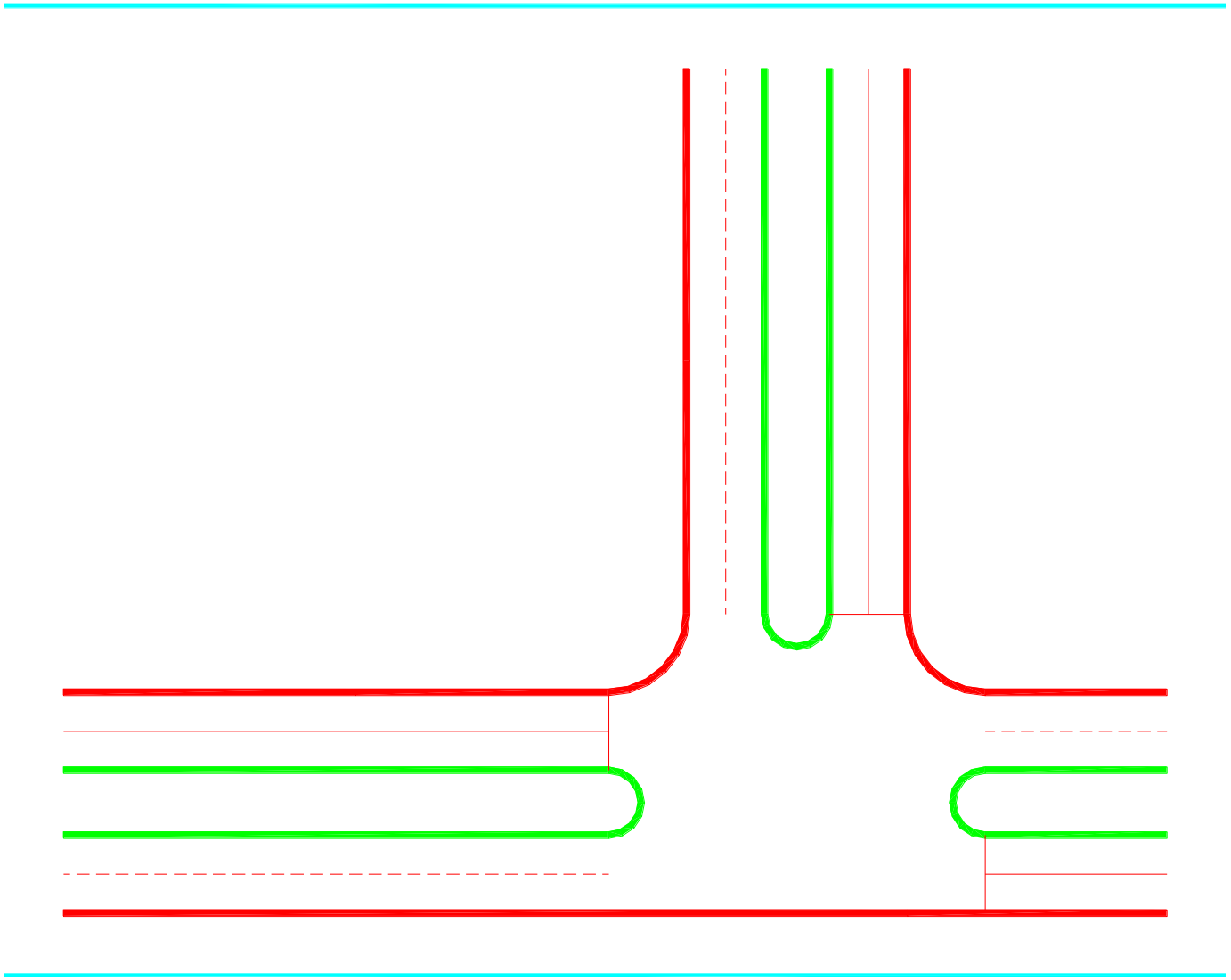
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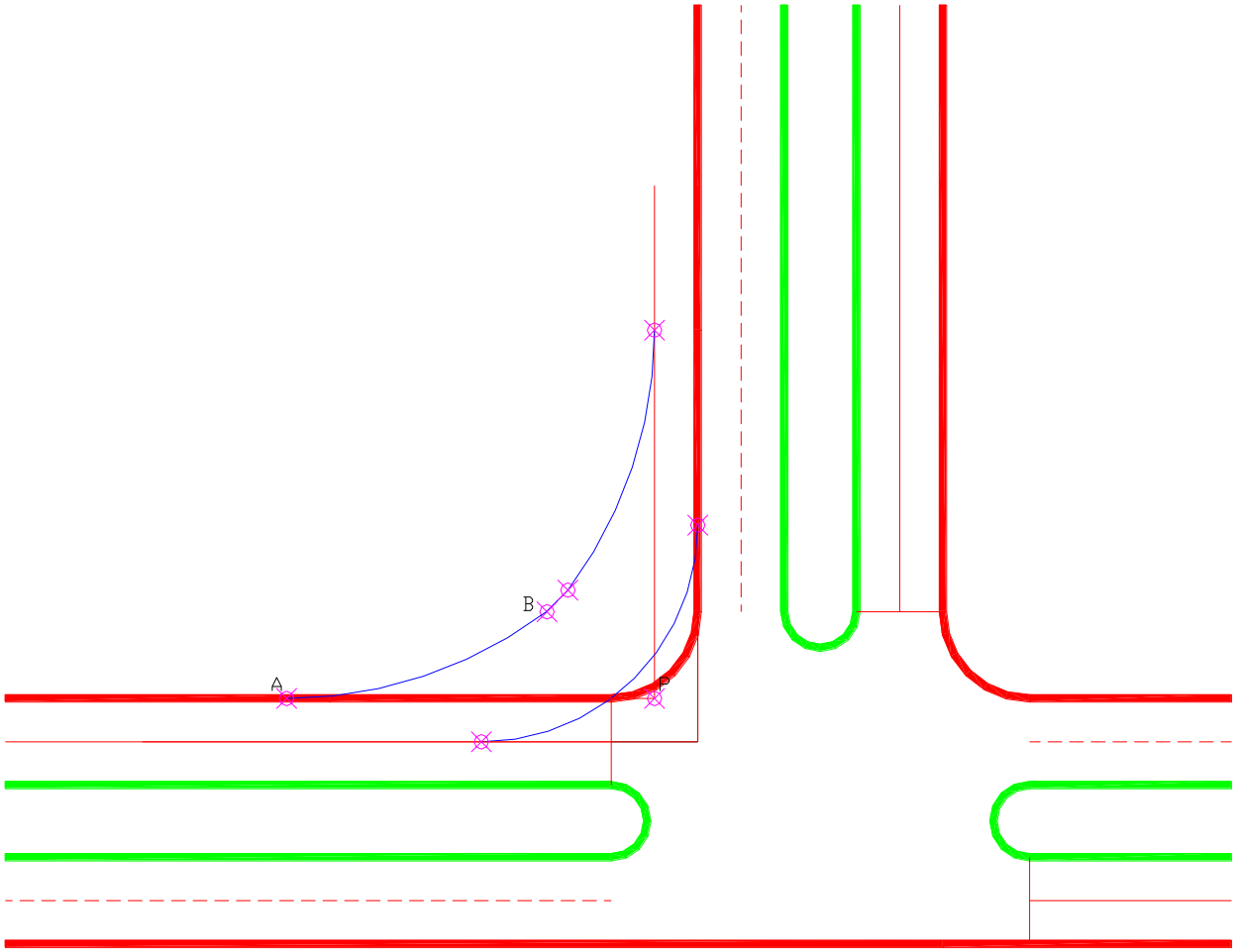
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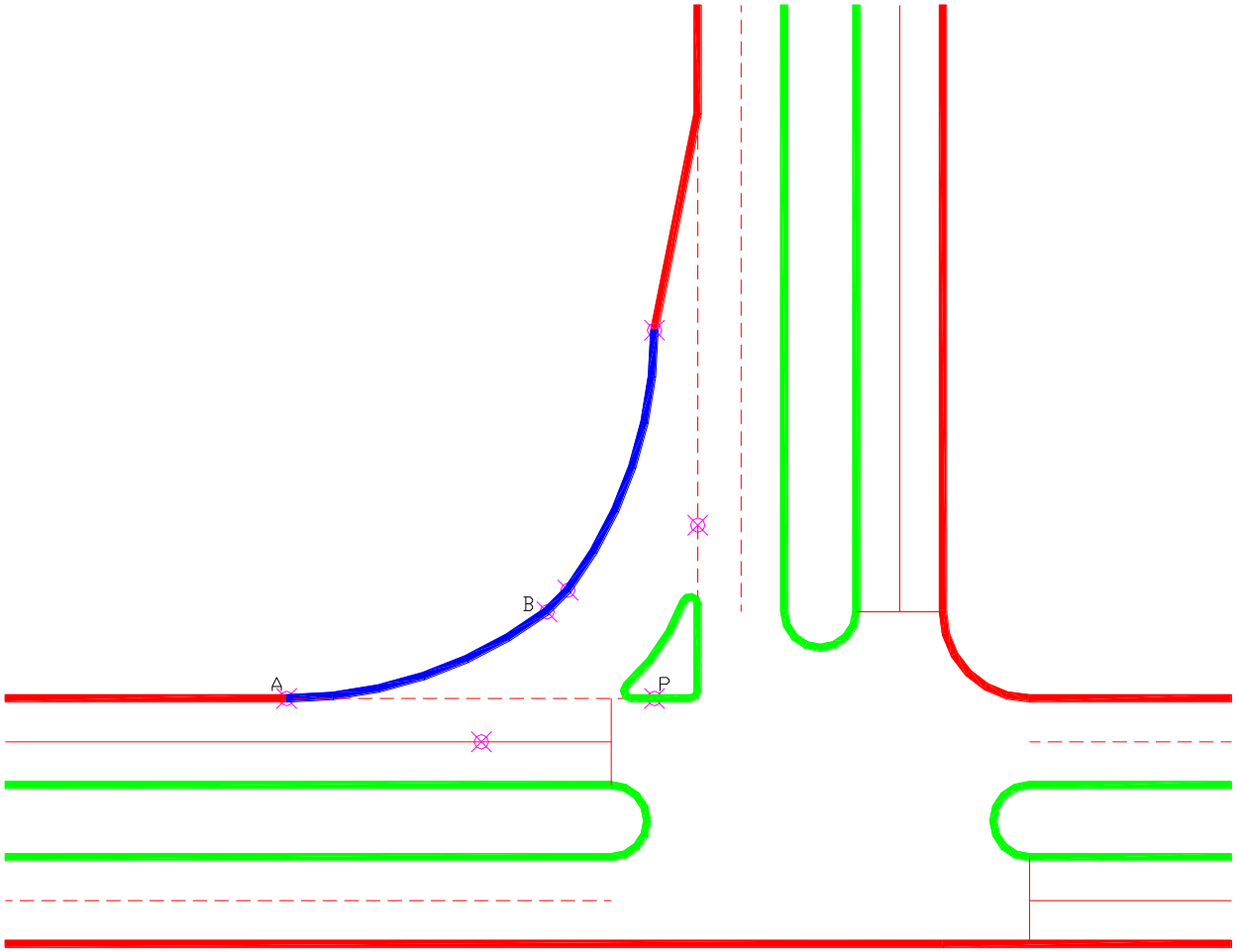
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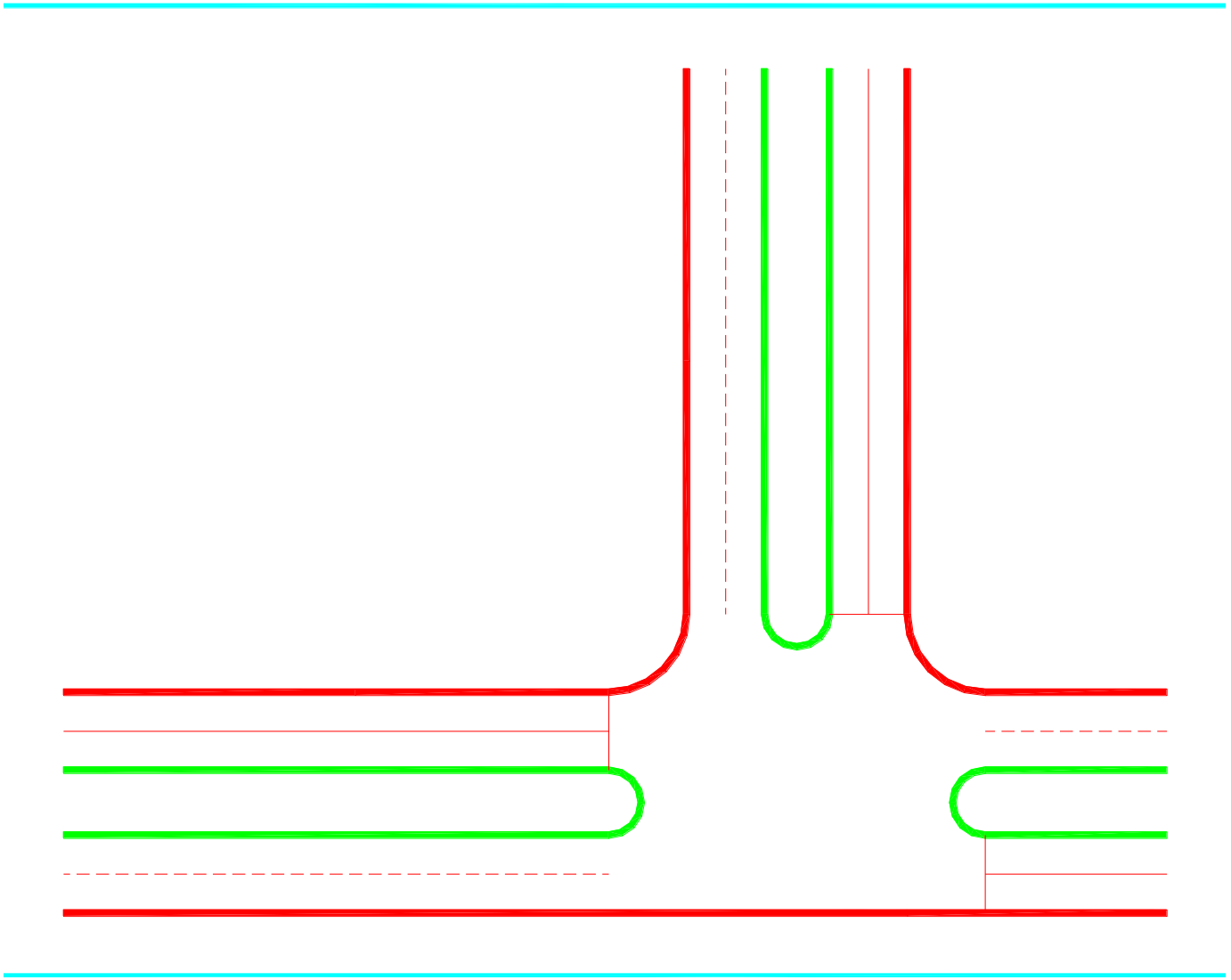
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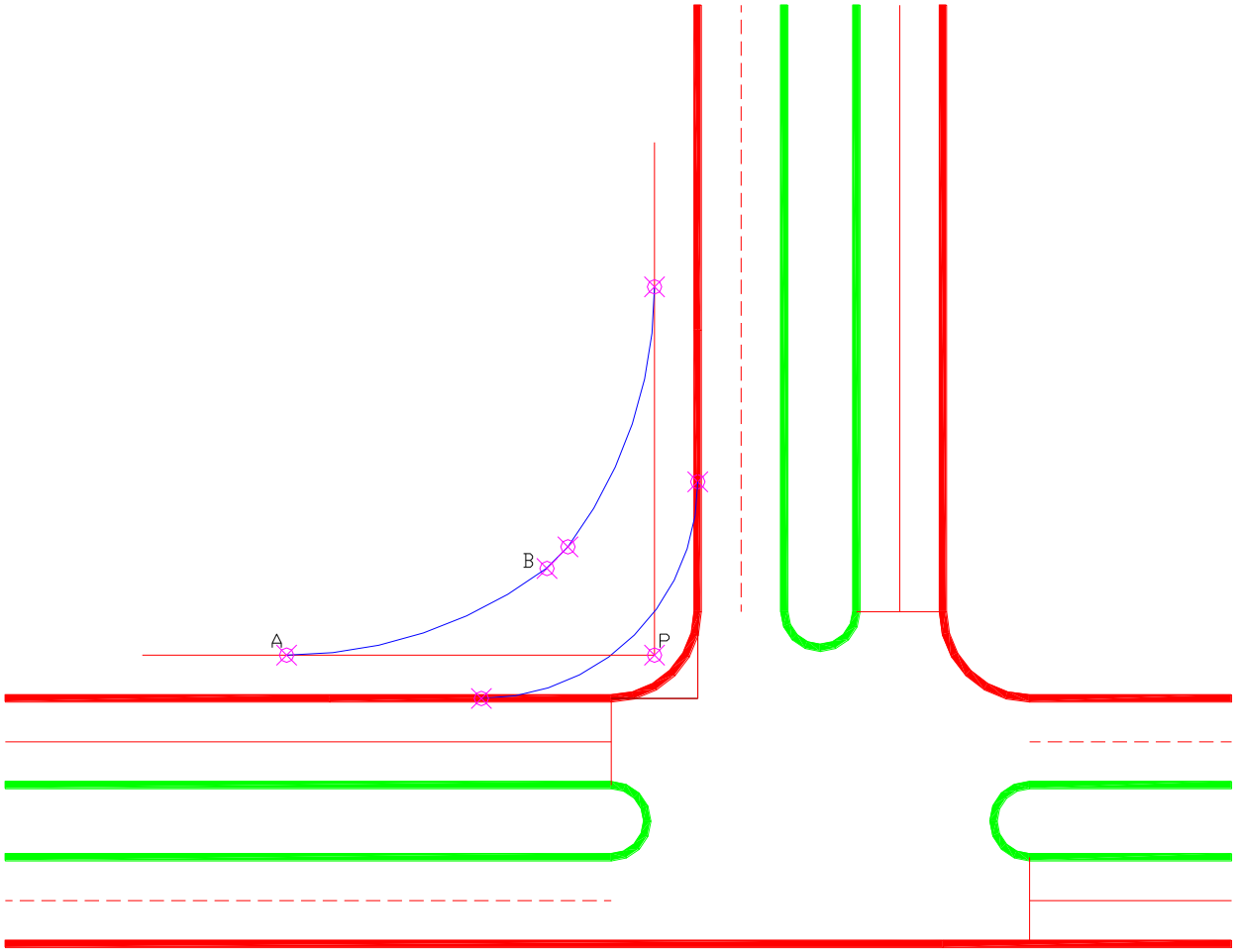
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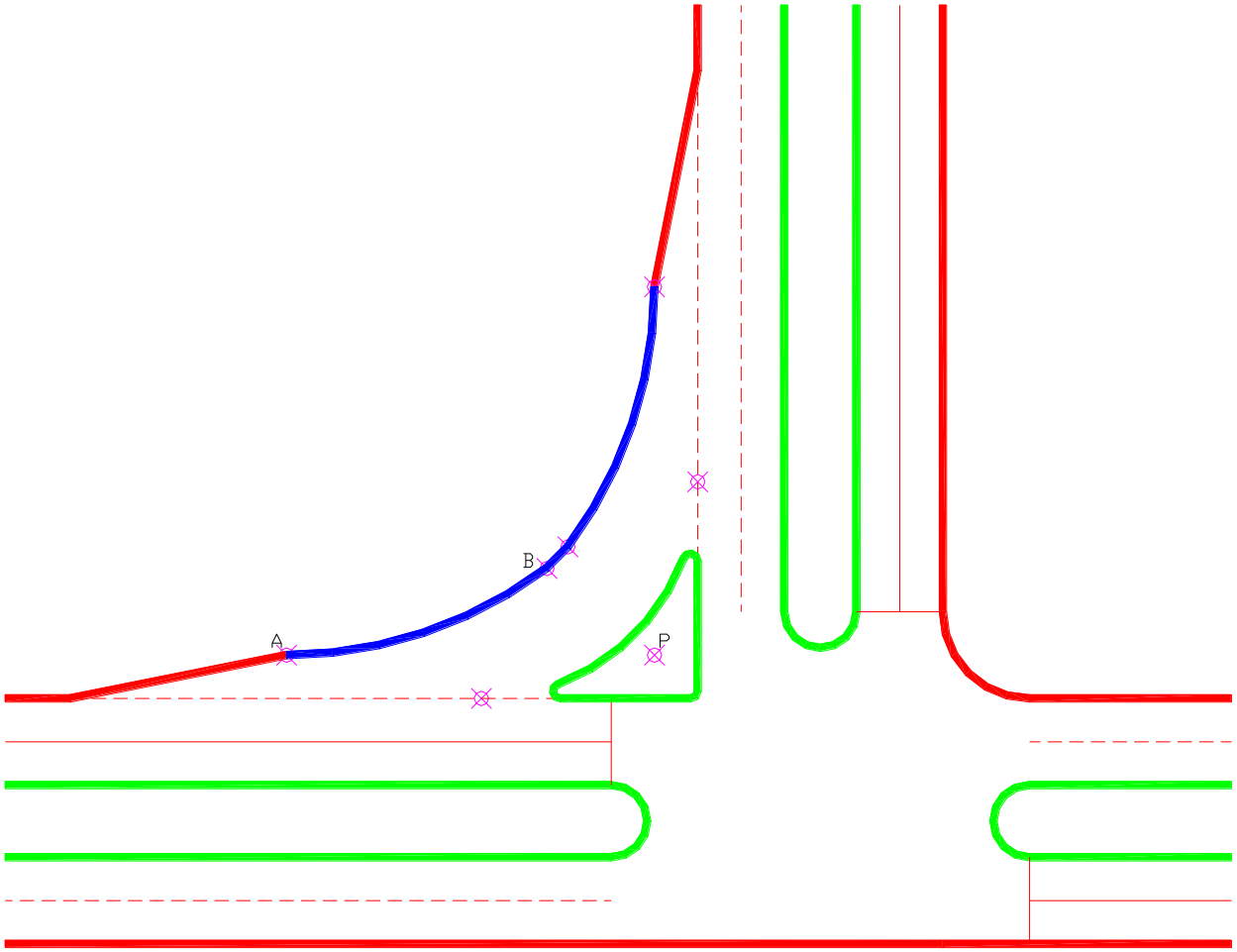
Design of Channelization



