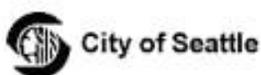


# Performance Report on Surface Streets in the Seattle Central Business District Volume 7: Sixth Update – Tunnel Re-Opening February 29, 2008



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 Volume 7 report, and all of the previous Volumes 1 through 6 of this report, were developed to provide the documentation required 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. With the release of Volume 7, the *Performance Report on Surface Streets in the Seattle Central Business District* is complete and the requirement of Section 10.3 have been satisfied.

The applicable 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 re-opened, 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 was 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. The reported measures were: 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 included 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.

The Volume 6 report updated three of the six performance measures. These included 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 Volume 7 Report is the last installment of the “Performance Report on Surface Street in the Seattle Central Business District.” It includes updates on all six of the performance measures following the re-opening of the downtown tunnel in September 24, 2007. Transit travel times and bus volumes were derived from fall 2007 data.

Figure 1 summarizes the tunnel status, contents and release dates for all seven volumes of this Report.

**Figure 1. Performance Report Release Dates**

Tunnel Status	Performance Report Release Dates						
	Open	Closed	Closed	Closed	Closed	Closed	Open
Performance Measure Updates	Complete	Complete	Complete	Complete	Complete	Complete	Complete
	Sept 05	Jan 06	March 06	Aug 06	Jan 07	Jul 07	Feb 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	⊙	⊙		⊙	⊙	⊙	⊙

## **Executive Summary on Tunnel Re-Opening, September 2007**

Volume 7 of this Report summarizes the tunnel re-opening experience in the Seattle Central Business District after September 24, 2007

There are results for all six of the evaluation programs that compose the evaluation effort. Key highlights from each of the six monitoring programs 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 October 1, 2007 to November 9, 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, the five sets of post tunnel data available from Volumes 2 through 6, and now Volume 7 after tunnel re-opening.

A review of the travel time indexes in conjunction with corridor specific travel time data, starting with the pre-tunnel closure baseline, through tunnel closure and concluding with tunnel reopening, yields the following observations:

- Transit improvements reduced surface travel times by roughly one fourth, while accommodating more than 100 additional trips per hour that were displaced from the tunnel.
- Third Avenue peak period restrictions improved travel time on that corridor by one to two minutes depending on time of day, while accommodating almost 100 additional trips per hour
- A seasonal trend appears to exist where fall travel times are slower than spring and summer travel times.
- Maintaining the surface transit improvements in conjunction with the re-opening of the tunnel appears to have offset most of the fall seasonal increase in surface travel time, while improving Second Avenue travel times by more than one and a half minutes in the critical PM Peak.

### General Purpose Traffic Operations

The City measured downtown traffic conditions before tunnel closure, during tunnel closure and after tunnel re-opening to assess the impacts of tunnel closure on general purpose traffic operations.

Traffic data were collected in January 2005 (before tunnel closure), October 2005 and May 2006 (during tunnel closure), and October/November 2007 (after tunnel re-opening). A summary of the key findings pertaining to general purpose traffic operations are provided below, primarily by comparisons between the survey conducted after tunnel re-opening with prior surveys.

During the AM peak period, the following conditions were observed:

- Travel times on northbound and southbound First Avenue and eastbound Spring Street increased after tunnel re-opening.
- Travel times on eastbound Olive Way, which decreased substantially after tunnel closure, continue to increase and are now approaching pre-tunnel closure levels.
- Travel times decreased after tunnel re-opening on northbound Fourth Avenue, southbound Fifth Avenue, westbound Stewart Street, and eastbound Cherry Street.

During the mid-day or off-peak period, the following conditions were observed:

- Travel times increased on northbound Fourth Avenue and southbound Fifth Avenue.
- Travel times on most other corridors have decreased or have remained at or near pre-tunnel closure levels.

