



Congestion-Clearing Payments to Passengers

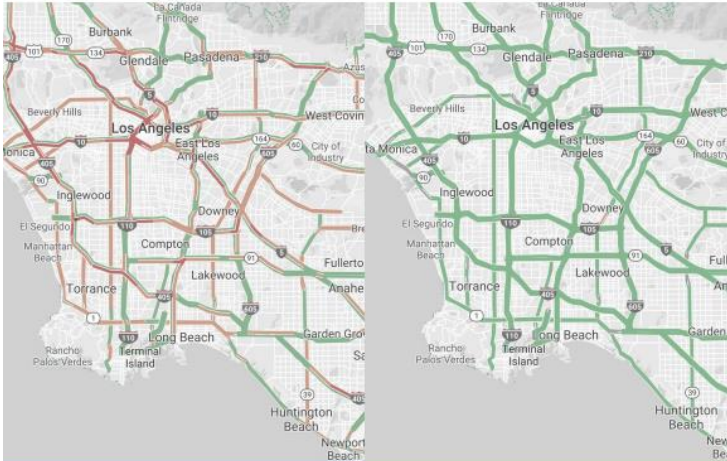
Presentation to Expert Roundtable: Economic Analysis
of the Transformation of Urban Transport Systems



Mineta
Consortium
for Transportation
Mobility

Congestion-Clearing Payments to Passengers

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+ Published Report

<https://transweb.sjsu.edu/sites/default/files/18-17-Minett-Congestion-Clearing-Payments.pdf>

Or

<https://transweb.sjsu.edu/sites/default/files/18-17-RB-Minett-Congestion-Clearing-Payments.pdf>

Field work completed pre-Covid-19

Outline



Describe:

- The solution that was being investigated
- The research that was carried out
- The economic analysis that was undertaken to evaluate the solution
- Conclusions



The Congestion-Clearing Payments Concept

A 'build nothing, pay passengers' option
for reducing traffic congestion

Research Questions



Instead of building infrastructure or pricing congestion:

- “Would it be possible to manage the volume of peak traffic through payment of incentives at a level that would get enough people to travel as passengers in carpools, vanpools or buses, that the congestion could be eliminated?”
- “If so, at what cost, and with what benefits?”
- “Would the benefits exceed the costs?”

Key ideas

- Recurring traffic congestion is caused by bottlenecks
- Congestion is an excess of concurrent drivers, given the throughput capacity of the bottleneck
- The queue of traffic grows when drivers arrive at the back of the queue at a greater rate than drivers depart from the front of the queue
- To reduce congestion, reduce the number of drivers

The Incentive



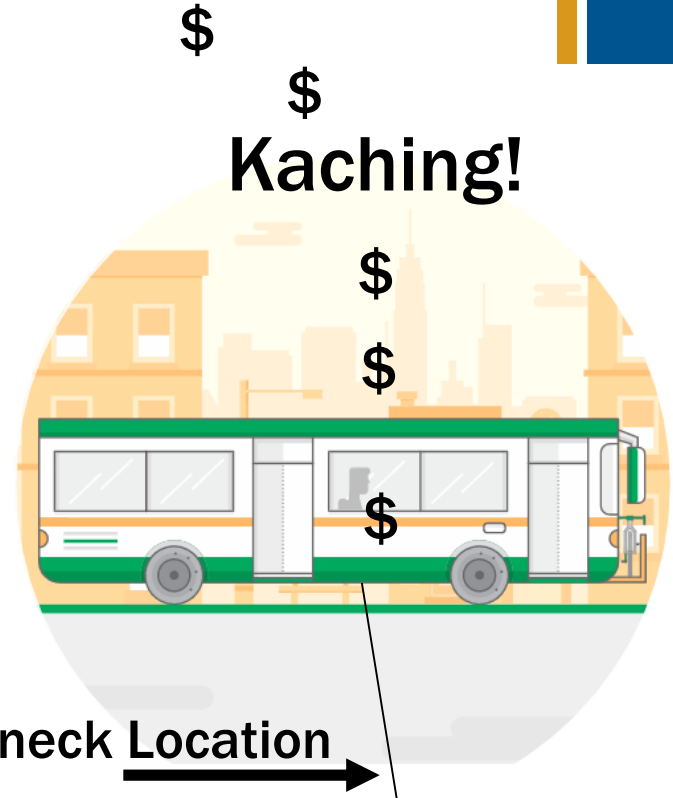
- Mode choice is not a 'behaviour', it is an 'optimization strategy'
- To get more people to travel as passengers, increase the reward
- Reward all people who are traveling as passengers when they cross the bottleneck line
- It does not matter what mode they used previously
- Put in place as an ongoing solution to manage congestion
- Critical is passenger verification app

Passenger Verification App



Frequent Flyer Program For Ground Transportation

Earn miles for all of your commute and travel. Redeem miles for exclusive rewards.

