

# **Before and After Studies**

## ***Congestion Performance Measurement Data Collection***

**David Bushnell, P.E. (Dave)**

Travel Analysis Branch Manager  
Transportation Data Office

**Paula J. Hammond, P.E.**

Secretary of Transportation

**Steve Reinmuth**

Chief of Staff

Spokane, Washington

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**Washington State  
Department of Transportation**

# Before and After Studies

## “Mobility Projects”

### Project WEB Page

- **Construct New Interchange** on I-5 to ease congestion and improve safety by reducing weaving
  - **When Constructed:**
    - Provide additional access point from SR-502 to I-5
    - Reduce travel time
    - Improve mobility along I-5
    - Improve safety

# Before and After Studies

## “Mobility Projects”

### Project WEB Page

- **Construct New Interchange** on I-5 to ease congestion and improve safety by reducing weaving.
  - **When Constructed:**
    - Provide additional access point from SR-502 to I-5
      - Measure: We can see there is an additional access point.
    - Reduce travel time
      - Measure: Collect travel time data before and after project.
    - Improve mobility along I-5
      - Measure: Increase capacity, reduce weaving, reduce hours of delay.
    - Safety
      - Measure: study collision data before and after.

# Before and After Studies

## “Mobility Projects”

### Project WEB Page

- **Widening – Add additional lanes.** Widening the highway will relieve congestion and improve traffic flow
  - **We will:**
    - Add additional lane to both directions of traffic.
      - To relieve congestion
    - Divide the northbound and southbound lanes with cable median barrier.
      - Help prevent accidents, improve safety, and relieve congestion.
      - Left turns will be eliminated in a number of locations
    - *Build five roundabouts* at key intersections.
      - To help drivers safely and easily turn around.

# **Before and After Studies “Mobility Projects” Project WEB Page**

- **We will:**
  - Relieve congestion
  - Improve travel time
  - Improve mobility
  - Help prevent accidents
  - Improve safety

# Before and After Studies

## Field Measurements

- **Traffic volume**
  - Permanent Counting locations, 24-7, reported hourly
  - Short Count, 72 hour +/-, reported 15 min. volume, hourly classification
  
- **Vehicle Speed**
  - Permanent Counting locations, 24-7, reported hourly
  - Short Count, 72 hour +/-, reported hourly
  
- **Travel Time**
  - Sample of license plates captured
  
- Note this is for areas where no ITS systems are operating

# **Before and After Studies “Mobility Projects”**

- **Data we are collecting**
  - Traffic volumes – Field counts
  - Travel Time – License plate recorders
- **What we can measure and report on**
  - Volume changes
  - Travel time changes
  - Speed changes
  - Delay changes
  - Peak spreading changes
  - Throughput changes

# **Before and After Studies “Mobility Projects”**

- **Different ways to measure Travel Time**
  - **Probe Vehicles – GPS, Stop watch**
  - **Transponders**
  - **ITS Flow systems**
  - **Cell Phones**
  - **Speed studies – Estimation only**
  - **Automatic License Plate Recorder - Cameras**
  - **Traffic Models – Estimation only**

# **Before and After Studies “Mobility Projects”**

## **▪ Traffic Modeling**

- Using information on hand and traffic models we can come up with expected outcomes**

## **▪ For Interchange**

### **▪ Travel time savings**

- 4 minutes 40 seconds per vehicle during the PM Peak**
- 71.6 vehicle hours in the peak hour**
  
- 804.9 vehicle hours per day**
  
- \$19,800 total user cost per day**

# **Before and After Studies “Mobility Projects”**

## **▪ Traffic Modeling**

- Using information on hand and traffic models we can come up with expected outcomes**

## **▪ For Adding a lane each direction**

### **▪ Speed changes**

- AM peak currently 32 mph with improvement 43 mph.**
- PM peak currently 27 mph with improvement 41 mph.**

