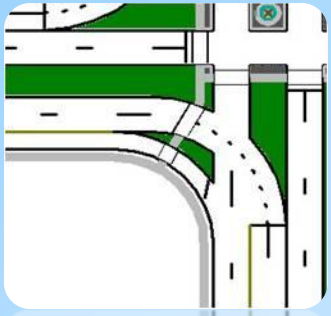
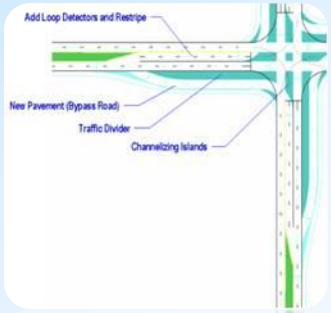
The Parallel Flow Intersection

A High Capacity 2-Phase Intersection





From

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The Cost Of Traffic Congestion



According to the Texas Transportation Institute's 2009 Urban Mobility Report…

"Congestion is a problem in America's 439 urban areas, and it has gotten worse in regions of all sizes."

In 2007, the cost of congestion to Americans was…

- 4.2 billion hours of lost time
- 2.8 billion gallons of fuel
- **$87.2 billion (US)**

"… an increase of more than 50% over the previous decade."

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Public Cost Of Congestion For A Single Busy Intersection

$26,243 each workday…

$6.6 million per year

- This cost calculation assumes a conventional intersection with 6,375 vehicles per hour for four hours per workday, 163 seconds average delay per vehicle, 2% commercial vehicles as described in the ITE Journal paper The Parallel Flow Intersection: A New Two-Phase Signal Alternative, October 2007

- Factors used to calculate the cost of congested intersection were taken from the Texas Transportation Institute's 2009 Urban Mobility Report

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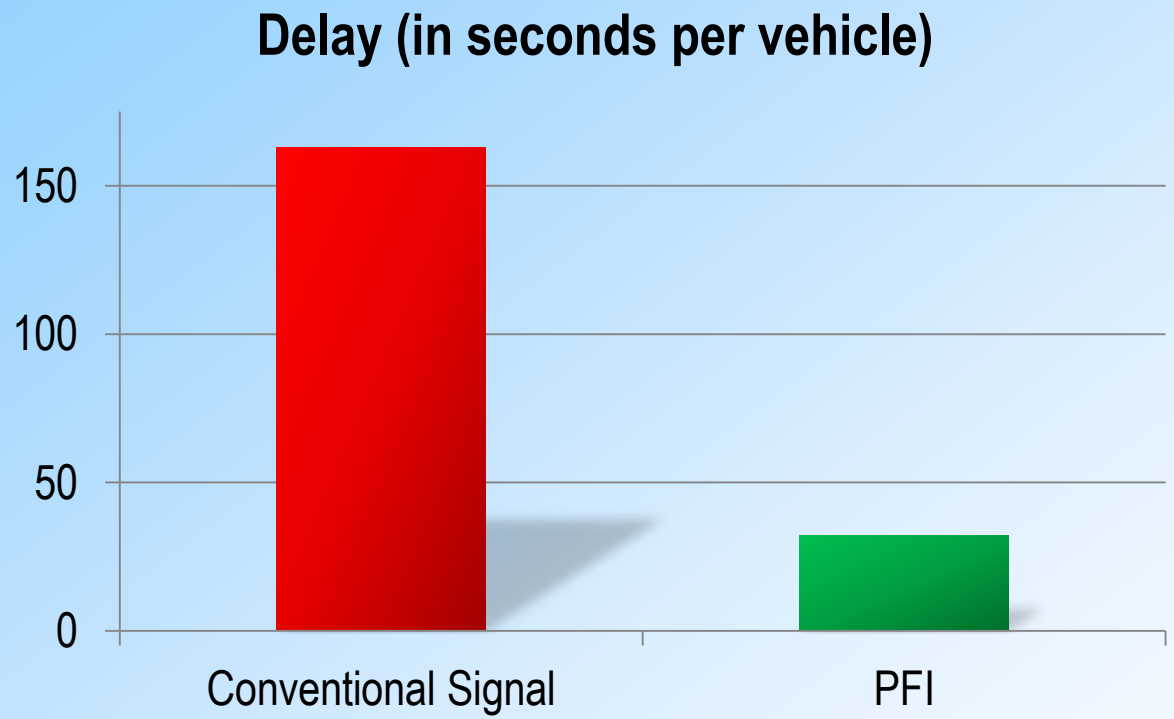
2-Phase Signals Are Congestion Busters!

Advantage…

- ✓ Fewer phases per cycle for less lost time from yellow and all-red phases
- ✓ Less startup time means less time lost to driver reaction and queue dispersion
- ✓ Shorter cycles means shorter queues
- ✓ Simultaneous movements doubles vehicle throughput

These effects compound to generate tremendous capacity over conventional multiphase signals

Impact On Intersection Delay



Over 80% less delay than a conventional intersection[1]

[1] The Parallel Flow Intersection: A New Two-Phase Signal Alternative, ITE Journal, October 2007

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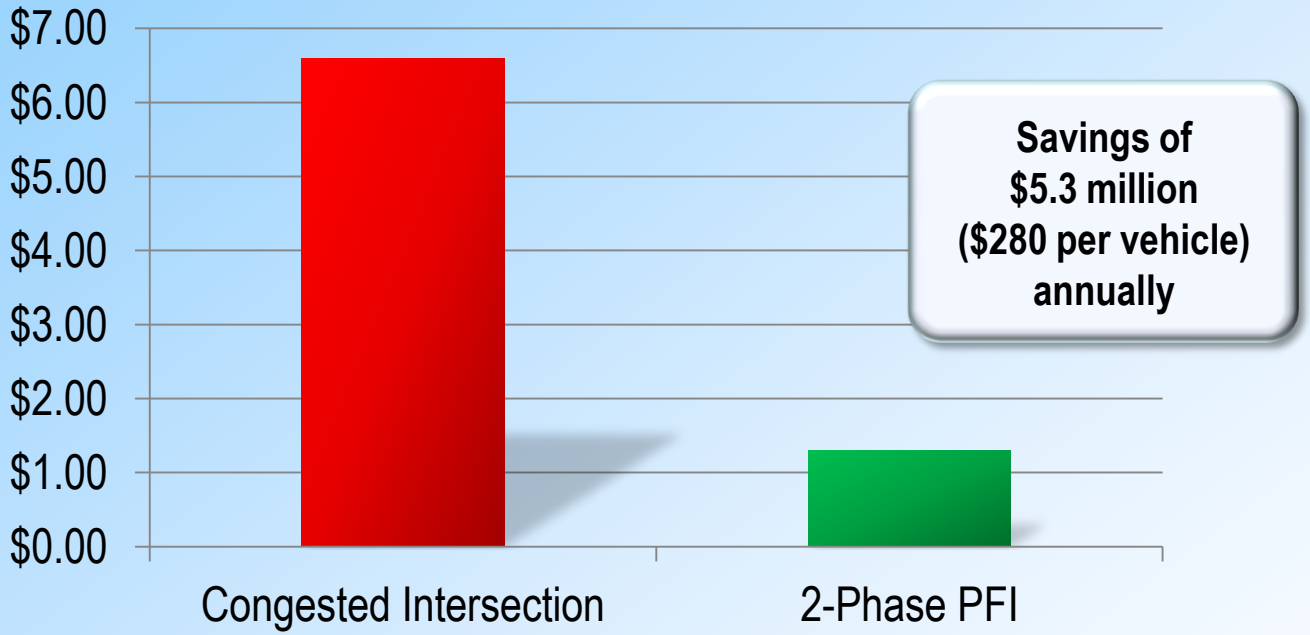
Annual Savings Of A PFI Are Substantial

