

US 85 Commuter Bus - Ft. Lupton DEIS Evaluation

August 20, 2007

Introduction

The North I-25 DEIS Package A alternative considers two commuter bus routes: one that would extend from the Denver Union Station (DUS) and a second that would extend from the Denver International Airport (DIA). Both routes will terminate in Greeley. Line stations will be located at designated existing transit stops in Denver, Commerce City, and Brighton, as well as new proposed stops in Fort Lupton, Platteville, Evans, and Greeley.

The proposed commuter bus route generally follows the existing US 85 alignment. The end-of-line station along with a parking/development opportunity is proposed in the vicinity of US 85 and D Street in Greeley. A map of the commuter bus routes showing the station locations is provided in Figure 1.

A commuter bus station is proposed in the vicinity of the US 85/CR 14.5 intersection in Fort Lupton. This report documents the potential traffic impacts of the proposed commuter bus station and provides technical documentation of the traffic data analysis. The other proposed commuter bus stations are addressed in separate reports.

Existing Conditions

The proposed commuter bus station is located southeast of the US 85/CR 14.5 intersection and would have approximately 114 parking spaces. The surrounding area includes several land use types including residential, commercial, retail development, gas stations, and small offices.

The proposed study area includes the following major roadways intersections:

United States Highway 85 (US 85)

US 85 is a four lane divided highway from I-76 Exit 12 north through Brighton, Platteville, and Greeley to the north side of Ault. The expressway has grade-separated interchanges at SH 7, SH 52, US 34, and USB 85 (Business Route 85).

14th Street/CR 14.5/US 85 intersection

The CR 14.5/US 85 intersection is signalized. The posted speed limit on CR 14.5 near the intersection is 25 mph and is 55 mph on US 85. The intersection geometry on the eastbound approach consists of a shared through/left turn lane and a right-turn lane, while the westbound approach consists of a left turn lane, a through lane

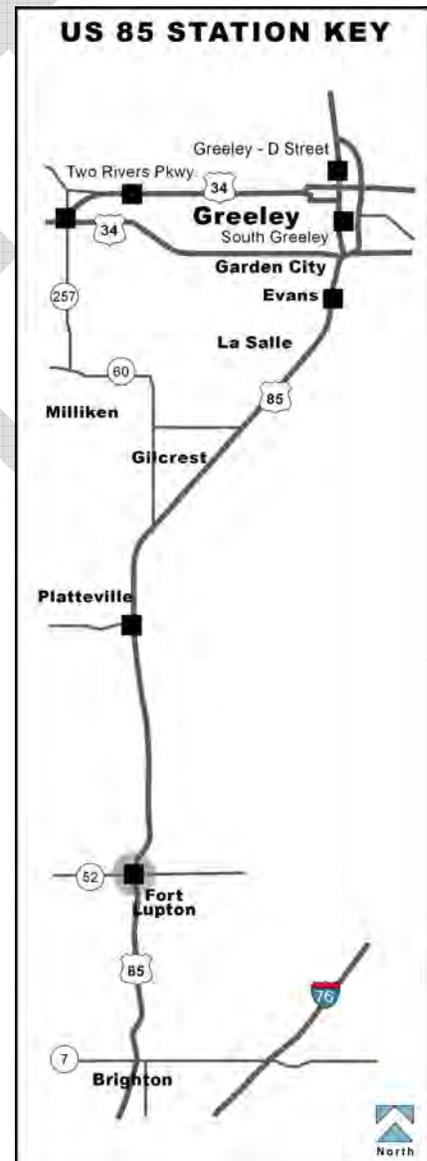


Figure 1. Vicinity Map

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two through lanes and a right turn lane. US 85 carries moderate southbound through traffic during the AM peak hour and heavy northbound through traffic during the PM peak hour.

