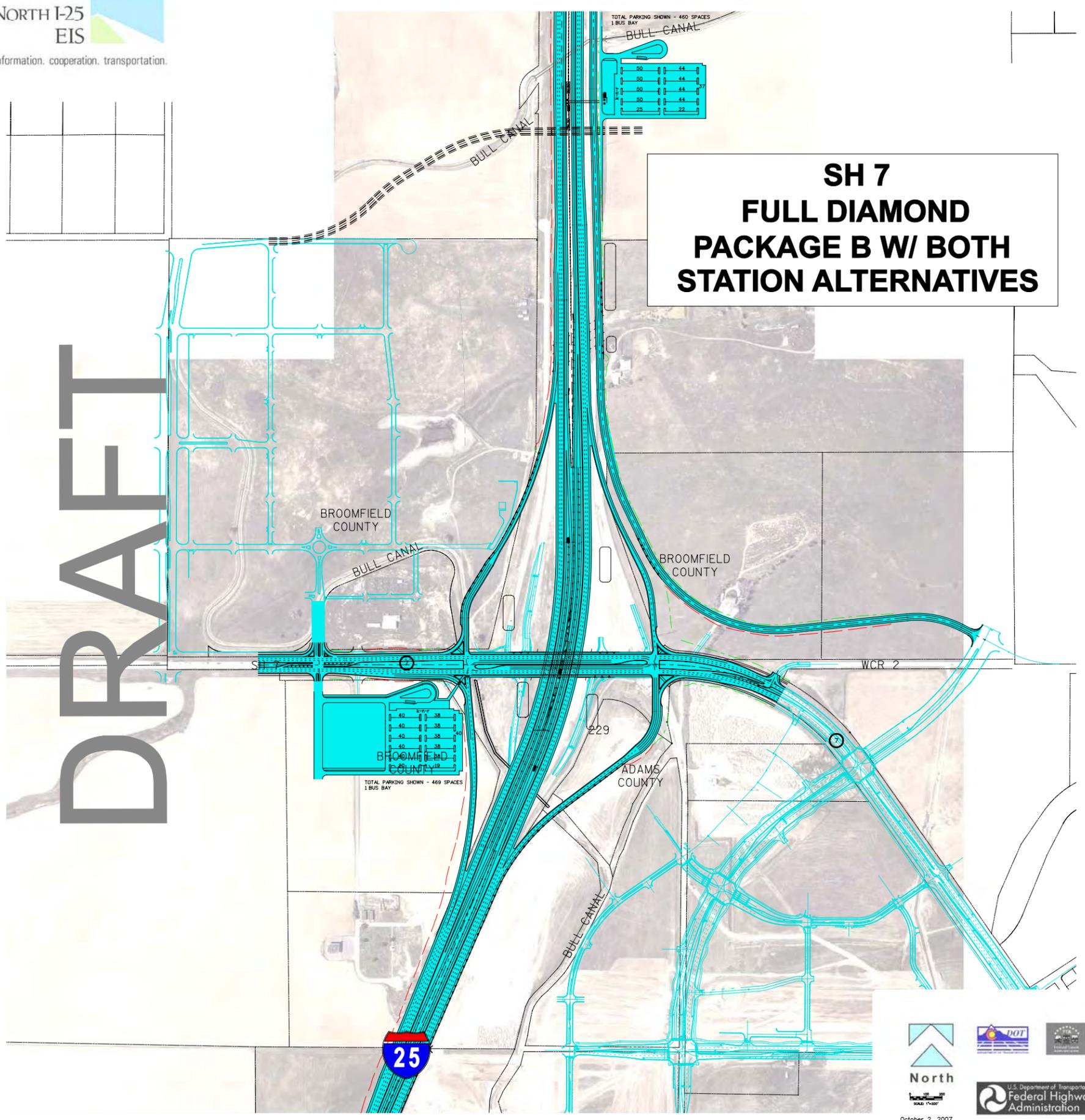





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**SH 7  
FULL DIAMOND  
PACKAGE B W/ BOTH  
STATION ALTERNATIVES**





North

SCALE: 1"=200'






October 2, 2007

D:\A\2507\GIS\Map\_Series\Map\_Series\_B\Map\_Series\_B\_SHP - Page 8.SHP

# SH 7 at I-25 DEIS Interchange Evaluation

August 20, 2007

## Introduction

This report describes the existing traffic volumes at this interchange and the adjacent intersections, as well as future traffic conditions with an improved interchange. It should be noted existing conditions refers to conditions in 2004 when traffic data was collected at the SH 7 interchange. Since the collection of traffic data, a major retail development opened in the southeast quadrant, SH 7 has been widening east of the interchange, the Washington Street intersection has been relocated and lanes have been added to the interchange. Therefore, these changes will not be evaluated in the existing conditions analysis but will be evaluated in the No Action scenario.

## Existing Conditions

The interchange of SH 7 with I-25 (milepost 240) was reconstructed in 1987. This interchange connects I-25 to northern Broomfield areas, Lafayette and Boulder to the west and to northern Thornton areas and Brighton to the east. It has a diamond configuration and its bridge over I-25 is 84 feet wide but only 36 feet of the bridge deck is currently used for travel lanes (one lane in each direction with a center left-turn lane). All interchange ramps are one-lane and each ramp terminal has exclusive left and right-turn lanes. Both ramp terminals are controlled by traffic signals.

The interchange area includes the following roadways:

**SH 7.** SH 7 is a two-lane facility that serves rural land both east and west of the interchange. The land at the SH 7 interchange is undeveloped but the Larkridge shopping center is under construction in the southeast quadrant and the City of Broomfield has approved a large mixed use development in the northwest quadrant. The speed limit in the vicinity of the interchange is 45 mph.

**Washington Street / East Frontage Road.** Washington Street at SH 7 consists of one-lane in each direction. North of SH 7, the frontage road connects to WCR 8 and south of SH 7 Washington Street becomes a major arterial traveling through the City of Thornton.

