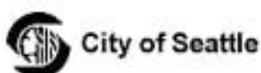


# Performance Report on Surface Streets in the Seattle Central Business District Volume 6: Fifth Update - Post Tunnel Closure July 16, 2007



As required by the Agreement between King County, City of Seattle and Sound Transit, as revised June 24, 2002, for the Downtown Seattle Transit Tunnel and Related Facilities.

Prepared by the Monitor and Maintain Committee, with representation from the following agencies:



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## Report Purpose

This report, and subsequent updates, are intended to provide the documentation necessary to satisfy the requirements of Section 10.3 of the “Agreement Regarding the Design, Construction and Operation of the Downtown Seattle Transit Tunnel and Related Facilities”, as executed by the City of Seattle, King County and Sound Transit.

Excerpts from Section 10.3 of this Agreement read as follows:

“It is the Parties’ intent that the Downtown Seattle Traffic and Street Improvements will be sufficient to maintain bus service performance on surface streets in downtown Seattle, during the closure period and after the tunnel is re-opened at performance levels similar to those existing prior to the Closure Period. The Parties hereby establish a Monitor and Maintain Committee (M&M Committee) to be comprised of the designated contacts set forth in Section 20.0. The M&M Committee may be expanded to include participation by other public agencies at the discretion of the Parties. The M&M Committee shall conduct baseline studies of bus travel time and passenger convenience, security, safety and comfort during a measurement period prior to the Closure Period (Baseline Measurement Period.)”

“During the Closure Period and for one year after the Tunnel is reopened, the M&M Committee shall continue to monitor downtown Seattle transportation system performance and make recommendations to the Parties to take actions to maintain said system performance. In performing its functions, the Committee shall be directed to (a) consult with and seek input from suburban stakeholders and (b) report quarterly to the City Council’s Transportation Committee regarding the performance of the downtown transportation system and regarding the Committee’s consultation with various stakeholders.”

The M&M Committee issued its first performance report in September, 2005 just prior to tunnel closure. Volume 1 of the report documented pre-tunnel closure conditions for six specific performance measures. Data for this initial baseline report was collected during the spring and summer of 2005. The six performance measures that have been tracked are as follows:

- Transit travel time
- General purpose traffic operations
- Transit ridership and bus volumes
- Pedestrian activity at bus zones
- Seattle Central Business District (CBD) Customer Surveys
- Transportation Demand Management (TDM) mitigation programs

Each of these six performance studies has been funded as a project within the overall Tunnel Agreement.

Volume 2 of the report issued January, 2006 provided an initial assessment of how the tunnel closure plan performed overall, and summarized the contingency planning effort that took place in the first 90 days following tunnel closure. The data sets used for Volume 2 were collected in the fall of 2005, following tunnel closure and extended up to the beginning of the Thanksgiving holidays. This allowed for a better comparison of before and after tunnel closure conditions in the Seattle central business district for non-holiday times.

Volume 3 of the report issued March 2006 provided updates on a subset of the six performance measures. Specifically, Volume 3 updated information on Measures 1, 3 and 4 and summarized the effect of a set of measures implemented after the release of Volume 2 to address issues identified after tunnel closure. These measures are: transit travel time; transit ridership and bus volumes; and pedestrian activity at bus zones. For Volume 3, transit travel time and bus volumes were derived from the first two weeks in February following the spring 2006 service change. Transit ridership figures were derived from the fall

2005 service change that ended on February 11, 2006. Pedestrian activity at bus stops was derived from a survey taken in late February/early March.

The Volume 4 report issued in August 2006 provided updated information on five of the six performance measures. Data was available for all measures except data related to pedestrian activity at bus zones. Transit travel times for this report were derived from the first seven weeks of the summer 2006 service change. Transit ridership data was taken from the spring 2006 service change. Most of the post-tunnel closure traffic data for this report was collected in May, 2006.

The Volume 5 issued January 2007 updated four of the six performance measures. These include the following: transit travel time, transit ridership and bus volumes, surveys of Seattle central business district customers, and TDM mitigation programs. Transit travel time and bus volumes were derived from the data from October, 2006 up to the Thanksgiving holiday. Transit ridership figures were derived using data from the fall, 2006 service change.

This Volume 6 report updates three of the six performance measures. These include transit travel time; transit ridership and bus volumes; and TDM mitigation programs. Transit travel time and bus volumes were derived using data from February, 2007. Transit ridership figures were derived using data from the winter, 2007 service change.

The projected schedule for the release of the balance of the report updates is shown in Figure 1.

**Figure 1. Performance Report Release Dates**

Performance Measure Updates	Performance Report Release Dates						
	Complete	Complete	Complete	Complete	Complete	Complete	
	Sept 05	Jan 06	March 06	Aug 06	Jan 07	Jul 07	Jan 08
	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5	Volume 6	Volume 7
Transit Travel Time	⊙	⊙	⊙	⊙	⊙	⊙	⊙
General Purpose Traffic Operations	⊙	⊙		⊙			⊙
Transit Ridership and Bus Volumes	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Pedestrian Activity at Bus Zones	⊙	⊙	⊙				⊙
Surveys of CBD customers	⊙			⊙	⊙		⊙
TDM mitigation programs	⊙	⊙		⊙	⊙	⊙	⊙

With the release of Volume 6, there is now only one volume of the report yet to be released. The final report, Volume 7, will be issued in January 2008, to provide enough time to process the last formal customer survey, which will be conducted following the re-opening of the tunnel in September 2007. Following the issuance of Volume 7, the monitoring system established by the M&M process be available through at least September 2008 to support additional reports if circumstances dictate they are needed.

## **Executive Summary on Post Tunnel Closure Conditions through June 2007**

Volume 6 of this Report summarizes the post tunnel closure experience in the Seattle Central Business District through June 2007.

The balance of this report provides more detail on each of the evaluation programs that compose the sixth reporting period post tunnel closure. Key highlights from each of the three monitoring programs included in this report are as follows:

### **Transit Travel Time & Reliability**

The first level of analysis for downtown transit travel time is a composite measurement of average time spent in the study area. This value is obtained by identifying the first and last observation of a bus trip in the CBD, regardless of the corridor. Averaging this figure for all trips results in a single value of time spent in the CBD for all observed trips. This value is used as an index, not a measure. This figure includes layover time as well as through-routed trips under one measurement. It will also include many different paths through the CBD with different lengths and travel conditions. The measure becomes meaningful when compared to the same measurement for different time periods to compare the ease of travel for transit through the CBD.

The data used for this reporting period was collected from February 12 to February 22, 2007. The Travel Time index for this reporting period is **74**, based on an average travel time of 16:21. The baseline Travel Time Index is **100**, representing the value before tunnel closure. The average travel time value at that time was determined to be 21:59, based on bus trips between 4 - 6 pm on weekdays during the month of July, 2005. The current index represents a **26%** decrease in time spent in the downtown core over the pre-tunnel closure baseline, and an **18%** decrease from the previous post-tunnel closure report. Travel time variability is still consistently good and also much improved over the same period in 2005.

