



Seattle Department of Transportation

Signal Operations and Maintenance

ANNUAL REPORT OF 2008 ACTIVITIES

This report summarizes key accomplishments of the Seattle Department of Transportation (SDOT or Department) Signal Operations and Maintenance group in 2008, based on metrics established in SDOT's Strategic Plan published in 2003. The Strategic Plan addresses the development, deployment, and use of Intelligent Transportation Systems (ITS) technologies and solutions. This report documents the progress that the Department has made towards achieving the plan targets. Although the plan was intended to cover the period beginning in 2003, substantial funding to implement the plan was not available until 2007. Therefore, this is the second of the year-end reports to be provided.



Overview of 2008



2008 was a productive year for the SDOT ITS Program with a strong focus on maintaining a safe and efficient transportation operations program, in particular the traffic signal systems and the communications network that supports that system. This core communications foundation must be kept in safe and efficient working order to serve all modes of transportation – vehicle, transit, pedestrian, bicycle, and freight. Additional functions and services, such as closed circuit TV cameras, and providing congestion information on the Internet, are built off of that foundation. The following outlines key activities of the SDOT ITS Program in 2008.

Strengthened the Foundation

- In 2007, SDOT applied the voter-supported maintenance funds to continue its annual preventative maintenance program for every traffic signal, pedestrian signal, school beacon and traffic camera in the City. This program ensures that every traffic signal in the City is in top operational and safe condition. Maintenance also provides an environmental benefit. For every traffic signal malfunction avoided, potential congestion due to the malfunction is avoided as well, and vehicle emissions are minimized.
- SDOT replaced older technology traffic signal controllers at more than 75 locations to enable more efficient traffic signal timing and operations.



Key Elements of the ITS Strategic Plan

ITS is used to help the Department achieve its overall mission of creating and maintaining a safe and reliable transportation system which enhances neighborhoods, the environment, and the economy. To do so, ITS deployments must:

- Manage daily traffic
- Manage special event traffic
- Manage incident traffic
- Support alternative modes
- Manage the investment in ITS
- Coordinate with regional partners

These elements are combined in **SDOT's ITS Vision:**

“To implement the most appropriate technology to meet safety, mobility and business process needs, and to operate and manage the City’s ITS assets at a financially and operationally efficient level.”

This vision gave rise to the following targets for ITS deployment and operations:

- Connect every traffic signal in the City to the central system
- Operate all signals at peak efficiency by developing the appropriate number of timing plans; providing the most efficient signal phasing; providing regular (every 3-4 years) signal re-timing; implementing interconnect/coordination as appropriate; moving to traffic responsive operations; and implementing transit signal priority on important transit corridors
- Provide accurate and timely information to motorists
- Ensure every ITS component is maintained in excellent working order
- Implement technologies that reduce the maintenance burden and improve operations
- Report on system performance at least annually



2008 Accomplishments

In the Strategic Plan, SDOT committed to reporting on the following performance measures on an annual basis:

- **Preventative maintenance**
- **Devices implemented**
- **Staff and equipment brought on line**
- **Arterials optimized**
- **Delay reduction on the key arterial network**
- **Reduction in trouble calls on the key arterial network**
- **Transit time savings and performance reliability improvements**
- **Customer satisfaction**

Each of these measures is discussed individually below.

Preventative Maintenance

SDOT understands the importance of maintaining ITS equipment. Failing to do so not only affects daily traffic conditions, due to broken equipment, but it also costs more in the long run, as conducting repairs on an ad hoc basis is less cost-effective than performing regular maintenance. In 2008, SDOT conducted annual preventative maintenance at most ITS device including:

- 1035 Traffic Signals
- 296 School and Intersection Beacons
- 54 Traffic Cameras

In addition, ongoing preventative maintenance was performed for over 50 computer and telecommunications systems and components that support ITS, including traffic control and video management software; and devices and systems that ensure communications with traffic signals and video cameras. Without these “hidden” systems, the visible ITS components such as optimized and interconnected traffic signals and web-provided camera images cannot operate at their peak effectiveness.

Maintenance, however, is very limited for devices such as radar speed signs and in pavement flashing light for crosswalks as maintenance funds have not been allocated for those devices.

Devices Implemented

One of the ITS program goals is to install new equipment to meet demands and to better serve all travelers. This can be either entirely new equipment (such as new traffic signals or pedestrian signals) or it can be upgrades to existing equipment. Implementations accomplished in 2008 are shown in the following table:

Improvement	2008 Achievement
New Signals	Installed 14 new signals that support safety and mobility needs
Traffic Signal Safety Improvements	Installed 7 new left-turn signals
Pedestrian Improvements	Upgraded 55 signals with LED displays and LED countdown indicators; installed audible pedestrian indications at 19 signals
Controller and Cabinet Upgrade	Installed more than 75 new controllers
CCTV Installation	Installed 16 new CCTVs
Radar Speed Signs	6 signs installed
School Beacons	Installed 8 school beacons upgraded 2 others
Bicycle Detection at Traffic Signals	Addressed bicycle detection at 27 traffic signals
Red-light Running Cameras	9 intersections equipped with a total of 12 cameras

Staff and Equipment Brought On-Line

Staff additions in 2008 were focused on improving operations. One person was added to support traffic signal timing, optimization, safety and the ITS program. Another staff person was added to oversee the strategic implementation of ITS resources. Both additions were to fill existing positions.

