Smarter
Cambridge Transport

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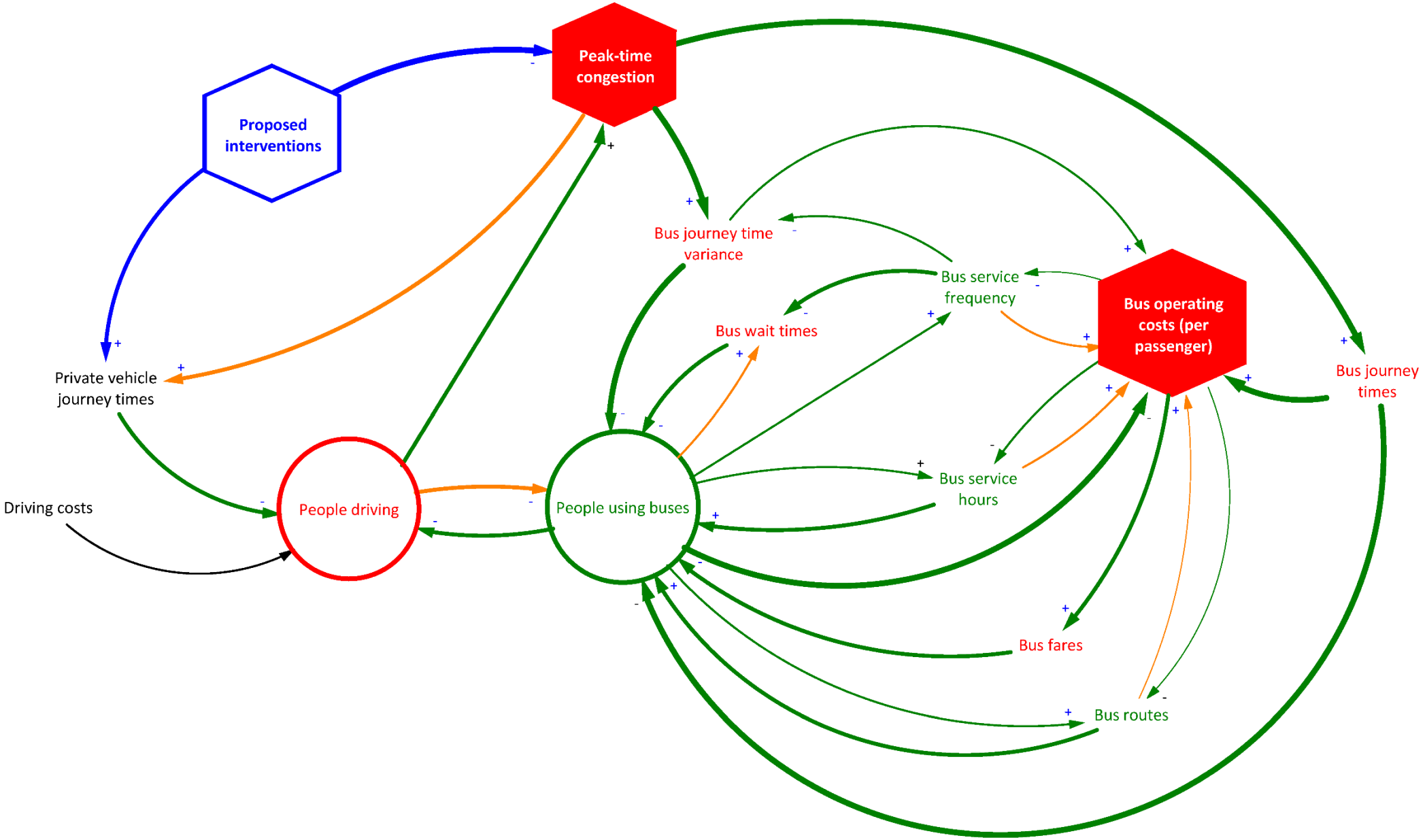
The art of traffic management

Transport interventions

- Lots of controls (including every traffic light)
- All controls interact
- No ‘volume’ control
- Short-term effects ≠ long-term effects

Everything interacts



Categories of controls

1. Rationing (e.g. of parking spaces)
2. Monetary costs (vehicle, petrol, parking, tolls)
3. Time cost

   How much do you value your time?

   Richer $\Rightarrow$ more willing/able to pay to save time

Trips v traffic

Be clear whether a figure is a measure of:

Trips

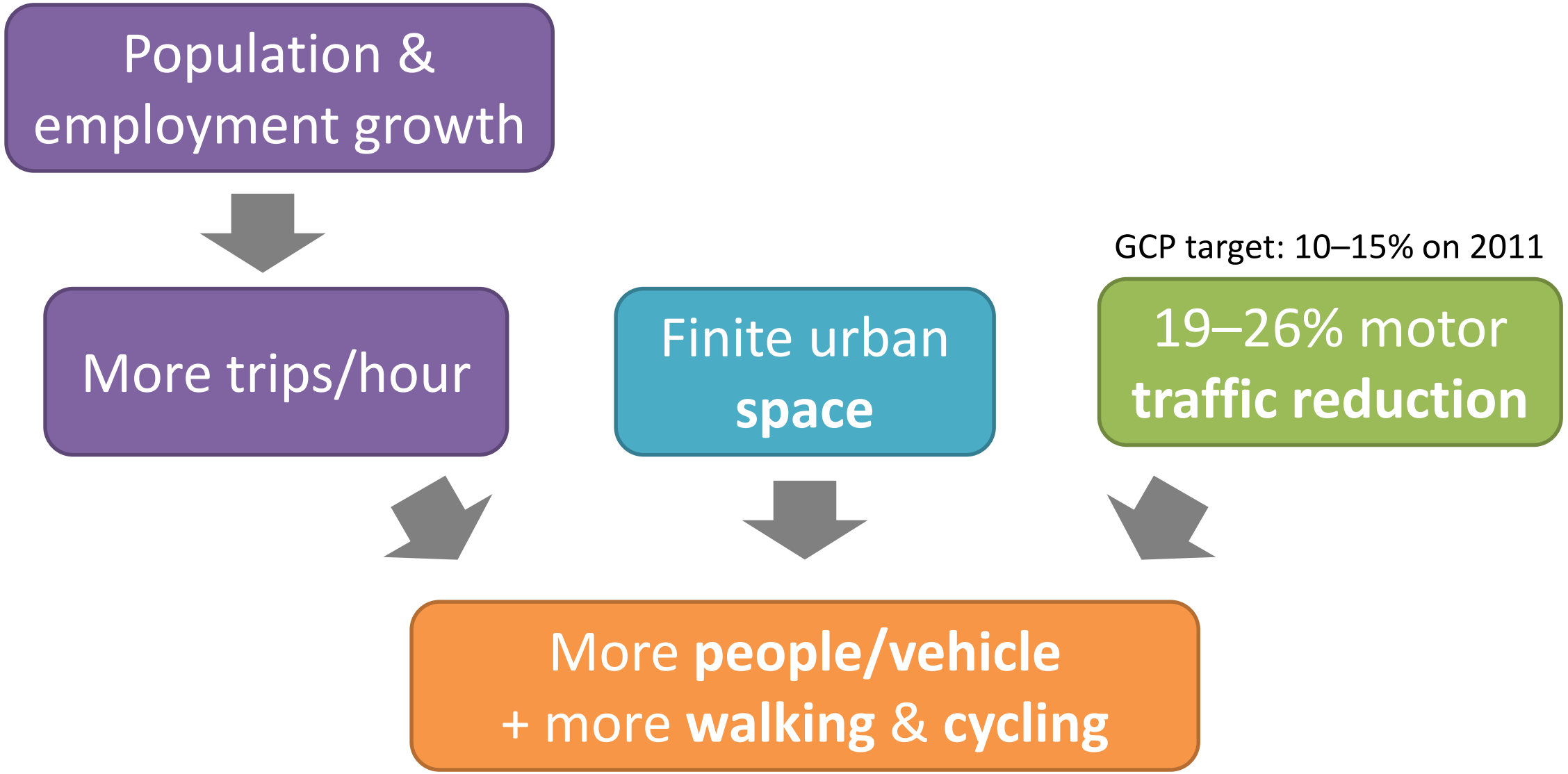
Movement of **people**

Also referred to as ‘demand’

