

# All RHODES Lead To Seattle

Getting Useful Arterial Street Data from the  
RHODES Traffic Signal Control Software

By

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# RHODES

- A software program used for peer-to-peer intersection signal timing
- Uses a high level of vehicle detection in order to optimize control strategies

# RHODES

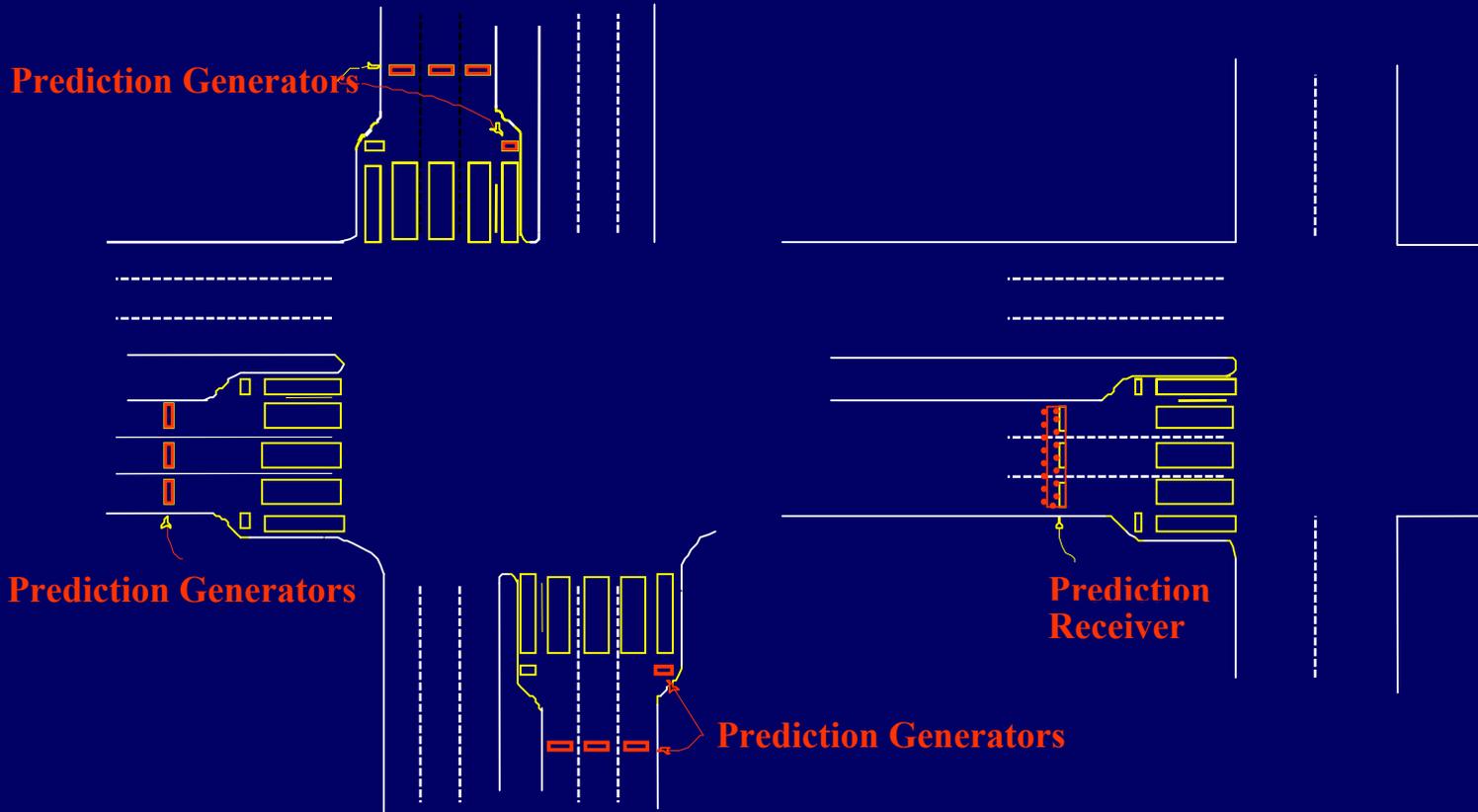
- Peer-to-peer traffic control
  - Adapts signal timing to monitored traffic
    - Waiting traffic
    - Approaching traffic
  - Predicts arriving traffic for each intersection leg, and optimizes/adjusts signal timing