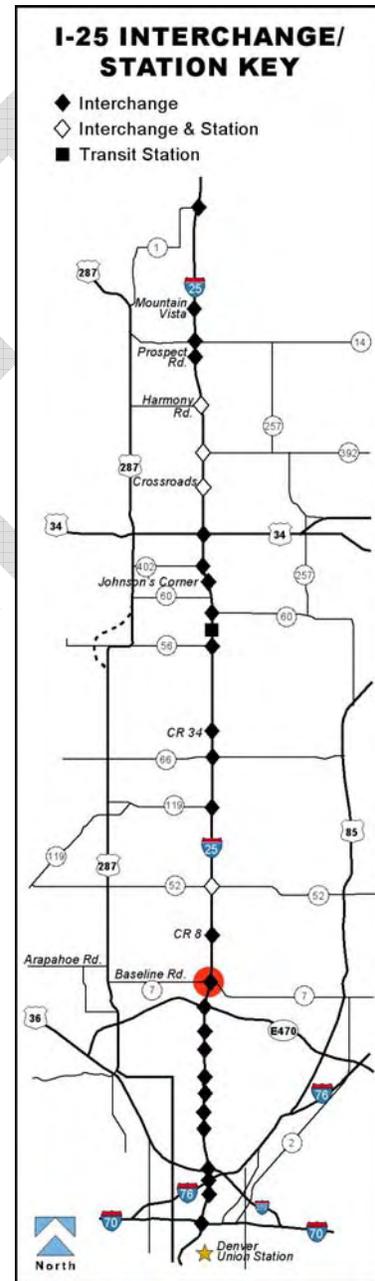


Figure 1. Vicinity Map

# SH 7 at I-25 DEIS Interchange Evaluation

Figure 2 shows the existing traffic counts collected in August 2004 at the SH 7 interchange. The counts show that traffic volumes are slightly higher to the west of the interchange and range between 16,000 and 20,000 vehicles per day. Daily ramp volumes range between 4,100 and 8,300 vehicles per day, with the higher ramp volumes on the southern-oriented ramps. At the interchange, peak hour turn movements are generally over 150 vehicles per hour, and are oriented to and from the Denver metro area. The highest peak hour volumes occur for the northbound to westbound movements and the eastbound to southbound at over 350 vehicles in the AM peak and 420 vehicles in the PM peak.

## Traffic Operations

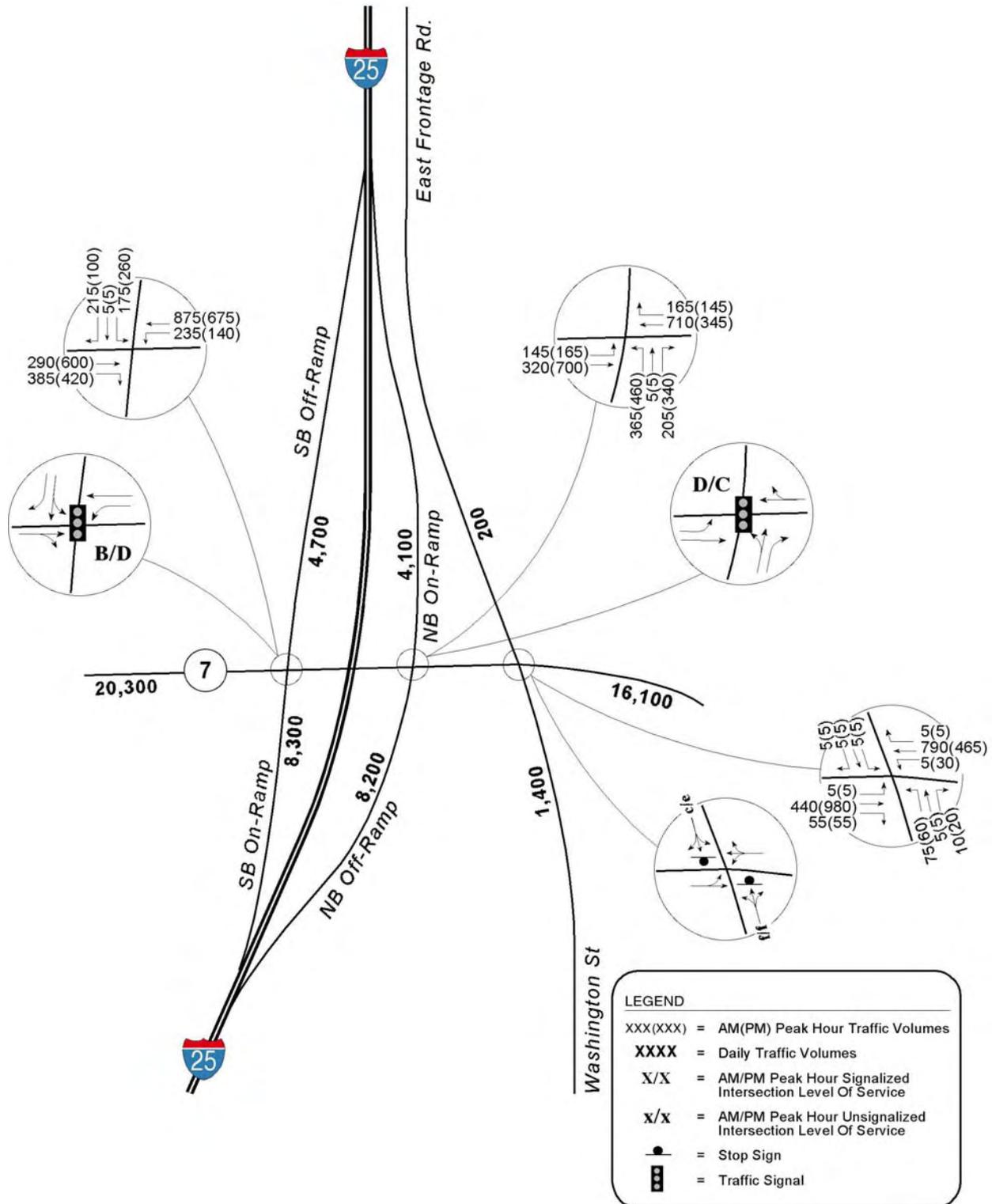
An operational analysis of the interchange was conducted based on methodology developed in the Highway Capacity Manual (Transportation Research Board, 2000). The result of such analysis is a level of service (LOS) rating. Level of service is a qualitative assessment of the traffic flow based on the average stopped delay per vehicles at intersections.