Annual Cost Of Delay ($ Millions)



- Using the factors from the previous slide, a congested intersection costs the public 5X more per year than the uncongested PFI
- The cost of converting to a PFI could be recovered within one year of operation

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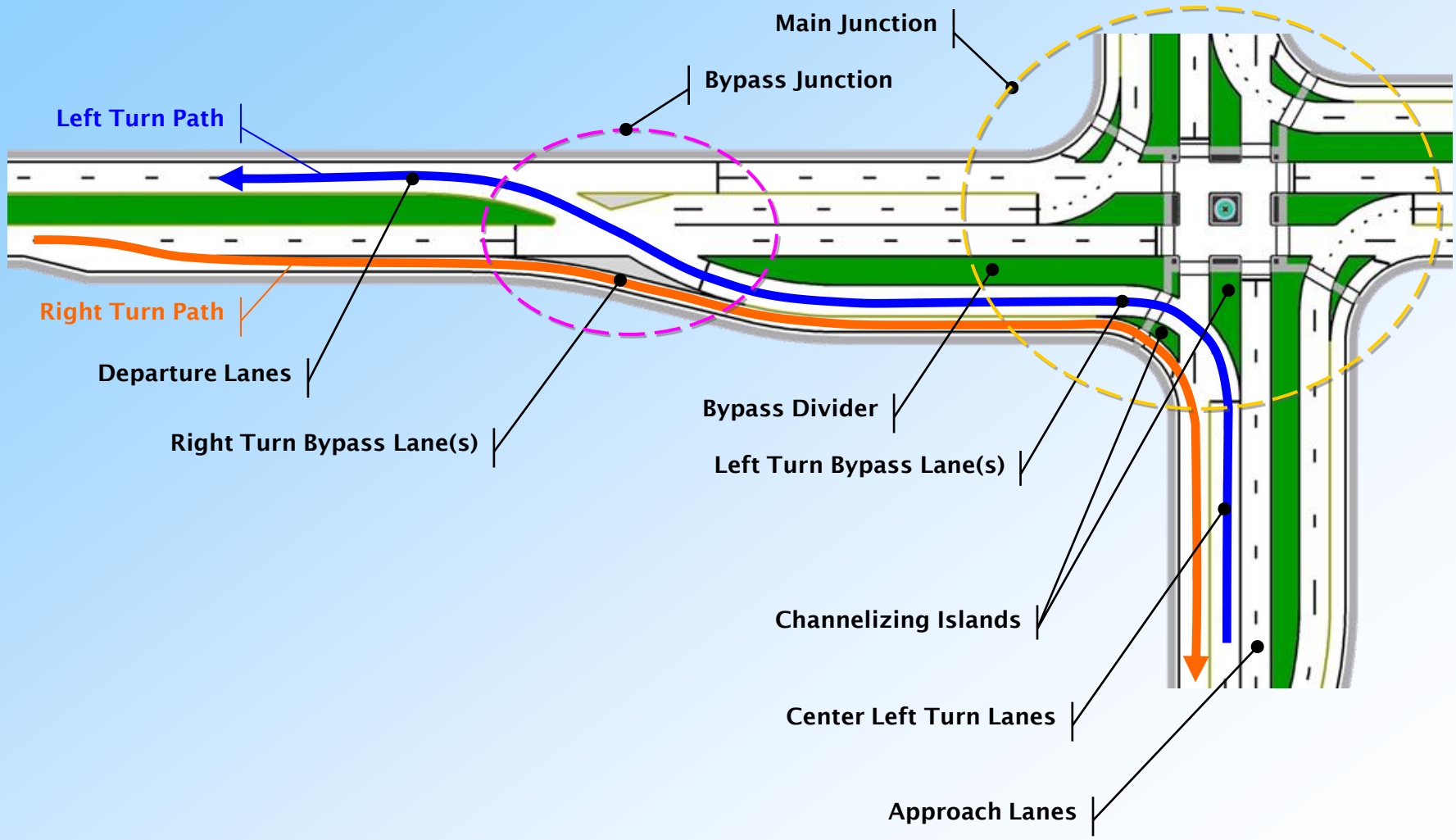
Anatomy of a PFI



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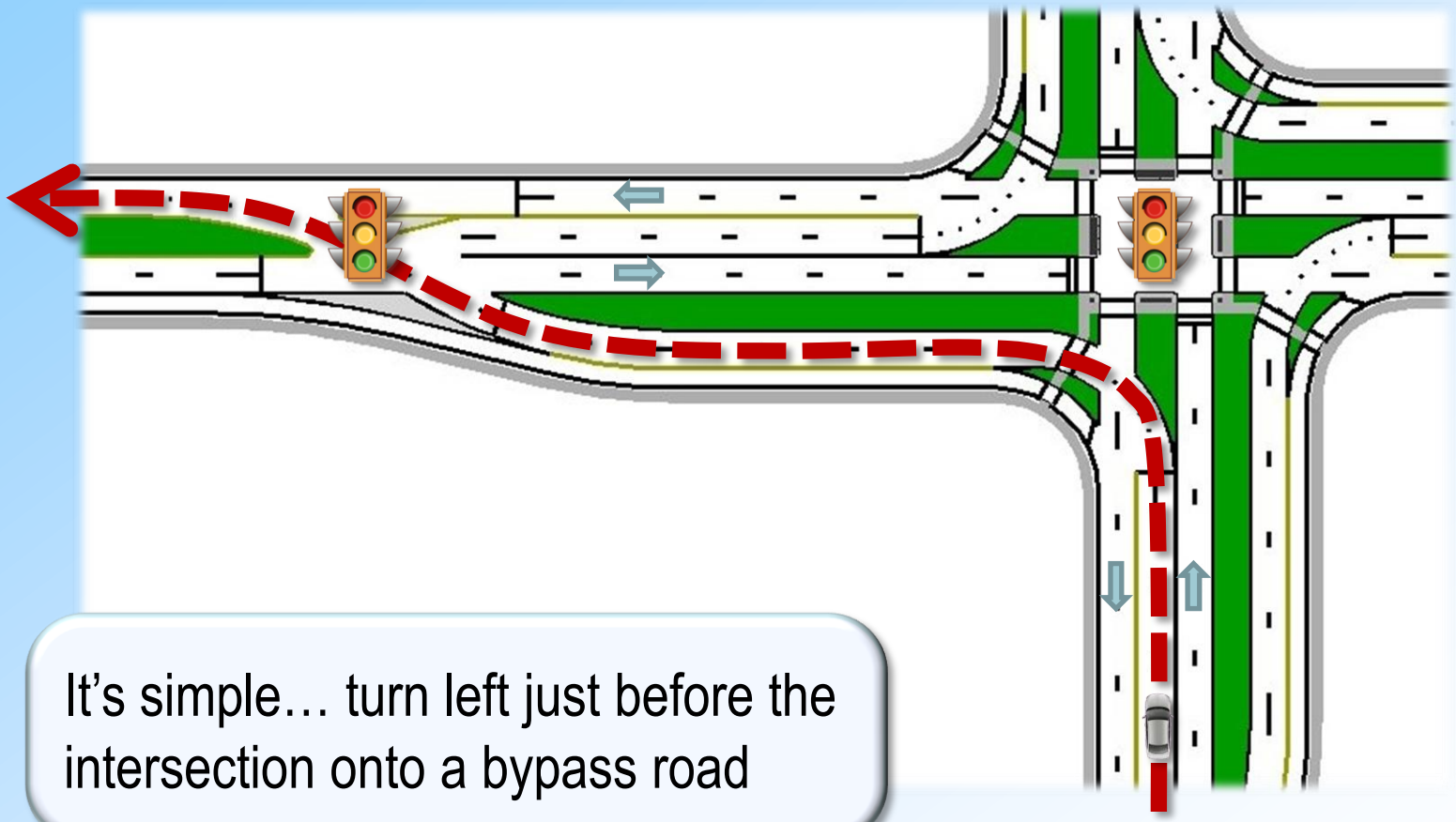
So, How Does The PFI Work?



