Projects to primarily address 'moving issues'

<table>
<thead>
<tr>
<th>ROAD SPACE CREATION</th>
<th>B1</th>
<th>Harbour, Cross City &amp; Lane Cove Tunnels, Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B2</td>
<td>A86 Tunnels, Paris</td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>Clem Jones &amp; M7 Motorway, Brisbane</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>Fraser River Toll Crossings, Vancouver</td>
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<td></td>
<td>B5</td>
<td>Costanera Norte, Santiago</td>
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<td></td>
<td>B6</td>
<td>Urban Highways, Mexico City</td>
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<tr>
<td></td>
<td>B7</td>
<td>The Big Dig, Boston</td>
</tr>
<tr>
<td></td>
<td>B8</td>
<td>LBJ/I-0365, Dallas</td>
</tr>
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<td></td>
<td>B9</td>
<td>Gota Tunnel, Gothenburg</td>
</tr>
<tr>
<td></td>
<td>B10</td>
<td>Hovenring, Eindhoven</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROAD SPACE RE-ALLOCATION</th>
<th>B11</th>
<th>Cycle Superhighway, Copenhagen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B12</td>
<td>Carrera 7, Bogota</td>
</tr>
<tr>
<td></td>
<td>B13</td>
<td>LRT &amp; Pedestrianisation, Strasbourg</td>
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<tr>
<td></td>
<td>B14</td>
<td>Cycling Network &amp; Hire, Strasbourg</td>
</tr>
<tr>
<td></td>
<td>B15</td>
<td>Mobilien Bus Network, Paris</td>
</tr>
<tr>
<td></td>
<td>B16</td>
<td>Ciclovia &amp; Ciclorutas, Bogota</td>
</tr>
<tr>
<td></td>
<td>B17</td>
<td>The Spui, The Hague</td>
</tr>
<tr>
<td></td>
<td>B18</td>
<td>Multi-Use Lanes, Barcelona</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROAD SPACE DEMAND MANAGEMENT</th>
<th>B19</th>
<th>N-VI HOV Lane, Madrid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B20</td>
<td>Spitscoren, Rotterdam</td>
</tr>
<tr>
<td></td>
<td>B21</td>
<td>Pico y Placa, Bogota</td>
</tr>
<tr>
<td></td>
<td>B22</td>
<td>INSTANT, Bangalore</td>
</tr>
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<td></td>
<td>B23</td>
<td>Go520, Seattle</td>
</tr>
</tbody>
</table>
Reasons for the project

The N-VI HOV/BUS lane aimed to:

» Reduce travel times by reducing congestion, increasing car occupancy rates and encourage mode shift to bus.
» Reduce the environmental impact of transport into Madrid.
» Increase the level of service of transport into Madrid.

Short project description

The HOV/bus system within the N-VI highway stretches for just over 15km between Laz Rozas, a suburban village, and a multimodal interchange at Moncloa, a central urban district of Madrid. For most of its length the system provides two concrete-separated high occupancy vehicle lanes, which are accessible to both buses and high-occupancy cars, and switch direction between the morning and afternoon peaks.

For the final 3.8km into Madrid, there is only a single reversible separated lane, just for buses.

These lanes were built at the same time as significant public transport improvements involving the extension of Madrid’s metro, and an upgrade of the interchange at Moncloa. The scheme has successfully improved journey times and reliability for commuters travelling by bus, and encouraged a modal shift towards bus travel along the corridor. The two high occupancy lanes carry more passengers per hour in one direction than the four general-purpose lanes they run alongside.

* Construction time not known
Chapter B19 | N-VI HOV/BUS lane, Madrid

CITY CONTEXT

Madrid is the capital and largest city of Spain. The population of the city is roughly 3.3 million and the entire population of the Madrid metropolitan area is calculated to be 6.5 million. It is the third largest city in the European Union, after London and Berlin, and its metropolitan area is the third largest in the European Union after London and Paris.

The city is located on the Manzanares river in the centre of both the country and the Community of Madrid (which comprises the city of Madrid, its conurbation and extended suburbs and villages). As the capital city of Spain, seat of government, and residence of the Spanish monarch, Madrid is also the political centre of Spain.

The suburbs of Madrid experienced rapid population growth in the twenty years before 1995. The urban sprawl created a recurring road congestion problem. The problem was seen to be particularly bad along the corridor to the northwest of the city centre, which is served by the radial N-VI highway.

Population density in the N-VI corridor is lower than in any other part of the metropolitan area, and the rate of car ownership is high (0.6 vehicles/person). Options for road-building were severely constrained by the lack of space not already given over to residential development, or made into protected green spaces.

The project

The HOV/bus system within the N-VI stretches for just over 15km between Laz Rozas, a suburban village, and an interchange at Moncloa, which is an urban district of Madrid.

