

CE474: Traffic Systems Design-Fall 2004

Lab 11 – Diamond Interchange Design
November 9, 2004

Zhen Li

National Institute for Advanced Transportation
Technology (NIATT), University of Idaho

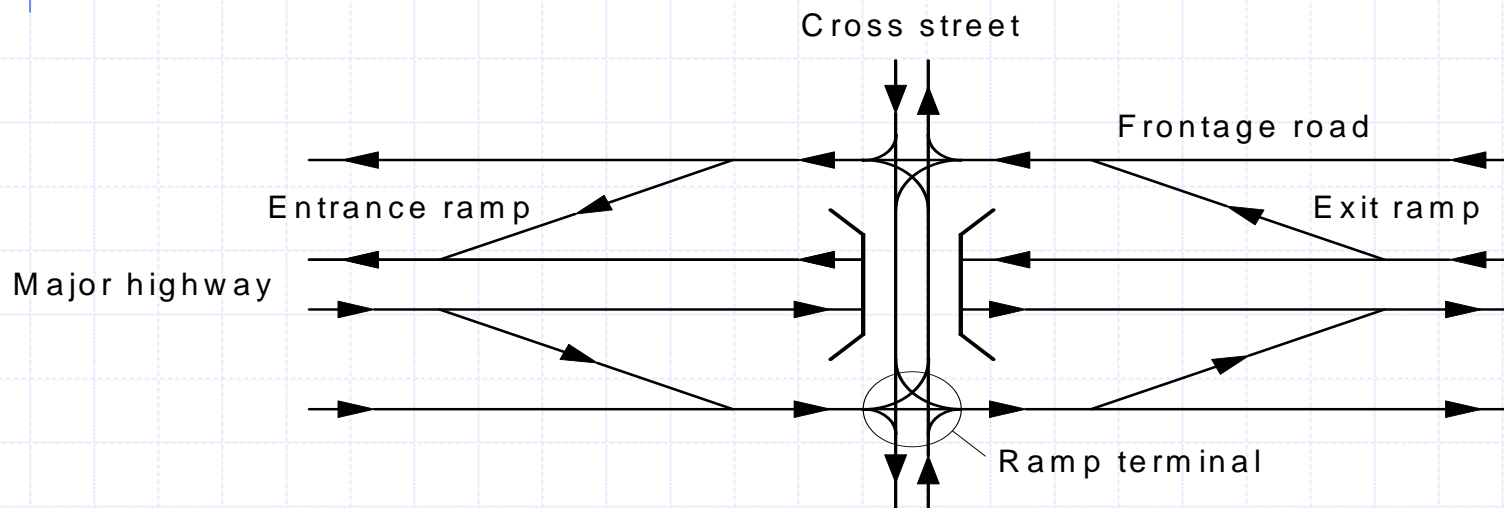
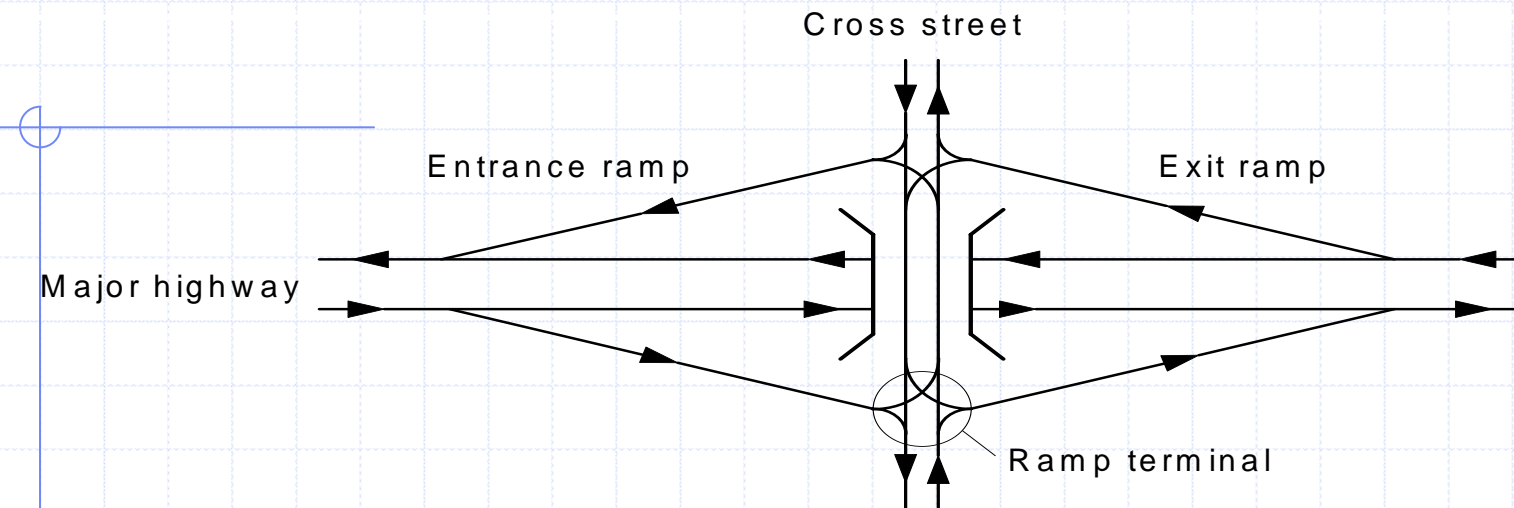
Ahmed Abdel-Rahim

Civil Engineering Department, University of Idaho

Today's Activities

- ◆ Background/design procedure
- ◆ CORSIM Model

Diamond Interchange



Diamond Interchange Signal Design

Design Issues:

1. traffic demand,
2. turn movement intensity,
3. variability of flow,
4. interchange spacing,
5. available signal controller hardware.

