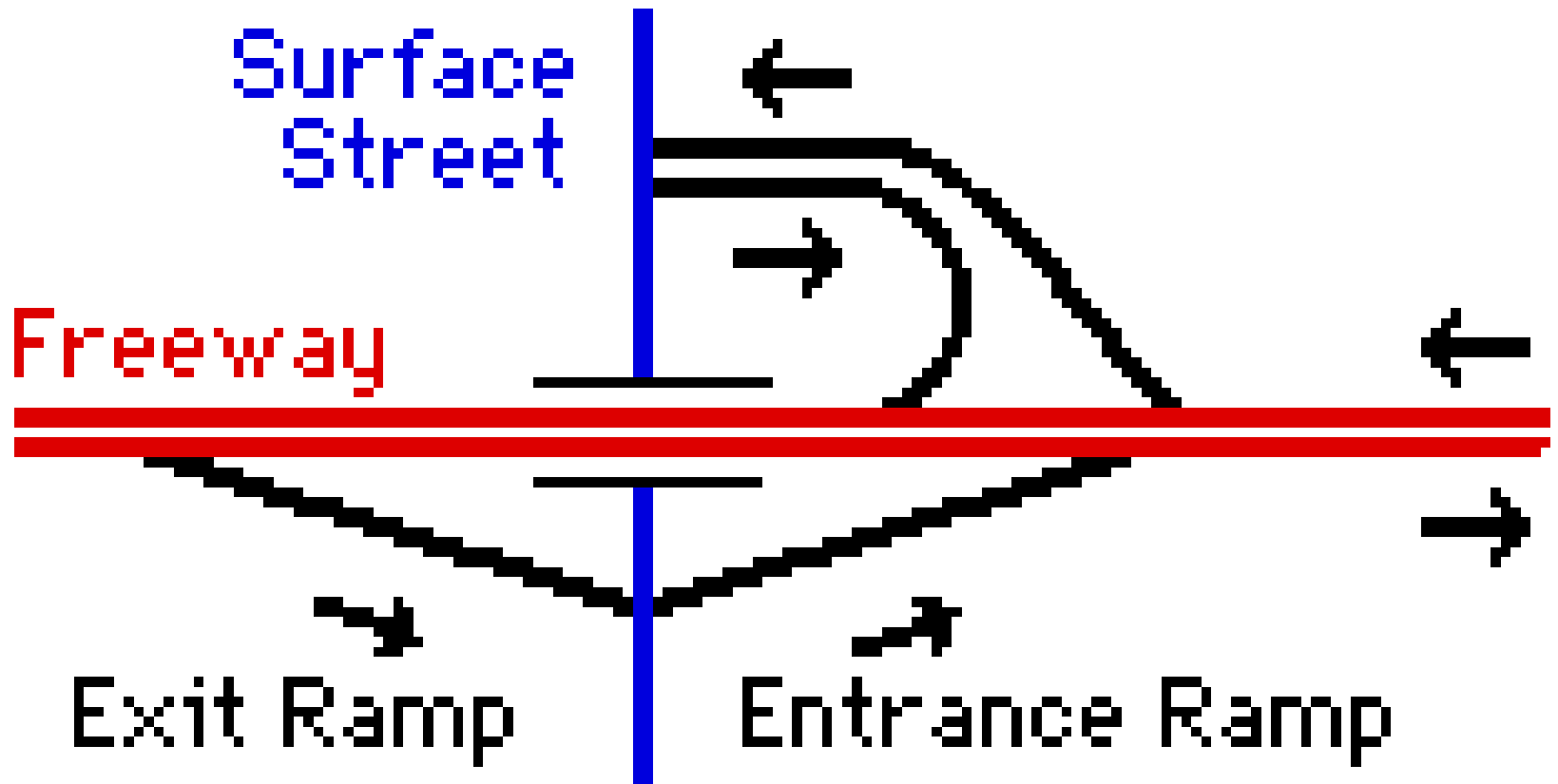
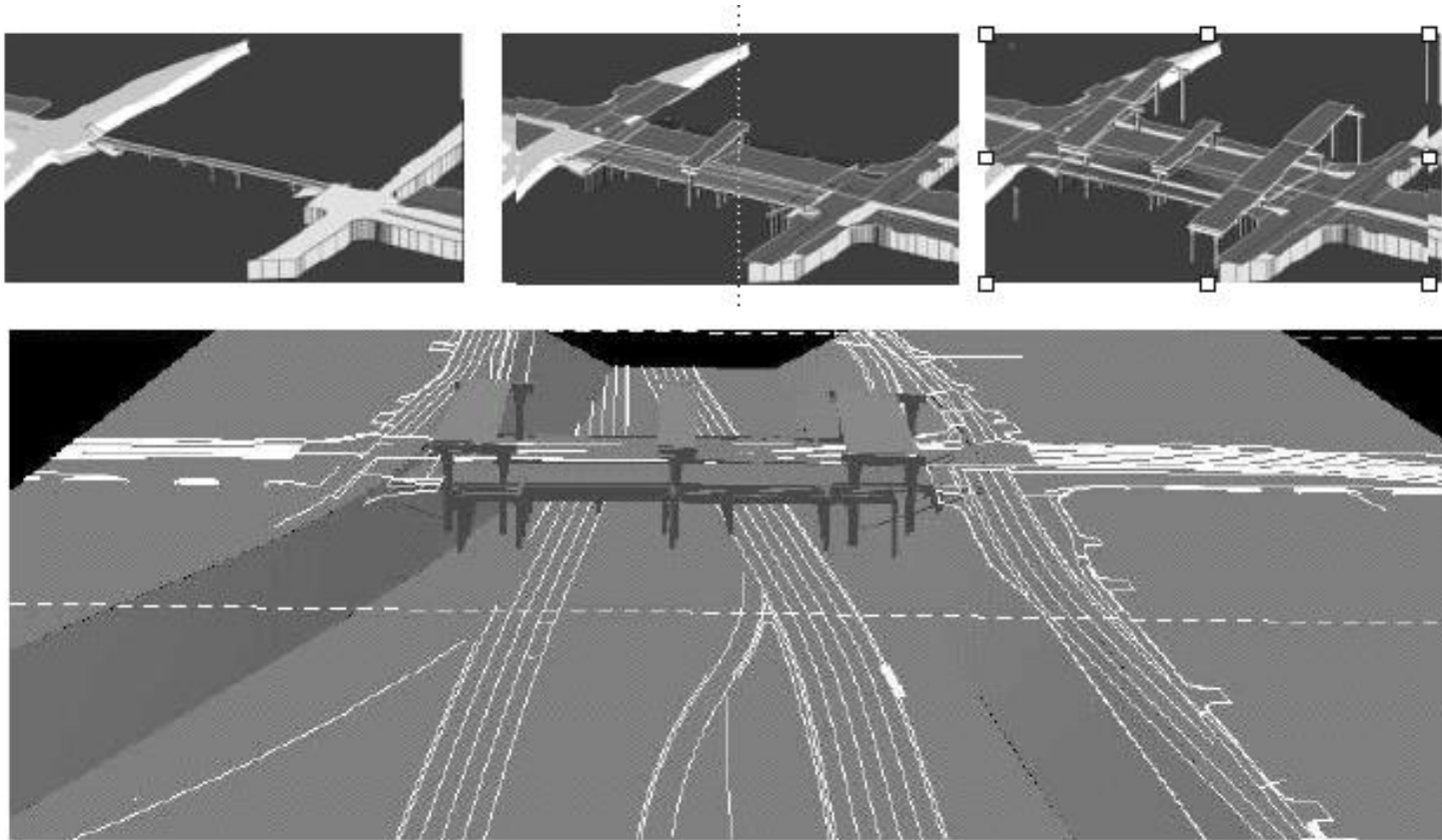