Traffic

Movement of **vehicles**

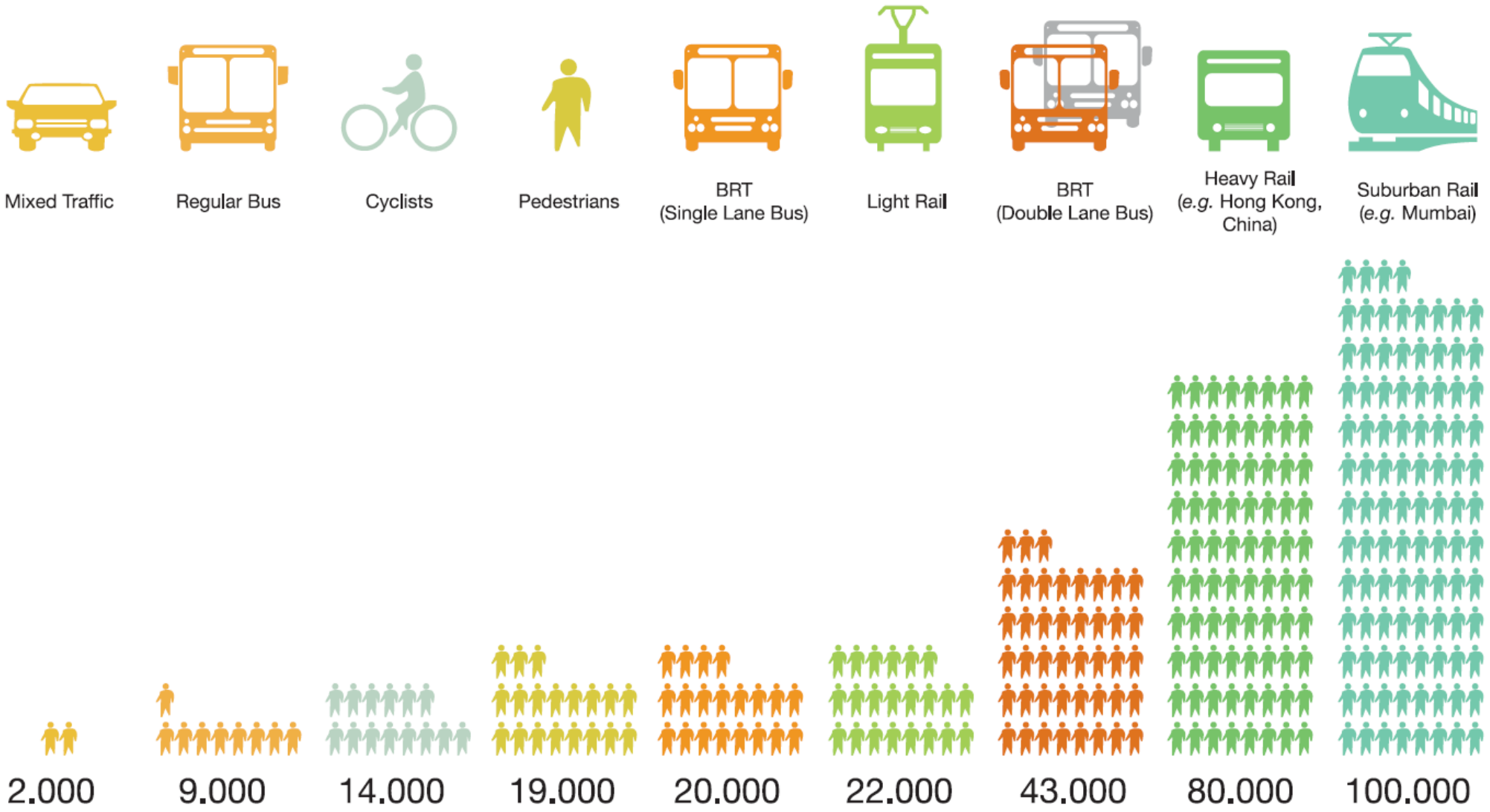
Trip density



Trip density

Corridor Capacity

people per hour on 3.5 m wide lane in the city

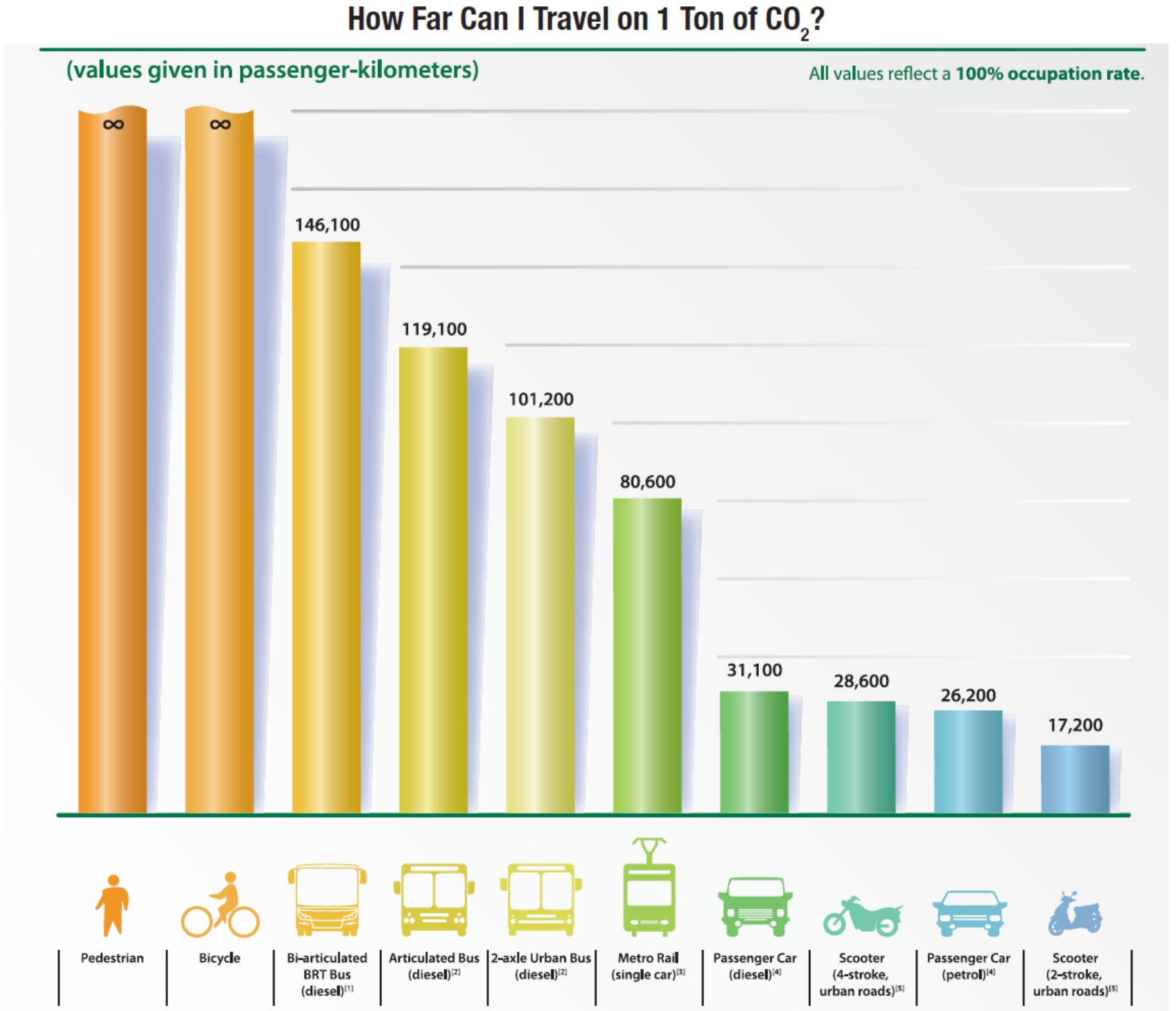


BRT = bus rapid transit, m = meters

Sources: H. Botma and H. Papendrecht. 1991. Traffic Operation of Bicycle Traffic. In *Transportation Research Record 1320*. TRB. Washington, D. C.: National Research Council, and based on GTZ calculations (2009).

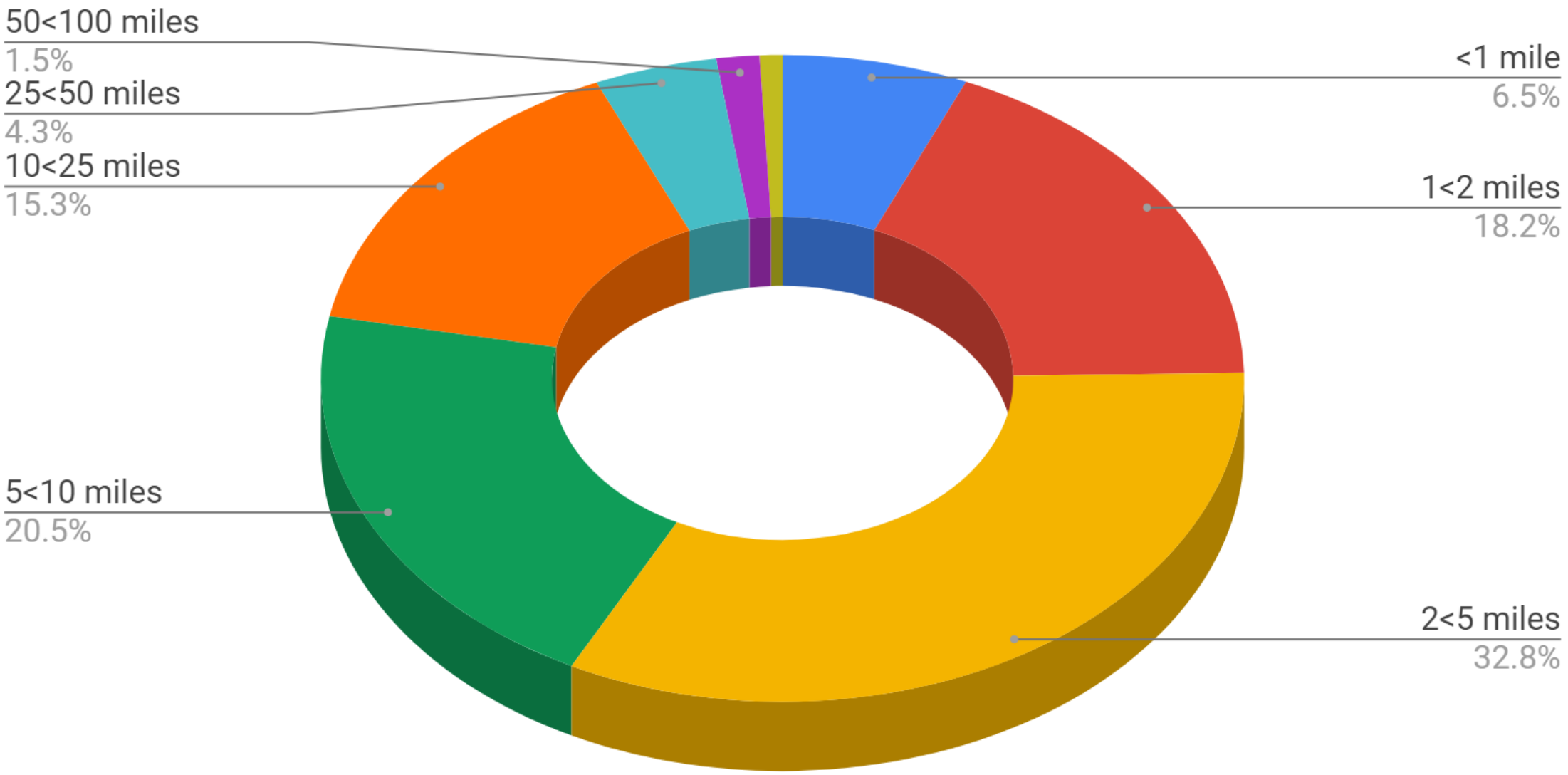
From *Changing Course in Urban Transport* by R Hickman, P Fremer, M Breithaupt, S Saxena