The 12.3km stretch of N-VI between Las Rozas and Puerto del Hierro comprises four lanes in each direction for all-purpose traffic, plus two lanes reserved for high occupancy vehicles including buses. These two lanes are reversible (switching direction to accommodate the morning and evening commutes). The lanes are located in the centre of the road and separated from other traffic by concrete barriers.

In addition to the lanes for general-purpose traffic between Puerto del Hierro and Moncloa, there is a single, 3.8km, concrete-separated lane reserved for buses only.

At Puerto del Hierro, the NV-I connects to an orbital motorway. Users of the high-occupancy lane can access it at this junction and at Las Rozas. In addition, the high occupancy lanes are accessible via entry and exit ramps which tunnel under the rest of the road at three points between Las Rozas and Puerto del Hierro, allowing bus operators to place stops along the route. The bus-only lane from Puerto del Hierro to Moncloa also uses ramps and tunnels to avoid conflicts with other traffic.

Figure B19.2

The length of the HOV lane
Funding and implementation

Construction of the works took 30 months. Parts of adjacent fields were acquired by the government by compulsory purchase, and this process was the main source of delay in construction.

For the reversible one-way lanes, on week days, the lanes are open to traffic driving towards the city in the morning, and away from it in the evening. On weekends and public holidays, the lanes carry traffic away from Madrid in the morning and towards it in the evening. The operators are able to change these arrangements as it is deemed necessary. At times when there is no congestion, the HOV/bus lanes are kept closed, to minimise conflicts associated with vehicles entering and exiting the lanes.

Electronic variable message signs are used to inform road users if the lanes are open or closed. Mobile barriers and traffic lights are used to secure access. CCTV and traffic sensors are used to monitor the lanes. A control centre for operating the lanes communicates with these devices.

The construction, maintenance and operation of the HOV and bus lanes was entirely funded through the National Public Budget. The Department of Roads in the Ministry of Public Works was given responsibility for constructing and maintaining the infrastructure, while the Department of Traffic in the Ministry of the Interior has responsibility for operating the lanes and enforcing traffic rules. Traffic police check the occupancy of cars in the HOV lanes.

A website has been set up to help match up drivers with car sharers.

TRANSPORT POLICY CONTEXT

Roads leading into Madrid are the responsibility of the Ministry of Public Works, while metropolitan public transport is the responsibility of local and regional government. By the time of the N-VI project, congestion on the corridor had become a serious enough problem in the public eye that a shared sense of urgency helped the various public bodies work together largely without conflict. The main point of contention during planning was whether double-occupancy cars should also be banned from the high-occupancy lane, in addition to single-occupancy cars.

The introduction of the lanes coincided with significant public transport improvements: a new bus terminal was created at the interchange point in Moncloa less than six months after high occupancy and bus lanes were opened, and line 6 of the Madrid Metro was extended from Ciudad Universitaria to Cuatro, via Moncloa, to become Madrid’s first orbital metro line (a second orbital route, line 12, opened in 2003).

The success of the scheme encouraged central government to announce a proposal in 2005, to create two-way bus lanes on all radial highways into Madrid, totalling 100km, at an estimated cost of €3.3m per km.

figure B19.3
A6 bus lane in operation
Impacts of the project

Usage: Figures, from November 2001 show that at am daily peak (7am-10am) more passengers (but fewer vehicles) travel in the two bus and HOV lanes than in the four other inbound lanes; 27,000 compared to 19,000.

Table B19.0 shows that there is an average of 30 passengers per bus in the bus lane, compared to 17 passengers per bus in the standard lanes. In cars there is an average of 2 passengers in the HOV lane compared to 1.1 in cars in the standard lanes.

Data from 2005 shows the number of total passengers (car and bus) had increased to 32,000 in the HOV lanes and 20,000 in the standard lanes. A much greater growth from the HOV lanes.

Bus occupancy in the HOV lanes also increased slightly from 30 in 2001 to 31 in 2005.

### Table B19.0

ANALYSIS OF LANE USAGE, NOV 2001

<table>
<thead>
<tr>
<th></th>
<th>HOV/BUS LANE (2)</th>
<th>STANDARD LANES (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total buses</td>
<td>478</td>
<td>131</td>
</tr>
<tr>
<td>Total bus pax</td>
<td>14,110</td>
<td>2,260</td>
</tr>
<tr>
<td>Pax per bus</td>
<td>29.5</td>
<td>17.3</td>
</tr>
<tr>
<td>Total cars</td>
<td>6,634</td>
<td>15,307</td>
</tr>
<tr>
<td>Total car pax</td>
<td>13,059</td>
<td>16,350</td>
</tr>
<tr>
<td>Pax per car</td>
<td>2.0</td>
<td>1.1</td>
</tr>
</tbody>
</table>