14th Street/CR 14.5/Denver Avenue intersection

The 14th Street/Denver Avenue intersection is unsignalized. 14th Street runs in the east-west direction and consists of shared through/left turn lane and a right turn lane on the eastbound and westbound approaches. Denver Avenue runs in the north-south direction parallel to US 85, and consists of a shared through/left turn lane and a right turn lane on the northbound approach, and a shared left/through/right turn lane on the southbound approach. The posted speed limit on both roads near the intersection is 35 mph.

14th Street/CR 14.5/Pacific Avenue intersection

The 14th Street/Pacific Avenue intersection is an unsignalized tee intersection. 14th Street runs in the east-west direction with single lane approaches in both directions. The northbound approach on Pacific Avenue is also a single lane. The posted speed limit on both roads near the intersection is 25 mph. Pacific Avenue carries residential traffic to/from the neighborhoods while 14th Street is a collector road that carries traffic to/from US 85.

Figure 2 summarizes the peak hour traffic counts collected in August 2006 within the study area. Additionally, Average Daily Traffic (ADT) data was obtained from the North I-25 Travel Demand Model – 2001 base year. As shown, the average daily traffic on US 85 in the vicinity of the 14th Street/CR 14.5/US 85 intersection is about 29,500 vehicles per day.

At the 14th Street/CR 14.5/US 85 intersection the westbound to southbound left-turning movement represents the highest turning volume (100 vehicles per hour) in the morning peak and the northbound to eastbound right-turning movement represents the highest turning volume (90 vehicles per hour) in the afternoon peak hour. At the 14th Street/Denver Avenue intersection the northbound to westbound left-turning movement represents the highest turning volume during both the morning and afternoon peak hours (115 vehicles per hour in the AM and 110 in the PM).

Traffic Operations Evaluation

Operational analyses of each key intersection were 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 controlled by traffic signals and stop-signs.

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

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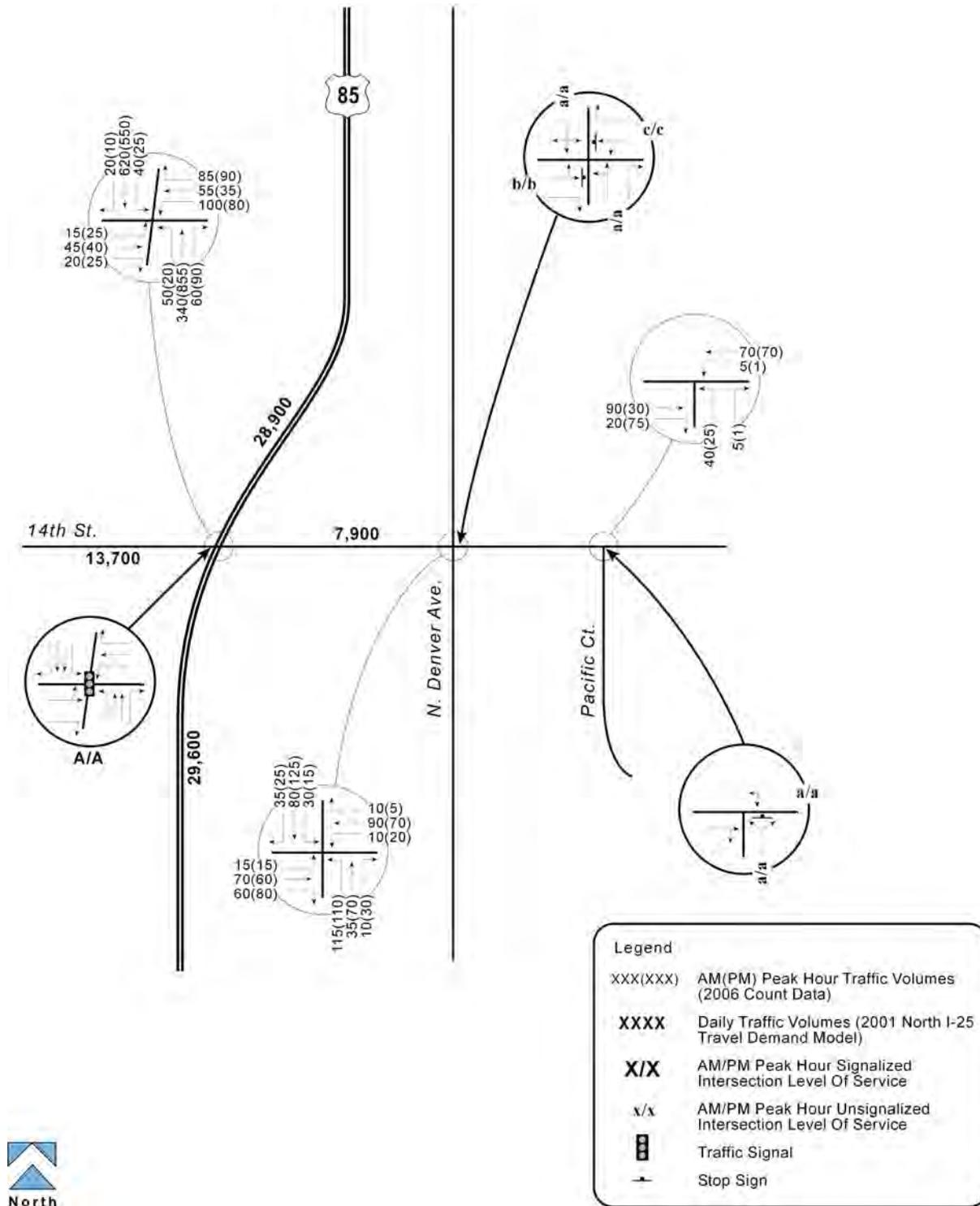


