Puget Sound Regional Council

Puget Sound Traffic Choices Study

Transportation Research Forum
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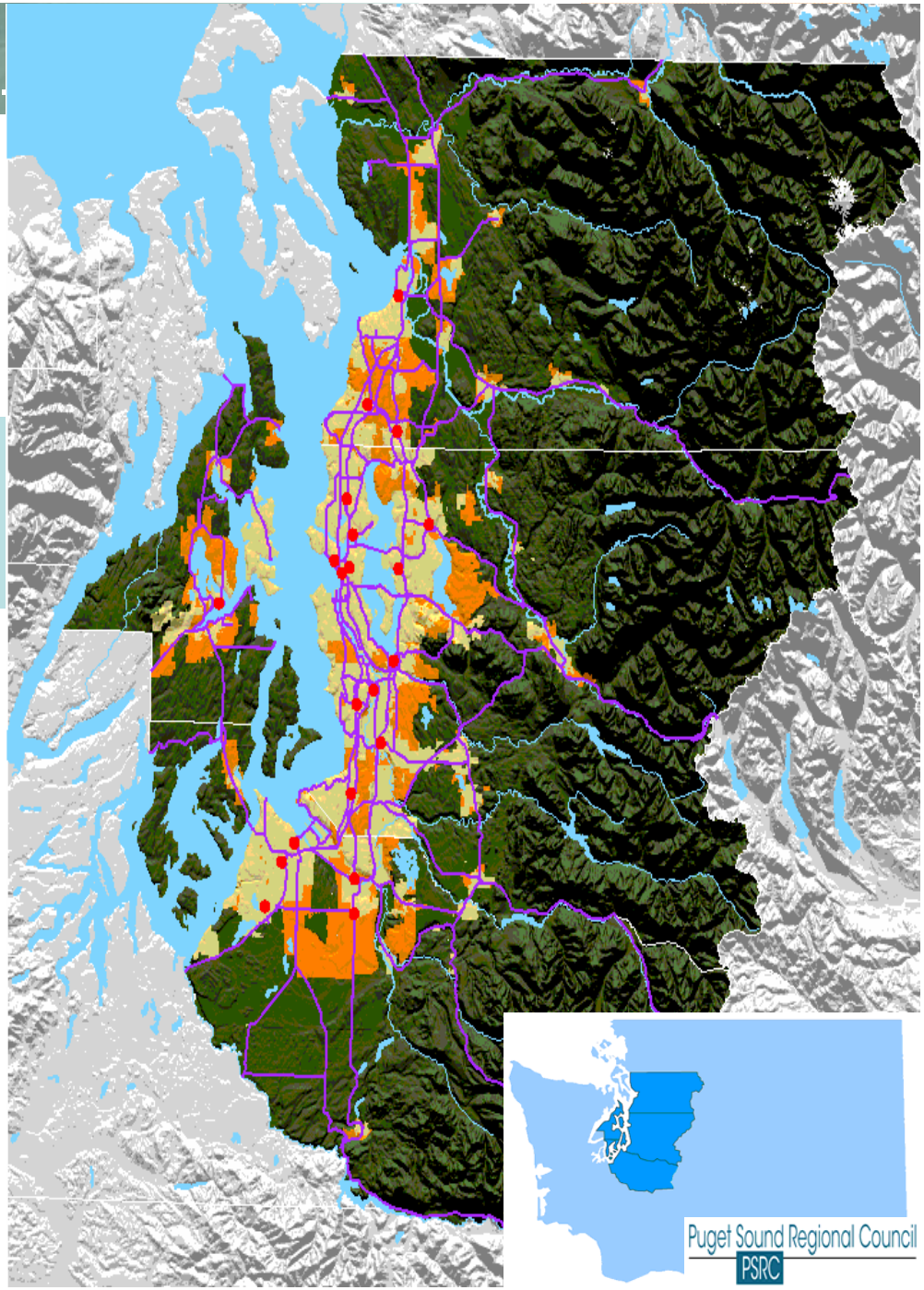
Puget Sound Region