Carbon intensity



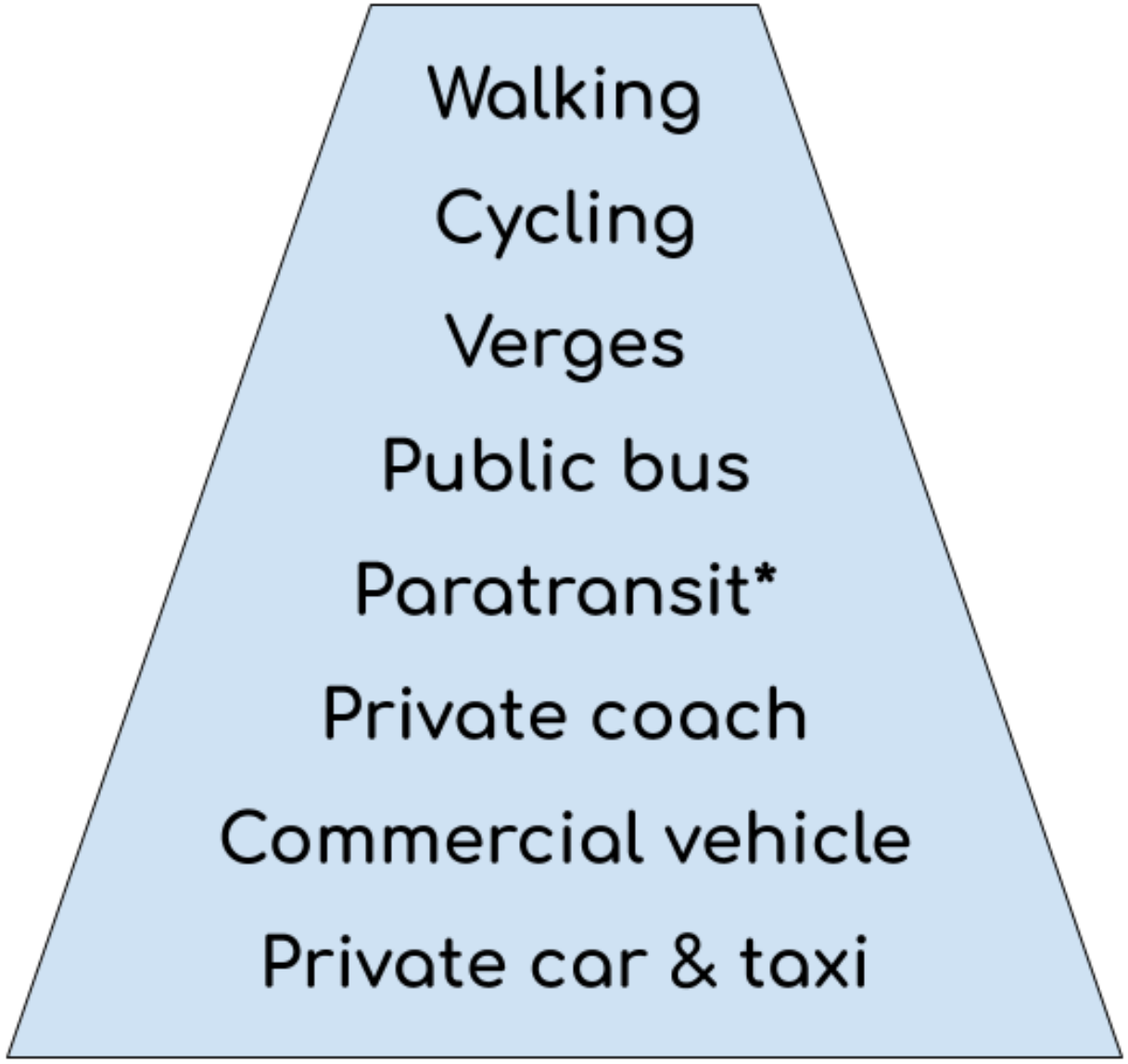
From *Changing Course in Urban Transport* by R Hickman, P Fremer, M Breithaupt, S Saxena

Car trips by distance



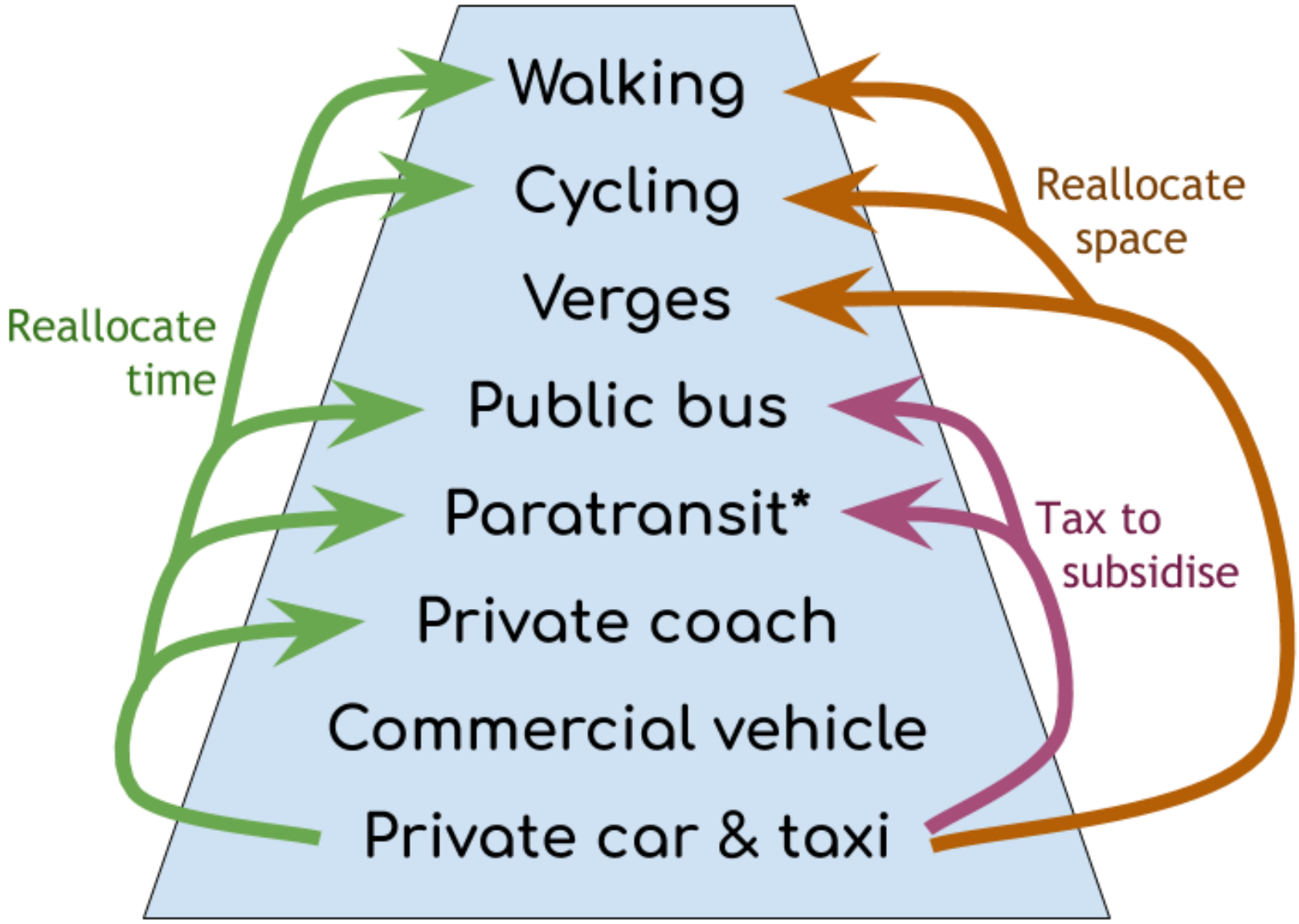
Data from the National Travel Survey of England