Figure 2. Existing Conditions

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 (sec./veh.)	Average Delay at Stop-Controlled intersections (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

Peak hour traffic counts were conducted in August, 2006 at the study area intersections. Other background parameters are documented in the *DEIS Traffic Evaluation – Methodology Summary*.

Figure 2 and Table 2 illustrate the existing peak period levels of service at the signalized and unsignalized intersections within the study area. Currently, the signalized 14th Street/CR 14.5/US 85 intersection operates at Level of Service (LOS) A during both the AM and PM peak hours. The westbound approach at the 14th Street/Denver Avenue intersection operates at LOS C during both the AM and PM peak hours. The northbound approach at the 14th Street/Pacific Avenue intersection operates at LOS A during both the AM and PM peak hours.

Table 2 Existing Intersection LOS and Delay

Intersection / Movement	Level of Service		Delay (seconds)	
	AM	PM	AM	PM
US 85/14th Street/CR 14.5	A	A	10	9
14th Street/Denver Ave. (unsignalized)				
Westbound Approach	C	C	16	17
14th Street/Pacific Ave. (unsignalized)				
Northbound Approach	A	A	10	9

2030 Conditions

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

- 1) No Action Alternative
- 2) Package A: GPL + CR + CB 85

These packages are illustrated in Figures 3 and 4. Since there are no project elements in the Fort Lupton area in Package B, the No-Action results are representative of Package B conditions. In developing peak hour turning movements at the study area intersections, the North I-25 Travel Demand Model - 2001 base year, 2030 No Action, and 2030 Package A results were utilized to calculate the growth factors over a 29 year period. Since the actual traffic

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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

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LEGEND

	1 New General Purpose Lane (GPL) in Each Direction
	1 New General Purpose Lane (GPL) + Auxiliary Lane in Each Direction
	Commuter Rail (CR)
	Commuter Bus (CB) Service in US 85 General Purpose Lanes and Que Jumps
	Feeder Bus Service
	Interchange Upgrades
	Number of Lanes
	Commuter Bus Station / Stop
	Commuter Rail Station
	FasTracks Rail Line
	FasTracks Transit Station
	Potential Commuter Rail Operational & Maintenance Facility
	Potential Commuter Bus Operational & Maintenance Facility

