



Highway Engineering CE 431 Tutorial

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CHAPTER 9

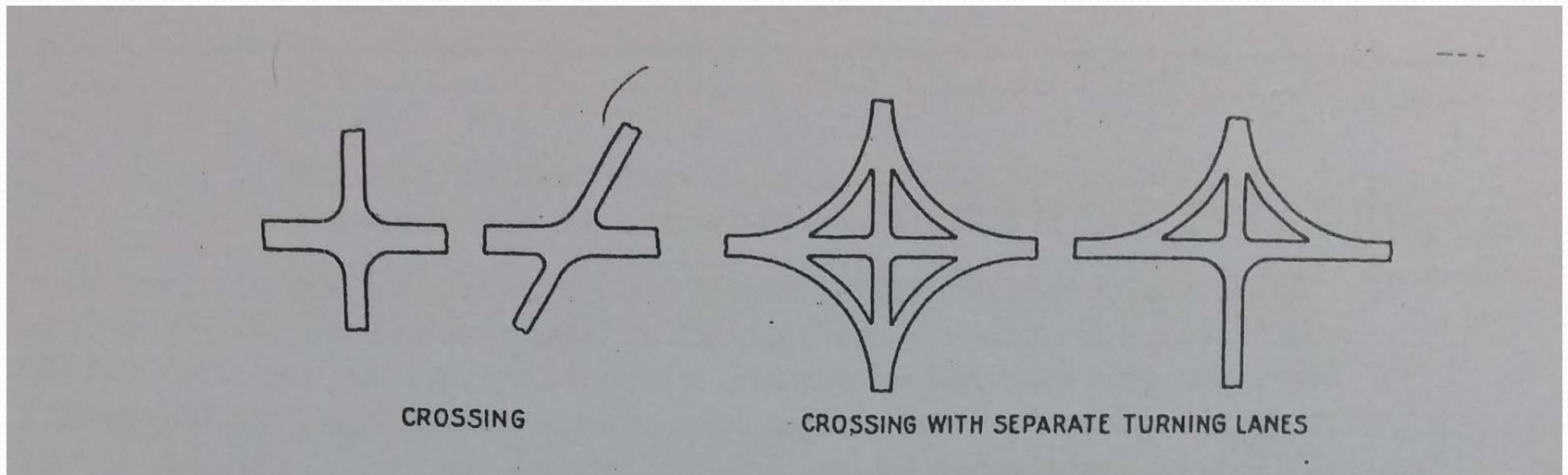
INTERSECTIONS AND INTERCHANGE,

Types of Intersections

- Cross intersection (+)
- T intersection
- Y intersection
- Flared intersection

Types of Intersections

- Cross intersection (+)



Types of Intersections

- Cross intersection (+)



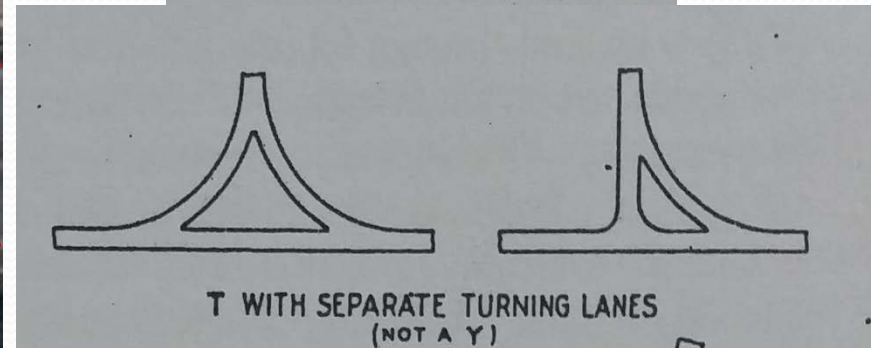
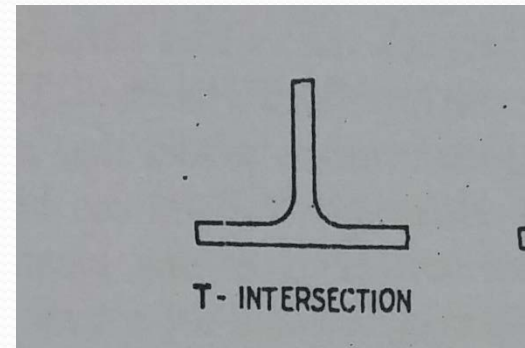
تقاطع التخصصي مع الامير محمد