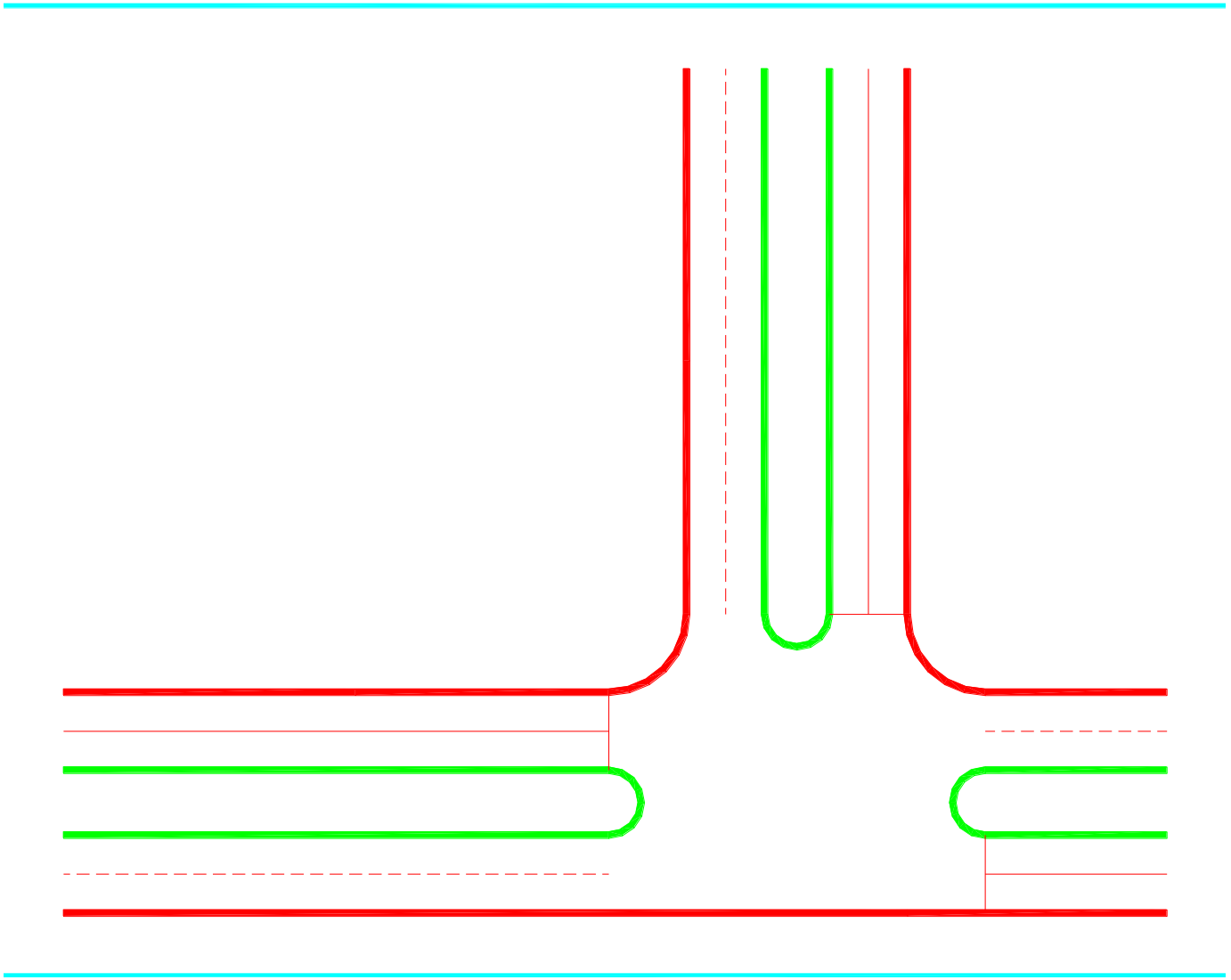
Design of Channelization (Type 4)