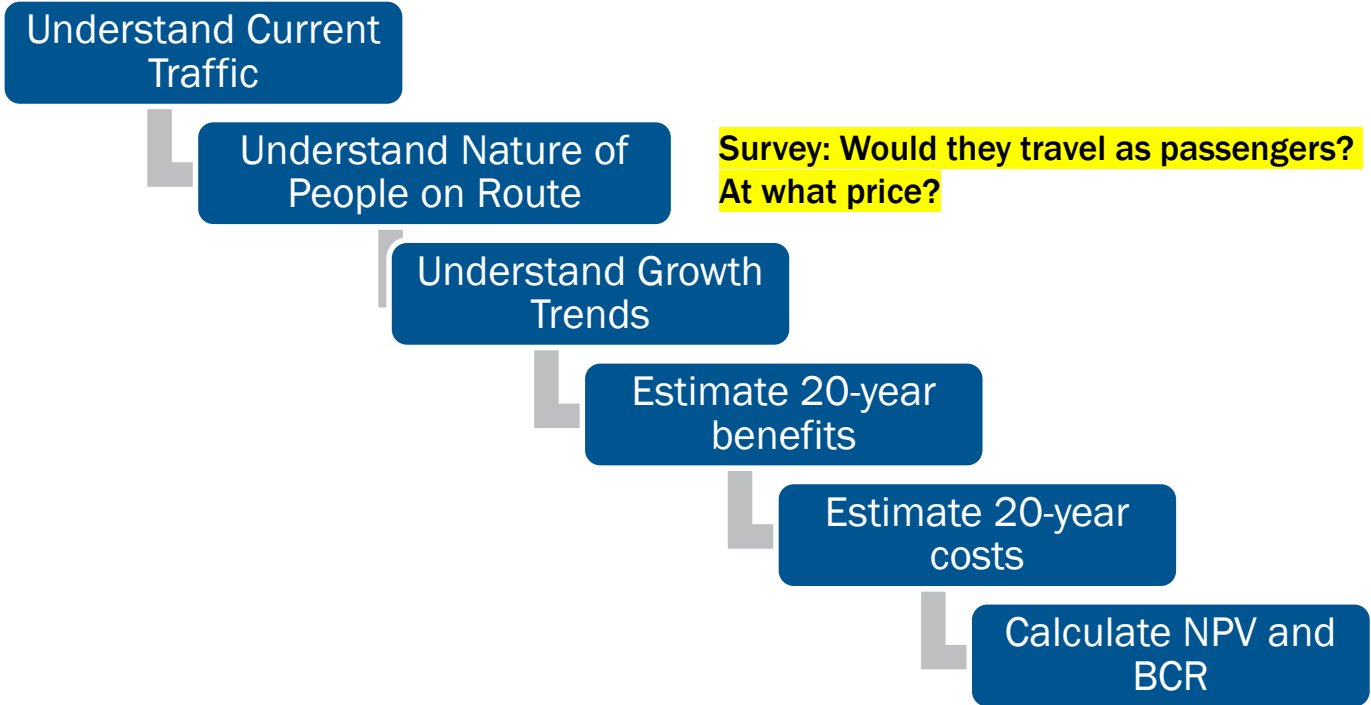




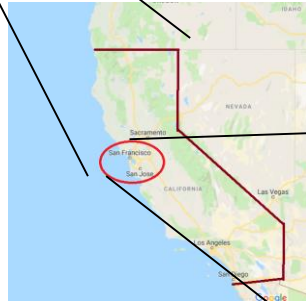
The Research

Developing a method for evaluating a
'build nothing, pay passengers' solution

Incentive Solution Evaluation Methodology

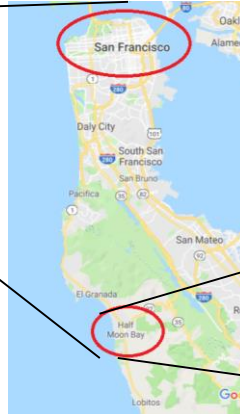


Case study route in California



From Half Moon Bay to Silicon Valley

A single bottleneck at the beginning of the route and capacity of about 1,400 vehicles per hour, with no plan for expansion, and chronic daily congestion at the bottleneck.