During the PM peak period, the following conditions were observed:

- Travel times increased substantially on northbound Fourth Avenue between Royal Brougham Way and South Washington Street, and between James Street and Olive Way.
- Travel times increased substantially on eastbound Spring Street. The City recently adjusted parking restrictions on Spring Street to address traffic backups observed on this corridor. However, travel time observations were limited to one or two days per corridor. These results may reflect specific conditions that occurred on those days only.
- Travel times on southbound Second Avenue remained well below pre-tunnel closure levels, and travel times decreased substantially on eastbound Cherry Street.

#### Transit Ridership and Bus 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 established as a screenline. The total volume of riders crossing this screenline, regardless of origin or destination, was measured for pre-closure baseline conditions, and for post-closure conditions. It was also been measured for tunnel re-opening conditions in 2007.

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 in spring 2007, just before tunnel re-opening was almost three percent higher than spring 2005, at 109,400 weekday riders. Preliminary data for fall 2007 suggest that loads crossing University Street after tunnel re-opening rose to over 115,000 weekday riders as of October and November. This increase was expected, since tunnel re-opening meant travel times across the CBD have decreased, encouraging more ride free area trips.

Average weekday loads increased by approximately 5 percent after tunnel re-opening, and were 8 percent higher than in spring 2005. Loads crossing the screenline in the tunnel in both directions increased by about 5 percent. The total load crossing the screenline during the peak hour from 4:30 to 5:30 PM increased by about 22 percent after tunnel re-opening, when compared to spring 2007, bearing out predictions of a latent demand for cross-CBD trips that had been suppressed by tunnel closure.

Since tunnel re-opening was accompanied by the reassignment of additional routes to Third Avenue, as well as the assignment of routes into the tunnel, all of the avenues except Third saw significant decreases in the amount of load crossing the screenline.

With regard to bus volumes, the re-opening of the tunnel was accompanied not only by the reassignment of routes back to the tunnel but also by the reassignment of routes on surface streets in order to continue to fully utilize the capacity on Third Avenue made possible by the retention of the peak hour traffic restrictions and skip stop operation that was implemented during tunnel closure. In comparing bus volumes by street segment for before and after tunnel re-opening, bus volumes were shifted primarily from Second and Fourth Avenues onto Third Avenue. Bus volumes on Second Avenue were reduced by approximately 26%; bus volumes on Fourth Avenue were reduced by approximately 20%.

#### Pedestrian Activity at Bus Zones

Conditions for walking pedestrians were relatively consistent across all survey periods for the eight bus zones included in the fall 2007 survey. Overall, the level of service for walking pedestrians appears to be relatively unaffected by either the closure or the re-opening of the Third Avenue transit tunnel. Level of service is more affected by localized changes related to the available sidewalk space.

For waiting pedestrians, most of the eight bus zones included in the fall 2007 survey are operating under “Desirable” conditions at LOS A. However, three of the locations have degraded slightly over conditions that were observed before and during tunnel closure, as described below:

- Zone 860 (NB 5th Ave & James St): This bus zone continues to be the most crowded of the study locations during the PM peak. The number standing pedestrians in the critical loading zone has increased over the previous study; however, the number is not as high as conditions just after tunnel closure (fall 2005). This zone also has the narrowest sidewalk of all of the study zones, which contributes to its high level of crowding.
- Zones 431 and 578 (NB and SB 3rd Ave & Pike St): These bus zones operated at LOS A and “Constrained” conditions during the fall 2007 study, which is slightly degraded from the conditions during tunnel closure. This is likely due to the addition of several high-ridership routes to Third Avenue during the tunnel re-opening. In addition, the overall increases in Metro ridership between 2005 and 2007 have likely increased the usage of these bus stops.

Even with the bus zones operating at a lower level of service or rank than previous surveys, all of the bus zones operated at or above LOS C and at or above “Constrained” conditions in the fall 2007 survey, which are deemed to be acceptable levels of service for waiting pedestrians in an urban environment.