At the corridor level, travel time comparisons were made using baseline data collected before tunnel closure and the five sets of post tunnel data available through Volumes 2 through 5 and now Volume 6. The results are summarized below:

- Travel time on First Avenue has improved in both directions by 3 to 4 minutes compared with the previous report. Overall schedule reliability as measured by the standard deviation is slightly improved in both directions in both the AM and PM peaks.
- Travel time on Second Avenue in the AM is effectively unchanged from the previous report. In the PM, average travel time improved by 23 seconds accompanied by reduction in variation as well.
- For Third Avenue, average travel times and variation changed only slightly with reductions in travel times from the previous period of a few seconds. The northbound PM peak was the exception with improvement in both travel time and variation of around 20 seconds. Travel times continue to be 2 minutes better in both directions in both peak periods than before tunnel closure.
- Fourth Avenue S average travel times decreased by about 20 seconds during both the morning and afternoon peak. Schedule variation decreased slightly in both peak periods as well.
- Travel on Virginia, Olive, and Howell are 30 seconds to a minute faster in the PM peak in this report compared to the results reported in Volume 5. Stewart is also faster by about 1 minute in the PM peak, recovering the minute slowdown seen in the previous report. Olive and Stewart continue to operate far better than before tunnel closure. The morning peak on Howell remains slower than before tunnel closure. In summary, bus travel on surface streets are still generally improved over pre-tunnel closure conditions, but riders of the routes that previously operated in the tunnel continue to experience longer trip times.

## **Transit Ridership and Bus Volumes**

Approximately 95,000 north-south riders crossed the downtown screenline at University Street on weekdays in fall 2004 before tunnel closure. As part of a general increase in ridership, this number increased to almost 106,700 weekday riders in spring 2005. Ridership data in spring 2007 indicate that loads have increased almost three percent since spring 2005, to 109,400 weekday riders. Overall ridership to and from the CBD has also increased even more in this period. The fact that the number of riders crossing the screenline has increased more slowly than the number entering and leaving the CBD is probably a result of three factors: (1) some riders leaving downtown who would have crossed the screenline if the tunnel was open are catching their trips after their bus crosses the screenline; (2) some riders entering downtown who would have stayed on their trips past the screenline if the tunnel was open are exiting before they reach University Street; and (3) some riders who would have used the tunnel for cross-CBD trips are not using surface buses as an alternative. In other words, although surface travel times have improved in the CBD since tunnel closure, surface travel times are still slower than tunnel travel times and it is likely that some potential cross-CBD trips are not occurring because they take longer on the surface than they would in the tunnel.

The bus volumes on surface streets in the Seattle Central Business District have not changed significantly from those reported in Volume 5.

## **Transportation Demand Management Program**

The package of Transportation Demand Management (TDM) programs introduced in support of tunnel closure has successfully expanded participation for commute options. The results from tunnel closure through May 2007 can be summarized as follows:

- Over 6,700 individuals and 150 businesses have joined Flexcar since the beginning of tunnel closure mitigation efforts in August 2005.
- 151 individual Puget Pass holders signed up for the Home Free Guarantee (HFG) in the third period, bringing the total close to 700 since program initiation.
- Registration activity at Rideshare Online continues at an accelerated pace, with 368 new registrants this period and about 1,650 total registrations by downtown employees since DSTT closure.
- The number of merchants participating in the second edition of the Shop, Dine & Ride book increased to 144.

## **Measure 1: Transit Travel Time**

### **Monitoring Objectives**

The purpose of monitoring transit travel times is to answer the following questions regarding transit travel times in the Seattle downtown core before and after tunnel closure:

- How long are the transit travel times in the Seattle downtown core?
- How consistent are the transit travel times in the Seattle downtown core?
- Where are slowdowns occurring and are there mitigation measures that might address these slowdowns?

### **Methodology**

Transit travel times on surface streets were measured using roadside bus detection equipment at 16 locations in the Seattle downtown core. The locations of these detection points are identified in Figure 2. A description of the equipment and technology can be found in the Methodology section of the baseline tunnel closure report.

The collection of transit travel times began in summer 2005 and has been continuously collected throughout the tunnel closure period. Two levels of data are included in the regular performance reports issued by the Monitor and Maintain Committee:

Level 1: Seattle downtown core summary statistics will be the highest level summary. They consist of aggregated travel times through the study area to define an average transit operating time in the Seattle downtown core on surface streets for the AM peak and the PM peak. This measure will show the amount of time a bus takes on average to traverse the downtown area. Considered over time, this measure will give an overall trend of the increase or decrease in delay on surface streets caused by tunnel closure.

Level 2: Transit Corridor Travel Time summary will track travel time along a discrete set of transit corridors on surface streets in the central business district. The transit corridors included in the monitoring are identified in Figure 2. The data will be categorized by corridor and by time of day (AM Peak and PM Peak). Variability of the data will also be reported to show the consistency of transit travel times.

Figure 2. Transit Travel Time Summary Analysis Corridors and Detection Point Locations



## Transit Travel Time Comparison

Data for transit travel time in the Seattle downtown core post tunnel closure is collected continuously. For this report, weekday travel times between February 12, 2007 and February 22, 2007 were used. This period was used to coincide with the spring 2007 service change that went into effect Saturday, February 10th. This analysis period was shortened due to power failure and equipment damage at a key location. Time-of-day periods, monitoring locations and analysis tiers - as described in the previous section - are the same as the baseline report, except where noted.

In general, transit travel time averages on surface streets for this period were faster than the initial post-closure period results. Overall, travel times were slightly faster than the previous report, with notable reduction in travel time on First Avenue in both directions, Virginia Street and Stewart Street, which all improved over the previous period to travel times consistent with spring 2006. Overall, the tunnel closure mitigation measures continue to benefit CBD transit operations, but there are seasonal impacts that create minor variations in average transit travel times.

### Seattle Downtown Core Travel Time Summary (Level 1):

The first level of analysis for downtown transit travel time is a composite measurement of average time spent in the study area. This value is obtained by identifying the first and last observation of a bus trip in the downtown core, regardless of the corridor. Averaging this figure for all trips results in a single value of time spent in the downtown core for all observed trips.

This value is used as an index, not a measure. This figure includes layover time as well as through-routed trips under one measurement. It will also include many different paths through the downtown core with different lengths and travel conditions. The measure becomes meaningful when compared to the same measurement in the future to compare the ease of travel for transit through the downtown core.

The baseline Travel Time Index is **100**, representing the value before tunnel closure. The average travel time value at that time was determined to be 21:59, based on bus trips between 4 - 6 pm on weekdays during the months of July and August, 2005. The data used for this reporting period covers the two weeks of the Spring 2006 service change. The Travel Time index for this reporting period is **74**, based on an average travel time of 16:21. The current index represents a **26%** decrease in time spent in the downtown core over the baseline, and a **5%** reduction over the same reporting period in 2006. The reduction in travel time is an approximate **18%** reduction from the previous reporting period (Fall 2006), lending evidence to seasonal travel time increases in the CBD during the Fall.

### Transit Corridor Travel Time Summaries (Level 2)

The four charts in Figure 3 show the average travel times for transit after tunnel closure on selected corridors. The data for Volume 6 was collected in February 2007 using the monitoring system. The data used is from weekdays only. Each chart shows the average travel time for the direction of travel and time of day indicated. The AM charts include buses observed between 7 – 9 am at the first reader on the corridor being measured. The PM charts cover the time period from 4 – 6 pm.

The average corridor travel times in this report are compared to the comparable statistics for both pre-tunnel closure baseline conditions and for the tunnel closure data reported in successive reports. Corridor travel times should not be compared to each other. Readers were placed to ensure route coverage. Readers were also sited to facilitate communications and insure access to power. As a result, the measured corridors differ in length, number of stops and number of signals, all of which affect travel time but are not related to congestion.