It's simple… turn left just before the intersection onto a bypass road

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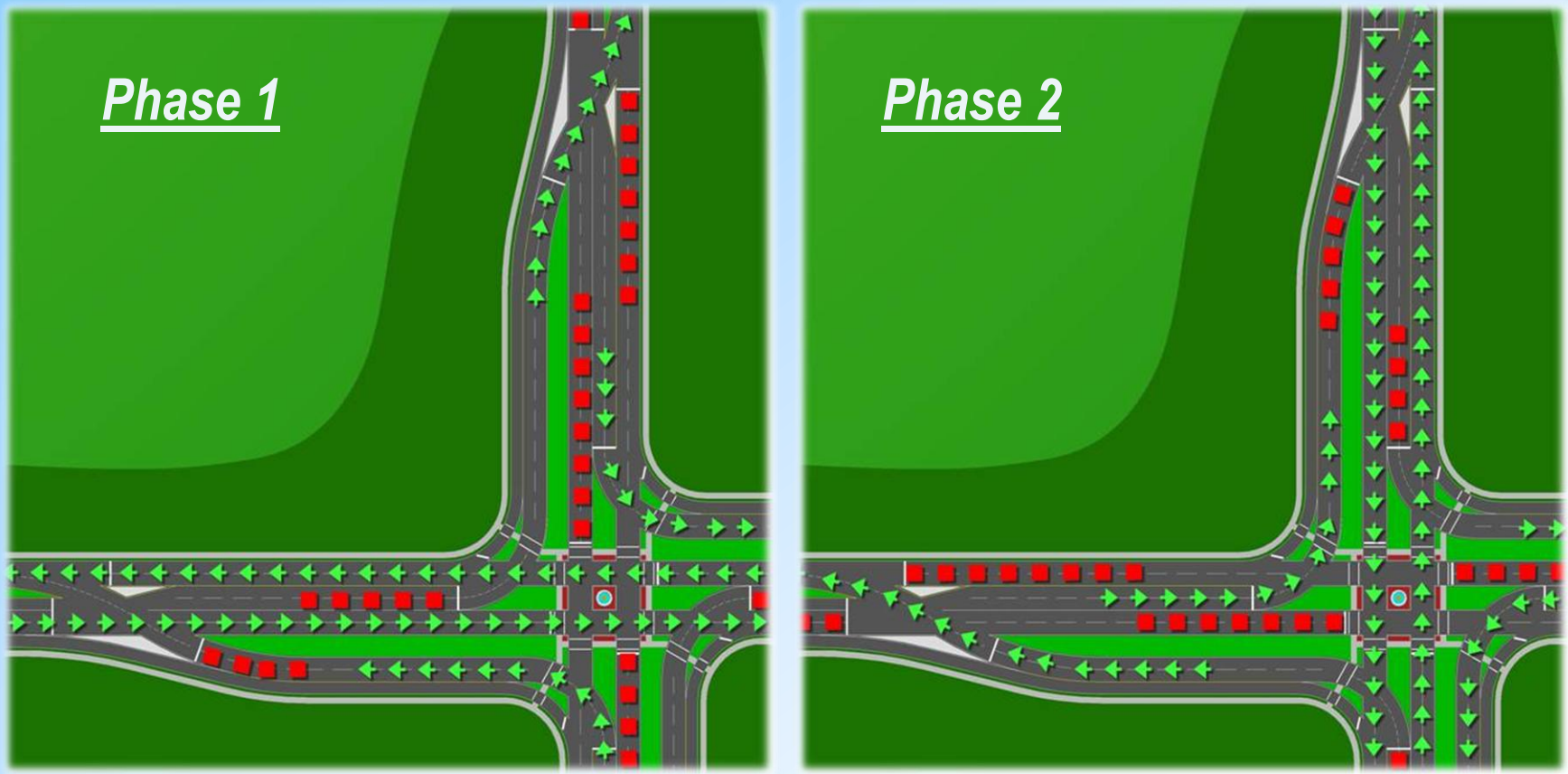
Simultaneous Movements Yields High Capacity!