Diamond Interchange Signal Design

- The typical diamond interchange has six approaches that are controlled by two traffic signals at the diamond interchange.
- Four of the approaches are considered exterior to the interchange and two serve vehicles within the interior.

Diamond Interchange Signal Design

- Considering the overall pattern of origins and destinations at the diamond interchange, there are a total of 18 movements.

Diamond Interchange Signal Design

- The main street in this case is considered the arterial phase, $\phi 2$ and $\phi 6$.
- At the left-hand intersection, the opposing approaches (all movements) will use phase $\phi 4$; the interior left turn movement will use phase $\phi 1$.
- At the right-hand intersection, the opposing approaches (all movements) will use phase $\phi 8$; the interior left turn movement will use phase $\phi 5$.

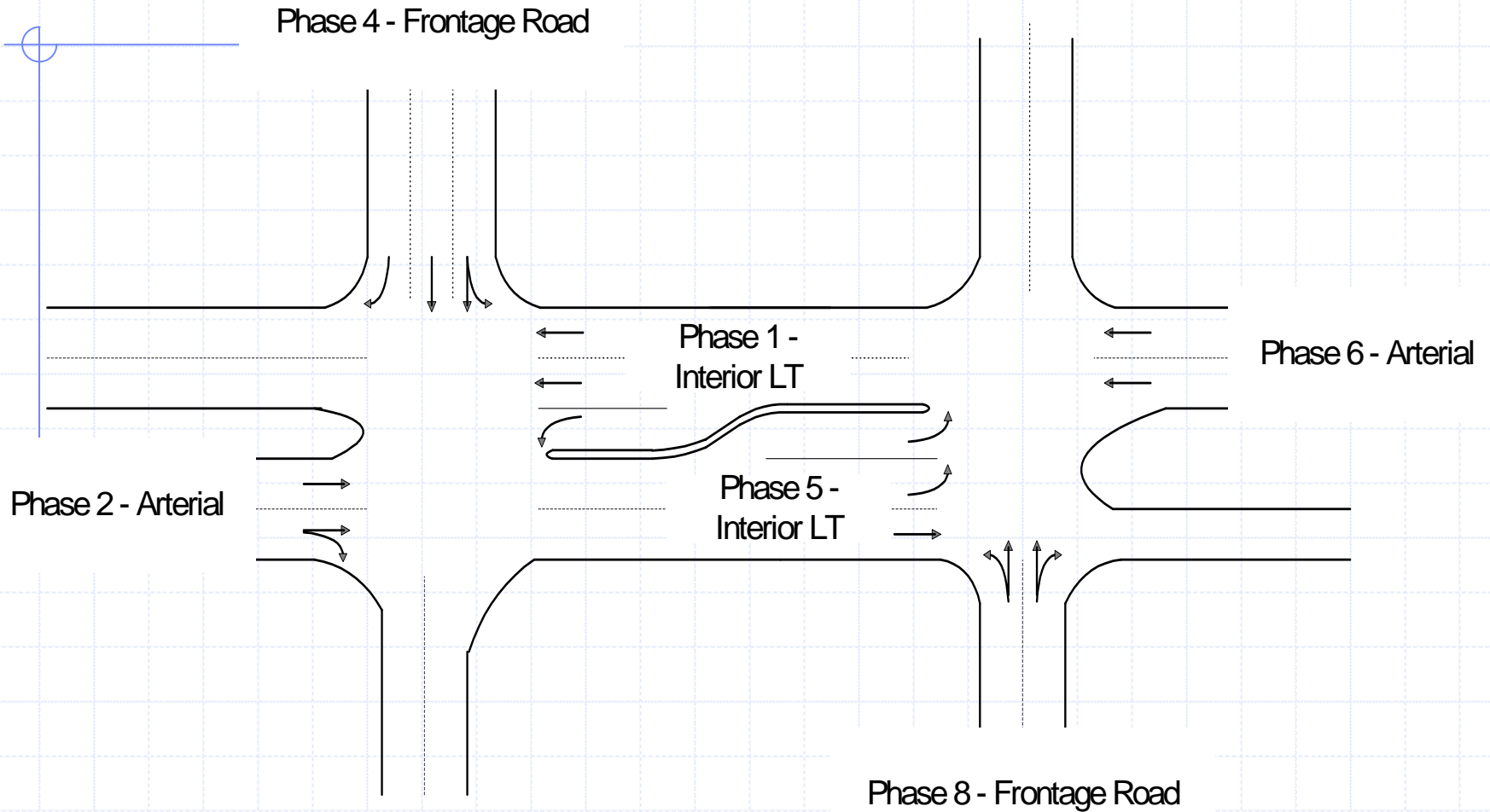
Diamond Interchange Phase Design

- This combination of phases is defined as an overlap. The overlap increases the amount of time provided to the interior through movement of the interchange.
- The interior through movement at right node, labeled OL A. This movement can be operated at the same time as phase $\phi 1$ and $\phi 2$.