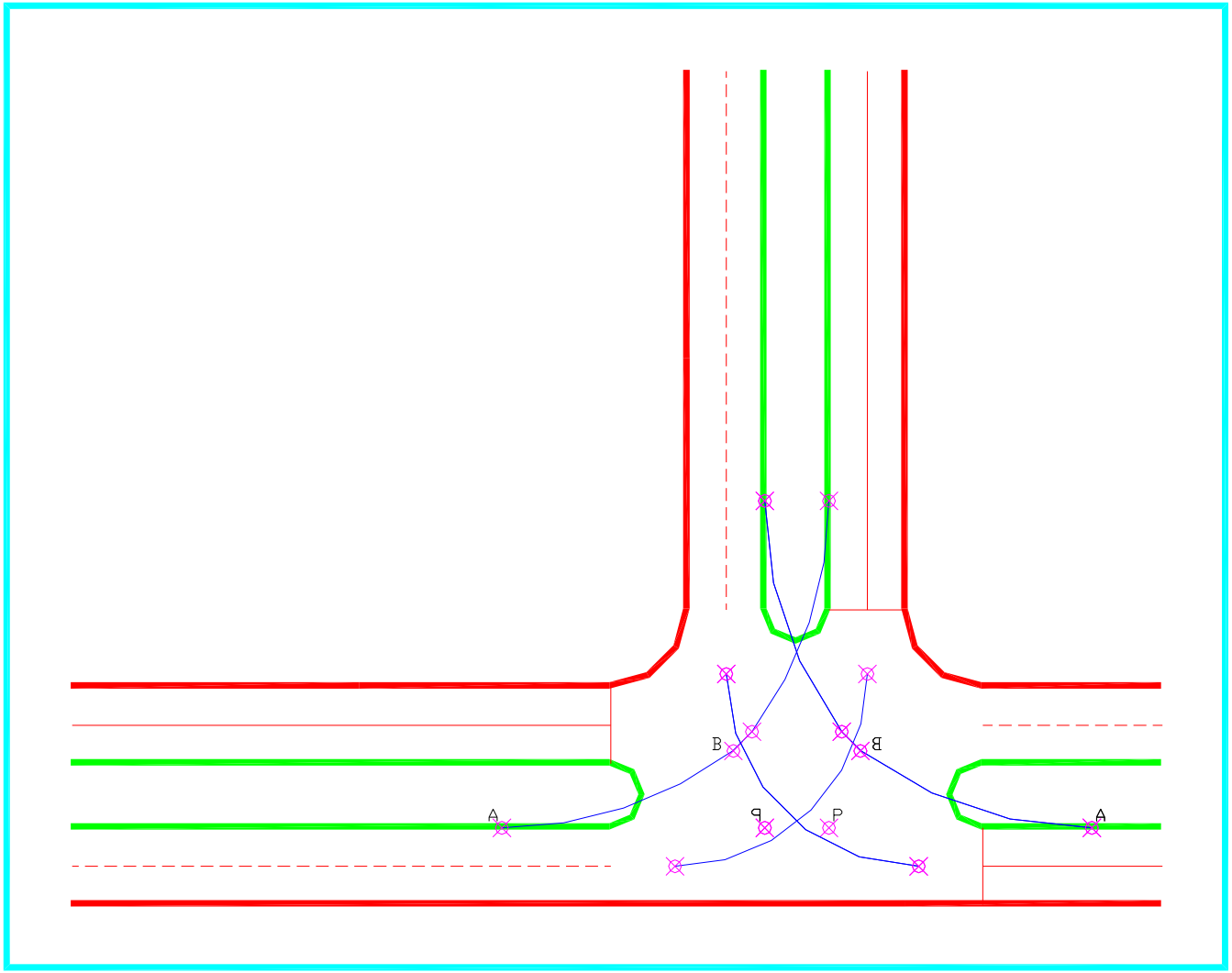
Design of Channelization (Type 4)