تقاطع التخصصي مع الامير سلطان

Types of Intersections

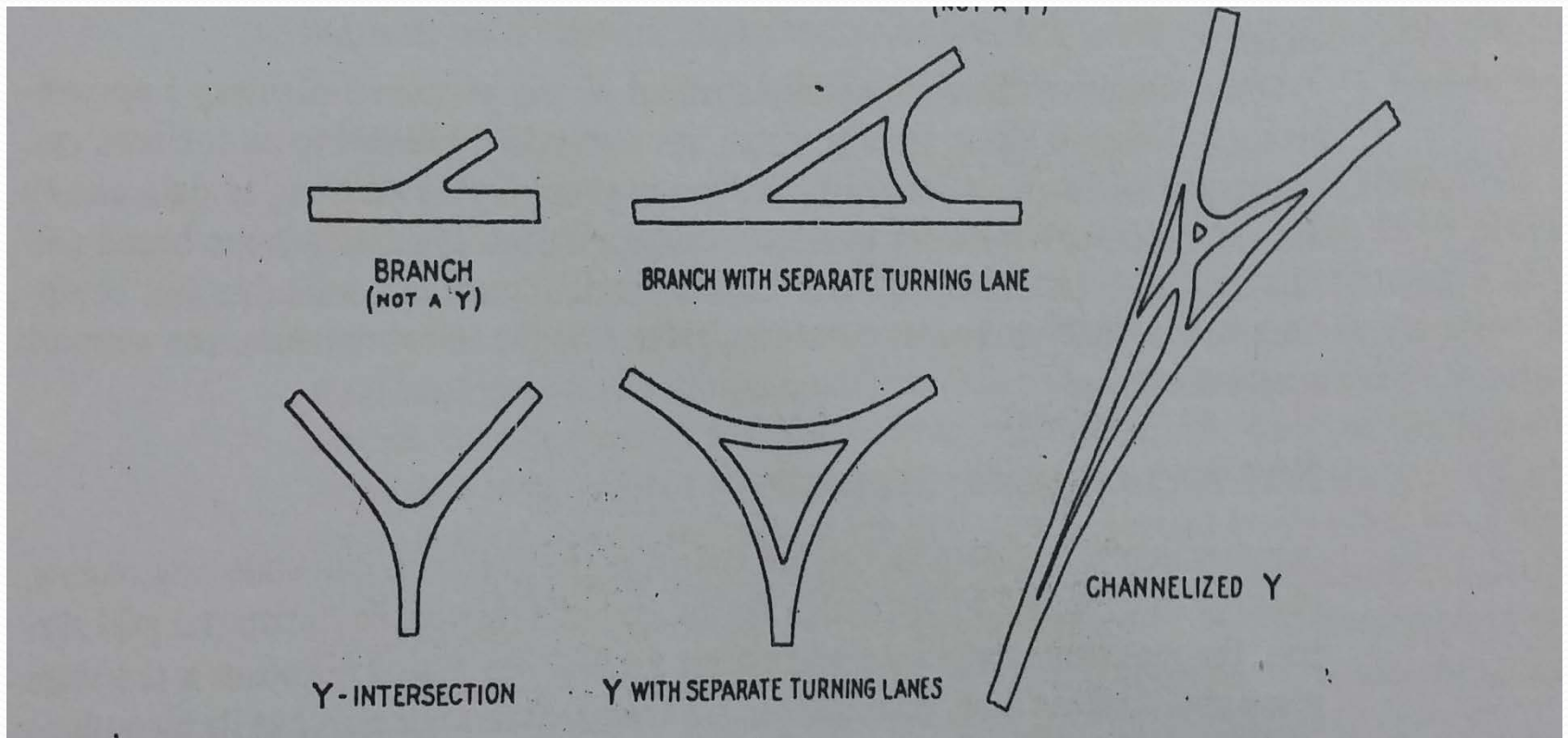
- T intersection



تقاطع التخصصي مع الامير نايف

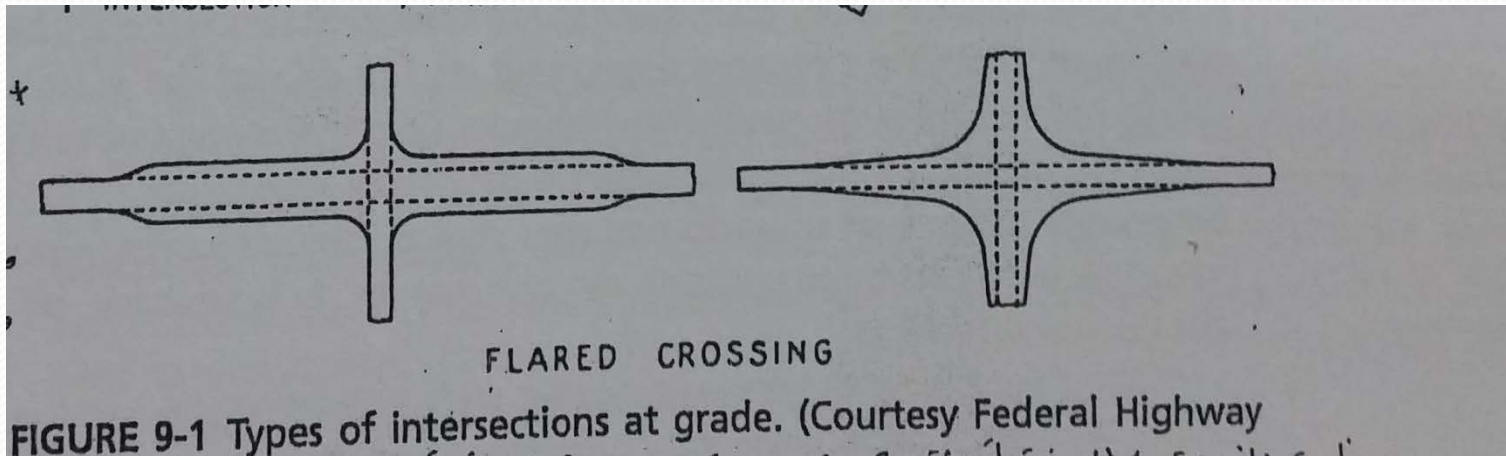
Types of Intersections

- Y intersection



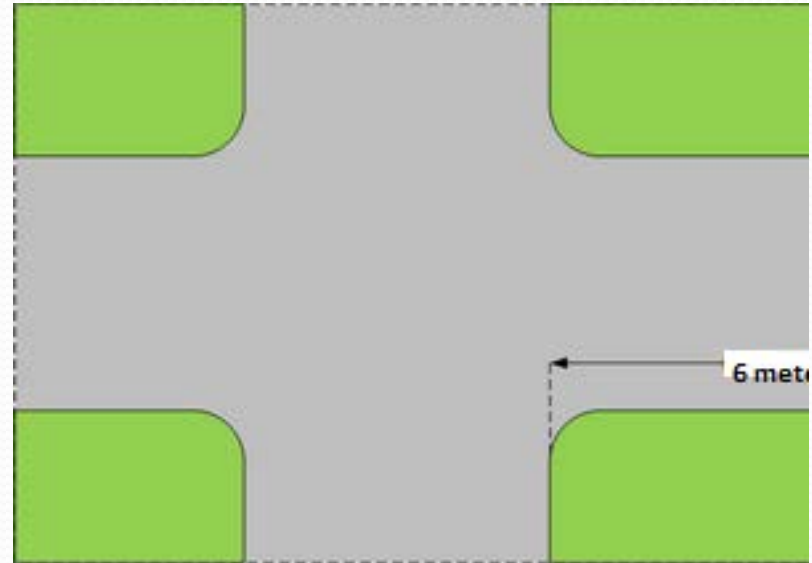
Types of Intersections

- Flared intersection



The design of intersections depends on

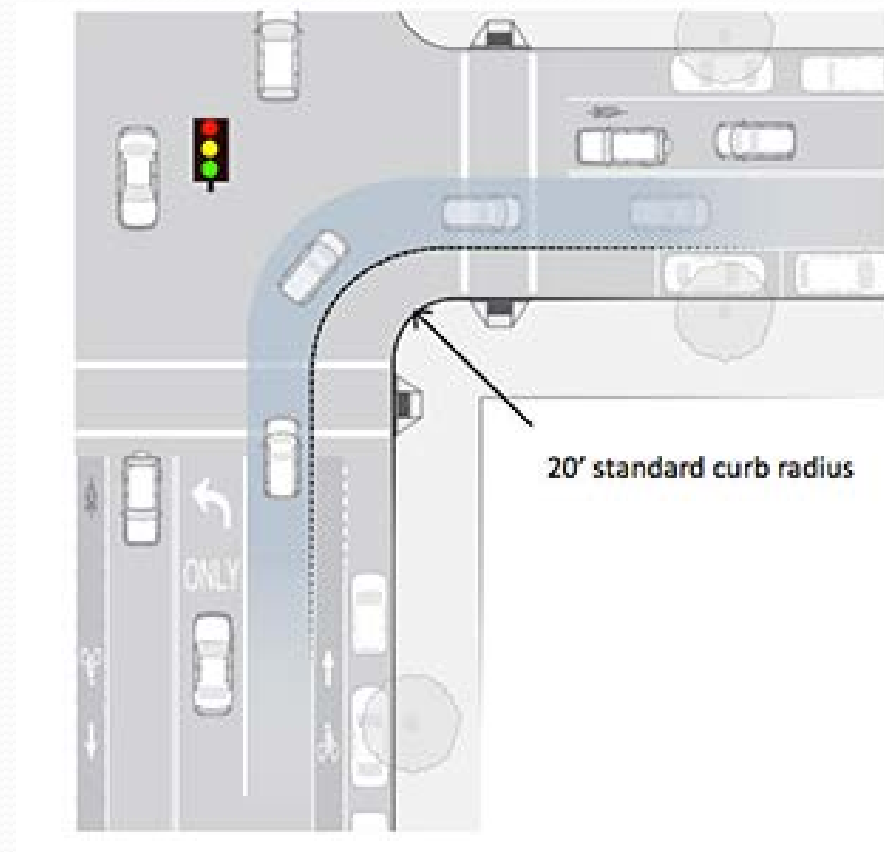
- The composition of the traffic
- The angle of intersection
- The right-of-way available
- The needs of pedestrians .
- The width and number of lanes on the intersecting street
- The speed at turning less than 10 mph (15 km/hr)



Minimum edge of pavement designs for turns

Table 9-1 and 9-2 (page 236-237) give recommended minimum edge of pavement designs at intersections