Arterials Optimized and Delay Reduction on Key Arterials

SDOT must ensure that the city's key arterials run as smoothly as possible. Doing so serves multiple purposes. First, it reduces delays, ensuring that those drivers who don't use the freeways are able to have reliable commutes. Second, it improves transit performance, and provides environmental benefits as outlined in the table, below. Third, it allows SDOT to coordinate with Washington State DOT to manage those areas where the state highway system and city-owned facilities interact, such as at freeway entrances and exits. Finally, it allows for the arterials to continue operating as smoothly as possible, under the circumstances, when traffic diverts from the freeway due to accidents.

The table below shows the effects of the optimization on corridors in the 2008 optimization program. SDOT was not able to measure travel times directly on key arterials over the course of the year, so the measure for meeting this goal will rely instead on the proxy of arterial optimization modeling.

Summary Corridor Optimization Results				
Period	Percentage Improvement in		Percentage Decrease in Emissions of	
	Fuel Efficiency	Overall Corridor Delay	CO	NOx
AM Peak	5%	23%	7%	5%
PM Peak	8%	27%	8%	7%
Off-Peak	3%	12%	3%	3%

Corridors included in this summary are:

- **West Seattle:** 35th Ave S from Roxbury Way S to Fauntleroy Way S AND Roxbury Way S from 35th Ave S to 4th Ave S
- **Ballard:** 15th Ave NW from NW Market St to NW Holman Rd AND NW Market Street from 24th Ave NW to 3rd Ave NW AND 24th Ave NW from NW Market St to NW 85th St
- **Beacon Hill:** Beacon Ave S from 15th Ave S to S Columbian Way
- Dearborn Ave from 5th Ave to 8th Ave

For the average traveler on these corridors, the improvements noted in the table above translate to up to a minute or two of peak hour/peak direction travel time savings.

CBD Traffic Signal Retiming — SDOT completed a downtown optimization project addressing 259 traffic signals, roughly in the area from Denny to Jackson (the northern and southern boundaries) and from Alaskan Way to Boren Avenue (the western and eastern boundaries). This was the first time in 21 years that the entire downtown area has been collectively optimized. New timing plans will improve traffic flow during peak periods, off-peak periods, special events and incidents.

In addition, SDOT has optimized the Rainier Ave S Corridor (from the Eastbound I-90 off ramp to Seward Park); Elliott Avenue was retimed and optimized in support of the Rapid Ride corridor implemented there in 2008; last, additional timing plans for evening and incident management operations (when traffic rerouting is required) at locations throughout the City were implemented.

Reduction in Trouble Calls

SDOT is transitioning to a new maintenance management system. During this transition, trouble call tracking is not available. When the new system goes on-line, the trouble call activity will be reported. Crews do report a significant reduction in trouble calls as the new, longer-lived, LED traffic and pedestrian signals are installed.

Transit Time Savings

In 2008, King County METRO Transit did not implement any new transit signal priority corridors, thus no new transit time savings tied to these systems can be reported. The region's Rapid Ride Corridor initiatives, which include transit signal priority, are planned for implementation beginning in 2010. In Seattle, the Rapid Ride corridors are:

- **C Line**—West Seattle to downtown Seattle using Fauntleroy Way SW, California Avenue SW, and State Route 99 (2011)
- **D Line**—Ballard to Uptown and downtown Seattle along 15th Avenue NW (possible alternate routing along 24th Avenue NW) (2012)
- **E Line**—Aurora Avenue N (State Route 99) between Shoreline and downtown Seattle (2013)

In support of the C-Line, 12 new traffic signal cabinets, controllers, associated communications and upgraded traffic signal detection were installed on Elliott Avenue W in 2008. This corridor was also reconfigured to provide a transit-only lane, and signal operations were adjusted to support that operation.

Customer Satisfaction

Customer satisfaction can be measured in many ways, including surveys, tracking complaints and comments made to the Department, or even by the willingness to fund additional transportation improvements. At this stage in the program, no formal customer satisfaction surveying has been done, although some level of customer survey will be accomplished in 2009. However, one indication of customer satisfaction could be measured based on the number of visits to the SDOT traffic camera web site (<http://www.seattle.gov/trafficcams>). The following table indicates the number of website hits in each year since 2004. The hits increased again in 2008 by 26 percent, suggesting a strong public demand for this information.

Year	Camera Locations Available on the Web	Annual Web Site Hits (in millions)
2004	11	2.7
2005	28	2.9
2006	36	4.8
2007	41	7.3
2008	41	9.4