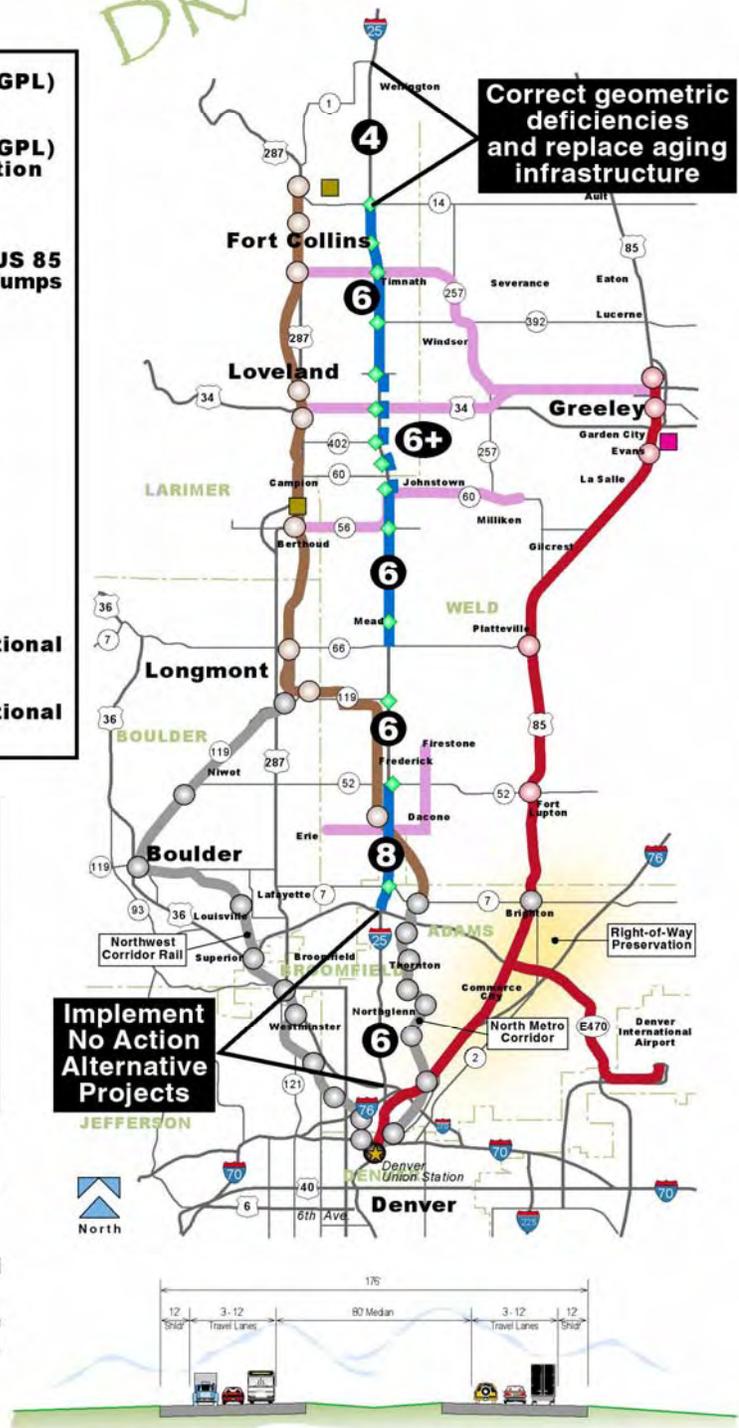
Congestion Management Measures include:

- 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 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.

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NOT TO SCALE

TYPICAL I-25 CROSS SECTION - 6 GENERAL PURPOSE LANES

Figure 4. Package A Alternative

counts were conducted in year 2006, the growth factors were adjusted to reflect a 24 year growth rate. These growth factors 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 checked for balancing between intersections and reasonableness.