### Table B19.1

IMPACT OF THE HOV LANGES (COMPARISON OF 1991 AND 2001)

<table>
<thead>
<tr>
<th>MONTH</th>
<th>HOV LANE</th>
<th>CONVENTIONAL LANES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BUSES</td>
<td>OTHER</td>
<td>BUSES</td>
</tr>
<tr>
<td></td>
<td>veh.</td>
<td>pax.</td>
<td>veh.</td>
</tr>
<tr>
<td>11/1991</td>
<td>244</td>
<td>6,602</td>
<td>15,810</td>
</tr>
</tbody>
</table>

### Table B19.2

MODE SPLIT ON THE CORRIDOR 7AM-10AM

<table>
<thead>
<tr>
<th></th>
<th>1991</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>56%</td>
<td>48%</td>
</tr>
<tr>
<td>Bus</td>
<td>17%</td>
<td>27%</td>
</tr>
<tr>
<td>Train</td>
<td>27%</td>
<td>24%</td>
</tr>
</tbody>
</table>
**Mode share:** The most significant impact of the HOV and bus lanes has been modal shift to buses. Table B19.2 shows that this increased from 17% of all journeys to 27%. Car use, by comparison, has fallen less dramatically.

**Journey times:** The bus and HOV lane has decreased journey times for bus/HOV passengers. Journey times on non-HOV lanes have also decreased. In 2001 it was found that at 8:30am the same 15km trip took 22 minutes in the HOV lane, compared to 40 minutes in the standard lanes.

Between 1991 and 1995 (after the introduction of the lanes) bus journey times in the am peak improved by 39% from 26mins to 11mins for a trip from Las Rozas to Moncloa.

**Congestion:** Before the introduction of the HOV and bus lanes the route reportedly suffered from chronic congestion. The journey time savings imply that congestion has improved on the route.

**Public realm:** The N-VI runs through parts of the metropolitan area of Madrid, passing by two protected green spaces and through a medium-density suburban area. In order to widen the road, parts of the fields adjacent to it had to be acquired by the government by compulsory purchase. However, the reversible design of the HOV/bus lanes mitigated the government’s need for additional land in an area where extensive road-building was not an option.
Name of project: SpitsScoren ‘Profit from the peak’
Location: Rotterdam, The Netherlands
Year: October 2009 to July 2012
Cost: €10 million (as budgeted)

Reasons for the project

Road pricing was widely discussed by policy makers prior to 2010.

It was agreed that public support was crucial to implement a successful road pricing scheme. As a result five ‘mobility projects’ were introduced with the following aims:

» To reduce peak hour traffic travelling to the Port of Rotterdam.

» To encourage modal shift away from car.

» To prepare motorists for the potential introduction of road pricing.

The scheme started in October 2009 and was due to finish in July 2012 but has been extended to December 2012. It is hoped however, that the behaviour change achieved will be longer-lasting than the project, reducing the long-term need to widen the road.

The project is jointly promoted by the City of Rotterdam, Rotterdam Metropolitan Region, the Directorate-General for Public Works and Water Management and the Port of Rotterdam Authority.

Short project description

The A15 is a 45-kilometre long motorway that runs through the Rotterdam port area. The SpitsScoren project was designed to reduce peak hour congestion on the A15 motorway during a period of roadworks to help minimise delays to freight traffic accessing the port.

The main mechanism for this is a financial incentive for drivers regularly using the A15 at peak hours who are invited to join the SpitsScoren scheme. Those who agree to participate are supplied with a smart phone programmed to track and provide daily feedback on their use of the A15. Each participant receives €5 each day they avoid driving at peak times.
CITY CONTEXT
Rotterdam is the second largest city in the Netherlands with a population of 600,000 people. The population of the wider Rotterdam urban area is around 1.3 million people. The Port of Rotterdam is the largest port in Europe and the second busiest port in the world, after Shanghai. The entire port and industrial complex of Rotterdam covers 10,500 hectares and is 40 kilometres in length with 430 million tonnes of cargo passing through the port annually.

TRANSPORT POLICY CONTEXT
Rotterdam is divided into a northern and a southern part by the river Nieuwe Maas and connected by a series of road and rail-only tunnels and bridges. Four main roads make up a ring road around Rotterdam, the A20 to the north and the A15 to the south (both from east to west) and the A4 to the west and the A16 to the east (both from north to south). The A15 is a 45-kilometre long motorway that runs through the Rotterdam port area.