# **Before and After Studies “Mobility Projects”**

## **▪ Traffic Modeling**

- Using information on hand and traffic models we can come up with expected outcomes**

## **▪ Affect to I-5**

- AM peak hour volume increase from 1000 vpl to 1280 vpl and speed may decrease 5 mph.**
- PM peak hour volume increase from 1080 vpl to 1441 vpl and speeds may decrease by 7 mph**

# Case Study

## City of Mesa

- **Monitor travel times using Probe Vehicle**
  - **Goal is to keep the rate of travel time increases below the growth rate of traffic volumes.**
  - **Corridors – 2 control corridors studied every year, 18 others studied on a three year cycle. Collecting data on six corridors every six months.**
    - **For each direction during each of three study times**
      - **AM peak**
      - **Mid day**
      - **PM peak**

# **Case Study City of Mesa**

- **Initial plan was to have the probe vehicle make two passes for each time period.**
- **They found that this was not statistically valid. To have a valid sample 200 passes with the probe vehicle was needed during each six month sample.**
- **This led to the scaling back of the number of corridors they had the resources to collect data on.**

# **Case Study**

## **City of Mesa**

### **▪ Advantages of Probe Vehicle**

- Speed changes throughout corridor can be monitored.**
- Location of changes can be identified.**

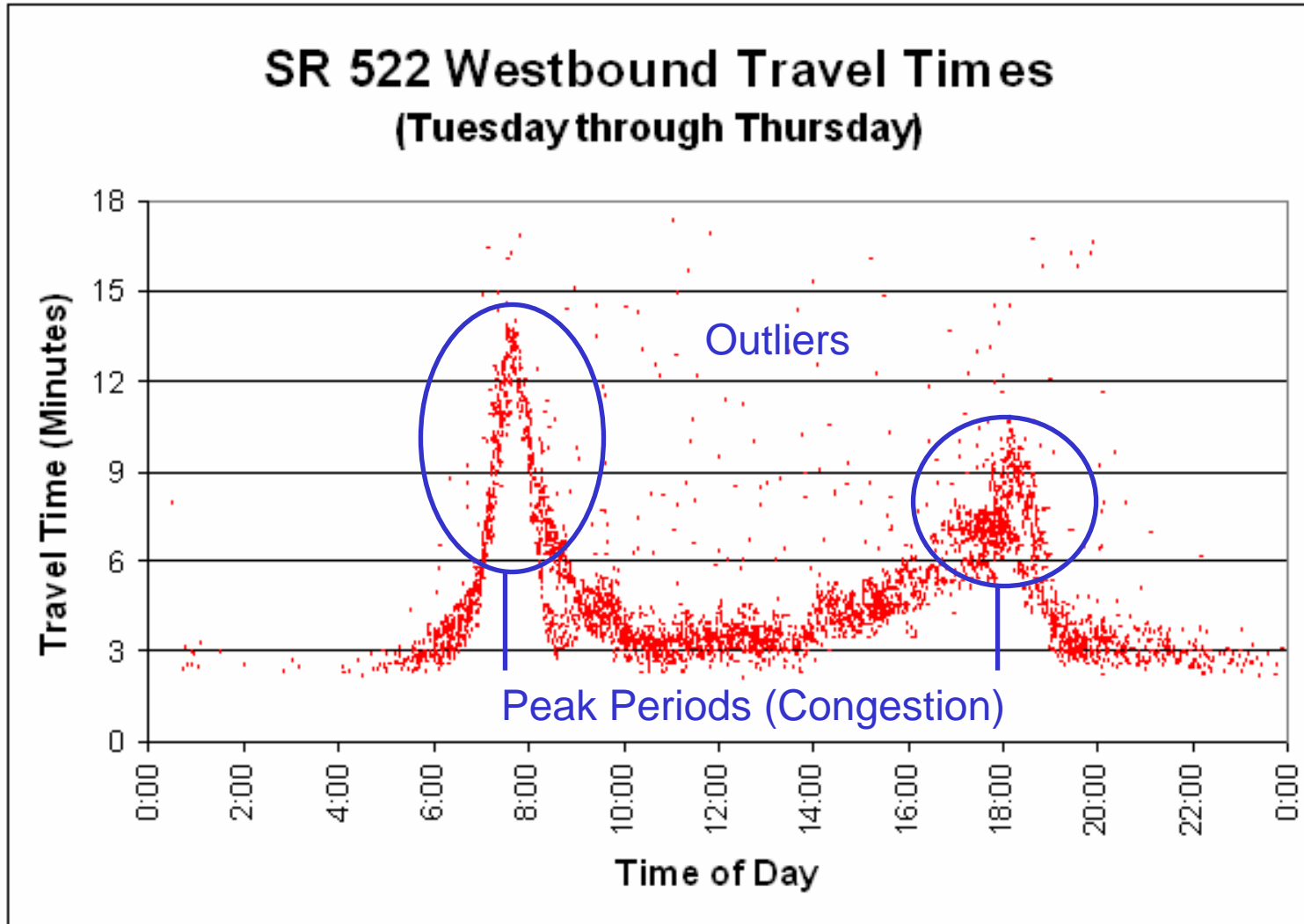
### **▪ Disadvantages of Probe Vehicle**