Levels of service are described by a letter designation ranging from “A” to “F”, with LOS A representing essentially uninterrupted flow, and LOS F representing a breakdown of traffic flow with excessive congestion and delay. Signalized intersection analyses result in a level of service rating for each movement and for the entire intersection but typically only the level of service for the entire intersection is reported. For unsignalized intersections a level of service rating is determined for each turn movement that must yield to another turn movement but an overall level of service rating is not determined for the entire intersection. The following table shows how average stopped delay at controlled intersections equates to levels of service.

**Table 1. Equivalent Level of Service to Average Stopped Delay**

Level of Service	Average Delay at Signalized Intersections in (sec./veh.)	Average Delay at Stop-Controlled intersections in (sec./veh.)
A	0 to <=10	0 to <=10
B	> 10 to <= 20	> 10 to <= 15
C	> 20 to <= 35	> 15 to <= 25
D	> 35 to <= 55	> 25 to <= 35
E	> 55 to <= 80	> 35 to <= 50
F	> 80	> 50

# SH 7 at I-25 DEIS Interchange Evaluation



**Figure 2. Existing Conditions**

# SH 7 at I-25 DEIS Interchange Evaluation

Figure 2 also illustrates existing peak period levels of service at the ramp terminals and adjacent intersections. Currently, both ramp terminals with traffic signal control operate at LOS D or better during the peak hours. At the Washington Street intersection, which operates with stop-sign control, turn movements from Washington Street operate at LOS F during both peak hours and turn movements from the frontage road operate at LOS C in the AM peak and LOS E in the PM Peak.

Table 2 provides additional information for key movements at each intersection to provide further insight into existing operations at the interchange. Key movements are those movements that could have an impact on adjacent intersections or an impact to I-25. For example, east-west movements along SH 7 can queue into adjacent intersections and impede traffic flow at those locations, while vehicles on the ramps could queue back onto the interstate. North-south movements at the west and east frontage road intersections have not been included in the table because they would not impede traffic flow on SH 7 Road. As shown in the table, only the eastbound through/right movement shows a LOS F condition in a peak hour, while most turn movements currently operate at a LOS D or better. The queuing analysis shows some long queues, especially for the eastbound through/right movement and the left-turn movement from the northbound ramp terminal. However, these queues do not extend through an adjacent intersection or back onto I-25. Queuing for other movements generally did not exceed the distance between intersections or the current storage length provided at the interchange.

**Table 2. Existing Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Southbound Ramp Terminal</b>					
<b>EB Thru/Right</b>	C	F	520'	1060'	N/A <sup>2</sup>
<b>WB Left</b>	B	C	120'	110'	Current Storage Provided – 130'
<b>WB Thru</b>	A	A	230'	230'	Distance to Adjacent Intersection – 350'
<b>SB Left</b>	D	E	310'	280'	Ramp Length – 1450'
<b>SB Right</b>	D	C	160'	140'	Current Storage Provided – 0'
<b>Northbound Ramp Terminal</b>					
<b>EB Left</b>	E	C	130'	140'	Current Storage Provided – 120'
<b>EB Thru</b>	A	B	170'	290'	Distance to Adjacent Intersection – 350'
<b>WB Thru/Right</b>	D	D	400'	360'	Distance to Adjacent Intersection – 330'
<b>NB Left</b>	E	D	1120'	930'	Ramp Length – 1450'
<b>NB Right</b>	A	A	170'	180'	Current Storage Provided – 0'
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. <sup>2</sup> There is not an intersection west of the interchange that may be impacted by operations at the southbound ramp terminal.					

## 2030 Conditions

2030 traffic projections were developed for the three alternatives being considered:

- 1) No-Action Alternative
- 2) Package A: GPL + CR + CB 85
- 3) Package B: TEL + BRT

These alternatives are illustrated in Figures 3 through 5. In developing peak hour turning movements at the ramp terminals and the nearest adjacent intersections, model results were calibrated against existing traffic counts to derive an adjusted model forecast. These adjusted forecasts along with existing turning movement data were used in the NCHRP 255 balancing procedure to develop 2030 peak hour turning movement forecasts. These forecasts were further adjusted, as necessary, to balance between intersections and for reasonableness.

### **2030 No Action Traffic Volumes**

Figure 6 depicts 2030 daily and peak hour No Action traffic projections for the SH 7 interchange and adjacent intersections. As shown, daily volume projections on SH 7 range from 60,000 vpd west of the interchange to 63,000 vpd east of the interchange, and ramp volumes range from 10,300 to 18,500 vehicles per day. Existing traffic volumes were higher west of the interchange; but are anticipated to shift due to the development plans on the east side of the interchange.

### **2030 Package A Traffic Volumes**

Figure 7 depicts 2030 daily and peak hour Package A traffic projections for the SH 7 interchange and adjacent intersections. The volumes in the figure are generally similar to those presented in the No Action Alternative, differing slightly due to the change in capacity on I-25. Daily volume projections on SH 7 range from 61,000 vpd west of the interchange to 63,000 vpd east of the interchange, and ramp volumes range from 11,900 to 19,400 vehicles per day. The traffic patterns follow No Action patterns; with the highest traffic flow east of the interchange and south of the interchange.

### **2030 Package B Traffic Volumes**

Figure 8 depicts 2030 daily and peak hour Package B traffic projections for the SH 7 interchange and adjacent intersections. Package B projections are generally similar to No Action Alternative and Package A projections, differing slightly due to the change in capacity on I-25. Daily volume projections on SH 7 range from 61,400 vpd west of the interchange to 65,100 vpd east of the interchange, and ramp volumes range from 10,700 to 20,200 vehicles per day. While the traffic patterns in Package B are generally similar to Package A (the highest flows are to and from the east and south), the Package B projections are lower to and from the north and higher to and from the south than Package A.