Road pricing was widely discussed by policy makers prior to 2010, with six successive ministers proposing road pricing schemes, each of which were rejected. It was agreed that public support was crucial to implement a successful road pricing scheme. As a result five 'mobility projects' were introduced with the following aims:

» To relieve congestion.
» To prove that road pricing is effective and stimulates rush hour avoidance.
» To make people aware of the alternatives for their daily commute.
» To prepare motorists for the potential introduction of road pricing.

The SpitsScoren scheme is one of these mobility projects.

The Project
The SpitsScoren project involves incentivising drivers who regularly use the A15 at peak hours to change their driving behaviours during an extended period of road works. The scheme was designed to minimise congestion on the A15 and the resulting delays to freight vehicles accessing/exiting the port. Participants in the project were selected from a vehicle registration number database of drivers who used the A15 over an eight-week period prior to the introduction of the scheme - captured using automatic number plate recognition (ANPR) cameras. Vehicles using the road more than three days per week were considered regular users. These users were contacted and invited to participate in the scheme. Participants are paid €5 per day not to drive on the A15 during peak times. Participants are required to sign up to a two year contract period with a maximum payment of €100 per month.

FIGURE B20.1
A15 BEFORE IMPLEMENTATION OF THE SPITSSCOREN SCHEME
Each participant receives a smartphone programmed to track their peak time travel using GPS. If the participant doesn’t travel on the A15 during rush hour they receive €5. Participants are encouraged to change the way they travel by one of the following options:

» Working from home/travelling later.
» Car sharing with a colleague.
» Car sharing through a social networking site.
» Travelling by bicycle or motorcycle.
» Travelling by public transport.

Participants’ correct participation in the scheme is checked through verification by GPS, mobile phone ID and ANPR.

The project started in October 2009 and will continue until December 2012. A similar scheme Spitsvrij (Peak Free), which covers an area rather than a corridor, has been launched in Utrecht more recently and has 5,500 participants.
Funding and implementation

In July 2008 the City of Rotterdam, Rotterdam Metropolitan Region, the Directorate-General for Public Works and Water Management, and the Port of Rotterdam Authority established a joint body called De Verkeersonderneming. In 2009 De Verkeersonderneming awarded the contract for delivering the project to the SpitsScoren consortium consisting of BNV Mobility Technolution, Goudappel Coffeng, Movenience and ABN AMRO.

KPMG reported that the project requires around €3 million in annual funding (split between national and local governments).

Impacts of the project

Usage: Participants in the scheme increased from around 800 in the first month to over 1,800 after seven months and the number of daily car trips avoided on the A15 increased from 550 in the first month to almost 800 by month seven.

Mode share: This scheme has encouraged individual behaviour change with an average of 60% of participants changing their travel behaviour by reducing travel, changing mode or re-timing trips.

Congestion: Daily peak time traffic reduction has varied between 5% and 7.5%, higher than the target of 5.0%.

If the reduction in traffic currently achieved by the scheme is maintained, the short to medium term need to widen the A15 will be considerably reduced.

Public acceptance/reaction

The monitoring report from the first stages of the project concluded that people are more likely to change their travel behaviour when there is some form of incentive. It was also found that people often have a greater range of alternatives to their current travel modes than they initially realise.
Name of project: **Pico y Placa**  
Location: **Bogotá, Colombia**  
Year: **1998**  
Cost: **(not available)**

### Reasons for the project

A series of policies were implemented in Bogotá during the three year administration (1998-2000) of Mayor Enrique Peñalosa, which were intended to transform a car-centered transport system into a people-oriented one. The Mayor had identified the dominance of the car to be “the worst threat to the quality of life for the city”.

The Pico y Placa scheme was designed to reduce the number of cars on the network to free up space for public transport.

### Short project description

Pico y Placa was a traffic congestion mitigation policy set up in 1998 to help regulate traffic in the city centre during rush hour periods. The system operates by restricting vehicles with certain licence plate numbers from travelling on the most heavily congested streets at specific times.
CITY CONTEXT
Bogotá is the capital city of Colombia, with a population of 10.1 million living in the metropolitan area. In terms of land area, Bogotá is the largest city in Colombia, and one of the biggest in Latin America.

Bogotá has 20 districts, forming an extensive network of neighborhoods. The population with higher incomes are mostly located to the north and north-east of the city, close to the foothills of the eastern mountain range. Poorer neighborhoods are located to the south and south-west of the city.

The urban layout in the city centre is a grid system of streets, with a focal point at a central square. Outer neighborhoods feature more modern developments.

TRANSPORT POLICY CONTEXT
In order to reduce the dominance of cars in the city between 1998 and 2000 the administration established policies in six areas:

» Institutional strengthening.
» Restraining private car use.
» Creation of more public areas.
» Creation of mass transit options (TransMilenio).
» Encouraging the use of bicycles and walking trips.
» Improving the maintenance of cities streets.