- **Simple curves and tapers**
- **Three centered compound curves**



Simple curves and tapers

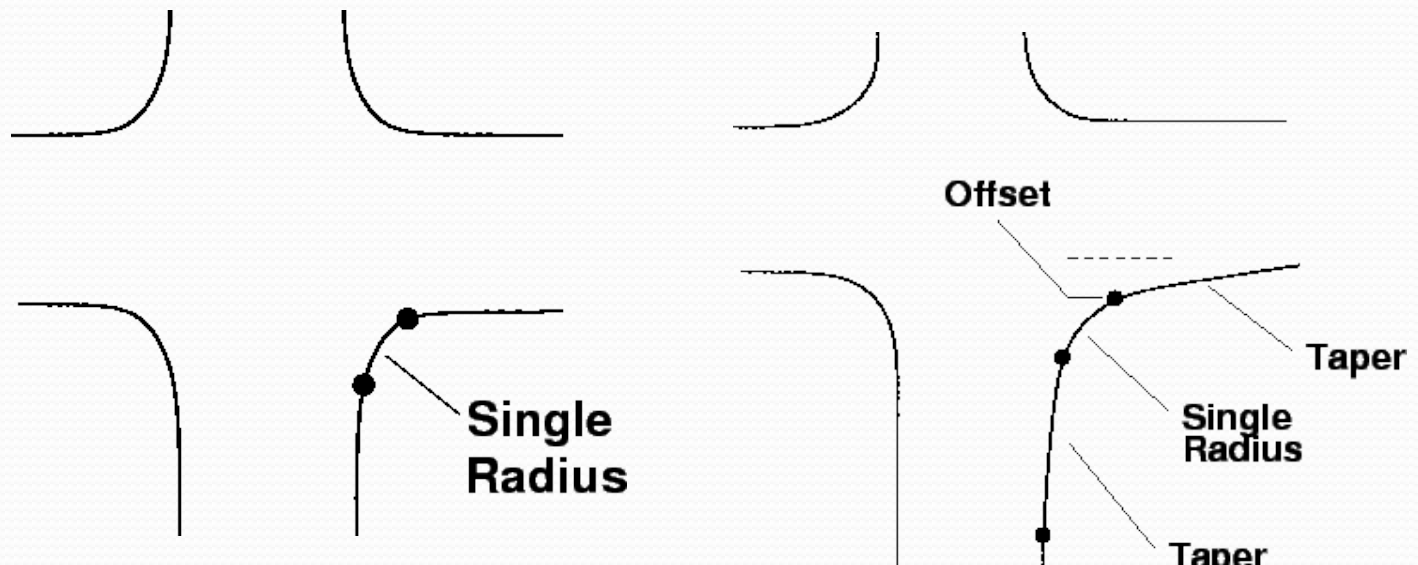
TABLE 9-1 Minimum Edge of Pavement Designs for Turns at Intersections—Simple Curves and Tapers

Angle of Turn (degrees)	نوع المركبة Design Vehicle	Simple Curve Radius (ft)	Simple Curve Radius with Taper		
			Radius (ft)	Offset (ft)	Taper
60	P	40	—	—	—
	SU	60	—	—	—
	WB-40	90	—	—	—
	WB-50	150	120	3.0	15:1
	WB-62	170	140	4.0	15:1
	WB-67	200	140	4.5	15:1
	WB-100T	150	95	2.5	15:1
	WB-109D	—	180	4.5	20:1

Passenger car

Single unit truck

Combination truck



Three centered compound curves

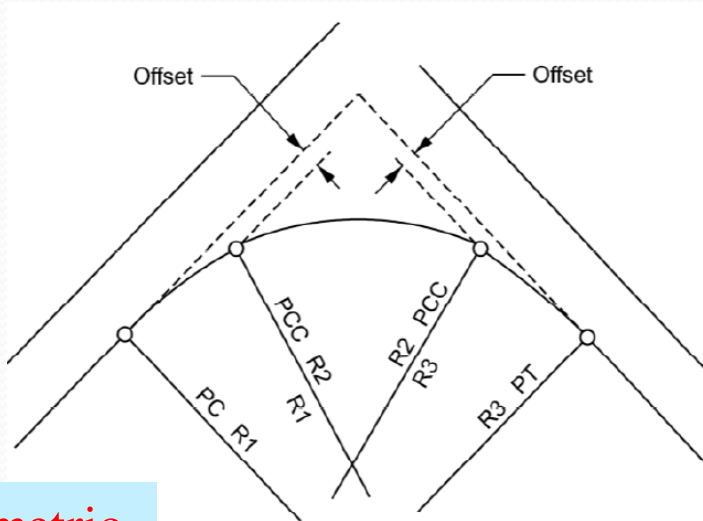
TABLE 9-2 Minimum Edge of Pavement Designs for Turns at Intersections—Three-Centered Compound Curves

Angle of Turn (degrees)	Design Vehicle	3-Centered Compound		3-Centered Compound	
		Curve Radii (ft)	Symmetric Offset (ft)	Curve Radii (ft)	Asymmetric Offset (ft)
60	P	—	—	—	—
	SU	—	—	—	—
	WB-40	—	—	—	—
	WB-50	200-75-200	5.5	200-75-275	2.0-7.0
	WB-62	400-100-400	15.0	110-100-220	10.0-12.5
	WB-67	400-100-400	8.0	250-125-600	1.0-6.0
	WB-100T	250-80-250	4.5	200-80-300	2.0-5.5
	WB-109D	650-150-650	5.5	200-140-600	1.5-8.0