HW Interchanges



Interchanges Visualization



Interchanges Visualization

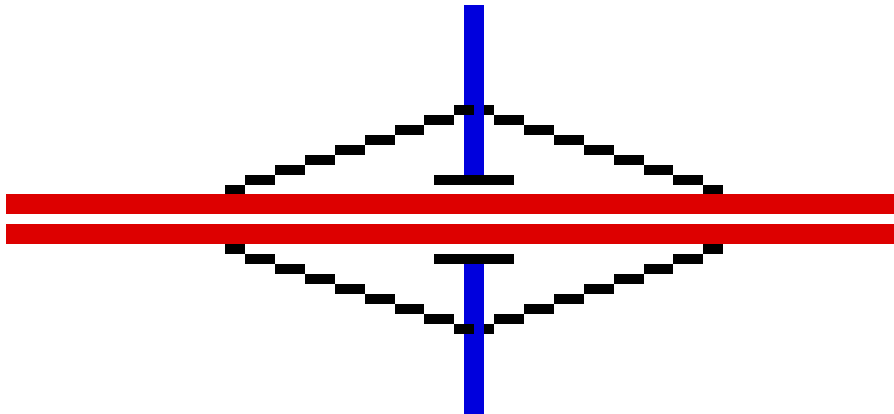


Interchanges Visualization with Traffic Regulation



Diamonds and other 4-ramp interchanges

The basic diamond (left) is often the design of choice for lower-traffic interchanges without special

