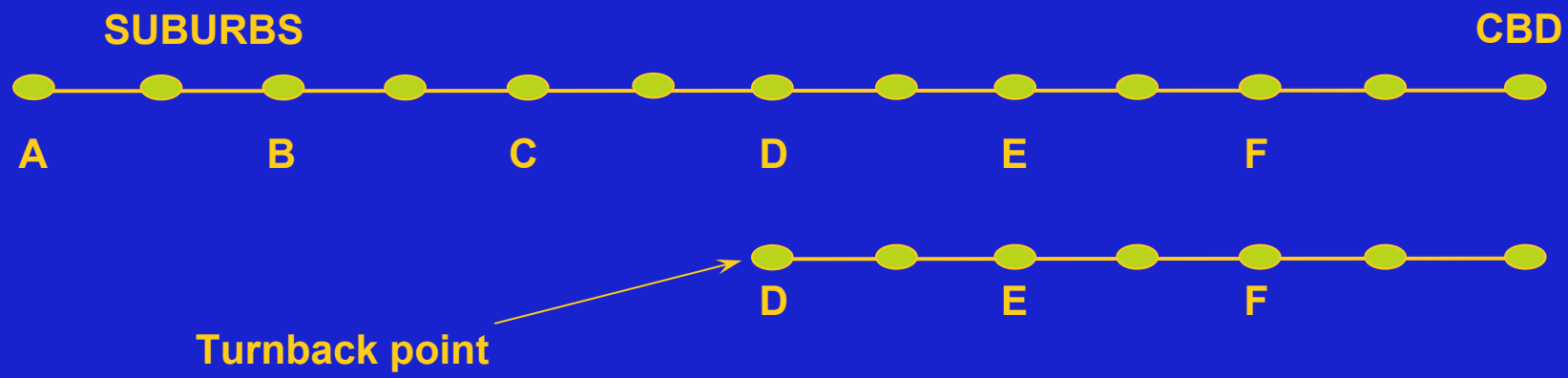
Corridor Analysis and Network Structure

Outline

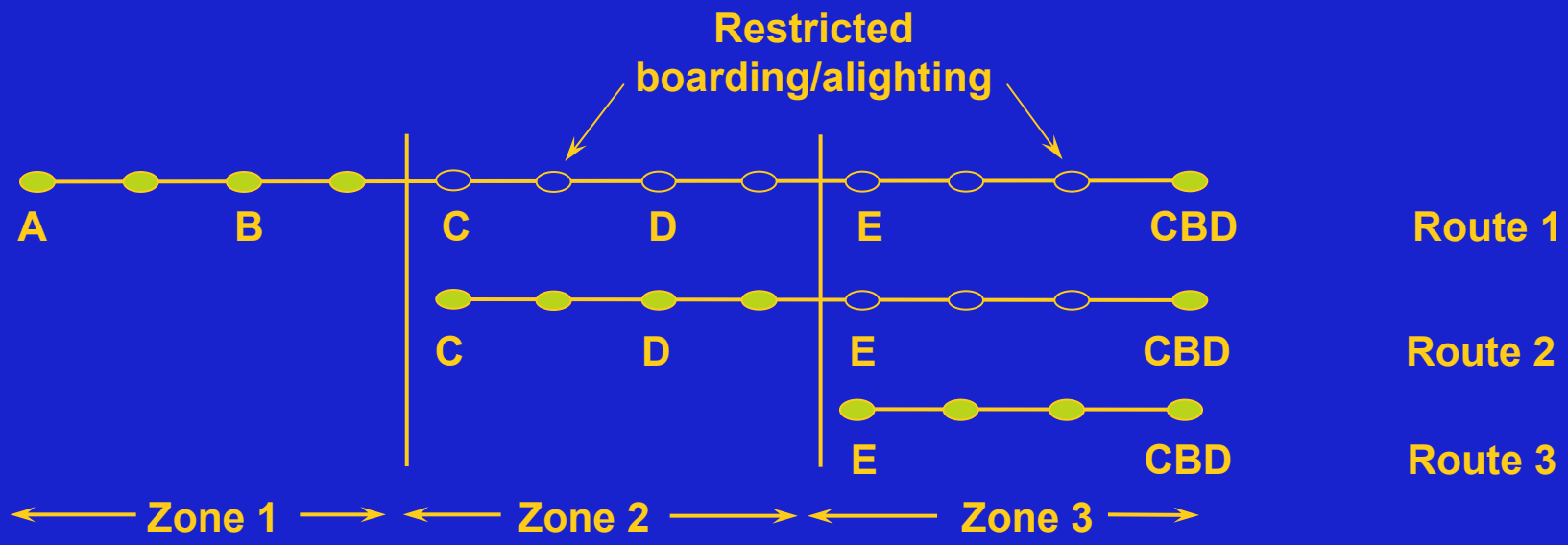
- Local Service
- Deadhead
- Network Structure

