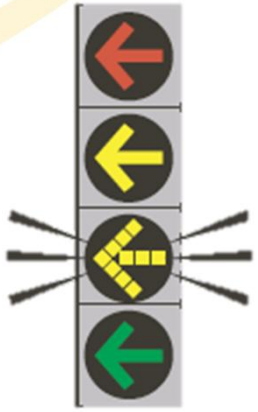
Opportunities for Phasing Left Turns across a Multi-Use Path using Flashing Yellow Arrow



LEE ENGINEERING

July 12, 2016

FLASHING YELLOW

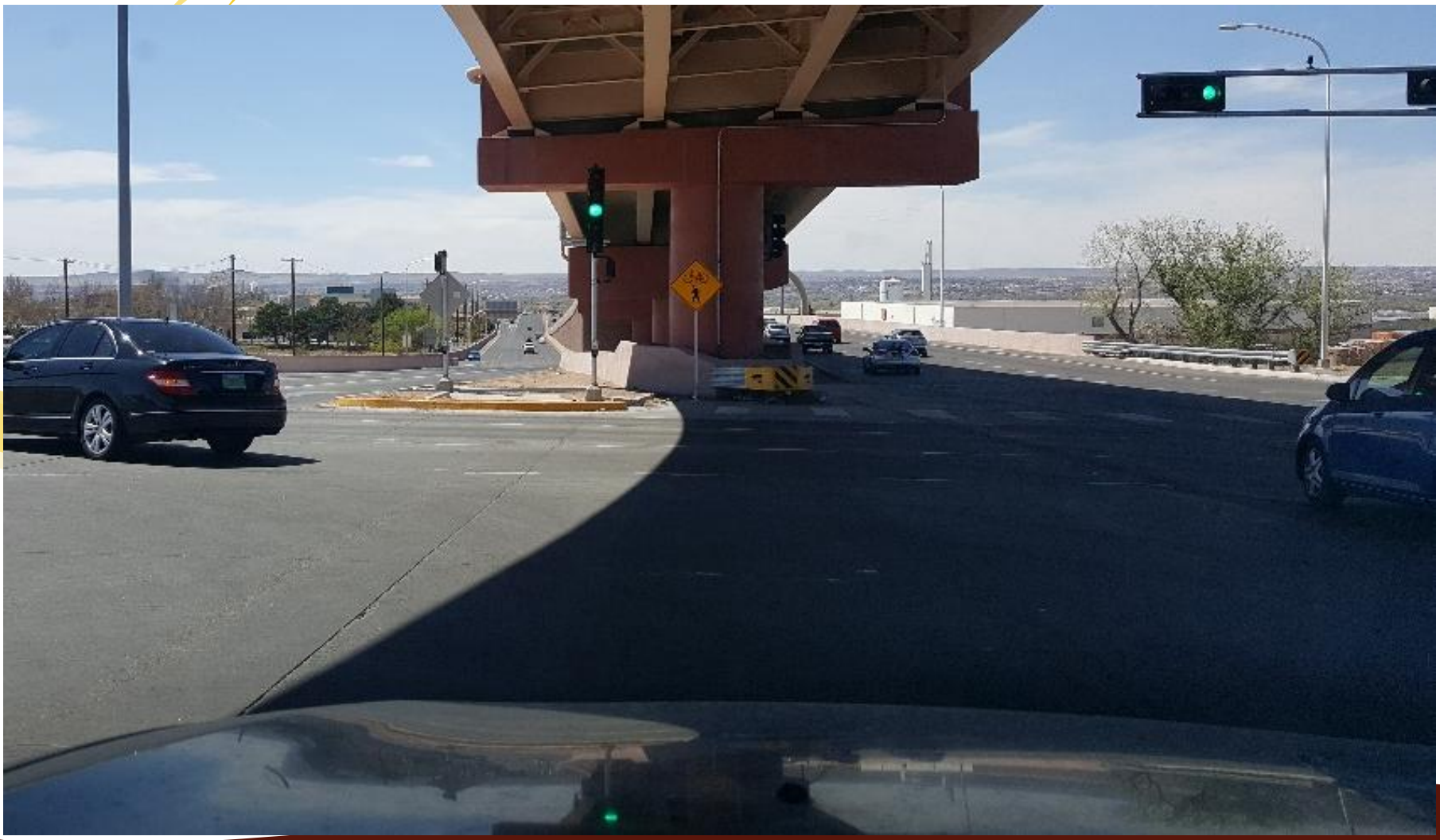
- allows waiting motorists to make a permitted left-hand turn after yielding
- shown to help drivers make fewer mistakes, making motorists safer during heavy traffic
- reduce delays when traffic is light.