# RHODES

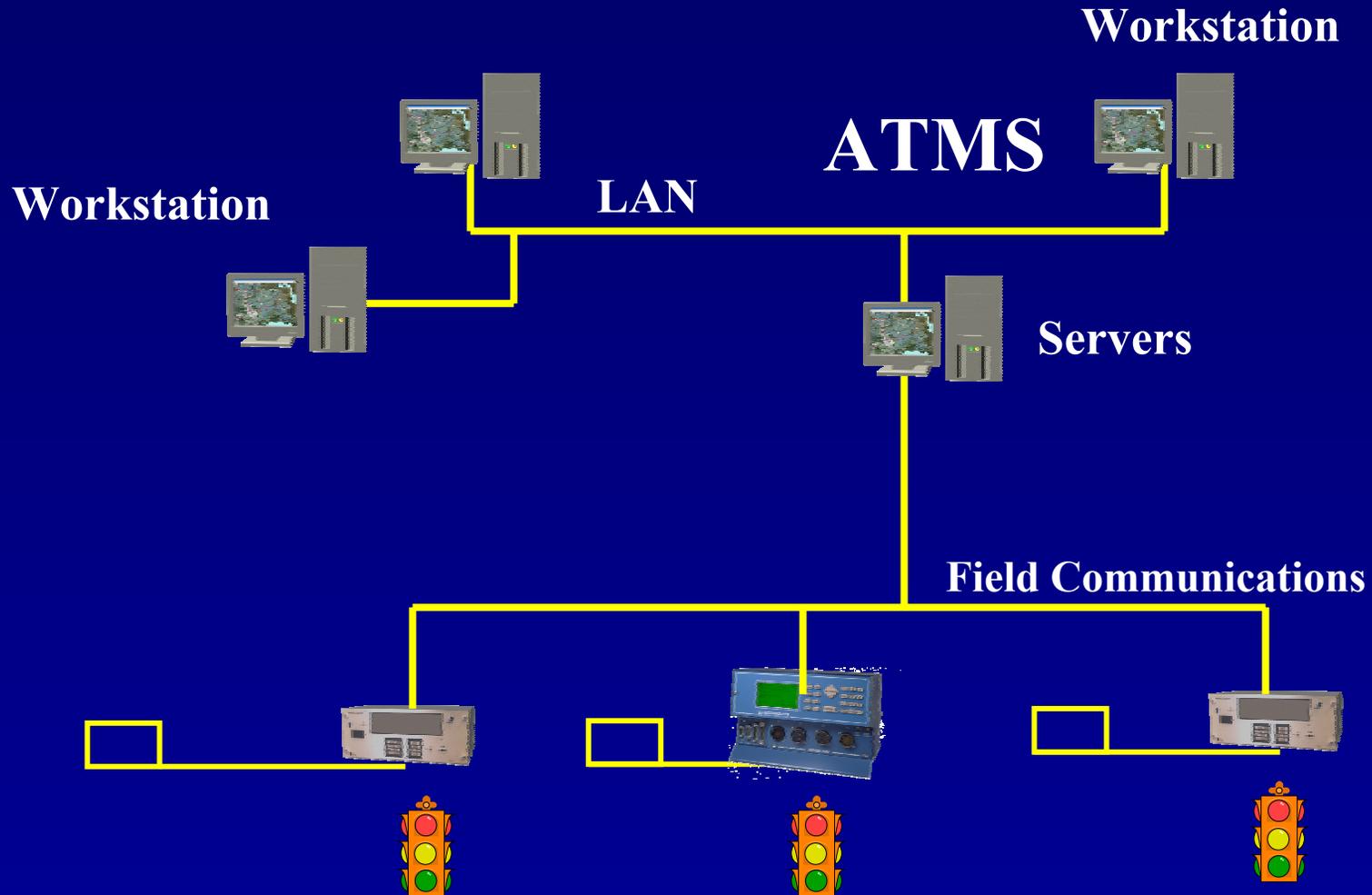
- Internal to RHODES
  - Queue Size (number of vehicles) Estimate
  - Predicted Link Flow Profiles
  - Predicted Delay
    - based on current queue and predicted arrivals
- External
  - Queue Size
  - Predicted Arrival Profile

# Data Requirements

(Number, Type and Location of Sensors)



# System Architecture



# RHODES

- A “smart” control algorithm
- Can use data from a variety of locations
- Can use a variety of data inputs