Short-Turning Local Service



SCHEDULE - Inbound						
A	B	C	D	E	F	CBD
7:00 A.M.	7:08	7:15	7:18	7:25	7:32	7:45
			7:25	7:32	7:39	7:52
7:15	7:23	7:30	7:33	7:40	7:47	8:00
			7:40	7:47	7:54	8:07
7:30	7:38	7:45	7:48	7:55	8:02	8:15
			7:55	8:02	8:09	8:22

Restricted Zonal Local Service



- Inbound buses do not stop except to let passengers alight; boarding prohibited. Outbound buses do not stop except to let passengers board; alighting prohibited.

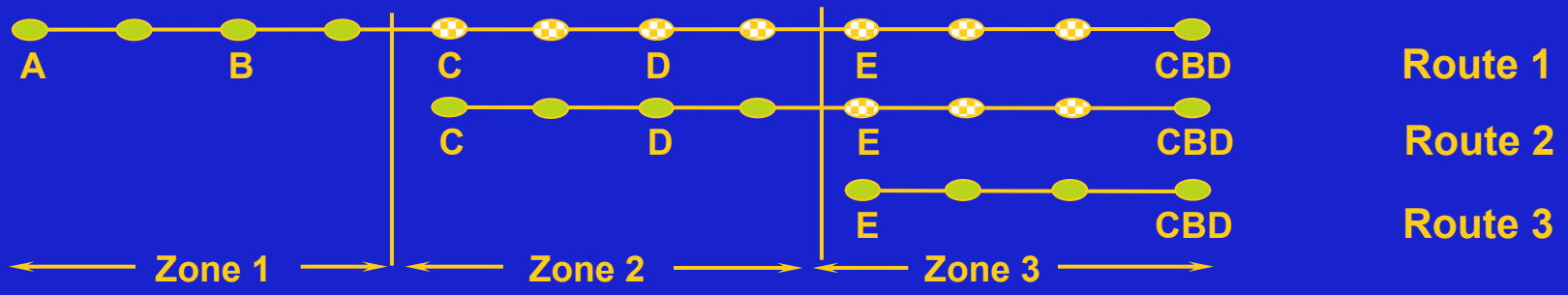
Restricted Zonal Local Service

SCHEDULE - Route 1					
A	B	C	D	E	CBD
7:00	7:08	(7:15)*	(7:24)	(7:30)	7:42
7:15	7:23	(7:30)	(7:39)	(7:45)	7:57
7:30	7:38	(7:45)	(7:54)	(8:00)	8:12

SCHEDULE - Route 2					
A	B	C	D	E	CBD
		7:10	7:20	(7:27)*	7:39
		7:22	7:32	(7:39)	7:51
		7:34	7:44	(7:51)	8:03

SCHEDULE - Route 3					
A	B	C	D	E	CBD
				7:25	7:39
				7:35	7:49
				7:45	8:59

Semi-Restricted Zonal Local Service
(Inbound only)