Puget Sound Regional Council
Metropolitan Planning Organization
designated under federal legislation

- 3.4 million people
- 1.8 million jobs
- 16,300 sq. kilometers
- Expecting significant growth over the next 25 years
- New growth will largely occur within existing urban areas



Existing Road Finance System

- **System is financially weak**
  - Poor fiscal elasticity of the gas tax, especially with new fuels
  - New capacity costs are rising with urbanization, and preservation and maintenance costs are rising as system ages
- **System performance is declining**
  - Congestion, road conditions deteriorating
  - Land use regulation, transit policy not obviating the problem
- **Gas tax (and other tax-based) finance perceived as unfair**
  - Expensive new capacity that benefits targeted taxpayers
  - Requires cross-subsidies, among regions, types of users
  - Hence, public support for general tax increases is ambiguous

Future of Road Finance?

- **Conventional road finance is a vicious circle**
  - We levy an average charge on all mileage...
  - …creating localized congestion during peak periods
  - The congestion prompts road authorities to build
  - But the low charges cannot cover the costs!
- **Demand pricing can break the circle**
  - Charges are levied selectively on certain vehicle-miles
  - Controls excessive congestion during peak periods
  - Demand pricing generates the revenue to build capacity when it is really needed
  - Revenue is collected from those who burden capacity

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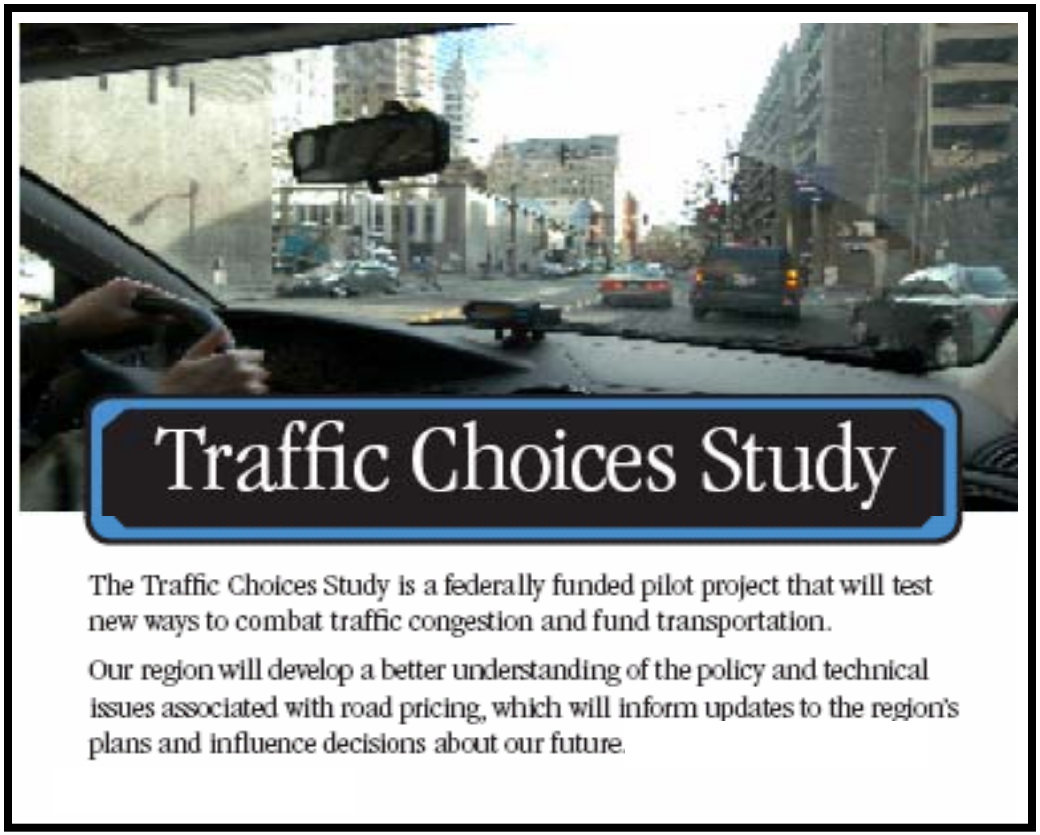