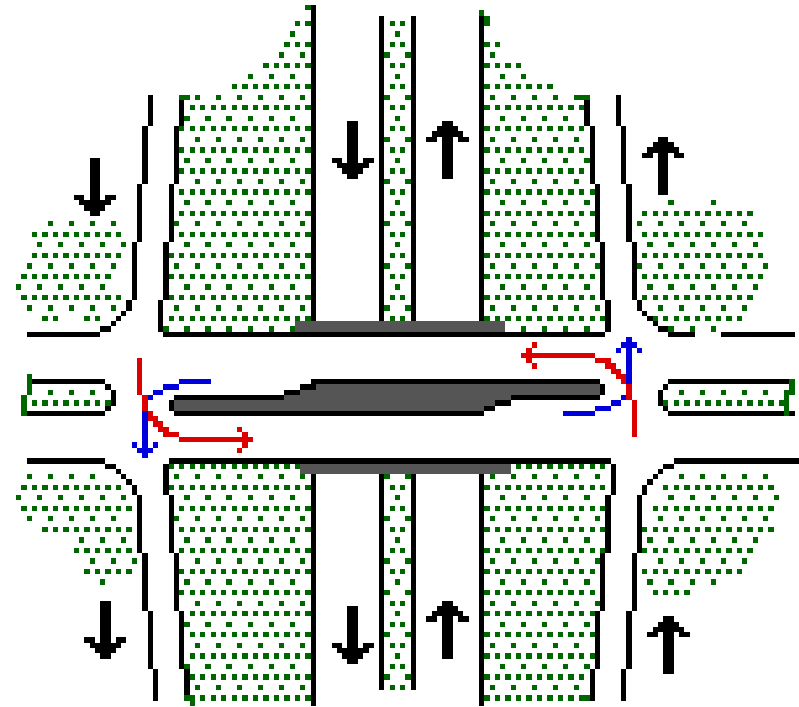


Classic diamond.

Single-point Urban Interchange (SPUI), Single-Point Diamond

Pronounced "Spooey", the Single-point Urban Interchange is a relatively new variant of the diamond. Other names for this interchange include "urban interchange" and "single-point diamond." The SPUI's advantages (for appropriate situations) include:

- Compact layout;
- requires less right-of-way acquisition
- Allows concurrent left turns for greater capacity

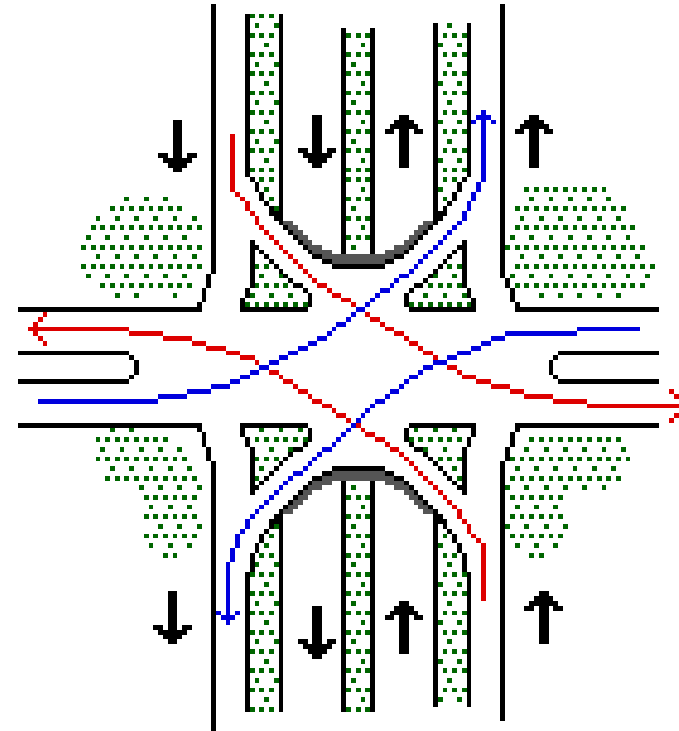


Diamond interchange.