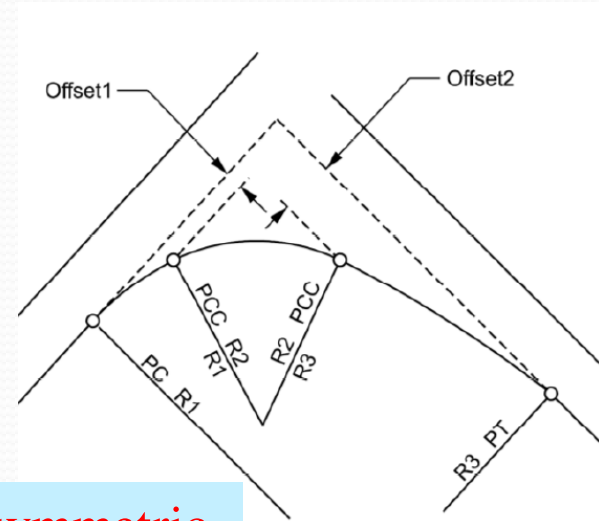
Passenger car

Single unit truck

Combination truck



Symmetric



Asymmetric

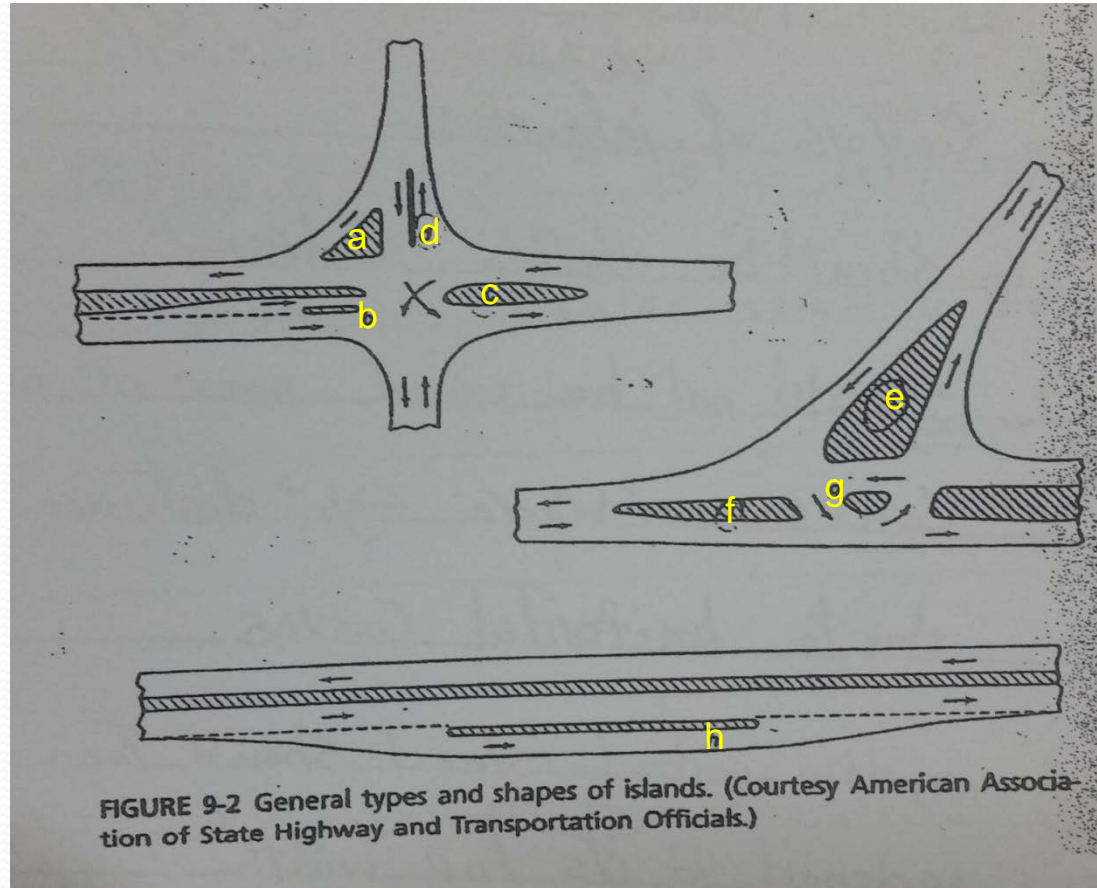
Islands

Islands at intersection purposes :