2030 No Action Traffic Volumes

The 2030 No Action daily and peak hour projections for the study area intersections are shown in Figure 5. As shown, the average daily volume on US 85 in the vicinity of proposed commuter bus station is around 63,000 vehicles per day (vpd). During the AM peak hour the major traffic flows are southerly from Fort Lupton towards Brighton and Denver. During the PM peak hour major traffic flows are northerly from Denver and Brighton towards Fort Lupton.

2030 Package A Traffic Volumes

The same methodology used to develop the 2030 No Action volumes was applied to estimate 2030 background traffic volumes for the Package A alternative. The North I-25 Travel Demand Model does not include park-and-ride patrons in its traffic assignment procedure. Therefore, in addition to these background forecasts – which are shown in Figure 6 – peak hour site traffic associated with the development of the commuter bus station and park-and-ride lot was estimated and assigned to the local road network according to the methodology outlined in the *Park-and-Ride Trip Generation and Distribution Methodology* report. A summary of this methodology and its application for this park-and-ride is provided below.

Park-and-Ride Trip Generation

The number of proposed spaces at the Ft. Lupton park-and-ride lot was determined using the methodology outlined in the *North I-25 DEIS Parking Results* report (Carter & Burgess, November 2006). Using the results of this report, trip generation is estimated at each site, by applying the following factors.

- First, a conservative estimate of maximum utilized spaces is determined by multiplying the number of spaces provided by 90 percent (or 0.9). This is referred to as the *number of occupied spaces*.
- Then, the number of occupied spaces is multiplied by the factors shown in Table 4.

Table 4 – Peak Hour Trip Generation for North I-25 EIS Park-and Ride Lots

	Trip Rate	Entering	Exiting
AM Peak Hour			
Trips per occupied space	0.75	87%	13%
PM Peak Hour			
Trips per occupied space	0.50	20%	80%

The Fort Lupton commuter bus station would be located on the southeast corner of the US 85/14th Street/CR 14.5 intersection and would have 114 parking spaces. The future peak hour traffic from the proposed station is shown in Table 5.