**LEGEND**

- ★ Major Structure Rehab by 2030
- Minor Structure Rehab by 2030
- ▬ Replace / Rehab Pavement by 2030
- Minor Safety Modifications by 2030
- ▬ FasTracks Rail Line

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**Figure 3. No Action Alternative**

**LEGEND**

	<b>1 New General Purpose Lane (GPL) in Each Direction</b>
	<b>1 New General Purpose Lane (GPL) + Auxiliary Lane in Each Direction</b>
	<b>Commuter Rail (CR)</b>
	<b>Commuter Bus (CB) Service on US 85</b>
	<b>Feeder Bus Service</b>
	<b>Interchange Upgrades</b>
	<b>Number of Lanes</b>
	<b>Commuter Bus Station / Stop</b>
	<b>Commuter Rail Station</b>
	<b>FasTracks Rail Line</b>
	<b>FasTracks / RTD Transit Station</b>
	<b>Potential Commuter Rail Operational &amp; Maintenance Facility</b>
	<b>Potential Commuter Bus Operational &amp; Maintenance Facility</b>

**Congestion Management Measures include:**

- Enhanced carpool lot parking capacity and amenities
- Courtesy patrol (incident management) from SH 14 to SH 7
- Variable messaging signs at all transit stations
- Automated Vehicle Locaters on all transit vehicles - "next bus" technology
- Links to local bike and pedestrian systems at station areas
- Support for development of Transportation Management Organization (TMO)

**NOTE:**

- Select sections of I-25 would require auxiliary lanes and / or an additional through lane in addition to this 6-lane cross section.
- Where widening is needed between SH 66 and SH 7, the median would be used.
- Commuter Rail Service without a Longmont to North Metro connection will also be evaluated.



TYPICAL I-25 CROSS SECTION - 6 GENERAL PURPOSE LANES

Figure 4. Package A

**LEGEND**

- 1 Buffer-Separated Tolled Express Lane (TEL) in Each Direction**
- 2 Barrier-Separated Tolled Express Lanes (TEL) in Each Direction**
- Bus Rapid Transit (BRT) Route (Uses TELs on I-25)**
- Feeder Bus Service**
- Interchange Upgrades**
- Number of Lanes: General Purpose/Tolled Express Lanes**
- Bus Rapid Transit Station**
- FasTracks Rail Line**
- FasTracks / RTD Transit Station**
- Potential Commuter Bus Operational & Maintenance Facility**

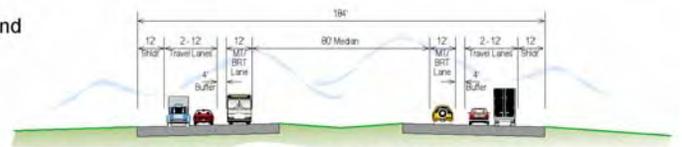
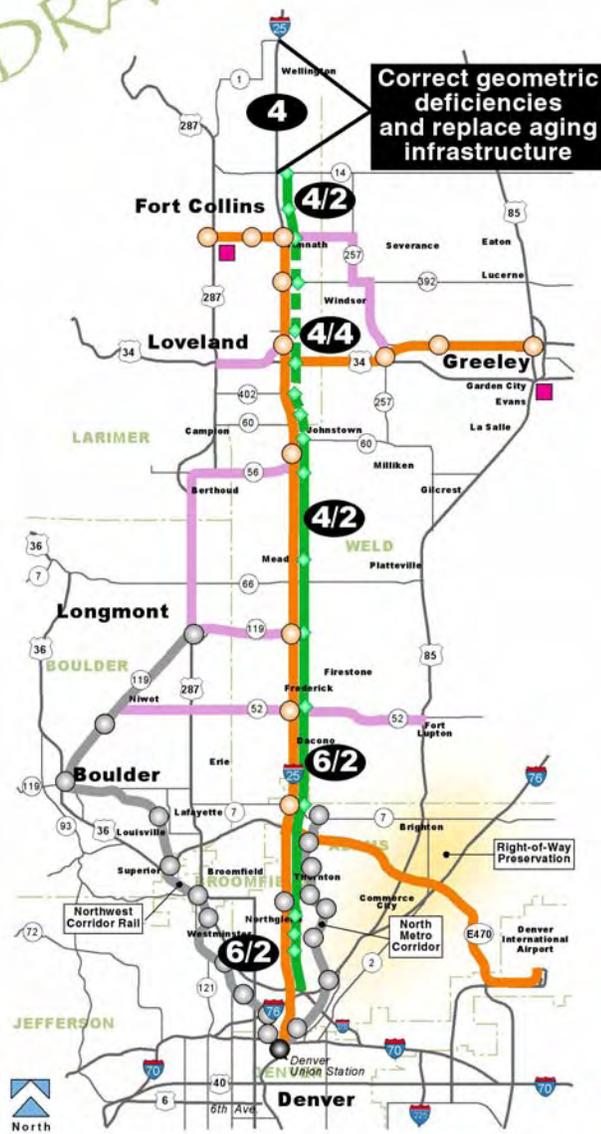
**Congestion Management Measures include:**

- Enhanced carpool lot parking capacity and amenities
- Courtesy patrol (incident management) from SH 14 to SH 7
- Variable messaging signs at all transit stations
- Automated Vehicle Locators on all transit vehicles - "next bus" technology
- Links to local bike and pedestrian systems at station areas
- Support for development of Transportation Management Organization (TMO)

**NOTE:**

- A wider barrier and express lanes cross section is included between SH 60 and Harmony Road.
- BRT stations located within an expanded median area.
- Where widening is needed between SH 66 and SH 7, the median would be used.

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NOT TO SCALE

TYPICAL I-25 CROSS SECTION - BUFFERED SEPARATED TOLLED EXPRESS LANES

Figure 5. Package B

# SH 7 at I-25 DEIS Interchange Evaluation

The traffic forecasts for SH 7 west of the interchange are higher than the generally accepted capacity of a six lane major arterial (48,000 vpd) in the No Action Alternative and in Packages A and B, but have been used in the analysis here to present a conservative analysis, ensuring that the turn lane designs at the interchange would accommodate higher traffic volumes. This was done because there are enough examples of other arterial roadways in Colorado carrying significantly more traffic than their generally accepted capacity (Table 3) to suggest it would be prudent to design for the higher forecasts.