Left turns and through movements occur at the same time

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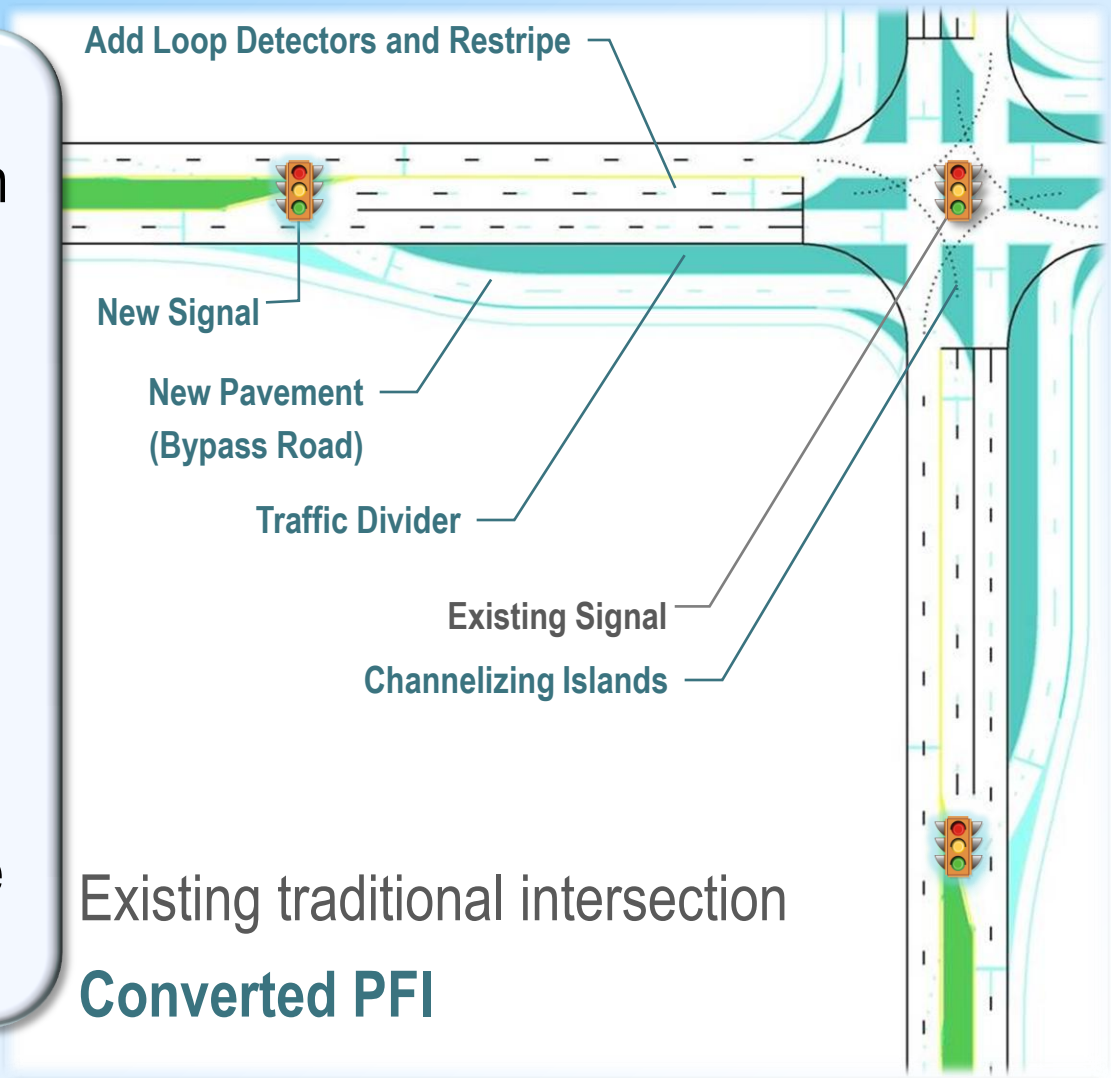
Fast And Easy Conversion

- Converting an existing intersection can be fast with minimal inconvenience to the public
- The existing roadway is largely unaffected if no additional lanes are needed



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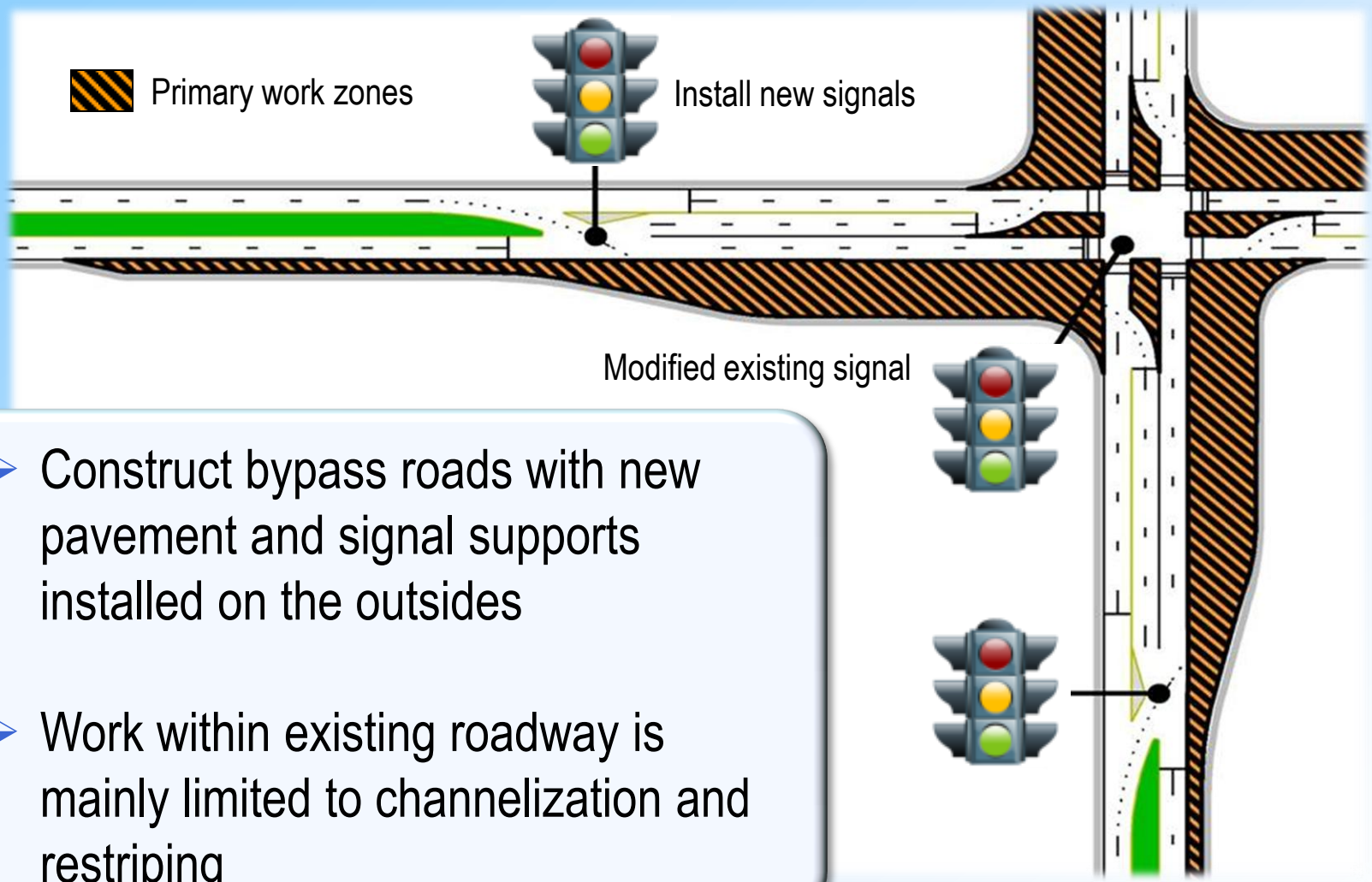
Most Work On Outsides



- Construct bypass roads with new pavement and signal supports installed on the outsides
- Work within existing roadway is mainly limited to channelization and restriping