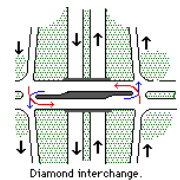
Single-point Urban Interchange (SPUI), Single-Point Diamond

Disadvantages include:

- Complex intersection and signal phases may be unfamiliar to drivers
- Multilane ramps or surface streets can lead to very large areas of uncontrolled pavement (used by vehicles in more than one direction)
- Distance between stop bars on surface street creates problems for bicycles, who need more time to clear the area between them
- More free-flow motor vehicle movements (part of what increases the SPUI's capacity) makes it harder for pedestrians to safely cross
- The standard traffic signal timing does not include a phase for pedestrian crossing; again, capacity and safety are at odds
- Vehicle clearance time (where all lights must be red) is longer
- Longer overpasses can require larger bridge girders;
- retrofits can require raising the bridge or lowering the road underneath

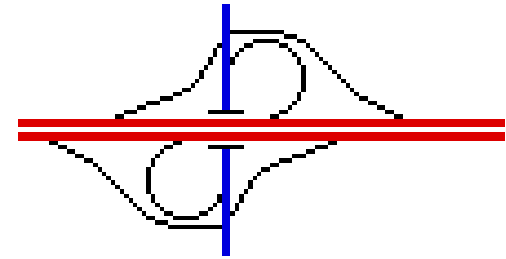


SPUI: opposing left turns (red pair or blue pair) can proceed concurrently.

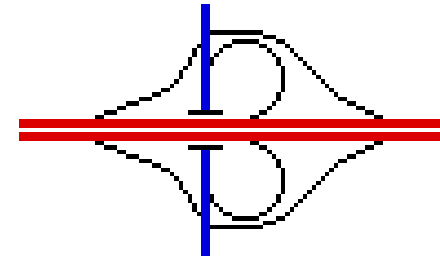


Six-ramp partial clover leaf interchanges

The six-ramp partial cloverleaf allows traffic on the side street to flow more smoothly than a plain diamond, since the only crossing traffic comes off the two exit ramps. Each side of the street has an easy right turn to either direction on the freeway. California engineers often call them "three-quarters" interchanges, since six of eight possible ramps are included.



Six-ramp partial cloverleaf.

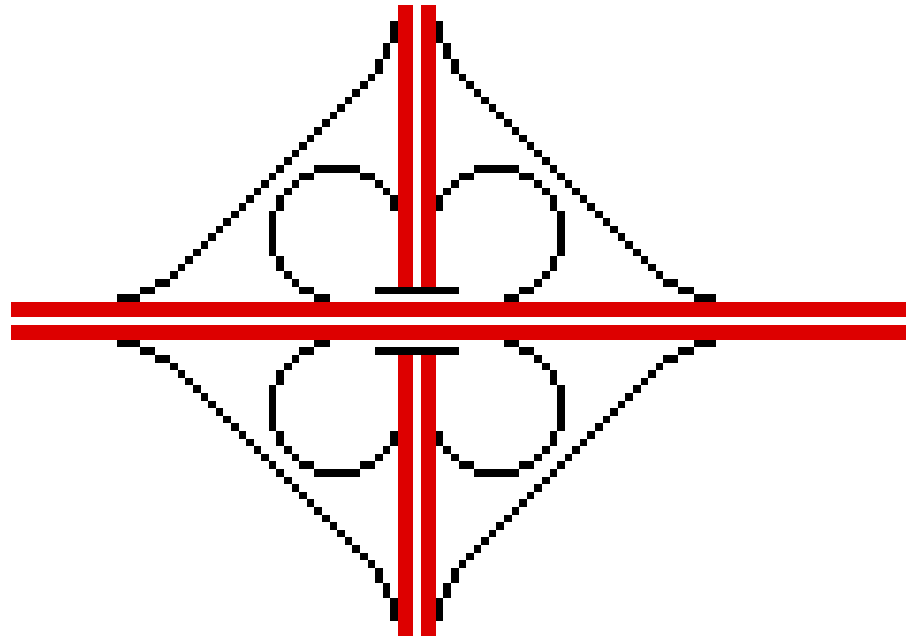


Variant favoring traffic to/from the left.