**Table 3. Arterial Roadways where Current Actual Traffic Volumes Significantly Exceed the Generally Accepted Roadway Capacity**

Facility	Location	Roadway Type	Capacity	Actual Volume
Colorado	at I-25	6-lane Major	48,000 vpd	70,000 vpd
Wadsworth	n/o I-70	6-lane Major	48,000 vpd	62,500 vpd
Federal	s/o 6 <sup>th</sup> Avenue	5-lane Major	40,000 vpd	51,200 vpd
Hampden	w/o I-25	4-lane Major	32,000 vpd	53,400 vpd
US 287	at US 36	4-lane Major	32,000 vpd	51,300 vpd
Sheridan	s/o 6 <sup>th</sup> Avenue	4-lane Major	32,000 vpd	45,100 vpd

## ***2030 No Action Traffic Operations***

### **Interchange Configuration**

At the time of traffic data collection for the North I-25 EIS the SH 7 interchange had a lane configuration as discussed and analyzed in the previous section. In 2006, enhancements were implemented at the interchange in response to a new retail development in the southeast quadrant of the interchange. These enhancements maintained the current terminal spacing but utilized the unused bridge width to provide additional through and left-turn lanes at the interchange. Additional interchange improvements include widening of both off-ramps and the southbound on-ramp. Other No Action Alternative improvements scenario include widen of SH 7 to six-lanes, which is included in the DRCOG RTP, relocation of Washington Street per development plans in the southeast quadrant and a new access west of the interchange to serve new development in the northwest quadrant. The interchange enhancements and the other improvements described are (collectively) shown in Figure 6 and therefore represent the No Action interchange configuration.

### **Interchange Operations**

Figure 6 shows the projected levels of service at the ramp terminals and at adjacent intersections along SH 7 for the No Action Alternative. As the figure indicates, both the northbound and southbound ramp terminals show LOS E or LOS F in both peak periods. The Washington Street intersection also shows LOS F conditions in both peak hours primarily due to SH 7 through traffic at this intersection. The new intersection west of the interchange shows LOS C in the AM peak hour and LOS E in the PM peak hour.

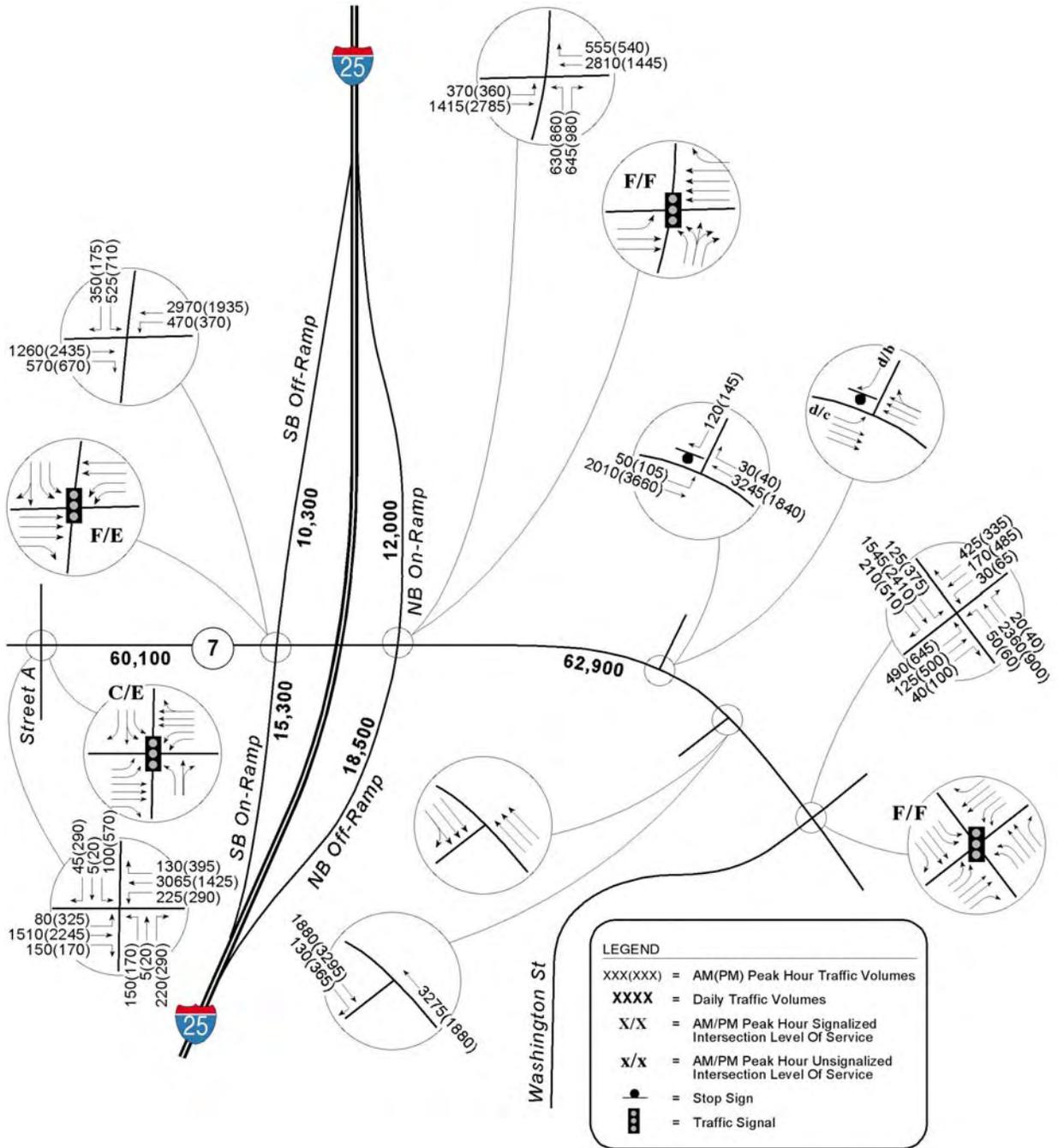


Figure 6. No Action Forecasts and Levels of Service

# SH 7 at I-25 DEIS Interchange Evaluation

Table 4 shows the projected levels of service and queuing for key movements at the interchange. Several movements experience LOS F conditions and 95<sup>th</sup> queues exceed storage lengths and extend into adjacent intersections or onto I-25, further underscoring that the No Action interchange would be in need of capacity improvements with the projected traffic volumes.