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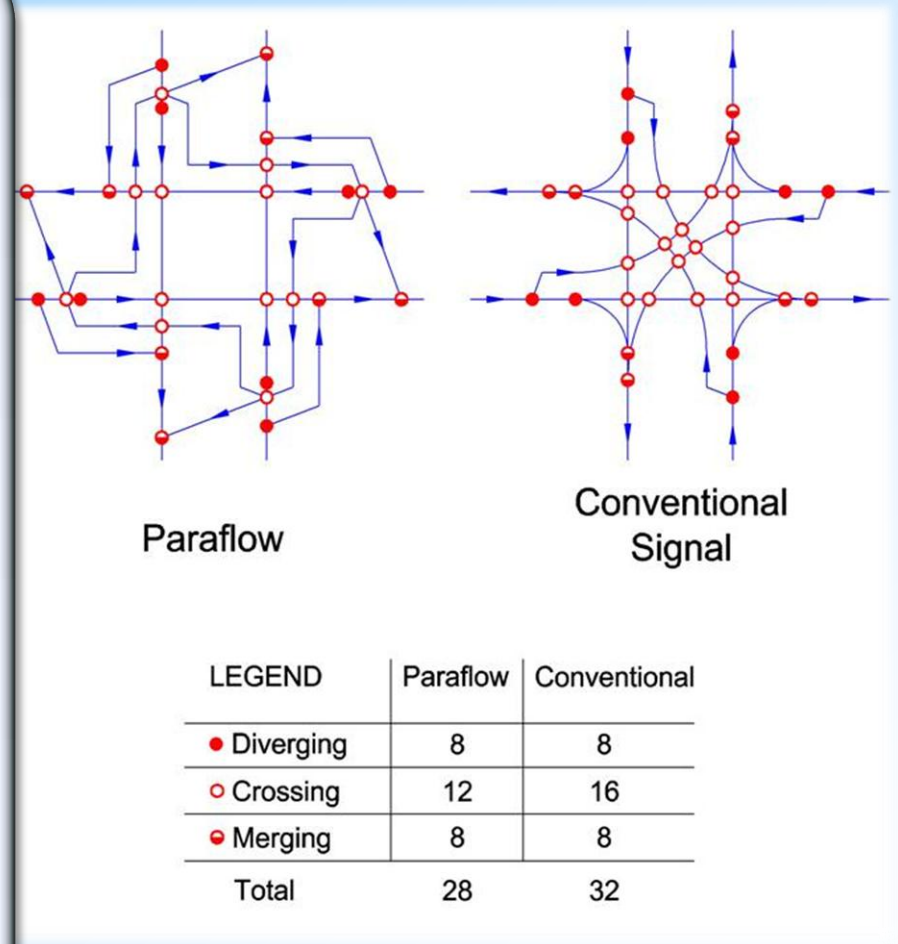
Safer Than Conventional Signals

- Less congestion means fewer crashes
- Four less crossing conflict points – the worst kind
- Conflict points distributed over multiple junctions – driver has fewer distractions
- No permitted left turns – safer for motorists and pedestrians



LEGEND	Paraflow	Conventional
Diverging	8	8
Crossing	12	16
Merging	8	8
Total	28	32

Conflict diagram

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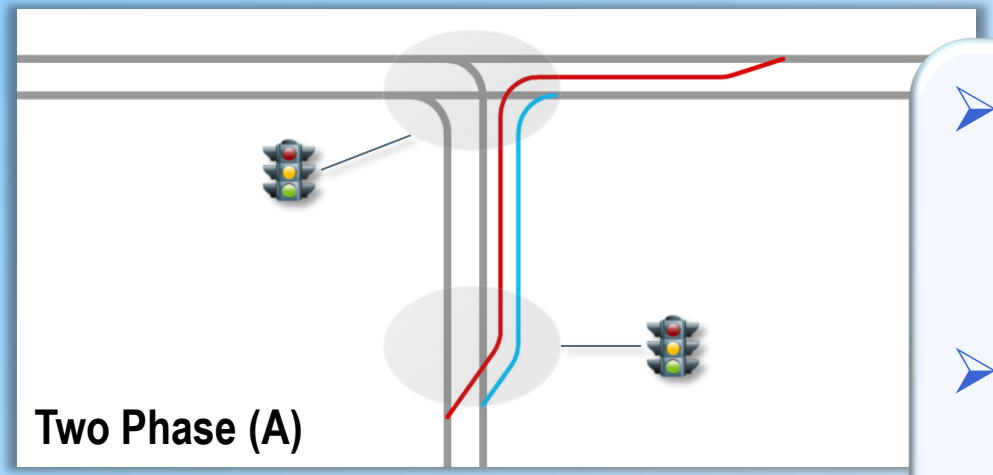
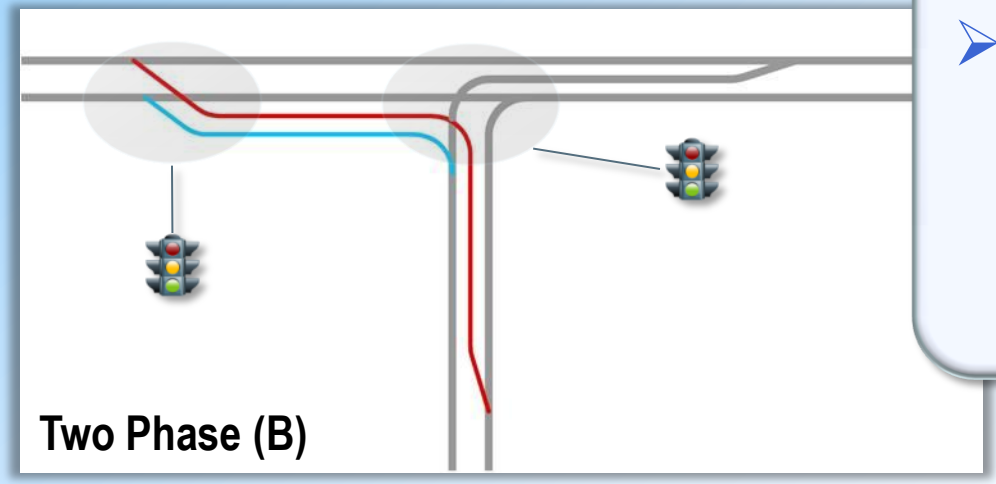
PFI ‘T’ Type Intersections





- Two alternative methods for ‘T’ type intersections
- Only one bypass road required
- Eliminates one signal phase to create a 2-phase intersection