- Number of passes needed.**
- More resources for post processing needed.**
- Drivers need to estimate average speed of vehicle around them.**

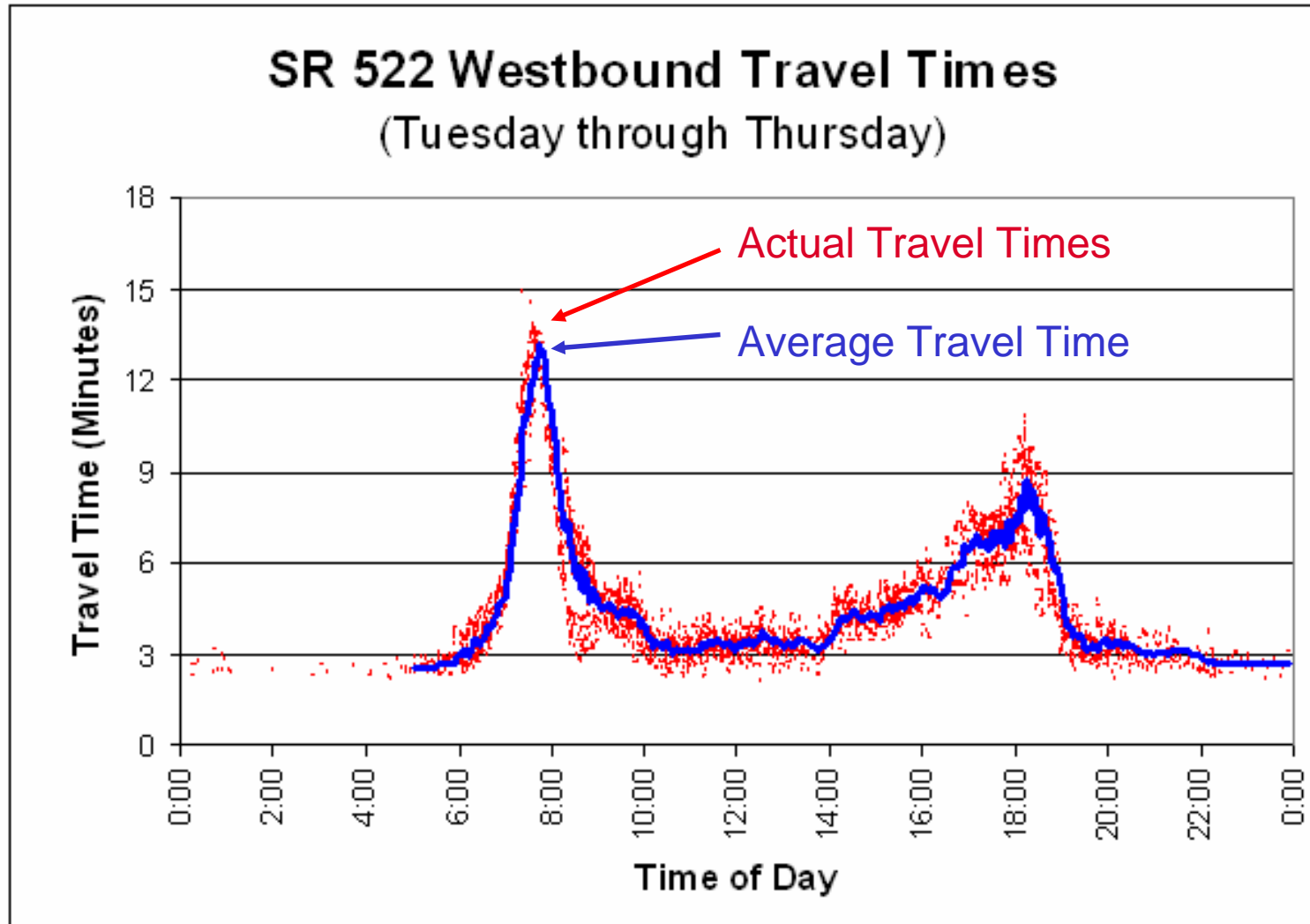
# Arterial Highway Data Camera

- Data collection test - EB
  - 10/6 – 10/9 (Fri – Mon)
- 2500 matches, 7% of ADT
- 40/hr
- 1 every 90 seconds
- Peak period test - WB
  - 10/10 (Wed), 7:15am-7:45am
  - 101 matches
  - 200/hr
  - 1 every 18 seconds
- Cameras processing plates every 1.5–2 seconds