Design of Channelization



Design of Channelization



Traffic Island



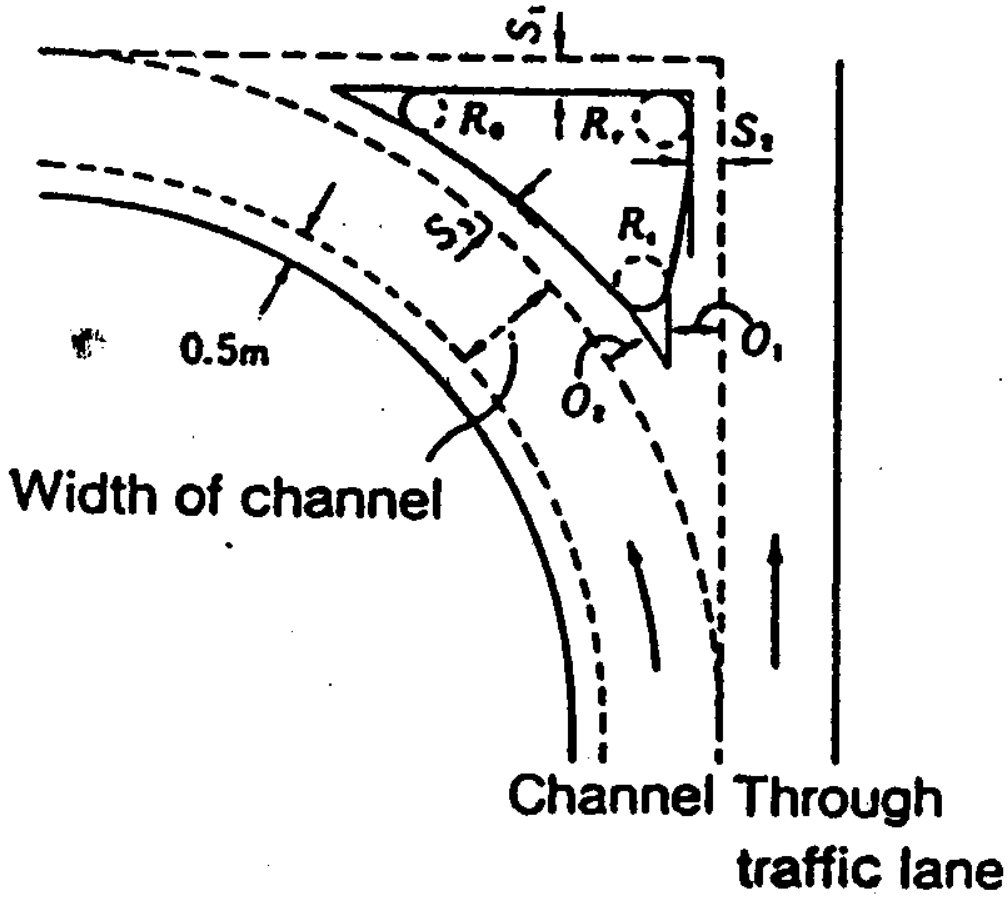
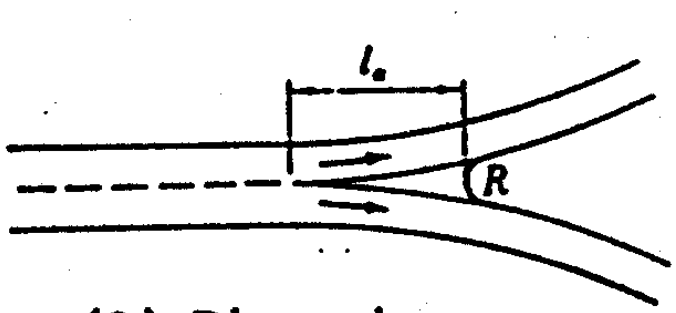
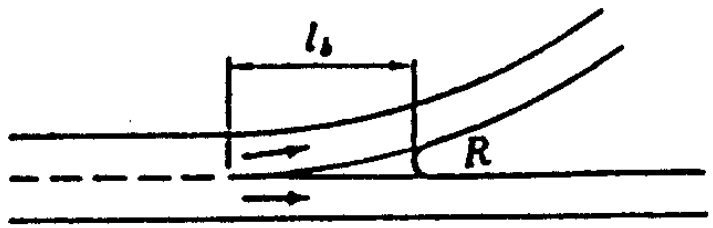