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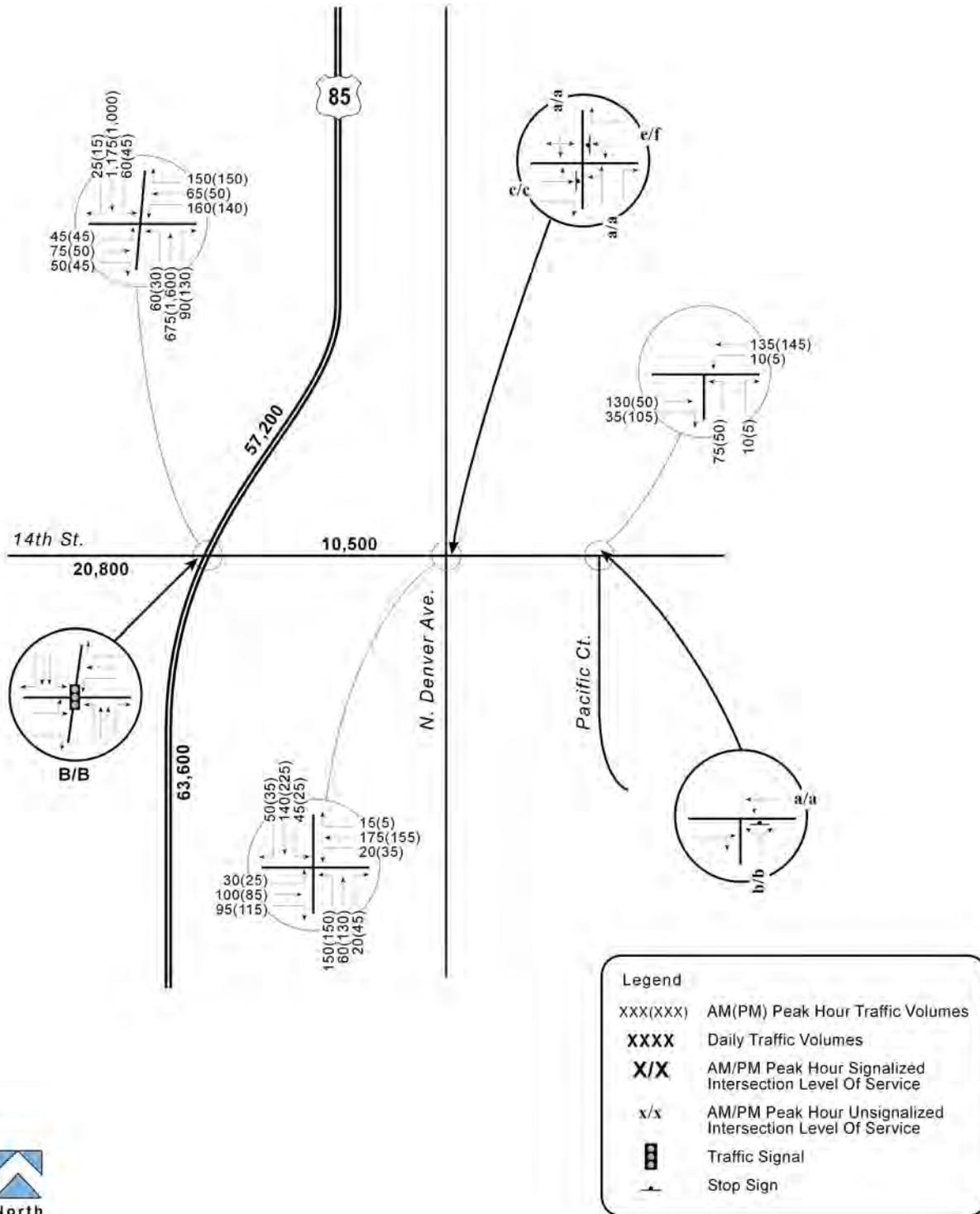


