

Fundamentals of Road Construction

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Lecture 6

The subject of the lecture:

Others road elements

Interchange

Interchange this is a road junction that uses grade separation, and typically one or more ramps, to permit traffic on at least one highway to pass through the junction without interruption from other crossing traffic streams.

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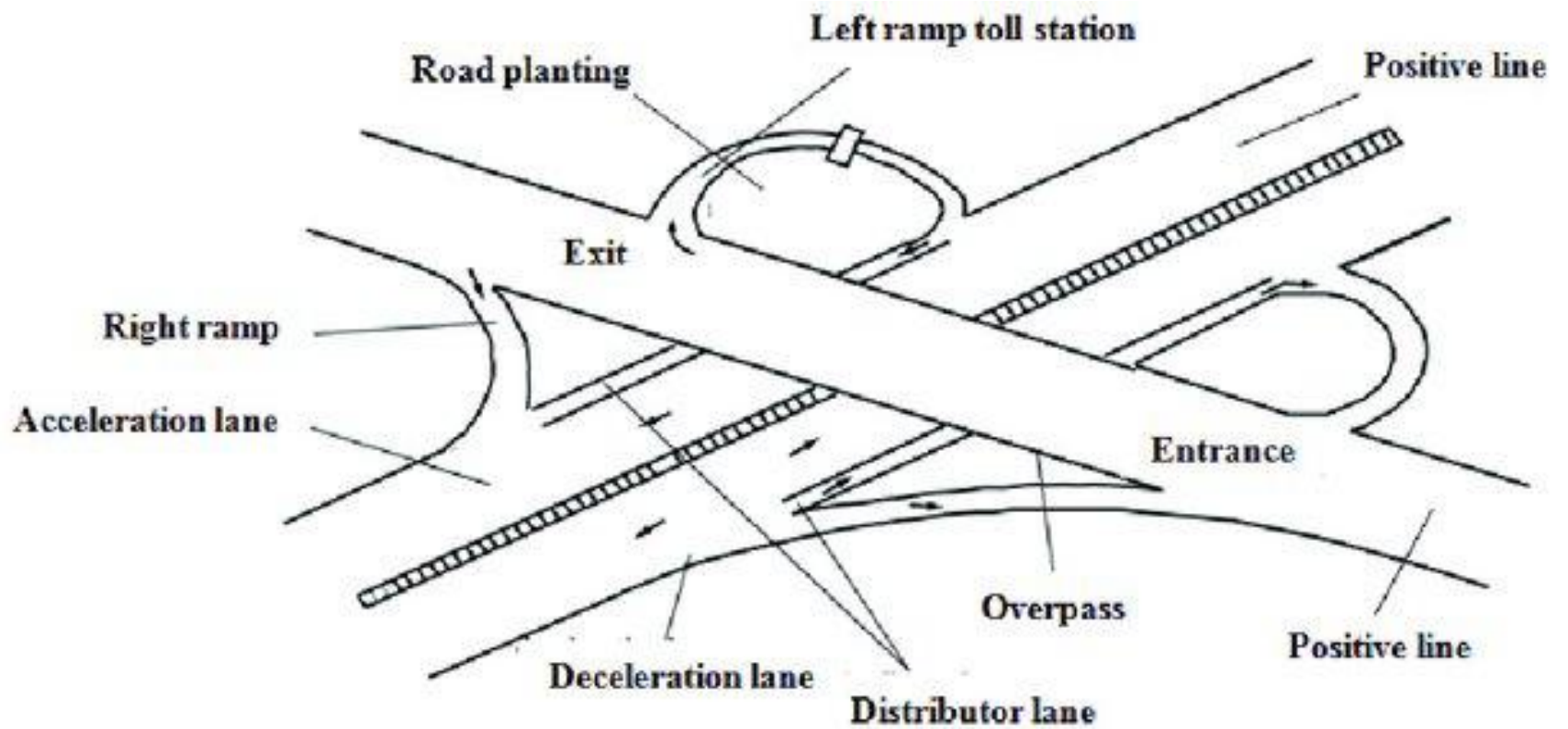
Source: <https://www.wnp.pl/budownictwo/nowy-wezel-drogowy-powstanie-na-zakopiance,448772.html>

Type of interchange

Interchange WA type - collision-free - there is no intersection of the driving roads, and torsional relations are implemented only as switching off, switching on and interlacing maneuvers of traffic flows

Interchange WB type - partially collision - there is an intersection of driving road on lower class road, but the relations of dominant intensity are conducted without collisions