#### Seattle Central Business District Customer Surveys

The tunnel re-opening does not appear to have significantly affected travel to and within downtown Seattle. Most respondents are coming downtown about as often as they did a year ago and those who ride the bus are either satisfied with how the tunnel opening has affected their downtown travel or they do not have an opinion one way or the other.

While many items in the survey did not change significantly from 2006 to 2007 a pattern of decline in satisfaction with respect to feeling comfortable and safe downtown was noted. Respondents have noticed more crowding of late, and while they are still satisfied with their personal security and safety in downtown, significantly fewer respondents feel “very satisfied” than in the past. The survey instrument does not allow any conclusions to be drawn about the reasons for this change.

For those who travel downtown by car, lack of parking and cost continue to detract from their overall downtown experience.

While bus riders get a great deal of information from transit agencies, it is much more difficult to attract the attention of car travelers as evidenced by the fact that 65% of those who only travel to downtown Seattle by car did not see any information about the tunnel after it opened on September 24.

### Transportation Demand Management Programs

The package of Transportation Demand Management (TDM) programs introduced in support of tunnel closure has successfully expanded participation in commute options. Some highlights from this program include:

- Over 650 individuals received transit information at Plan Your Commute tables this period. Of the 571 people who pledged to reduce their drive alone trips, nearly 350 of them reported completing their pledge, eliminating an estimated 14,000 vehicle miles of travel (VMT).
- 7,000 individuals and 70 businesses joined Flexcar (renamed Zipcar) in the last period of tunnel closure mitigation efforts.
- 89 individual Puget Pass holders signed up for the Home Free Guarantee (HFG) in the third period, bringing the total to over 750 since program initiation.
- Registration activity at Rideshare Online continues at an accelerated pace, with 612 new registrants this period and about 2,270 total registrations by downtown employees since DSTT closure.
- The number of merchants participating in the current edition of the *Shop, Dine & Ride* book remains at 144.
- Some TDM efforts will be continuing through 2008, including Home Free Guarantee for individuals buying Metro passes and telework support for new programs. In addition, a new effort has been initiated to enhance bicycle commuting, specifically by improving bike/bus connections.

## Transit Service Plan for Tunnel Re-Opening

The retrofitted Downtown Seattle Transit Tunnel re-opened for bus service in September 2007. Although only buses will operate in the tunnel until Link Light Rail (LRT) start-up in 2009, bus service in the re-opened tunnel will operate under joint bus/LRT operating rules. The rules for joint bus/LRT operation limits the peak number of buses per hour, per direction to sixty. Prior to tunnel closure, tunnel bus volumes per hour were 6% to 10% higher depending, on the direction and time of day.

In determining what routes would be assigned to use the tunnel and what routes would remain on surface streets, the following objectives were used to guide the design the tunnel re-opening service plan:

### Primary Objectives

- Maximize use of the tunnel up to the allowable limit of 60/peak hour/direction; balance the northbound/southbound bus volumes and use the tunnels capacity throughout the day.
- Assign routes to the tunnel that make the best use of 60 passenger hybrid tunnel buses.
- Tunnel assignments should maintain a geographic balance.
- Make best use of the continued transit priority measures along Third Avenue.
- Maintain balanced bus volumes between skip stop zones on Second, Third, and Fourth Avenues.
- Minimize the need for future downtown Seattle changes with Link, RapidRide, Alaskan Way Viaduct replacement and other major projects.

### Secondary Objectives

- Group tunnel routes to provide combined service to common destinations.
- Routes should have good access to/from tunnel portals at Convention Place Station & the busway/Royal Brougham.
- Return former tunnel routes as appropriate given these objectives
- Provide access to/from downtown Seattle that is direct and as fast as possible, minimizing the need for additional running time.

