



IPAM Workshop

Mathematical Approaches To Traffic Flow Management

III. Traffic Control Special Topics

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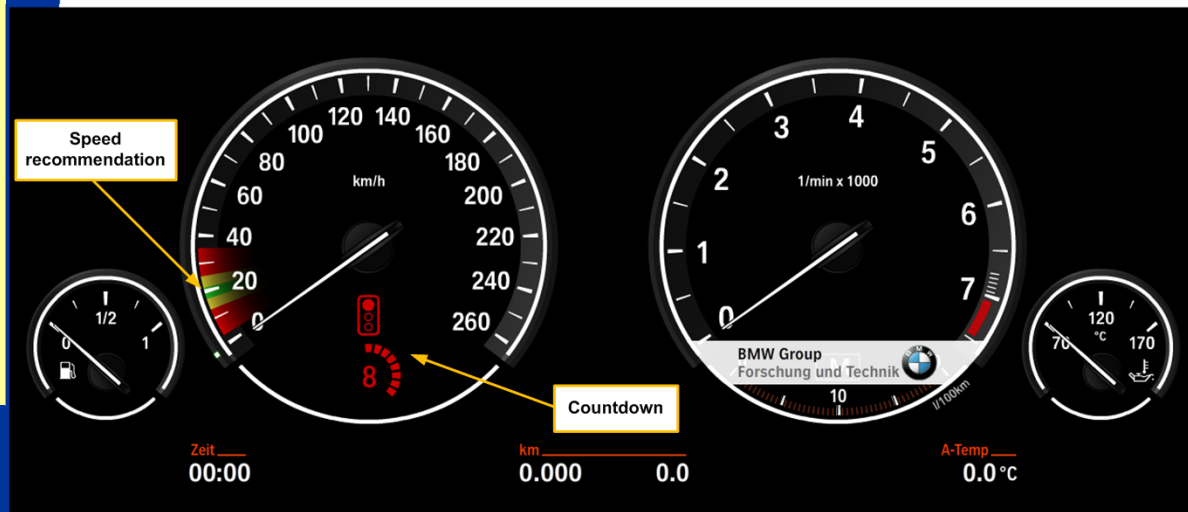




Vehicles, Internet, Phone, and the Future

Dynamic Speed Advisory
(source: BMW)

V2I Example:
SPaT message





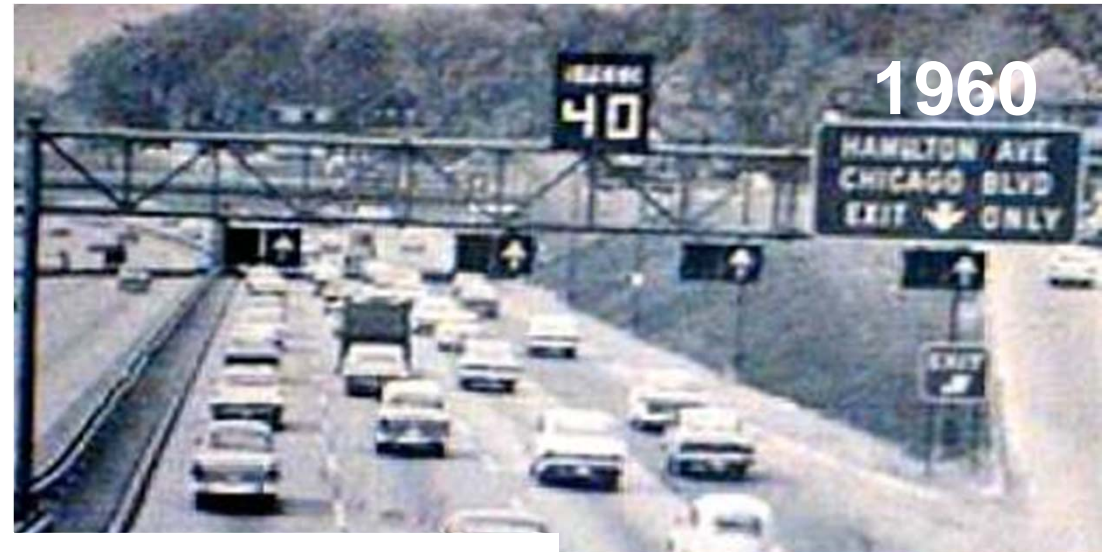
Variable Speed Limits (1)