But Did you Know…

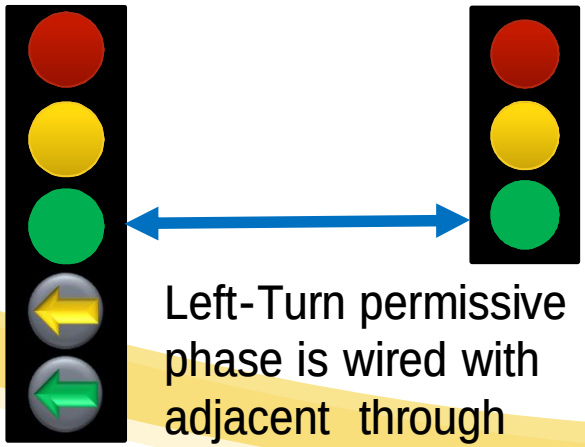
Flashing Yellow Arrow operation could have an added benefit for pedestrians as well.

Permitted Left-Turn/Pedestrian Phase Conflict

Hardwire Conundrum

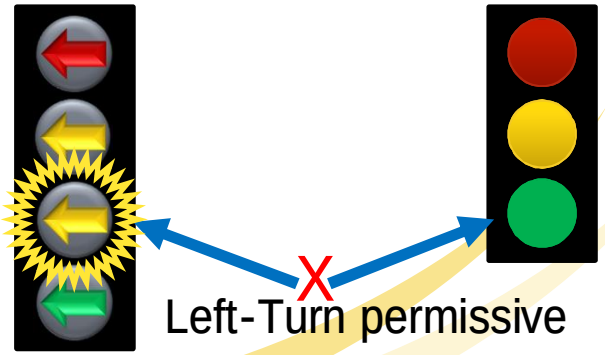


5 Section Head Wiring



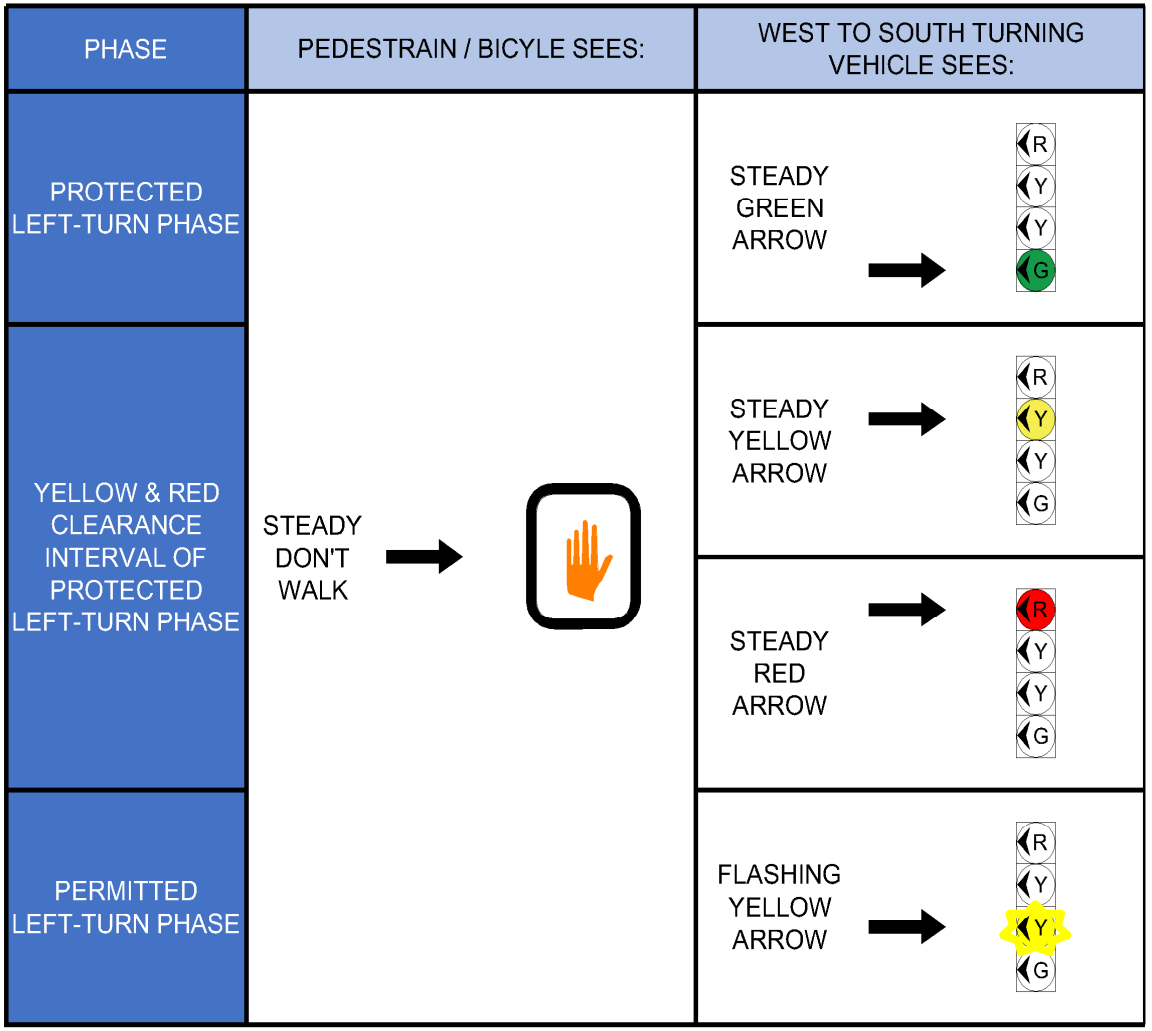
Left-Turn permissive phase is wired with adjacent through phase.