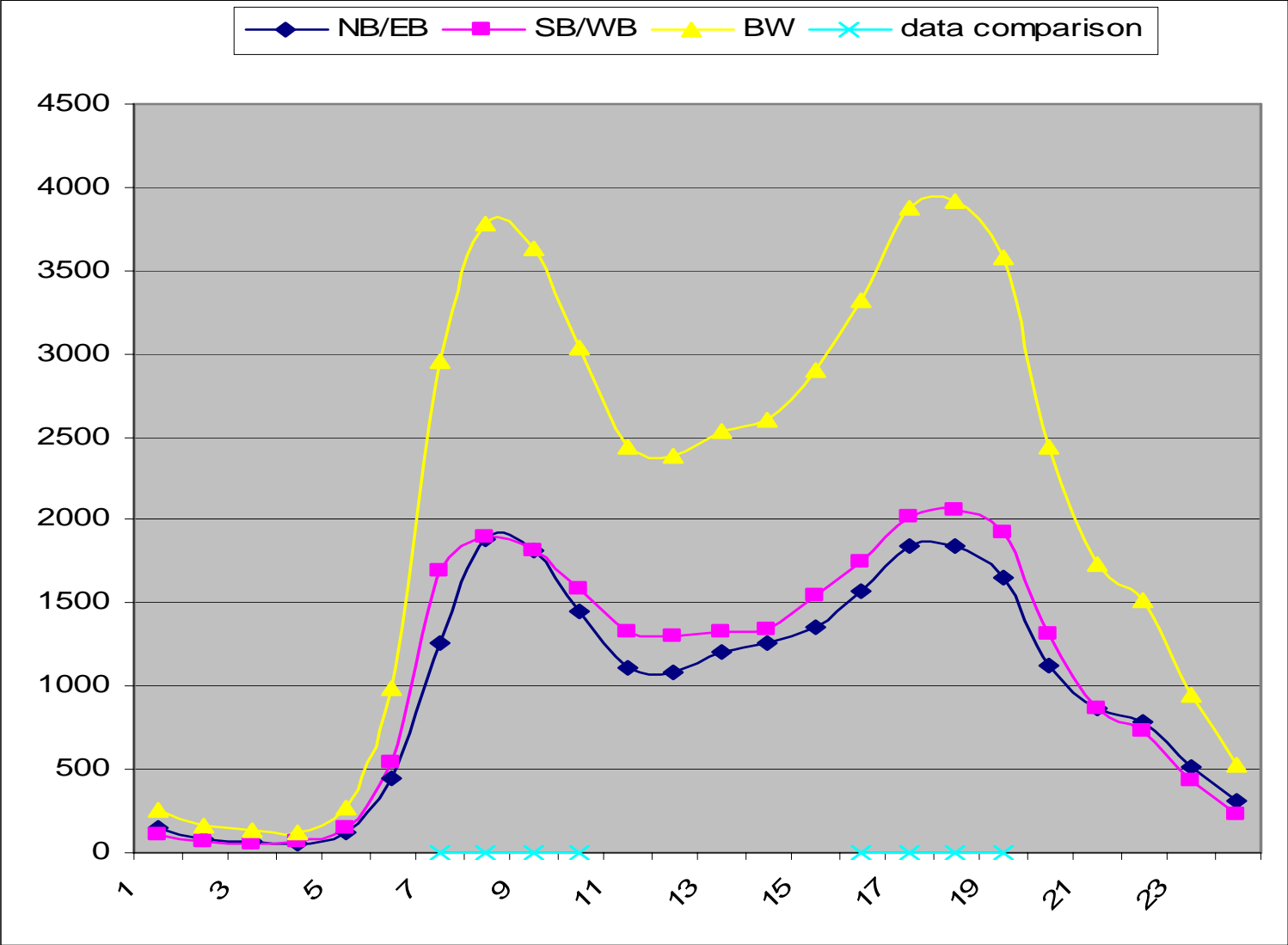
# Travel Time Data Example



# Travel Time Data Example (Outliers Removed)



# SR-522



# WSDOT

## Before and After

### SR-167 HOT Lanes Pilot Project



# WSDOT

## Before and After

### SR-167 HOT Lanes Pilot Project

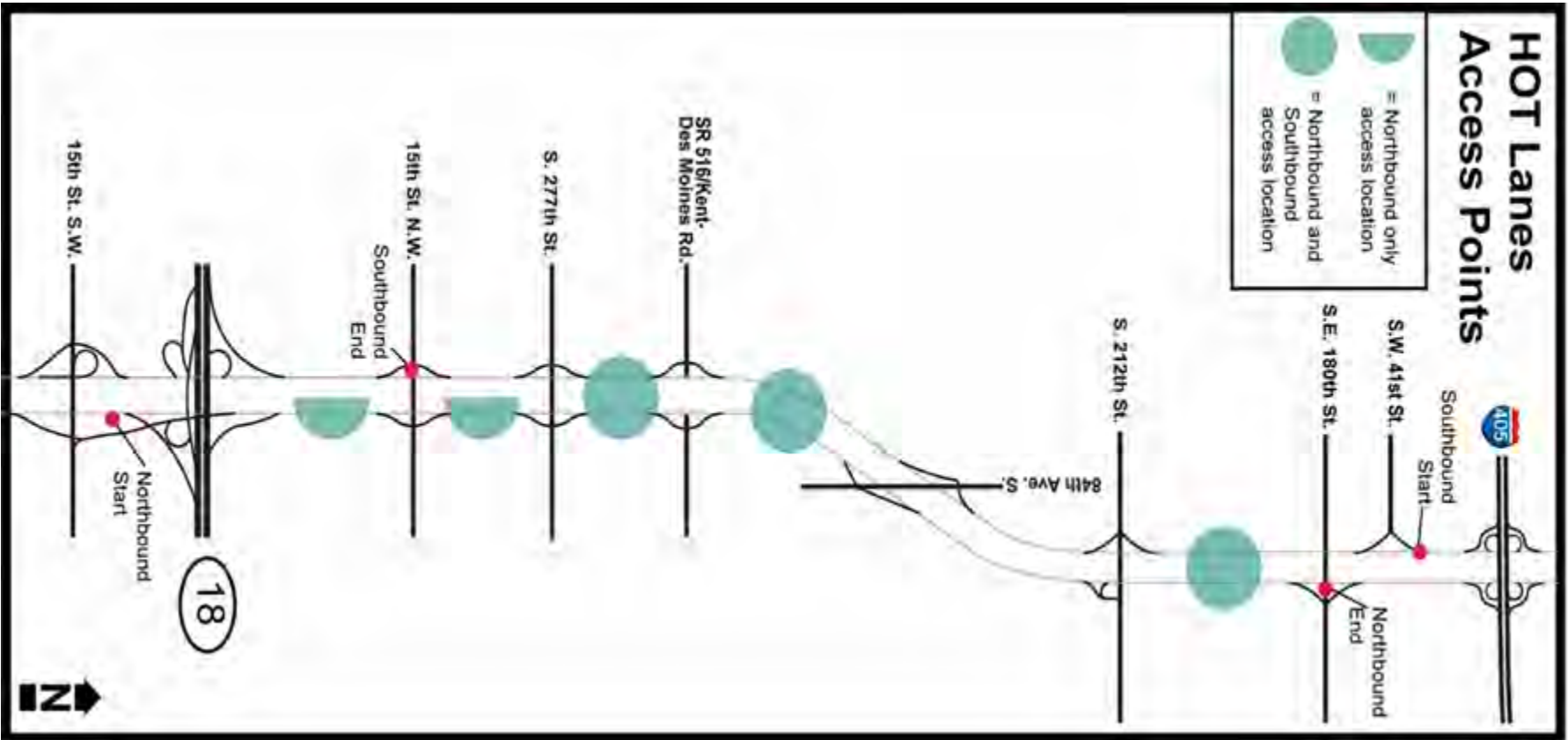


# WSDOT

## Before and After Travel Time Studies

### SR-167 HOT Lanes

SR 167