- Examples

Lodge Freeway, MI

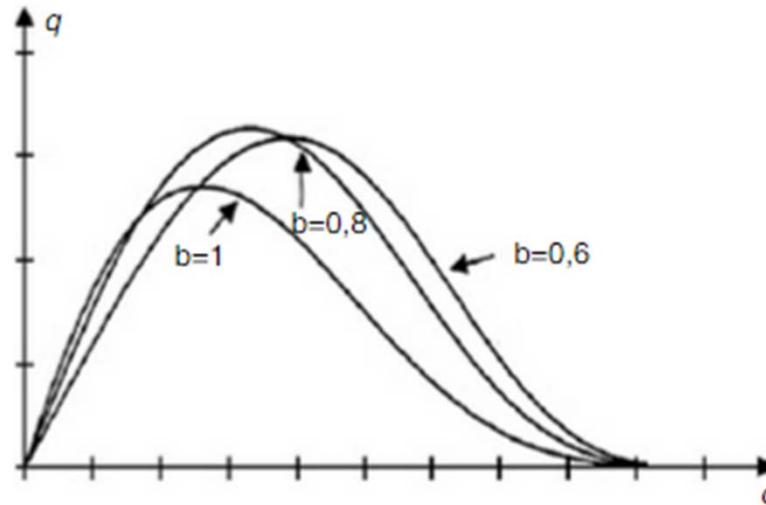
M25, UK

Netherlands

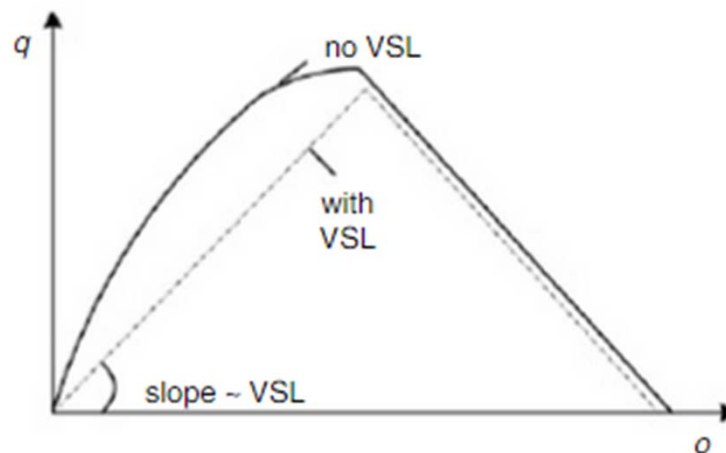




Variable Speed Limits (2): Impacts



(b)





Dynamic Lane Use (1)