**Table 4. 2030 No Action Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Street A</b>					
WB Left	D	F	350'	360'	Current Storage Provided – 600'
WB Thru/right	C	C	620'	180'	Distance to Adjacent Intersection – 1,100'
<b>Southbound Ramp Terminal</b>					
EB Thru	B	F	250'	1,260'	Distance to Adjacent Intersection – 1,100'
EB Right	Free	Free	N/A	N/A	N/A <sup>3</sup>
WB Left	E	C	1,290'	1,170'	Current Storage Provided – 1,600'
WB Thru	F	B	240'	260'	Distance to Adjacent Intersection – 390'
SB Left	E	F	1,640'	1,660'	Current Storage Provided – 1,400'
SB Right	F	D	1,400'	1,490'	Current Storage Provided – 700'
<b>Northbound Ramp Terminal</b>					
EB Left	F	C	650'	400'	Current Storage Provided – 540'
EB Thru	A	F	100'	80'	Distance to Adjacent Intersection – 390'
WB Thru	F	F	>2,000'	1,230'	N/A <sup>2</sup>
WB Right	Free	Free	N/A	N/A	N/A <sup>3</sup>
NB Left	F	F	2,380'	630'	Current Storage Provided – 1,400'
NB Right <sup>4</sup>	Free	Free	N/A	N/A	Current Storage Provided – 700'
<p><sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane.</p> <p><sup>2</sup> The next adjacent intersection is Washington Street which is over 1,500 feet west of the northbound ramp terminal.</p> <p><sup>3</sup> SH 7 lane drop at the ramp terminal.</p> <p><sup>4</sup> In the AM peak the left-turn queues block access to the right-turn lane.</p>					

## **2030 Package A Traffic Operations**

### **Interchange Configuration**

The proposed configuration for the SH 7 DEIS interchange evaluation is a diamond configuration (Figure 7). This diamond configuration has ramp terminal spacing of 1,200 feet in order to accommodate future loop ramps in the northwest and southeast quadrants (which will not be constructed as part of this project). In addition to the greater ramp terminal spacing, other improvements include a wider bridge to accommodate six-lane SH 7 and side-by-side dual left-turn lanes, northbound triple-left turn lanes, eastbound to southbound dual-right turn lanes and continuous auxiliary lanes along SH 7 to facilitate free right-turn movements from the off-ramps.

### **Interchange Operations**

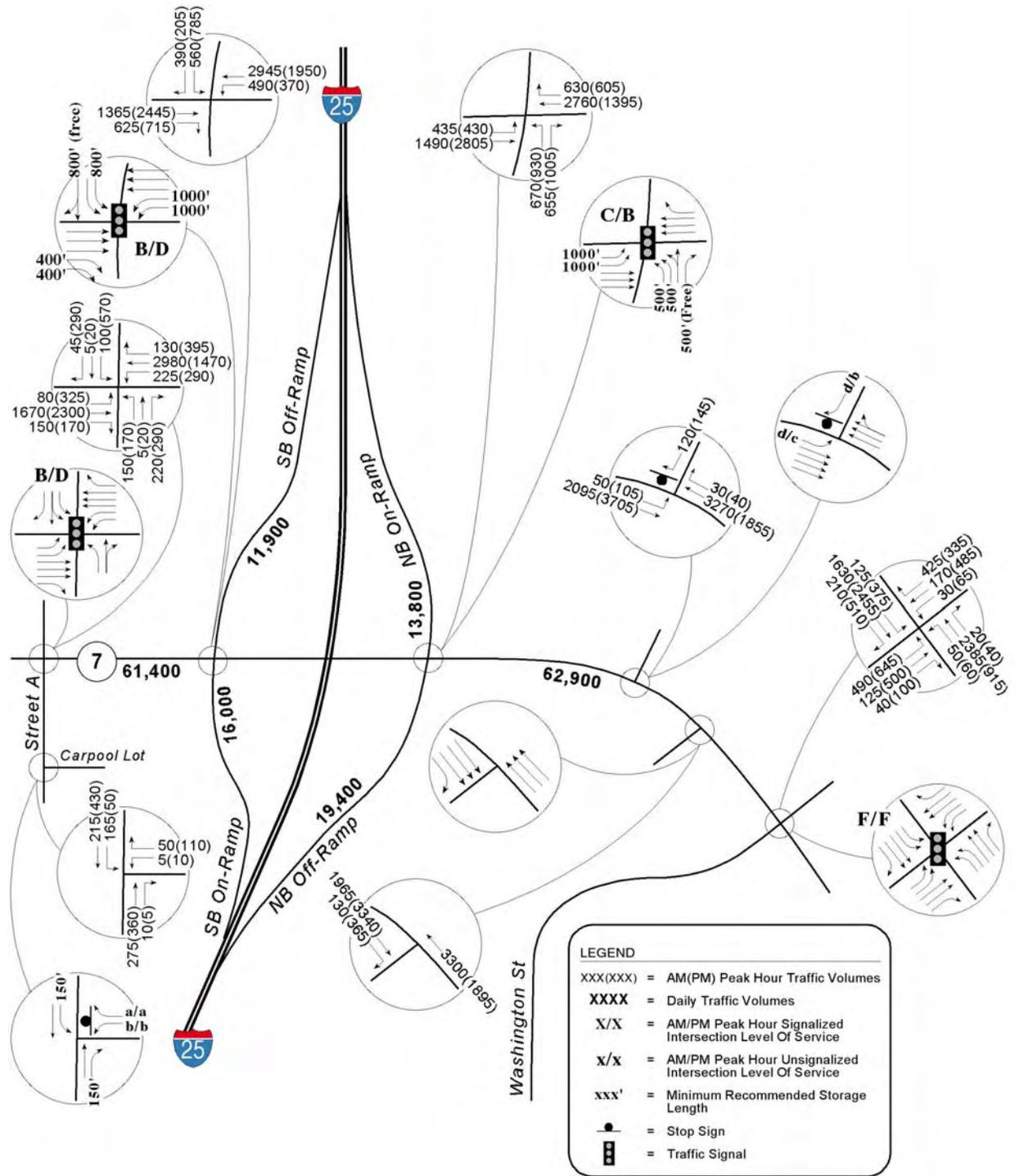
Figure 7 shows the levels of service for the ramp terminals, Washington Street intersection and the new intersection west of the interchange (Street A). In addition, the figure gives lane recommendations at each intersection and shows the storage provided in the interchange design. With the interchange enhancements, the ramp terminals operate with improved levels of service. At the northbound ramp terminal, the LOS F conditions in both peak hours are improved to LOS C in the AM peak and LOS B in the PM peak. At the southbound ramp terminal, the levels of service in the AM peak hour improve from LOS F to LOS B and in the PM peak hour improved from LOS E to LOS D.