The Full Cloverleaf

The Full Cloverleaf

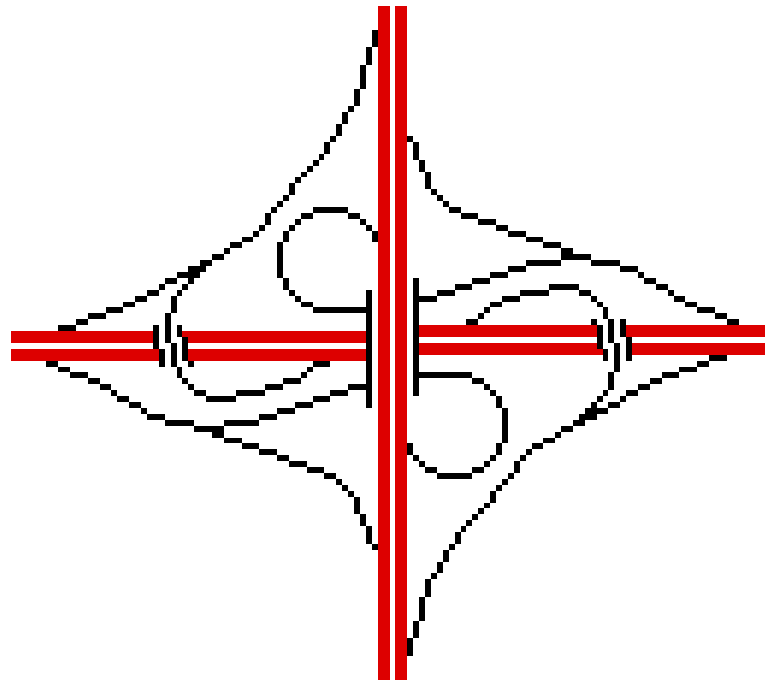
The classic cloverleaf allows "non-stop" full access between two busy roads. Traffic merges and weaves, but does not cross at-grade; unless the interchange is too congested, no stopping is required. The colloquial "cloverleaf" is the same as the more technical "full cloverleaf", as you can



Full Cloverleaf.

The Full Cloverleaf

Another modification (shown), at the I-395/King St (VA 7)

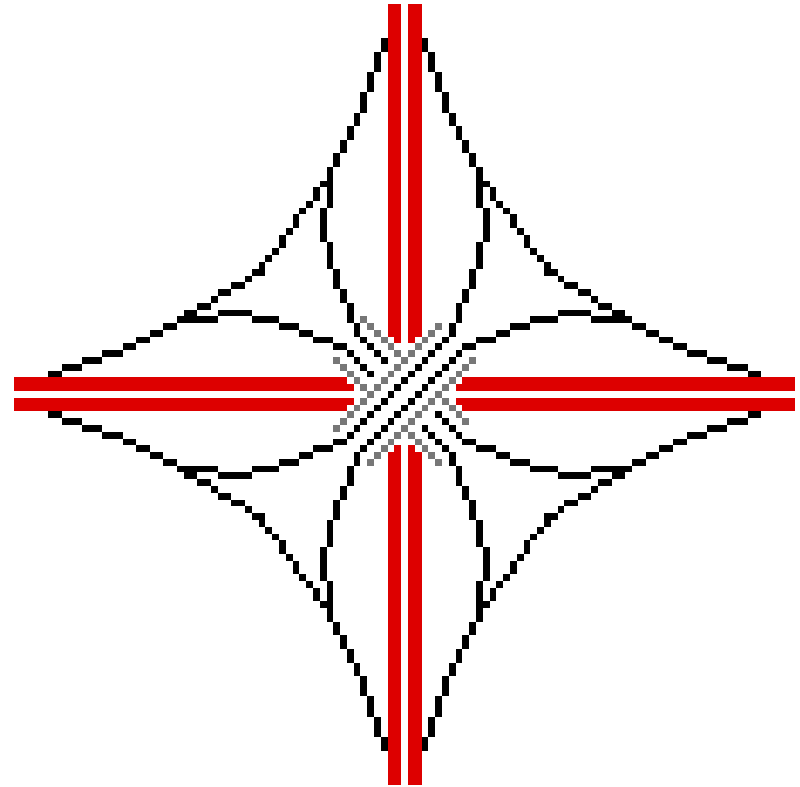


I-395 at VA 7.