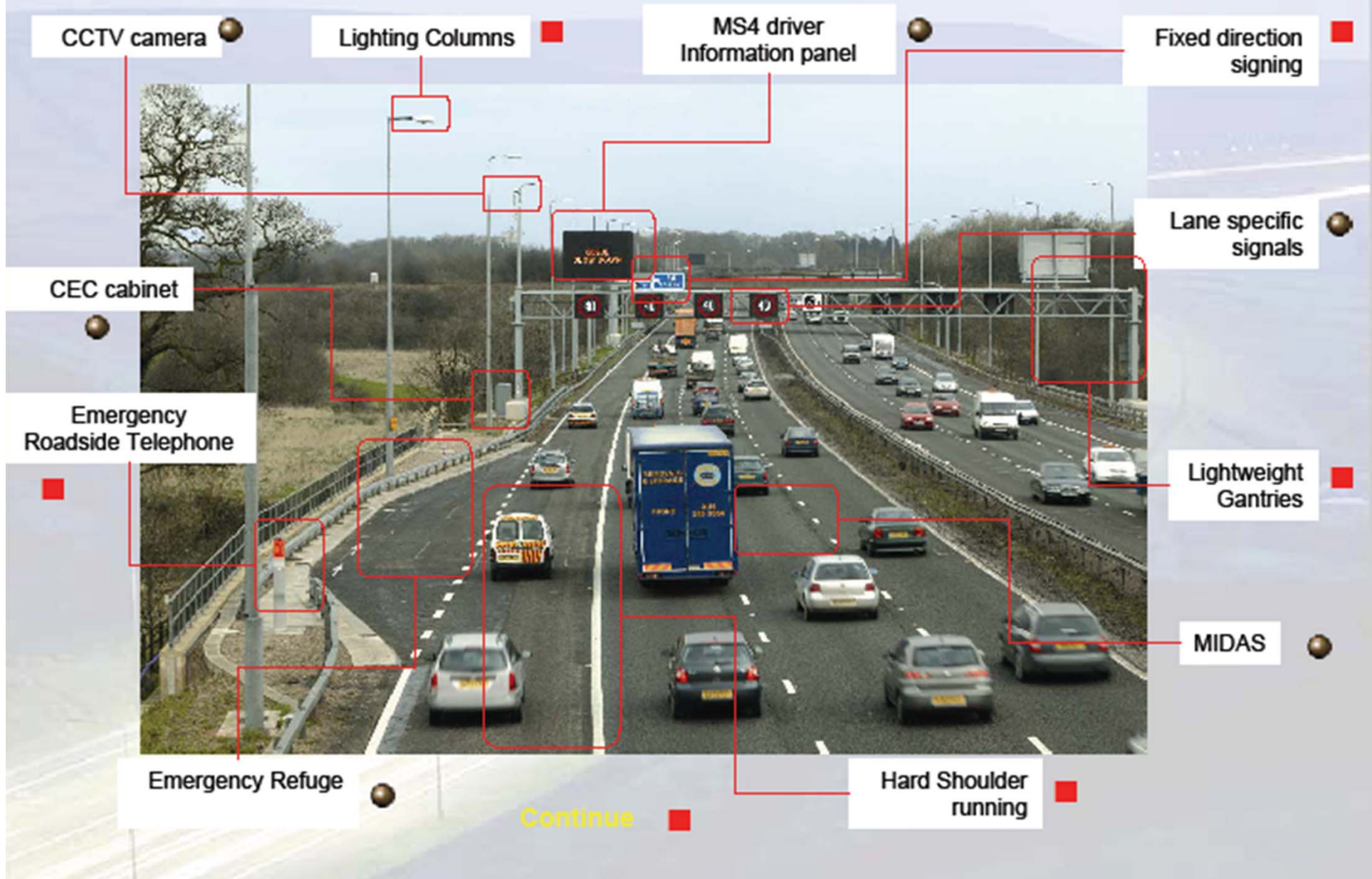




Dynamic Lane Use (2)