Urban transport hierarchy



*Contracted or licensed to convey socially disadvantaged people

Urban transport hierarchy



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Cambridge Biomedical Campus

Trips	**41,387** daily trips in 2017 **+ 26,113** new trips = **67,500** by 2031
Motor traffic	**28,475 vehicles** (weekdays 2017) ≈ **29%** of all traffic entering Cambridge
Other	**12,912** by foot, cycle and bus

Cambridge Biomedical Campus

How to absorb 26,000 new trips?

Rail? [1] >15 x 12-car train loads[2] ≈ 1/hr

P&R? New Hauxton site (2,260 spaces): < 9%

Bus? [1] >400 single-decker loads ≈ >27/hr[3]
>250 double-decker loads ≈ >17/hr[4]

Cycle? 10 cycle parks as big as station Cyclepoint

[1]Assumptions: 85% average occupancy of public transport; all trips made 6am-9pm (15 hours)
[2]Thameslink 12-car train capacity: 1,754 people (666 seated, 1,088 standing), 85% average
[3]Single-decker capacity: 75 people (40 seated, 35 standing)
[4]Double-decker capacity: 100 people (75 seated, 25 standing) – can't run on Trumpington Guided Busway

Cambridge motor traffic

Motor traffic **97,302 vehicles** entered Cambridge 7am-7pm in 2018 (90,780 in 2011)

GCP target **10–15%** reduction on 2011 levels

≈ **15,500–20,000** fewer vehicles

+ 10–15% reduction in in-city trips

Daily public transport trips into Cambridge

GCP target	**>45,000** additional trips by bus by 2031[1] ≈ 100 extra buses/hour
Net-Zero CO_2 target	**>100,000** additional trips by bus by 2031? ≈ 220 extra buses/hour
For reference	Cambridge railway station: ≈ 16,000 trips Guided Busway services: 5,500 trips Car: ≈ 116,400 trips (based on 1.2 people/car) 120 buses arrive in Cambridge 8–9am All Cambridge**shire** buses: ≈ 27,000 trips

[1]Based on 26,000 new trips to the Biomedical Campus and a 14% reduction in car trips from 2011 levels

Hub-and-spoke bus routing

Traditional bus routing model is hub-and-spoke:

- Concentrates lots of buses in a small area
- Requires a large, well-connected bus station (like Preston)
- Cambridge is not like Preston

City centre bus stops

27 bus bays up to 10 minute walk apart.

About 120 bus arrivals 8–9am weekdays.

Current bus routes

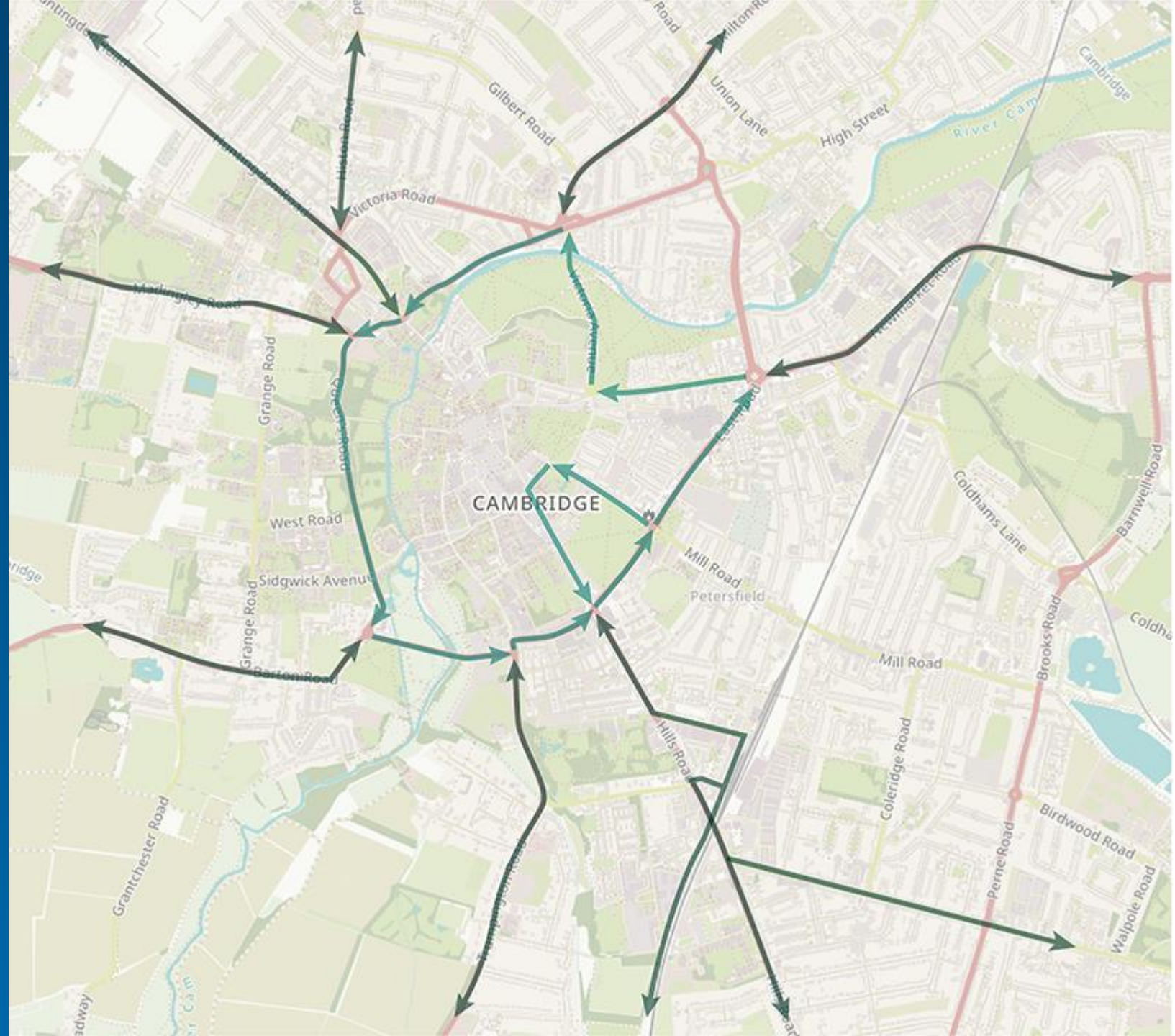
Red circles indicate areas of conflict with people walking and/or cycling.

