

Lecture 2 (Chapter 20)

Actuated Signal Control

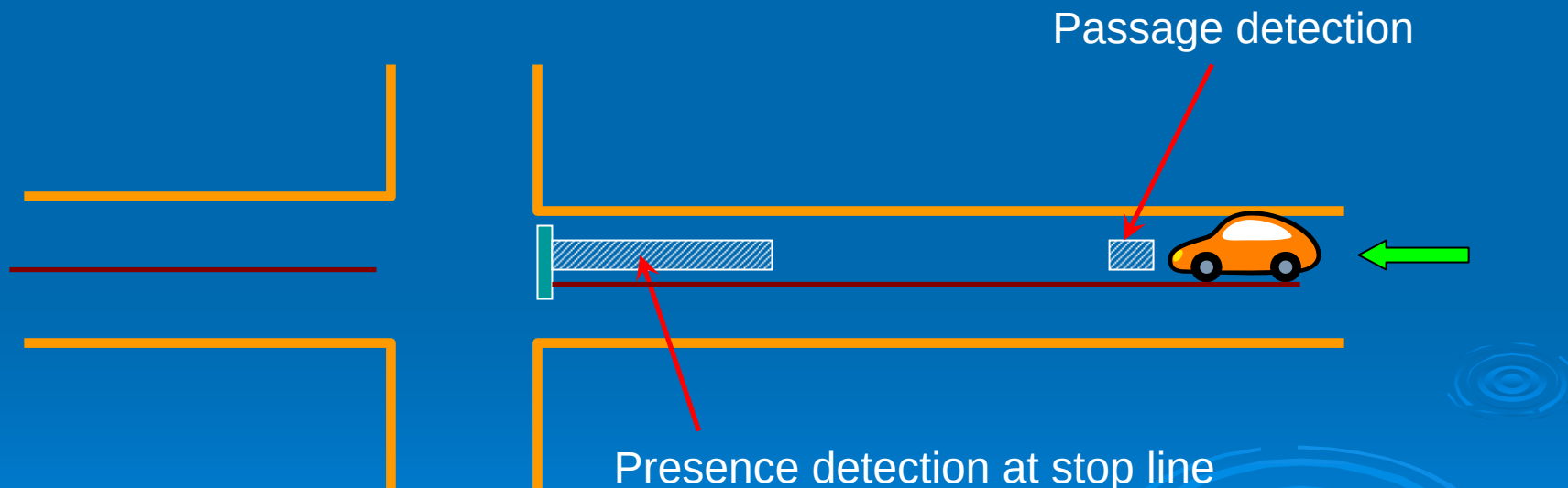
Actuated Signal Operation

- Types of signal control
 - Fixed or pre-timed
 - Fully actuated
 - Semi-actuated
- Fully actuated signal
 - Based on vehicle detection
 - varied green and cycle
- Types of detectors
 - Inductive loop
 - Video image