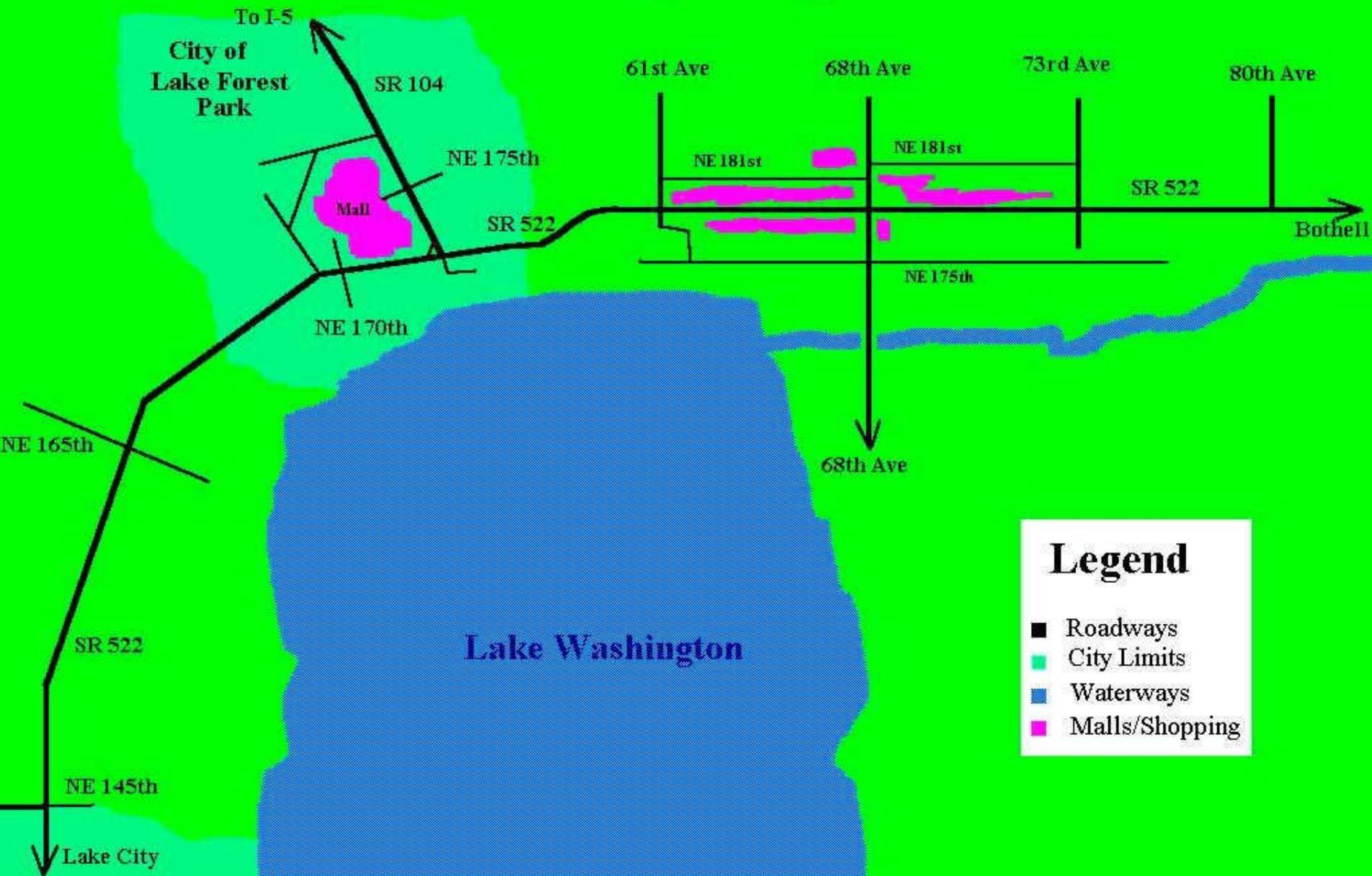
# RHODES

- Rhodes requires accurate volume counts
- Detectors required upstream of intersections  
(in advance of expected queues)

# RHODES

- Detector Location
  - Can be placed in a variety of locations
  - Needs to provide
    - Volume
    - Occupancy
    - Speed at system detectors