Ring-and-spoke ('lollipop') bus routing

Route buses around the inner ring road instead

- Interchange at any stop on the inner ring road
- All bus trips are possible with no more than one interchange
- Each stop might have 3 bus bays, able to serve up to 180 buses/hour

Re-routing general traffic



Buses circulate anti-clockwise around inner ring road (doors on city centre side) or loop via Emmanuel St.

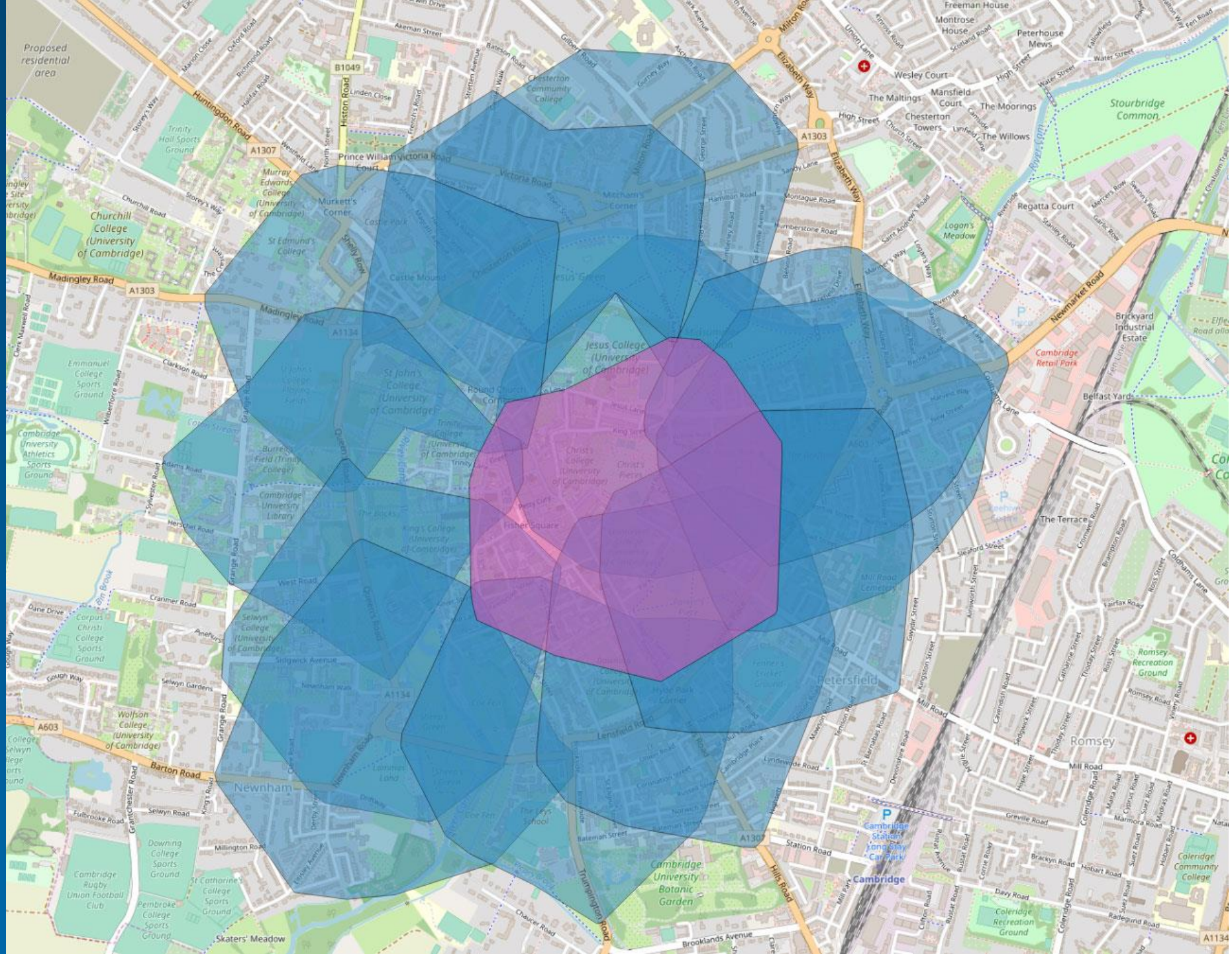
Three bays per stop potentially serve 180 buses/hour or 13,000+ people/hour

Ring-and-spoke ('lollipop') bus routing

Benefits

- Frees up space in the city centre to widen pavements and reduce conflicts with people cycling
- Increases capacity for running more buses
- Puts much more of the city within direct reach of South Cambs
- Enables more city dwellers and tourists to visit rural attractions
- Brings people to parts of the city that could develop into attractive destinations (e.g. Mitcham's Corner, Sun Street)