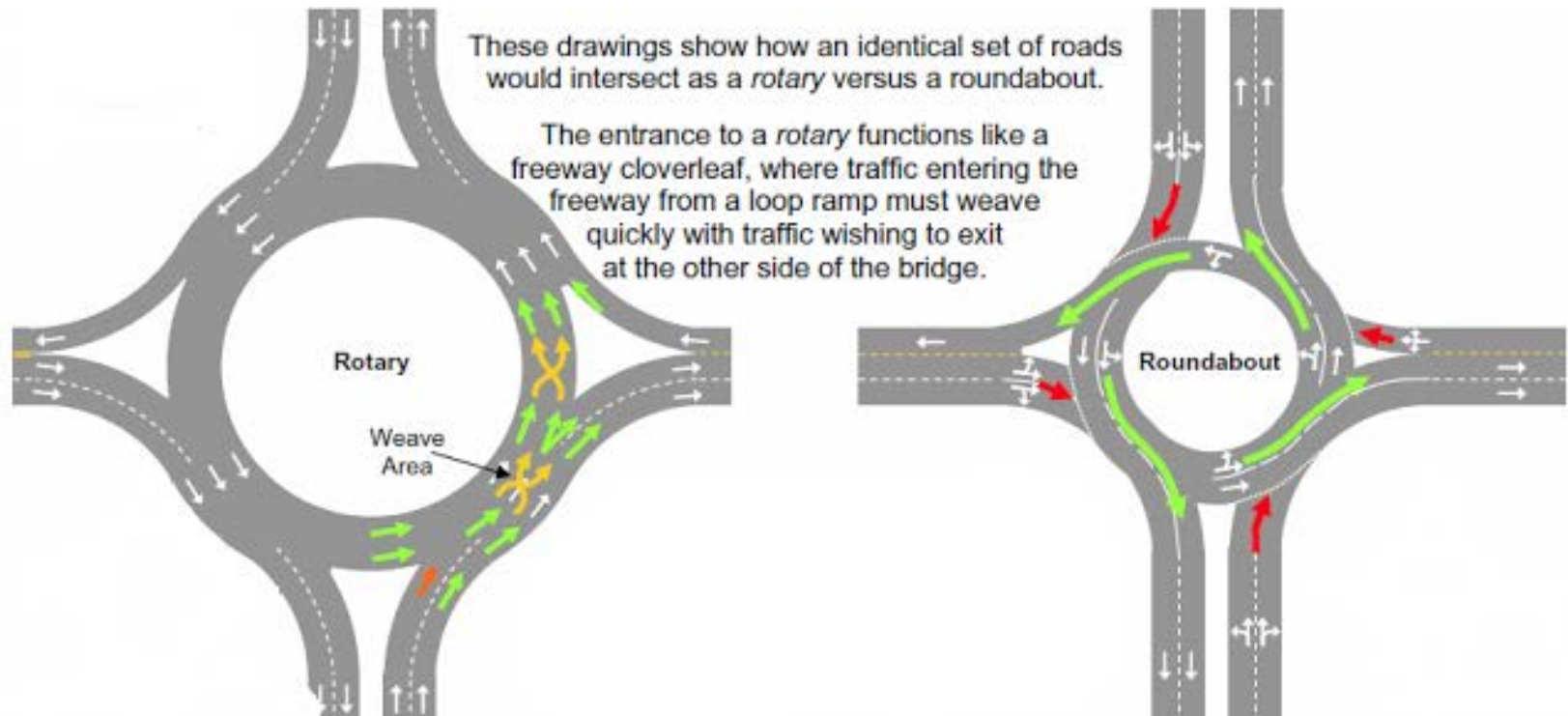
- Separation of conflicts
- Control of angle of conflict
- Reduction of pavement areas
- Arrangement of traffic flow in the intersection
- Arrangements of turning movement
- Protection of pedestrians
- Location of traffic control devices

Types of islands

- Directional (a, b, g)
- Divisional (d, c, f, e)
- Refuge (h, a)



Traffic circles versus roundabouts



Traffic circles versus roundabouts



دوار الملك عبدالعزيز بجده



دوار دائري الجامعه

Grade separations and interchange

- **Interchange**

Is a grade separation in a witch vehicles moving in one direction to other direction by using ramp



- **Grade separations**

Is a grade separation at different levels, there is no ramp to connecting roadway.



Why we do grade separations and interchange

- To carry large volumes of traffic
- To eliminate bottle necks
- To prevent crashes
- where the topography is such that other types of are not feasible
- user benefit of reducing delays an at-grade intersection