Semi-Directional 4-way, or the Stack

Semi-Directional 4-way, or the Stack

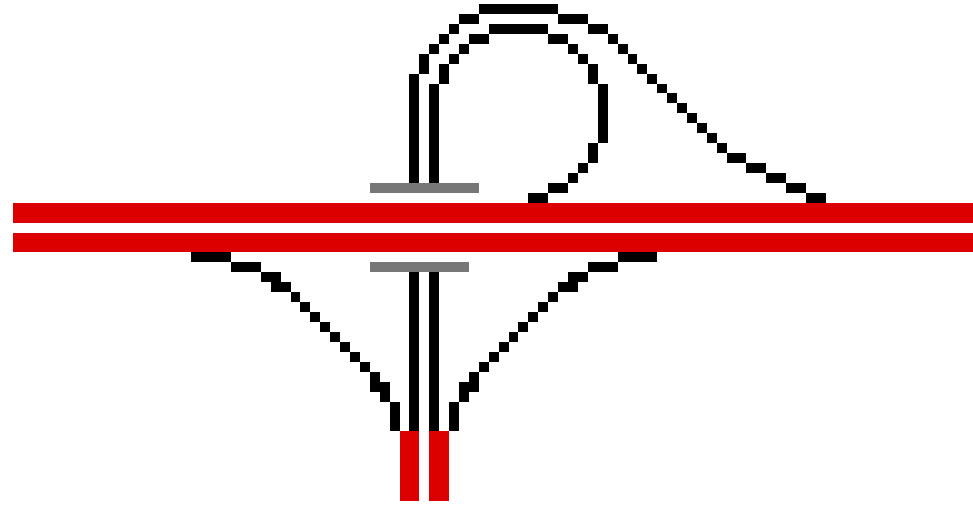
For the driver, the 4-level stack is the nice choice for two intersecting freeways. Each road has a direct connection to the other roadways, with no looping or weaving, and the ramps cross in a 4-level deck you can see for about a mile. If the ramps are two lanes wide, the interchange has quite high capacity and drivers with good tires probably won't even have to slow down. What's more, they're easy to navigate



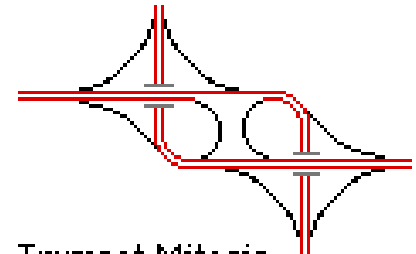
Four-level stack.

Trumpets, and other 3-way interchanges

This is a conceptually simple way to end one freeway at another. Like a cloverleaf, it requires only one or two bridges, and designing for higher speed will take up more land. Alternatives to the trumpet, shown below, usually involve more bridges but remove the loop ramp.



Trumpet.



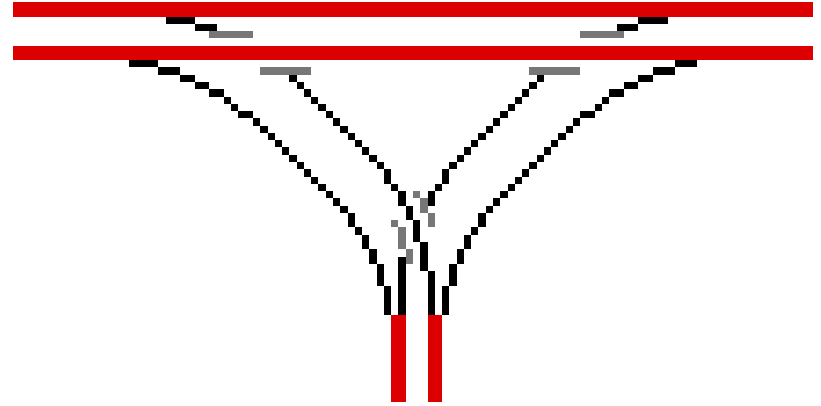
Trumpet Mitosis
(Bennington, Vt.)

Fused Trumpet

Directional T

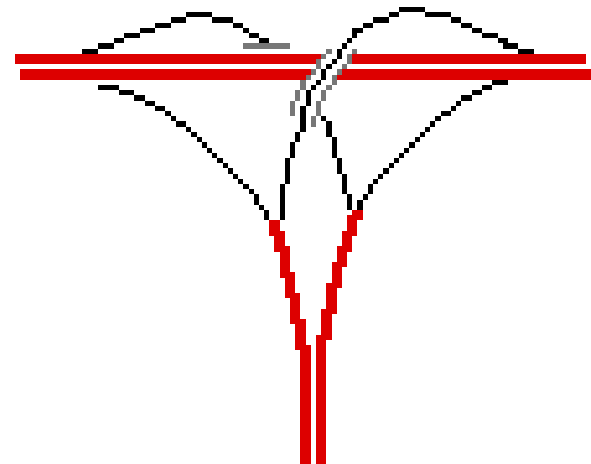
Directional T

Informally known as the "New England Y," this design is often seen in the urban United States, especially the northeast. It features directional ramps (no loops, or weaving right to turn left) which can be built fairly wide (multilane) in comparatively little space. Some designs have two ramps and the "inside" thru road (on the same side as the freeway that ends) crossing each other at a three-level bridge.



