

CE 474 – Class 07

September 9, 2015

Agenda for today and next time...

Class 07 (9.09)

Synthesis: A10/A11

Mini-lecture: A13

Discuss: A13 CTQ

Do/Discuss: A14 (team)

Prepare: A15

Class 08 (9.10)

[Field work, brief class meeting]

Do: A15 (Field, group) (due 9.14)

Homework (due 9.14):

- Read: A16
- Read: STM (pp 5.1-5.16)
- Do: A16 CTQ (new question) (individual)
- Read: Chapter 4 overview
- Read: A17
- Do: A17 CTQ (individual)

TRANSPORTATION in the news

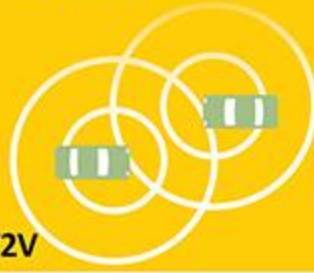
The front line of crash avoidance technology

In-vehicle warning systems use radar, cameras, and other sensors to scan the roadscape and warn drivers—with visual, auditory, and physical alerts—of impending crashes.



In-Vehicle

With **vehicle-to-vehicle (V2V)** technology, vehicles within range communicate wirelessly to exchange information such as speed and location to help drivers avoid catastrophic crashes.



V2V

Similar to V2V, **vehicle-to-infrastructure (V2I)** is a wireless info-swap between vehicles and roadside fixtures, such as traffic signals and signs.



V2I

If completely effective, the full suite of safety technology – V2V, V2I, and in-vehicle crash warning systems – could potentially address about

95 percent

of all vehicle crashes involving unimpaired drivers.

TRANSPORTATION ... in the news

A driver is traveling too fast and loses control of the vehicle



Crash Count: **498,000**

\$64.7 billion/year

Safety impact: With V2I, a connected roadside sign alerts drivers of upcoming unsafe conditions or road features, such as a sharp curve or slippery conditions, and advises the driver to reduce speed.

A driver slows down or stops and is rear-ended

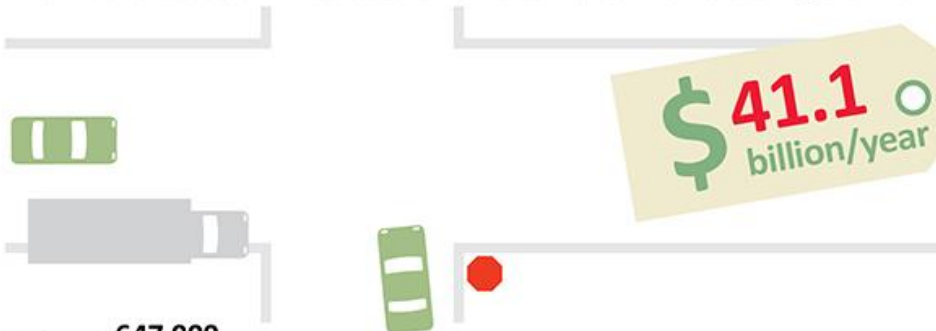


Crash Count: **1,340,000**

\$41.9 billion/year

Safety impact: In-vehicle crash avoidance alerts the trailing driver that the car in front has stopped or is slowing, giving the trailing driver advance warning to apply the brakes.

A driver crosses an intersection and collides with crossing traffic



Crash Count: **647,000**

\$41.1 billion/year

Safety impact: A parked truck obscures the view of a driver turning left from a stop sign. With V2V, the car going through the intersection automatically alerts the driver turning left, enabling the driver to brake and avoid impact.

10 Using High Resolution Field Data to Visualize Traffic Flow



11 From Model to the Real World: Field Observations



Group questions:

- Take 15 minutes to develop answers to questions.
- Skip question #5.
- Prepare word document with concise answers.
- Report on results.