The Project
The Pico y Placa mitigation policy operates using the following principles:

» Vehicles are currently restricted from entering central areas based on the last digit of the number plate. Four numbers are not permitted each day Mon – Fri so that each vehicle can enter freely on 2 days of the week.
» The prescribed periods are 06.00 to 08.30 and 15.00 to 19.30.
» The fine for drivers caught entering the Pico y Placa zone during exclusion is COP 257,500 (approximately £90).
» Part of the city is exempt from the vehicle restrictions - shown in blue on Figure 6.0.

Figure B21.0
Map of the new “Pico y Placa”
Funding and implementation

Pico y Placa began in July 1998 and initially restricted vehicles at peak hours of the day, between 7am and 9am, and between 5.30pm and 7.30pm. Private vehicles were prohibited from circulating in the exclusion zone twice a week. Restrictions were dependent on the last digit of the vehicle licence plate number, as shown in table B21.0. Every six months the days are rotated.

In August 2001 the policy was extended to public transportation vehicles. The restriction prohibited 40% of public vehicles from travelling in the exclusion zone for one day of the week. However, this was quickly modified to 20% of public vehicles between 5.30am to 9.00pm for one day a week, again based on the last number of the licence plate.

At this time the Bogota transport authority felt that there was an oversupply of unregulated public transport vehicles and so increased regulation was not believed to have adversely affected service levels.

In July 2003, the duration of each peak period was extended by an hour (to 6am -9am and 4pm-7pm).

In 2009, this policy was expanded to encompass the time between peak periods, from 6am to 7:30pm.

However, further changes in July 2012 have seen the policy restricted once again to peak times (6am – 8.30am, and 3pm – 7:30pm).

<table>
<thead>
<tr>
<th>Day</th>
<th>License Plate Numbers permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Even days</td>
<td>0, 2, 4, 6, 8</td>
</tr>
<tr>
<td>Odd days</td>
<td>1, 3, 5, 7, 9</td>
</tr>
</tbody>
</table>

Table B21.0
CURRENT LICENCE PLATE RESTRICTIONS
Impacts of the project

**Congestion:** The Pico y Placa scheme considerably reduced congestion in peak hours with a 40% reduction in private vehicle use. However, the restrictions have resulted in a continual growth in the number of private vehicles in Bogotá. This is believed to be the result of drivers buying an additional car with a different licence plate to enable them to avoid the restrictions. For example, in 2010, 190,000 vehicles were registered, compared to 145,000 the previous year.

**Air quality/environment:** Though Pico y Placa was a scheme focused on improving mobility for public transport users, there were also a number of environmental benefits to the scheme as a result of the reduced private vehicle use, including a reduction in fuel consumption and greenhouse gas emissions.

**Economic impact:** According to a survey by Fenalco (representing businesses), when the restriction was extended to the full day rather than just peak periods, the most affected employment sectors were workshops, service stations and tyre retailers. These sectors saw their sales fall by 29%, followed by car parks and restaurants that saw a reduction of 28% on their sales.

According to the same survey, the only sectors that reported sales increases were the motorcycle and vehicle dealers, both with an increase of 7%.

Public acceptance/reaction

Initially the Pico y Placa proposals faced significant opposition, with much of the population affected by the scheme. A study undertaken by La Universidad de los Andes found that the implementation of the scheme had resulted in losses of €18 million to the city and its industries.
Name of project: INSTANT: An Incentive Mechanism for Decongesting the Roads
Location: Bangalore, India
Year: 2008-2009
Cost: $1,920 awarded weekly over the 27 week study period (total of $51,840)*

Reasons for the project
The INSTANT project aimed to reduce the commute time and increase the travel comfort of the 14,000 commuters to Infosys Technologies, a large company based 15km outside of Bangalore. It also aimed to reduce congestion-related costs such as pollution and fuel.

Short project description
The INSTANT project was conducted in Bangalore, India, and incentivised a population of commuters to travel at less congested times with monetary rewards. The project ran from October 2008 to April 2009. The project involved 14,000 commuters and succeeded in incentivising many commuters to travel at uncongested times, thereby significantly reducing their commute times.

* Set up costs are not available, however they could be expected to be low, relating to mainly stakeholder engagement and participant recruitment.
CITY CONTEXT
Bangalore is the capital of the Indian state of Karnataka. Located on the Deccan Plateau in the south-eastern part of Karnataka, Bangalore is India’s third most populous city and fifth most populous urban agglomeration. Bangalore is well known as a hub for India’s information technology sector and is among the top 10 preferred entrepreneurial locations in the world.

The Information Technology boom in Bangalore over the last 15 years has seen its population grow from 4.13 million in 1991 to about 8.4 million in 2011. This has corresponded with an increase in the size of Bangalore from 226sq. km in 1995 to 741sq. km in 2007.