Fig.10.3 Setback and Nose-Offset

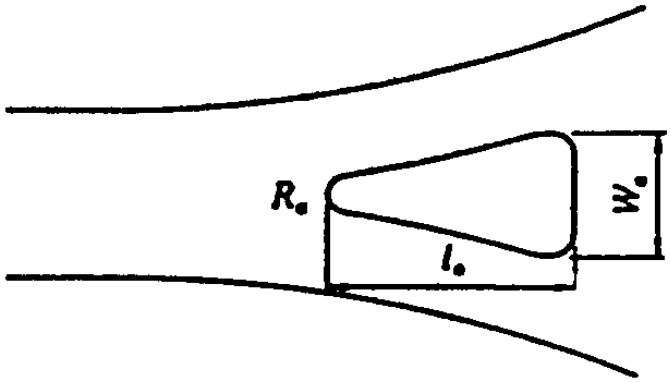


(1) Diverging

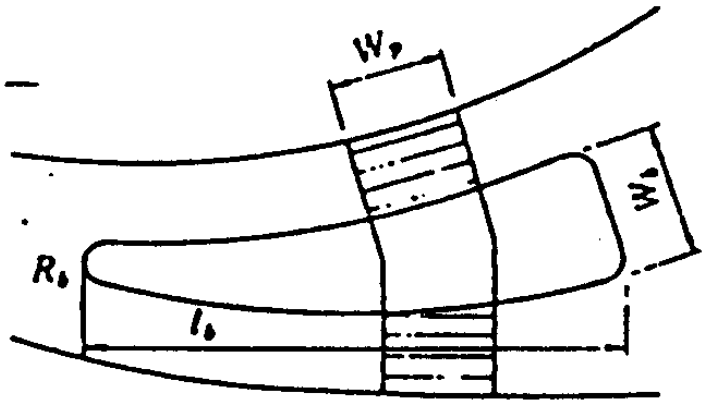


(2) Shifting

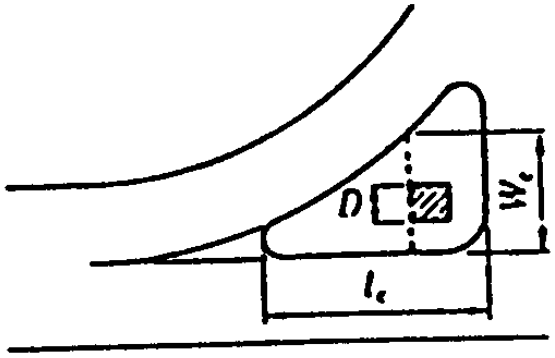
Fig. 10.4 Approach Marking for Island



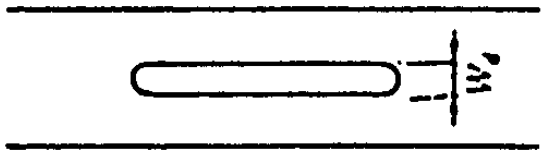
(a) Diverging



(b) With crosswalk



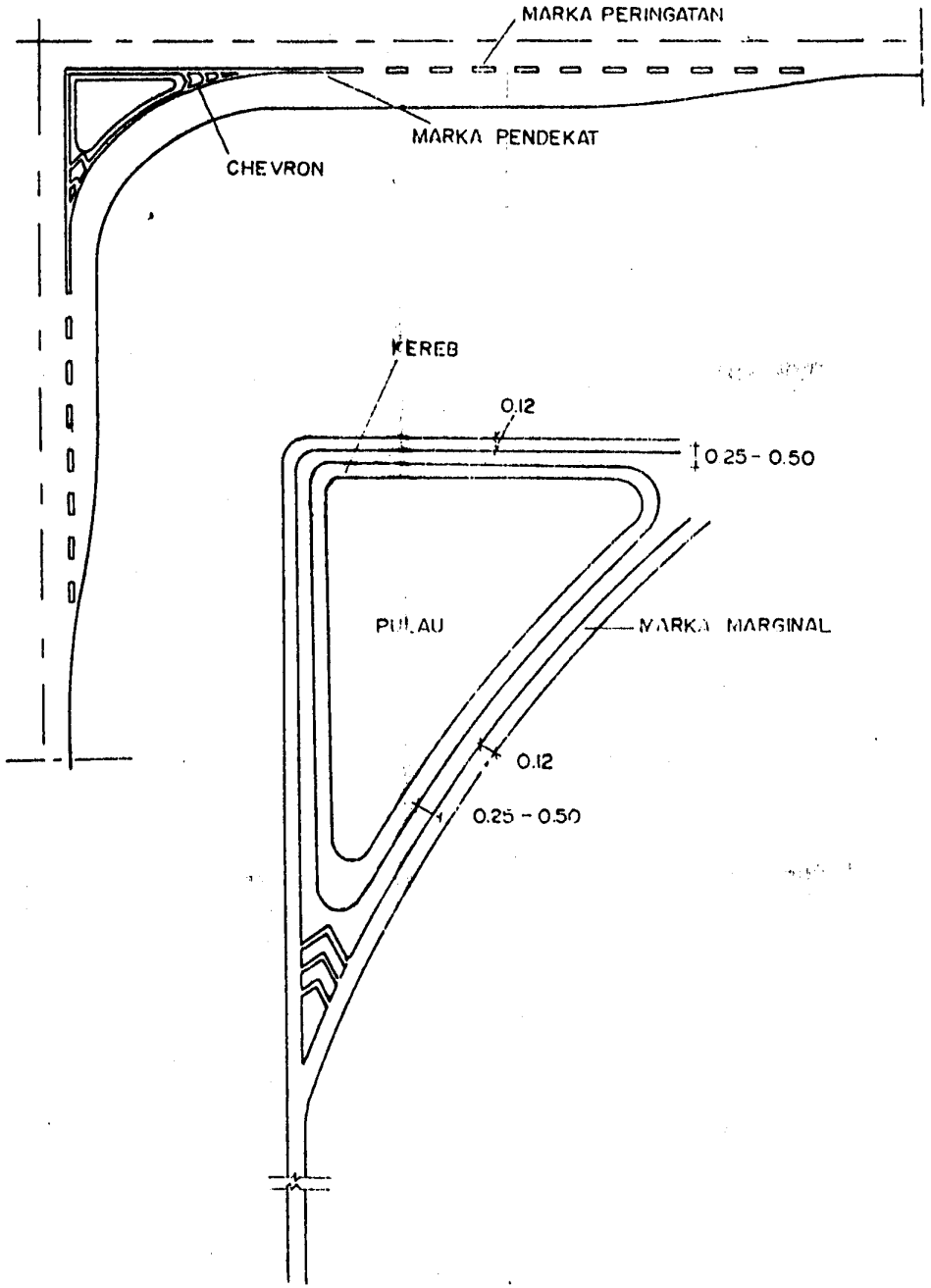
(c) With road devices



(d) Separator without taper

Fig.10.2 Island and Separator

E. MARKA PULAU (Island) PADA PERSIMPANGAN



Simultaneous Left-Turn Lanes

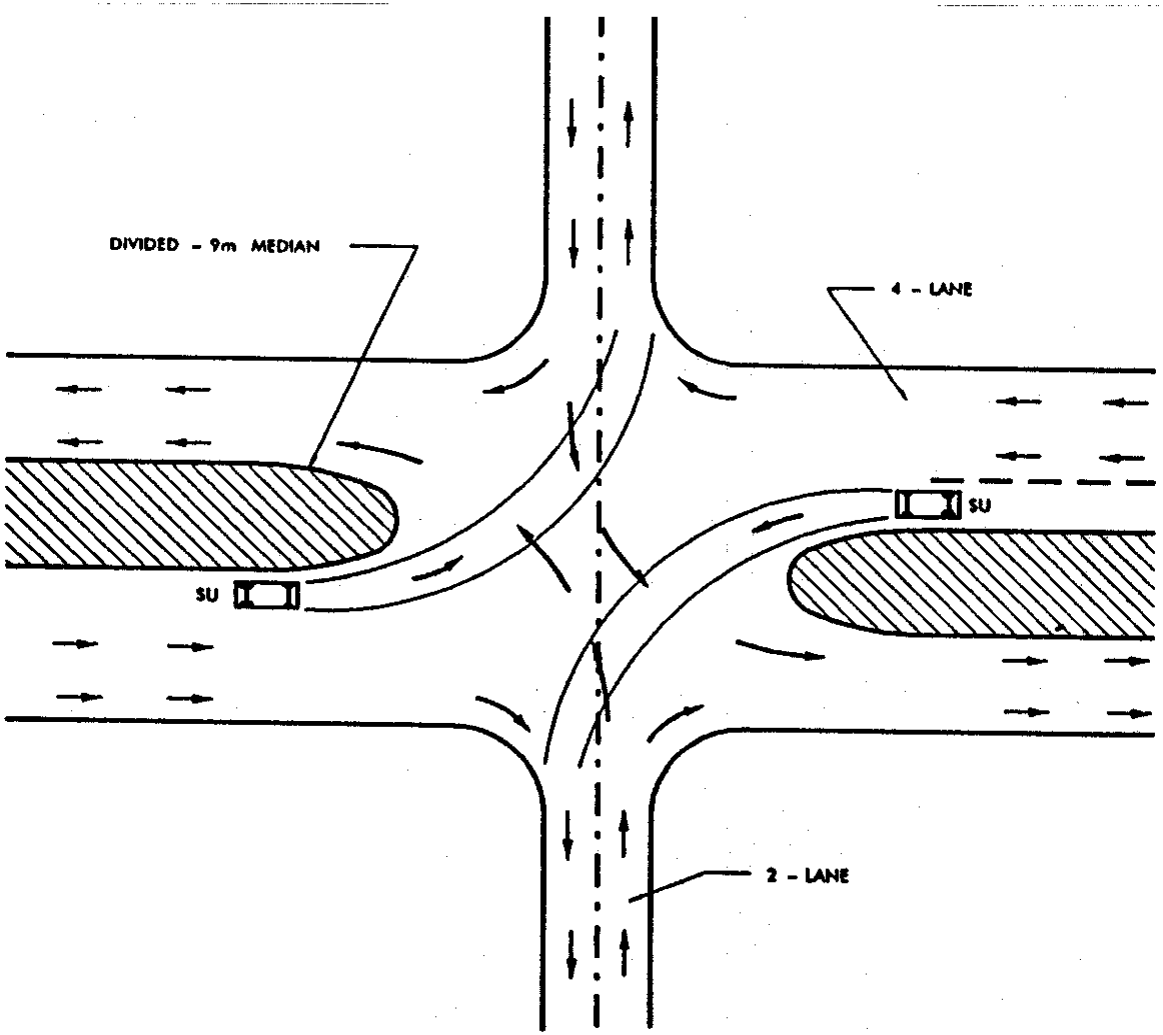
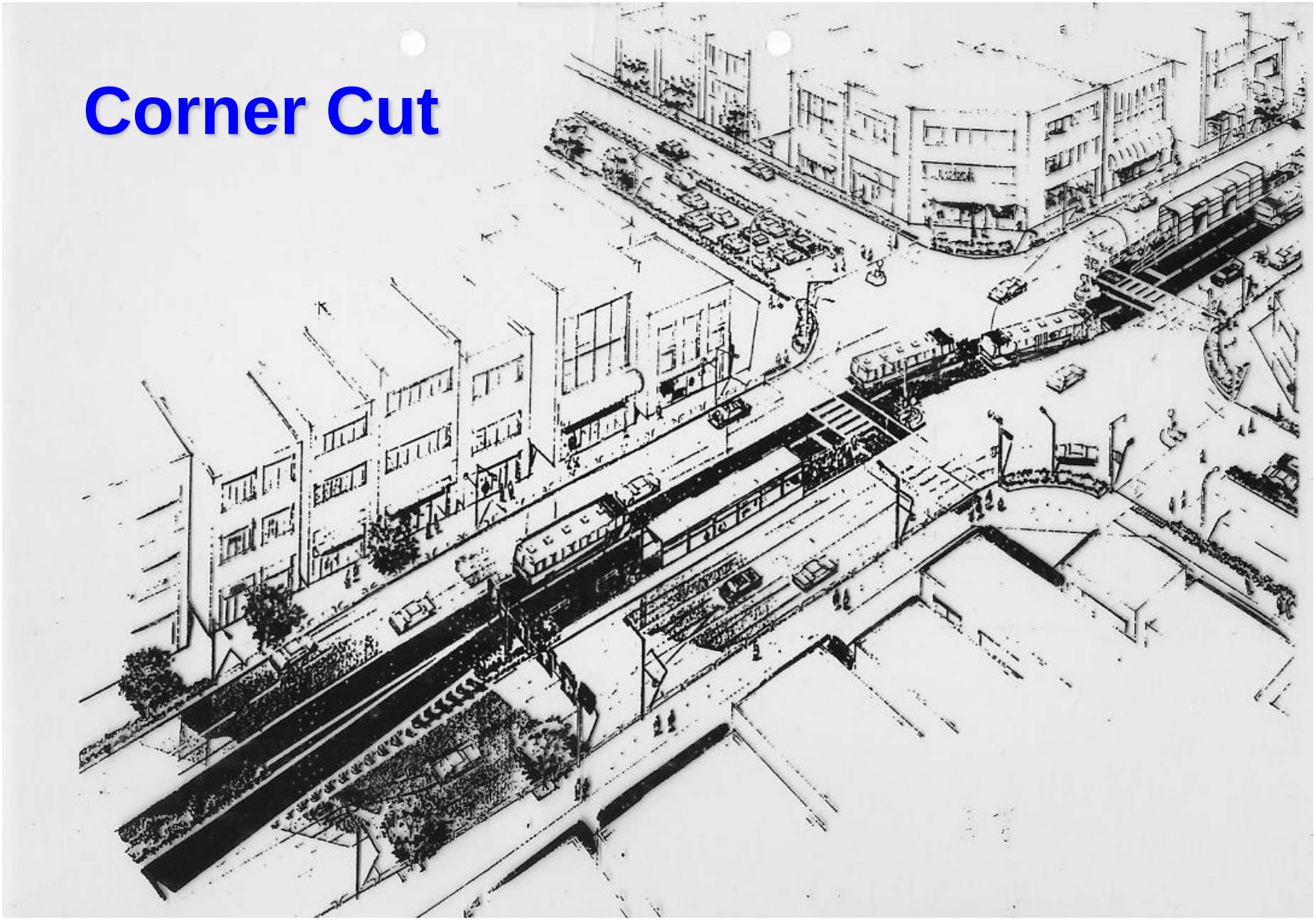