PFI left turn Normal movements PFI right turn

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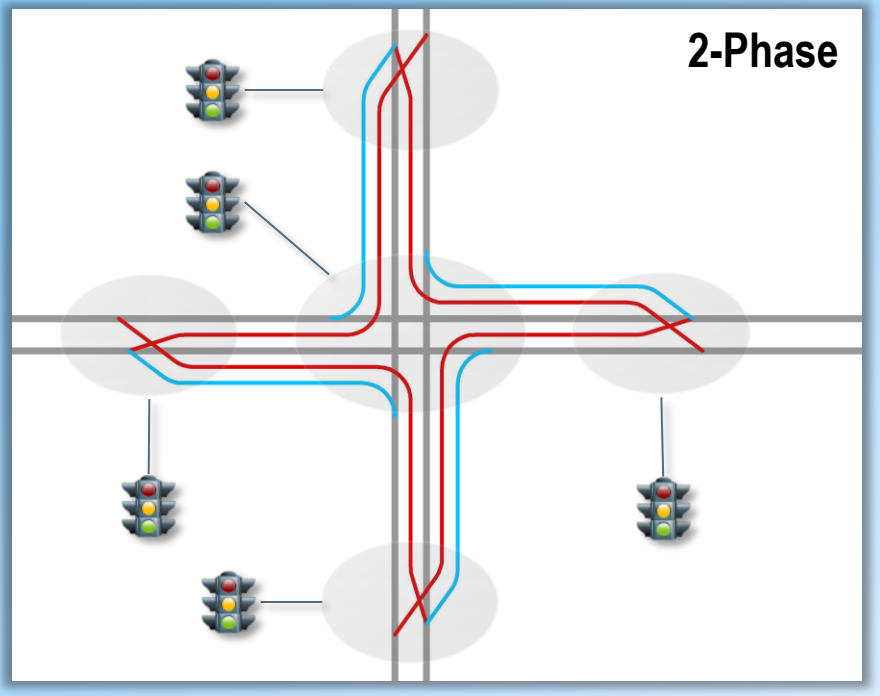
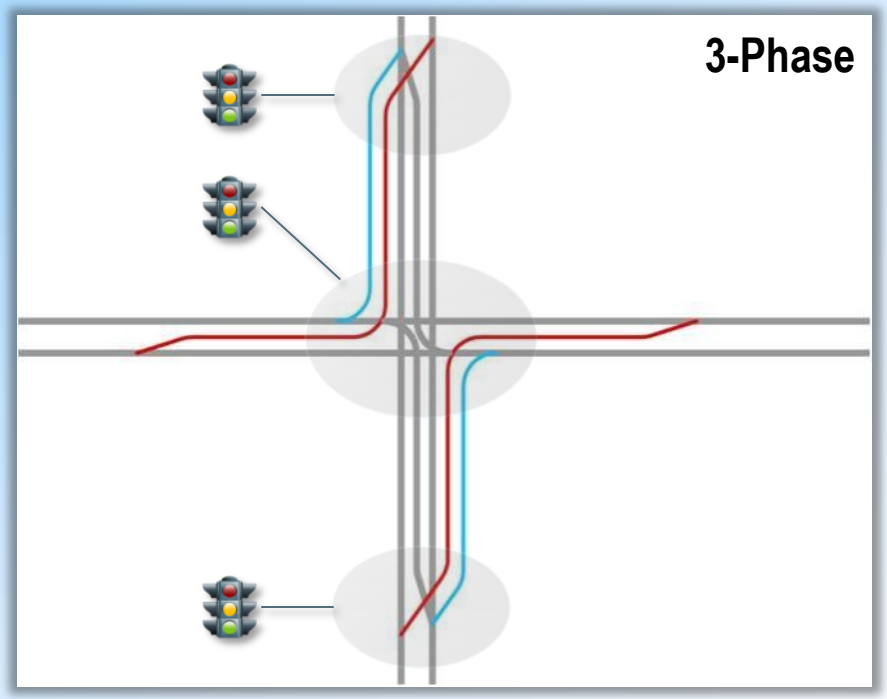
PFI Four Leg Intersections





- Two alternative methods for four leg intersections
- 2-phase design requires four bypass junctions and 3-phase design needs two

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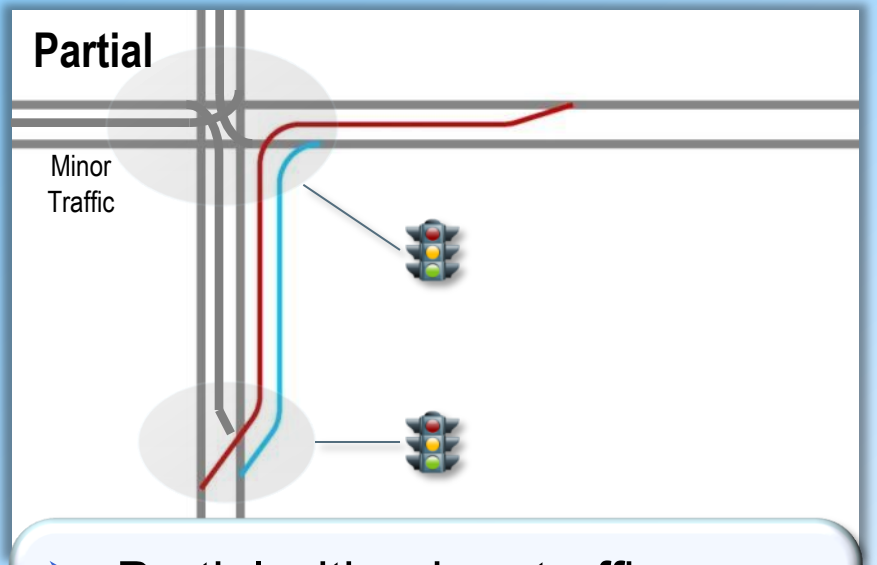
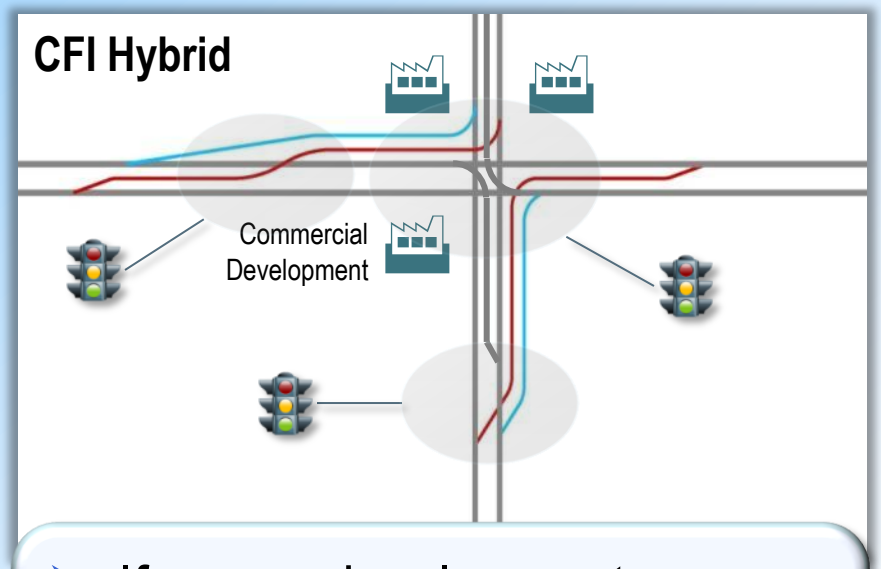
PFI Four Leg Intersections



- Partial with minor traffic volume leg acting more like a ‘T’ type intersection
- Minor leg uses ‘called’ signal phase



- If corner development dictates, a CFI leg can be combined with a PFI
- Three phases per signal cycle