Semi-Directional T

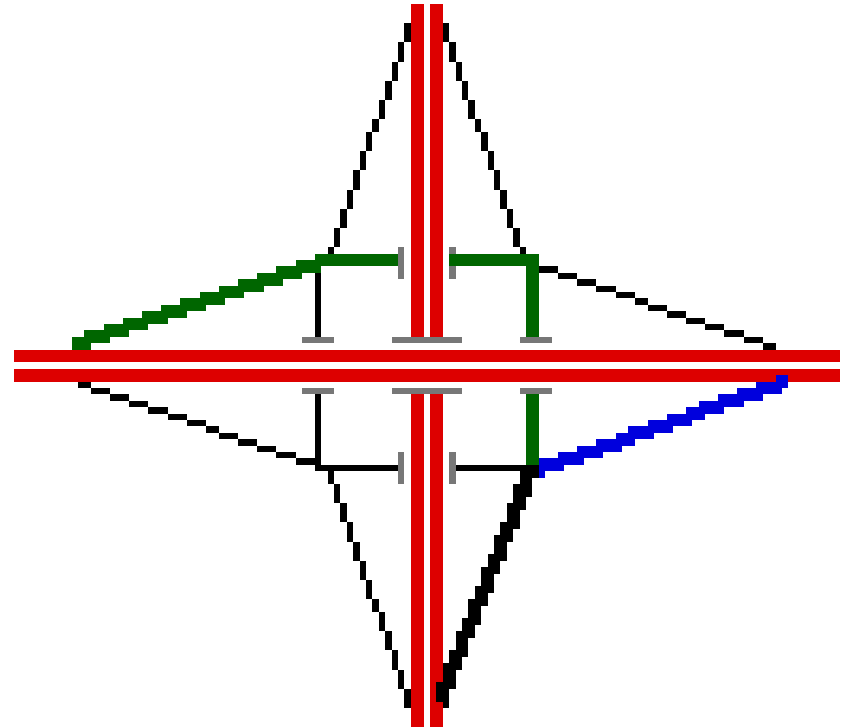
Lacking the problem left exits, this design is a good choice for high traffic junctions. The ramps can be made two or three lanes wide for more capacity. It's semi-directional, meaning cars veer right before crossing both carriageways to the left, but the turns are gradual.



The Volleyball

This interchange is better known as the 3-level diamond or split-level diamond. The term "volleyball interchange," one of my few contributions to colloquial English, will get you blank stares at a job interview, but a smile of recognition among many road fans.

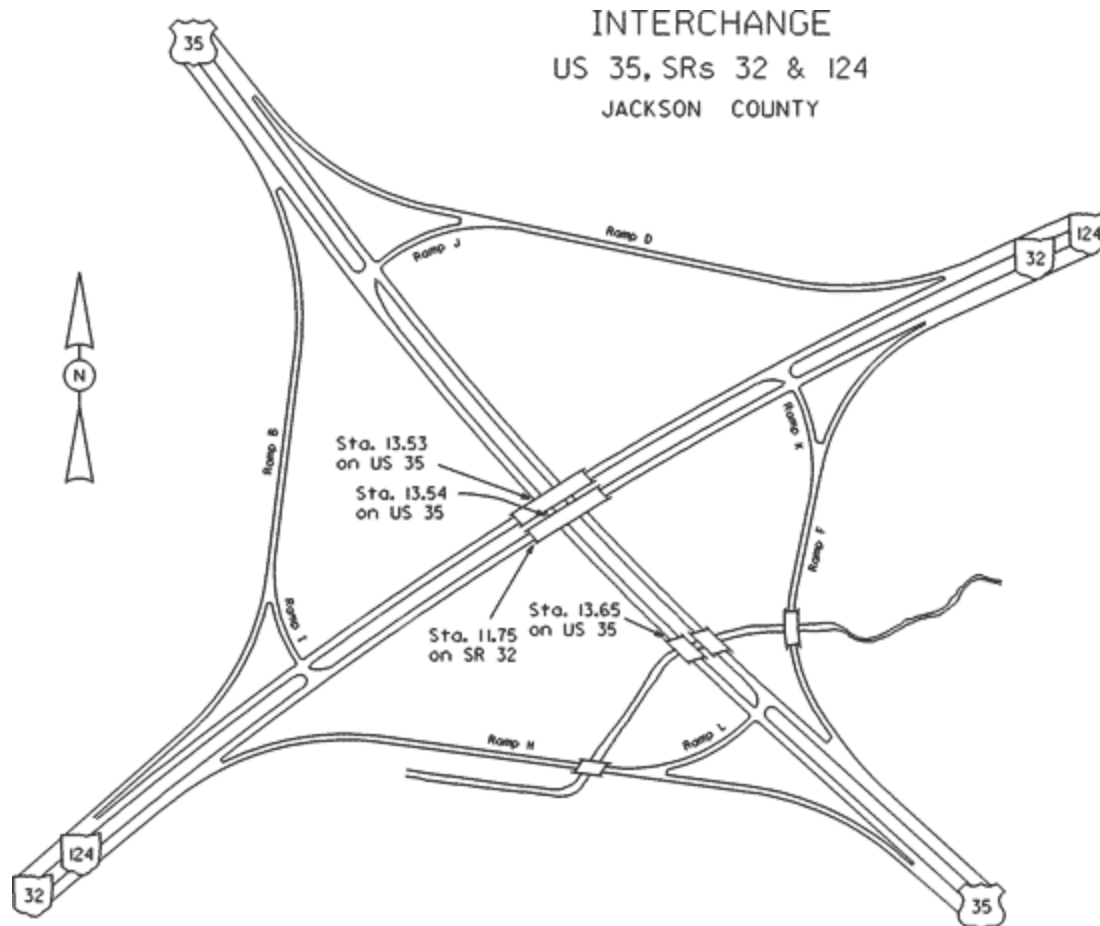
All turning motions are handled in an intermediate square structure connecting the eight ramps. Turning traffic travels around the square in the same direction as a roundabout in that country. Through traffic can proceed on either intersecting road without stopping.