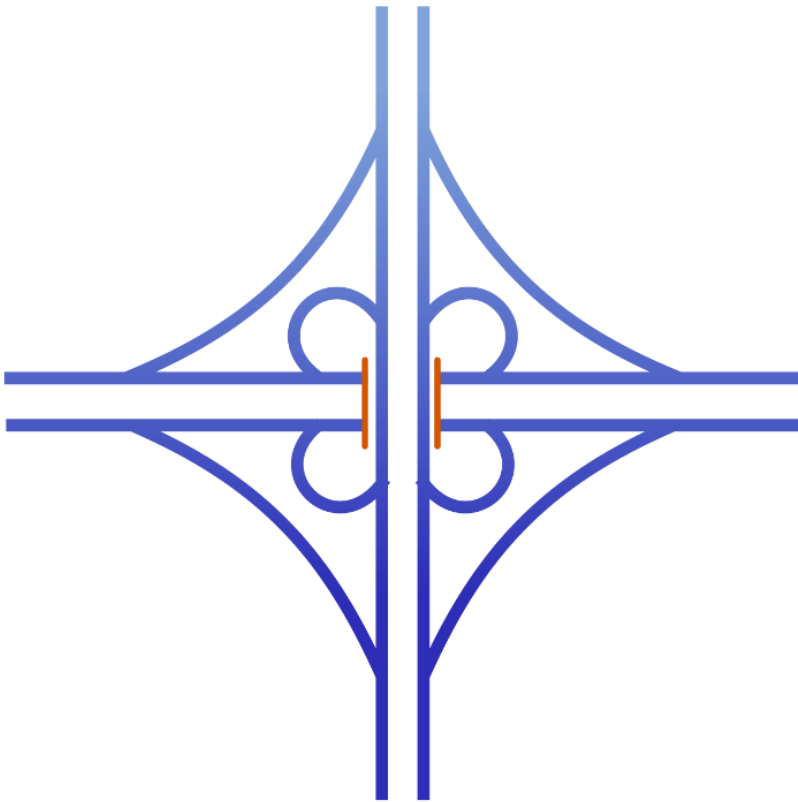
Interchange WC type - collision node - only straight traffic relations intersect at different levels, torsional relations on both roads take place at intersections



Source: https://www.researchgate.net/publication/264983141_Research_on_the_Running_Speed_Prediction_Model_of_Interchange_Ramp/figures?lo=1

System four-way interchanges (WA type)

Cloverleaf interchange



Advantage:

- 1 overpass
- little space
- collision-free turning back

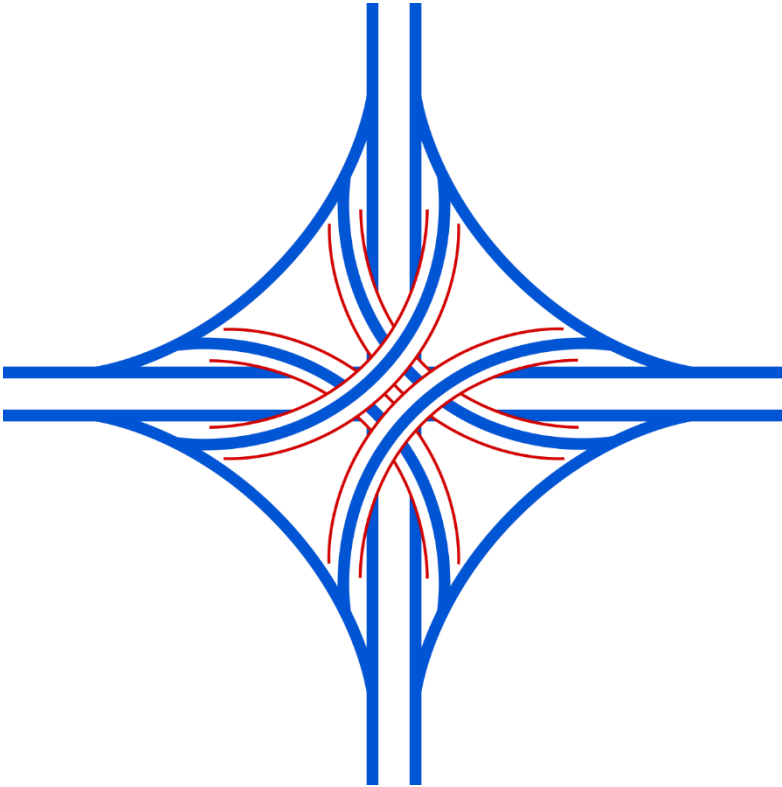
Disadvantage:

- intersect of two traffic flow of vehicles



Typical cloverleaf interchange; shown is the former configuration of Interstate 270 and State Route 161 at the border of Columbus and Blendon Township, Ohio, United States. This interchange was modified to a cloverstack in the early 2000s. 40.0822647°N 82.9071779°W