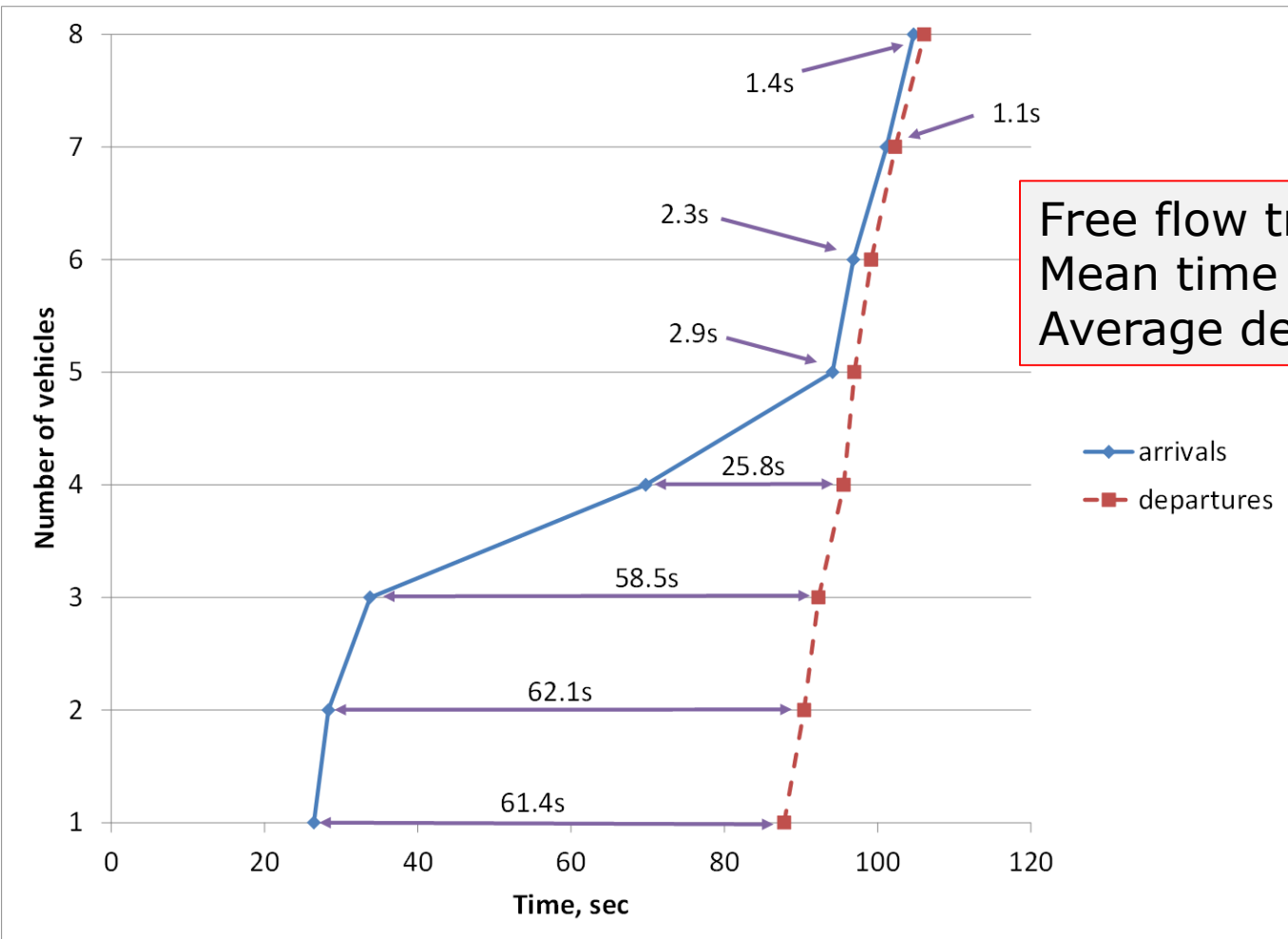
ACTIVITY 10

Using High Resolution Field Data to Visualize Traffic Flow



ACTIVITY 11

From Model to the Real World: Field Observations

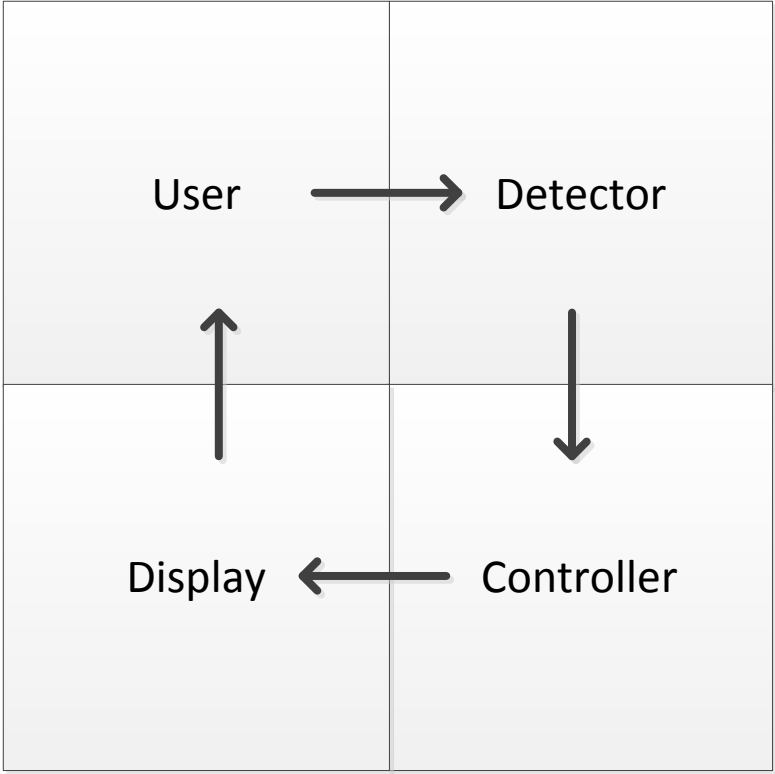


Free flow travel time = 1.25s
Mean time in system = 26.9s
Average delay = 25.7s/veh



Key Terms and Issues

1. Define “movement” and “phase”.
2. What is a ring?
3. What is a concurrency group?
4. What is the purpose of a ring barrier diagram?