Exhibit 9-99 **Four-leg intersection providing simultaneous left turns.**

Corner Cut



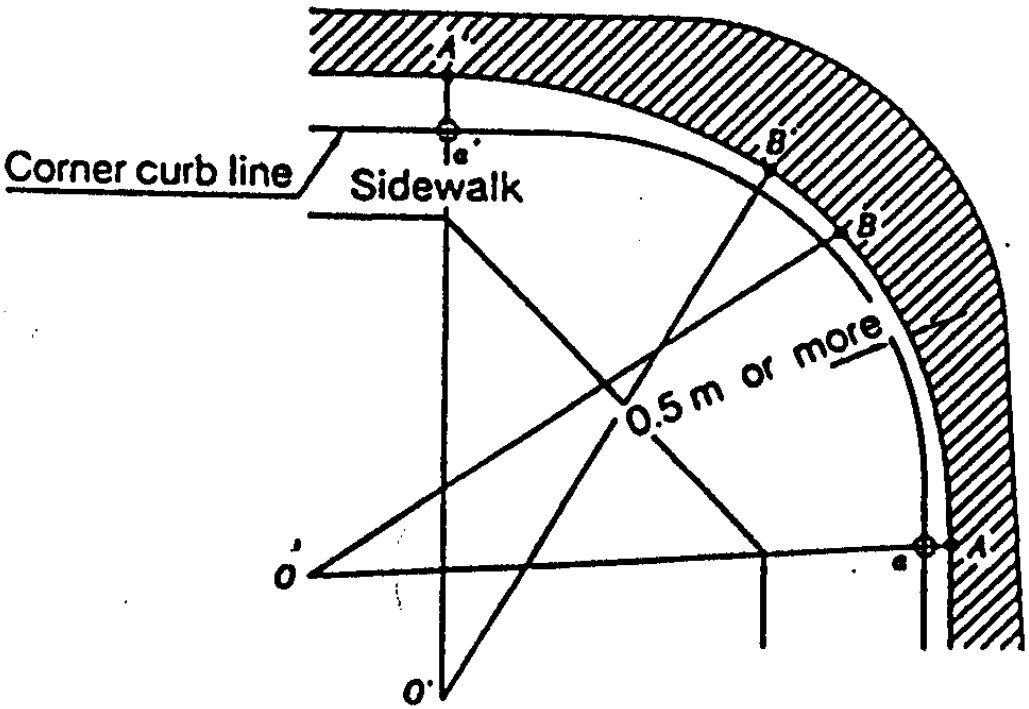


Fig.A.10.3 Width Occupied by Vehicle and Corner Cut

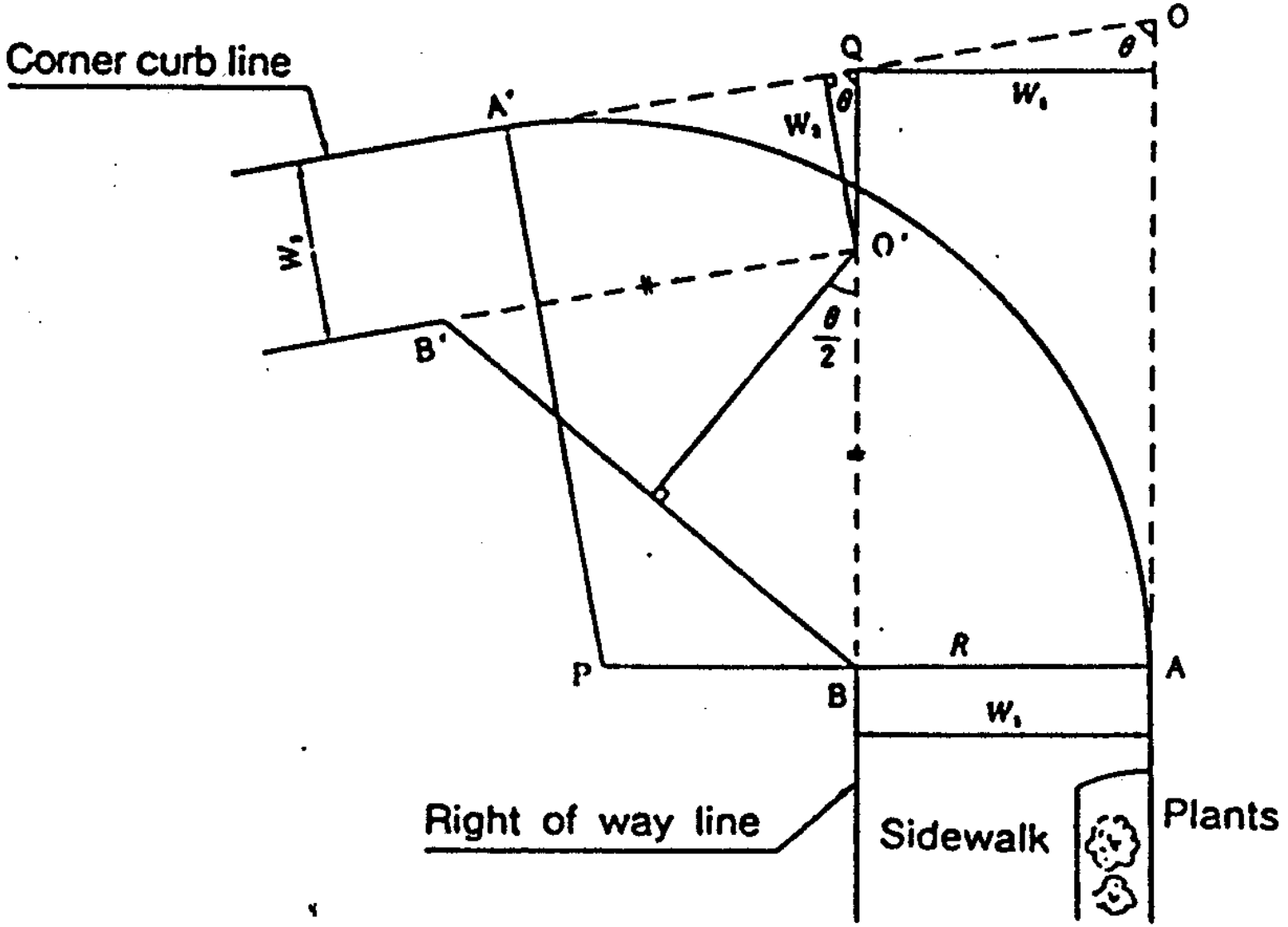


Fig.A.10.4 Corner Curb and Corner Cut

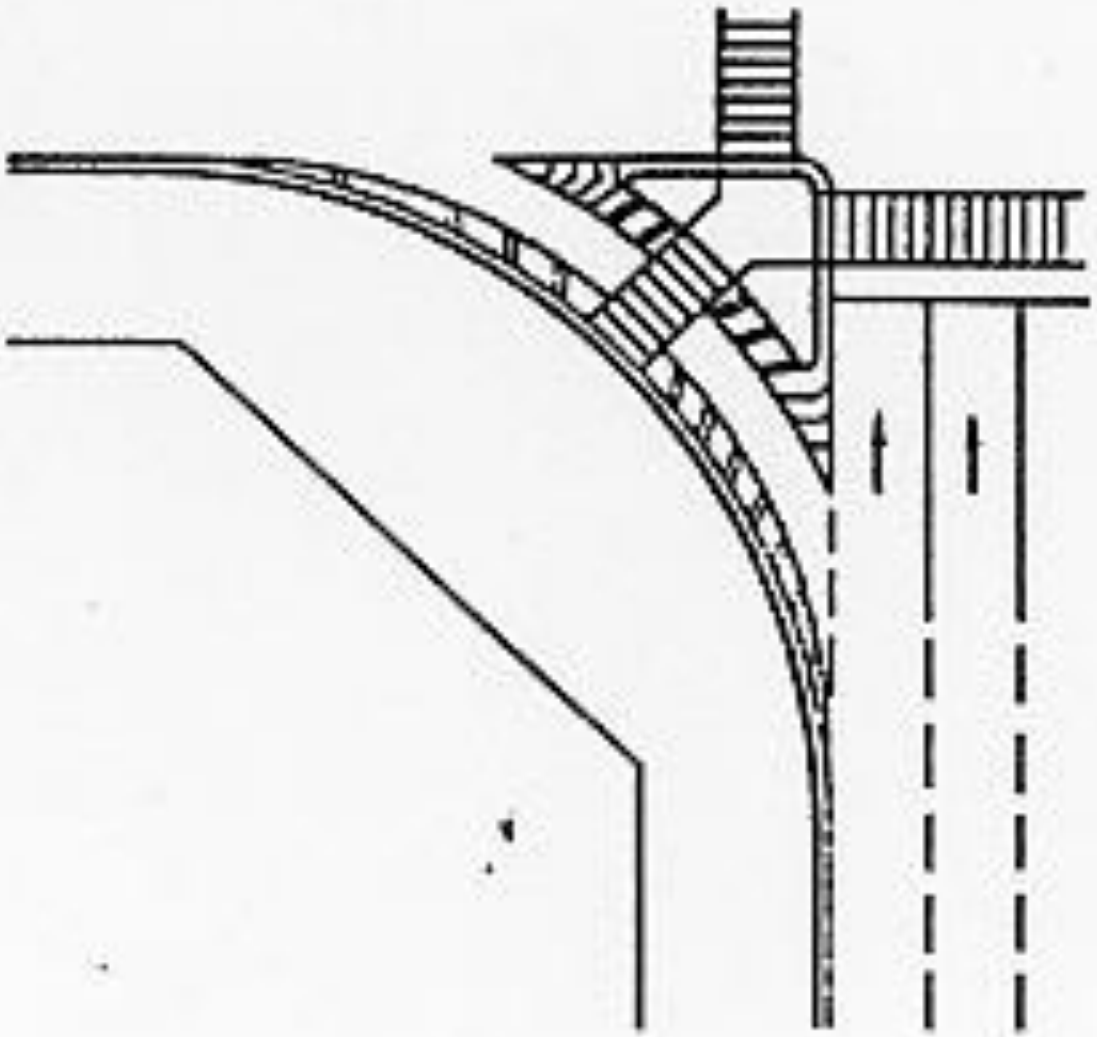
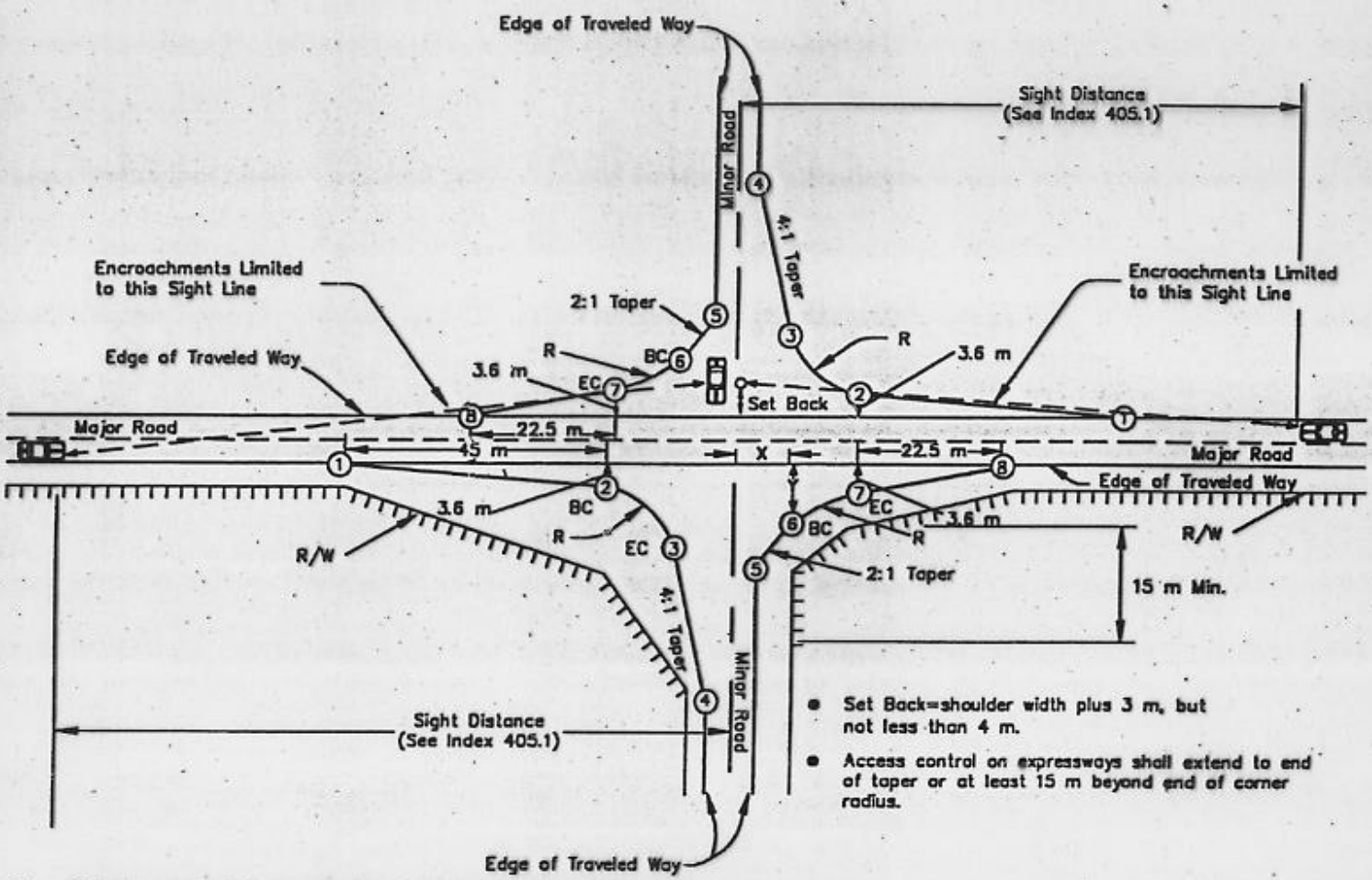