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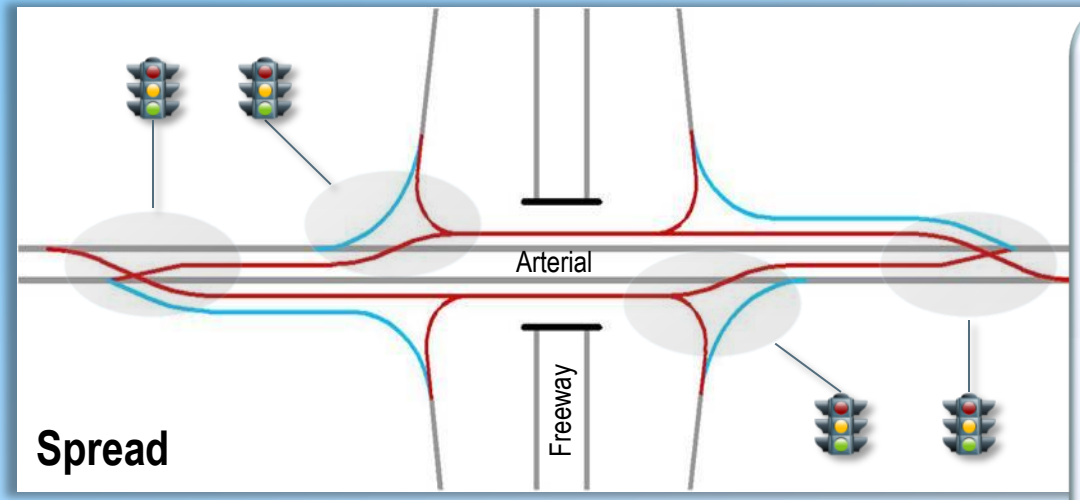
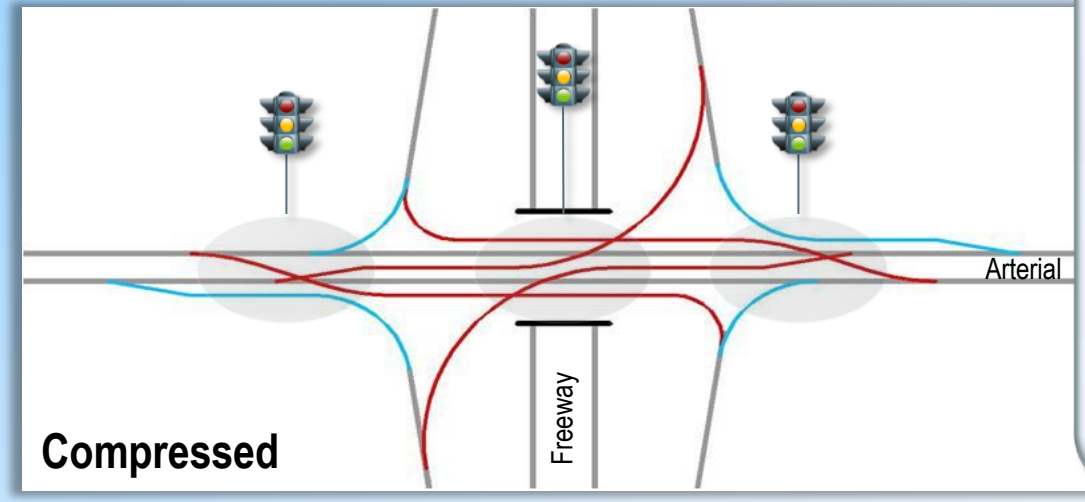
PFI Diamond





- 2-phases per cycle
- Spread diamond can be used to convert existing diamond interchange at lower cost
- Compressed diamond requires less space than spread design

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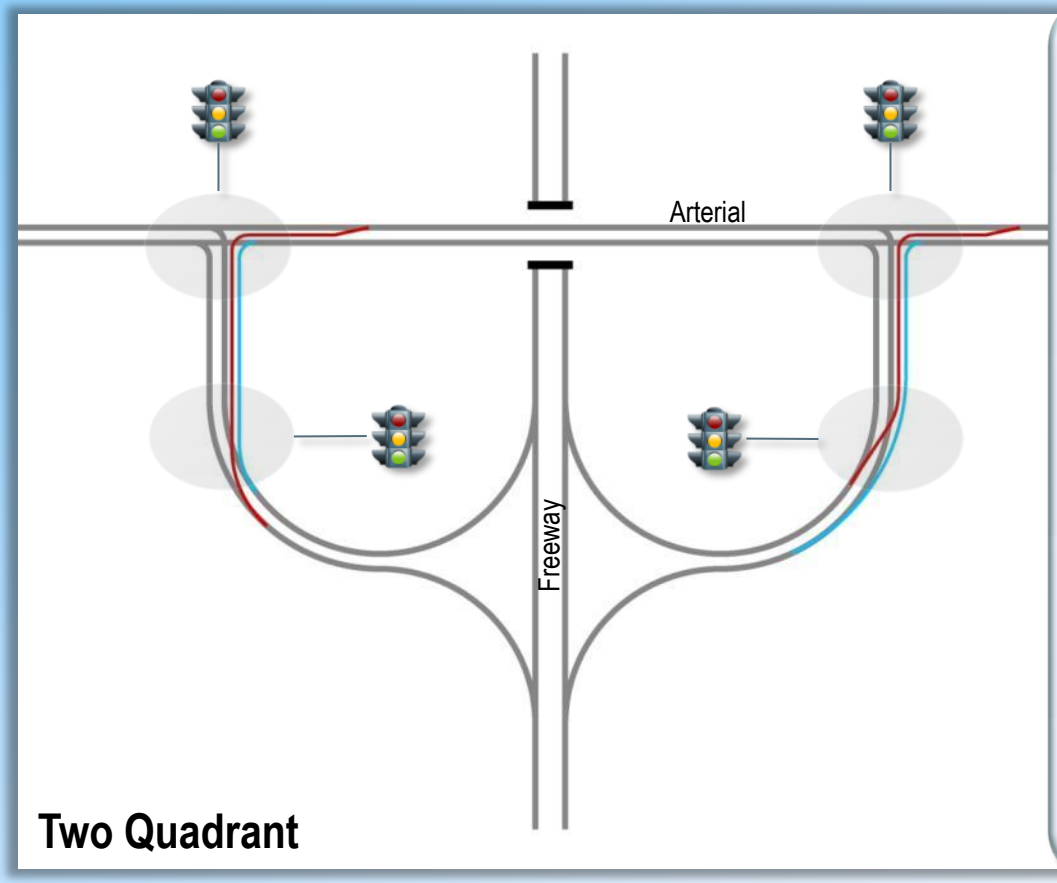
PFI Diamond



- Provides for two phases per cycle while conventional is three phases per cycle
- Configure ramp intersections as 'T' type (A) or (B) PFI