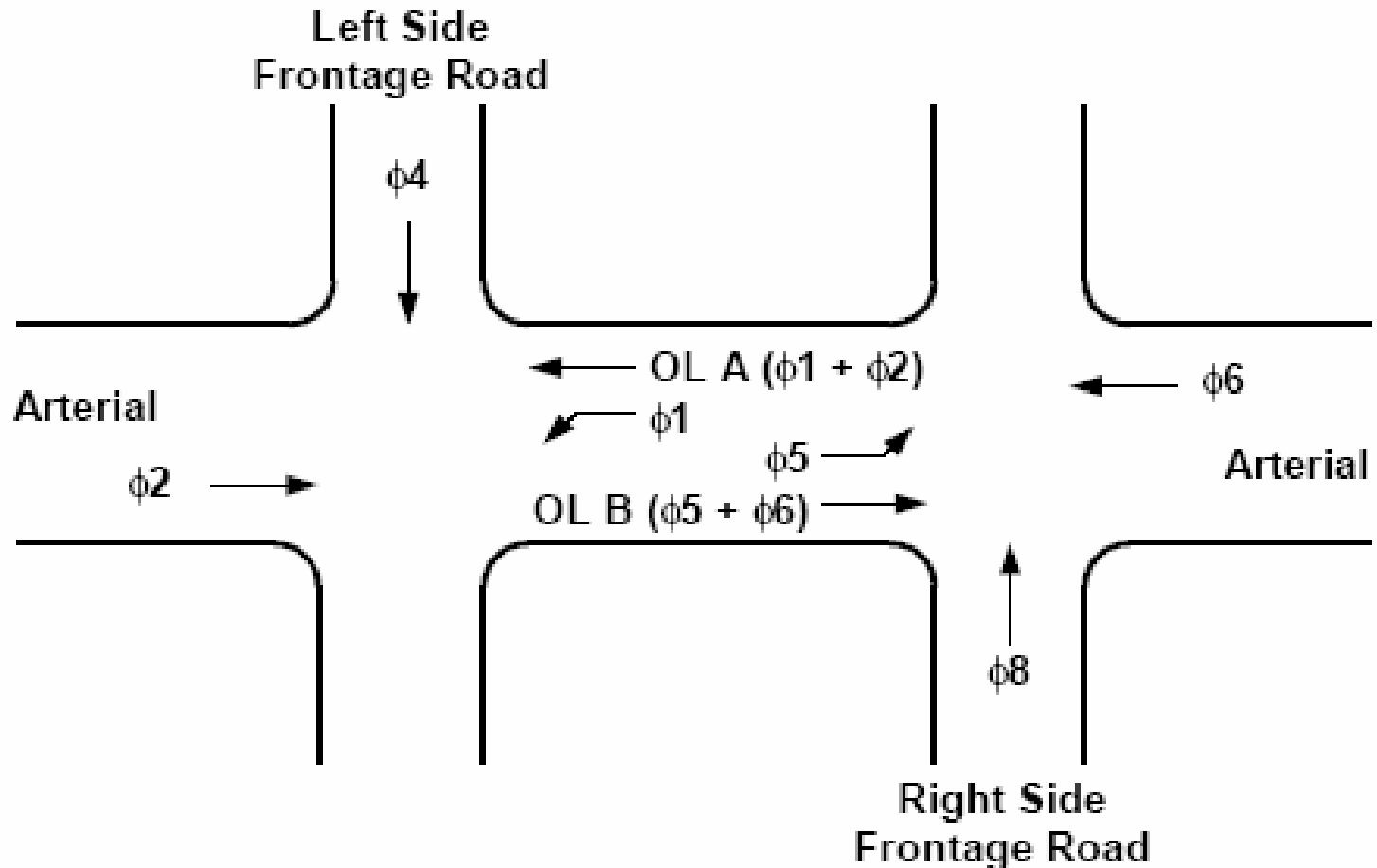
Diamond Interchange Phase Design

The interior through movement at right node, labeled OL B. This movement can be operated at the same time as phase $\phi 5$ and $\phi 6$.

