

## Transit Operational Spot Improvement Projects

The Transit Speed and Reliability (TS&R) program - part of King County Metro's Service Development section - is working with partner cities to evaluate and develop strategies to improve transit speed and reliability. The majority of these spot improvement projects are located within the City of Seattle because traffic congestion, a constrained arterial systems and a dense transit network in the City of Seattle combine to create numerous transit operational problems. While Seattle generates most of the projects, there are spot improvements underway throughout King County.

TS&R receives reports on transit operational problems from a variety of sources. These include input from transit operators from the quarterly base visits, from transit planners within Service Development, system supervisors in Transit Service and Quality, and safety officers in Transit Safety, and occasionally through local city traffic engineers and transit riders. TS&R traffic engineers investigate the reported problem in the field to gain a first hand understanding of the physical and operational conditions and the magnitude, duration, and time of day nature of the reported problem. Most importantly, these field visits enable the TS&R traffic engineers determine if there are possible solutions to address or mitigate the problem. Following this initial assessment, the necessary traffic operational studies required to fully document the problem and the potential solution are prepared and shared with the city traffic engineer.

In addition to responding to feedback from others, TS&R initiates transit corridor studies to identify the most significant operational problems for transit along the corridor. The studies include data collection (traffic volumes, bus volumes, bus riders, signal timing), existing condition analysis using the Synchro traffic signal traffic optimization models, evaluation of alternative solutions, which includes an estimation of travel time benefit for each solution, and the recommendation/selection of a preferred solution. From these operations studies, a list of possible transit improvements is identified.

Once identified, all potential improvements typically fall into one of three basic areas:

- 1) **Transit facility-related operational improvements** - bus stop relocations/consolidations/removal.
- 2) **Street usage/signal operational improvements** - on-street parking removal/restrictions, relocation of crosswalks, re-channelization, revised traffic signal phasing and/or timing, signal optimization, transit queue jump, new pedestrian/transit signals, and new transit lanes.
- 3) **Transit Signal Priority improvements** – installation of King County's transit signal priority system.

Recommended improvements are further categorized into short-term improvements (quick fix, or relatively low-cost solutions), mid range improvements, and long range improvements.

Short-term transit operational improvements take approximately one to twelve months to implement, require little public involvement, generate little controversy, and cost less than \$10,000. Examples of short-term improvements include implementation of minor on street parking restrictions, minor traffic signal re-timing, small-scale re-channelization projects, standard traffic signal coordination projects, and limited bus stop consolidation projects.

Compared to short term projects, mid range improvements require more extensive coordination with the affected city, some form of a public outreach program, and a more extensive traffic operations analysis. They also cost more to implement and typically require some form of an interagency agreement. Mid term transit operational improvements take approximately 12 to 24 months to implement. Typical mid-term efforts would include new signal queue jumps, major signal re-timing projects that involve new hardware, additions of new left-turn lanes or transit lanes which do not require major reconstruction or right of way take, more extensive or controversial on-street parking restrictions, an aggressive stop consolidation effort, and new transit signal priority installations in corridors where the traffic control system has been upgraded.

Long-term transit operational improvements take in excess of 24 months and are not viewed as spot improvements. Project examples in this category would and include implementation of new transit lanes that require major

construction, transit signal priority projects linked to upgrades of the traffic control system, and any project involving right of way acquisition.

After implementation of a spot improvement, the city and/or TS&R staff will make field observations to compare transit operation before and after implementation. One or more of the following observations may be used to determine if the project met its objective:

- Number of buses stopping at a signalized intersection
- Length of vehicle queues at a signalized intersection
- Wait time for green light at a signalized intersection.
- Point to point travel time
- Number of potential conflicts between buses and other roadway users

The attached *Spot Improvement Bi-Annual Report* provides project information on improvements completed between January and June 2004.

# TRANSIT SPEED AND RELIABILITY SPOT IMPROVEMENT BI-ANNUAL REPORT

JUNE 2004

Transit Speed and Reliability (TS&R) continues its efforts to fix small traffic operations problems that affect the daily operation of Metro buses. Spot improvements are low-cost, single location solutions that can be implemented quickly and with a minimum of impacts to other roadway users. Once reported and identified, spot improvements can take anywhere from a month to over two years to implement, depending on the nature of the problem, the solution, and agency staff resources. This report is the first bi-annual reports that will highlight the spot improvements that have been recently completed.