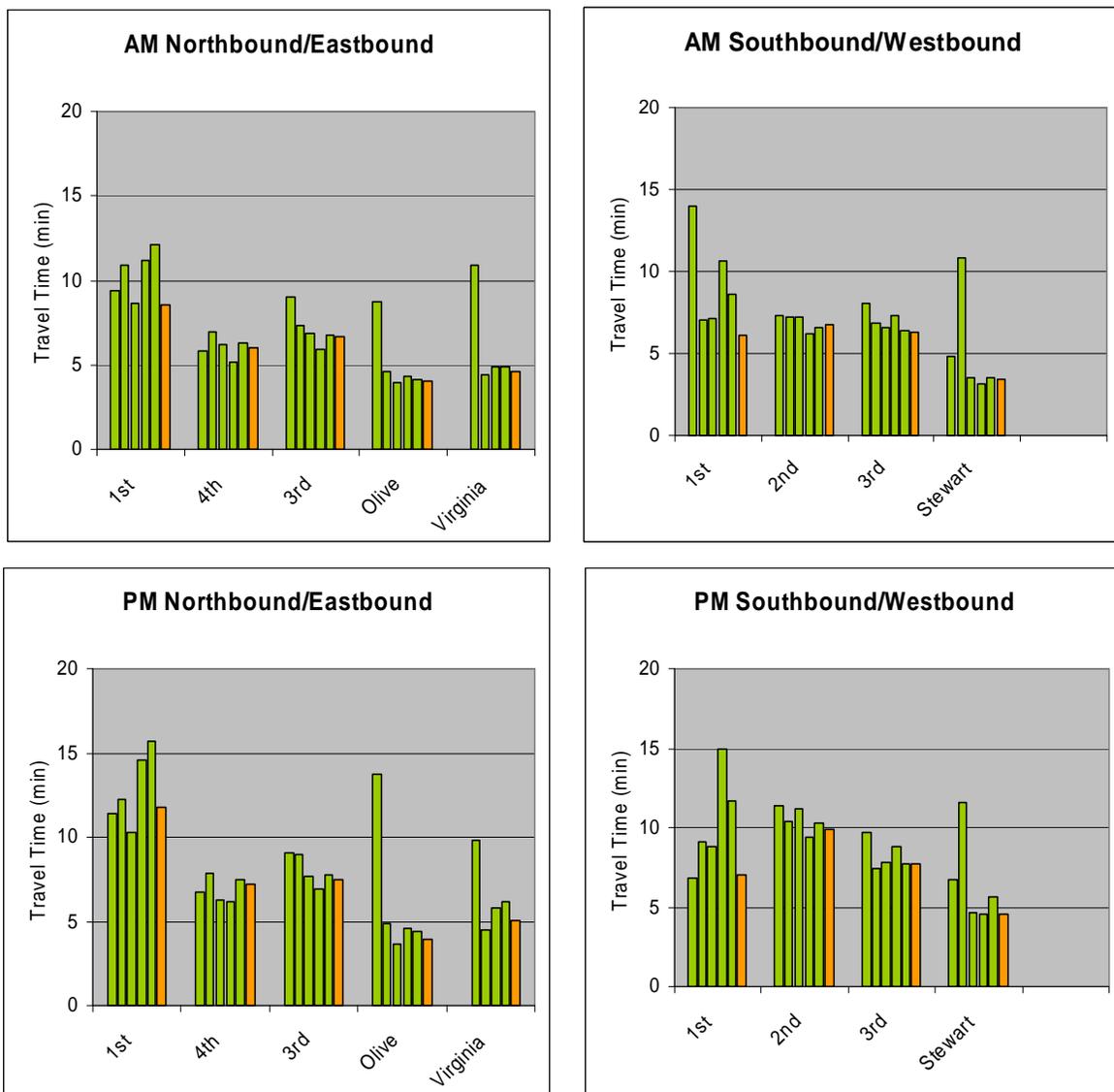
The reader locations that define the boundaries of each of the transit corridors are described below along with a table for each corridor that summarizes the Average Travel Time by time period along with the standard deviation (SD) of the observations in minutes. As a statistical measure, approximately 69% of all

observations are within one standard deviation of the average. The SD can be interpreted as approximating the range (+/- 1SD) of the typical travel time that a majority of bus riders will experience on the corridor. There are currently six data points; Volume 1 pre-tunnel baseline, and Volume 2 through 6 post-tunnel closure observations.

- Volume 1: Pre-Tunnel Closure Baseline, Third Quarter 2005
- Volume 2: Post Tunnel Closure, Fourth Quarter 2005
- Volume 3: Post Tunnel Closure, First Quarter 2006
- Volume 4: Post Tunnel Closure, Second Quarter 2006
- Volume 5: Post Tunnel Closure, Fourth Quarter 2006
- Volume 6: Post Tunnel Closure, First Quarter 2007

Travel time summaries for all six data sets are provided in Figures 3 and 4.

**Figure 3. Transit Corridor Travel Time Comparisons Before and After Tunnel Closure**



**Figure 4A. First Avenue Transit Travel Time and Variation**

First Avenue	AM Peak (7 – 9 am)	PM Peak (4 – 6 pm)
Northbound, Royal Brougham to Seneca Street	Travel time: Baseline – 9 min 22 sec ( <i>SD: 4.8 min</i> ) Volume 2 – 10 min 54 sec ( <i>SD: 5.8 min</i> ) Volume 3 – 8 min 36 sec ( <i>SD: 1.8 min</i> ) Volume 4 – 11 min 8 sec ( <i>SD: 2.1 min</i> ) Volume 5 – 12 min 6 sec ( <i>SD: 2 min</i> ) Volume 6 – 8 min 33 sec ( <i>SD: 1.2 min</i> ) Change from Volume 5: - 3m 33sec	Travel Time: Baseline – 11 min 24 sec ( <i>SD: 5.3 min</i> ) Volume 2 – 12 min 12 sec ( <i>SD: 6.0 min</i> ) Volume 3 – 10 min 18 sec ( <i>SD: 3 min</i> ) Volume 4 – 14 min 34 sec ( <i>SD: 4.3 min</i> ) Volume 5 – 15 min 41 sec ( <i>SD: 4 min</i> ) Volume 6 – 11 min 47 sec ( <i>SD: 3.2 min</i> ) Change from Volume 5: - 3m 54sec
Southbound, Seneca Street to Royal Brougham*	Travel time: Baseline – 14 min ( <i>SD: 8.8 min</i> ) Volume 2 – 7 min ( <i>SD: 5.4 min</i> ) Volume 3 – 7 min 8 sec ( <i>SD: 1 min</i> ) Volume 4 – 10 min 40 sec ( <i>SD: 1.8 min</i> ) Volume 5 – 8 min 39 sec ( <i>SD: 1.5 min</i> ) Volume 6 – 6 min 9 sec ( <i>SD: 1 min</i> ) Change from Volume 5: - 2m 30sec	Travel time: Baseline – 6 min 51 sec ( <i>SD: 3.9 min</i> ) Volume 2 – 9 min 6 sec ( <i>SD: 6 min</i> ) Volume 3 – 8 min 49 sec ( <i>SD: 1.4 min</i> ) Volume 4 – 14 min 55 sec ( <i>SD: 3 min</i> ) Volume 5 – 11 min 42 sec ( <i>SD: 3.1 min</i> ) Volume 6 – 7 min 1 sec ( <i>SD: 2.4 min</i> ) Change from Volume 5: - 4m 41sec

**First Avenue** (Northbound and Southbound) reader locations are Royal Brougham to the south and Stewart Street to the north, with a midpoint at Seneca Street. Average travel time and variation in travel time on First Avenue decreased in both the northbound and southbound directions. The relatively low number of observed trips on this corridor tends to generate greater variation from period to period than the other corridors. Travel times are comparable to the same period in 2006.