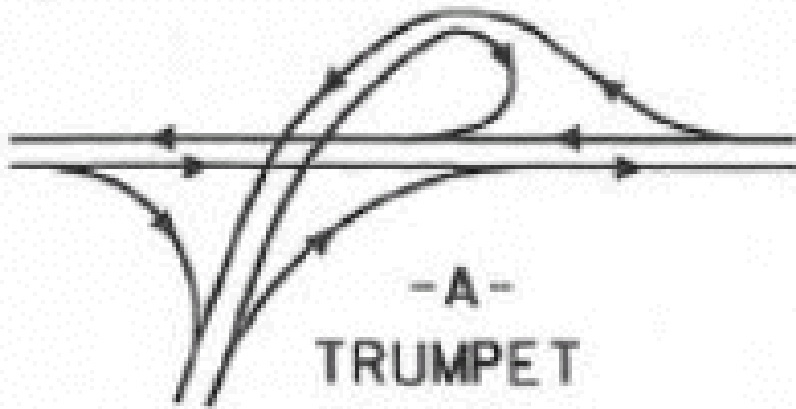


Main types of interchange

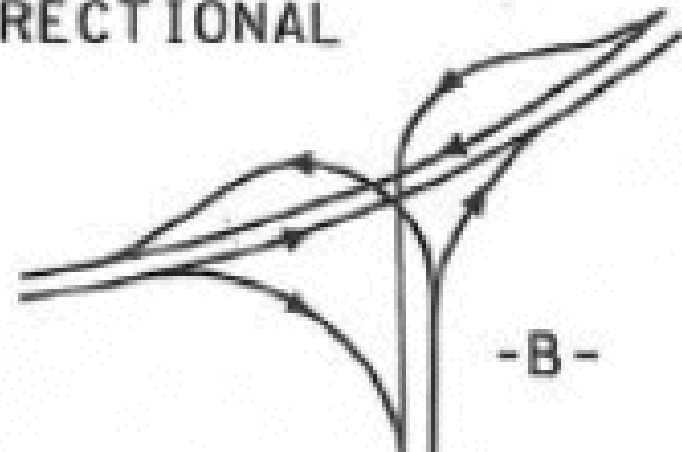
- 1. T and Y interchanges**
- 2. One quadrant interchanges**
- 3. Diamond interchanges**
- 4. Single – point urban interchanges**
- 5. Partial and full cloverleafs**
- 6. Directional interchanges**