# SR 522 - Kenmore Signal System



# RHODES – On SR 522

## Kenmore, WA

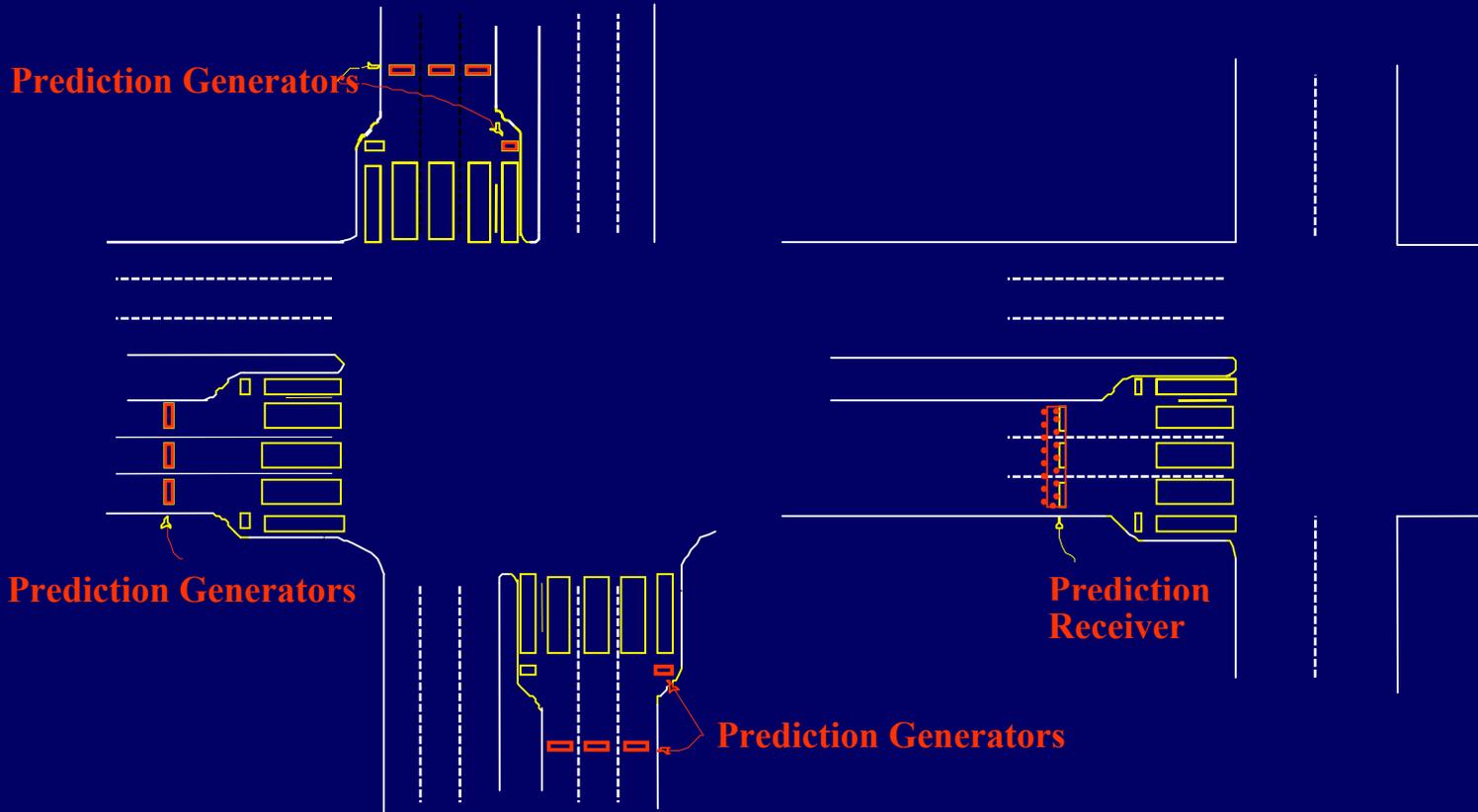
- 2070 Traffic signal controllers
  - Dual output ports for data transfer
- MIST – RT-TRACS software
- Multiple data collection locations

# RHODES – On SR 522 - Kenmore

- Multiple data collection locations
- For each intersection
  - Stop bar
  - Queue / dilemma zone
  - Advanced detection
    - Mid-block, or
    - Exit from up-stream signal, or
    - Upstream lane specific detector

# Data Requirements

(Number, Type and Location of Sensors)



# Kenmore System

- Also transmits current signal phase indicator (G / Y / R)
  - Every second
- Appears to allow measurement of signal clearance for each phase

# Kenmore System

- WSDOT Intent
  - Develop system that reports management information
  - By time of day, leg, movement
- Frequent failure = need to retune signal

