

University of Al-Maarif

College of Engineering

Department of Civil Engineering



TRAFFIC ENGINEERING

EIGHTH LECTURE

Lecturer:

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INTERCHANGE

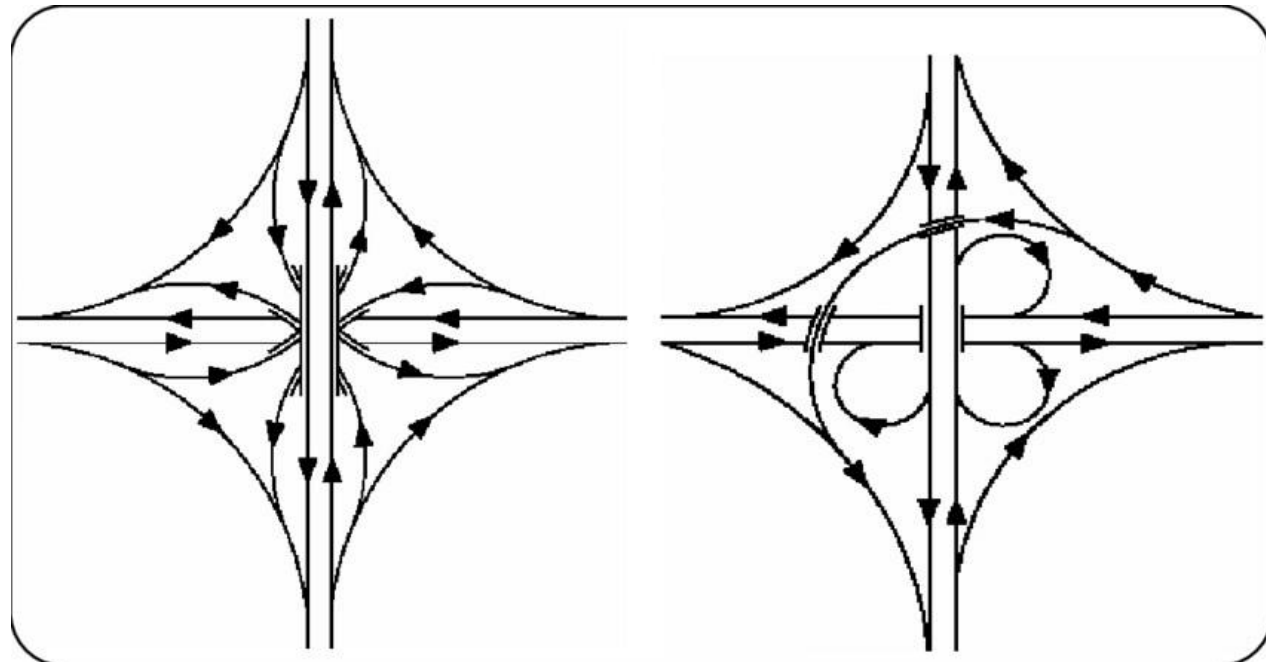
grade-separated intersections are provided to separate the traffic in the vertical grade. When a railway line crosses a road, then grade separators are used. Different types of grade-separators are flyovers and interchange. Flyovers itself are subdivided into overpass and underpass. When two roads cross at a point, if the road having major traffic is elevated to a higher grade for further movement of traffic, then such structures are called overpass. Otherwise, if the major road is depressed to a lower level to cross another by means of an under bridge or tunnel, it is called under-pass.

Interchange is a system where traffic between two or more roadways flows at different levels in the grade separated junctions. Common types of interchange are:

- **Directional interchange;**
- **Trumpet interchange;**
- **Diamond interchange; and**
- **Cloverleaf interchange**