Actuated Signal Operation

- Types of detection
 - Passage or point detection
 - Presence or area detection



Terms for Actuated Operation

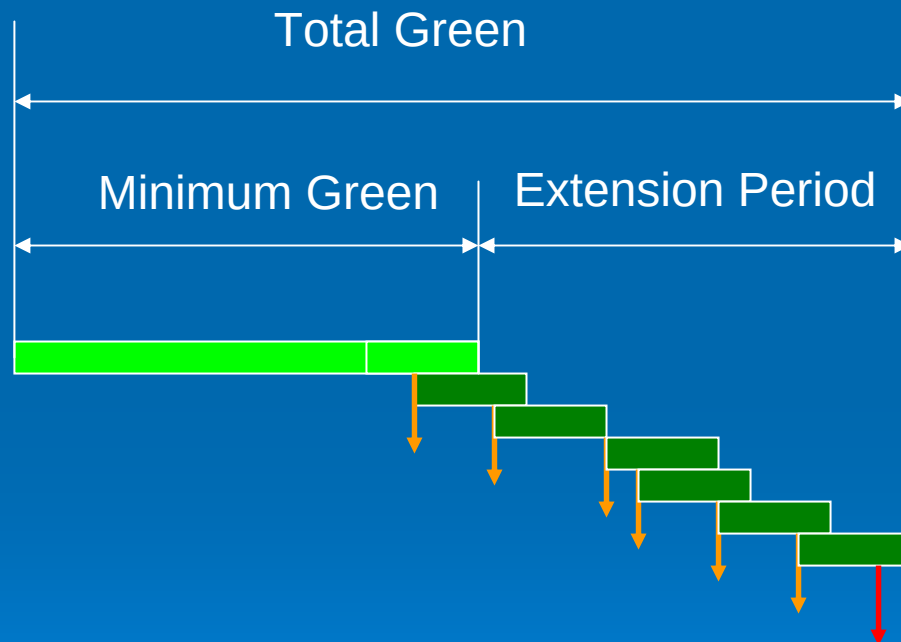
➤ Controller terms

- Minimum green (5~10 sec)
- Minimum initial (min. initial + Unit Extension = Min Green)
- Unit or vehicle extension or passage gap (0.0~4.0 sec)
- Maximum green
- Min Recall and Max Recall



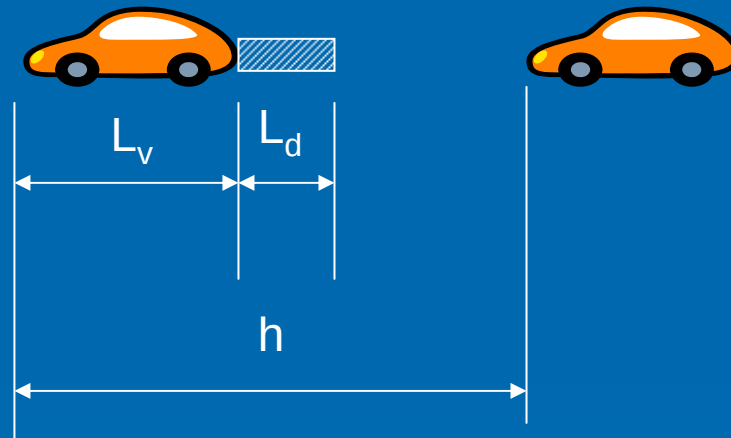
Terms for Actuated Operation

➤ Actuated controller operations



Passage Gap and Maximum Allowable Headway

- Maximum allowable headway is the headway above which the signal phase will gap out