In Package A, a carpool lot will be provided in the southwest quadrant of the interchange. This carpool lot will consist of 180 parking spaces and will have access off of Street A. Figure 7 shows turn movement volumes anticipated at the carpool lot, level of service for turn movements from the lot and recommended storage lengths for turn lanes on Street A. At the carpool lot access stop-sign control is recommended because left and right-turn movements from the lot operate at LOS B or better during the peak hours.

Table 5 summarizes levels of service for key individual turning movements at all intersections. As shown, most movements operate LOS D or better conditions in the peak hours. At the southbound ramp terminal, the left-turn movement from the off-ramp operates at LOS E in the AM peak and LOS F in the PM peak and the eastbound through movements operates at a LOS E in the PM peak. At the northbound ramp terminal LOS E or F conditions occur during the AM peak hour for the northbound left-turn and eastbound left-turn movements.

Table 5 also compares SimTraffic estimates of the 95<sup>th</sup> percentile queue length for those key movements to the storage distance available for each. For turning movements, the distance listed is the planned turn lane storage length, while for through movements the length listed is the distance between intersections. The queuing analysis shows that in both peak hours the estimated 95<sup>th</sup> percentile queues would be contained within the turn bays or within the distance between adjacent intersections.

# SH 7 at I-25 DEIS Interchange Evaluation



**Figure 7. Package A Forecasts and Levels of Service**

**Table 5. 2030 Package A Level of Service and Queue Lengths For Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Street A</b>					
WB Left	C	E	250'	280'	Current Storage Provided – 600'
WB Thru	B	B	740'	160'	Distance to Adjacent Intersection – 690'
WB Right	A	A	220'	80'	Distance to Adjacent Intersection – 690'
<b>Southbound Ramp Terminal</b>					
EB Thru	B	E	290'	660'	Distance to Adjacent Intersection – 690'
EB Right	Free	Free	N/A	N/A	Storage Provided in Design – 800'
WB Left	C	C	500'	380'	Storage Provided in Design – 2,000'
WB Thru	A	A	320'	30'	Distance to Adjacent Intersection – 1,150'
SB Left	E	F	570'	1,550'	Storage Provided in Design – 1,600'
SB Right	Free	Free	N/A	N/A	Storage Provided in Design – 700'
<b>Northbound Ramp Terminal</b>					
EB Left	F	A	910'	250'	Storage Provided in Design – 2,000'
EB Thru	A	A	270'	230'	Distance to Adjacent Intersection – 1,145'
WB Thru	D	D	730'	520'	N/A <sup>2</sup>
WB Right	Free	Free	N/A	N/A	Continuous accel. / decel
NB Left	E	D	1,520'	610'	Storage Provided in Design – 1,500'
NB Right	Free	Free	N/A	N/A	Storage Provided in Design – 500'
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane. <sup>2</sup> The next adjacent intersection is Washington Street which is over 1,500 feet west of the northbound ramp terminal. <sup>3</sup> SH 7 lane drop at the ramp terminal.					

**2030 Package B Traffic Operations**

**Interchange Configuration**

The proposed interchange configuration for SH 7 in Package B is the same as in Package A (Figure 8).

Under Package B the car pool lot would have 469 spaces and would serve as a park-n-ride lot for the bus rapid transit system.

## **Interchange Operations**

Figure 8 shows the levels of service for the ramp terminals, the Washington Street intersection and the new intersection west of the interchange (Street A). In addition, SH 7 gives lane recommendations at each intersection and shows the storage provided in the interchange design. With the interchange enhancements, the ramp terminals operate with improved levels of service. At the northbound ramp terminal, the LOS F conditions in both peak hours are improved to LOS C in the AM peak and LOS B in the PM peak. At the southbound ramp terminal, the levels of service in the AM peak hour improve from LOS F to LOS B and in the PM peak hour improved from LOS E to LOS D.

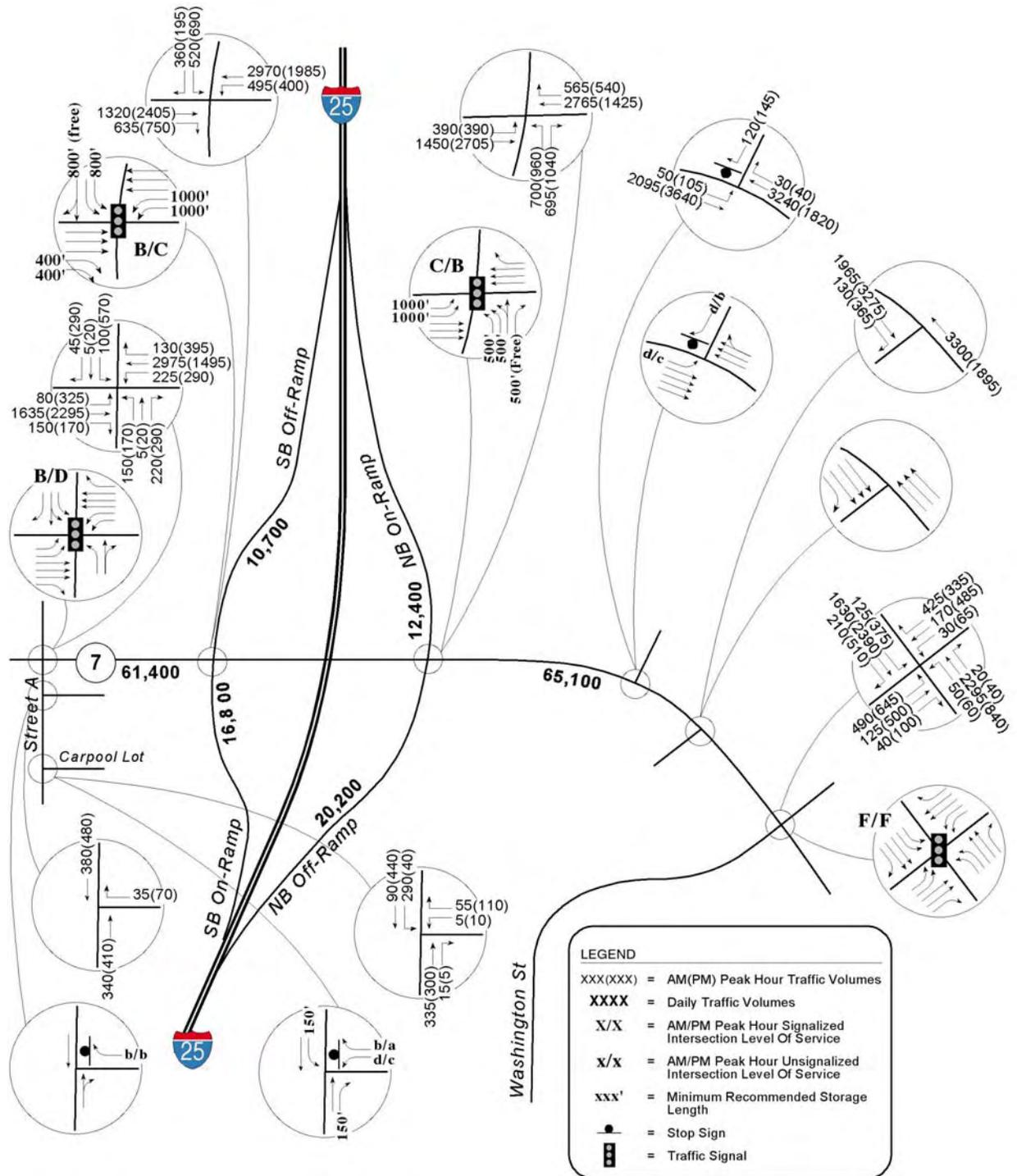
In Package B, the carpool lot becomes a park-n-ride lot for the bus-rapid transit system and therefore will expand from 180 spaces to 469 spaces. Figure 8 shows turn movement volumes, level of service and recommended turn lane storage length at the park-n-ride access. As shown, turn movements operate at LOS C in the peak hours with stop-sign control. Also, the north access is recommended to be restricted to right-turns only due to its proximity to SH 7.