M42 – Birmingham England

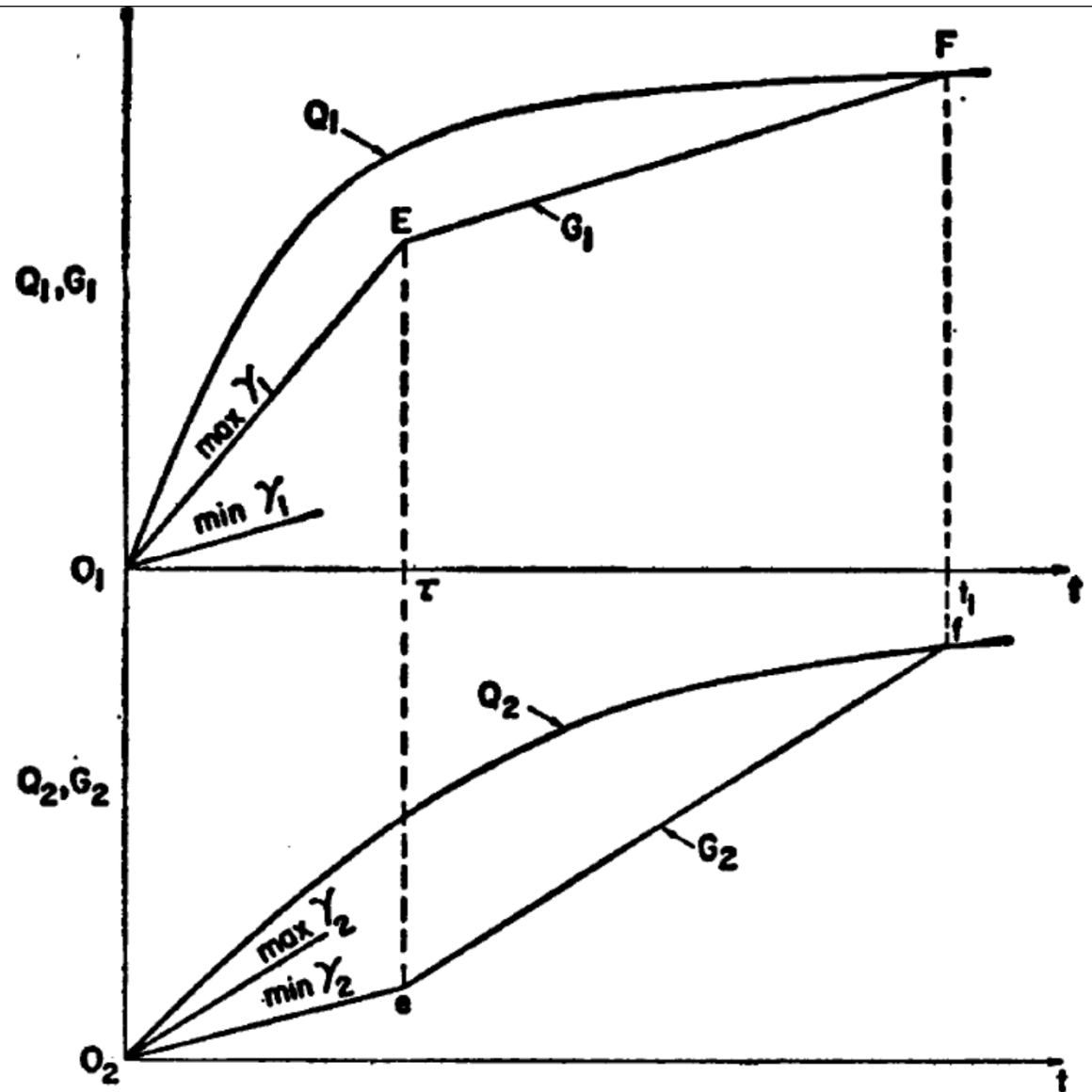




Control of an Oversaturated Intersection

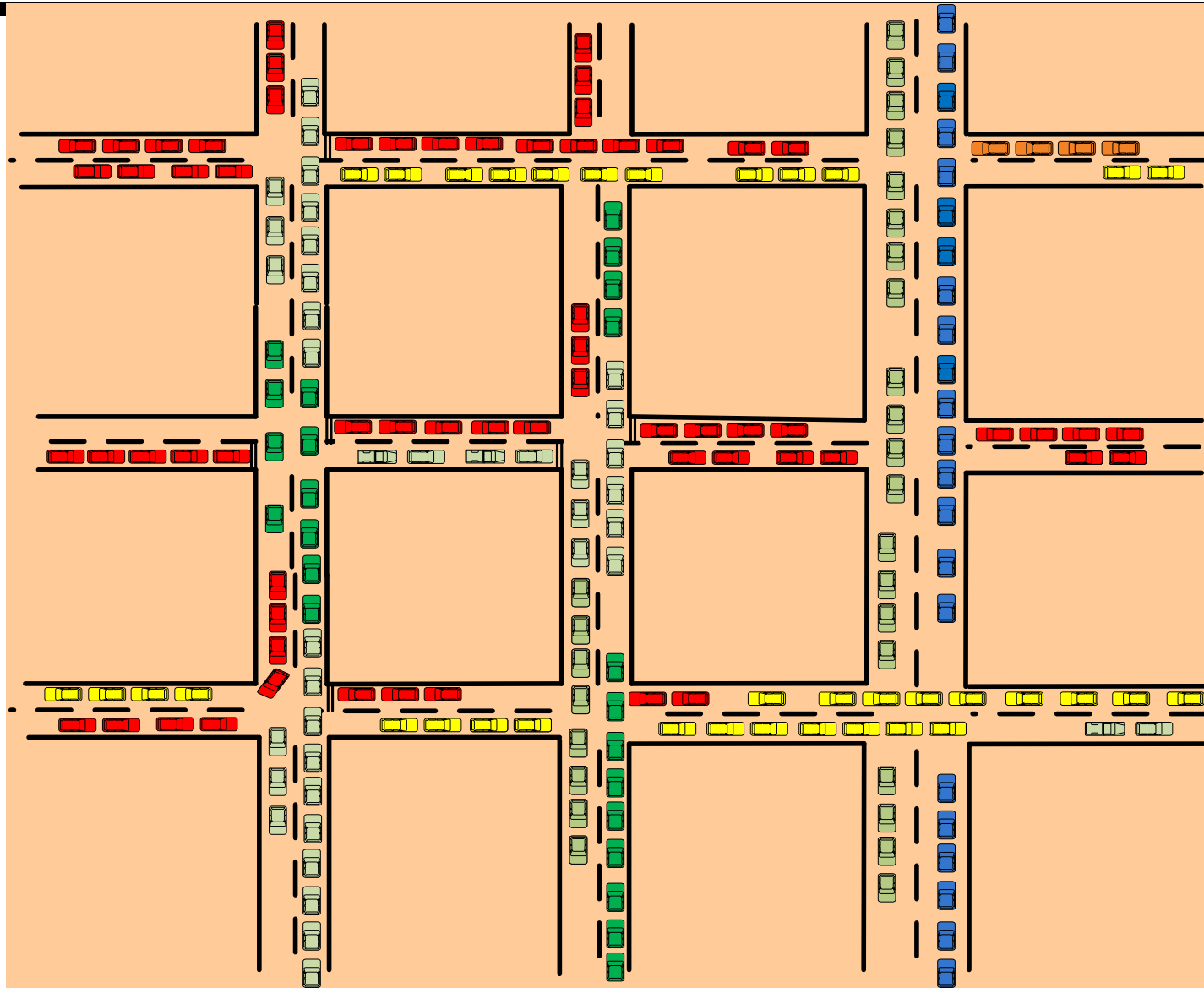
Gazis & Potts,
 “The
 Oversaturated
 Intersection”, 2nd
 ISTTT, 1963

$$\frac{q_1}{s_1} + \frac{q_2}{s_2} > 1 - (L/C)$$





Gridlock..



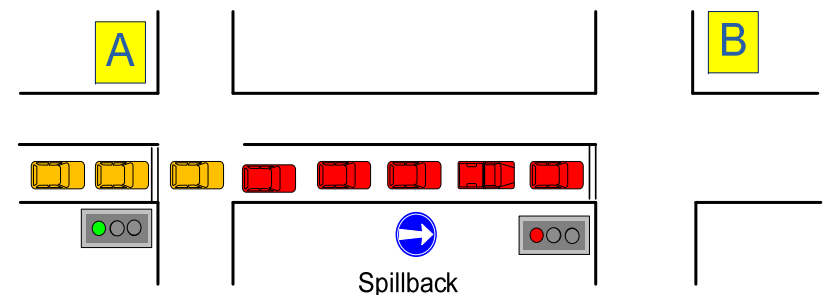


System Oversaturation: Control Strategies

- Forced and hold green
- Gating and metering
- Maximum capacity flow
- Negative offset- reverse green waves
- Green waves with cross streets
- Flared green with cross street
- Diversion away from congestion
- Shorter cycle length
- Longer cycle length