4 Section Head Wiring

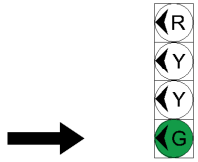
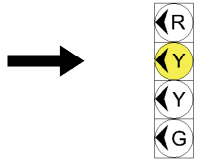
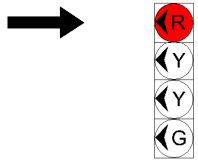
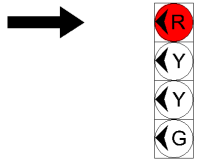
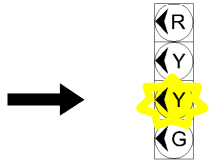


Left-Turn permissive phase and adjacent through phase are wired separately.

FLASHING YELLOW OPERATION WITHOUT PEDESTRIAN CALL

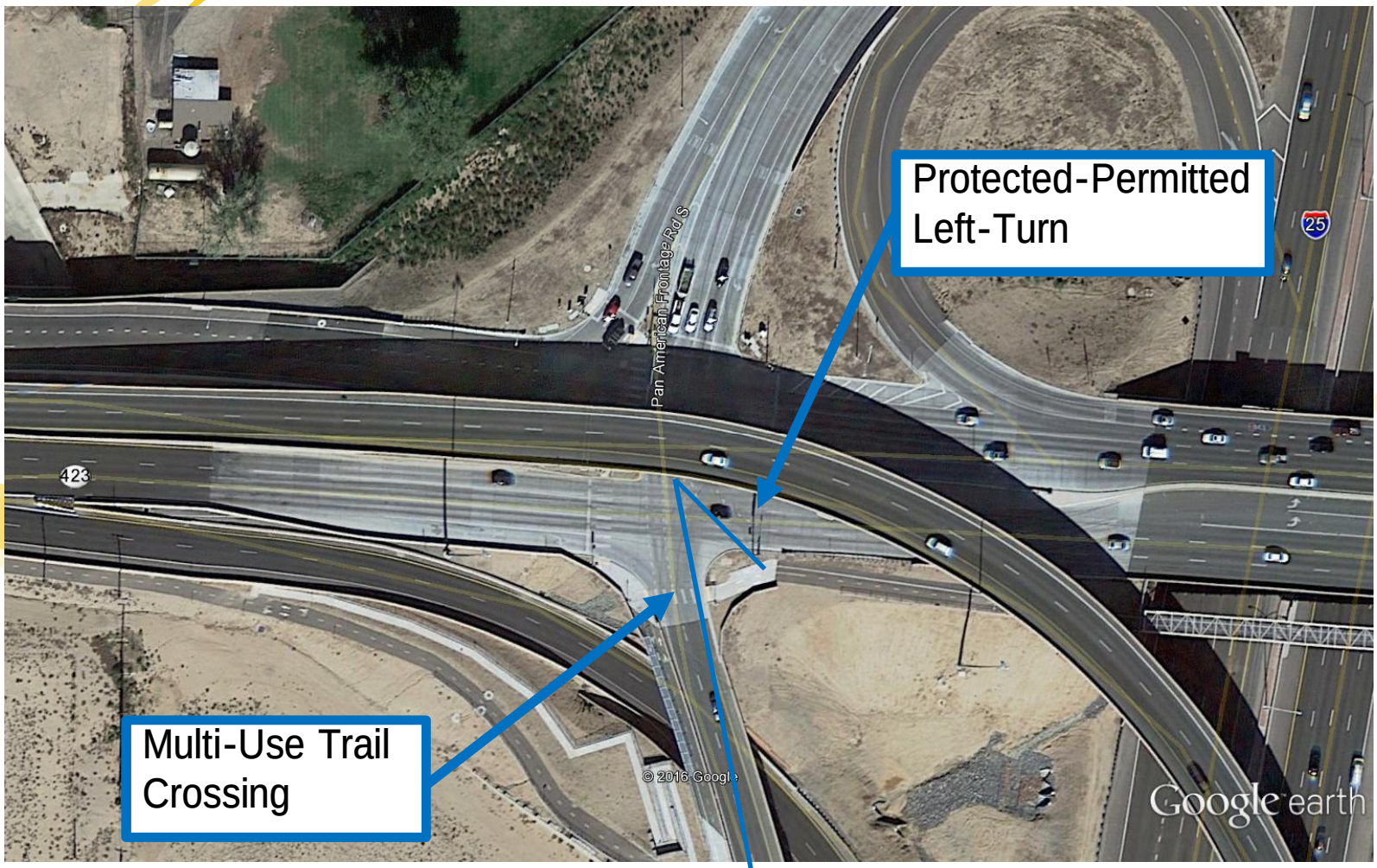


FLASHING YELLOW OPERATION WITH PEDESTRIAN CALL

PHASE	PEDESTRAIN / BICYLE SEES:	WEST TO SOUTH TURNING VEHICLE SEES:
PROTECTED LEFT-TURN PHASE	STEADY DON'T WALK	STEADY GREEN ARROW 
YELLOW & RED CLEARANCE INTERVAL OF PROTECTED LEFT-TURN PHASE		STEADY YELLOW ARROW 
		STEADY RED ARROW 
PEDESTRIAN WALK PHASE	STEADY WALK	STEADY RED ARROW 
PEDESTRIAN CLEARANCE INTERVAL	FLASHING DON'T WALK	
PERMITTED LEFT-TURN PHASE	STEADY DON'T WALK	FLASHING YELLOW ARROW 

PB2

Case Study



PB2 Insert figure showing unatural bike crossing direction on trail