INTERCHANGE TYPES

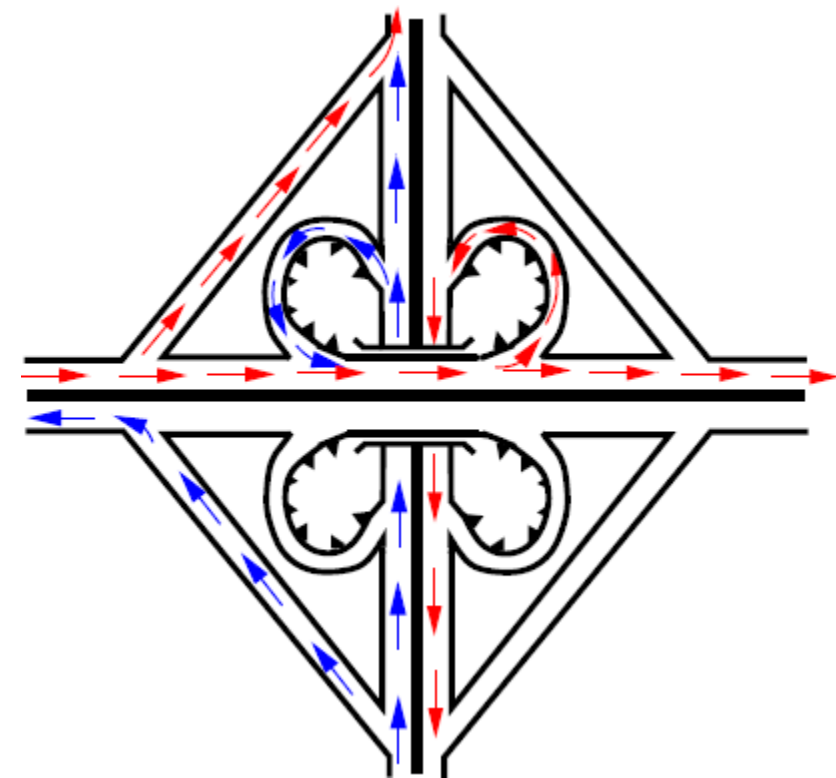
- **Directional interchange** is placed at an intersection of two highways where a high volume of traffic desires to transfer between only two legs of the interchange. Directional interchanges have increased ramp speed and capacity and require less space, when compared to a conventional cloverleaf interchange, but they are more costly to construct due to an increased number of ramps.



INTERCHANGE TYPES

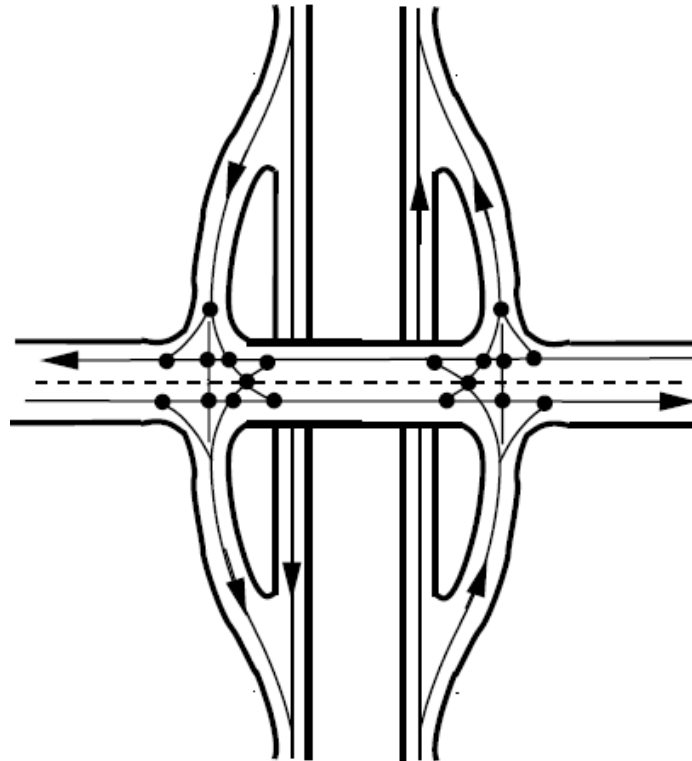
- **Cloverleaf Interchange:** Probably the most common highway interchange out there. The cloverleaf interchange is designed to allow drivers to make turns off and onto the highway from four directions using loop ramps. Loop ramps safely accommodate left turns and eliminate all cross traffic conflicts.

Two main disadvantages of the cloverleaf interchange design are the **need for more space and longer travel distance for the left-turning traffic**. However, cloverleaf interchanges are significantly cheaper than directional interchanges and are ideal for rural areas.