**Figure 4B. Second Avenue Transit Travel Time and Variation**

Second Avenue	AM Peak (7 – 9 am)	PM Peak (4 – 6 pm)
Southbound, Pike Street to S Jackson Street	Travel time: Baseline – 7 min 20 sec ( <i>SD: 1.9 min</i> ) Volume 2 – 7 min 13 sec ( <i>SD: 2.6 min</i> ) Volume 3 – 7 min 11 sec ( <i>SD: 1.45 min</i> ) Volume 4 – 6 min 13 sec ( <i>SD: 1.5 min</i> ) Volume 5 – 6 min 35 sec ( <i>SD: 1.4 min</i> ) Volume 6 – 6 min 47 sec ( <i>SD: 1.4 min</i> ) Change from Volume 5: + 12sec	Travel time: Baseline – 11 min 26 sec ( <i>SD: 4.3 min</i> ) Volume 2 – 10 min 26 sec ( <i>SD: 3.5 min</i> ) Volume 3 – 11 min 10 sec ( <i>SD: 2.4 min</i> ) Volume 4 – 9 min 22 sec ( <i>SD: 2.2 min</i> ) Volume 5 – 10 min 18 sec ( <i>SD: 2.5 min</i> ) Volume 6 – 9 min 55 sec ( <i>SD: 2.0 min</i> ) Change from Volume 5: - 23sec

**Second Avenue** (Southbound only) reader locations are Pike Street and S Jackson Street with a midpoint at Seneca Street. Because this measurement is for the entire length of Second Avenue, it does not capture the sometimes significant delays for transit turning right at Columbia Street to access SR99 southbound. Second Avenue travel time increased very slightly in the AM with no change in variation, and decreased slightly in the PM with a small decrease in variation. Average travel times have been very consistent over the past year of observations.

**Figure 4C. Third Avenue Transit Travel Time and Variation**

<b>Third Avenue</b>	<b>AM Peak (7 – 9 am)</b>	<b>PM Peak (4 – 6 pm)</b>
Northbound, Yesler Way to Stewart Street	Travel time: Baseline – 9 min (SD: 4.6 min) Volume 2 – 7 min 20 sec (SD: 3.1 min) Volume 3 – 6 min 53 sec (SD:1.3 min) Volume 4 – 5 min 53 sec (SD:1.3 min) Volume 5 – 6 min 43 sec (SD:1.3 min) Volume 6 – 6 min 37 sec (SD:1.2 min) Change from Volume 5: - 6sec	Travel Time: Baseline – 9 min 6 sec (SD: n/a) Volume 2 – 8 min 57 sec (SD: 3.6 min) Volume 3 – 7 min 41 sec (SD:1.3 min) Volume 4 – 6 min 53 sec (SD:1.8 min) Volume 5 – 7 min 47 sec (SD:1.9 min) Volume 6 – 7 min 26 sec (SD:1.6 min) Change from Volume 5: - 21sec
Southbound, Stewart Street to Yesler Way	Travel time: Baseline – 8 min 5 sec (SD: 1.3 min) Volume 2 – 6 min 52 sec (SD: 2.8 min) Volume 3 – 6 min 36 sec (SD:1.6 min) Volume 4 – 7 min 17 sec (SD:1.5 min) Volume 5 – 6 min 26 sec (SD:1.4 min) Volume 6 – 6 min 20 sec (SD:1.5 min) Change from Volume 5: - 6sec	Travel time: Baseline – 9 min 45 sec (SD: 2.5 min) Volume 2 – 7 min 27 sec (SD: 2.9 min) Volume 3 – 7 min 51 sec (SD:1.5 min) Volume 4 – 8 min 46 sec (SD:1.8 min) Volume 5 – 7 min 46 sec (SD:1.6 min) Volume 6 – 7 min 43 sec (SD:1.6 min) Change from Volume 5: - 3sec

**Third Avenue** (Northbound and Southbound) reader locations are Stewart Street to the north and Yesler Way to the south, with a midpoint at Seneca Street. Average travel times are essentially unchanged from the previous period. Variation is also consistent across the most recent three measurement periods with Northbound PM peak showing the only notable change in travel time and variation. Travel times in both directions and peak periods are continue to be 1½ to 2 minutes faster than the pre-closure conditions.

**Figure 4D. Fourth Avenue Transit Travel Time and Variation**

<b>Fourth Avenue</b>	<b>AM Peak (7 – 9 am)</b>	<b>PM Peak (4 – 6 pm)</b>
Northbound, S Jackson Street to Seneca Street	Travel time: Baseline – 5 min 48 sec (SD: 1.2 min) Volume 2 – 6 min 58 sec (SD: 2.8 min) Volume 3 – 6 min 14 sec (SD:1.35 min) Volume 4 – 5 min 12 sec (SD:1.2 min) Volume 5 – 6 min 16 sec (SD:1.3 min) Volume 6 – 5 min 59 sec (SD:1.1 min) Change from Volume 5: - 17sec	Travel Time: Baseline – 6 min 46 sec (SD: 1.1 min) Volume 2 – 7 min 50 sec (SD: 4 min) Volume 3 – 6 min 15 sec (SD:2 min) Volume 4 – 6 min 11 sec (SD:2.2 min) Volume 5 – 7 min 29 sec (SD:2.8 min) Volume 6 – 7 min 9 sec (SD:2.1 min) Change from Volume 5: - 20sec

**Fourth Avenue** (Northbound only) reader locations are Seneca Street to the north and S Jackson Street to the south. Average travel times decreased by about 20 seconds in both the AM and PM peak. Variation in travel time improved slightly.