Survey Questions (1 of 2)



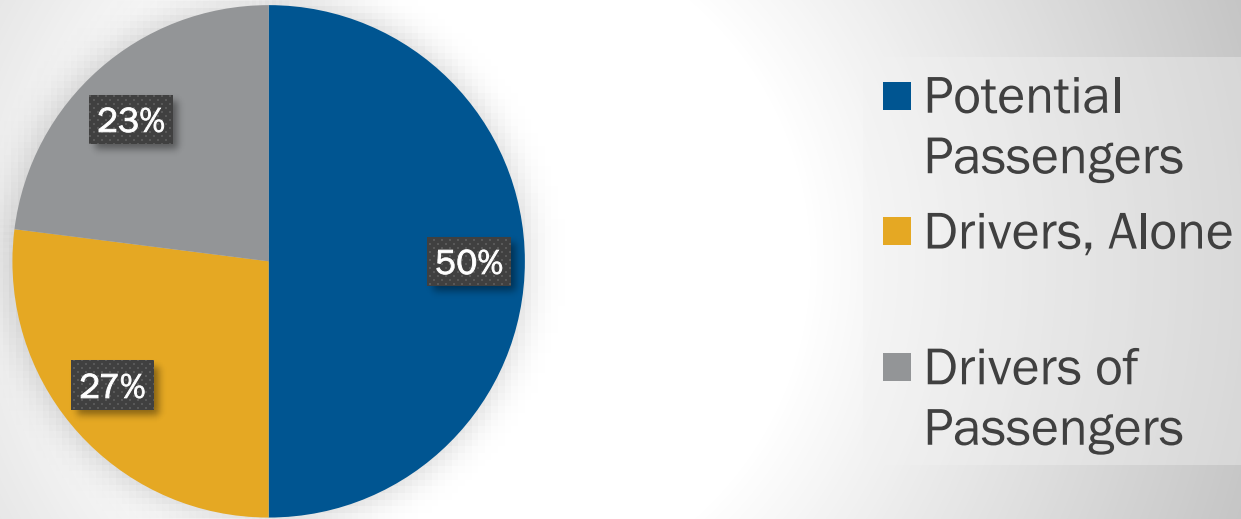
- Domicile, travel in congestion or not, mode of travel, departure time, impact of congestion on you?
- If congestion went away, would any of those change? i.e. start to travel, change departure time, change mode?
- Waiting for congestion to go away, would you help by traveling as a passenger some of the time?
 - Are you the sort of person who would travel as a passenger?
 - If no, would you do it for money?

Survey Questions (2 of 2)



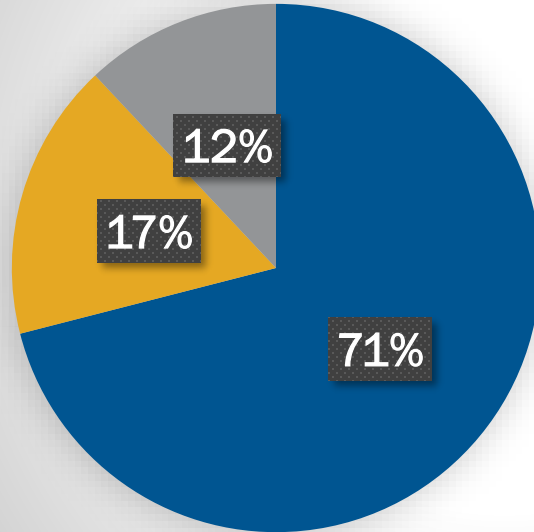
- If yes, how much money, if it was easy to do, to travel as a passenger
 - On a bus?
 - In a vanpool?
 - In a carpool?
 - In a shared Uber-style of service?
- If not a passenger person even for money, are you the sort of person who would provide a ride?
- If no, would the answer be different if you were paid by the passenger?
 - If yes, how much money to give a passenger a ride?

Survey Response: Willingness to Share the Ride



If Congestion Went Away

Existing Commuters would...