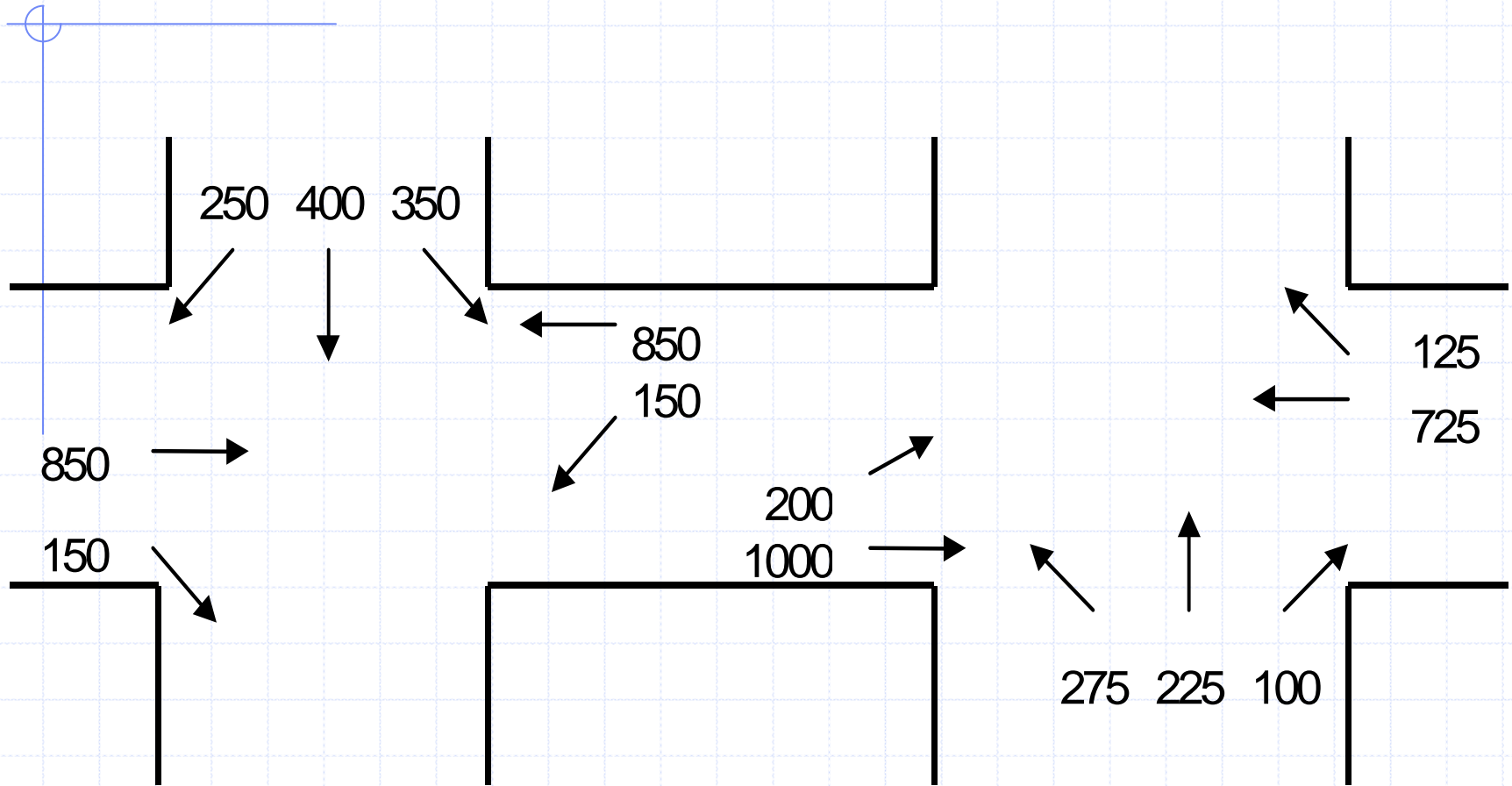
Diamond Interchange Phasing Sketch



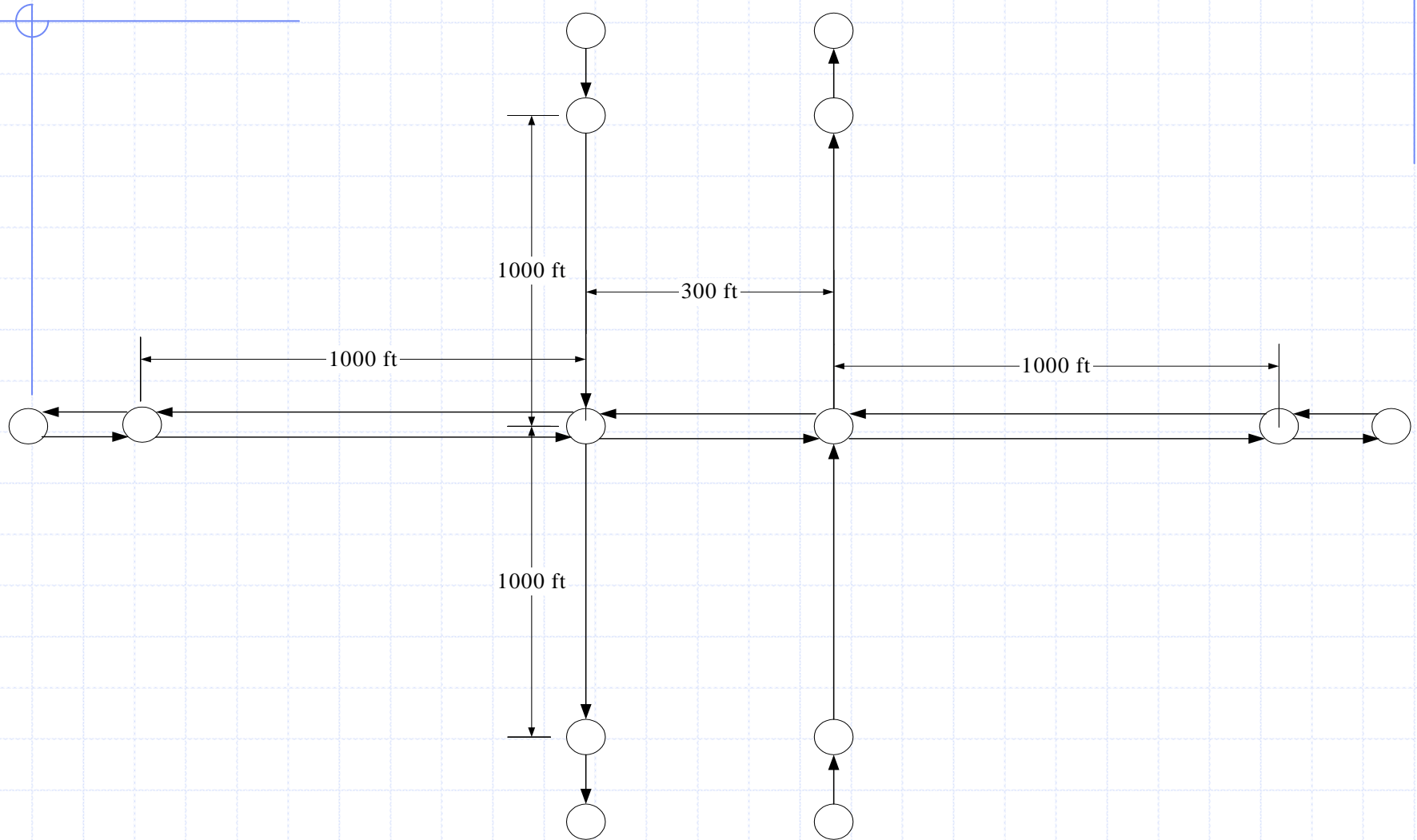
Diamond Interchange Phasing



Diamond Interchange volume



Diamond Interchange CORSIM Network



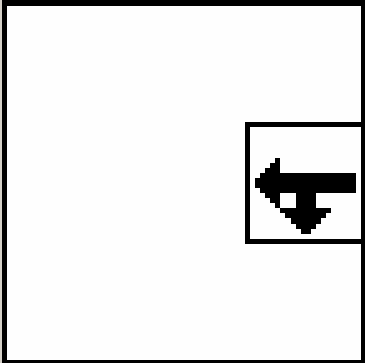
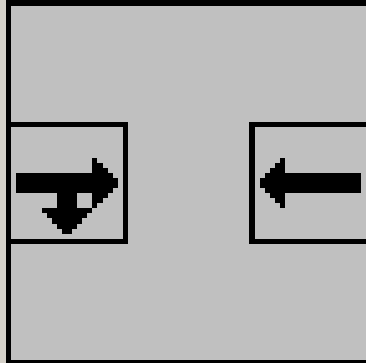
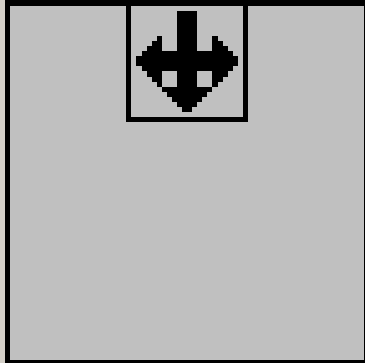
Experiment Procedures

- Step 1: create a new project.
- Step 2: create a new TRAFED file.
- Step 3: Input Network Properties
 - Duration = 900seconds