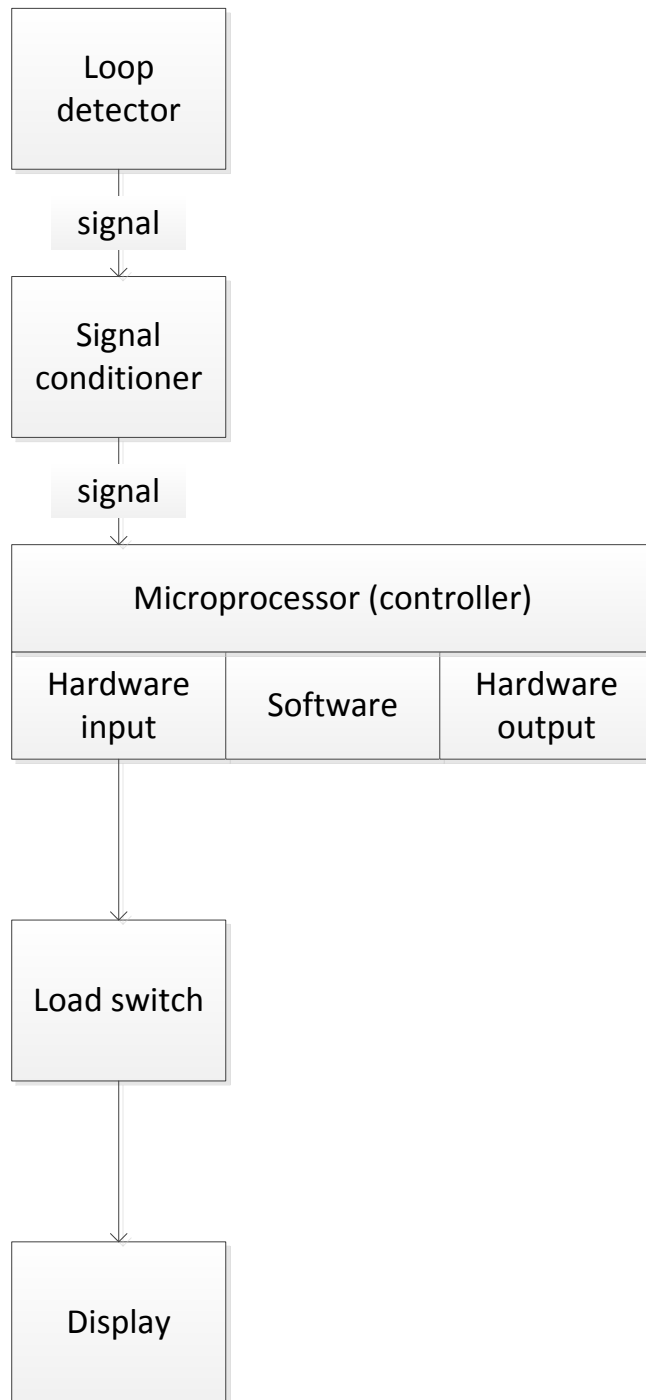


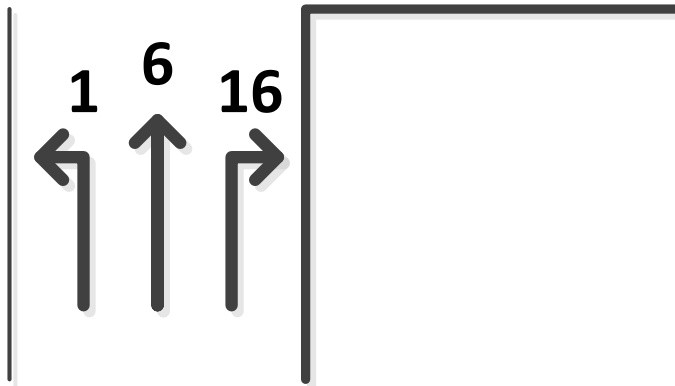
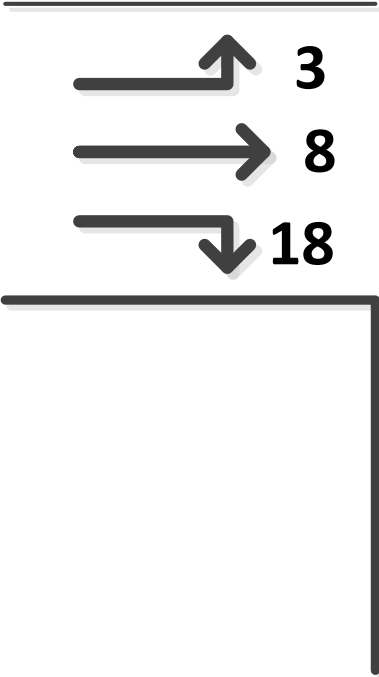
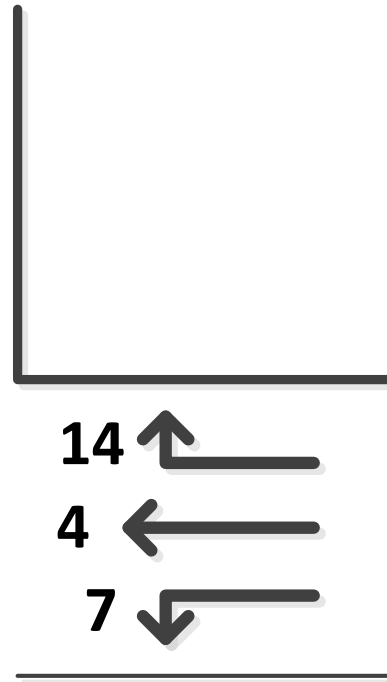
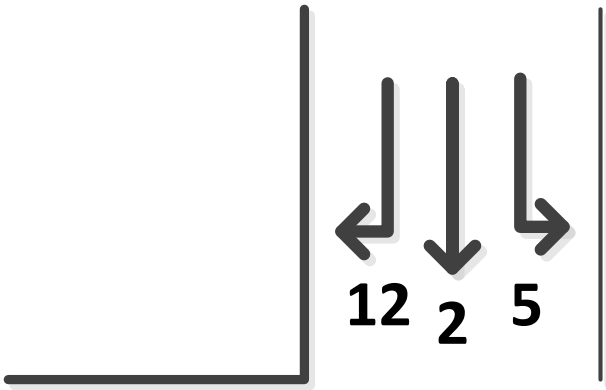
Detector amplifiers