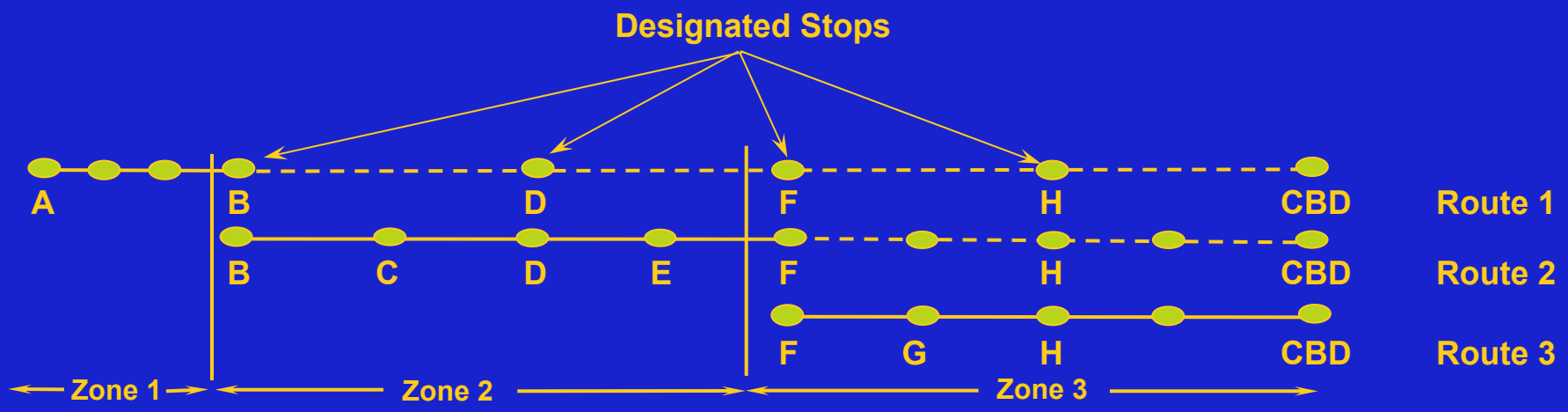
Buses stop only to allow passengers to alight; once stopped, waiting passengers may board.

SCHEDULE - Inbound

A	B	C	D	E	CBD	
				7:25	7:39	Route 3
		7:10	7:20	(7:27)*	7:39	Route 2
7:00	7:08	(7:15)*	(7:24)	(7:30)*	7:42	Route 1
				7:35	7:49	Route 3
		7:22	7:32	(7:39)*	7:51	Route 2
7:15	7:23	(7:30)*	(7:39)*	(7:45)*	7:57	Route 1
				7:45	8:59	Route 3
		7:34	7:44	(7:51)*	8:03	Route 2
				7:55	8:09	Route 3
7:30	7:38	(7:45)	(7:54)	(8:00)*	8:12	Route 1

* ( ) means on-board passengers may alight; waiting passengers may board only if bus stops to let someone alight.