**Figure 4E. Virginia, Olive Way and Howell Transit Travel Time and Variation**

	<b>AM Peak (7 – 9 am)</b>	<b>PM Peak (4 – 6 pm)</b>
Eastbound Virginia Street, Third Avenue to Ninth Avenue	Travel time: Baseline – <i>n/a</i> Volume 2 – 10 min 39 sec ( <i>SD: 5.1 min</i> ) Volume 3 – 4 min 23 sec ( <i>SD: .9 min</i> ) Volume 4 – 4 min 53 sec ( <i>SD: .9 min</i> ) Volume 5 – 4 min 53 sec ( <i>SD: 1.0 min</i> ) Volume 6 – 4 min 35 sec ( <i>SD: 1.0 min</i> ) Change from Volume 5: - 12sec	Travel Time: Baseline – <i>n/a</i> Volume 2 – 9 min 50 sec ( <i>SD: 4.9 min</i> ) Volume 3 – 4 min 28 sec ( <i>SD: 1 min</i> ) Volume 4 – 5 min 48 sec ( <i>SD: 2.4 min</i> ) Volume 5 – 6 min 11 sec ( <i>SD: 2.7 min</i> ) Volume 6 – 5 min 3 sec ( <i>SD: 2.0 min</i> ) Change from Volume 5: - 1m 8sec
Eastbound Olive Way, Third Avenue to Eighth Avenue	Travel time: Baseline – 8 min 42 sec ( <i>SD: 9.1 min</i> ) Volume 2 – 4 min 34 sec ( <i>SD: 2.4 min</i> ) Volume 3 – 3 min 54 sec ( <i>SD: 1 min</i> ) Volume 4 – 4 min 19 sec ( <i>SD: 1 min</i> ) Volume 5 – 4 min 6 sec ( <i>SD: 1.1 min</i> ) Volume 6 – 4 min 5 sec ( <i>SD: 1.3 min</i> ) Change from Volume 5: - 1sec	Travel Time: Baseline – 13 min 43 sec ( <i>SD: 9.7 min</i> ) Volume 2 – 4 min 51 sec ( <i>SD: 2.5 min</i> ) Volume 3 – 3 min 41 sec ( <i>SD: .9 min</i> ) Volume 4 – 4 min 34 sec ( <i>SD: 1.45 min</i> ) Volume 5 – 4 min 25 sec ( <i>SD: 1.9 min</i> ) Volume 6 – 3 min 57 sec ( <i>SD: 1.8 min</i> ) Change from Volume 5: - 28sec
Eastbound Howell Street, Eighth Ave to Yale Street	Travel time: Baseline – 2 min 6 sec ( <i>SD: 1.4 min</i> ) Volume 2 – 3 min 53 sec ( <i>SD: 2.4 min</i> ) Volume 3 – 3 min 23 sec ( <i>SD: 1.6 min</i> ) Volume 4 – 3 min 3 sec ( <i>SD: 1.25 min</i> ) Volume 5 – 3 min 3 sec ( <i>SD: 1.3 min</i> ) Volume 6 – 3 min 19 sec ( <i>SD: 1.3 min</i> ) Change from Volume 5: + 16 sec	Travel Time: Baseline – 5 min 25 sec ( <i>SD: 3.1 min</i> ) Volume 2 – 5 min 37 sec ( <i>SD: 3.3 min</i> ) Volume 3 – 4 min 50 sec ( <i>SD: 2.3 min</i> ) Volume 4 – 5 min 23 sec ( <i>SD: 2.5 min</i> ) Volume 5 – 5 min 51 sec ( <i>SD: 2.6 min</i> ) Volume 6 – 5 min 21 sec ( <i>SD: 2.9 min</i> ) Change from Volume 5: - 30sec

**Virginia Street** (Eastbound only) reader locations are Third Avenue at Stewart Street to the west and Ninth Avenue at Stewart Street to the east. There was no transit service on Virginia Street before the tunnel closure, so there is no baseline data. Average travel times decreased from the previous report, and were comparable to the same period in 2006. Variation in travel time decreased in the PM peak.

**Olive Way** (Eastbound only) reader locations are Third Avenue to the west and Eighth Avenue to the east. Average travel times and variation were virtually unchanged in the AM peak from the previous report. Average travel time decreased by about 30 seconds in the PM peak. Travel times were comparable to the same period in 2006.

**Howell Street** (Eastbound only): Transit on Howell Street east of Eighth Avenue was slightly slower in the AM peak and 30 seconds faster in the peak as compared to the previous reporting period.

**Figure 4F. Stewart Street Transit Travel Time and Variation**

	<b>AM Peak (7 – 9 am)</b>	<b>PM Peak (4 – 6 pm)</b>
Westbound, Ninth Avenue to Third Avenue	Travel time: Baseline – 4 min 50 sec ( <i>SD: 1.9 min</i> ) Volume 2 – 10 min 52 sec ( <i>SD: 5.2 min</i> ) Volume 3 – 3 min 31 sec ( <i>SD: 1 min</i> ) Volume 4 – 3 min 8 sec ( <i>SD: 1.5 min</i> ) Volume 5 – 3 min 32 sec ( <i>SD: 1.05 min</i> ) Volume 6 – 3 min 27 sec ( <i>SD: 0.9 min</i> ) Change from Volume 5: - 5 sec	Travel Time: Baseline – 6 min 42 sec ( <i>SD: 1.5 min</i> ) Volume 2 – 11 min 36 sec ( <i>SD: 4.9 min</i> ) Volume 3 – 4 min 42 sec ( <i>SD: 2 min</i> ) Volume 4 – 4 min 32 sec ( <i>SD: 2.5 min</i> ) Volume 5 – 5 min 40 sec ( <i>SD: 3.3 min</i> ) Volume 6 – 4 min 34 sec ( <i>SD: 2.2 min</i> ) Change from Volume 5: - 1m 4sec

**Stewart Street** (Westbound only) reader locations are Third Avenue to the west and Ninth Avenue to the east. Average travel time was unchanged in the AM and decreased by about 1 minute in the PM Peak reversing the change measured in the previous report. The same is true of the variation in travel times.

## **Measure 3: Transit Ridership and Bus Volumes**

### **Monitoring Objectives**

The purpose of monitoring transit passenger and bus volumes is as follows:

- Provide data on bus volumes by street segment in downtown Seattle
- Measure the average weekday PM peak hour and weekday passenger loads crossing the Seattle CBD north-south screen line
- Provide data as available from Community Transit and Pierce Transit on average ridership crossing the north-south screen line during average PM peak hours and weekdays
- Identify and analyze any substantive changes in ridership or bus volumes for before and after tunnel closure conditions

### **Methodology**

Baseline bus volumes used for this analysis were extracted from HASTUS - the King County Metro scheduling system - using the February 2005 service change. These counts included in-service as well as out of service coaches. A projection of bus volumes on downtown streets for after tunnel closure conditions for September 2006 was also issued with Volume 1, the Baseline Report. These projected bus volumes have subsequently been compared with actual bus volumes for all service changes that have occurred since tunnel closure. Volume 2 provided a comparison with bus volumes as of December 2005 that reflected routing adjustments made to address operating impacts on Stewart Street. Volume 3 provided a comparison with bus volumes from the February 2006 service changes. Volume 4 provided a comparison with bus volumes as of June 2006. Volume 5 provided a comparison with bus volumes as of the September 2006. With Volume 6, the comparison is with bus volumes from the February 2007 service change.

For passenger loads, the Automated Passenger Count (APC) system is the primary source for passenger data for Metro coaches. APC data is collected in a random sample during each signup, downloaded and processed monthly. This data is summarized in a final form at the end of each signup. Preliminary data, based on smaller samples, is available monthly. Metro driver count data is collected on an ad hoc basis when preliminary APC results indicate that observations of trips on a particular route will fall below an adequate sample. Ridership data on Community Transit and Pierce Transit service is generated by the monitor reports supplied by each of these agencies. The ridership data from Community Transit and Pierce Transit is available by signup at the aggregate level.

