



## Draft Technical Memorandum

Date: August 5, 2010  
To: Bill Bryant, SDOT  
From: Randy Hammond, HNTB Corporation  
Subject: Transit Corridor Improvement Project  
NW Market/45th Street  
Agreement No. T09-06  
**NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE**  
**Traffic Diversion Impacts Mitigation**

### EXECUTIVE SUMMARY

A traffic technical analysis was conducted for the intersection of NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection in Seattle's University District. This intersection would experience increases in northbound left-turn demand associated with transit priority treatment at the NE 45<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection. The safety performance at this location also was reviewed to estimate the potential for accident reductions with a revised signal operation. The incremental shift in volume does not warrant revisions in the channelization or signal operation at the NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection. No changes are deemed necessary for implementation of the proposed transit priority treatment.

### INTRODUCTION

During the course of the recent SDOT Transit Priority studies, the signalized intersection at NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE was included in an evaluation of traffic impacts resulting from several transit priority strategies. The primary impacts were related to traffic diversions associated with various left-turn prohibitions that were under consideration. A general prohibition of all left turns along NE 45<sup>th</sup> Street between Roosevelt Way NE and University Way NE would have shifted turning traffic to adjacent streets, including NE 50<sup>th</sup> Street. This strategy is currently being reviewed by neighborhood and community groups.

Another transit priority strategy studied was conversion of the northbound left-turn lane at the NE 45<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection to a bus-only movement during weekday PM peak periods. Northbound general purpose traffic turning left onto NE 45<sup>th</sup> Street would be directed to other parallel routes, including NE 42<sup>nd</sup> Street, NE 43<sup>rd</sup> Street, NE 47<sup>th</sup> Street, and NE 50<sup>th</sup> Street during this period. NE 50<sup>th</sup> Street became the focus of the diversion impact analysis, because it crosses the I-5 freeway and provides access to I-5 ramps.

### TRAFFIC OPERATIONS

NE 50<sup>th</sup> Street currently consists of four east-west travel lanes at 15<sup>th</sup> Avenue NE. On 15<sup>th</sup> Avenue NE, four north-south lanes are provided, with the curb lanes used for on-street parking. Parking is prohibited southbound during the morning and northbound during the evening peak period in the vicinity of NE 50<sup>th</sup> Street. No left-turn lanes or left-turn signal phases are provided in the two-phase signal operation. Existing PM peak hour level of service at this location is LOS B with about 12.7 seconds of average delay per vehicle.

At the NE 45<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection, approximately 130 vehicles use the northbound left-turn lane during the PM peak hour; 20 of these vehicles are buses. The traffic diversion associated with the PM peak turn prohibition at NE 45<sup>th</sup> Street would be about 110 vehicles per hour (vph). One-sixth of the diverted traffic (18 vph) would use NE 42<sup>nd</sup> Street, resulting in an eight-percent increase in total volume between University Way NE and 15<sup>th</sup> Avenue NE. One-third of the diverted traffic (37 vph) would use NE 43<sup>rd</sup> Street, increasing total traffic volumes by 11-percent. One-sixth of the diverted traffic would also use NE 47<sup>th</sup> Street, increasing total traffic volumes by five-percent. The remaining one-third of the diverted traffic (37 vph) would reach NE 50<sup>th</sup> Street, causing a three-percent increase in the total volume on NE 50<sup>th</sup> Street west of 15<sup>th</sup> Avenue NE. Figure 1 shows the traffic diversion due to the PM peak hour transit-only restriction of the northbound left-turn at the NE 45<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection.

With the addition of the diverted traffic, LOS B would still be maintained at the NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection, with average delays of about 13.6 seconds per vehicle. Other scenarios that included more diversion volume also operated at LOS B during the PM peak hour.

The northbound left-turn volume at the NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection would increase about 40 vph during the PM peak period when diversions are distributed among several routes. Total northbound left-turn volume at this intersection would reach about 160 vph, representing an increase of about 30 percent over the existing volume. The added diversion volume does not warrant a dedicated left-turn lane or a separate signal phase for northbound left-turn traffic. Southbound opposing volumes are light during the PM peak period, and the northbound left turn would operate at LOS B. The existing north-south channelization does not require modification to accommodate the added diversion traffic.