Although there are fewer routes that were returned to the tunnel in September, 2007 - 18 routes versus the 21 routes that operated in the tunnel before the 2005 closure - the number of daily bus trips remains close to pre-closure levels. About 1,075 daily trips now operate through the tunnel after re-opening in September 2007 compared to 1,105 trips in 2005. There is also better utilization of tunnel midday as more all day services was assigned to the tunnel in order to take advantage of the speed and reliability that tunnel operation affords. Midday bus trips increases by 13% over 2005 tunnel operation.

### Route Assignments

A summary of the key elements of the September 2007 service change are provided below:

#### Routes Assigned to the Tunnel:

##### *Former all-day Tunnel routes:*

- 41, 71, 72, 73, 101, 106, 150, 194, 255, 550

##### *Former peak-only Tunnel routes:*

- 212, 225, 229, 256, 301

Routes new to the Tunnel:

- 174 (all-day)
- 74E (peak-only)
- 217 (AM peak only)

Third Avenue Route Assignments – By Avenue & Direction

Moving From 2nd Avenue – Southbound:

- 2E, 17/23, 35, 113, 116-118-119, 120, 121-122, 123, 125

Moving From 5th Avenue – Southbound:

- 5/54-55, 16, 66, 358

Moving From 1st Avenue – Northbound:

- 5/54-55, 21E, 56E, 120

Moving From 4th Avenue – Northbound:

- 17/23, 35, 116/118/119, 123

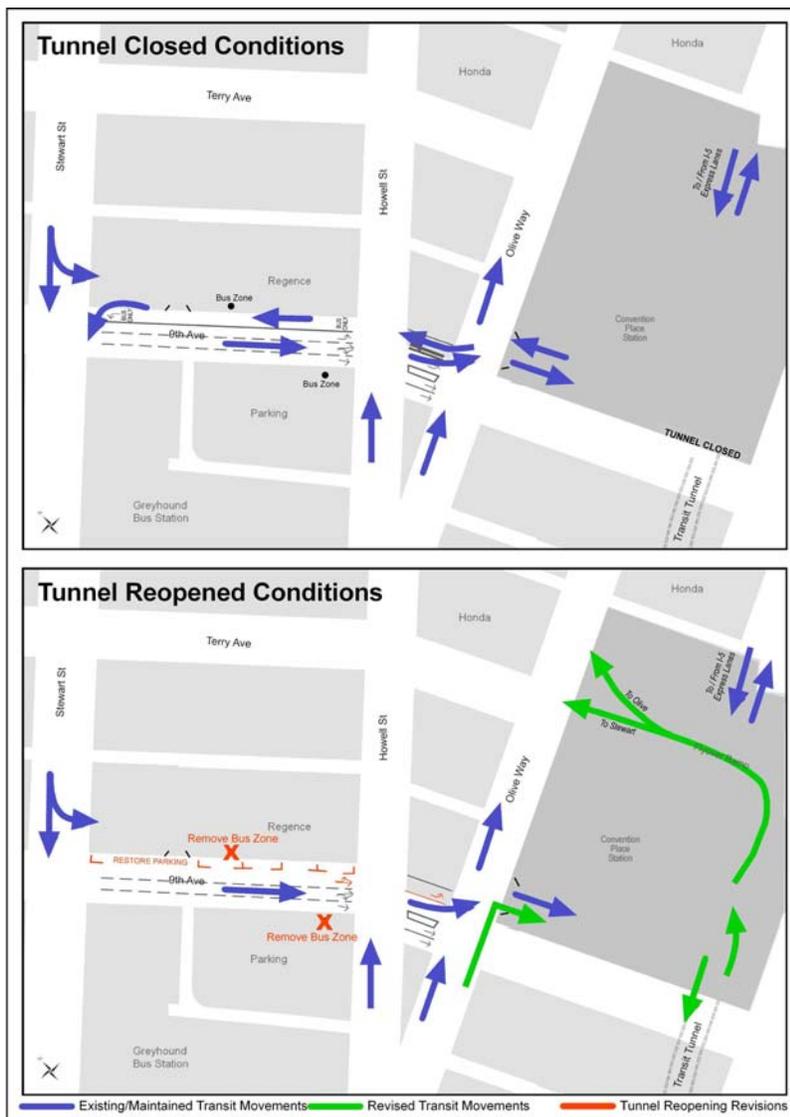
Former peak-only Tunnel routes Remaining on Surface Streets