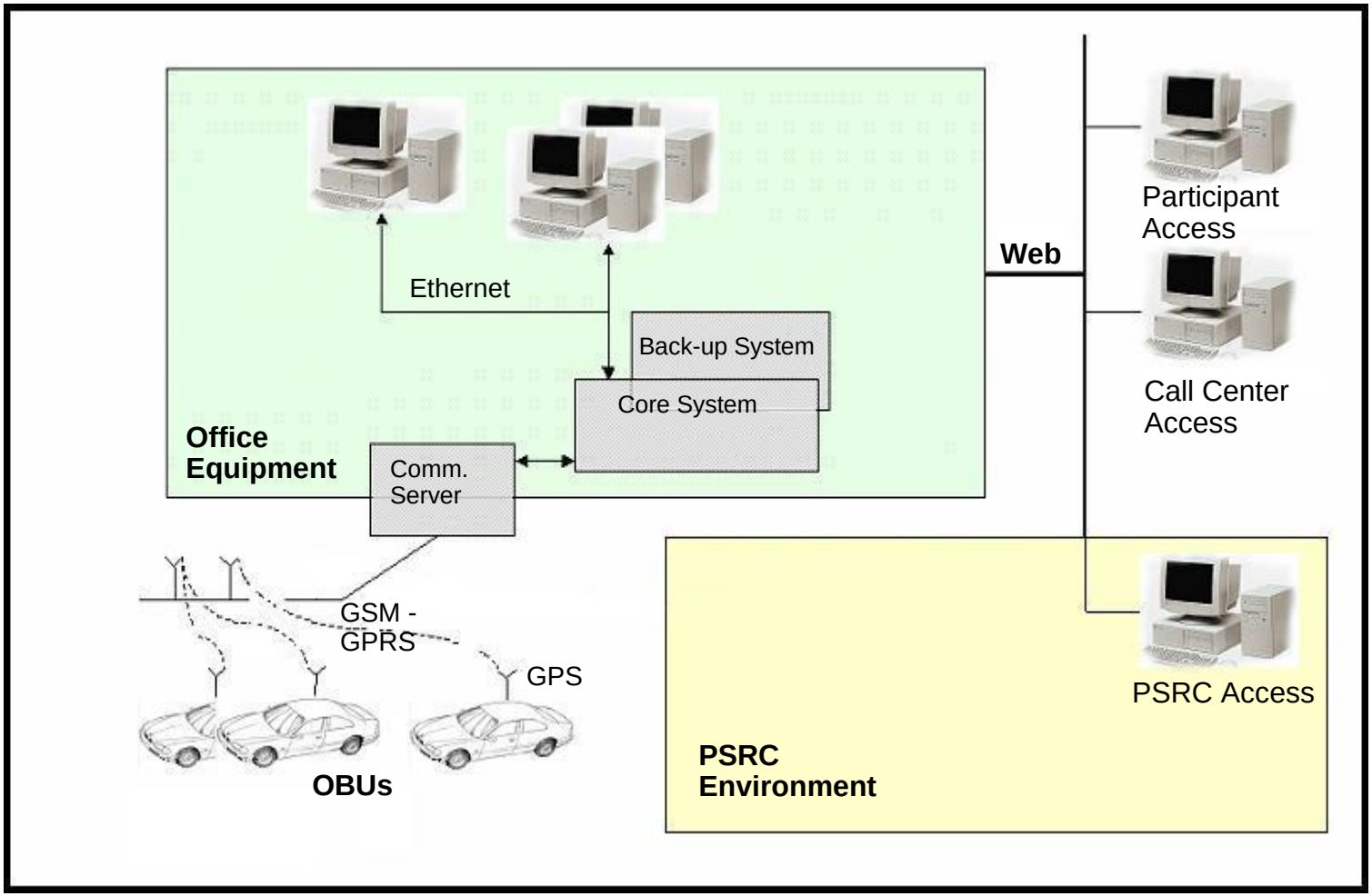
Project Objectives

- Familiarize real people with the concept of road pricing
- Learn whether drivers will pay to use a variety of roads
- Develop a better understanding of the policy and technical issues
- Test technology and program design

Key Attributes of the Project

- Study effects of system-wide congestion pricing on traveling public within controlled research environment
- Groundwork for one future finance option for Puget Sound's roadway network
- Use of existing off-the-shelf technology
  - Proven, tested, safe equipment and installation
  - Secure, reliable back office system
- GPS-based tracking of vehicles; GPRS/GSM communications to central office
- "Hold-Harmless" billing using participant Endowment Accounts

Overview of Main System Components



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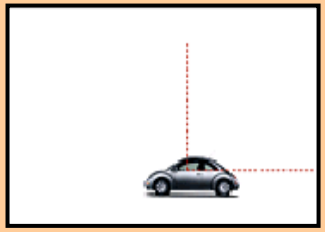
Start-up Period

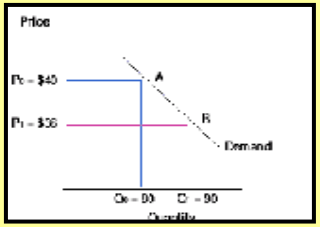
- Enroll participants
- Install in-vehicle equipment
- Baseline data collection
- Loaded system test
- Develop household travel budgets

Active Period



- In-vehicle toll display
- Driver modifies travel or pays toll
- Vehicle charged for road use
- Tolls levied against endowment accounts
- Participants keep unspent account balance