 - Use defaults for other values.
- Step 5: Create nodes.
- Step 6: Create links.
- Step 7: Edit entrance node

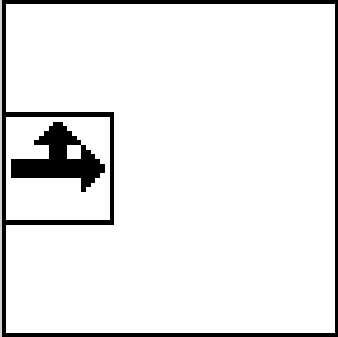
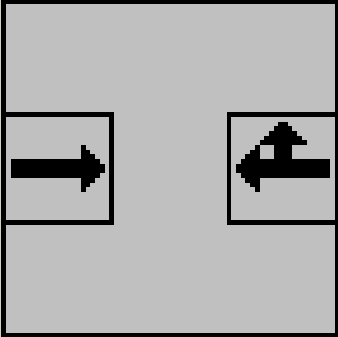
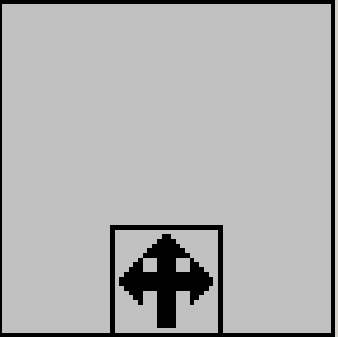

Experiment Procedures

- Step 8: Edit other node
- Step 9: Edit Link (Left turn and right turn pockets).
- Step 10: Edit Controller for nodes
- Step 11: Translate.
- Step 12: Run.
- Step 13: Watch.
- Step 14: Change to actuated control.