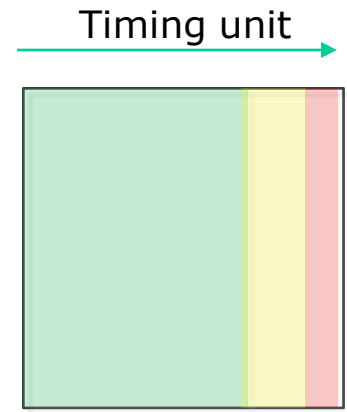
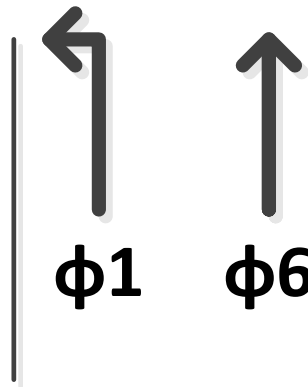
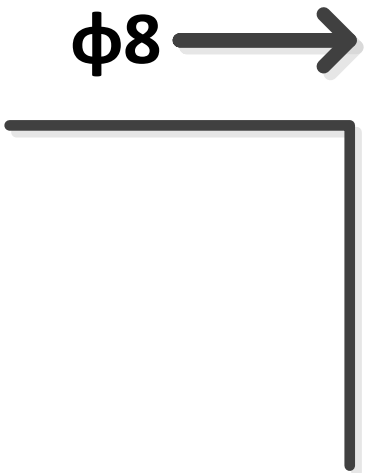
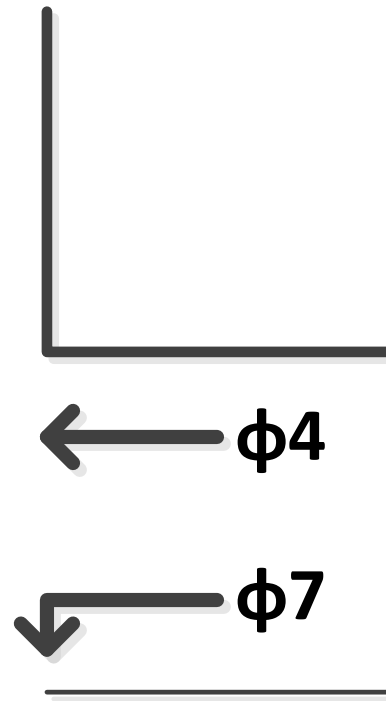
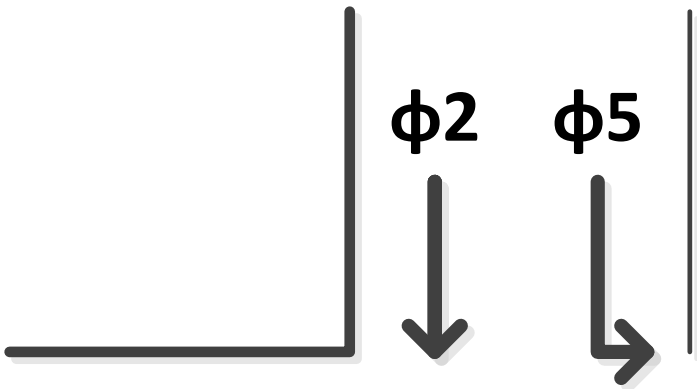
Controller