Fig.A.10.2 Wide Channel

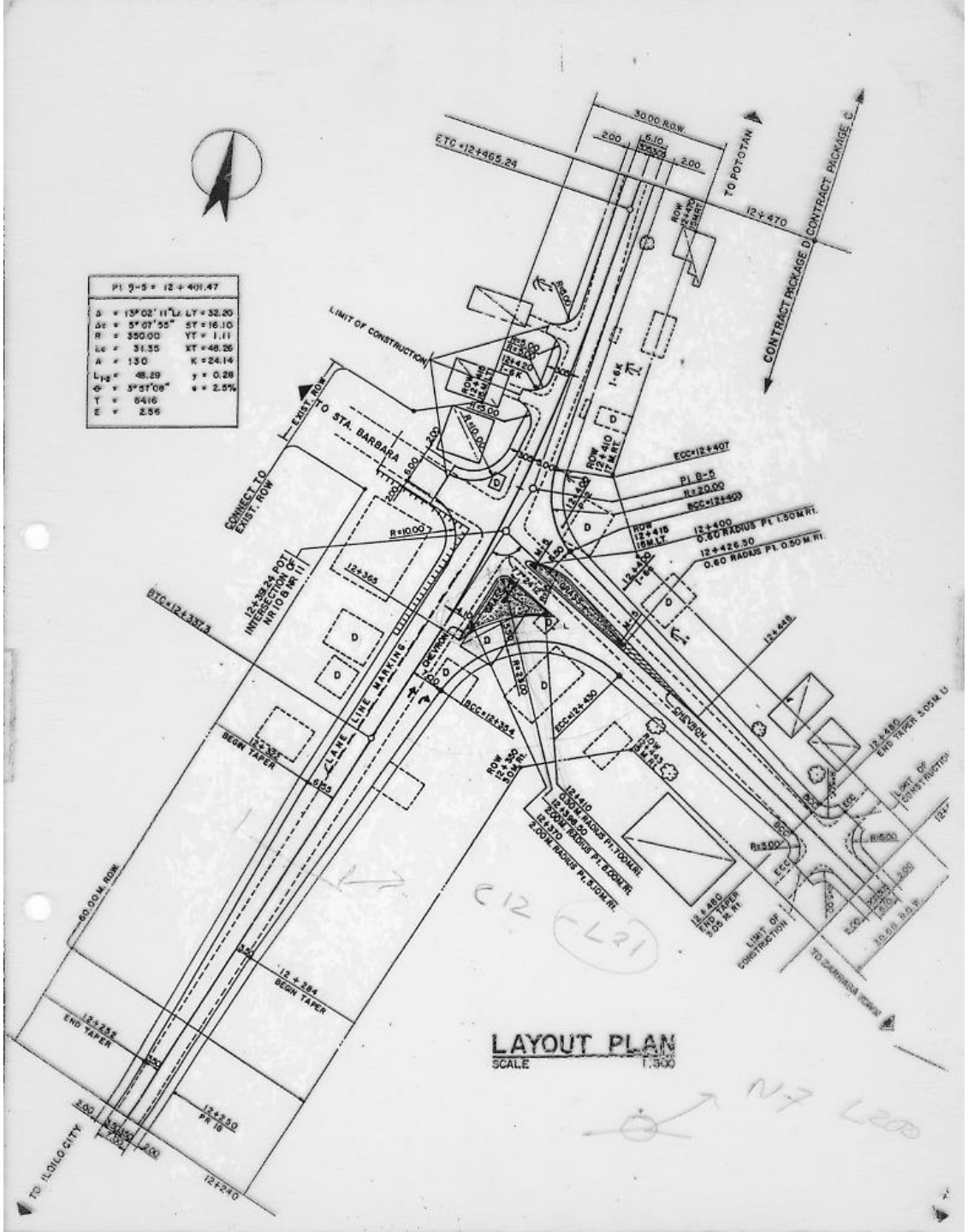


- Set Back=shoulder width plus 3 m, but not less than 4 m.
- Access control on expressways shall extend to end of taper or at least 15 m beyond end of corner radius.

X – Distance measured from centerline of minor road along major road – m.
Y – Offset distance measured from edge of traveled way of major road to any given point – m.

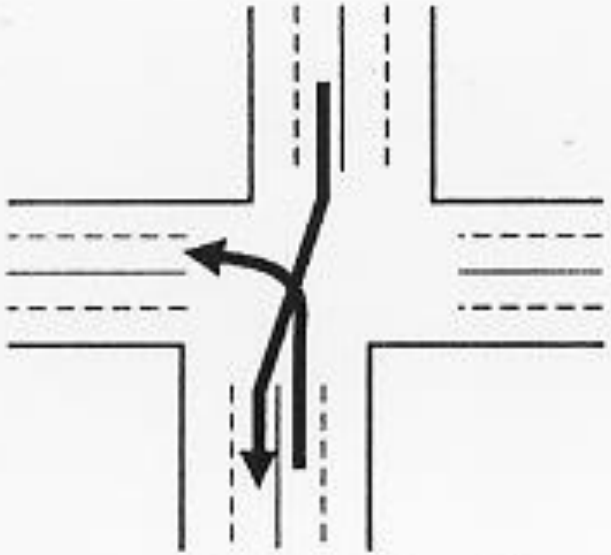
Radius of Curve	Design Vehicle	Pt ①		Pt ②		Pt ③		Pt ④		Pt ⑤		Pt ⑥		Pt ⑦		Pt ⑧	
		X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
9 m	Bus	61.26	0.0	16.26	3.6	8.25	10.39	3.6	28.97	3.6	12.20	5.47	8.46	12.10	3.6	34.60	0.0
12 m	California	64.52	0.0	19.52	3.6	8.84	12.65	3.6	33.61	3.6	16.01	6.56	10.08	15.40	3.6	37.90	0.0
15 m	STAA	67.85	0.0	22.83	3.6	9.47	14.91	3.6	38.39	3.6	22.69	9.09	11.70	20.14	3.6	42.64	0.0

California standard intersection, minor road with state highway. (*California Highway Design Manual, 5th ed., 1995.*)

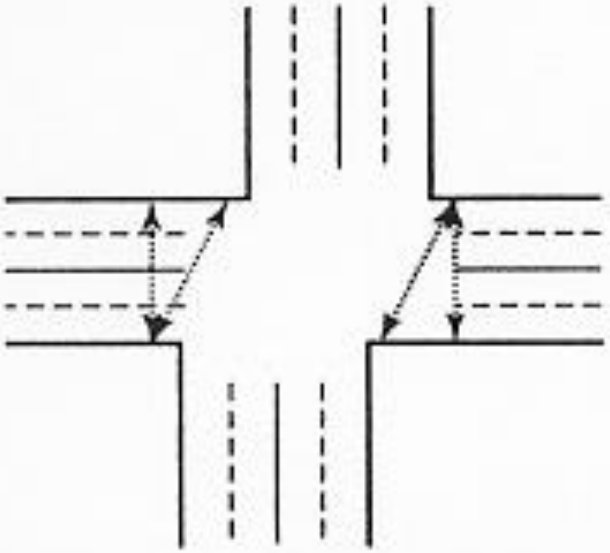

PI 9-5 = 12 + 401.47
Δ = 13°02' 11" Lt
Δc = 5°07' 55"
R = 350.00
Lc = 31.35
A = 130
L Tot = 46.29
Φ = 5°51' 08"
T = 64.16
E = 2.56
LT = 32.20
ST = 16.10
YT = 1.11
XT = 48.26
K = 24.14
y = 0.28
e = 2.5%
ETC = 12+465.24
30.00 R.O.W.
TO POTOTAN
12+470
CONTRACT PACKAGE D
CONTRACT PACKAGE C
LIMIT OF CONSTRUCTION
EXIST. ROW
TO STA. BARBARA
CONNECT TO EXIST. ROW
ECC=12+407
PI B-5
R=20.00
BCC=12+403
12+400
0.60 RADIUS PI 1.50M RT.
12+426.50
0.60 RADIUS PI 0.50 M. RT.
12+418
12+480
END TAPER 3.05M LT.
LIMIT OF CONSTRUCTION
BTC=12+337.3
12+392.24 POT. OF INTERSECTION NR 10 & NR 11
12+365
LINE MARKING
CHEVRON
BCC=12+384
ECC=12+430
12+328
BEGIN TAPER
60.00 M. ROW
12+284
BEGIN TAPER
12+258
END TAPER
12+250
PR 16
TO ILOILO CITY
12+240
12+410
12.00 M RADIUS PI 7.00 LT.
12+370
2.00M RADIUS PI. 8.00M RT.
2.00M RADIUS PI. 3.10M RT.
12+480
END TAPER 3.05 M. RT.
LIMIT OF CONSTRUCTION
TO ZARRAGA TOWN
LAYOUT PLAN
SCALE 1:300