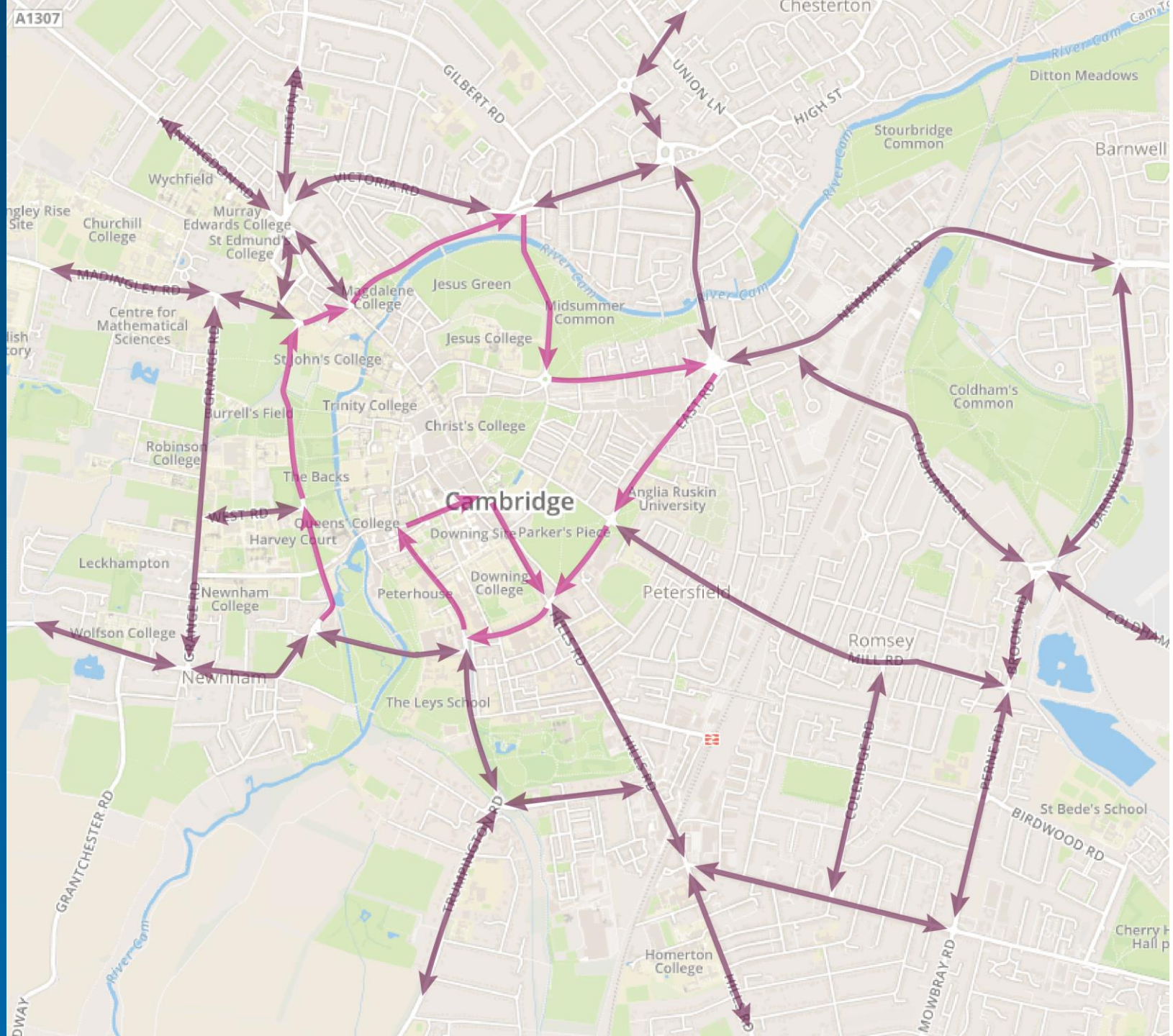
Ring road bus stops



Each shape is what can be reached in a 10 minute[1] walk from a bus stop on the inner ring road (blue) or Emmanuel St (purple).

[1]650m at 4km/hr or 2.5mph

Re-routing general traffic

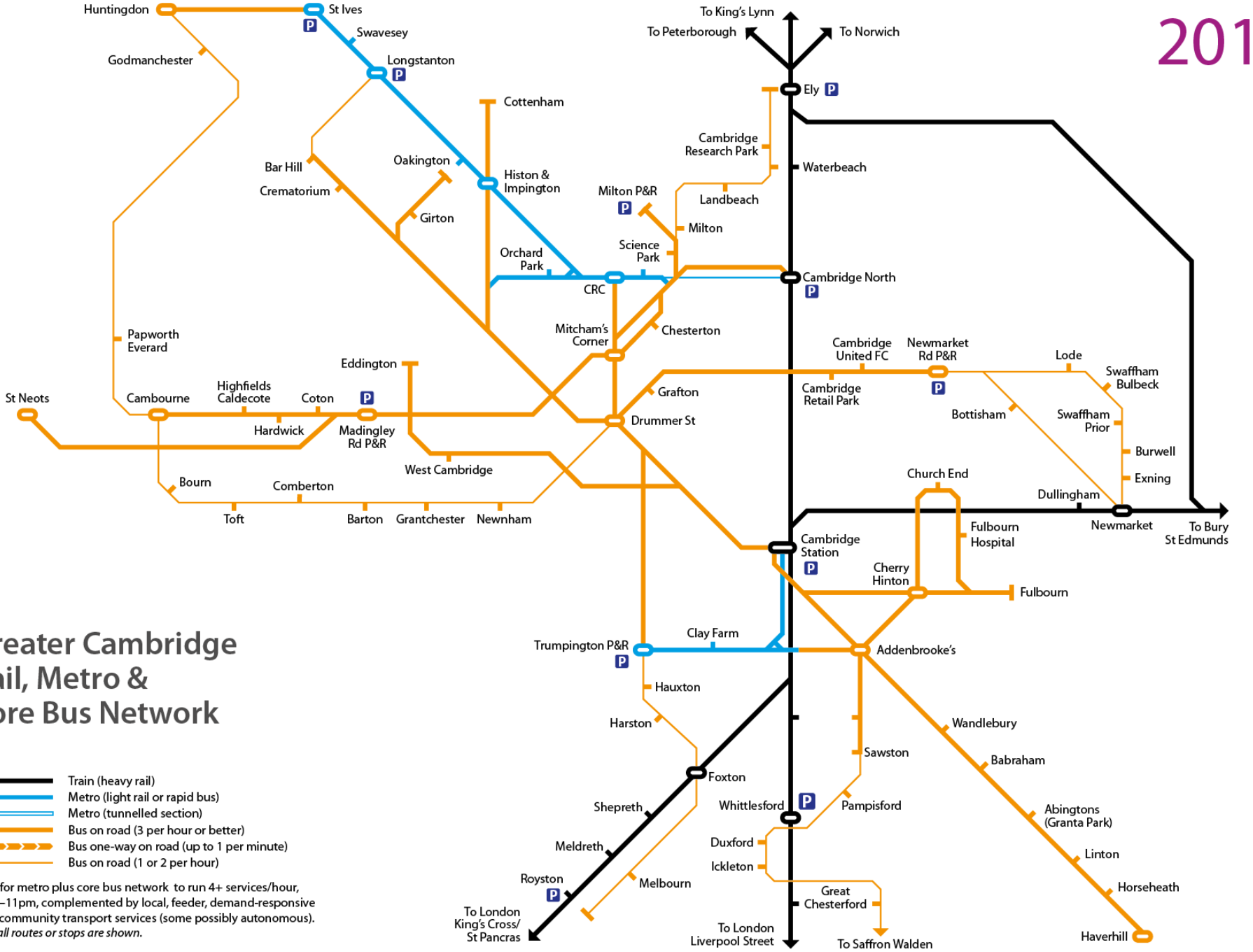


General traffic circulates clockwise around the inner ring road.

The Fen Causeway remains two-way.

Current bus network

2019



Greater Cambridge Rail, Metro & Core Bus Network

- Train (heavy rail)
- Metro (light rail or rapid bus)
- Metro (tunnelled section)
- Bus on road (3 per hour or better)
- Bus one-way on road (up to 1 per minute)
- Bus on road (1 or 2 per hour)

Aim for metro plus core bus network to run 4+ services/hour, 6am–11pm, complemented by local, feeder, demand-responsive and community transport services (some possibly autonomous).
Not all routes or stops are shown.