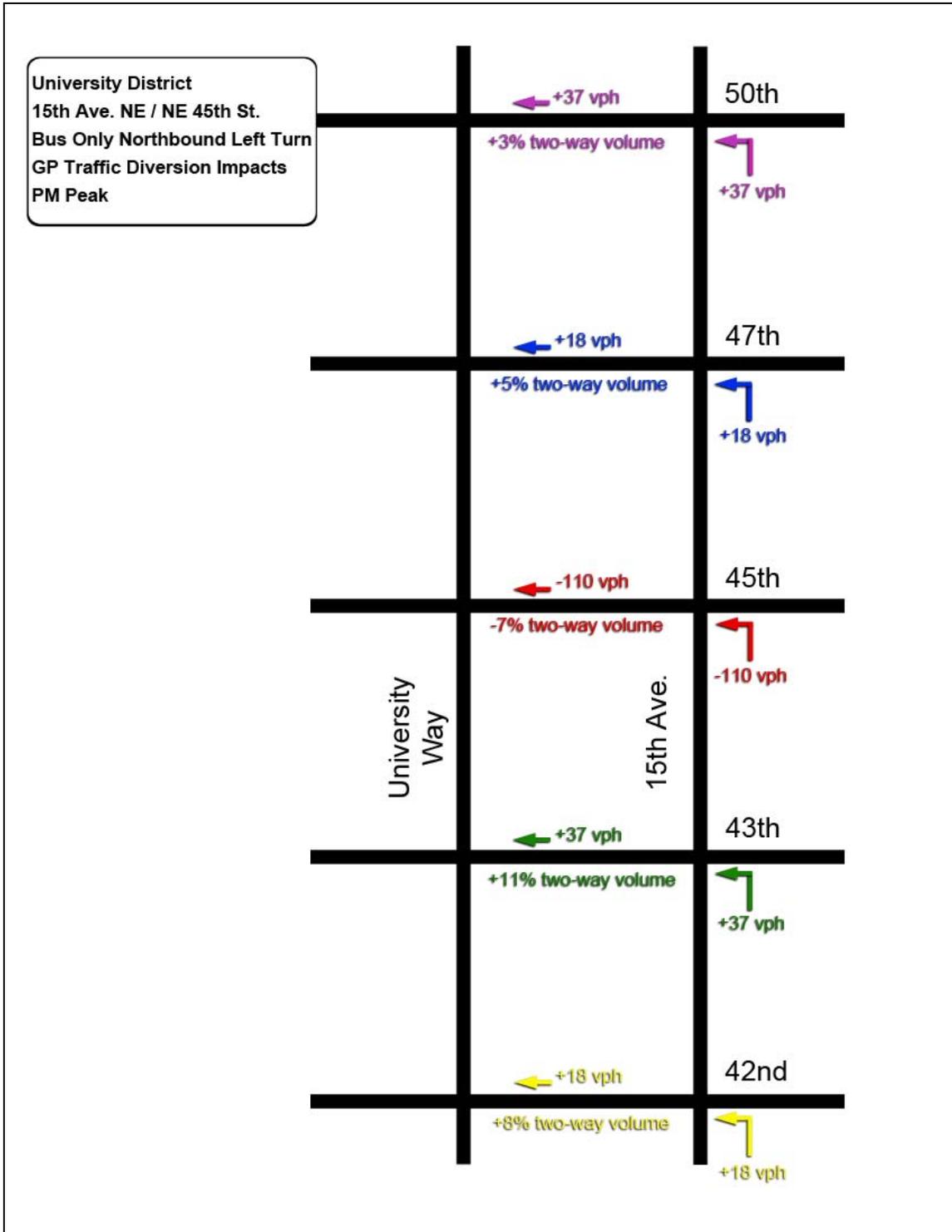
## **COLLISION ANALYSIS**

Previous studies have documented the accident experience at the NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection (UATAS, 2008). Between 2001 and 2010, 60 collisions were reported, including 22 left-turn crashes with nine left-turn injury crashes. A portion of these crashes may be attributable to the crest vertical curve in the east-west directions of travel, which provides limited sight distance. Protected left-turn signal phases for east-west travel were suggested as mitigation, but volumes do not warrant this treatment, and dedication of lanes for left turns would diminish capacity for east-west through movements.

A split-phase signal operation could be used to reduce the conflicts for east-west turns. Intersection operations analysis reveals that split-phase operation would result in LOS C with about 33 seconds of delay per vehicle. Although delays would increase somewhat with the split-phase control, LOS C represents an acceptable condition for peak hour operations in an urban area.

## **RECOMMENDATION**

These analyses indicate that no changes would be warranted to the existing signal operation with the proposed northbound left-turn prohibition at the NE 45<sup>th</sup> St/15<sup>th</sup> Avenue NE intersection. The benefits associated with collision reduction do not appear to justify revised signal control for east-west movements along NE 50<sup>th</sup> St. There is sufficient capacity to serve the added demand that may divert to the NE 50<sup>th</sup> Street/15<sup>th</sup> Avenue NE intersection without requiring modifications of existing channelization or signalization.



**Figure 1**  
 NE 45<sup>th</sup> Street/15<sup>th</sup> Avenue NE NB Left-Turn Re-routing