# WSDOT

## Before and After SR-167 HOT Lanes



Tolls on the SR 167 HOT lanes HOT lanes are used to keep traffic in the HOT lanes flowing at 45 mph or faster, even when the regular lanes are congested.

Flexible pricing of the toll rate will keep the lane free of congestion at all times: the price will adjust up or down depending on the space available in the HOT lane.

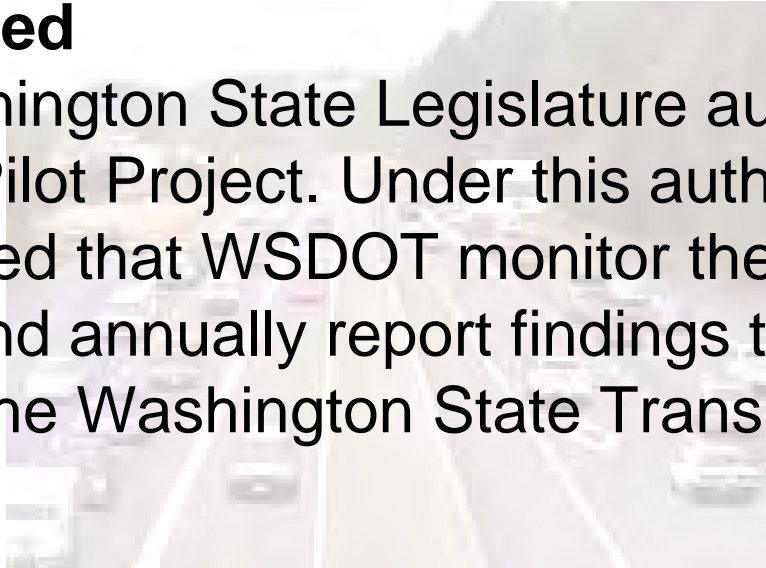
# **WSDOT**

## **Before and After Travel Time Studies**

### **SR-167 HOT Lanes**

#### **Purpose and Need**

In 2005 the Washington State Legislature authorized the SR 167 HOT lanes Pilot Project. Under this authorization, the legislature required that WSDOT monitor the operations of the HOT lanes and annually report findings to both the Legislature and the Washington State Transportation Commission.