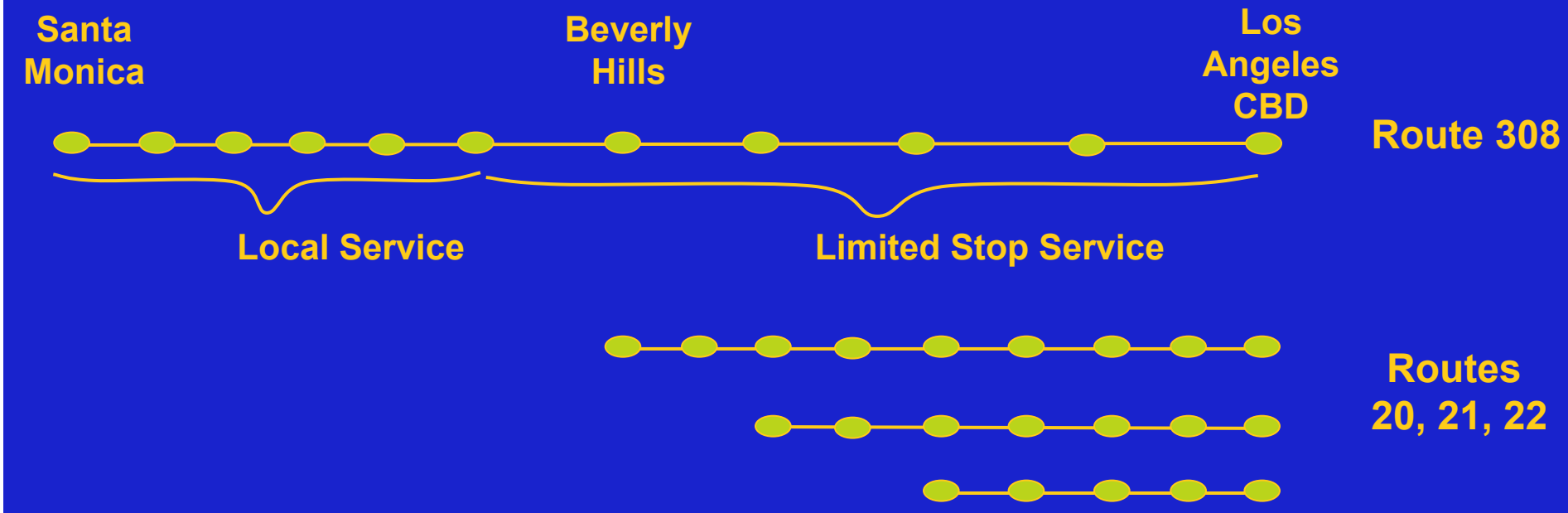
Limited-Stop Zonal Local Service



SCHEDULE - Inbound

A	B	C	D	E	F	G	H	I	CBD	
7:00 AM	7:12	-----	7:19	-----	7:26	-----	7:33	-----	7:40	Route 1
	7:13	7:17	7:22	7:27	7:31	-----	7:38	-----	7:45	Route 2
					7:30	7:35	7:40	7:45	7:50	Route 3
7:15	7:27	-----	7:34	-----	7:41	-----	7:48	-----	7:55	Route 1
	7:28	7:32	7:37	7:42	7:46	-----	7:53	-----	8:00	Route 2
					7:45	7:50	7:55	8:00	8:05	Route 3

Bus Service in Wilshire Boulevard Corridor



Deadheading Strategies

A. Deadhead all vehicles on route:

   Possible with one (or more) routes of short turn or zonal route system

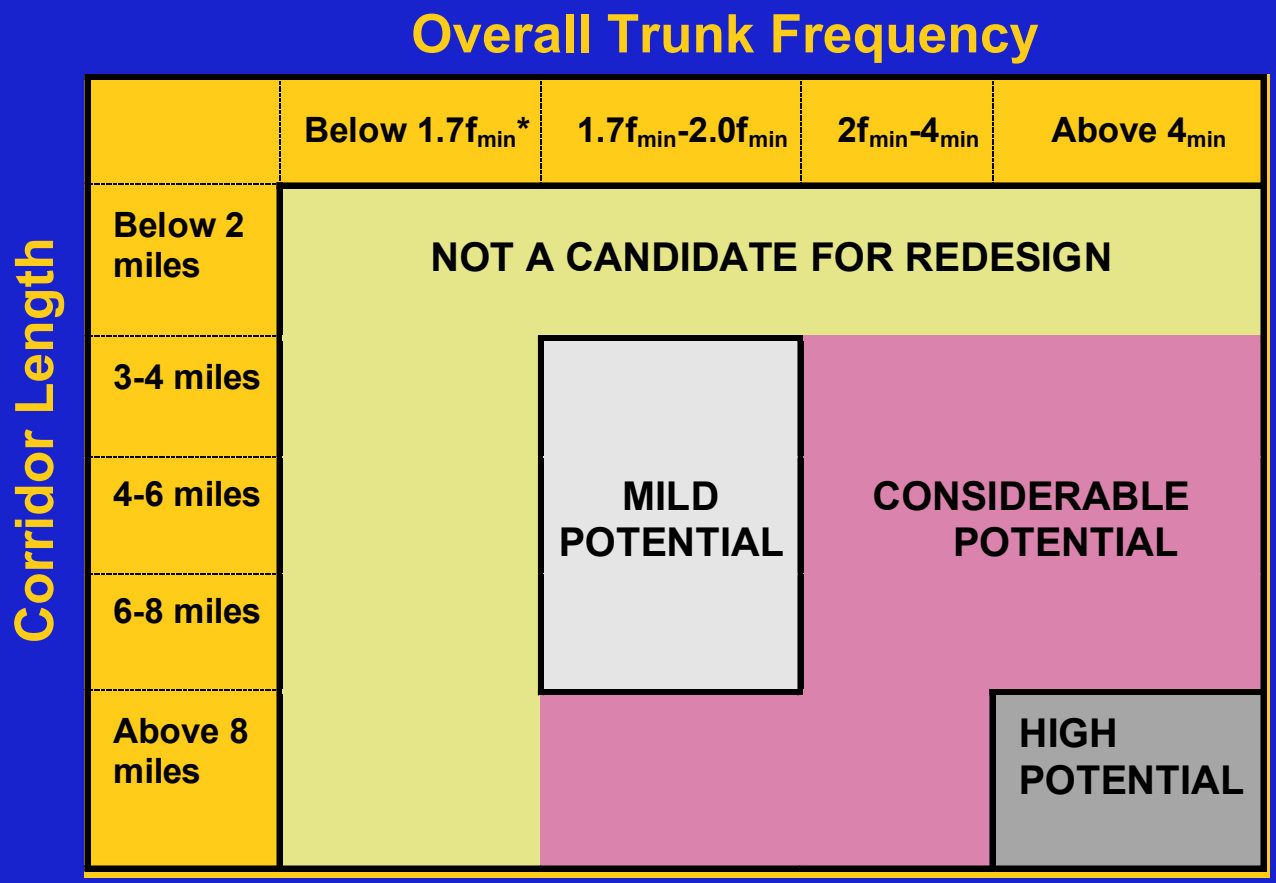
B. Deadhead some vehicles on route:

   Deadhead every other bus (or 2 out of every 3) with remainder in service

Issues:

1. Can a vehicle be saved by deadheading?
2. Will there be adverse public reaction?

Key Factors in Determining the Potential Benefit of Route Redesign of a Corridor



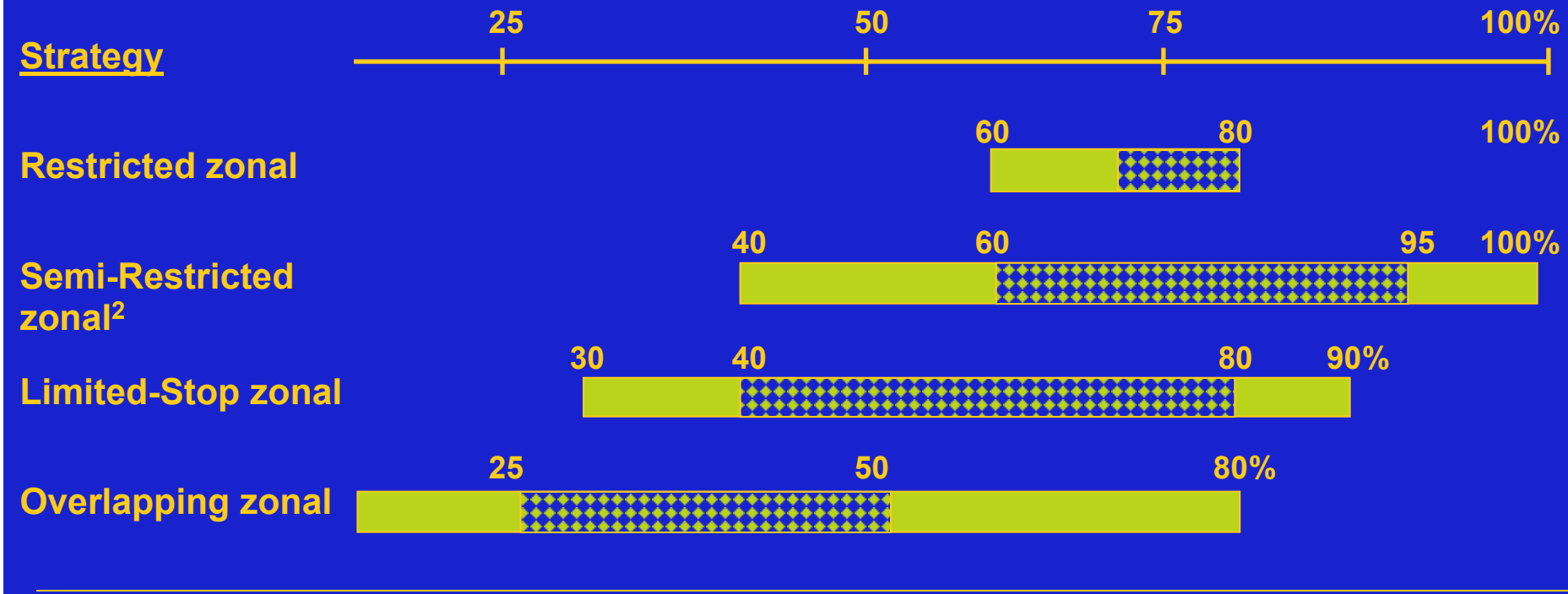
*f_{min} = minimum acceptable frequency for a peak period radial route