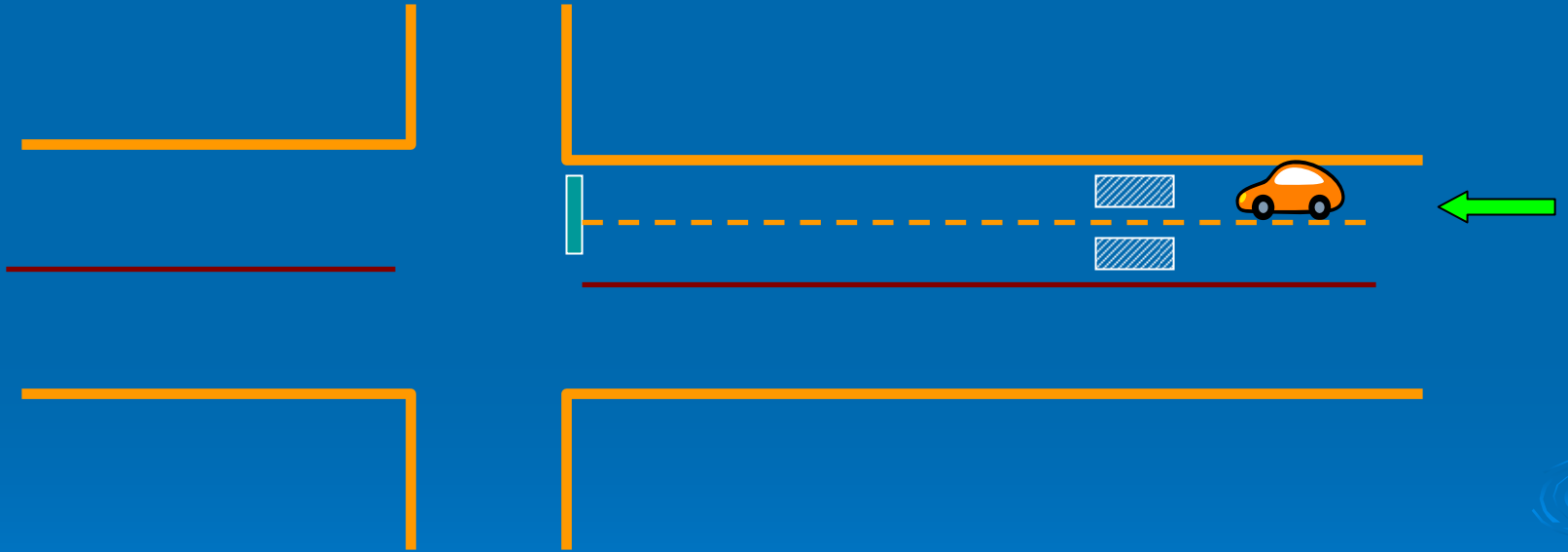
$$h = \frac{L_d + L_v}{1.47S} + P$$

Example

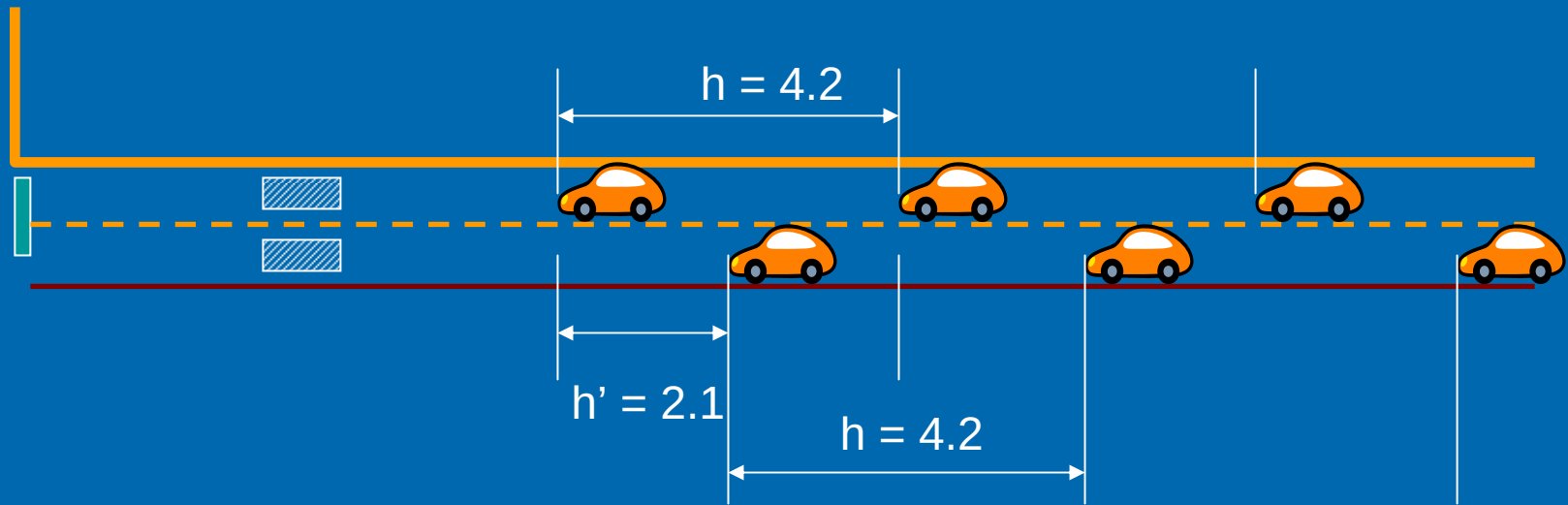
- Vehicles traveling on a signalized approach at the speed of 50 mph. Assume the detector length on the approach is 6 feet, and the vehicle length is 15 ft. If the signal operation is designed to gap out the phase when a vehicle headway is greater than 4.0 sec. What passage gap value (unit extension) should be set in the signal controller?

Actuated Control and Detection on a Multi-lane Approach

- Current practice for multi-lane approach is to have the detectors on both lanes connected to the same detector (phase).



Single Detection vs. Lane-by-lane Detection



Exercise

- Set up a signalized intersection in Synchro with two one-way streets (Eastbound and Northbound). The intersection is controlled with a fully actuated controller. The eastbound is controlled by phase 2, and the northbound is controlled by phase 4. Both approaches have a stopline detector of 40 ft long. The eastbound is the main street, so green resides on the eastbound direction when there is no vehicle call on the northbound direction. Using the following traffic demand: Eastbound: 400 vph; Northbound: 200 vph.
Assume minimum green (minimum initial) = 5 seconds, and the passage gap 3.0 sec.
- (1) Observe the animation and understand the principles of actuated operation.
- (2) What are the average delays for the two approaches from Synchro?
- (3) Run SimTraffic for 15 minutes with an initial period of 5 min. Report the same delays based on SimTraffic runs.
- (4) Change the passage gap from 3.0 sec to 2.5 sec, and perform (2) and (3) above.