Patrick Byrd, 7/5/2016

NORTH
INTERSTATE
25

Pan American W FR SB
NORTH
25

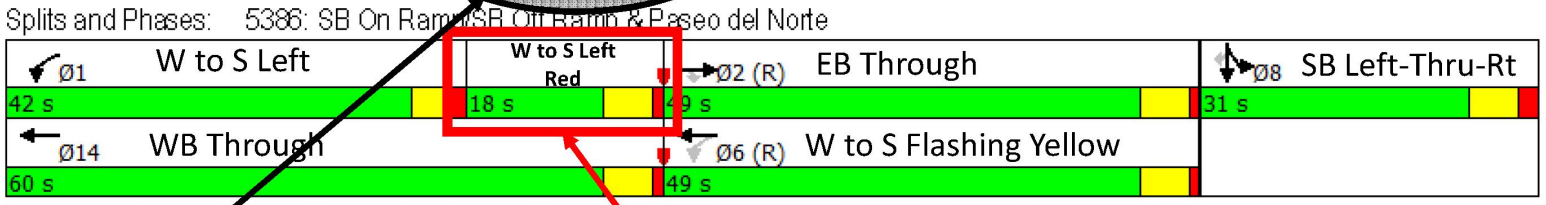
Case Study Facts

- Multi-use trail users concerned about permissive left-turns across counter flow pedestrian crossing.
- Conflicting left-turn has the following characteristics:
  - Limited storage capacity
  - Operating at LOS E during AM Peak
  - Ample site distance provided
  - 2 not related crashes in 2015

LEADING PROTECTED LEFT DELAYS FLASHING YELLOW ARROW PHASE

Flashing Yellow Arrow Not Delayed

Flashing Yellow Arrow Delayed by Pedestrian Call



The start of the permitted Phase cannot be utilized due to EB queue clearance time

Pedestrian plus EB Through which postpones “Flashing Yellow Arrow” of Phase 6

PB1

Average Queue Dispersion of Opposing Through Traffic

Peak Hour	50th Percentile Opposing Through Queue Clearance (s)	Conflicting Pedestrian Walk Plus Clearance Time (s)
AM	42.8	18
Midday	28.1	
PM	36.3	