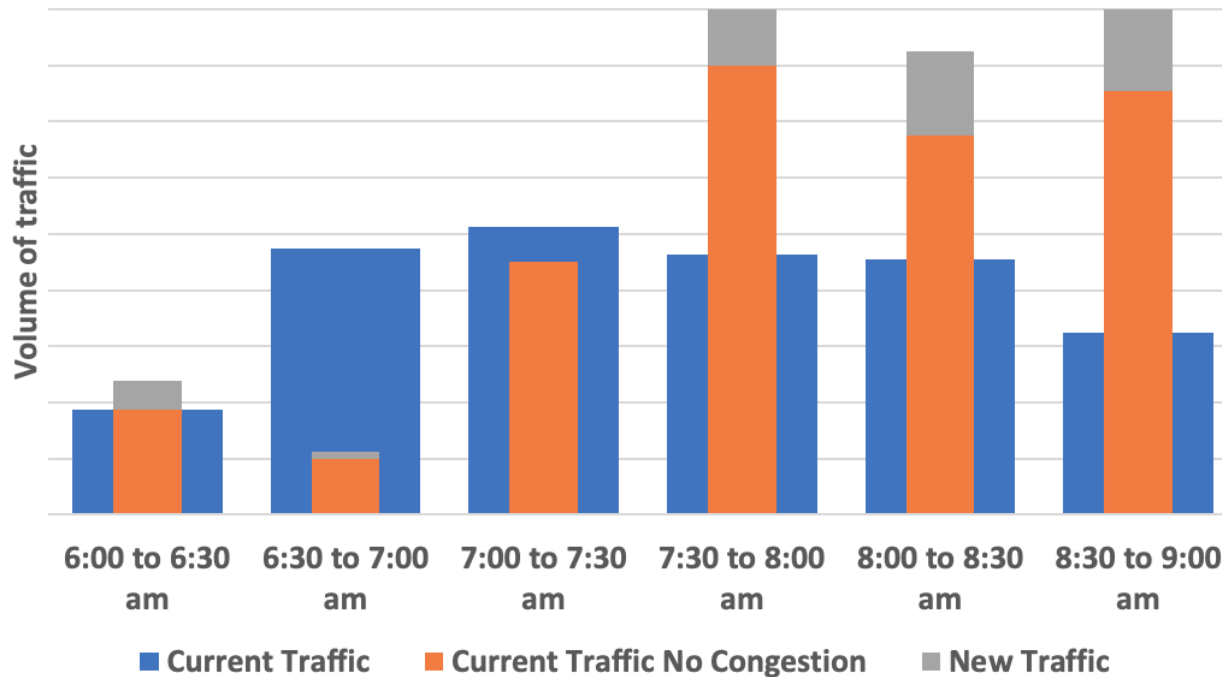


- Shift to later departure, (1,735 more hours at home)
- Shift to earlier departure (490 hours earlier at destination)
- No change to departure time