Spillback:

- Spillback is caused when the queue from downstream intersection uses up all the space on the link and prevents vehicles from entering the upstream intersection on green



Strategies:

- Negative offsets (reverse progression)
- Dynamic adjustment of offsets
- Metering, “Flare” the green

 Impacted Vehicle



Transit Priority Strategies

■ Design

- Bus (HOV) lanes
- Queue Jump lanes

■ Control (Traffic Signals)

- Passive
- Active

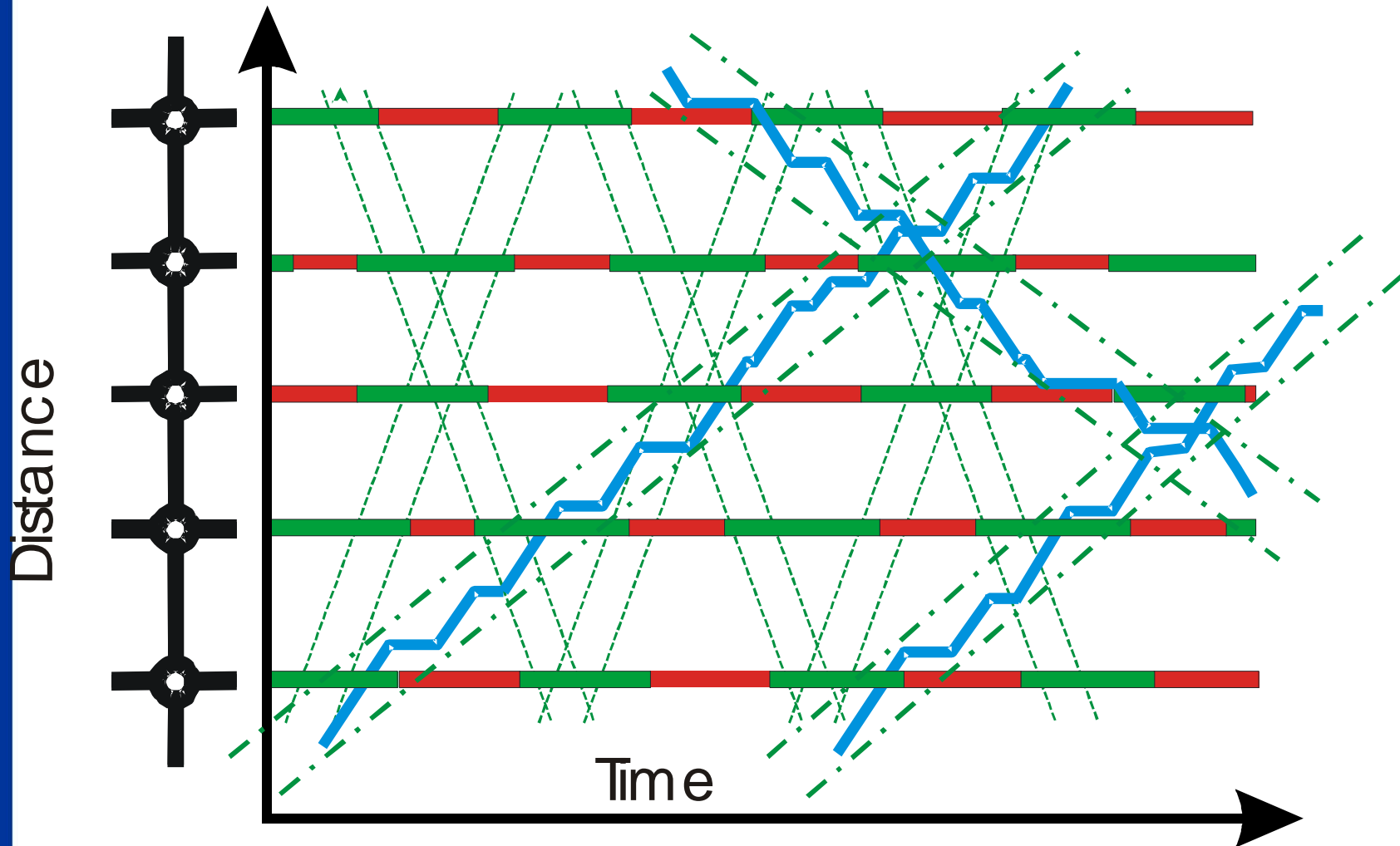
■ Combination

■ Benefits to Transit

- Travel time (delay) reduction
- Improved schedule reliability
- Customer satisfaction/ridership increase