Stack interchange



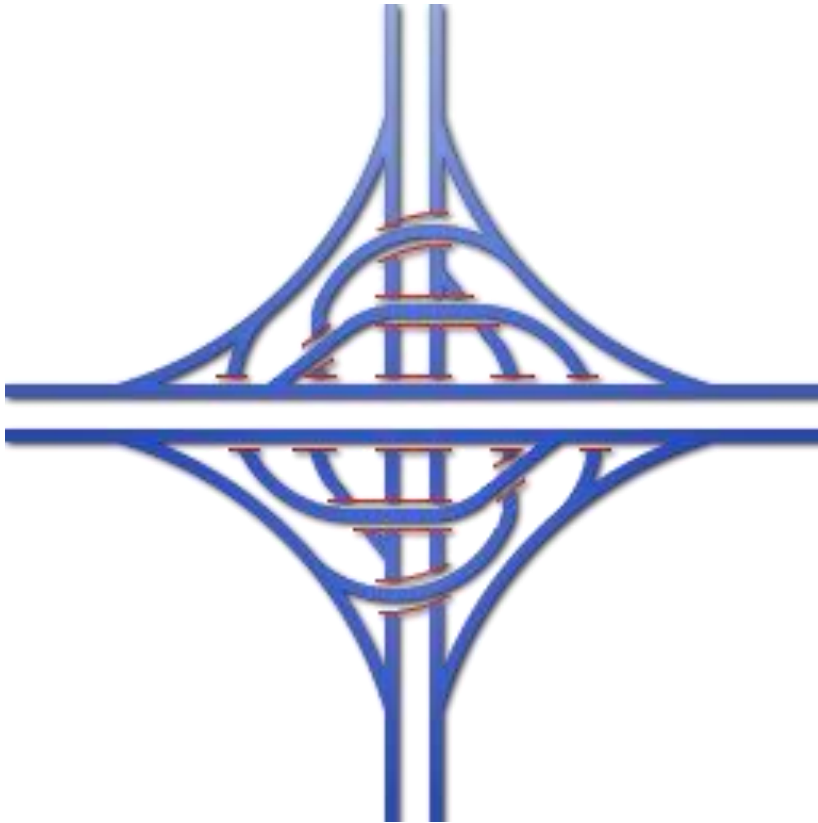
Advantage:
very little space
high speed ramps

Disadvantage:
multi-level overpass



A multi-level stack interchange in Jing'an,
Shanghai, China. $31.226335^{\circ}\text{N}$ $121.464606^{\circ}\text{E}$

Turbine interchange



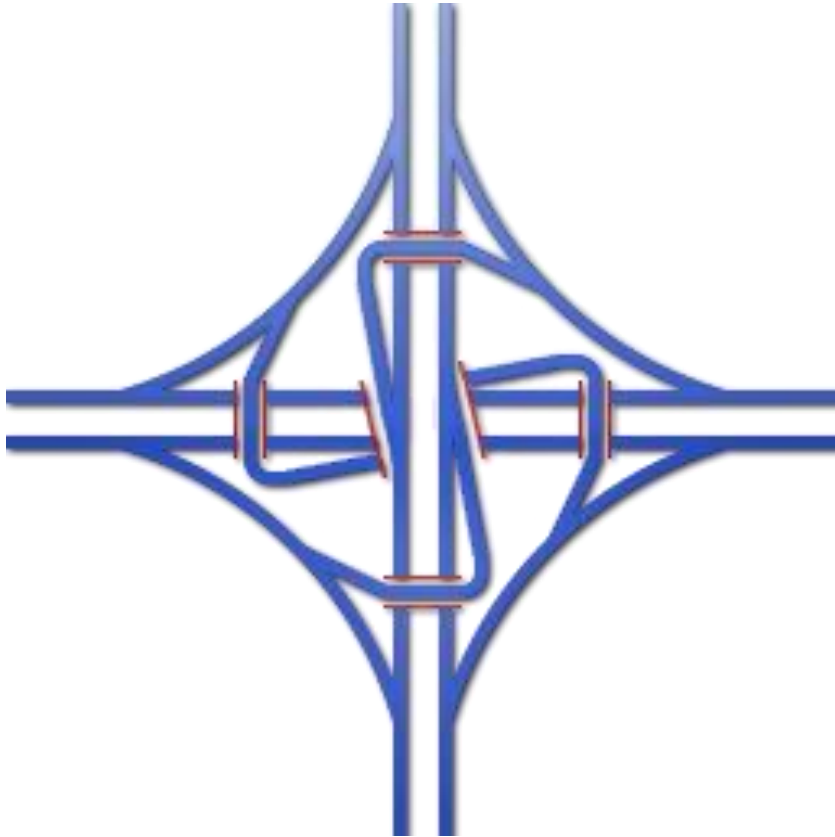
Advantage:
high speed ramps

Disadvantage:
many overpass



The Jane Byrne Interchange in Chicago, Illinois, a notable turbine interchange. $41.875577^{\circ}\text{N}$ $87.645042^{\circ}\text{W}$

Windmill interchange



Disadvantage:
low speed ramps



The Vaanplein junction in Barendrecht, Netherlands from 1977 was a windmill before it was renovated.