Main types of interchange

1. T and Y interchanges



THREE LEG
DIRECTIONAL



Main types of interchange



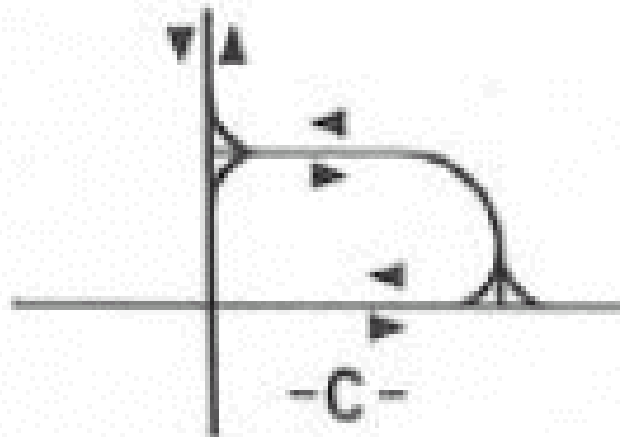
Trumpet



Three leg directional

Main types of interchange

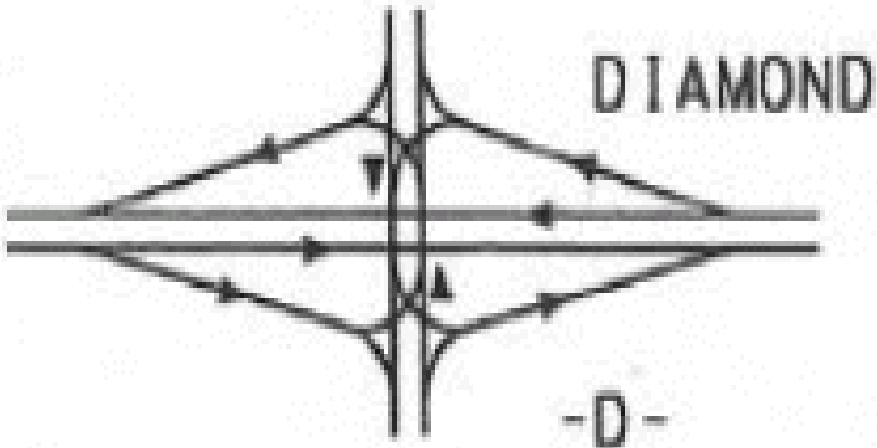
2. One quadrant interchanges



ONE QUADRANT

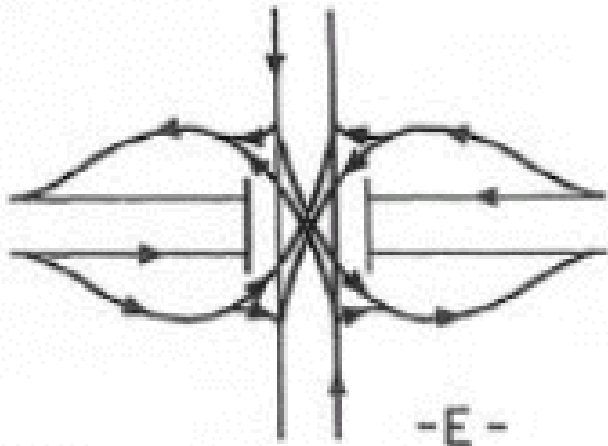
Main types of interchange

3. Diamond interchanges



Main types of interchange

4. Single – point urban interchanges

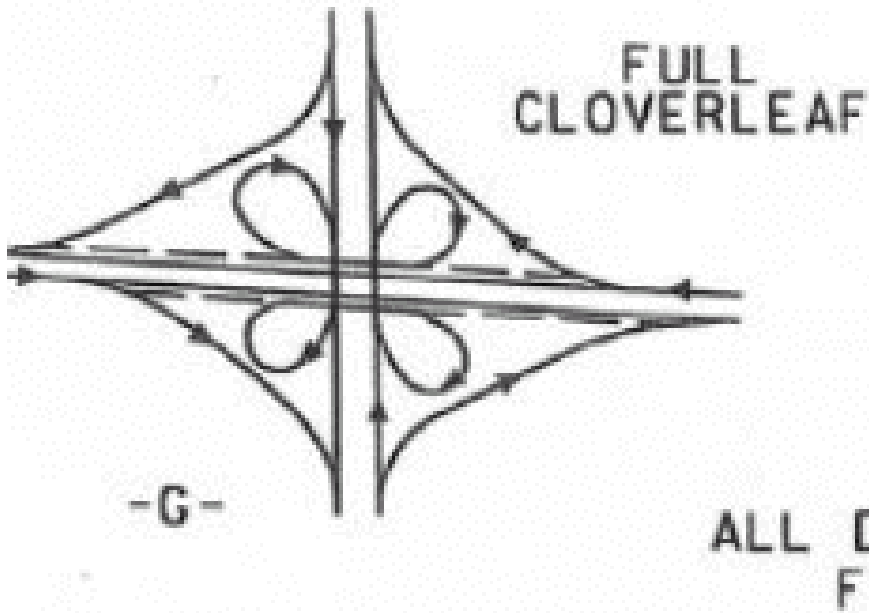


SINGLE-POINT
URBAN INTERCHANGE



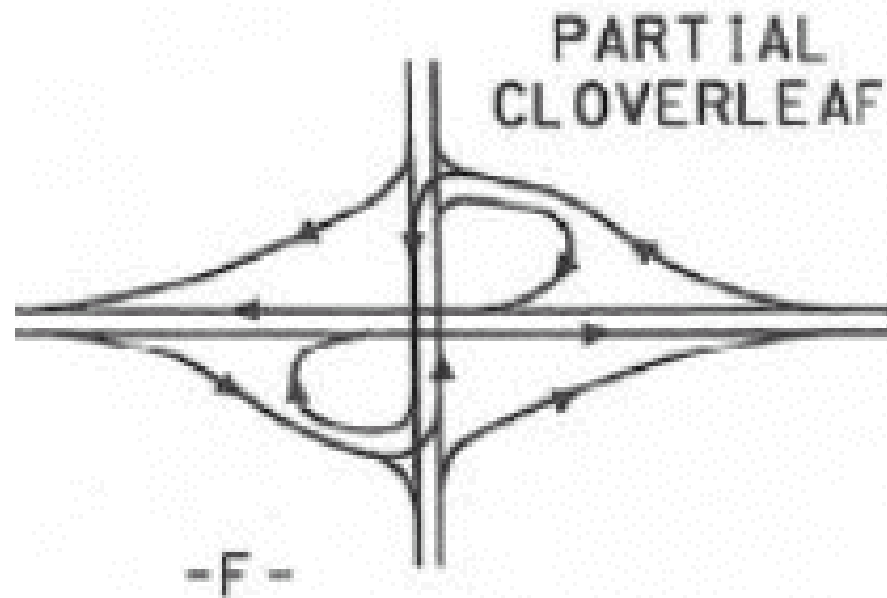
Main types of interchange

5. Partial and full cloverleaf



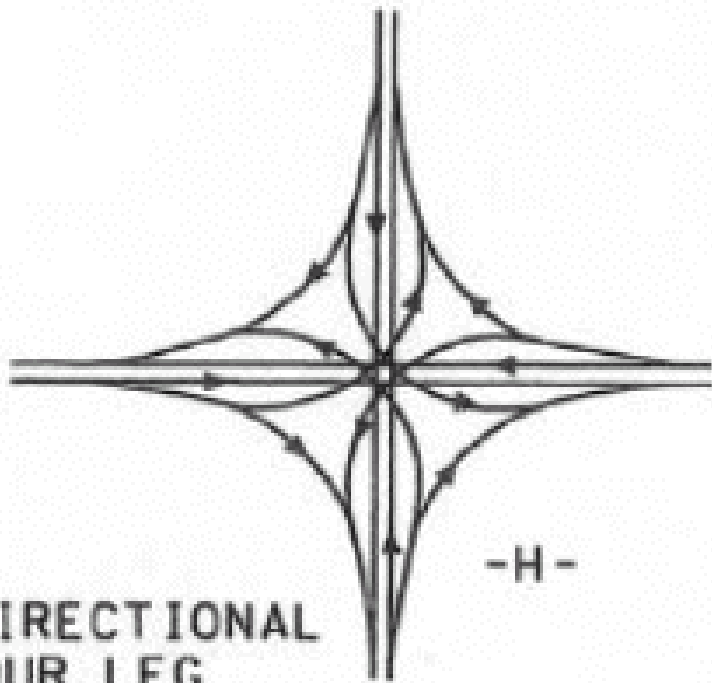
Main types of interchange

5. Partial and full cloverleaf



Main types of interchange

6. Directional interchanges





Thank you