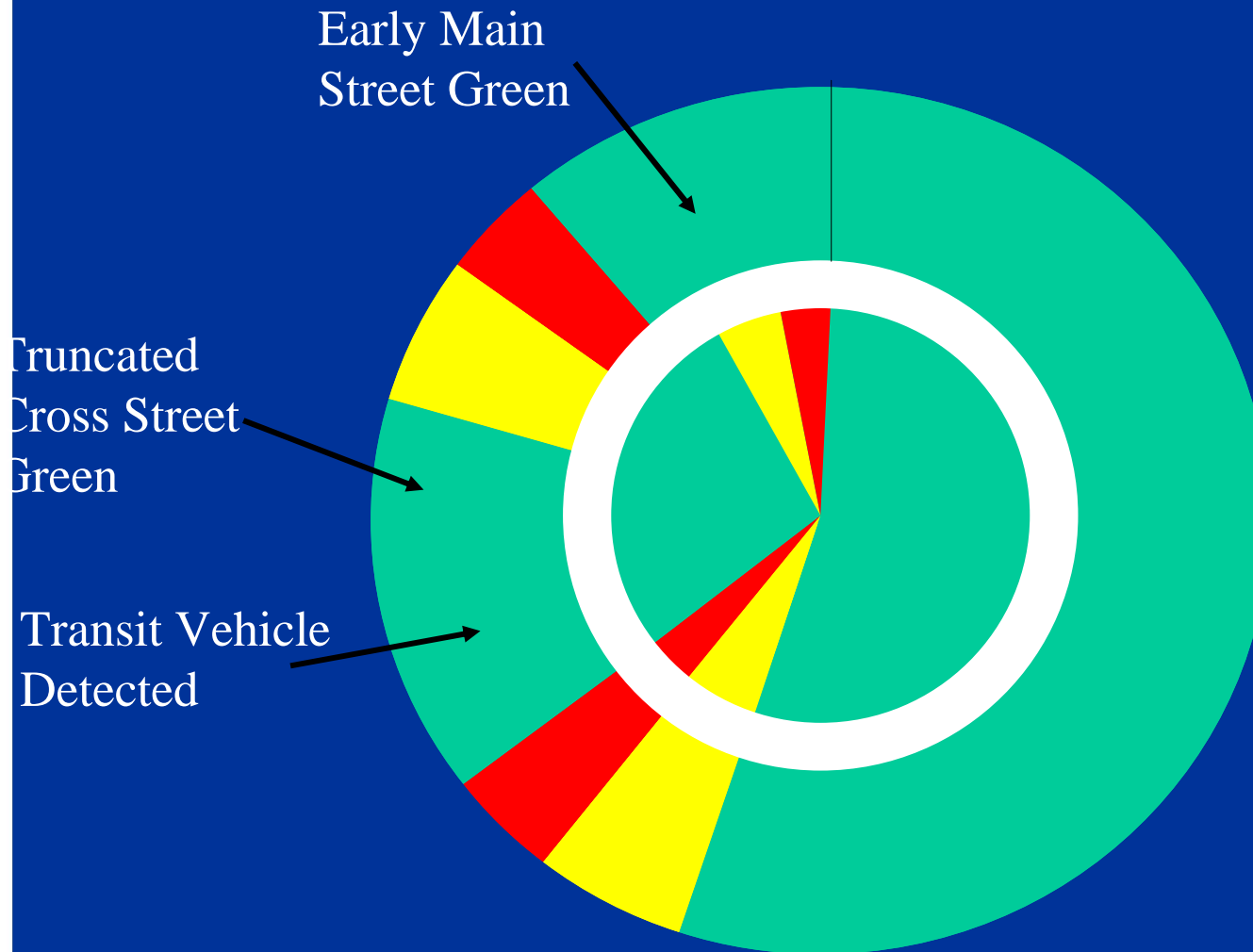
Passive Priority Strategies (1)