Load switches









Subject Phase

1

2

3

4

5

6

7

8

1

2

3

4

5

6

7

8

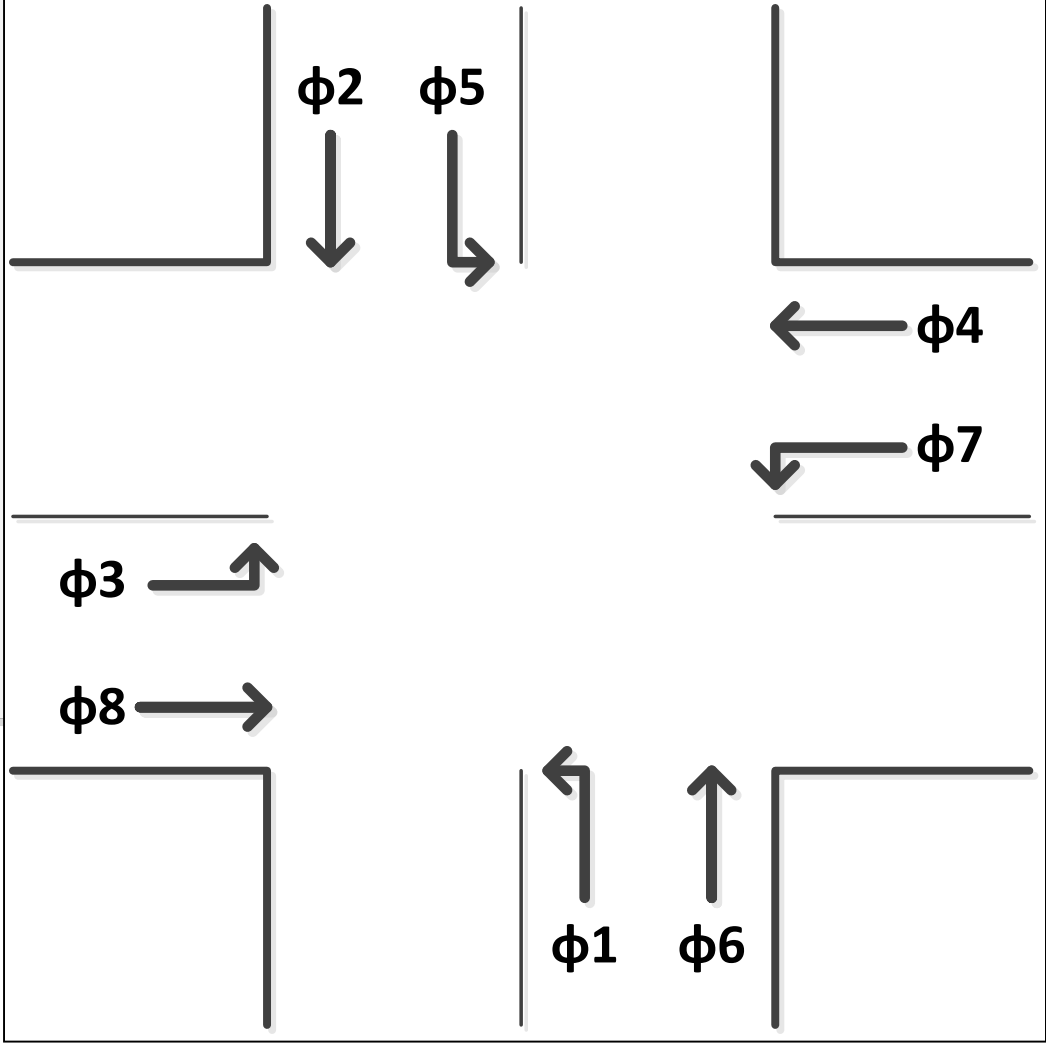
Compatible or Conflicting Phases