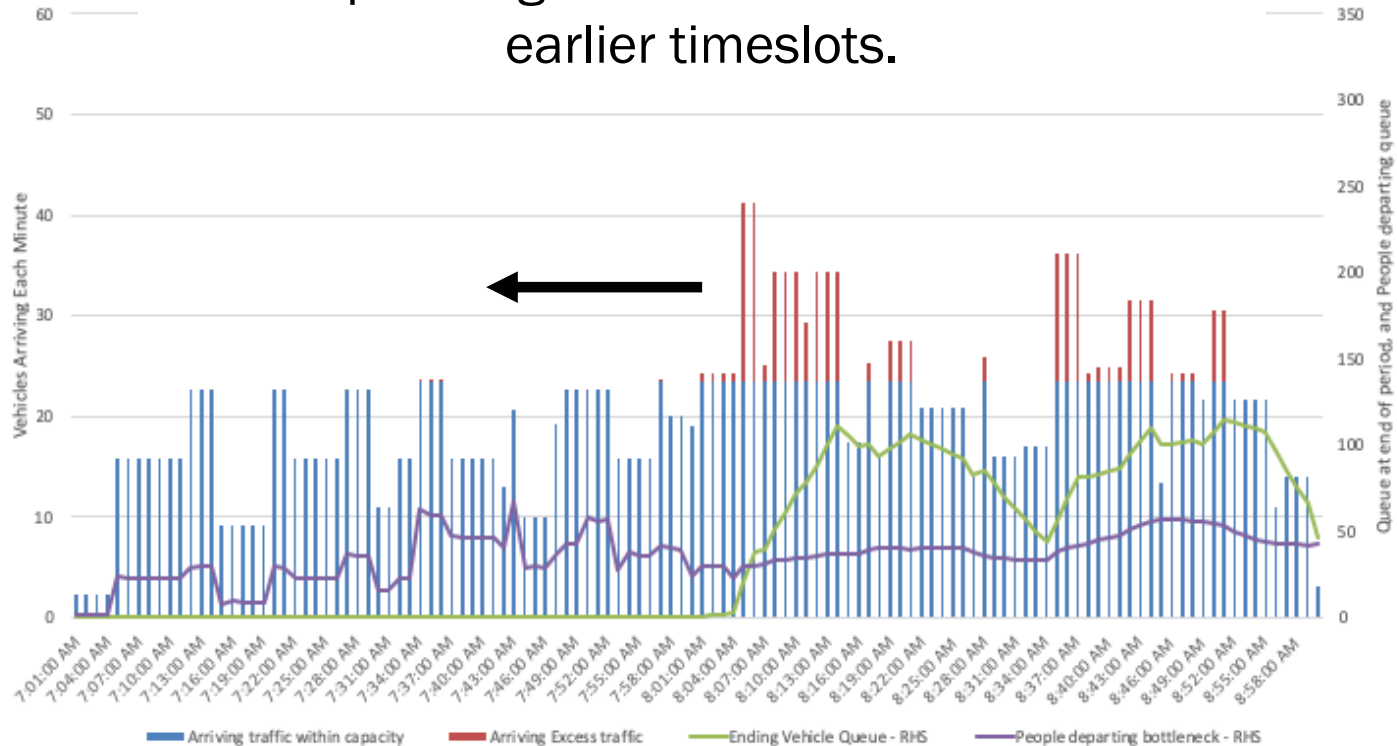
Intra-peak Demand Shift



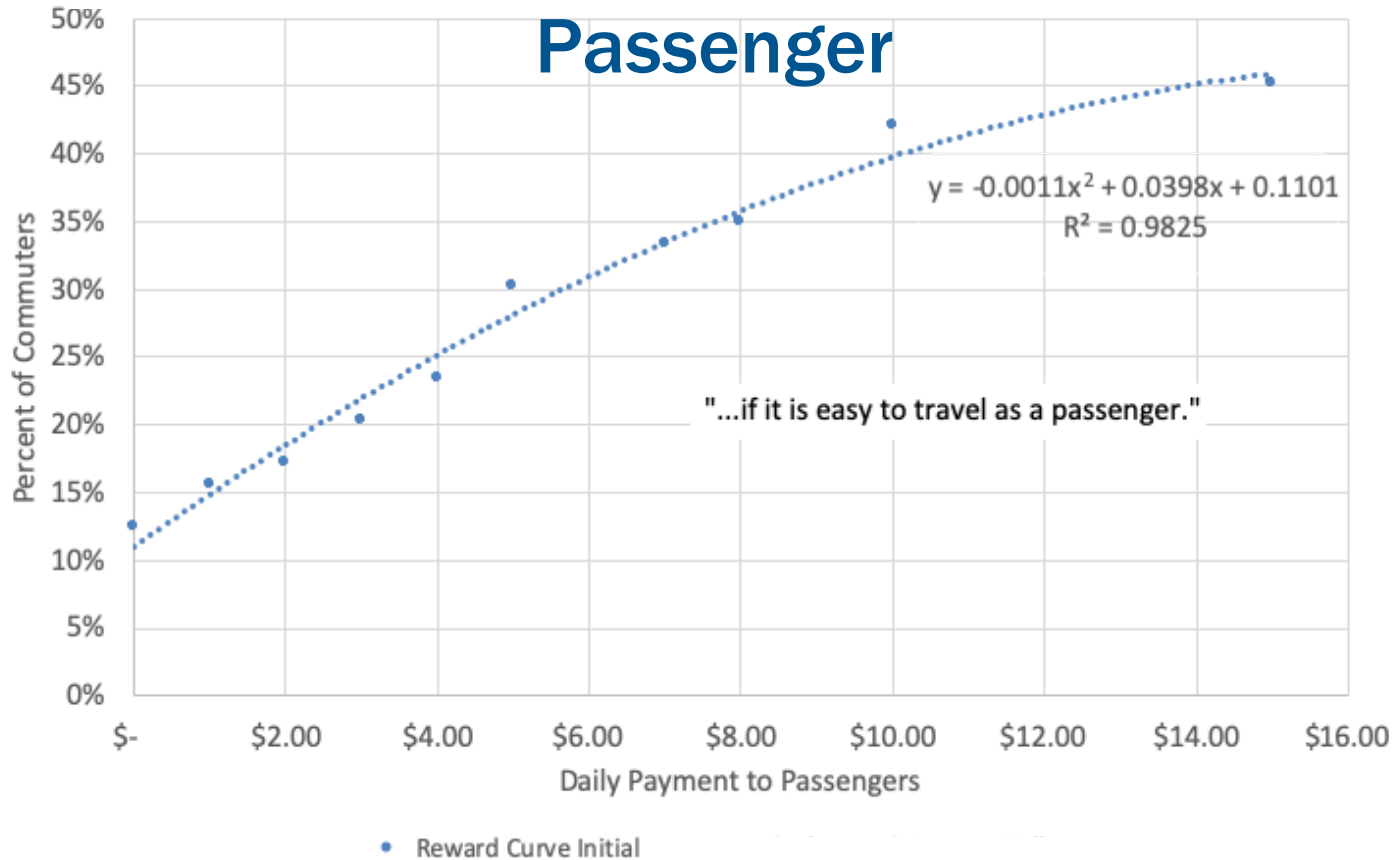
Trip-Time Shift if Congestion Removed (Arrival at the Bottleneck)(Survey-Based)