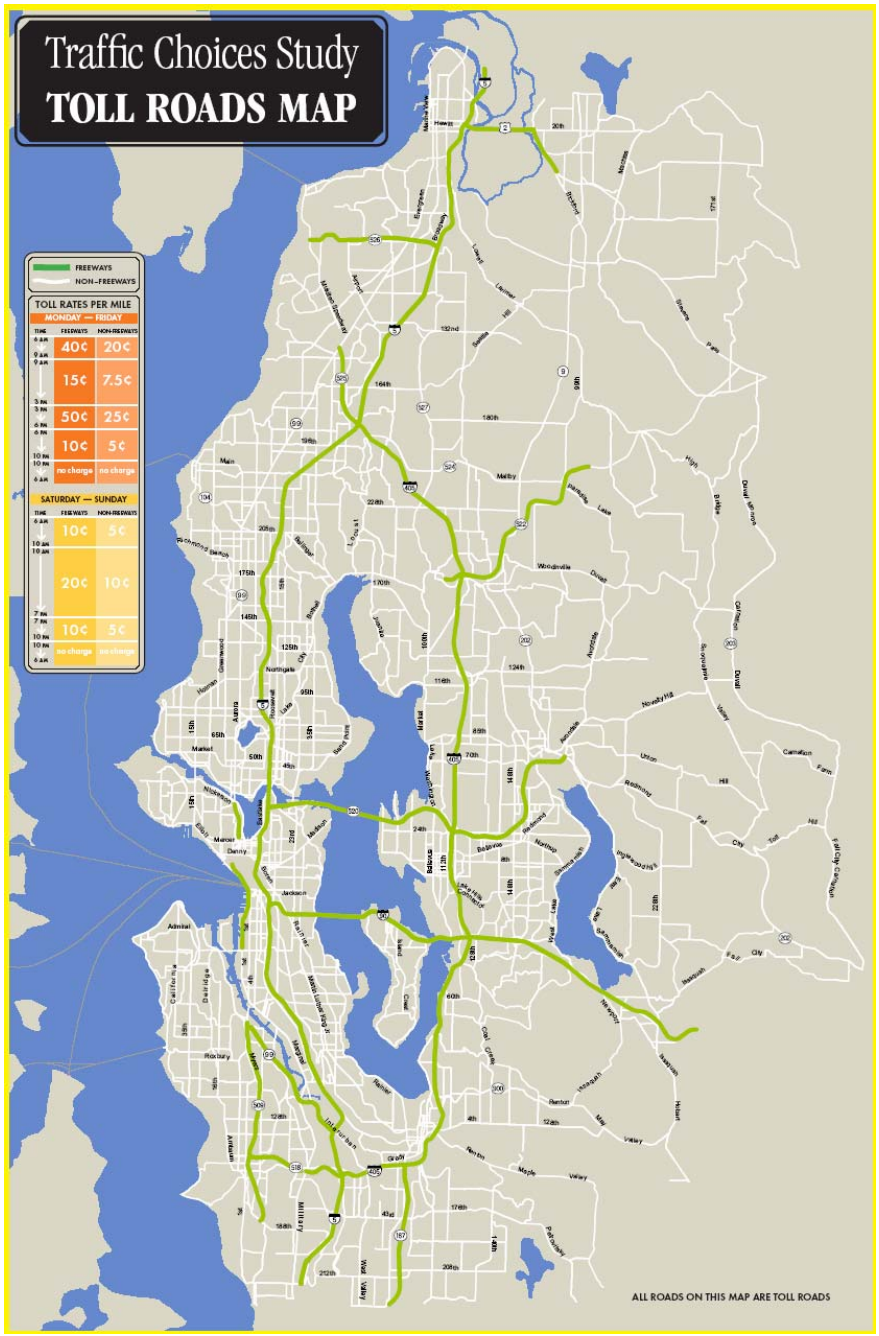
Analysis Period



- Calculate price elasticities
- Behavioral response
- Technical documentation
- Examine policy areas
- Full documentation of all aspects of the project

Priced Roads

Highways and Major Arterials



Toll Schedule

Tolls vary by:

–road facility type

–weekday versus weekend

–time of day

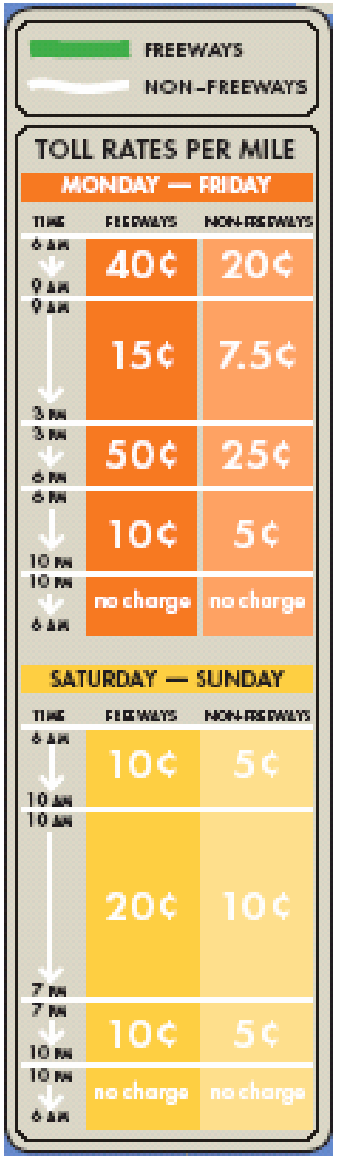
AM Peak - higher tolls

Midday - lower tolls

PM Peak - higher tolls

Evening - lower tolls

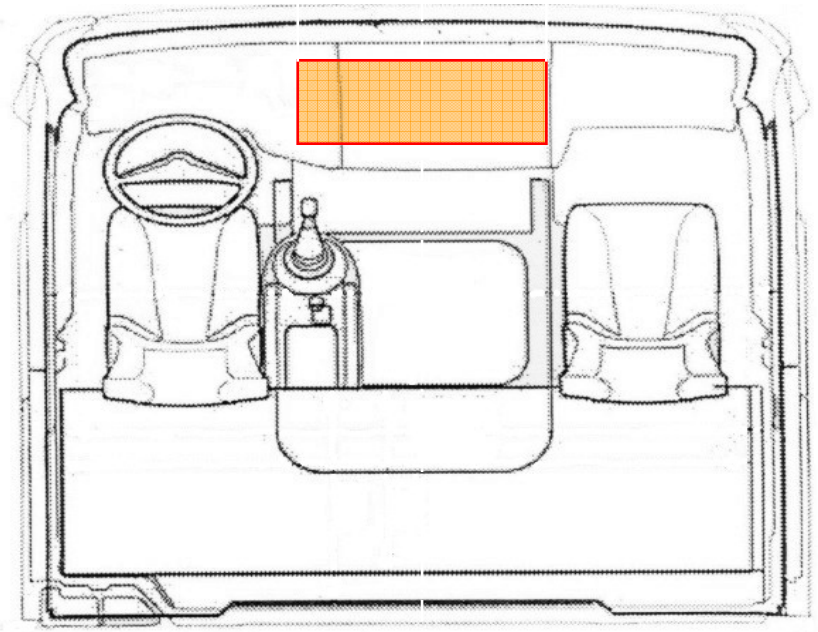
Night - zero tolls



The On-Board Unit

- Internal GPS module
- Internal GPRS module
- Stores 8,000 link digital road network
- Software matches GPS signal returns to road links
- 2X16 character display (road name and toll/mile)

Mounting location



OBU Tolling Display

First Line:
The toll sum for each trip is displayed.

Second Line:
The name of the link and costs per mile is displayed.

Deployment: Some findings to date

- Core technology for satellite-based toll systems is mature
- Quality of the underlying geodata base is a crucial factor
- At times, GPS signal reception may need to be augmented with additional positioning technologies
- Arterial tolling systems have different design requirements than a freeway only systems
  - Short length trips may result in a few trips without sufficient location data
  - Digital characterization of roadway network is significantly more complex
  - On board unit storage limitations, a solvable problem
  - Enforcement…
- Significant deployment issue is the installation of hardware

Deployment: Verification and Payment

- Will GPS be sufficient to meet a standard of proof to allow billing and enforcement?
- Occasional users and non-banking individuals impose challenges for any Electronic Payment System
- Enforcement may require other facility use verification (DSRC, video capture, mobile enforcement).
- Trade-off between verification and protection of privacy –issues with technology implications that influence the underlying economics of system design

Deployment: Fairness of Road Pricing

- Direct use charging addresses existing horizontal inequalities
  - Across users groups (e.g. vehicle classes)
  - Across geography (e.g. urban/rural)
- Other equity concerns (across income classes) may remain, and are best addressed through a comprehensive treatment of both revenue and expenditure policies
- Road financing that improves overall economic efficiency leaves society with greater resources available to address equity

Deployment: Privacy

- Privacy questions involve what data leaves the vehicle, and what safeguards are in place to limit its availability and use.
- It will be possible to design an approach where only “generic” facility use data is used by a central billing system.
- Audit/dispute functions could be preserved through temporarily storing data within the vehicle.
- Ultimately, any charging system must be technically verifiable and legally enforceable, within bounds of what is politically acceptable.

Outlook

- Project demonstrates general feasibility of GPS-based solution for tolling applications in US
- Successful operational results may influence long-term planning and policy making in the Seattle region and elsewhere
- Important policy questions such as privacy and equity will be better understood
- Large-scale deployment of a GPS-based tolling solution depends on a viable business model and public acceptance of underlying concepts

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http://www.psrc.org/projects/trafficchoices/index.htm