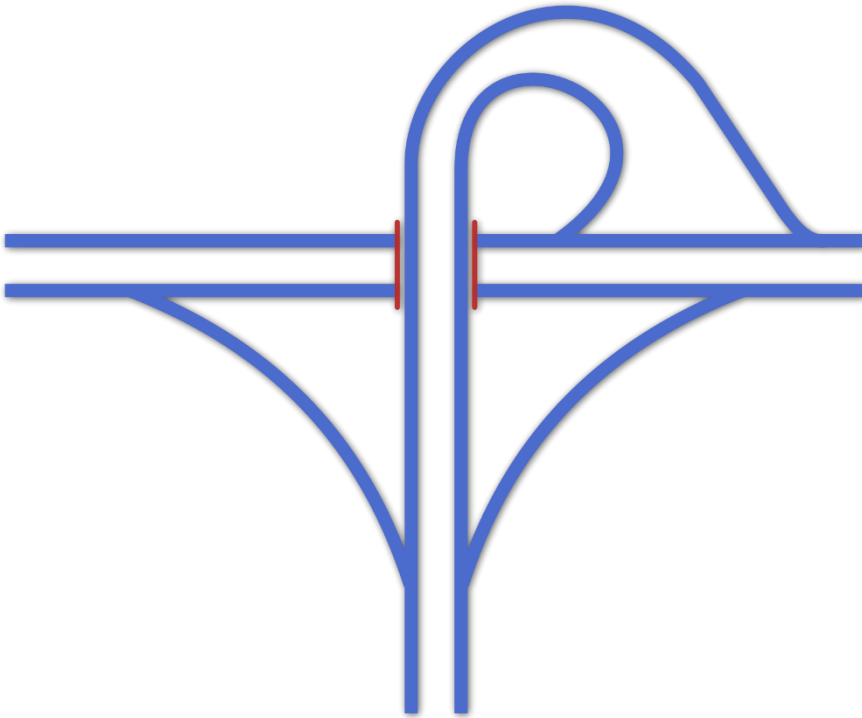
51.8654048°N 4.5154236°E

Hybrid interchanges



System three-way interchanges (WA type)