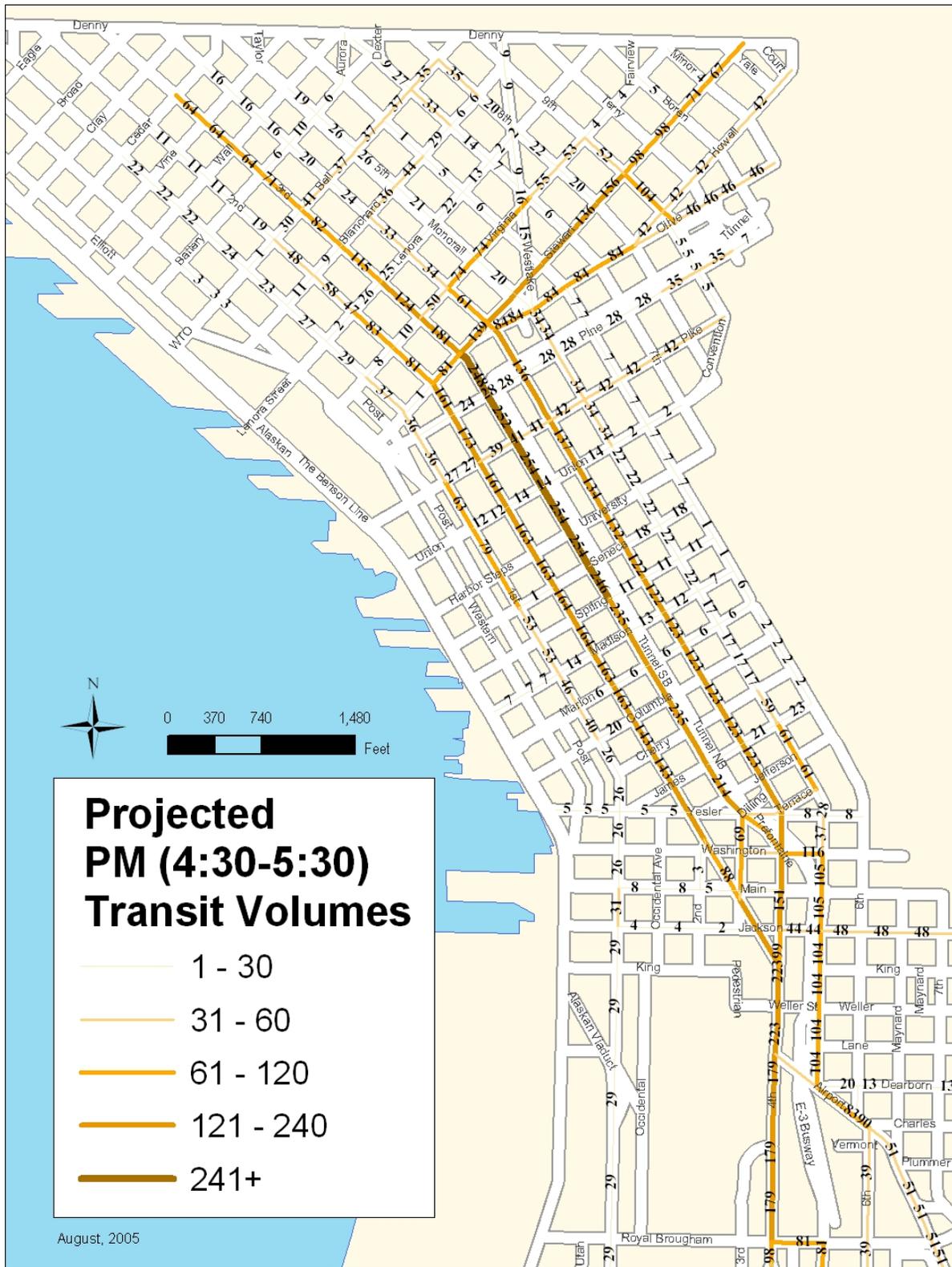
APC data, supplemented by driver counts and estimates for any non-APC observed trips, was used to estimate pre-tunnel closure Metro ridership volumes crossing the screen line just south of University Street by trip during the PM peak hour and the average weekday. These results were been summarized by street and by direction and have subsequently been used to assess changes in ridership volumes and loads since tunnel closure.

### **Bus Volumes**

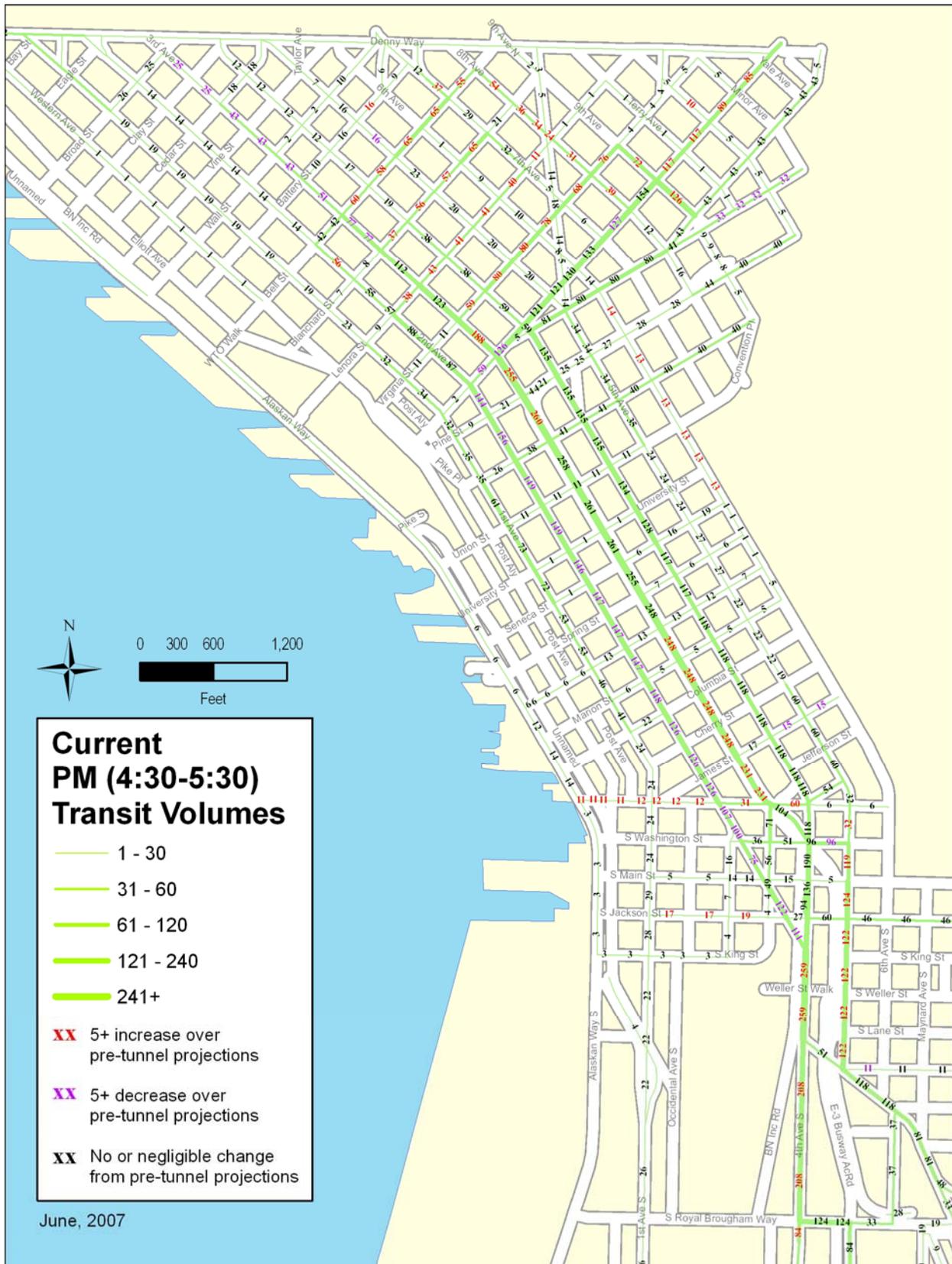
The bus volumes that were projected for downtown street segments during tunnel closure, as shown in the Volume 1 Baseline report, are summarized in Figure 5A. The actual post tunnel bus volumes for downtown streets for the February 2007 service change are shown in Figure 5B.

Bus volumes in the CBD during the PM Peak continue to be essentially the same for most links as projected. The PM Peak period used for determining transit volumes is 4:30 to 5:30 pm. Slight variations in volumes are due to schedule adjustments that change a trip from being included or excluded from the measured peak hour. The substantive changes for the baseline projection continue to be changes in bus volumes due to the relocation of selected trips from Second Avenue to Third Avenue, and the service adjustments on Stewart Street.