- 177, 190, 196, & 266 – on 2nd & 4th Avenues
- 306 & 312 – on 2nd & 3rd Avenues

## Ninth Avenue Contraflow Lane

As part of the three party Agreement between the City of Seattle, King County and Sound Transit regarding the Design, Construction, Operation and Maintenance of the Downtown Transit Tunnel, the parties agreed to implement five primary mitigation projects to enhance transit operations on surface streets. The parties agreed to maintain these improvements from the closure of the tunnel for rail retrofit until one year after the initiation of rail service in the tunnel. However, the Agreement did provide a mechanism for the parties to remove a primary mitigation project at an earlier date if it was determined that it would no longer be needed. This was the case with the Ninth Avenue Contra Flow lane for transit. To support tunnel closure, a contra flow lane for transit was created on Ninth Avenue between Olive Way and Stewart. This was needed because buses could not exit the Convention Place staging area during tunnel closure using the normal routing. With the re-opening of the tunnel for bus operation, the Ninth Avenue contra flow lane was no longer needed so Ninth Avenue was restored to a one way southbound street and the on street parking that was previously removed has been restored. See Figure 2 for details on the channelization of this street during and after tunnel closure.

**Figure 2. Ninth Avenue Contraflow Lane Removal**



## Customer Outreach for September 2007 Service Change

The September 2007 service change, in conjunction with re-opening of the Downtown Seattle Transit Tunnel, required an intensive effort to inform customers about all the changes in routing and stop assignments. Key statistics that illustrate the magnitude of the outreach effort that was mounted are provided below:

- Metro distributed 75,000 copies of a special Rider Alert Brochure on buses and transit information racks and through Street Teams in downtown Seattle. For a typical service change in February or June, Metro published 25,000 special Rider Alert brochures. The September 2007 brochure included several maps showing all the downtown boarding locations, a route-by-route description of the September changes, a list of boarding locations when the tunnel is closed, and a list of changes along First, Second, Third, Fourth and Fifth avenues.
- After the service change, Metro published 50,000 copies of brochure titled “Welcome Aboard in Downtown Seattle and the Transit Tunnel“ that provides a map and guide to help customers get around downtown using the tunnel and service on the street.
- Metro also published 50,000 copies of its annual System Map and Rider’s Guide, which includes a map showing downtown bus service and entrances to the tunnel.
- Metro produced 70 different bus stop Rider Alerts telling customers about bus routes moving either to the tunnel or to Third Avenue. Staff posted the alerts at more than 200 locations in downtown Seattle about two weeks before the service change.
- 2,500 posters were installed in all Metro buses.
- Daily announcements were made over the bus intercom systems in the days leading up to the service change.
- Commute planning sessions were made available at numerous sites throughout downtown Seattle.
- Metro staff from the Rider Information section staffed a satellite site at the former Westlake Tunnel station information kiosk; this temporary office provided directions and transit information to over 500 customers per day.
- A public event at Westlake Park was staged to celebrate the re-opening of the tunnel, to provide transit information and to encourage riders to visit local businesses along the tunnel route.

In addition, nearly 250 employees from the King County Department of Transportation and Sound Transit put in more than 1,000 hours as members of Street Teams in downtown Seattle. The street teaming effort included 454 separate shifts at 54 locations throughout downtown. Street teamers were on the streets morning to night Wednesday through Saturday, September 19-22, and again on Monday, September 24. The street teams handed out information about bus route changes and new timetables, and they answered many questions from customers, such as where to go to enter a tunnel station. Each team member was identified with a vest and cap in Metro colors and the new King County logo.