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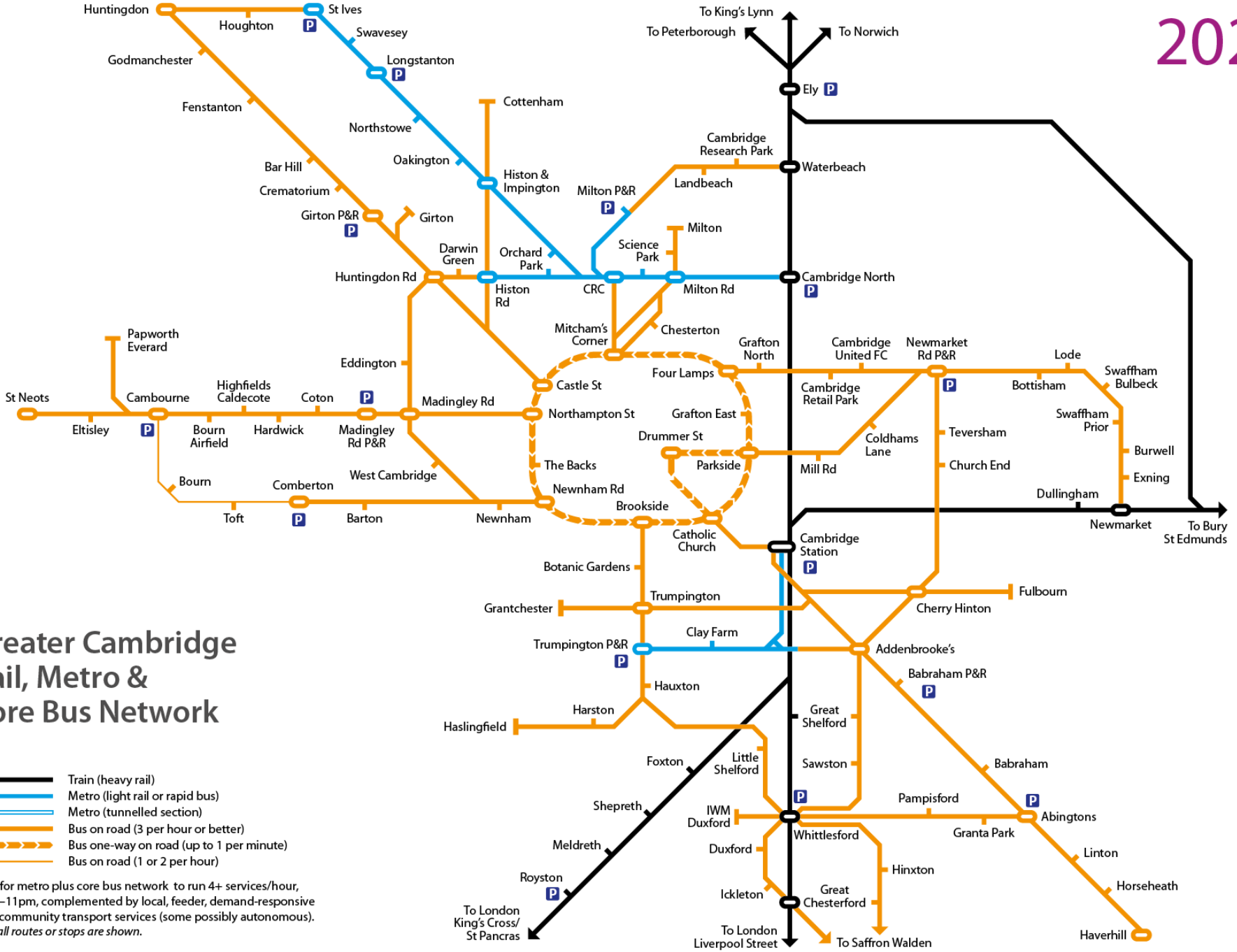
Reorganised bus network

2021



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Not all routes or stops are shown.

v0.21

Questions

- Is it intuitively appealing (in the way that a tram system is)?
- Is it acceptable to run as many as 180 buses/hour (at peak times) along The Backs?
- Is there another way to route buses to avoid The Backs?
- Is it acceptable that some car trips may take up to 15 minutes (rare case) longer?
- Is it possible to fit 3-bay bus stops at maybe 12 locations around the inner ring road?
- **Is it worth exploring this idea further?**

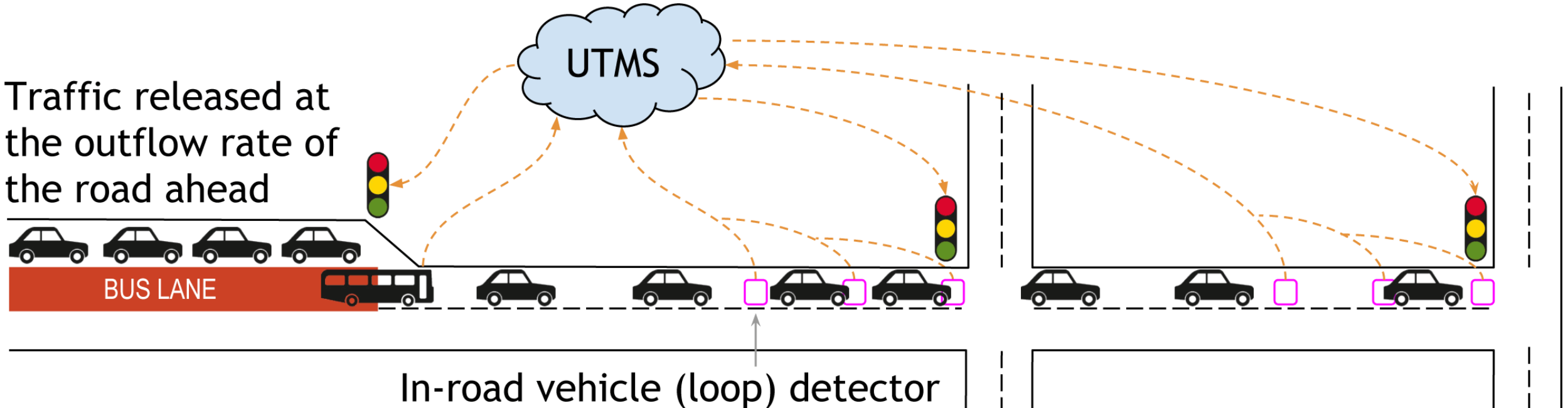
Quick facts about buses

- Capacity: 75-100 passengers (40–80 seated)
- Cost: £200,000+ for a double-decker
- Electric buses will soon be able to run all day on an overnight charge
- High cost and limited rate of production prohibits rapid replacement of all buses with electric
- Modern (Euro VI) engines are significantly less polluting that previous models (and far less than most diesel cars) and can be retrofitted

Buses in the city centre can be little!

Inbound Flow Control

Rather than build bus lanes in the city, where space is needed most for walking, cycling and green space, hold traffic at the **edges** of the city. Buses can jump that queue, then flow with uncongested traffic into the city.



Car parking in Cambridge

Category	Spaces	Public income	How is public income used?
Council-owned	>3,500	£10.1m	Council services
On-street	?	£2.2m	Admin + transport services
Residents' zones	>4,000	£0.5m	Admin + transport services
Biomedical Campus	5,922	£1.2m	NHS (patient parking income pays car park build costs)
Retail	>3,000	Nil[1]	
Private	?	Nil[1]	

[1]The businesses whose staff/customers use the car park pay business rates, but the rateable value of parking spaces is £0.