Trumpet interchange

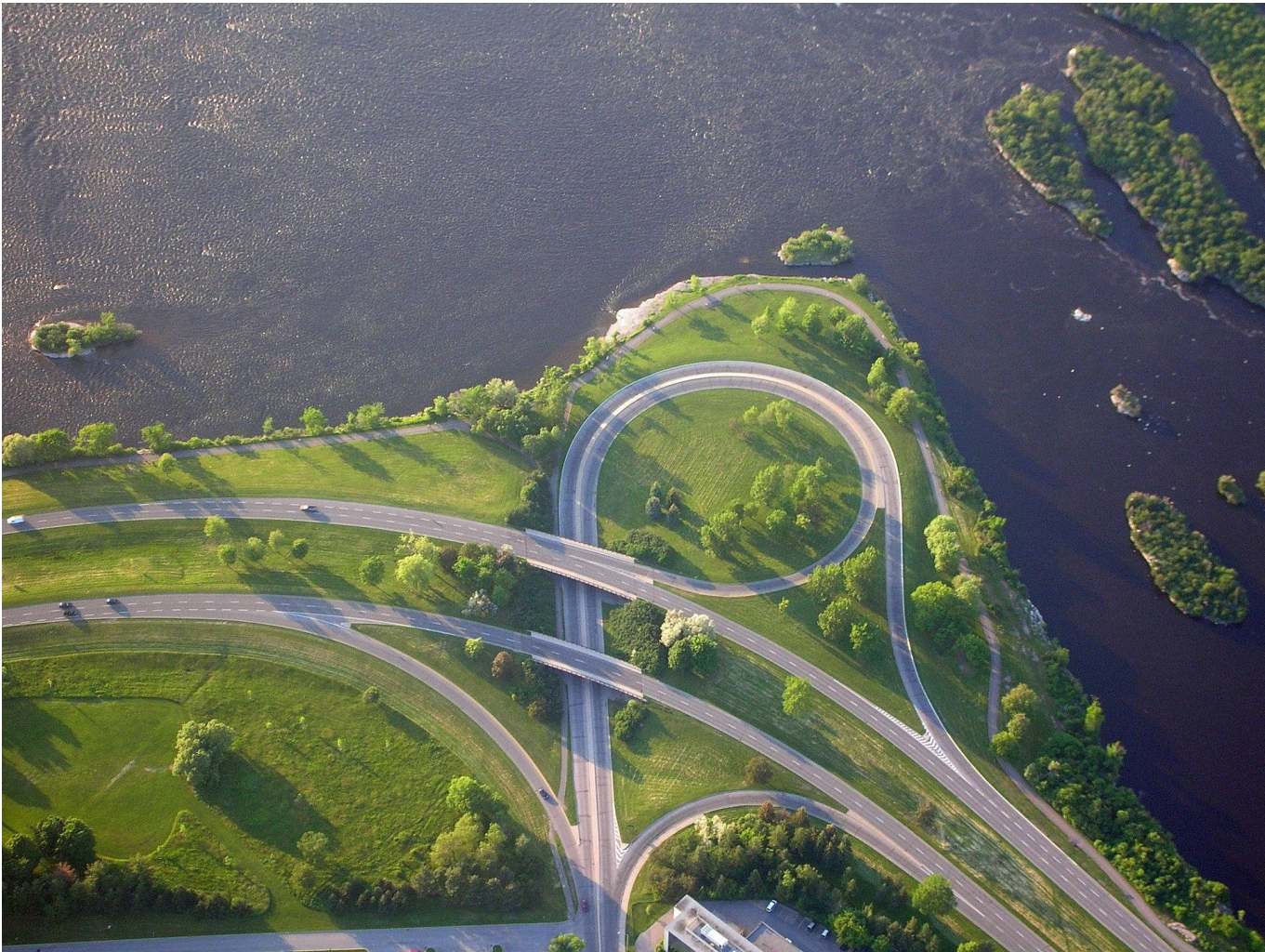


Advantage:

1 overpass

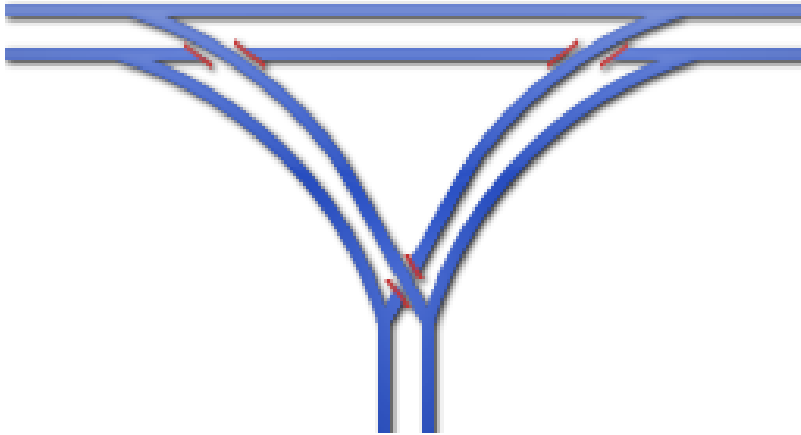
Disadvantage:

low speed ramp (only for one road)



A trumpet interchange on the Sir John A.
Macdonald Parkway in Ottawa, Ontario.
45.411389°N 75.735278°W

Directional T interchange (Y-interchange)



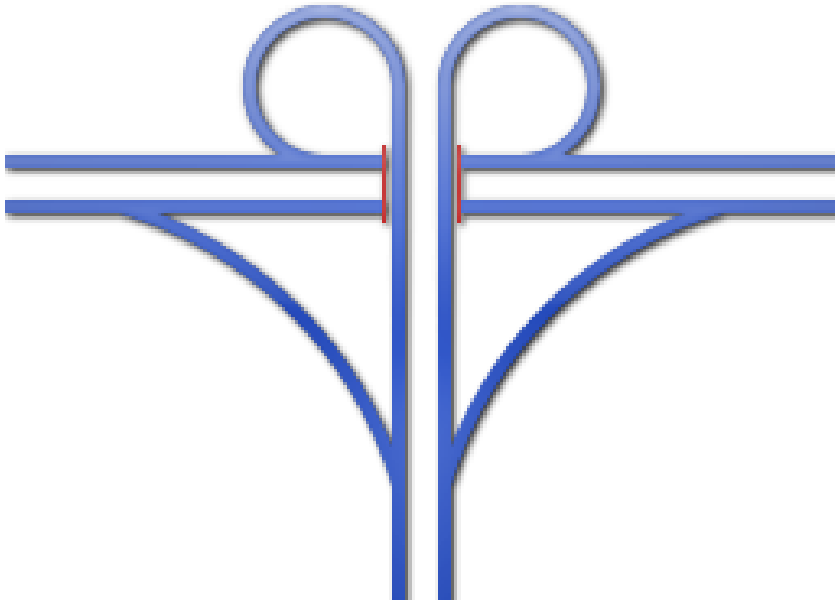
Advantage:
high speed ramps

Disadvantage:
3 overpass
many space



Complex T interchange of SR 85 and SR 87 in
San Jose, California. 37.255721°N
121.858878°W