Volleyball interchange.

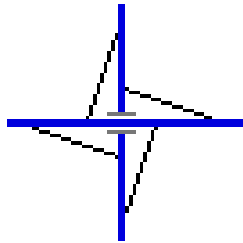
Oddities

Some strange or fictional interchanges

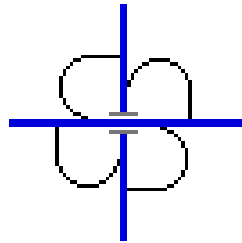


US 35 SHEET 3 OF 6
SR 32 SHEET 3 OF 5

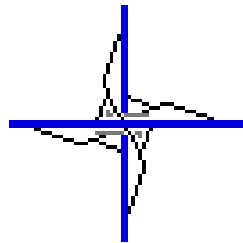
Oddities



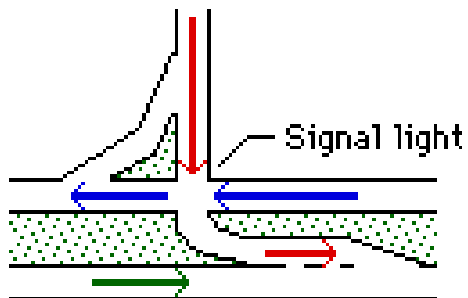
Windmill.



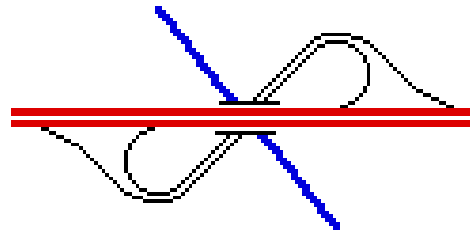
Looped Windmill.



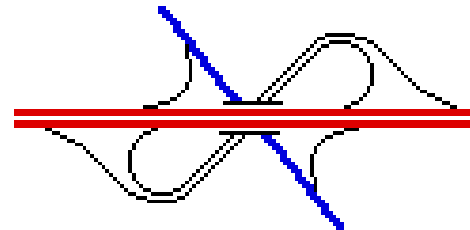
Dual-point
urban interchange.



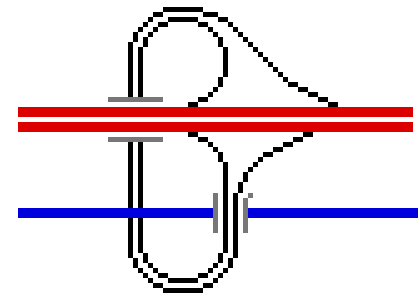
Looped Windmill
ramp terminus
with channeling.



Spupclo.



Six-ramp Spupclo.



Paperclip.

Award of Merit



**Interstate 105/Interstate 110 Interchange
Los Angeles, California**