

Lagging Protected/Permissive with FYA Considerations

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Review:

Standard/Traditional Yellow Trap

Review:

Standard Yellow Trap

- Protected/Permissive phasing has historically been used only with leading protected portion due to the “standard” yellow trap

Review:

Standard Yellow Trap

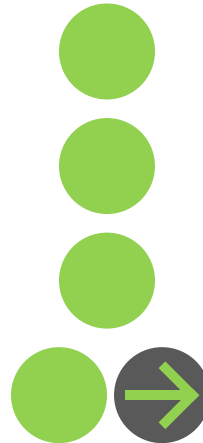
1. Two-way green (permissive lefts)

2. Clearance **TRAP**

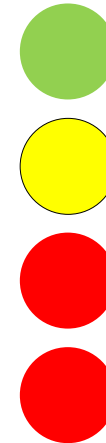
3. Red clearance

4. Oncoming lagging left

Southbound



Northbound
(**shared** left/through indication)



Review:

Standard Yellow Trap

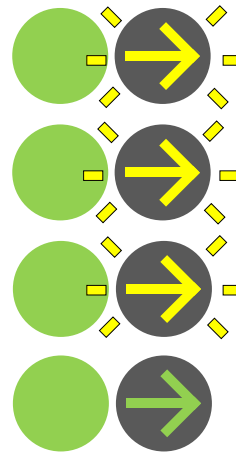
- FYA signals provide the ability to use a lagging protected left by giving opposing left turn drivers a separate indication for permissive lefts

Review:

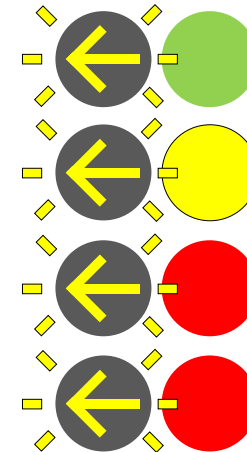
FYA Eliminates Yellow Trap

1. Two-way green (permissive lefts)
2. Clearance **(NO TRAP)**
3. Red clearance
4. Oncoming lagging left

Southbound



Northbound
(**separate** left/through indications)



Review:

The “Soft Trap”

Question: Why might opposing lagging lefts cause confusion for left turners with FYAs?

Oncoming
lagging left
turn phase
(starting soon)



Flashing yellow arrow (to remain flashing)

Green ball (about to turn yellow)

Eden Prairie, Minnesota

Answer: Left turners might be paying too much attention to adjacent signal indications.

These just changed to yellow ball...

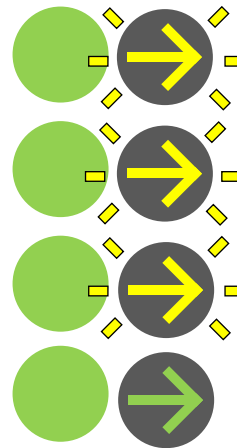


...is this yellow arrow still flashing?

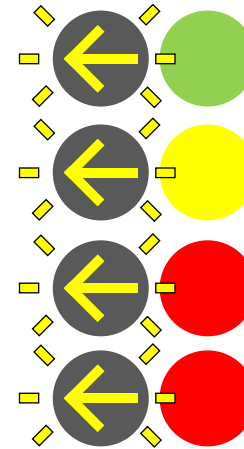
The “Soft Trap”

1. Two-way green
2. Clearance (“**Soft Trap**”)
3. Red clearance
4. Oncoming lagging left

Southbound



Northbound
(**separate** left/through indications)



The “Soft Trap”

(or “perceived yellow trap”)

- Standard yellow trap is eliminated with FYA
- Drivers continue to make unsafe decisions regarding when to make permissive lefts
- **Obvious (?)** cause: poor gap judgment
- **Less Obvious (?)** possible cause: left-turning drivers may be guessing to ignore their flashing yellow arrow indication when adjacent through traffic changes from green ball to yellow ball...
 - ...such as prior to an oncoming lagging left turn phase

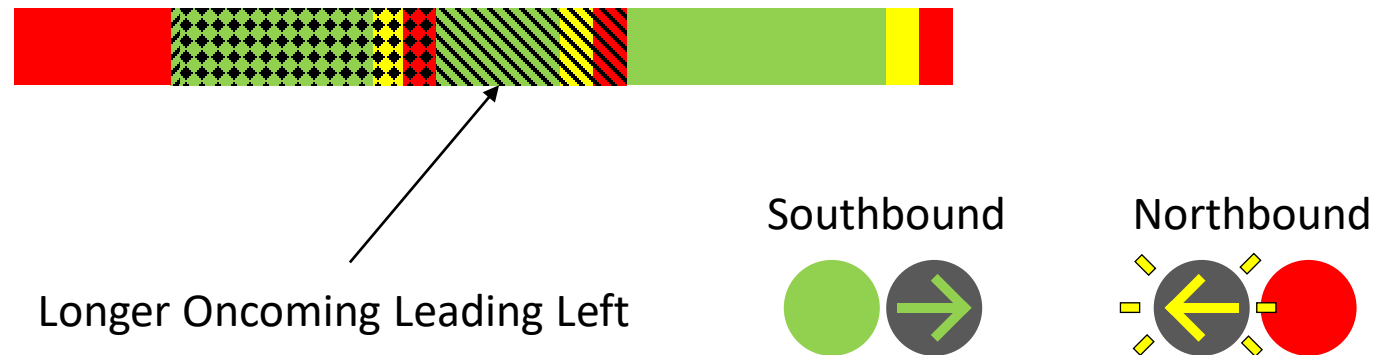
The “Soft Trap”

(or “perceived yellow trap”)

- Environment (suburban or urban) may be contributing factor
- Urban:
 - Often no dedicated left turn indications
 - OK to use information from through indications
- Suburban:
 - Typically dedicated left turn signal indications
 - NOT OK to use information from through indications
- How do we expect drivers to know when they’ve moved from Urban to Suburban environment?

NOT the Soft Trap

- The Soft Trap is likely NOT due to a driver observing a flashing yellow arrow and an adjacent red ball at the same time
- If this were the case, dual leading protected/permissive phasing with different length protected phases would be more problematic than has been observed:



Next Steps

Problem Statement

- The “Soft Trap” has been an obstacle to wider use of lagging Prot/Perm
- Use of leading Prot/Perm can cause a “hiccup” where left turn demand exceeds protected capacity
- Using Prot/Perm (instead of Permissive Only) adds delay when 5 seconds of Min Green plus 5+ seconds of clearance is used to serve one car

Proposed Solution(s) to Consider

- Avoid displaying Protected phase (use only Permissive phasing) if demand per cycle is less than two cars
 - Use Permissive Only phasing explicitly
 - Use controller logic to determine demand and omit phase cycle-by-cycle
 - Use detection placement/delay strategies (third car detection)
- For heavy left turns with minimal opposing traffic, use lagging Prot/Perm
 - Avoid calling/extending opposing through movement
 - Goal is to skip opposing phase if possible

Proposed Solution(s) to Consider (cont.)

- Look for opportunities to improve driver education
- Research how to solve problem of Urban vs. Suburban environment
- Research whether more Permissive (and lagging Prot/Perm) usage would lead to improvement in yielding behavior (including to pedestrians)

Proposed Solution(s) to Consider (cont.)

- Selecting use of lagging Protected/Permissive can help to address Permissive Only with POOFYA issue
 - Use lagging left turn phase only when ped phase is called
- Consider wider usage of lag/lag Prot/Perm in low-volume/low-speed environments
 - Increase motorist experience level
 - Potential to help evolve driver expectations