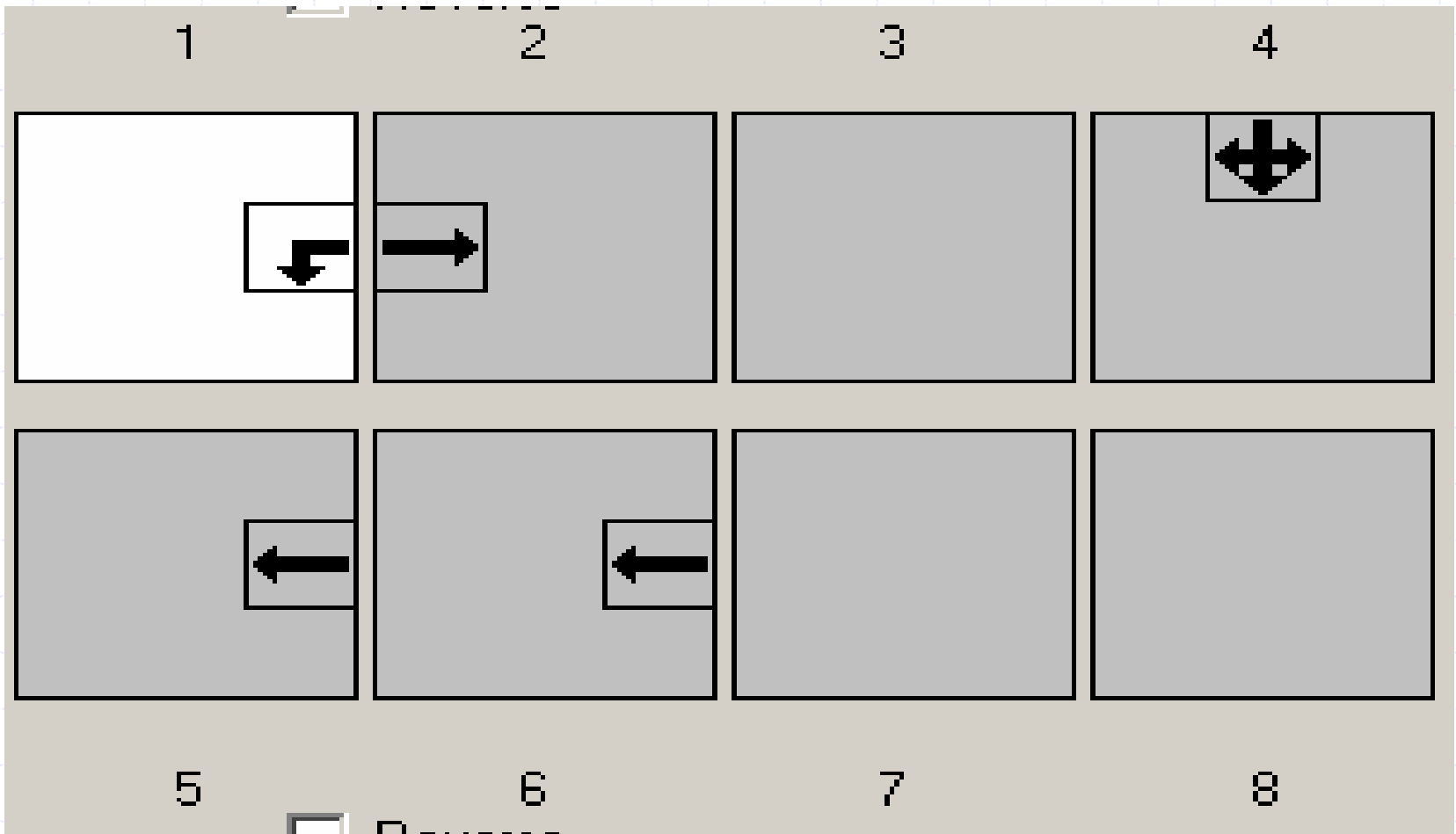
Fixed-time Control (Left node)

Phase	1	2	3
Controlled Movements:			
Green Time:	10	25	25
Yellow Time:	3	3	3
All Red Time:	1	1	1