TRANSPORT POLICY CONTEXT
The enormous growth in the population and the size of Bangalore has not been accompanied by a commensurate improvement in the transportation infrastructure and has led to a very severe and persistent congestion.

Traffic accidents are another major problem in Bangalore and much is being done to try to reduce the number of accidents. Building central barriers to stop pedestrians crossing busy roads and turning two-way roads into one-way roads are the two main approaches to reducing traffic accidents. There has been a marked improvement in the number of road accidents where these changes have been implemented.

Bangalore’s approach to incentivising travel that reduces congestion is in contrast with the current practice to penalise those who contribute to congestion in most of the world’s major cities.

The Project
This INSTANT project targets one of the most congested road routes in Bangalore — Hosur Road, linking Bangalore to ‘Electronics City’ located 15km south of Bangalore.

Electronics City is an industrial technology hub in the south of Bangalore. Infosys Technologies is based at Electronics City and is a multi-national IT services company.

Of the 14,000 daily commuters to its premises, around 9,000 commute by buses chartered by Infosys, 3,000 commute by private automobiles (cars, motorcycles) and 2,000 by other means (typically, public transport). Over 200 buses are used for the morning and evening commutes. Extensive and detailed data is maintained by Infosys on the bus commutes, e.g. commuting times and occupancy of each bus.

FIGURE B22.1
ROUTE MAP SHOWING HOSUR ROAD AND INFOSYS (INDICATED BY RED DIAMOND).
To encourage commuters to travel at less congested times, an incentive scheme was initiated, called INSTANT (for the Infosys-Stanford Traffic project). The scheme awards credits to users every day depending on their arrival time. The credits accrued by a commuter qualifies them for a monetary reward made at the end of each week. Reward amounts varied from Rs. 500 USD$ ($10, assuming an exchange rate of Rs. 50/$1) to Rs. 12,000 USD$ ($240) and were paid out through a raffle mechanism. The more credit a commuter had, the higher the reward amount they could win and the higher the chance that they win a reward at all.

The scheme awards credits each day to employees based on their arrival times. Each week the cumulative number of credits of each commuter is used by an algorithm to choose commuters who will win monetary rewards. The main feature of the algorithm is that the more credits a commuter had earned the higher the amount of prize money they could win and the higher the chance that they could win a prize. The algorithm has three components: credit allocation, weekly reward draws and credit deduction.

Analysis of bus journey time data showed that buses with a pickup time of 7.15am were at least half an hour quicker than buses with a pickup time of 8.15am. Similarly, a bus departing at 5pm was found to be at least half an hour quicker than a bus departing at 6.15pm or 7.15pm. Typically, the buses with longer journey times were found to be operating above capacity (around half of all buses leaving after 7.15am had more than people than the 49 person capacity limit, compared to approximately a quarter of buses leaving before 7.15am). It was also calculated that each bus which commutes the extra time during rush hour consumes at least one more litre of diesel.

**Funding and implementation**

A total of Rs. 96,000 USD$ ($1920) was given out each week to a total of 66 qualified, randomly chosen commuters. About 1,900 commuters were rewarded during the course of the program.

The incentive rewards were funded by the Infosys bus companies through fuel savings generated as a result of quicker journey times.

![figure B22.2](image_url)

**REWARD INCENTIVE MECHANISM**
Impacts of the project

Journey times: A steady decrease in overall average commuter journey time was observed. At the time of the pilot launch, the average journey time was approximately 70 minutes, which fell to 54 minutes by the end of the pilot, a reduction of 23%. This equated to an overall time saving of 2,600 person hours for each working day.

One further observation however, was that journey time increased slightly to 57 minutes in the 3 months immediately following the pilot scheme.

Congestion: Over the duration of the pilot scheme, the number of commuters arriving before 8am increased from 1,000 to 2,000, with the number arriving before 8.30am increasing from 2,000 to 4,000, and the number arriving before 9am increasing from 5,000 to nearly 9,000.

Public transport overcrowding: The shift in commute times also helped to ease the problems of bus over-crowding, with around 35% of buses picking up after 7.15am operating over capacity, compared with over 50% prior to the trial. The change also allowed InfoSys to reduce the size of their commuter bus fleet by 8 buses as a result of more evenly spread demand levels. In total, the company was able to save approximately Rs 20,000 every day on fuel costs alone.

Public acceptance/reaction

The scheme was unveiled to employees of Infosys Technologies through a series of consultation meetings to agree on the nature of the experiment prior to its commencement. The experiment was greeted with a mixture of interest, curiosity and scepticism, but succeeded in engaging the 14,000 employees based in Bangalore. A number of local and national newspapers (Times of India, Daily News, Deccan Herald) also reported the positive impacts of the scheme.
Reasons for the project
The main reasons for the project are to:

» Reduce congestion and CO2 emissions on one of the busiest corridors in the State.
» Test the viability and feasibility of real-time ridesharing.