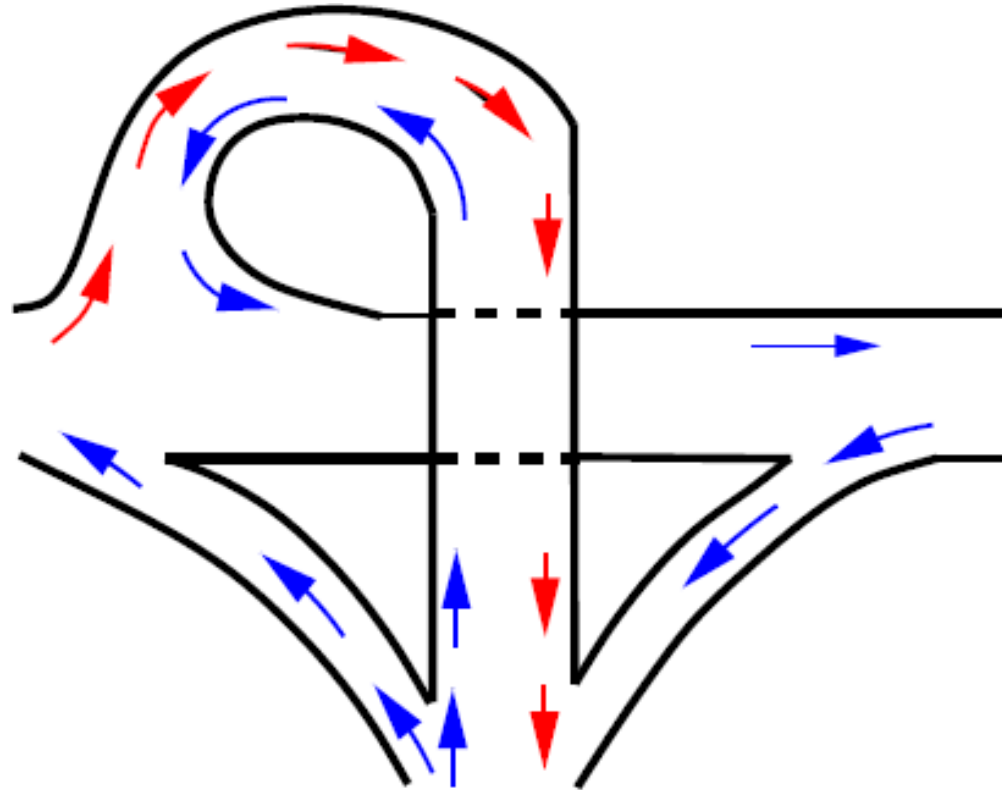
INTERCHANGE TYPES

- **Diamond interchange** design is utilized when a busy freeway intersects with a lesser road. Traffic leaves and enters the highway through four ramps. Left turns are made after leaving the highway. Due to the limitations in design, an increase in the volume of traffic on the crossroad leads to congestion and increased waiting time for traffic leaving the highway.



INTERCHANGE TYPES

- A **trumpet interchange** may be used instead of a T-intersection when one highway terminates into another highway. A trumpet interchange may be seen as a combination of a directional and a diamond-shaped interchange.