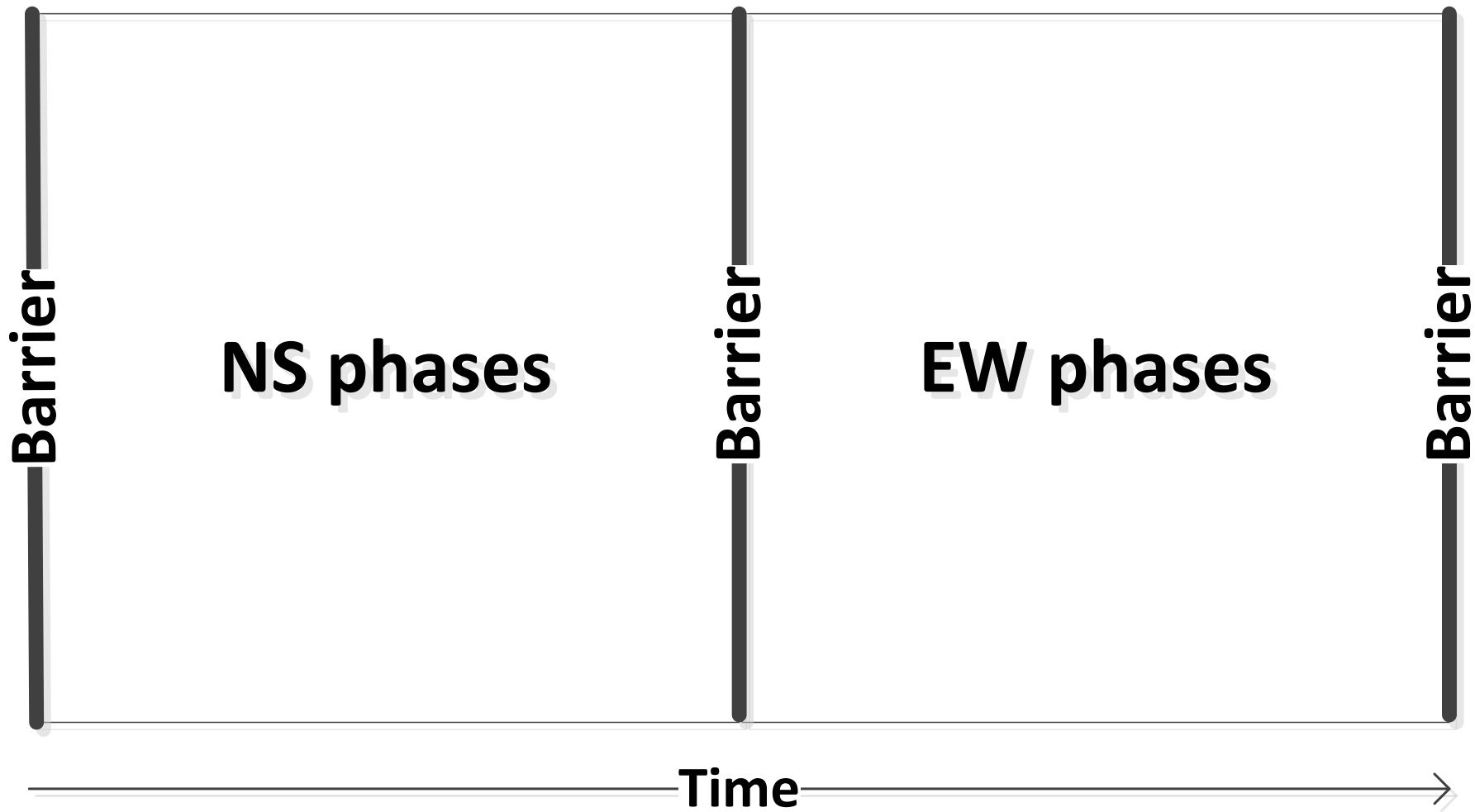
Subject Phase

	1	2	3	4	5	6	7	8
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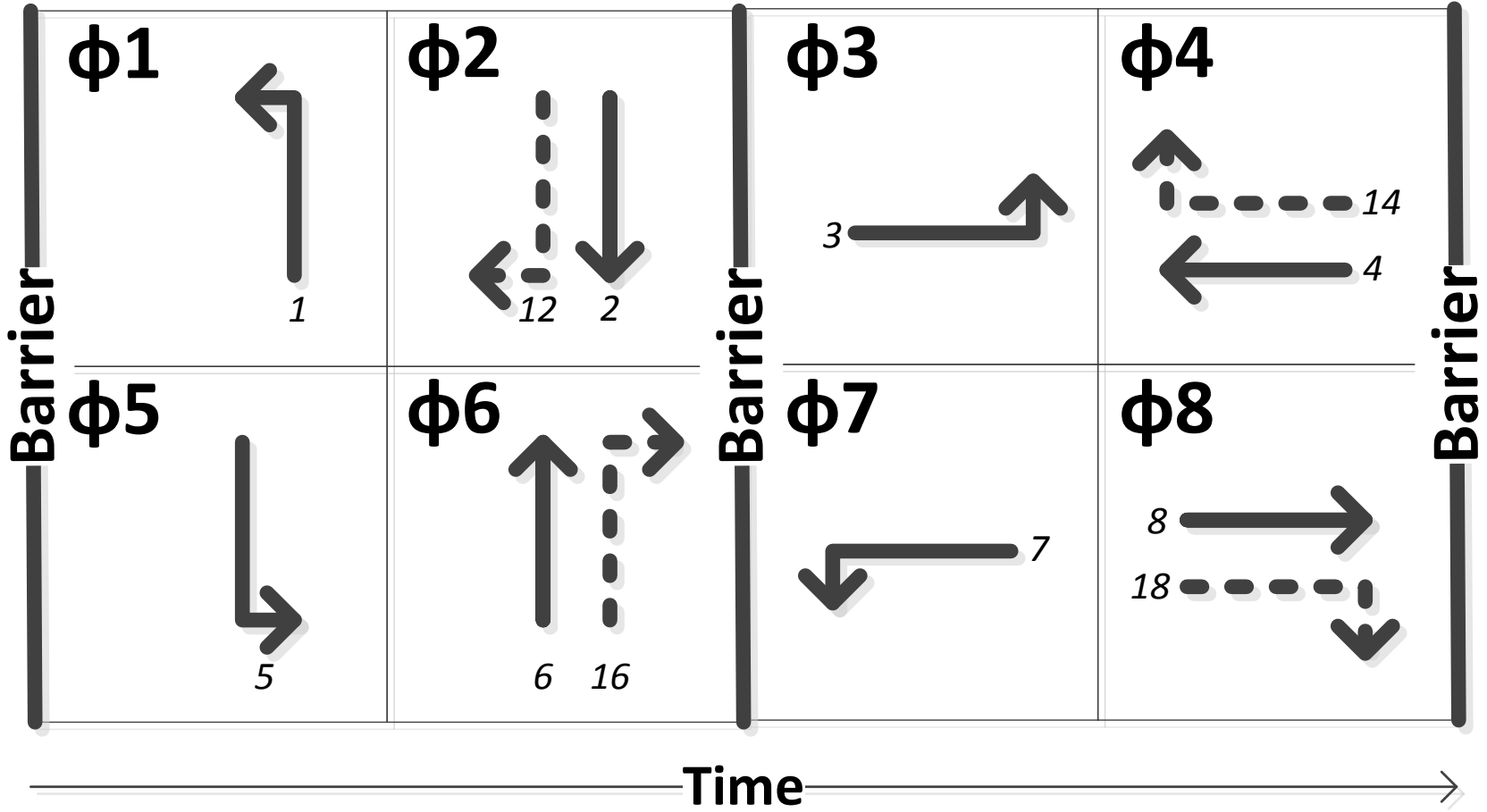
Compatible or Conflicting Phases