Half-clover interchange



Advantage:

1 overpass

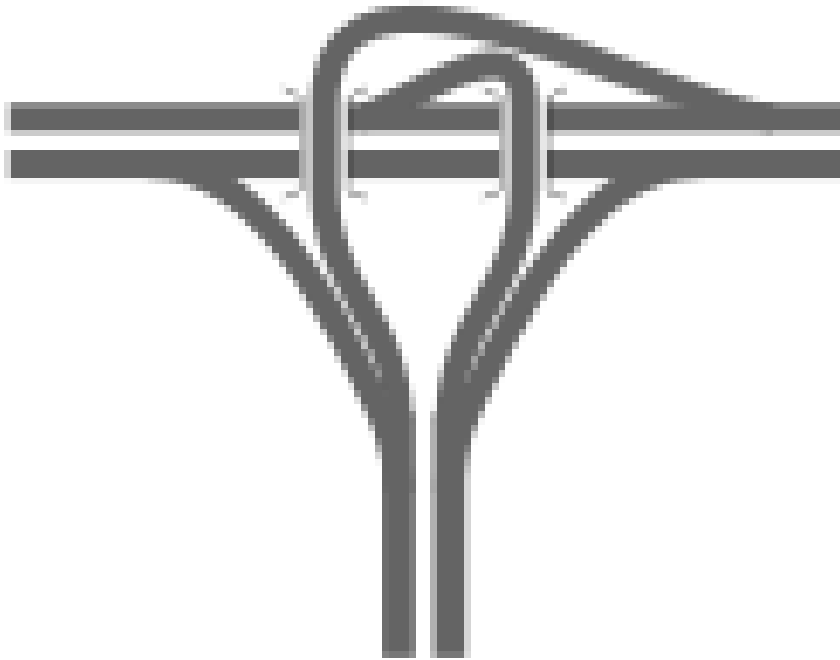
Disadvantage:

low speed ramp



Source: https://kongresdrogowy.pl/files/upload/20102020_MBudzynski.pdf

T-bone interchange



Advantage:

short low speed ramp

Disadvantage:

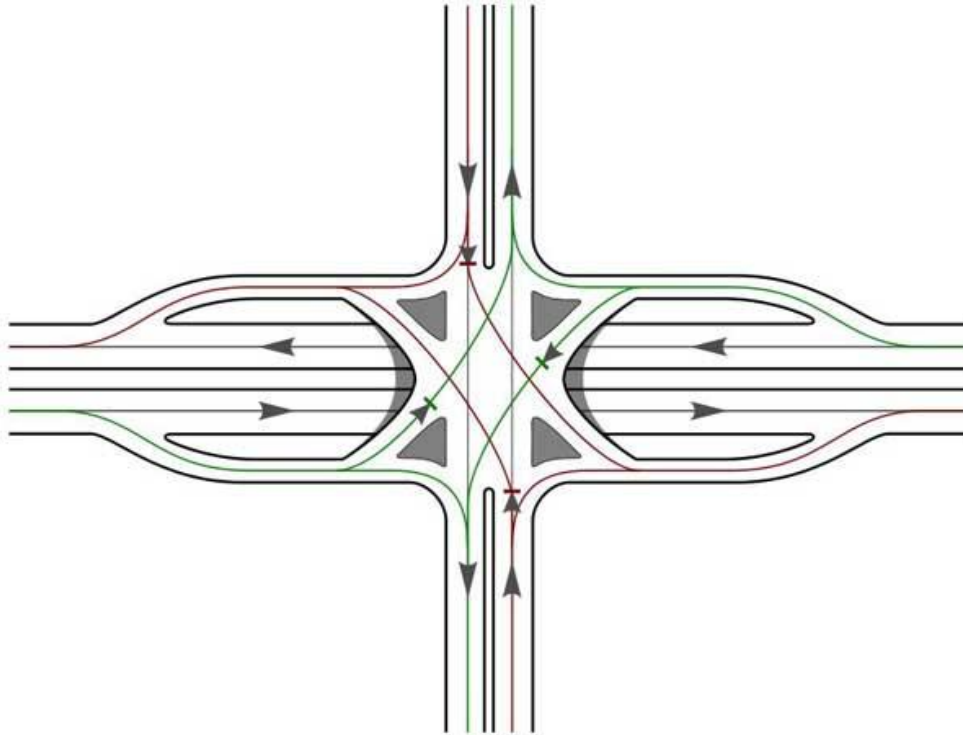
many space

2 overpass



Source: <https://steamcommunity.com/sharedfiles/filedetails/?id=1335020351>

Interchanges - WB type



Advantage:
low space

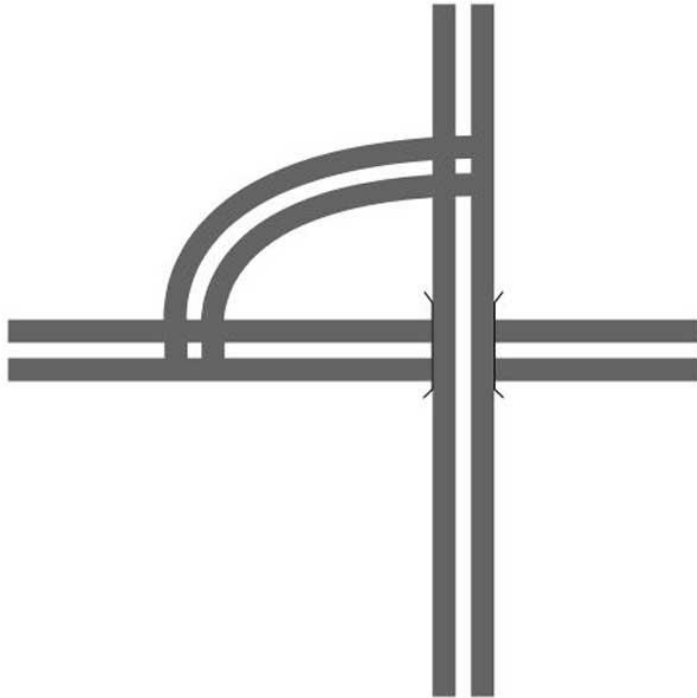
Disadvantage:
collision points



Source: <https://www.gddkia.gov.pl/pl/a/5913/Budowa-Autostrady-A-4-Tarnow-Rzeszow-w-Rzeszow-Polnoc-w-Rzeszow-Wschod>



Interchanges - WC type



Advantage:
low space

Disadvantage:
many collision points

Highway rest stop

Rest stop have parking areas allocated for cars, trucks, toilets for road users, some of them have gas station, restaurants, service and accommodation.



Source: <https://www.auto-swiat.pl/wiadomosci/aktualnosci/mop-co-to-jest-i-ile-ich-mamy-w-polsce/6ltj5m6#slajd-2>

Rest stop type 1



Source: <https://www.auto-swiat.pl/wiadomosci/aktualnosci/mop-co-to-jest-i-ile-ich-mamy-w-polsce/6ltj5m6#slajd-2>

Rest stop type 2



Source: <https://www.auto-swiat.pl/wiadomosci/aktualnosci/mop-co-to-jest-i-ile-ich-mamy-w-polsce/6ltj5m6#slajd-2>

Rest stop type 3



Source: <http://www.seon.co.kr/eng/project/projectView.php?no=650&division=>

Other options



Source: https://www.wikiwand.com/en/Bridge_restaurant

Other options



Source: <https://www.fluencecorp.com/case/apiral-wastewater-treatment-for-highway-service-area/>

Bike path

A bike path is a bikeway separated from motorized traffic and dedicated to cycling or shared with pedestrians or other non-motorized users.



Source: <https://bialystok.wyborcza.pl/bialystok/7,35241,24019865,nowe-sciezki-rowerowe-w-sumie-bialystok-ma-prawie-125-kilometrow.html>

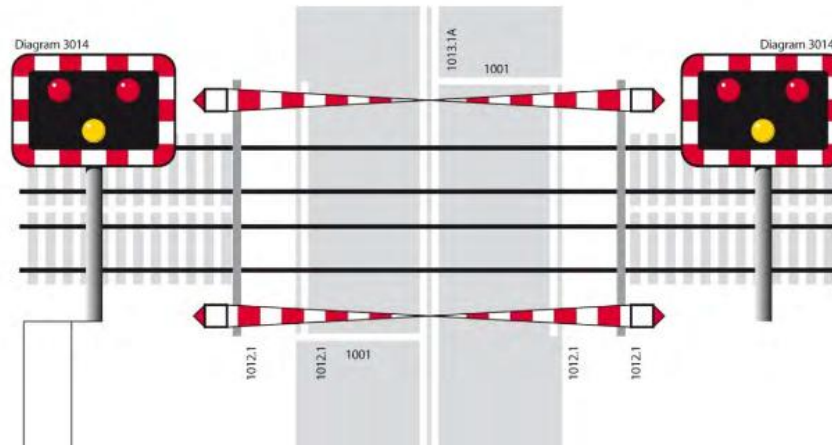
Level crossing

A level crossing is an intersection where a railway line crosses a road or path.