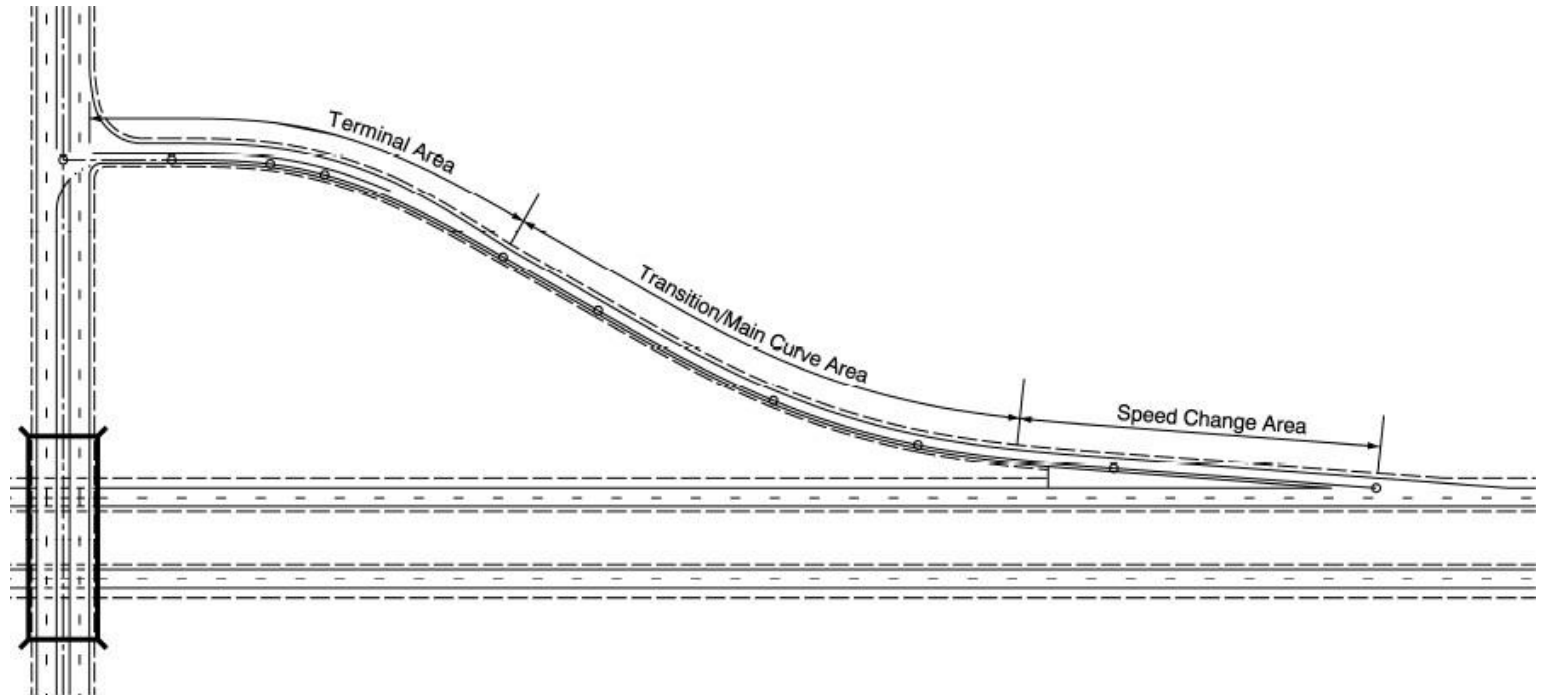
RAMPS

Ramps are usually part of grade-separated intersections where they serve as interconnecting roadways for traffic streams at different levels. They are also sometimes constructed between two parallel highways to allow vehicles to change from one highway to the other. Freeway ramps can be divided into two groups: (1) entrance ramps allow the vehicles to **merge** into the freeway stream and (2) exit ramps allow vehicles to **diverge** the freeway stream. When it becomes necessary to control the number of vehicles entering or leaving a freeway at a particular location, access to the entrance or exit ramp is controlled in one of several ways.

RAMPS

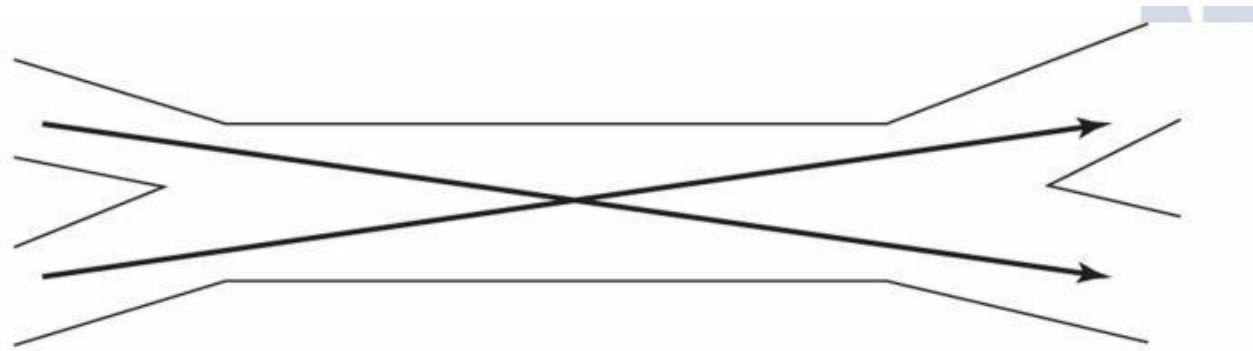
Ramps consist of three discrete elements:

1. The Speed Change Area (including the gores).
2. The Main Transition Area (sometimes called the “Main Curve”, although it may be on tangent alignment).
3. The Terminal Area – which is in some ways an extension of the intersection with the crossroad.

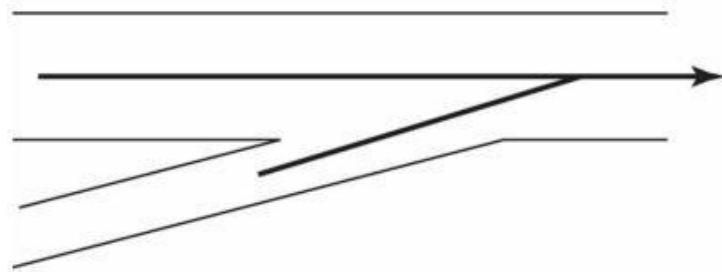


WEAVING SECTIONS

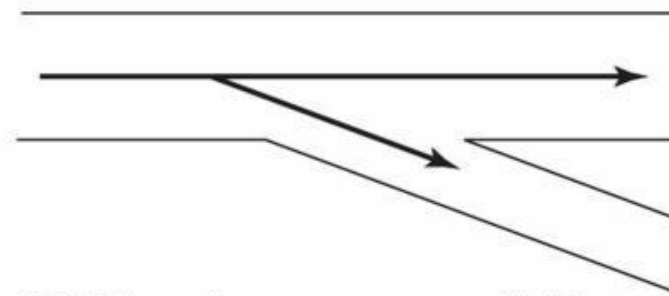
Weaving sections occur when entrance ramps are closely followed by exit ramps, and/or an auxiliary lane is utilized. Such areas present special design problems due to the concentrated lane changing maneuvers of merging and diverging traffic.



(a) Weaving movements cross each others path.



(b) Merging movements join to form a single traffic stream.



(c) Diverging movements divide to form separate traffic streams.

THANK YOU FOR
LISTENING