**Figure 5A. PM Peak Hour Transit Volumes- Projected in September 2005 Baseline Report**



**Figure 5B. Actual PM Peak Hour Transit Volumes as of February 2007 Service Change**



## Transit Ridership Volumes

Prior to tunnel closure, the primary concern regarding ridership was that ridership on transit trips entering the CBD might exceed the available capacity, leading to unacceptable overloads. To address this concern, University Street - approximately in the middle of the CBD - was used as a screenline, and the total volume of riders crossing this screenline, regardless of origin or destination, was measured for baseline (pre-closure) and current (post-closure) conditions.

Approximately 95,000 north-south riders crossed the downtown screenline at University Street on weekdays in fall 2004 before tunnel closure. As part of a general increase in ridership, this number increased to almost 106,700 weekday riders in spring 2005. Ridership data in spring 2007 indicate that loads have increased almost three percent since spring 2005, to 109,400 weekday riders. Overall ridership to and from the CBD has also increased even more in this period. The fact that the number of riders crossing the screenline has increased more slowly than the number entering and leaving the CBD is probably a result of three factors: (1) some riders leaving downtown who would have crossed the screenline if the tunnel was open are catching their trips after their bus crosses the screenline; (2) some riders entering downtown who would have stayed on their trips past the screenline if the tunnel was open are exiting before they reach University Street; and (3) some riders who would have used the tunnel for cross-CBD trips are not using surface buses as an alternative. In other words, although surface travel times have improved in the CBD since tunnel closure, surface travel times are still slower than tunnel travel times and it is likely that some potential cross-CBD trips are not occurring because they take longer on the surface than they would in the tunnel.

Figure 6 compares spring 2007 ridership at University Street with the baseline spring 2005 loads. Average weekday loads increased by approximately 2.6 percent. However, the total load crossing the screenline during the peak hour from 4:30 to 5:30 pm decreased by about 13 percent. The decline in the peak period indicates that, as mentioned above, a significant number of commuter riders are catching their outbound buses after those coaches cross the screenline.

**Figure 6. Passenger Loads at University Street, before and after Tunnel Closure**

		Weekday Riders		Change	1-Hr PM Peak Riders		Change
Avenue	Dir	Spring 2005	Spring 2007		Spring 2005	Spring 2007	
First	N	9,861	10,708	+8.6%	757	790	+4.4%
	S	6,002	5,892	-1.8%	469	650	+38.6%
Second	S	14,794	15,859	+7.2%	2,465	1,544	-37.4%
Third	N	17,849	29,273	+64.0%	1,478	2,681	+81.4%
	S	17,239	26,056	+51.1%	1,883	2,892	+53.6%
Fourth	N	10,375	16,894	+62.8%	825	913	+10.7%
Fifth	S	3,046	4,730	+55.3%	155	257	+65.8%
Tunnel	N	12,991	N.A.		1,188	N.A.	
	S	14,495	N.A.		1,959	N.A.	
Total		106,651	109,411	+2.6%	11,179	9,727	-13.0%

Figure 7 compares spring 2007 data for standing loads at University Street with the baseline spring 2005 standing loads. The overall incidence of standing loads is at or below pre-tunnel closure levels, both during the entire weekday and during the peak 1-hr. Average weekday loads greater than seating capacity have increased in incidence on Second Avenue, as did the PM peak hour loads on First Avenue northbound. Spring 2007 data indicated one trip with an average load of more than 20 percent over seating capacity on First Avenue northbound during the PM peak hour. These statistics represent a small number of observations of a small number of trips, and are well below the level of concern.

**Figure 7. Loads over Seating Capacity at University Street, before and after Tunnel Closure**

Avenue		Average Loads Greater than Seat Capacity				Average Loads 20% over Seating Capacity			
		% of Weekday Trips		% of Peak 1-Hr Trips		% of Weekday Trips		% of Peak 1-Hr Trips	
		Spring 05	Spring 07	Spring 05	Spring 07	Spring 05	Spring 07	Spring 05	Spring 07
First	N	1.8%	1.5%	7.5%	8.1%	0.0%	0.4%	0.0%	2.7%
	S	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Second	S	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Third	N	1.2%	1.2%	1.5%	0.0%	0.2%	0.2%	0.0%	0.0%
	S	5.0%	1.6%	4.7%	2.8%	1.3%	0.1%	1.6%	0.0%
Fourth	N	0.5%	0.1%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%
Fifth	S	0.8%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%
Tunnel	N	0.4%	N.A.	0.0%	N.A.	0.0%	N.A.	0.0%	N.A.
	S	0.2%	N.A.	0.0%	N.A.	0.0%	N.A.	0.0%	N.A.
Total		1.3%	0.9%	1.4%	1.4%	0.3%	0.1%	0.2%	0.2%

Ridership crossing the University Street screenline is slightly higher than pre-closure levels. However, data from screenlines at the edges of the CBD indicate that loads leaving the CBD have increased substantially since spring 2005, from 90,800 to 105,700 riders each weekday, including loads on Community Transit and Pierce Transit-operated services. Similarly, loads entering the CBD increased from about 88,000 in spring 2005 to about 105,700 in spring 2007. With tunnel reopening, ridership crossing the University Street screenline may rise sharply as passengers take more cross-CBD trips, especially if the current higher speeds (and associated cross-CBD trips) on Third Avenue can also be maintained.

Standing loads have increased since spring 2005, although they are still a small fraction of outbound trips. Figure 8 compares the percent of trips with standing loads leaving downtown at various times of the day. The largest increase, not surprisingly, is in the PM peak, when 5.3 percent of trips leaving the Seattle CBD had standing loads, as compared to 3.4 percent of trips in spring 2005. This increase was spread across a number of routes, including ones not likely to be directly affected by tunnel closure, and is more likely related to the general rise in ridership over the past two years than to tunnel closure.

**Figure 8. Percent of Trips Leaving CBD Averaging Standing Loads, before and after Tunnel Closure.**

		AM Peak	Midday	PM Peak	Evening	Total
		6-9 AM	9AM-3 PM	3-7 PM	7-11 PM	
Standing Loads	Spring 2005	2.4%	2.7%	3.4%	0.3%	2.4%
	Spring 2007	3.3%	2.5%	5.3%	1.2%	3.6%
Over 120% Load	Spring 2005	0.0%	0.7%	0.5%	0.0%	0.4%
	Spring 2007	0.6%	0.4%	1.2%	0.0%	0.7%

## Measure 6: Transportation Demand Management Program

### Goals and Objectives

The Transportation Demand Management (TDM) program was designed to retain and increase users of alternative modes of transportation (transit, walking, bicycling, rideshare) during the Downtown Seattle Transit Tunnel closure period. Programs are targeted towards commuters working within the Seattle Central Business District (CBD) and the International District.\* A multi-pronged approach was undertaken to achieve this goal:

- Enhancement of programs and products to retain existing users
- Broadening the scope of programs and products to attract new users (individuals and small employers)
- Creating a supportive operating environment necessary to promote alternative modes of transportation
- Educational activities to promote the current programs and assist commuters in making travel decisions
- Incentive programs to reward commuters for trying alternative methods or committing to major changes

\* *Commuters must work within the following downtown boundary to participate: south of Stewart Street, north of Dearborn Street, west of I-5, and east of Elliot Bay.*

Primary activities that occurred in this reporting period included targeted outreach to both small and large employers on pre-tax transit pass purchase programs and Flexcar membership. There was also targeted outreach at major commercial buildings, employers, and point of sale outlets aimed to provide individuals with both the incentives and the knowledge to use current programs.