1	
2	X
3	X
4	X
5	
6	
7	X
8	X





Ring 2
Ring 1



Barrier

ϕ_1, ϕ_5

ϕ_5, ϕ_2

OR

ϕ_1, ϕ_6

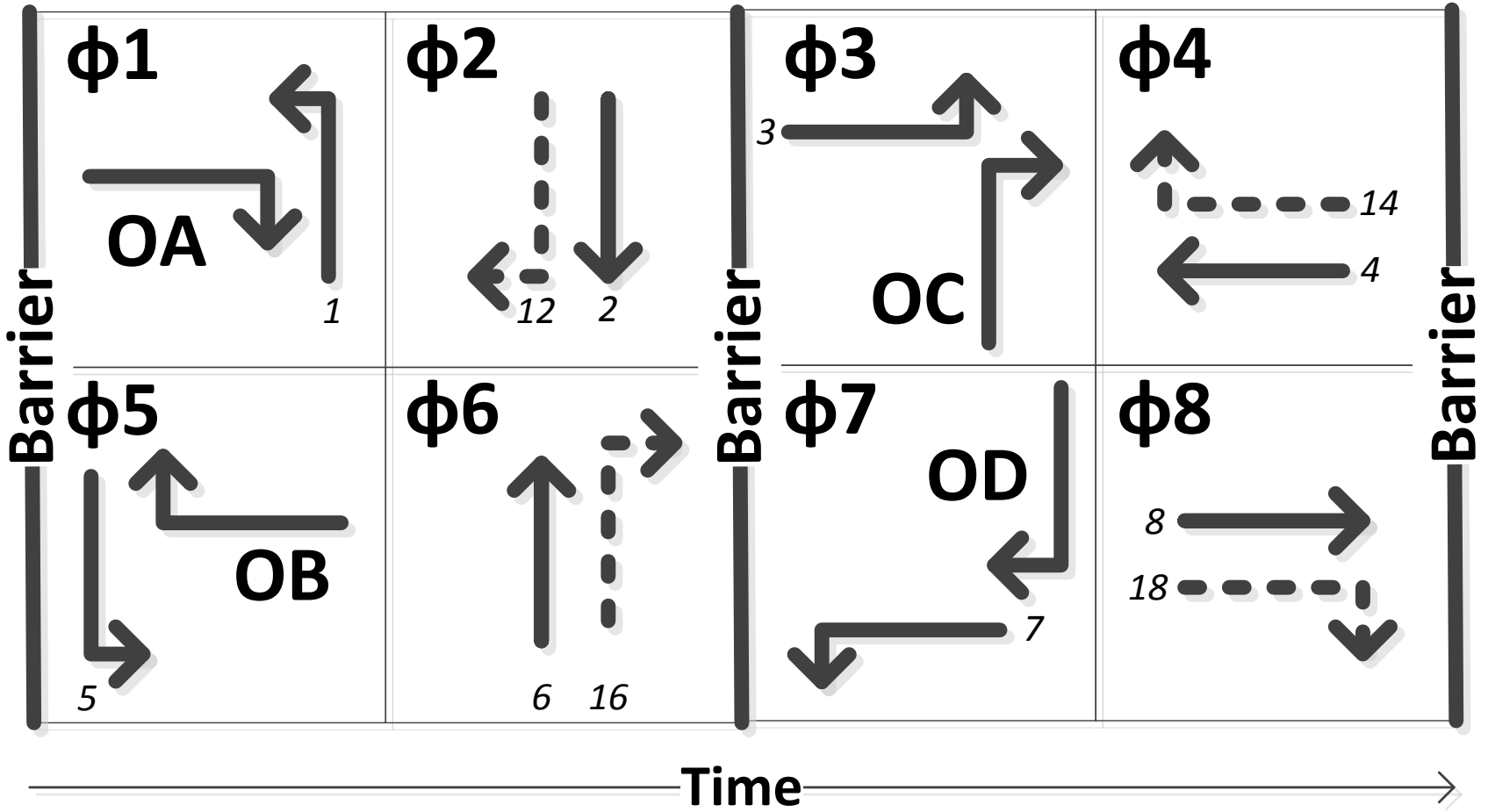
ϕ_2, ϕ_6

Barrier

Time

Ring 2

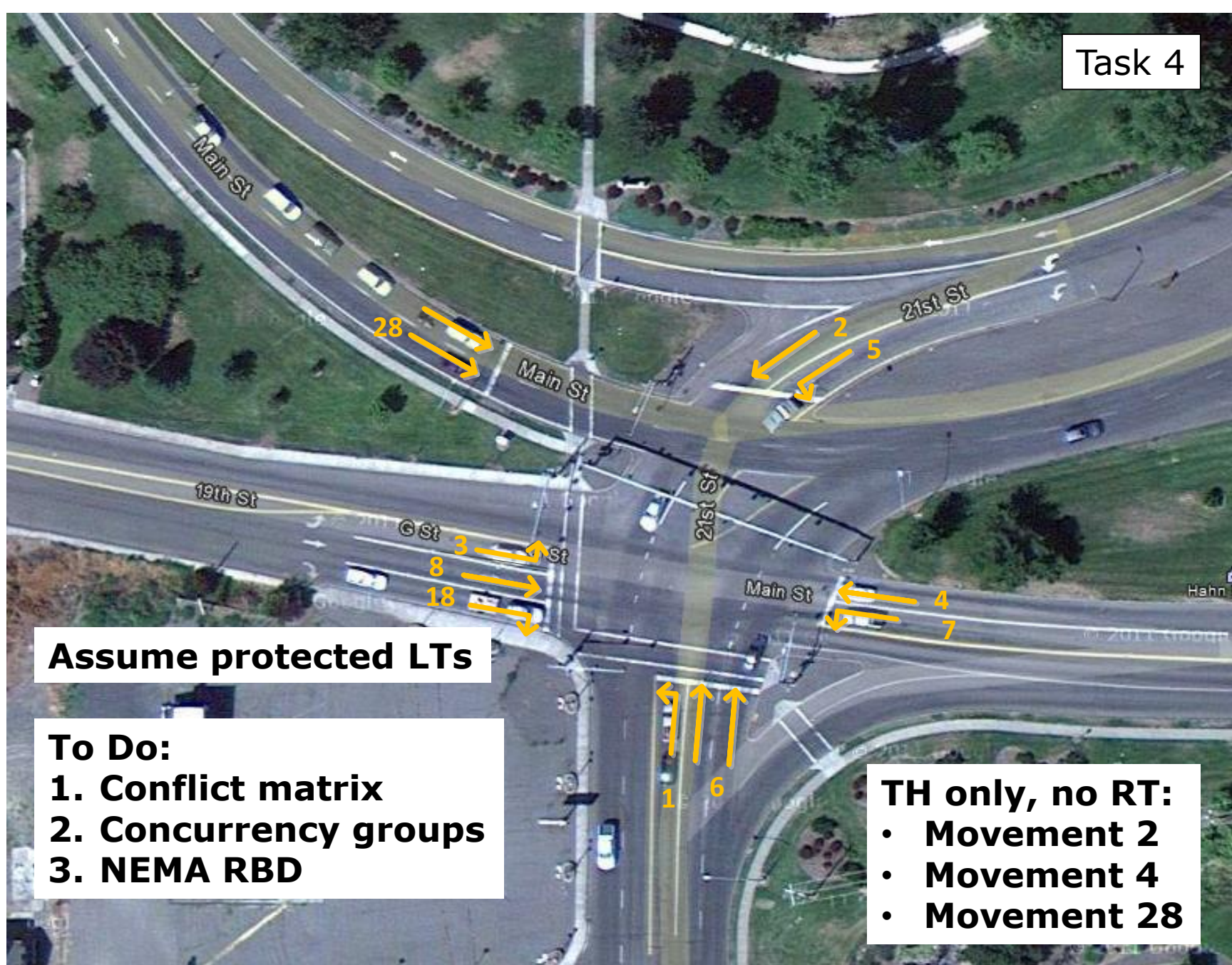
Ring 1





Note: Corrected Figure 7

Movement	Phase controlling movement	Required time (sec)
SBLT	5	5
SBTH	2	25
NBLT	1	10
NBTH	6	15



Assume protected LTs

To Do:
1. Conflict matrix
2. Concurrency groups
3. NEMA RBD

TH only, no RT:

- Movement 2
- Movement 4
- Movement 28

	Subject movement											
Conflicting (X) or compatible (C) movement		1	2	3	4	5	6	7	8	18	28	
	1											
	2											
	3											
	4											
	5											
	6											
	7											
	8											
	18											
	28											

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