Appendix



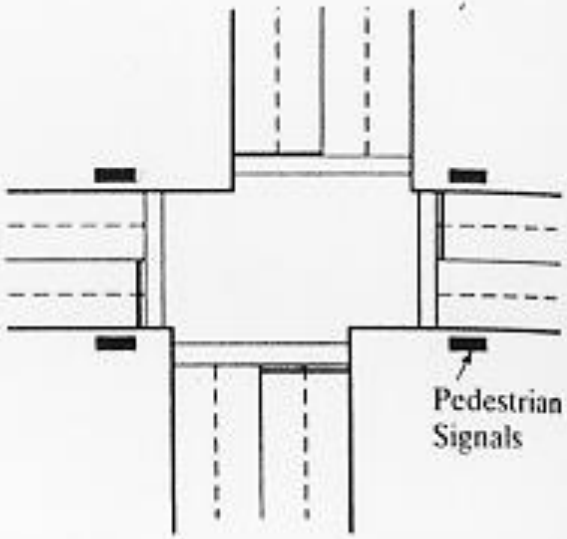


(a) Left-Turn Trajectory Problems Illustrated

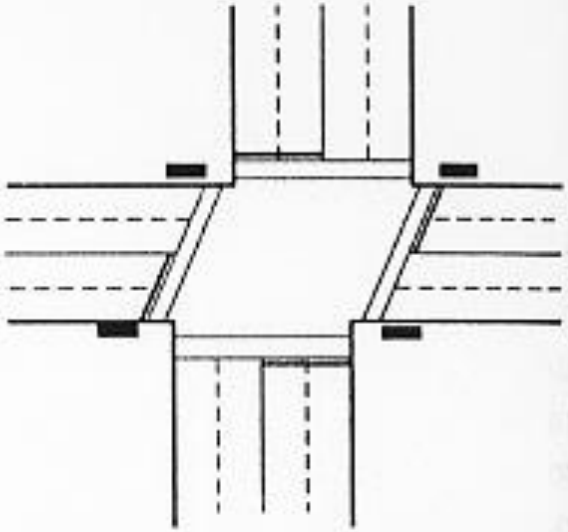


(b) Pedestrian Path Problems Illustrated

Figure 19.16: Special Problems at Offset Intersections



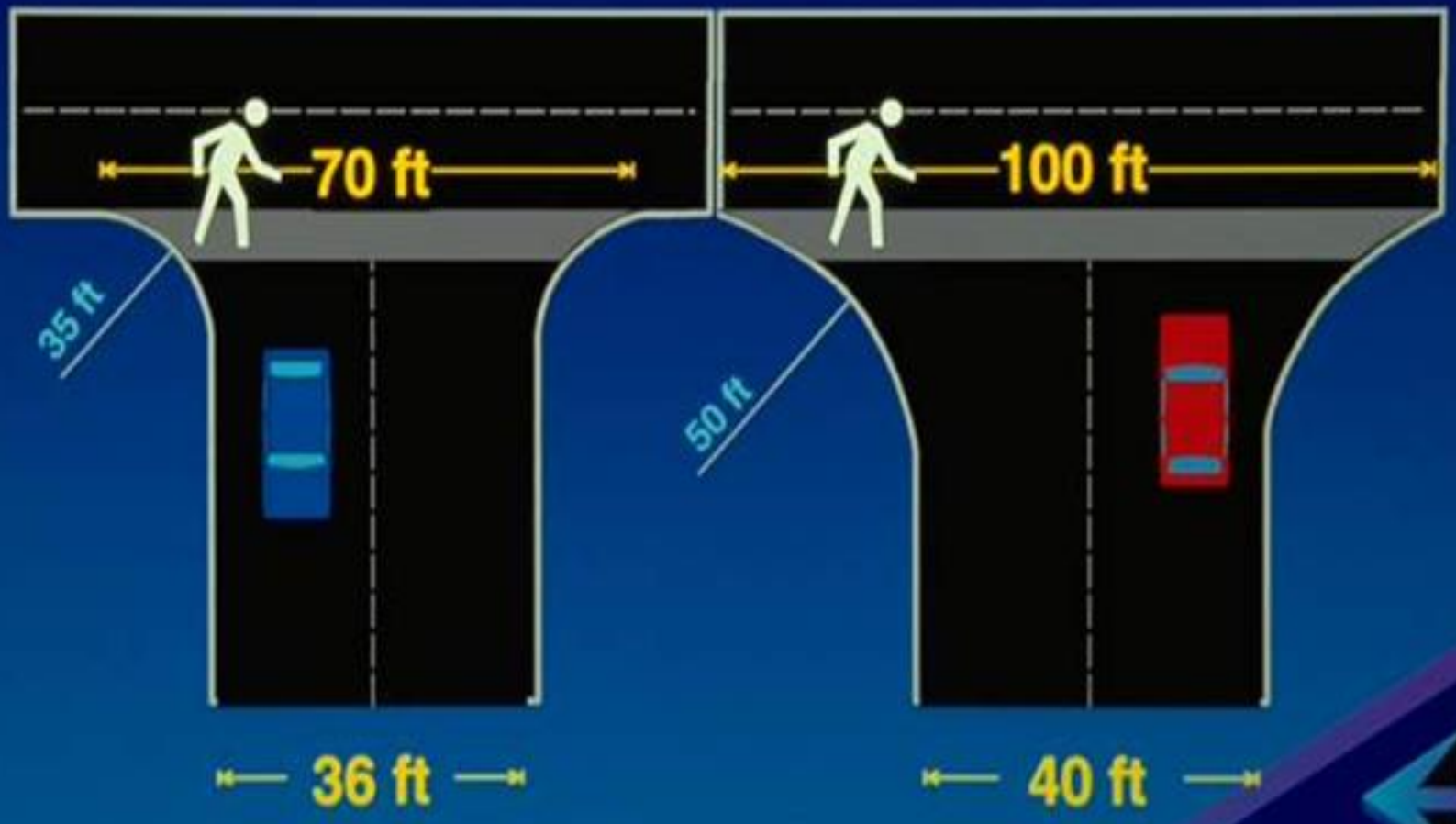
(a) Markings for Perpendicular Pedestrian Crossings



(b) Markings for Diagonal Pedestrian Crossings

Figure 19.17: Signing, Markings, and Pedestrian Signals for a Right-Offset Intersection

Pedestrian exposure due to very large radii







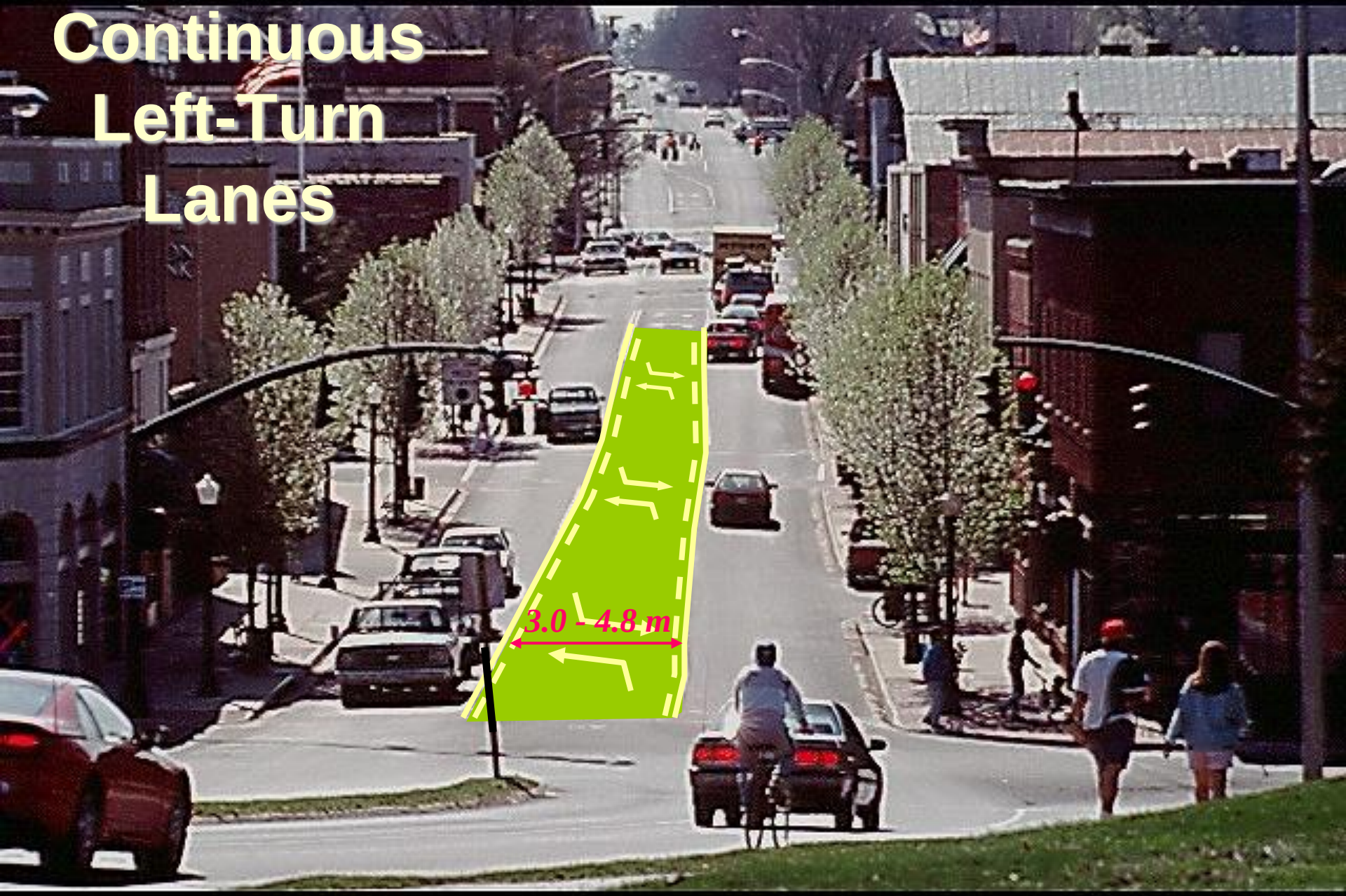
Sight Obstruction



Auxiliary Lanes



Continuous Left-Turn Lanes




Offset Left-Turn
Lanes


Traffic Island