With maximum passenger rates a queue still forms. A "go-early bonus" would be needed to entice passengers and drivers back into the earlier timeslots.



Reward Sought for Being a Passenger



Need to limit SOV travel at peak of peak (eventually)



■ Options

- Charge a price for SOV travel at peak
- Physically constrain SOV travel at peak
- Provide an HOV bypass so all HOV have preference over SOVs at peak



Economic Analysis

20 years of benefits and costs

The Process



- Model the change in the traffic as congestion is reduced
- Model the further change to the traffic as intra-peak demand shift occurs, or the cost of preventing it
- Model population and economic growth for 20-years
- Model benefits for 20 years and discount to present
- Model costs for 20 years and discount to present
- Calculate NPV and BCR

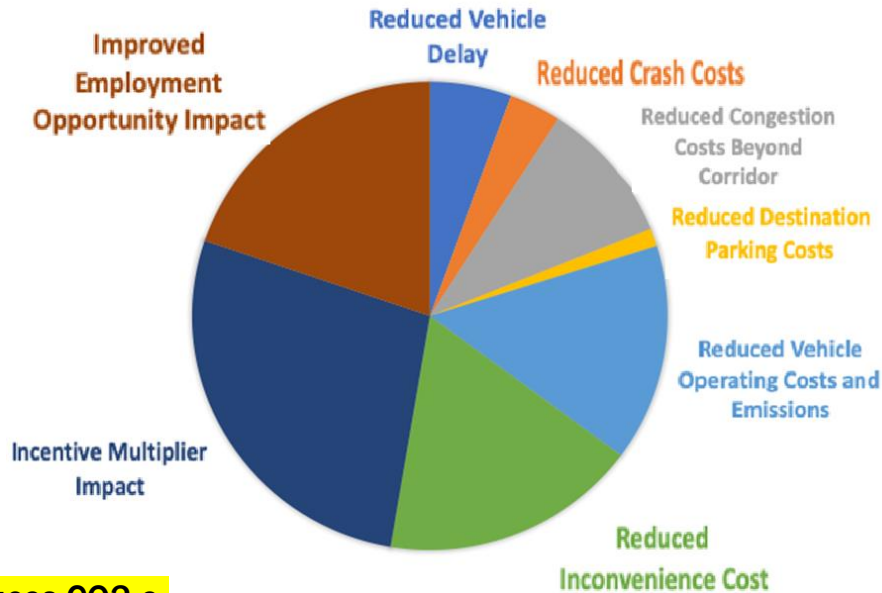
Benefits (traditional view)

Benefit (reductions)	Details	Value (PV of 20 years)
Reduced vehicle delay	Standard hourly values	\$35.5 million
Fuel use reduction	Based on trip time	\$ 2.1 million
Emissions/pollution	Carbon pricing	\$ 8.0 million
Vehicle miles travelled	Fuel and maintenance	\$85.8 million
Destination parking	\$1 per park per day	\$ 7.9 million
Congestion beyond	\$8 per round trip	\$63.1 million
Crash costs	Standard method	\$22.6 million