Codified as RCW 47.56.403

# WSDOT

## Before and After Travel Time Studies

### SR-167 HOT Lanes

#### Overview of Performance Measures

The authorizing legislation identified several specific areas for monitoring and evaluation. The monitoring areas were:

- Facility use data;
- Freeway efficiency and safety;
- Effectiveness for transit;
- Person and vehicles movements by mode;
- Ability to finance improvements and transportation services through tolls;
- The impact on all highway users.

# WSDOT

## Before and After Travel Time Studies

### SR-167 HOT Lanes

#### Baseline vs. Annual Measurements

Baseline data will be collected and analyzed.

Historical traffic data

Previous public opinion results is already available.

Collecting available baseline data into one location under this plan will be an initial step in the monitoring program.

Once the HOT lanes are operational, annual monitoring can begin. The monitoring program will take advantage of as many existing traffic monitoring efforts as possible to ensure consistent results over time.

# **WSDOT**

## **Before and After Travel Time Studies**

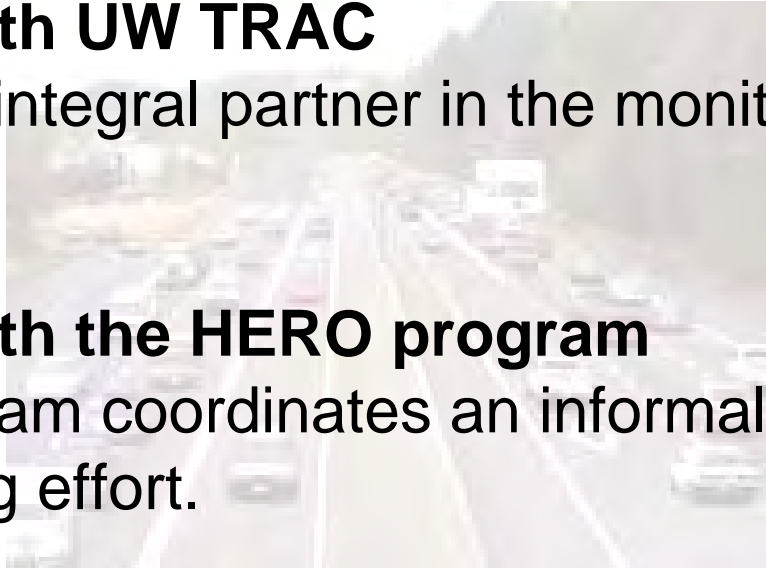
### **SR-167 HOT Lanes**

#### **Coordination with UW TRAC**

TRAC will be an integral partner in the monitoring and evaluation.

#### **Coordination with the HERO program**

The HERO program coordinates an informal HOV lane violation reporting effort.



# WSDOT

## Before and After Travel Time Studies

### SR-167 HOT Lanes

#### Measurements:

Average vehicle speeds

Total traffic volume

Number of paid HOT lane trips

Frequency of HOT lane use

Length of HOT lane trips

Toll rate information

Enforcement results



# **WSDOT**

## **Before and After Travel Time Studies**

### **SR-167 HOT Lanes**

#### **Measures to report**

**Freeway Efficiency and Safety**

**Effectiveness for Transit**

**Person and Vehicle Movements by Mode**

**Ability to Finance Improvements & Services with Tolls**

**Impacts on All Highway Users**