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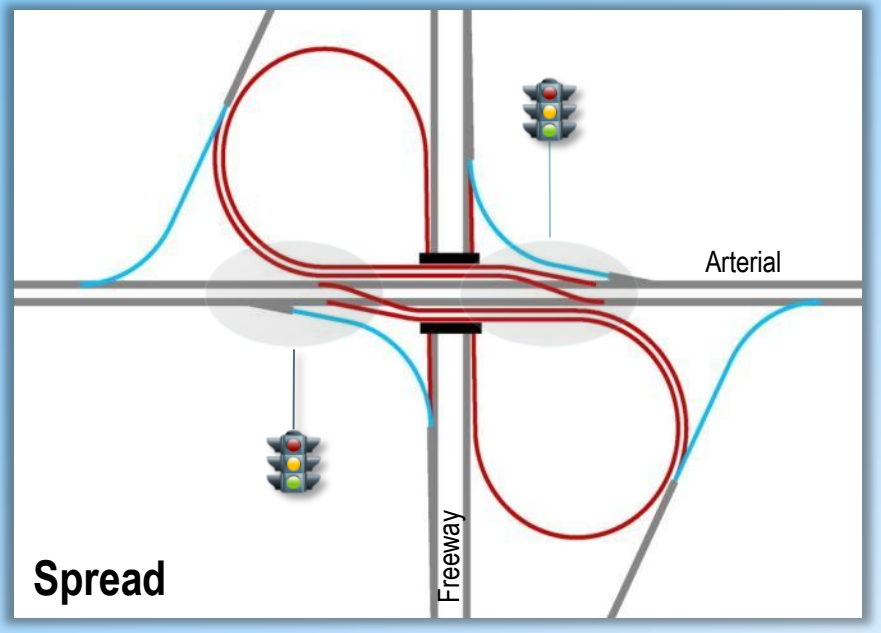
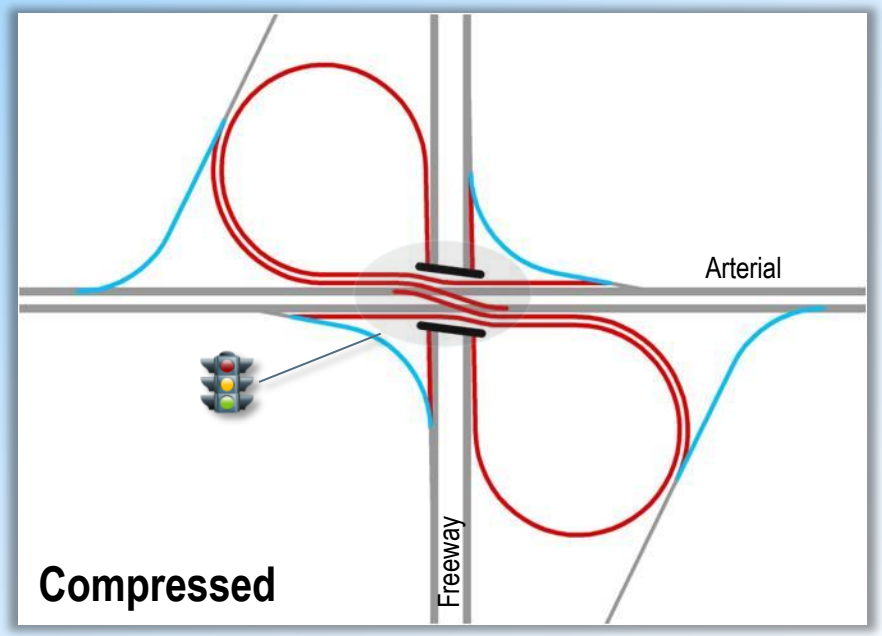
PFI Partial Cloverleaf





- PFI par-clo 'A' eliminates left turn conflict of traditional par-clo's
- Spread version can be used to convert existing par-clo or full partial cloverleaf at lower cost

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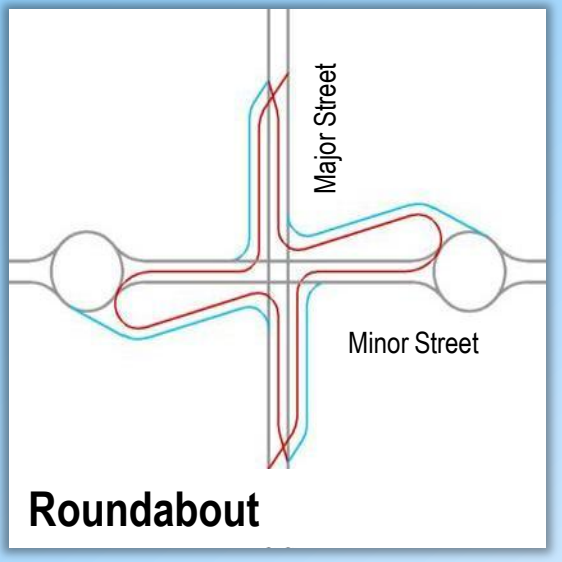
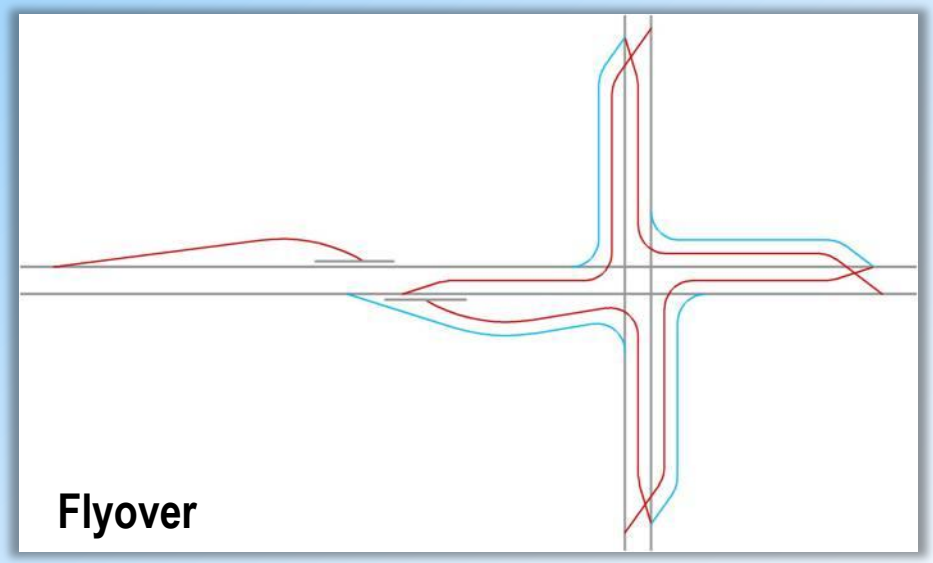
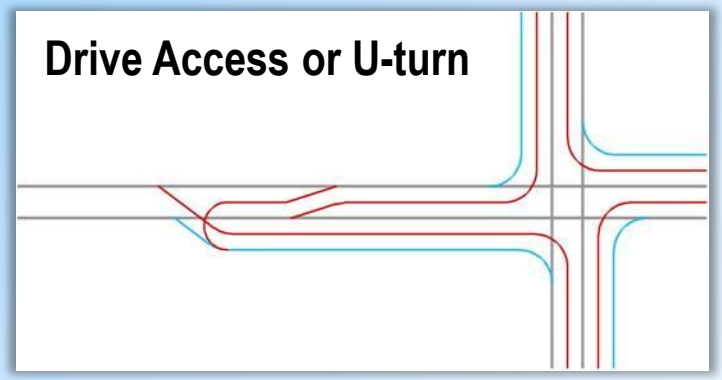
PFI Bypass Junctions







Several bypass junction treatments are possible

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Summary of PFI Advantages…

- ✓ Can reduce delay over 80%
- ✓ Increases capacity over 3x
- ✓ Intuitive to drive
- ✓ Provides direct left and right turns
- ✓ Easy to install
- ✓ Safer with fewer conflict points
- ✓ Pedestrian and bike friendly
- ✓ Many different applications

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United States Patent

The parallel flow intersection and all design variants are protected under **United States Patent No. 7,135,989**.

Use of the design in the United States without permission from Greg Parsons, P.E., is strictly prohibited. For other countries, appropriate international laws apply.

For More Information

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