Benefits (expanded view)

Benefit	Details	Value (PV of 20 years)
Inconvenience Cost	Hours of better time	\$111.9 million
Incentive Multiplier	\$1.25 per \$1.00	\$176.3 million
Expanded Incomes	1 hour per day income	\$126.6 million
Opportunity Impact	Life satisfaction	\$ not priced
Wellbeing Impact	20 mins less commute = 19% increase in pay	\$ not priced
Economic Expansion	3% of GDP	\$ not priced
CO ₂ emissions avoided	calculated	181,000 tonnes

Benefits

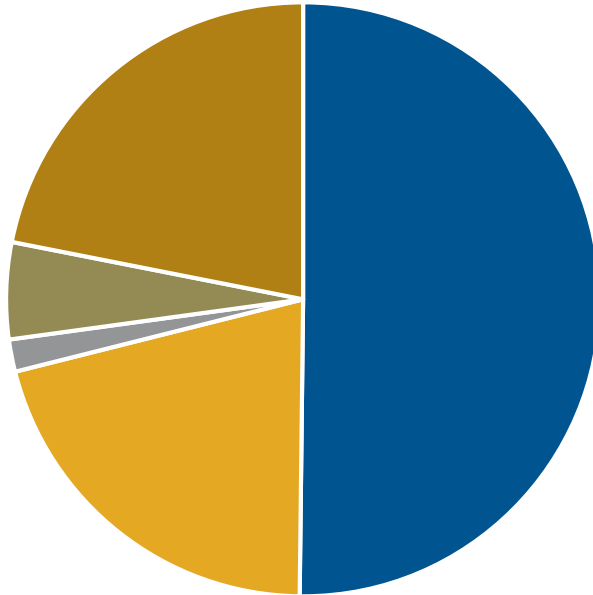


Case Study Route Only
3% discount factor

Reduces CO2-e emissions by 181,000 tonnes over the 20 years

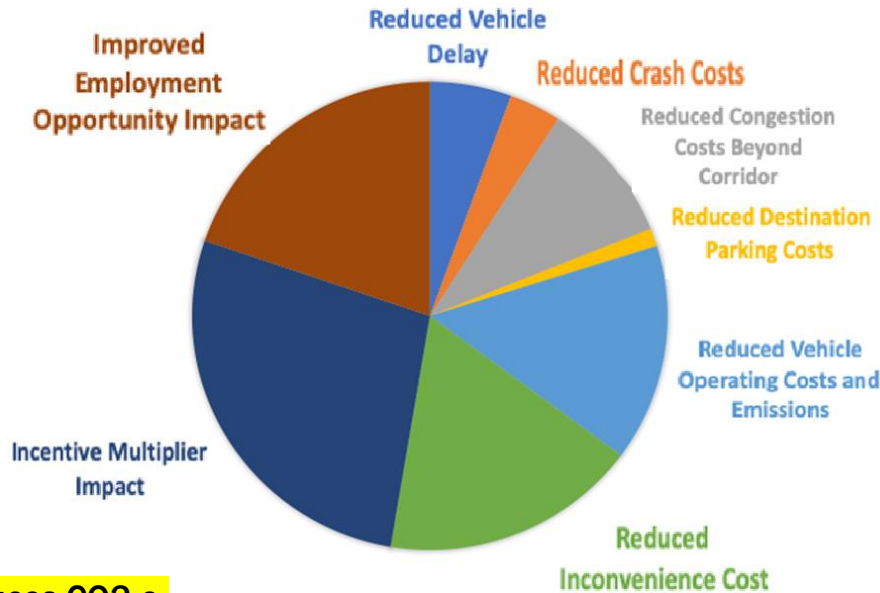
PV 20-yr benefits
\$640 Million

Costs (PV of 20 years estimated)

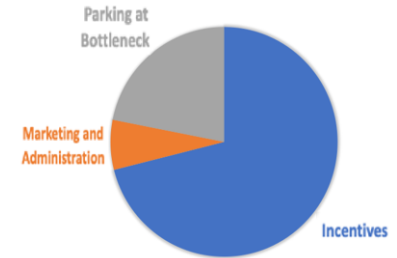


- Incentives for Passengers to travel as passengers (\$71 million)
- Incentives for passengers to travel early as passengers (\$29.5 million)
- Marketing (\$2.5 million)
- Administration (\$ 7.5 million)
- Bottleneck casual carpool parking (\$31 million)