# Management Information Goals

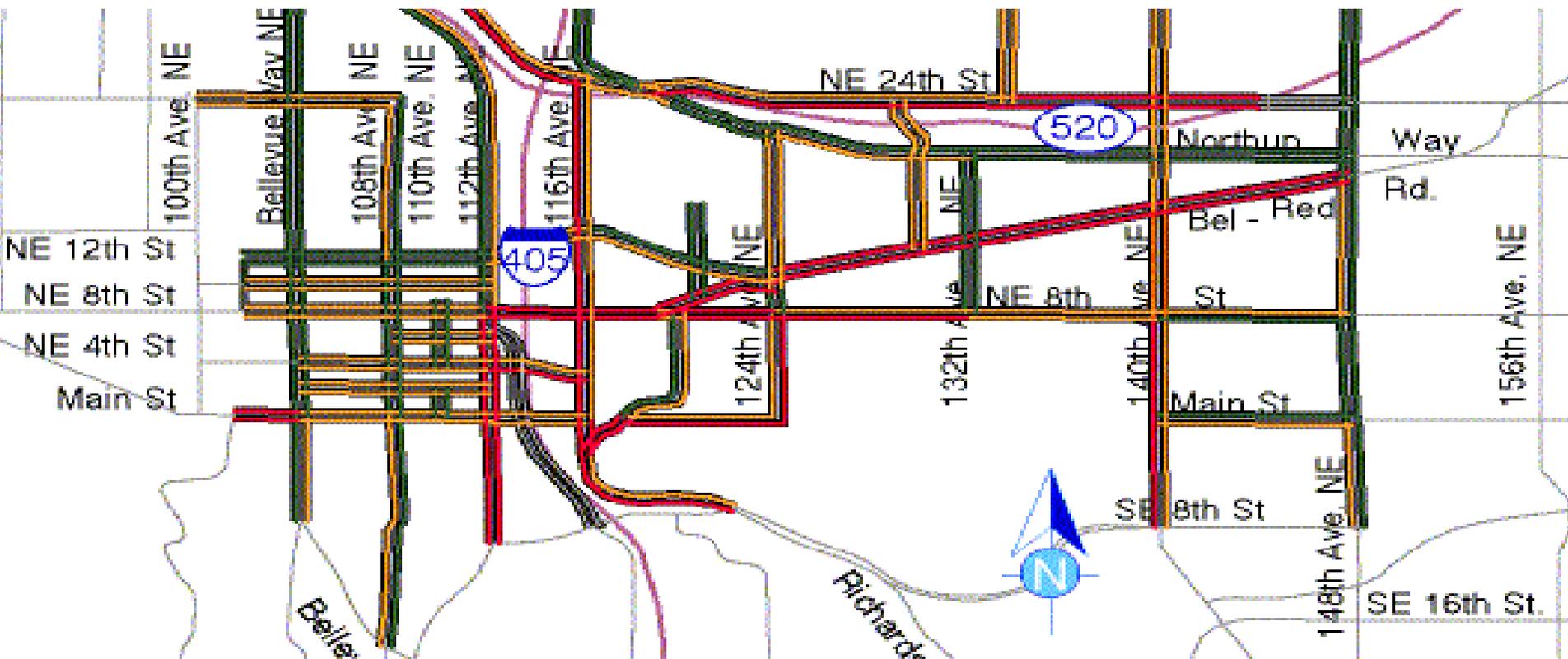
- Signal system performance
  - “Failures to clear queues”
  - Queue length
- Intersection use
  - Vehicle volumes

# Kenmore System

- If signal “fails”
  - Use volume data to retime signals

# Kenmore System

- Other uses of data
  - Real time indication of performance
  - WSDOT web site



Actual Condition	
<span style="color: red;">—</span>	Heavy
<span style="color: orange;">—</span>	Moderate
<span style="color: green;">—</span>	Light

Historical Index	
<span style="color: red;">—</span>	More congested than usual
<span style="color: orange;">—</span>	As expected
<span style="color: green;">—</span>	Lighter than usual

# For Future Traffic Signal Systems

- What data can you get?
  - Data type (volume, occupancy, signal timing)
  - Data timing
  - Data location / meaning
- What you can analyze depends on what you can collect
  - Be non-conventional
  - See Joseph Perrin, Univ. of Utah, TRB paper 02-3182

# Future Systems

- Volume (timing?) by intersection leg feeds signal timing plan development
- Volume also describes use
  - Planning
  - Operations
- Timing of volume needed for timing of maintenance activities

# Future Analysis

- Measurements of queue size or delay indicates if new signal timing plans should be developed
- How do we measure
  - Queue size?
  - Delay?

# Queue Size

- Volume in versus volume out?
- Occupancy of dilemma zone detectors during green / red phases
- Direct measurement

# Delay

- Supplemental data collection
  - Toll tag reads
  - Transit Signal Priority systems
  - Other

# Keys To The Future

- How do we use surveillance (data collection) to actively manage the facility
  - Improve facility operation
  - Reduce delay
  - Communicate with the public
    - Real time
    - Performance measures (how are we doing?)