## 14TH AVE S / S JACKSON ST / RAINIER AVE S



### PROBLEM REPORTED

Inbound route 7 & 9 coaches were delayed during AM periods. The green light on Jackson St was too long for the amount of traffic present, creating long vehicle queues on northbound Rainier Ave.

### ASSESSMENT

TS&R and a Seattle Department of Transportation (SDOT) signal technician visited the location to assess the situation during the morning. It was discovered that a broken traffic detector was holding the green light on Jackson St to its maximum allowable time. Also, the green time was observed to be not long enough for northbound traffic present on Rainier Ave.

### THE FIX

All of the traffic detectors at the intersection are planned to be replaced in the future when the street is resurfaced. In the meantime, more green time has been given to the northbound-through and northbound-left turn movements. Also, the maximum green time on Jackson St was reduced.

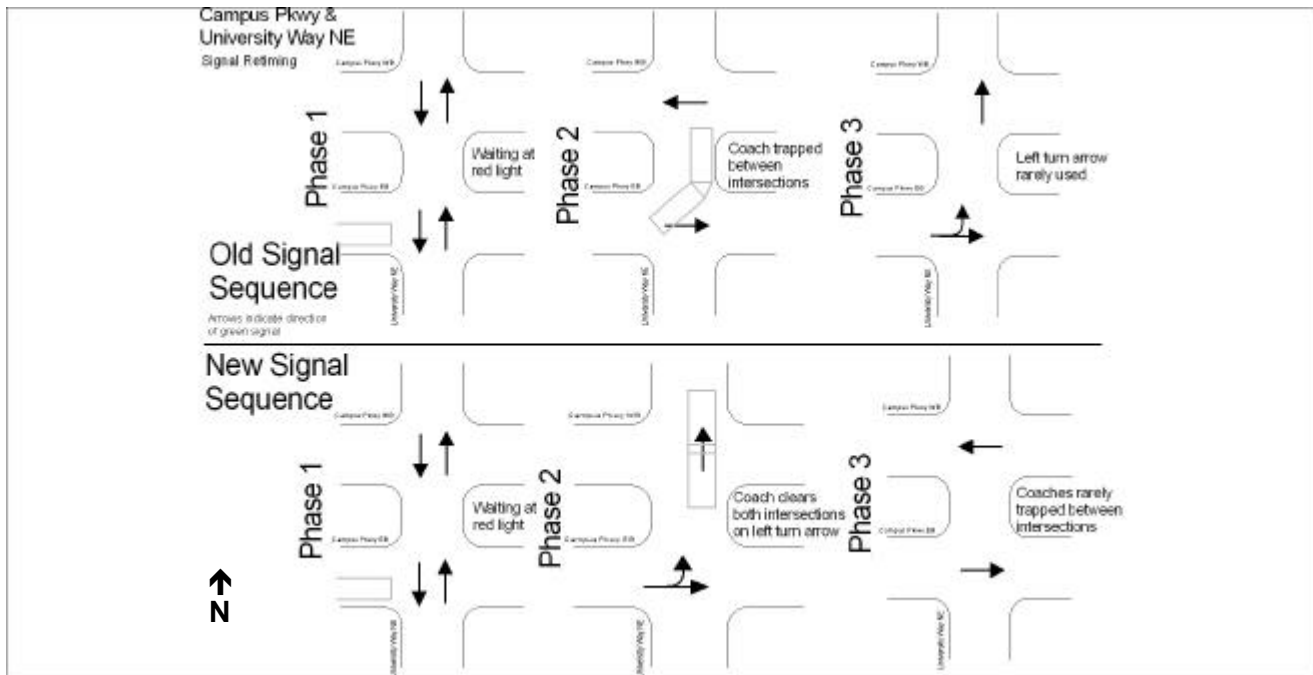
### RESOLUTION

The interim fix noticeably reduced the length of the northbound vehicle queues on Rainier Ave, without significantly impacting vehicles from other directions. The result is reduced delay to inbound routes 7 and 9 during all times of day, most significantly in the AM period. Once the traffic detectors are replaced, the traffic signal will be able to run more efficiently.

### AGENCY STAFF CONTACTS:

Ralph Carroll, SDOT  
Owen Kehoe, KC Metro

## NE CAMPUS PKWY & UNIVERSITY WAY NE



### PROBLEM REPORTED

Route 71,72,73,74 outbound coaches were getting stuck between the eastbound and westbound intersections when making the eastbound left-turn. Coaches often waited through an entire signal cycle to complete the turn.