Benefit and Costs (to scale)



Case Study Route Only
3% discount factor



Reduces CO2-e emissions by 181,000 tonnes over the 20 years

PV 20-yr benefits
 \$640 Million



Net Present Value
 \$500 Million
 BCR is 4.5



PV 20-yr costs
 \$140 Million

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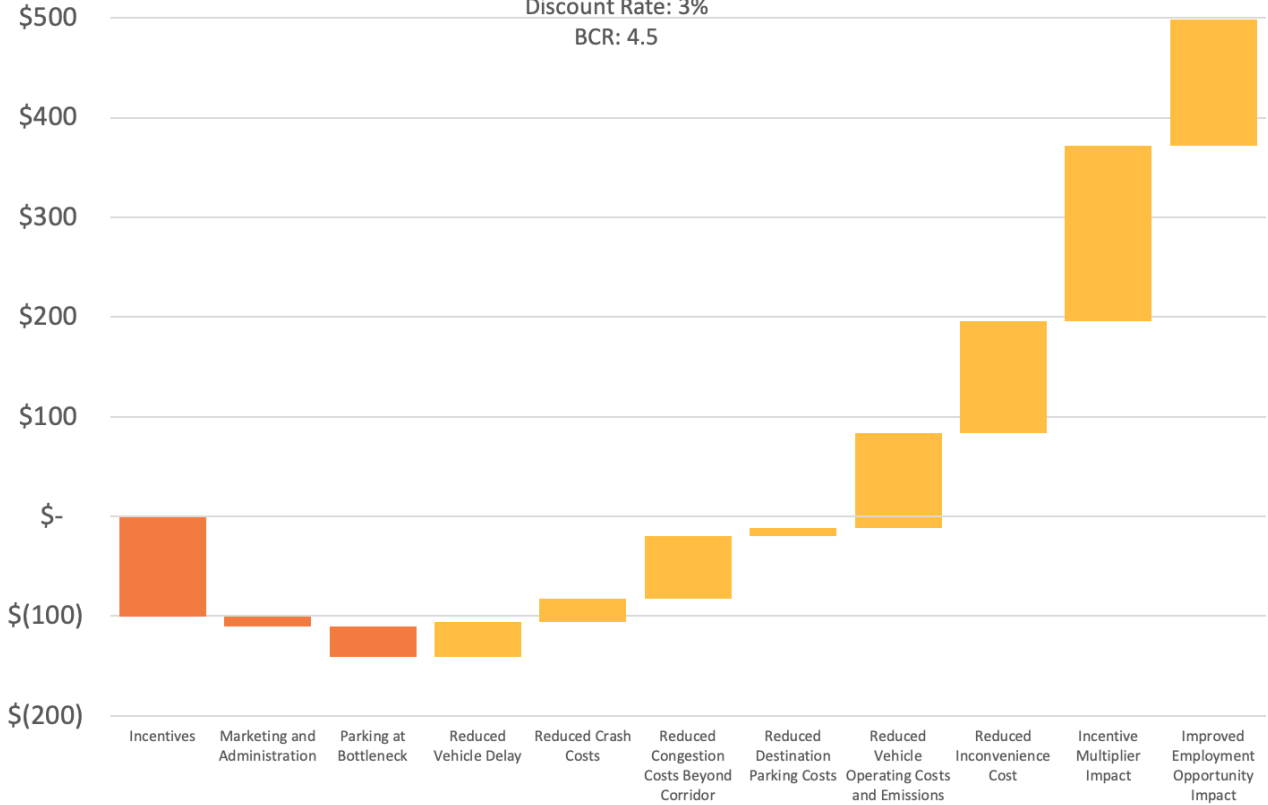
20-Year Costs and Benefits

Case-Study Route

Discount Rate: 3%

BCR: 4.5

\$NPV Millions (\$2019)





Concluding Comments

What we learnt

Questions and Extensions



- Where will the money come from?
- Integration with tolls
- Solution solves equity issues tolls usually raise
- Land-use ‘development charges’: PV of future impact on incentives

Next steps

- Looking for routes to further develop survey
- Looking for funding for pilot project





Thank you

For more information, contact
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