### Data Collection

Each TDM program is being monitored and tracked to determine its attractiveness and effectiveness. The data is being collected on a month-to-month basis and includes number of people served and number of people using a particular TDM option. As a way of measuring continued progress, the numbers from the third period are compared to the current program totals.

### Summary

The package of TDM programs introduced in support of tunnel closure has successfully expanded participation in commute options. Some highlights include:

- Over 6,700 individuals and 150 businesses have joined Flexcar since the beginning of tunnel closure mitigation efforts in August 2005.
- 151 individual Puget Pass holders signed up for the Home Free Guarantee (HFG) in the third period, bringing the total close to 700 since program initiation.
- Registration activity at Rideshare Online continues at an accelerated pace, with 368 new registrants this period and about 1,650 total registrations by downtown employees since DSTT closure.
- The number of merchants participating in the second edition of the Shop, Dine & Ride book increased to 144.

**Figure 9. Reporting Period Data (December 2006- May 2007)**

<b>Existing Programs with Enhancements</b>	<b># of New Participants</b> (December 2006- May 2007)	<b>Current Total</b> (since initiation of TDM program in Aug 2005)
Puget Pass Consignment		
# of Accounts	9	60
# of Passes	913	5,302
FlexPass*		
# of Contracts	26	220
# of Passes	781	11,703
Rideshare (Carpool, Vanpool, VanShare)		
# of VanPools and VanShares	0	51
# of VanPool Users*** (riders)	76	165
Rideshare Online		
# of Registrants	368	1654
Flexcar		
# of Business Contracts	69	220
# of Individual Contracts	4,049	10,823
<b>New Programs to Increase and Retain Users of Alternative Travel Modes</b>	<b># of New Participants</b> (December 2006- May 2007)	<b>Current Total</b> (since imitation of TDM program in Aug 2005)
Home Free Guarantee (HFG) for Individuals		
# of Accounts	151	692
# of Rides (usage)	12 individual and 14 company	16
Plan Your Commute		
# of Participants	103	1476
# of Free Ride Tickets Distributed	480	22,440
% of Tickets Redeemed	+5%	48%
Telecommuting		
# of Workshops	0	
% of companies that allow telework	+3%	25%
<b>New Programs to Support the Operating Environment of Alternative Modes</b>	<b># of New Participants</b> (December 2006- May 2007)	<b>Total</b> (since imitation of TDM program in Aug 2005)
Bicycling		
# of 3-hour Workshop Participants	N/A^^	77^^
Shop Dine & Ride		
# of Retail Participants	8	144

^^ - Numbers were not provided for the current reporting period. Total numbers reflect activity through May 2006.

\* - FlexPass and FlexPass + CT added together

\*\* - Rideshare totals (accounts and users) from STAR Carpools, Metro Vanpools, Community Transit Vanpools, other Vanpools, and Metro VanShare. Carpools do not include City of Seattle registrations.

\*\*\* - Estimates based on 7 riders per Community Transit vanpool

## Program Notes

### Puget Pass Consignment

There were two new Puget Pass Home Free Guarantee (HFG) consignment accounts created in the past six months. With 26 total rides taken during the fourth period, (HFG) usage was slightly more than the third period total of 9. Considering that the number of consignment pass holders totals more than 5,000, the usage represents less than 1% of total pass holders. This is well within the normal usage rates for the overall HFG program.

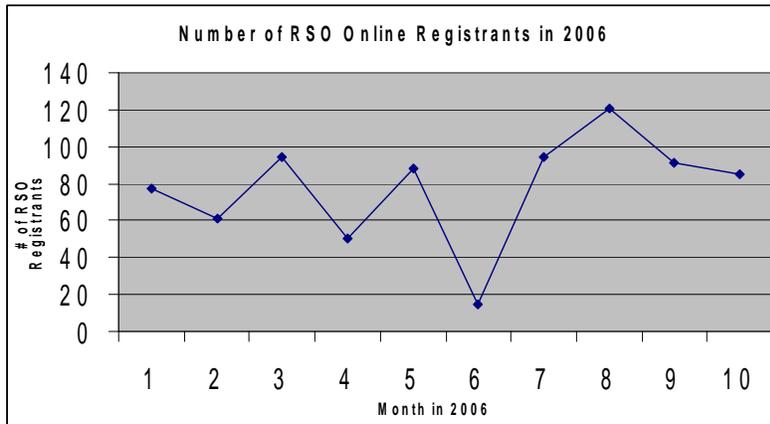
### FlexPass

The number of Area FlexPass agreements continues to increase. After 26 new accounts in this fourth quarter, there are currently 220 total FlexPass contracts .

### Rideshare

There are 76 new VanPool users since January 2007. Meanwhile, Rideshare Online has seen a significant increase in online registration, with 368 new registrants in the past six months.

**Figure 10. Number of RSO Online Registrants in 2006**



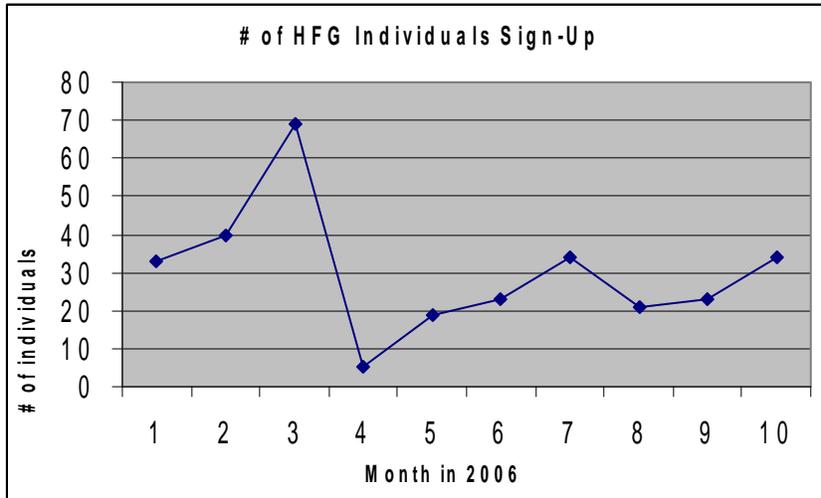
### Flexcar

FlexCar numbers have increased dramatically. In the past six months, 34 new businesses and 1,919 individuals have joined Flexcar.

**Home Free Guarantee (HFG) for Individuals**

Monthly Puget Pass holders who work in downtown are eligible for Metro’s HFG program at no cost. An additional 135 downtown Seattle commuters have signed up for the benefit in the past six months.

**Figure 11. Number of HFG Individuals Sign-Up**



**Plan Your Commute (PYC)**

The Plan Your Commute sessions were offered every Wednesday at the Transportation Connection until mid-March 2006, when regular sessions were discontinued to allow for preparation for activities surrounding the tunnel re-opening. There are plans for a regular, rotating PYC session every weekday during the weeks before and after tunnel re-opening.

Throughout the spring and summer, PYC is accompanying other outreach efforts at targeted transportation fairs and other events. Since June 2006, 103 participants have learned about commute options from personal rider information officers at these mobile Plan Your Commute stations. Along with the information, over 480 King County Metro free ride tickets were distributed, with a redemption rate of between 29-47% each month.

**Shopper Incentives**

One hundred forty-four retail service providers participated in the third phase of the Shop, Dine and Ride program, an increase of eight businesses from the last printing. The program encourages commuters and shoppers to continue to visit downtown Seattle throughout the tunnel closure period. 40,000 guides were printed this time.