The pilot was originally timed to coincide with the introduction of tolling on the SR 520 state highway although the tolling was slightly delayed.

Short project description
The SR-520 is a key network connection for major regional population and employment centres in Seattle and is one of the highest-volume transit corridors in the region.

Go520 is a real-time ride-sharing scheme which aims to offer a more flexible approach to car-sharing than traditional carpooling clubs. Drivers and potential passengers sign up and download an app for their smartphone and the system automatically matches people based on their location and time of travel, which could vary from day-to-day. Riders pay a nominal fee at the start of the journey and then a set cost per mile for the journey. The private operating company collects a percentage fee for providing the service with the remainder going directly to the driver.

Initially funded by the Washington State Department of Transportation in the pilot stage, the scheme is now wholly operated by a private company. During the pilot, additional incentives were paid to riders and drivers to encourage sign up.

* as a pilot project, continued June 2011 onwards, private sector operated and funded
CITY CONTEXT
Seattle is the largest city in the Pacific North West region of North America with a metropolitan population of around 3.4 million inhabitants. The city is home to the third busiest container port in the United States serving as a major gateway for trade with Asia. The economy is driven by a mix of more traditional industry, information technology and biotechnology. It was recently ranked the No.1 ‘smarter city’ in America due to an increasing focus on green industries and government policy.

By the year 2030, the Seattle region is expected to grow by more than 1.3 million people and add 700,000 jobs. Forecasts predict that the population and employment growth will increase travel demand across SR 520 by 40,000 daily trips. Twelve of the region’s largest growth centres are located near the SR 520 corridor.

TRANSPORT POLICY CONTEXT
The SR-520 is a key network connection for major regional population and employment centres in downtown Seattle, the University District, downtown Bellevue, Overlake, Redmond and Kirkland. It is one of the highest-volume transit corridors in the region with 566 daily bus trips on 23 routes across the SR 520 bridge. On an average buses carry almost 15,000 riders across the SR 520 Bridge, including 5,000 people during the morning peak period. Transit ridership in the SR 520 corridor has increased by over 30% in the past five years. Most of this growth has been in bus travel to and from the University District and in commutes to job centres in downtown Seattle and on the Eastside... (Cont’d)

The Project
In 2010, the Washington State Department of Transport (WSDOT) commissioned AVEGO to coordinate and manage Go520 as a pilot project. The aim was to evaluate the viability and feasibility of real time ridesharing to complement existing measures geared to reducing congestion and CO2 emissions on the SR 520, a highway linking Redmond, WA to downtown Seattle. AVEGO was asked to attract and register 1,000 participants (250 drivers and 750 riders).

Participants download either the Driver or Rider application for their smartphone or sign up to a personalised website. Drivers use their app to create their own routes and points where they would be willing to collect passengers whilst riders use their app to book a ride with a registered driver. Riders state when and where they wished to travel and the system automatically pairs them up with a driver going in the same direction.

To mitigate potential safety fears, pickups from residential addresses are banned, with riders directed to their nearest collection point from a list of predetermined locations.

To recruit participants the project initially focused on engaging with stakeholders along the SR 520 corridor, including large employers before moving on to a wider launch in January 2011 backed by a local and national PR campaign. At the pilot stage potential signees were giving a range of incentives to sign up including the chance for drivers to earn $30 in free fuel and riders $30 of journey credits equating to approximately 8 one way trips. It also allowed drivers to speed up their commute as having passengers on board made it possible to use the Multiple Occupancy Vehicles (MOV) lanes and ramps. At this stage all journeys were tracked via GPS and both riders and drivers were given the opportunity to provide feedback on their driver.

figure B23.1
The SR520 bridge
During the pilot stage, there was a strict screening and approval process with both riders and drivers asked to provide their Social Security Number and date of birth so that a criminal background check could be performed. Drivers also had to provide insurance details and certify that they conformed to their car manufacturer’s maintenance guidelines. Whilst interest was high, such personal information requests were seen as disproportionate to the benefits of joining the scheme and so many people were dissuaded from signing up. Despite this, AVEGO managed to attract 962 drivers and riders by the end of the pilot period.

Since the pilot stage concluded, AVEGO has continued to run the system independently of government funding but they have made a number of changes. The process became more open with the rigorous screening process dropped along with the requirement to provide insurance documentation. Knowing that to be successful, the service needs a critical mass of sign ups, a guaranteed ride service was established. This provided a steady stream of available services and reassurance that should a rider not find a matching driver they will still be able to get to their destination.