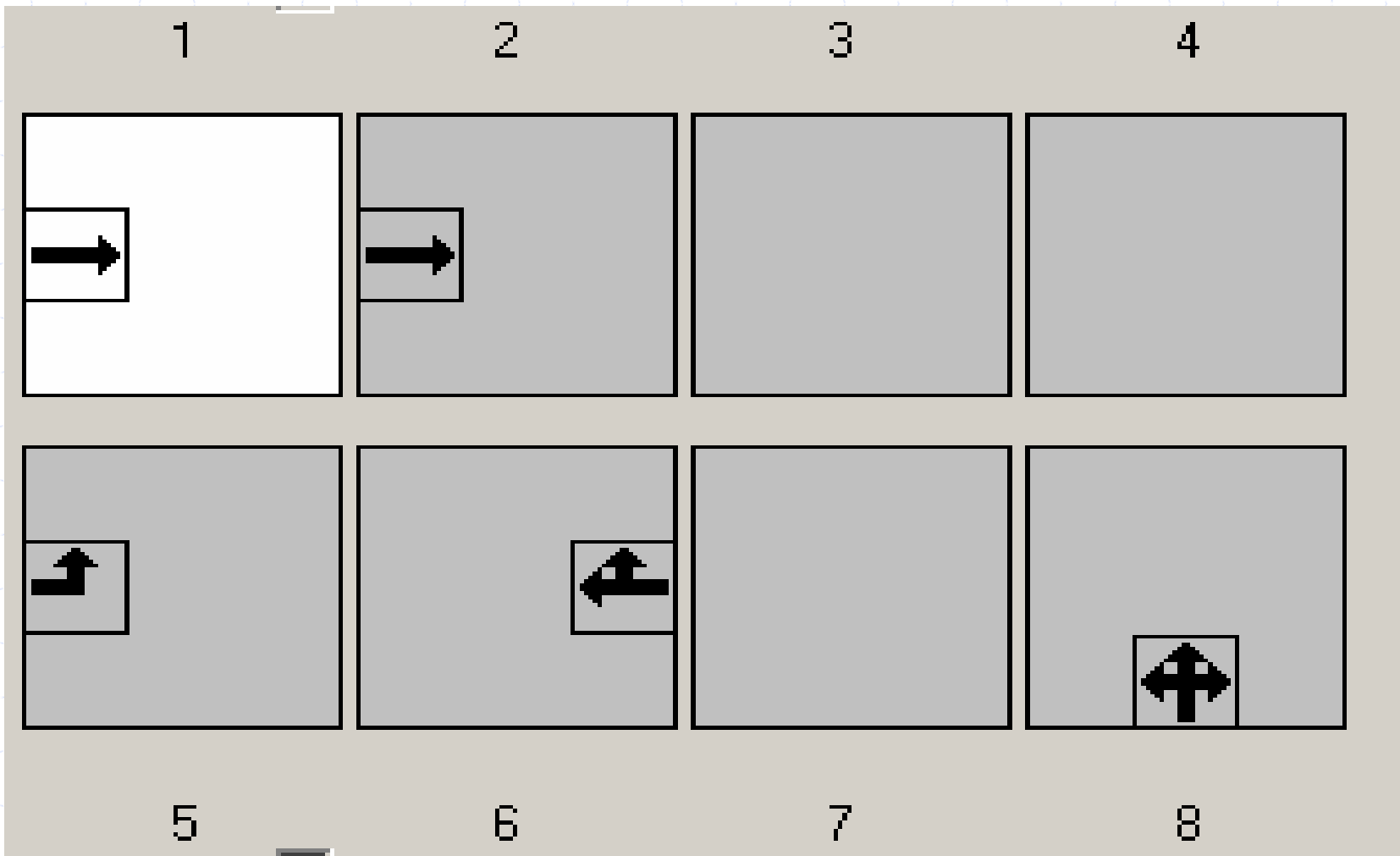
Fixed-time Control (Right node)

Phase	1	2	3	
Controlled Movements:				
Green Time:	10	25	25	0
Yellow Time:	3	3	3	0
All Red Time:	1	1	1	0

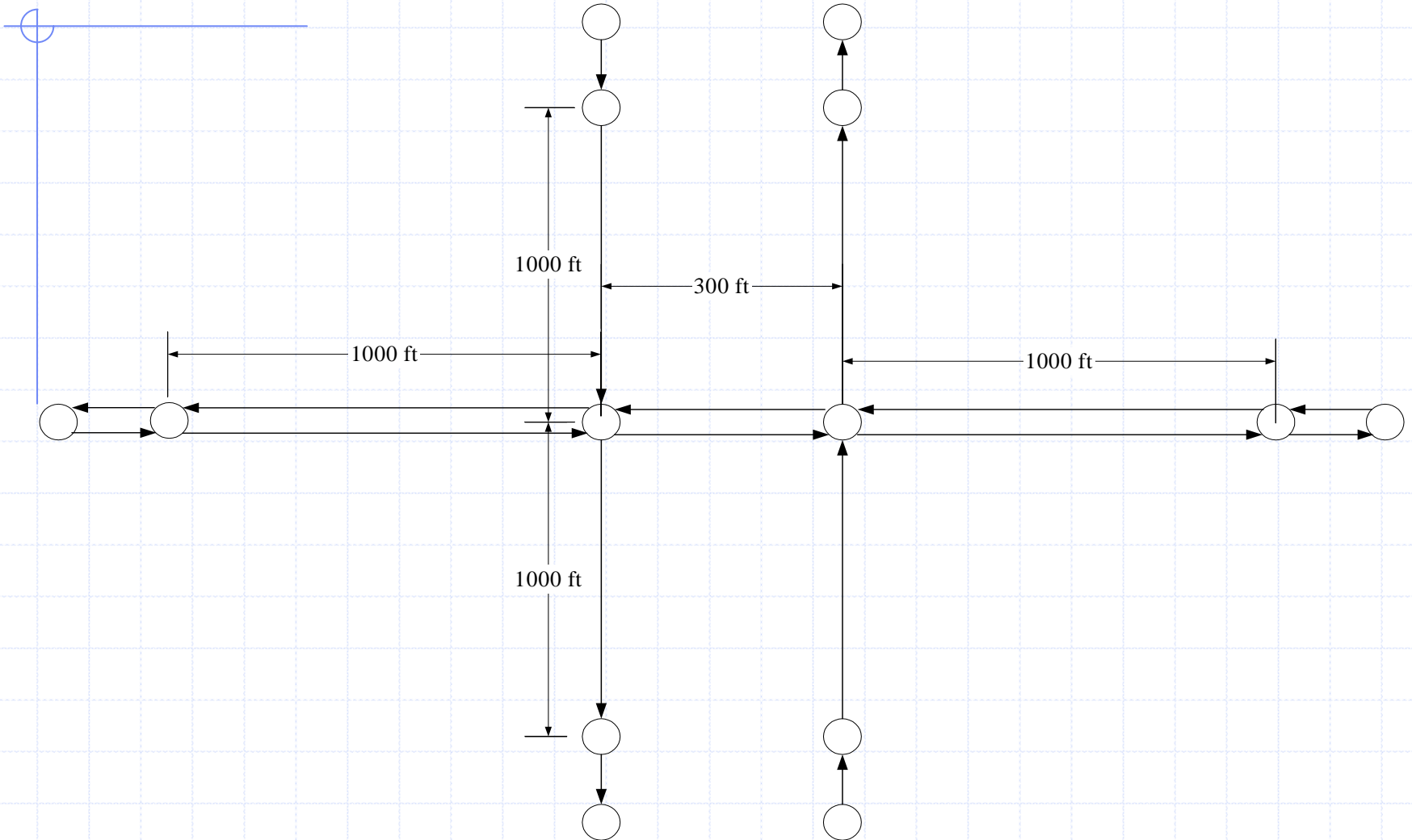
Actuated Control (Left node)