Table 6 summarizes levels of service for key individual turning movements at all intersections. As shown, most movements operate LOS D or better conditions in the peak hours. At the southbound ramp terminal, the left-turn movement from the off-ramp operates at LOS E in the AM peak and LOS F in the PM peak. At the northbound ramp terminal LOS E or LOS F conditions occur during the AM peak hour for the northbound left-turn and eastbound left-turn movements.

Table 6 compares SimTraffic estimates of the 95<sup>th</sup> percentile queue length for those key movements to the storage distance available for each. For turning movements, the distance listed is the planned turn lane storage length, while for through movements the length listed is the distance between intersections. The queuing analysis shows that in both peak hours the estimated 95<sup>th</sup> percentile queues would be contained within the turn bays or within the distance between adjacent intersections.

It should be noted that in the No Action Alternative and in Package A and Package B, the SH 7/Washington Street intersection operates at a LOS F in both peak hours. The poor levels of service are a result of the high peak hour through traffic volume at the intersection. As previously noted, the daily traffic volume projections for SH 7 exceed the capacity of a 4-lane arterial. This suggests the need for six-lane on SH 7 east of the Washington Street intersection.

# SH 7 at I-25 DEIS Interchange Evaluation



**Figure 8. Package B Forecasts and Levels of Service**

**Table 6. 2030 Package B Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Street A</b>					
WB Left	C	E	490'	280'	Current Storage Provided – 600'
WB Thru	A	A	620'	140'	Distance to Adjacent Intersection – 690'
WB Right	A	A	160'	70'	Distance to Adjacent Intersection – 690'
<b>Southbound Ramp Terminal</b>					
EB Thru	B	D	250'	430'	Distance to Adjacent Intersection – 690'
EB Right	Free	Free	N/A	N/A	Storage Provided in Design – 800'
WB Left	C	D	500'	460'	Storage Provided in Design – 2000'
WB Thru	A	A	260'	70'	Distance to Adjacent Intersection – 1150'
SB Left	E	F	610'	1,150'	Storage Provided in Design – 1400'
SB Right	Free	Free	N/A	N/A	Storage Provided in Design – 700'
<b>Northbound Ramp Terminal</b>					
EB Left	E	A	700'	240'	Storage Provided in Design – 2000'
EB Thru	A	A	200'	210'	Distance to Adjacent Intersection – 1145'
WB Thru	D	D	710'	600'	N/A <sup>2</sup>
WB Right	Free	Free	N/A	N/A	Continuous accel. / decel
NB Left	F	D	1,040'	610'	Storage Provided in Design – 1500'
NB Right	Free	Free	N/A	N/A	Storage Provided in Design – 500'
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane. <sup>2</sup> The next adjacent intersection is Washington Street which is over 1,500 feet west of the northbound ramp terminal. <sup>3</sup> SH 7 lane drop at the ramp terminal.					

**Alternatives Evaluation Comparison**

**Traffic Operational Analysis**

Table 7 compares the levels of service and delay at the SH 7 interchange for the three packages. As the table indicates, both Package A and Package B provide a noticeable improvement in intersection operations over the No Action Alternative. Package B provides better operations at the ramp the southbound terminal in the PM peak hour due to lower ramp volumes. At the northbound ramp terminal and at Street A traffic operations are essentially the same between Packages A and B.

SH 7 at I-25  
DEIS Interchange Evaluation

**Table 7. Intersection Level of Service and Delay**

Intersection	No Action		Package A		Package B	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Street A	LOS C (25 sec.)	LOS E (57 sec.)	LOS B (19 sec.)	LOS D (51 sec.)	LOS B (17 sec.)	LOS D (51 sec.)
Southbound Ramps	LOS F (>80 sec.)	LOS E (73 sec.)	LOS B (12 sec.)	LOS D (41 sec.)	LOS B (12 sec.)	LOS C (29 sec.)
Northbound Ramps	LOS F (>80 sec.)	LOS F (>80 sec.)	LOS C (34 sec.)	LOS B (18 sec.)	LOS C (33 sec.)	LOS B (17 sec.)

LOS X – Level of service

## - Average delay in seconds per vehicle

DRAFT