### THE FIX

TS&R staff proposed a new timing plan for the traffic signal, which was subsequently approved by SDOT traffic engineers. SDOT Signal technicians installed the new timing plan late last year.

### ASSESSMENT

The signal was reconstructed last year. Included in the reconstruction was the addition of a left turn arrow, intended to help the eastbound left-turn movement. However, due to the ordering of the signal phases, coaches were still getting stuck in the intersection.

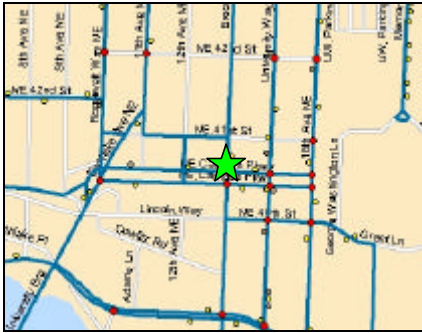
### RESOLUTION

The new timing plan results in a significant improvement for coaches making the left turn. Coaches are less likely to become stuck between the intersections, and rarely have to wait through an entire signal cycle. Traffic from other directions is not impacted because green times were not changed.

### AGENCY STAFF CONTACTS

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## NE CAMPUS PKWY & BROOKLYN AVE NE



### PROBLEM REPORTED

A long red light was observed going both directions on Campus Pkwy, even though little traffic uses Brooklyn Ave. Many routes that use the intersection were unnecessarily delayed.

### ASSESSMENT

SDOT had re-timed all of the signals on Campus Pkwy last fall. TS&R notified a signal technician who investigated the problem. An error was discovered in the traffic signal controller programming.

### THE FIX

The controller error was corrected, and now traffic going east-west on Campus Pkwy has more green time available and less red time to wait for.

### RESOLUTION

This fix reduced delay to the many routes that travel through the intersection.

### AGENCY STAFF CONTACTS

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## FAIRVIEW AVE E & EASTLAKE AVE E



### PROBLEM REPORTED

Heading northeast on Fairview Ave, coaches waited for a long red light while there was light traffic on Eastlake Ave. Problem was most pronounced after 7:00PM when routes 71, 72, 73 begin to operate local service on Fairview Ave. This problem was identified from operator feedback collected during a recent service development base visit, and was verified in the field by TS&R staff.

### ASSESSMENT

This signal operated in coordination with other signals on Eastlake Ave, but Eastlake Ave traffic was given priority over Fairview Ave traffic.

### THE FIX

Based on information provided by TS&R, SDOT has changed the signal timing so that the signal runs isolated (without coordination) between the hours of 9:00 AM and 3:30PM and from 6:30PM through the end of the day. When running isolated, the signal is more responsive to traffic on Fairview Ave.

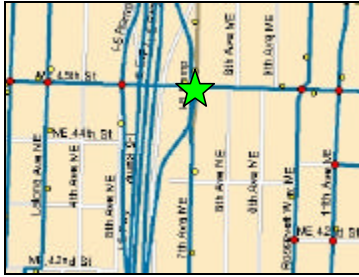
### RESOLUTION

This fix reduced the time that outbound route 70 and local routes 71, 72, 73 have to wait at the intersection during off-peak hours.

### AGENCY STAFF CONTACTS

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## 45<sup>TH</sup> AVE NE & 7<sup>TH</sup> AVE NE



### PROBLEM REPORTED

Eastbound coaches had difficulty merging into the traffic lane at this intersection after serving the nearby zone, resulting in delays and operator frustration.

### ASSESSMENT

When eastbound traffic had a red signal, a long queue of vehicles would back up and few drivers would yield to a merging coach. Coaches would often have to wait for the entire queue to clear before being able to continue east on 45<sup>th</sup> St.

### THE FIX

Coordinating with WSDOT and SDOT, TS&R designed a “queue jump” transit signal for the intersection, which gives an advance green light to a coach waiting in the pullout. The signal uses a sophisticated video detection system, in tandem with traditional wire loop detectors, to trigger the bus signal only when a bus is waiting to receive it.

### RESOLUTION

The queue jump signal allows coaches, after stopping at the red signal, to easily pull ahead of the traffic queue and merge into an empty lane, thus reducing delay and improving schedule reliability.

### AGENCY STAFF CONTACTS

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