Source: L Head, TCRP A-16

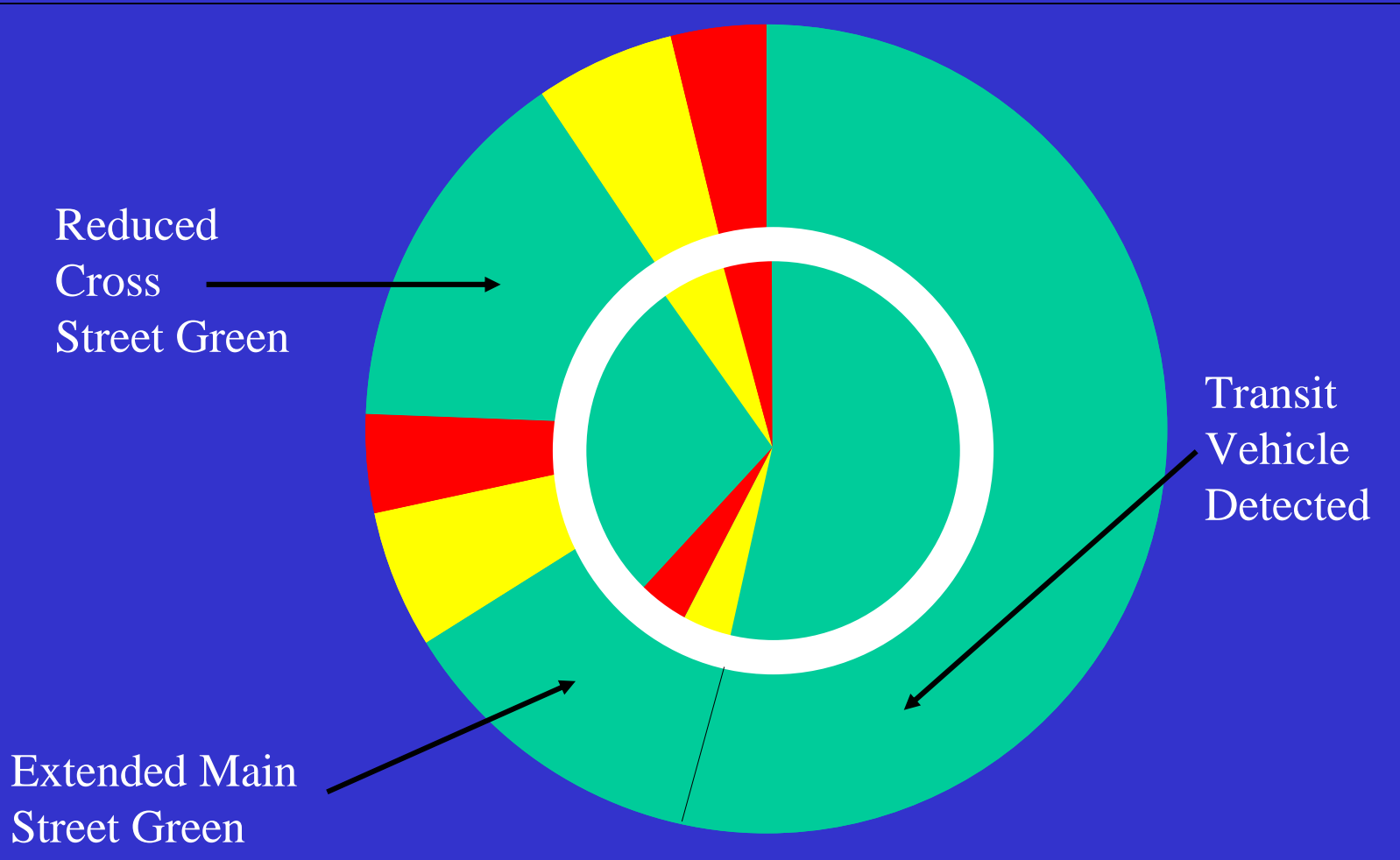


Active Priority: Early Green (Red Truncation)





Active Priority: Green Extension





Active Priority Strategies: Issues (1)