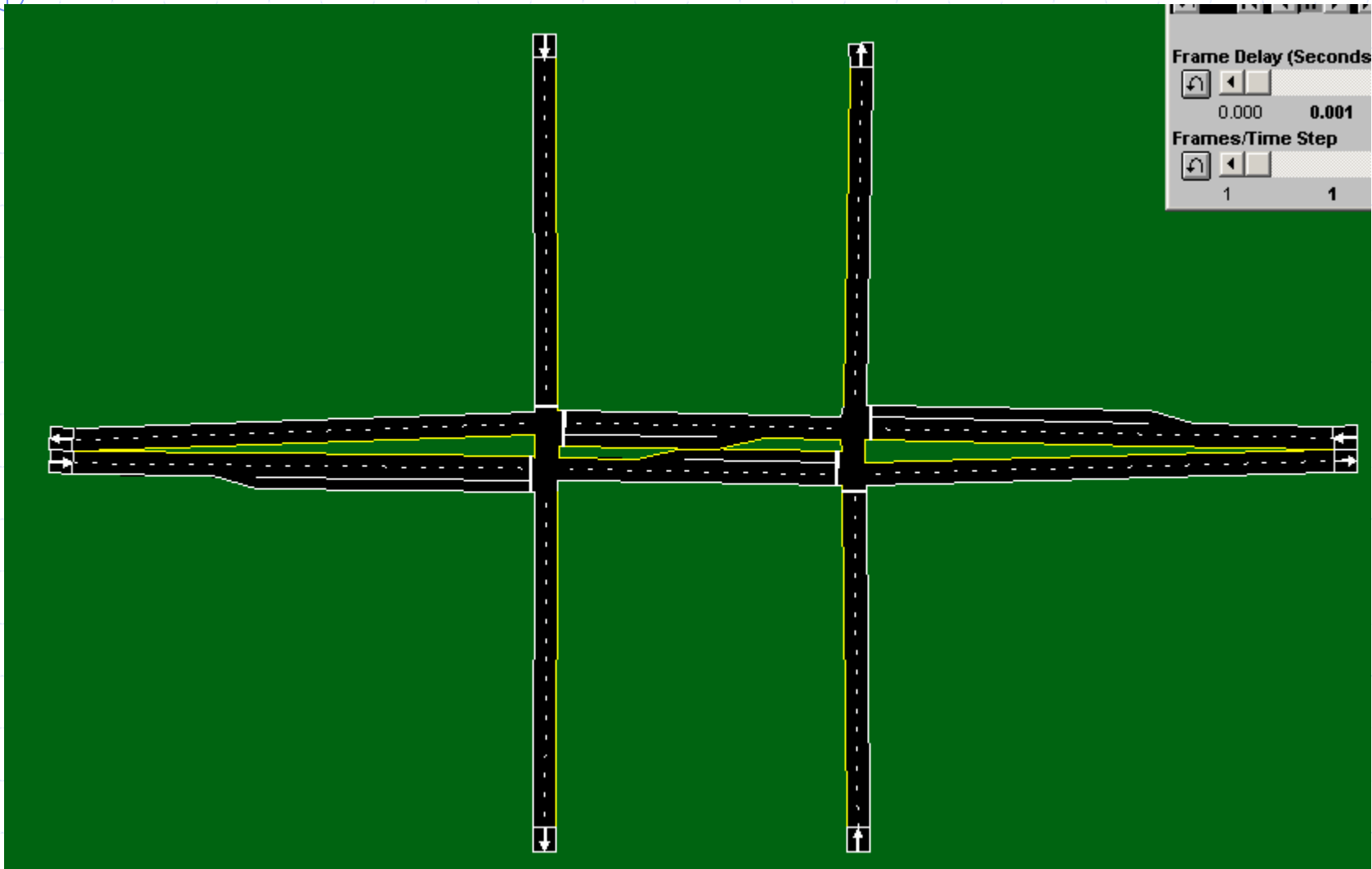
Actuated Control (right node)



CORSIM Diamond Interchange Network



Diamond Diamond Interchange CORSIM Network



Assignment

- Assignment
 - What can be improved?
 - Compare Lead-Lead, Lead-lag, Lag-Lead, and Lag-Lag.
 - Compare fix-time and actuated control
 - A report talking about what you found.
- Bonus
 - Coordination