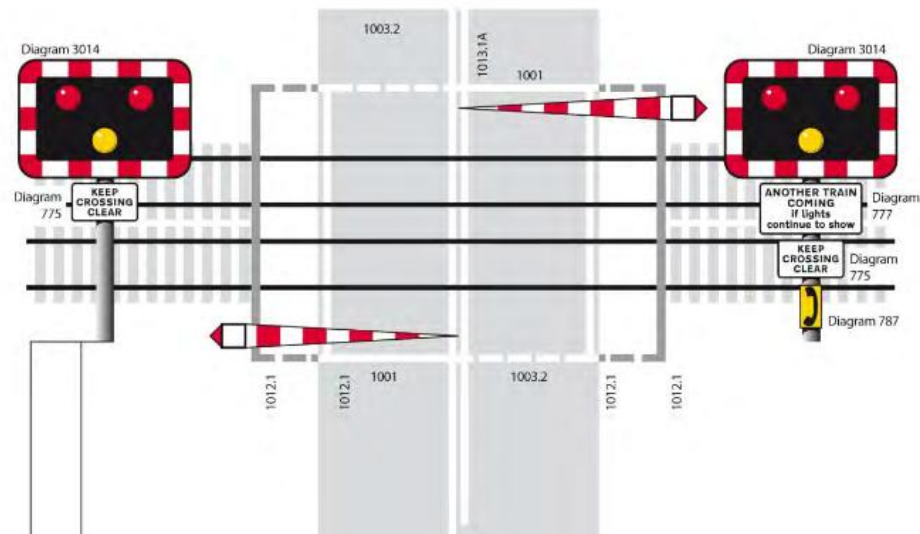


Source: https://pl.wikipedia.org/wiki/Przejazd_kolejowo-drogowy#/media/Plik:Kategoria_B.jpg

Typical layout of barrier crossing (with additional risks)

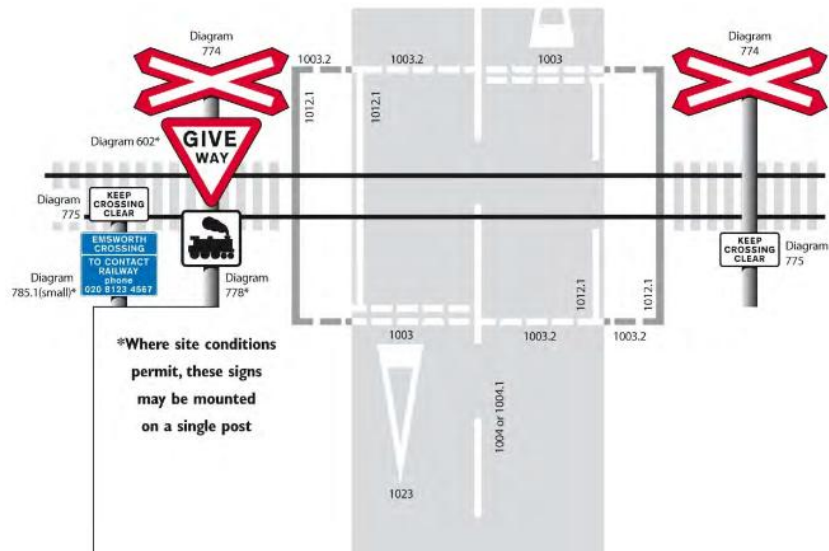


Typical layout of automatic half barrier crossing or automatic barrier crossing (locally monitored)



Source: https://www.orr.gov.uk/sites/default/files/om/level_crossings_guidance.pdf

Typical layout of an open crossing



Source: https://www.orr.gov.uk/sites/default/files/om/level_crossings_guidance.pdf

Traffic light

A traffic light - devices positioned at road intersections, pedestrian crossings, and other locations to control flows of traffic.



Source: <https://gazetawroclawska.pl/tutaj-w-czwartek-nie-bedzie-dzialac-sygnalizacja-swietlna/ar/c1-14021281>

Road sign

The road signs in Poland follow the Vienna Convention on Road Signs and Signals and, therefore, are more or less identical to those in other European countries. Warning signs have yellow background rather than the more common black-on-white design, and therefore similar to the road signs in Greece.



Source: <https://wyborcza.pl/7,155287,26314852,rzad-dolozy-znakow-drogowych.html>

Literature:

[**https://en.wikipedia.org/wiki/Interchange_\(road\)**](https://en.wikipedia.org/wiki/Interchange_(road))

[**https://oskduet.pl/a/wezly-drogowe**](https://oskduet.pl/a/wezly-drogowe)

THANK YOU FOR YOUR ATTENTION