Spare Green time in the Signal Cycle

Critical intersections

High pedestrian volumes

Insufficient queue storage

$$G_e = \sum^N G_i (1 - X_i)$$

N : number of phases

G_i : green time for phase i

X_i : degree of saturation for the critical link --phase i

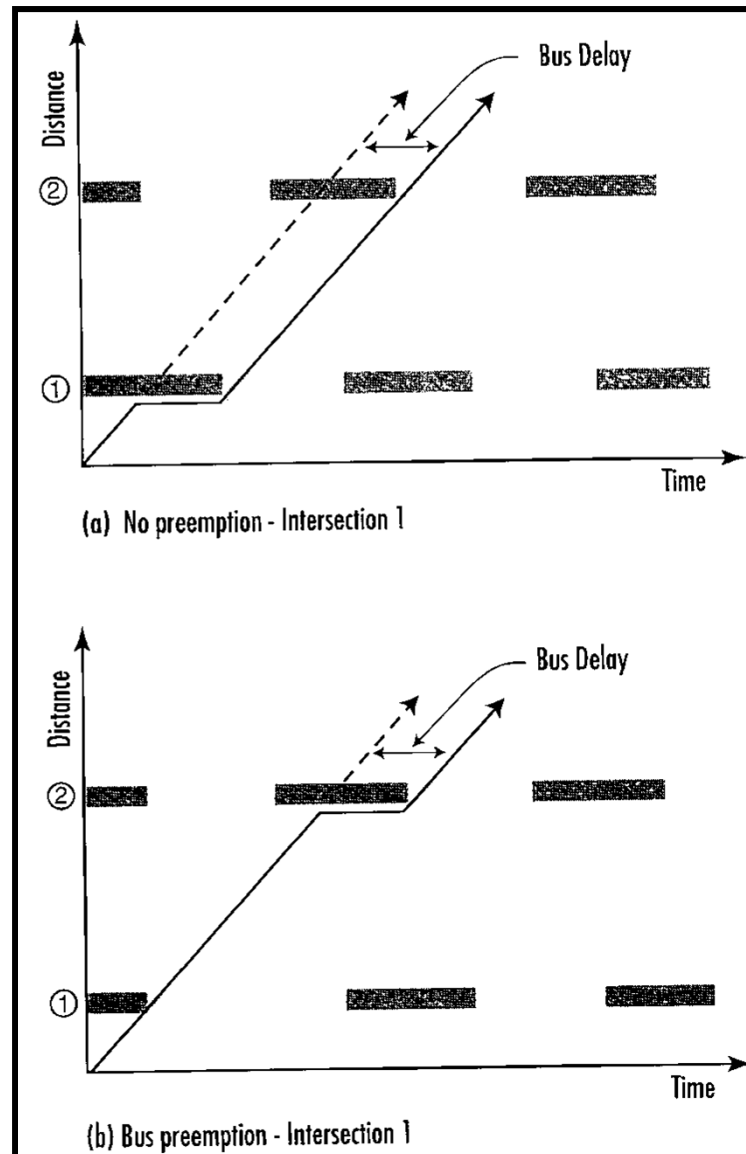
Bus Route Progression

Schedule Adherence

Empty/Out of Service Late Runners?

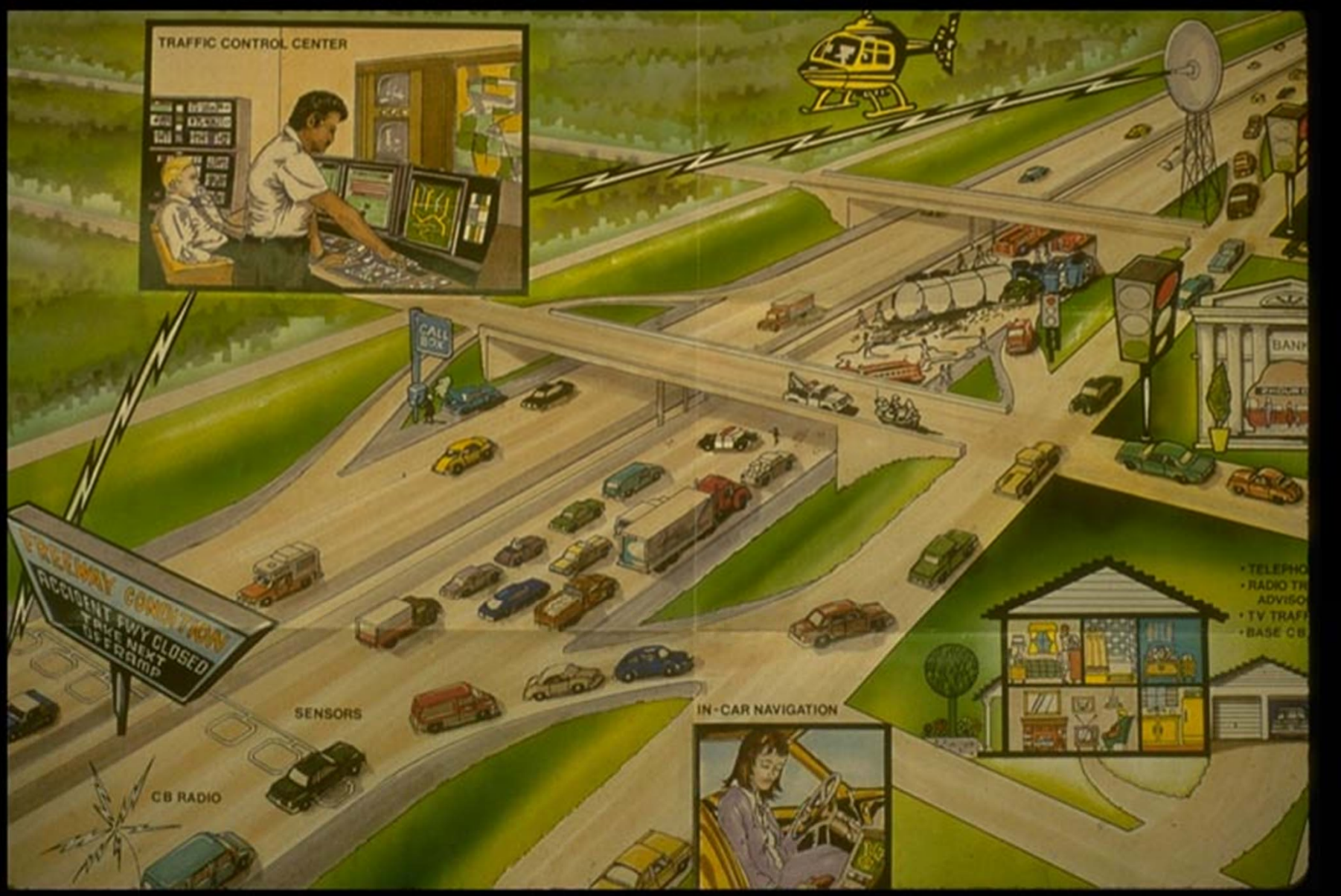


Active Priority Strategies: Issues (2)





Corridor Traffic Management & Information Vision





ITS Technology & Impacts