PB1 Add photo here
Patrick Byrd, 7/5/2016

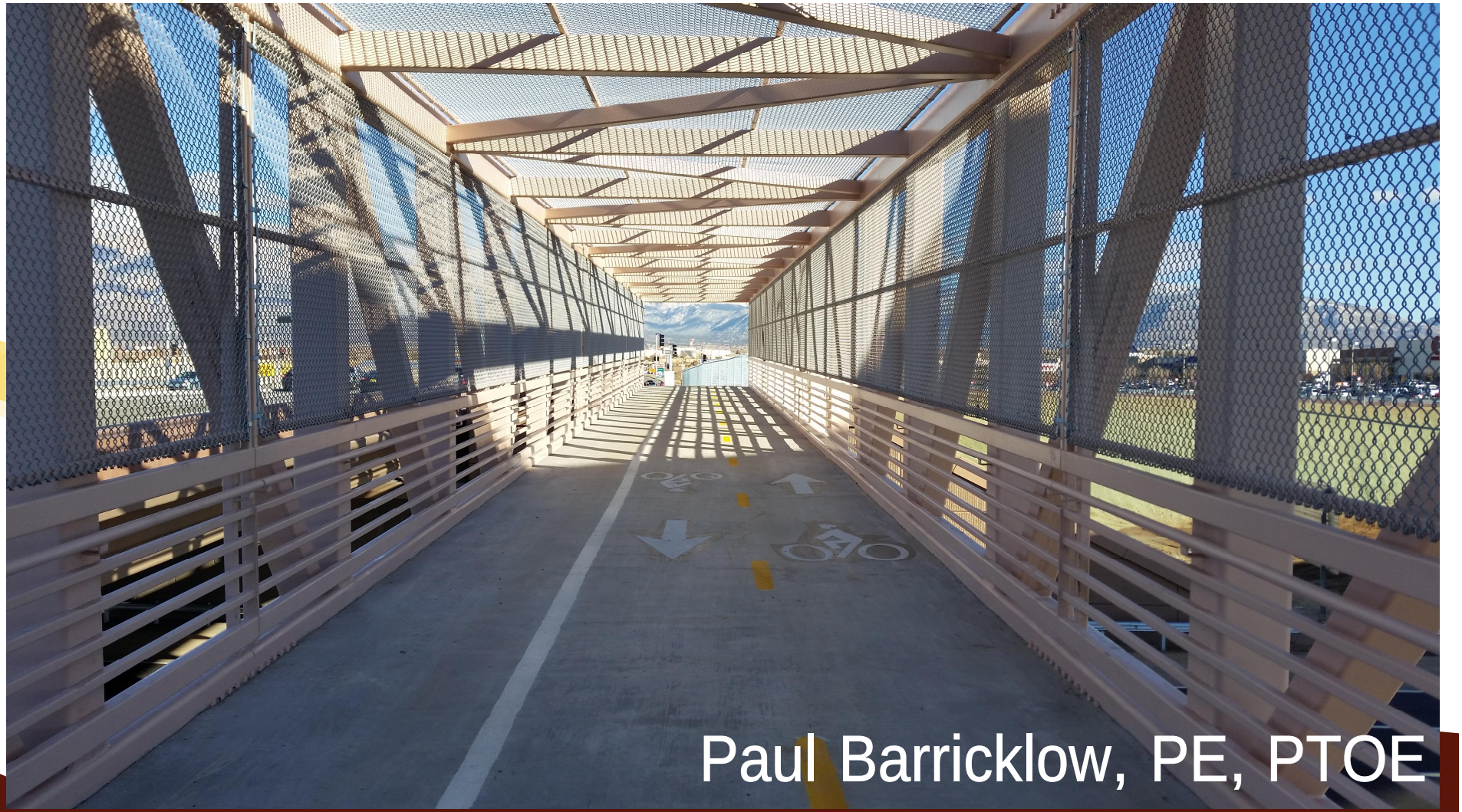
Case Study
Implementation Requirements

- Replacement of Left-Turn Signal Heads
- Rewiring of Left-Turn Phase
- Possible Installation of New MMU2 Unit
- Internal Controller Adjustments
  - Logic / Conflict Programming

Key Ideas

- Pedestrian Delayed Flashing Yellow Arrow Phase provide:
  - Protected Pedestrian Phase
    - Except Rights
  - Concurrent Queue Clearance and Ped Phase
  - Breaking the Hardwire Connection provides Phasing and Sequence Flexibility

QUESTIONS?



QUESTIONS?

Paul Barricklow, PE, PTOE

pbarricklow@lee-eng.com
(505) 338-0988

Operate during a permissive left-turn phase and increase driver awareness to find appropriate gaps before turning.