The Road Pricing Future

Paul Salama
Co-founder & COO
ClearRoad

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Oregon Convention Center, Portland
AV Heaven & Hell

Vs.

SHARED MOBILITY PRINCIPLES FOR LIVABLE CITIES

Seek fair user fees
Progress!

“No more bridge shopping.”
Equalizes traffic on bridges and tunnels.
Fifty Years in the Making(?!)

Legend
- **Toll Crossings**
- **Unpaved Bridges**
- **FDR Drive and Route 6/A**
- **TCM Congestion Charge Zone**
- **PuNYC Congestion Charge Zone**
- **New York City**

**Harlem River Bridges**
1. Henry Hudson Bridge
2. Broadway Bridge
3. University Heights Bridge
4. Washington Bridge
5. Alexander Hamilton Bridge
6. Macombs Dam Bridge
7. 145th Street Bridge
8. Madison Avenue Bridge
9. Third Avenue Bridge
10. Willis Avenue Bridge

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*RED ZONE*

**NO CARS**
11 AM - 4 PM
**MON THRU FRI**
The Dirty Secrets of Tolling Infrastructure
Mass Pike Conversion to All-Electronic Tolling

$130M for Tolling Infrastructure
$204M for Backoffice Systems
$130M for Demolition & Reconstruction

$464M Total Cost & 5 Year Timeline

“The primary reason to implement [All-Electronic Tolling] is not cost savings, rather it is customer convenience and its safety, congestion and emission reduction benefits” – massDOT
London Congestion Charge

Over $200M to install

49% of revenue goes to operation ($172 M)

Binary system, can’t manage per-trip fees

Expensive to tweak boundaries
London Ultra-Low Emission Zone (ULEZ) – 2019
London Ultra-Low Emission Zone (ULEZ) – 2021

Over $900M to expand boundary
$300M/year to operate
No guarantee of revenue for City
Traffic Management Solutions Are Not Designed for Compatibility
Traffic Management Solutions Are Not Designed for Future Expansion
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Connected Cars Promise to Replace Static Physical Infrastructure
ClearRoad Leverages Connected Cars to Enable Any Type of Road Pricing
ClearRoad Leverages Connected Cars to Enable Any Type of Road Pricing... Cheaply
Works w/ Current & Future Connected Vehicles

- Plug-in devices for cars
- Smartphone & MaaS apps
- Embedded telematics
- Truck fleet telematics

ClearRoad Open API

ClearRoad
The Road Pricing *Transaction* Platform

Road Usage Data

ClearRoad

Billing System

Governments
Mobility Tech Trends
+ GPS Accuracy

u-blox F9 takes GNSS precision to the next level

5G V2X brings new capabilities with backward compatibility

Wideband carrier support | High throughput | Ultra-low latency | Ultra-high reliability | Strong security
Policy Solutions Are Managed Separately & Often Redundantly
Connected Cars Promise to Integrate Disconnected Policies & Systems
Look to Uber Surge Pricing as a Model

Real-time multi-factor pricing for each geography, based on hyper-local understanding of:

- Demand & Traffic Conditions
- Driver Availability
- Passenger Willingness to Pay
We Already Vary Mobility Policies Based on:

- **Time-of-Day**
- Current Traffic Conditions
- Vehicle Occupancy
- Vehicle Emissions
- Vehicle Weight & Size
- Driver “Status”
- Driver Residence
- Driver Economic Status
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![Vehicle Classification Table]

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>VEHICLE DESCRIPTION</th>
<th>PREPAID ACCOUNT AND TRANSPONDER</th>
</tr>
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<tbody>
<tr>
<td>Passenger Vehicle</td>
<td>2-axle up to 7 ½ feet in height</td>
<td>$2.05</td>
</tr>
<tr>
<td>Medium Vehicle</td>
<td>2-axle more than 7 ½ feet in height</td>
<td>$5.13</td>
</tr>
<tr>
<td>Large Vehicle</td>
<td>5-axle or more</td>
<td>$10.25</td>
</tr>
<tr>
<td>All 3-axle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All 4-axle</td>
<td></td>
<td></td>
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Opportunities for Hyper-Targeted, Precise & Multi-Dimensional Mobility Planning Outcomes (City “Surge Pricing”)

![Dartboard](image-url)
Examples (1) – Limiting Congestion Pricing Impacts on Vulnerable Communities

- Discount for Low-Income Households in Transit Deserts
- Car-Dependent Small Business Credit in Communities of Concern

San Antonio Transit Undersupply
Examples (2) – Minimizing Freight Impacts

- **Surcharge** for Peak paired with an Off-Hour **Negative Charge**
- EV Truck Discount for travel through Environmental Justice Communities
Examples (3) – Managing Autonomous Vehicles

- “Zombie” Tax
- Discount for AV Trips with Few Alternatives
Design the Perfect Micro-Tolling Scheme for New York City

Getting around New York City is as challenging as ever. The City's traffic and subway woes continue to make headlines, yet our discussions of how to handle them are stuck in yesterday's battles and technologies.

We can now move beyond congestion pricing to micro-tolling, charging drivers directly for the congestion they cause. We can impose fees that keep traffic flowing and fund transit while giving hyper-targeted relief to those most burdened. With micro-tolling, the prices and boundaries can be tweaked on the fly, responding to any changing conditions and priorities. This demo is only a sampling of the endless possibilities to make micro-tolling work best for everyone.
PAUL SALAMA
Co-Founder & COO
ClearRoad.io
paul.salama@clearroad.io