Advantages and Disadvantages of Local Service Operating Strategies

	Short-Turn	Restricted Zonal	Semi-Restricted Zonal	Limited-Stop Zonal
Need for schedule coordination and strict adherence	valuable in a.m. vital in p.m.	none	none	unnecessary in a.m. valuable in p.m.
Reliance on overtaking	none	strong	moderate	strong
Wait time impact*	up by 90% in outer segment, by 20% in inner segment	up by 90% throughout	up by 90% in outer segment, by 20% in inner segment	up by 90% in outer segment, by 20% in inner segment
In-vehicle time reduction	none	considerable	moderate	considerable
Walk-distance impact*	none	none	none	up by 0.2 mi. for some outer segment passengers
Difficulty in public comprehension	little	considerable	considerable	moderate
Most favorable conditions for vehicle savings:				
Corridor length	short	long	any	long
Fraction of local (non-CBD) travel	moderate to high	small	moderate	moderate to high
Outer segment volume	low	low	low	any

* Average impact to peak direction travelers in typical application

Strategies Best Suited to Different Ratios of Peak Volume to Uptown Boardings[1]



Legend

- range in which strategy can be effectively operated
- range in which strategy is likely to be most promising

1 For inbound direction. When the peak direction is outbound, use the ratio of peak volume to uptown alightings (PV/UA). The same figures apply.

2 Can be operated inbound only.

Effect of Corridor Length on Choice of Local Operating Strategy

Strategy	4 mi. or less	4-6 mi.	6-9 mi.	9 mi. or more
Restricted Zonal				
Semi- Restricted Zonal				
Limited-Stop Zonal				
Overlapping Local				
Skip-Stop				

Legend

 discourages use of strategy

 neutral

 encourages use of strategy

 strongly encourages use of strategy

Comparison of Network Structures

RADIAL (with limited circumferential)

Aim: obtain large share of trips to central business district (CBD)

Observations:

- transit has strongest competitive position w.r.t. auto for CBD:
  - high parking prices
  - limited parking availability
  - auto congestion on radial arterials
- CBD market has been declining share of all urban trips
- network effectiveness for non-CBD trips is poor

Conclusions:

- effectiveness depends on specifics of urban area:
  - strength of CBD as generator
  - highway/auto/parking characteristics
- overall level of transit ridership
- political considerations

Grid And Timed Transfer

Aims:

- provide reasonable level of transit service for many O-D pairs
- decrease the perception of transfers as major disincentive for riders

Observations:

- must avoid negative impact on CBD ridership
- what is impact of restricting headways to set figure e.g. 30 min.?
- how much extra running time is required to guarantee connections?
- will transit be competitive in non-CBD markets?
- well-located transfer centers can enhance suburban mobility

Conclusions:

- grid systems work well with high ridership and dispersed travel patterns -- New York City, Toronto, Los Angeles (key here is high frequencies reduce need for timed transfers)
- timed transfers work well for urban areas with dispersed focused suburban activity centers, multi-modal networks

Pulse

Aim: to provide convenient one transfer service throughout small urban area

Observations:

- route design geared to particular round trip travel time because all routes have same headway
- as number of routes increase, harder to maintain reliability, have to increase recovery/rendezvous time
- depends on availability of effective pulse point

Conclusions:

- well suited for many well focused outer suburban areas and small independent cities

Multimodal

Aim: to provide effective service for both short and long trips

Observations:

- rail (or other guideway) networks are expensive to build and hence network is limited in length
- rail capacity is high, marginal cost of carrying passengers relatively lo
- key issues for new rail lines: to what extent is direct bus service retained as opposed to forcing transfer to rail

Conclusions:

- need to look at total trip time and cost to determine net impact on different O-D trips
- build integrated bus/rail fare policy to encourage riders to take fastest route