The service operates 10 times a day between Capitol Hill and the Overlake Transit Center, of particular benefit to Microsoft employees, whose headquarters are located in the area. Since the launch of the 2nd phase, there are now over 1,100 participants, of which 46 are drivers, with 46% of registered users returning to make further trips.

Soon after the conclusion of the pilot, another company set up a competing scheme called Zebigo, which offered a similar experience but asked drivers to set up a profile with photograph to help provide reassurance for potential passengers.

**TRANSPORT POLICY CONTEXT (CONT'D)**

Real time ridesharing initiatives complement on-going state and local efforts to help manage congestion and reduce CO2 emissions on the SR 520. Other measures include commute trip reduction, vanpooling, incident response, ramp metering, tolling and more traditional online ridesharing. WSDOT have a range of tools available online to help commuters plan their journeys.

There is a live journey table which gives the current journey time between two destinations and an average. They also have a journey reliability calculator to assist commuters in determining what time they would need to leave in order to arrive at their destination by a certain time. High Occupancy Vehicle (HOV) lanes have been in use on the SR 520 since the late 1980s/early 1990s and are unusual for North American in that they are on the right hand side of the road and have one section which also requires vehicles to be occupied by at least three people.

Infrastructure investment in this corridor is also planned. The SR 520 High Capacity Transit Plan of 2008 outlines a strategy for meeting the demand for cross-Lake Washington. The plan covers three main elements:

- Bus rapid transit: shared facilities HOV lanes and supportive HOV direct-access ramp investments, transit bypass lanes, preferential treatments at intersections, intelligent transportation systems and limited stops, greater efficiency with improved vehicle design, fare collection systems and high quality bus stations.
- Multi-modal interchange adjacent to the University of Washington campus.
- Consideration of Light rail operation on dedicated facilities.
Funding and implementation

In 2010, WSDOT commissioned AVEGO to coordinate and manage the pilot project on the SR 520 alongside two local partners from September 2010. The initial pilot ran from January 2011 to June 2011 funded by $400,000 from WSDOT. From June 2011 onwards, the project became the sole responsibility of AVEGO with no further funding from WSDOT though they, and other local partners, continue to be involved in the project.

AVEGO charges riders a $1 transaction fee and then 20c per mile with all transactions handled through PayPal. They collect 15% of the total cost with the rest passed directly to the driver.

Impacts of the project

As a relatively small scale and new scheme there are no wider impacts reported. However AVEGO have reported the following usage statistics.

Usage:

» Over 1,100 participants (46% of which are repeat users).
» 46 registered drivers.
» Up to 100 trips per day on the Capitol Hill and the Overlake Transit Centre corridor.
» 13% growth in users since the beginning of the second phase (mostly through word of mouth).
» 49% increase in the number of real time ridesharing journeys since the beginning of the second phase.

Public acceptance/reaction

The pilot consisted of three consultation exercises: an entrance survey, an exit survey and focus groups. Results from the exit surveys and focus groups contributed to a change in processes once the pilot stage ended, specifically reducing the administrative and procedural burden on registering drivers.
## Case Study Areas Population

<table>
<thead>
<tr>
<th>City</th>
<th>Metropolitan population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seoul, South Korea</td>
<td>23.5 million</td>
</tr>
<tr>
<td>Mexico City, Mexico</td>
<td>21.2 million</td>
</tr>
<tr>
<td>Paris, France</td>
<td>12.0 million</td>
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<tr>
<td>Bogotá, Colombia</td>
<td>10.1 million</td>
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<td>Bangalore, India</td>
<td>8.4 million</td>
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<tr>
<td>Boston, USA</td>
<td>7.6 million</td>
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<tr>
<td>San Francisco, USA</td>
<td>7.6 million</td>
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<tr>
<td>Santiago, Chile</td>
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<tr>
<td>Madrid, Spain</td>
<td>6.5 million</td>
</tr>
<tr>
<td>Dallas, USA</td>
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<td>Singapore</td>
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<td>Barcelona, Spain</td>
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<td>Sydney, Australia</td>
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<tr>
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<td>Brisbane, Australia</td>
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<tr>
<td>Vancouver, Canada</td>
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<td>Stockholm, Sweden</td>
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<td>Copenhagen, Denmark</td>
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<td>Dublin, Ireland</td>
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<td>Hamburg, Germany</td>
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<td>Oslo, Norway</td>
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<td>Rotterdam, The Netherlands</td>
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<td>The Hague, Netherlands</td>
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<td>Gothenburg, Sweden</td>
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<td>Strasbourg, France</td>
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<td>Freiburg, Germany</td>
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<td>Assen, Netherlands</td>
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<tr>
<td>Hennef, Germany</td>
<td>0.05 million</td>
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</table>
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