Figure 5. 2030 No Action Forecasts and Levels of Service

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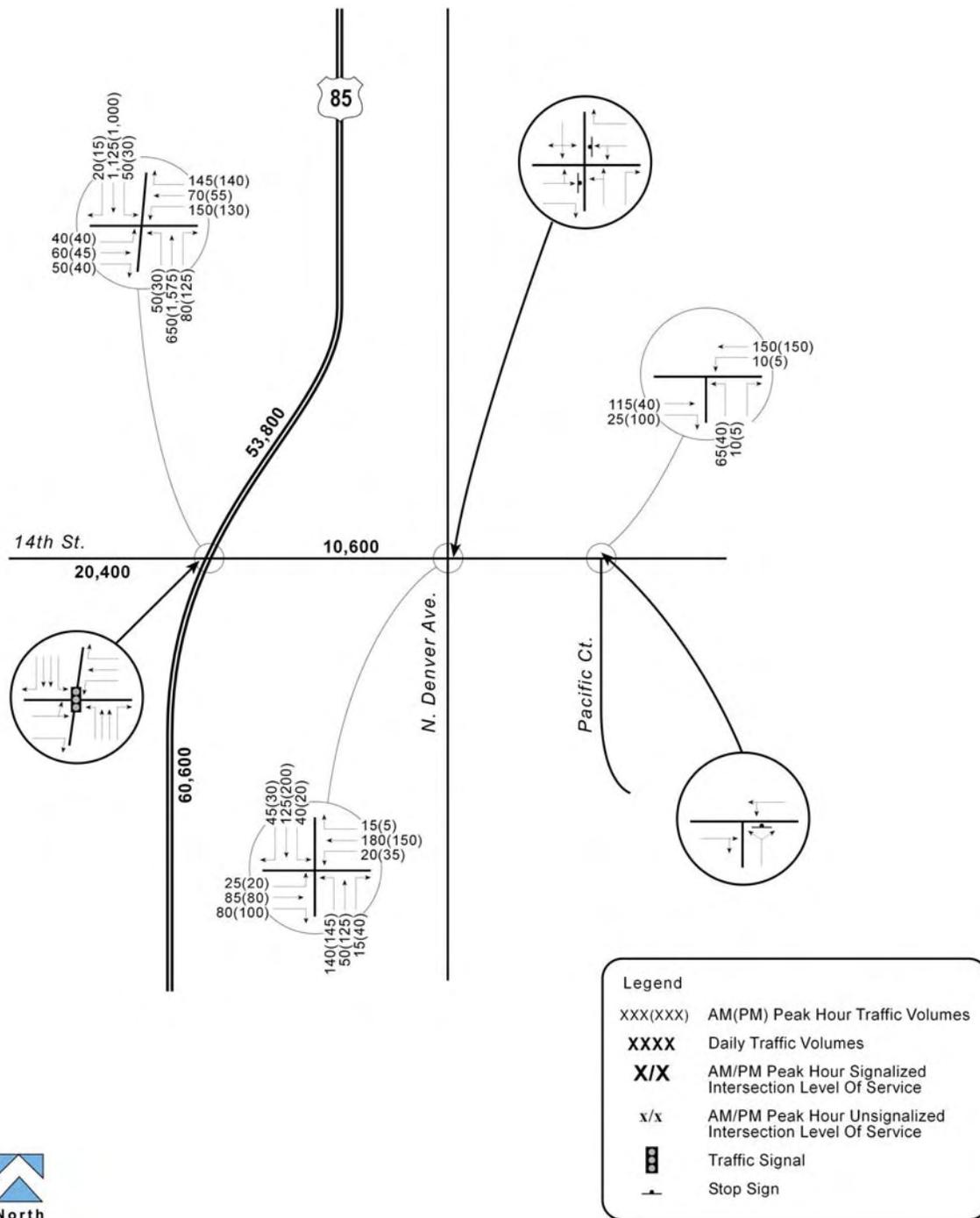


Figure 6. 2030 Package A Background Traffic Forecasts

Table 5 Future Peak Hour Traffic from the Ft. Lupton Park-and-Ride Lot

Location	Daily Trips	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Ft. Lupton PNR Lot	240	65	10	75	10	40	50

Trip Distribution

The trip distribution and assignment for the station was determined based on existing and future land use patterns in the vicinity of the site. It was assumed that the access to the station would be provided from Denver Avenue. The peak hour trip generation and distribution estimates for the proposed park-and-ride lot are shown in Figure 7. These peak hour trip generation estimates were combined with the background traffic projections to arrive at the total 2030 Package A peak hour projections in Figure 8. In general, daily traffic is projected to be less along US 85 in the Package A alternative, as more regional traffic is attracted to the improved I-25 corridor.

2030 No Action Traffic Operations

Figure 5 shows the projected levels of service at the study area intersections under the No Action scenario. For the purpose of No Action analysis it was assumed that the US 85 would remain as a four-lane roadway, since that geometry is more representative of true future no action conditions in the area.

As Figure 5 and Table 3 indicate, the signalized 14th Street/CR 14.5/US 85 intersection would operate at LOS B during both the AM and PM peak hours. The northbound approach at the unsignalized 14th Street/Pacific Avenue intersection would operate at LOS B during both the AM and PM peak hours. However, the westbound approach at the unsignalized 14th Street/Denver Avenue intersection would operate at LOS E during the AM peak and LOS F during the PM peak hour, with considerable delay in both time periods.

Table 3 2030 No Action Intersection LOS and Delay

Intersection / Movement	Level of Service		Delay (seconds)	
	AM	PM	AM	PM
US 85/14th Street/CR 14.5	B	B	13	13
14th Street/Denver Ave. (unsignalized)				
Westbound Approach	E	F	42	73
14th Street/Pacific Ave. (unsignalized)				
Northbound Approach	B	B	11	10

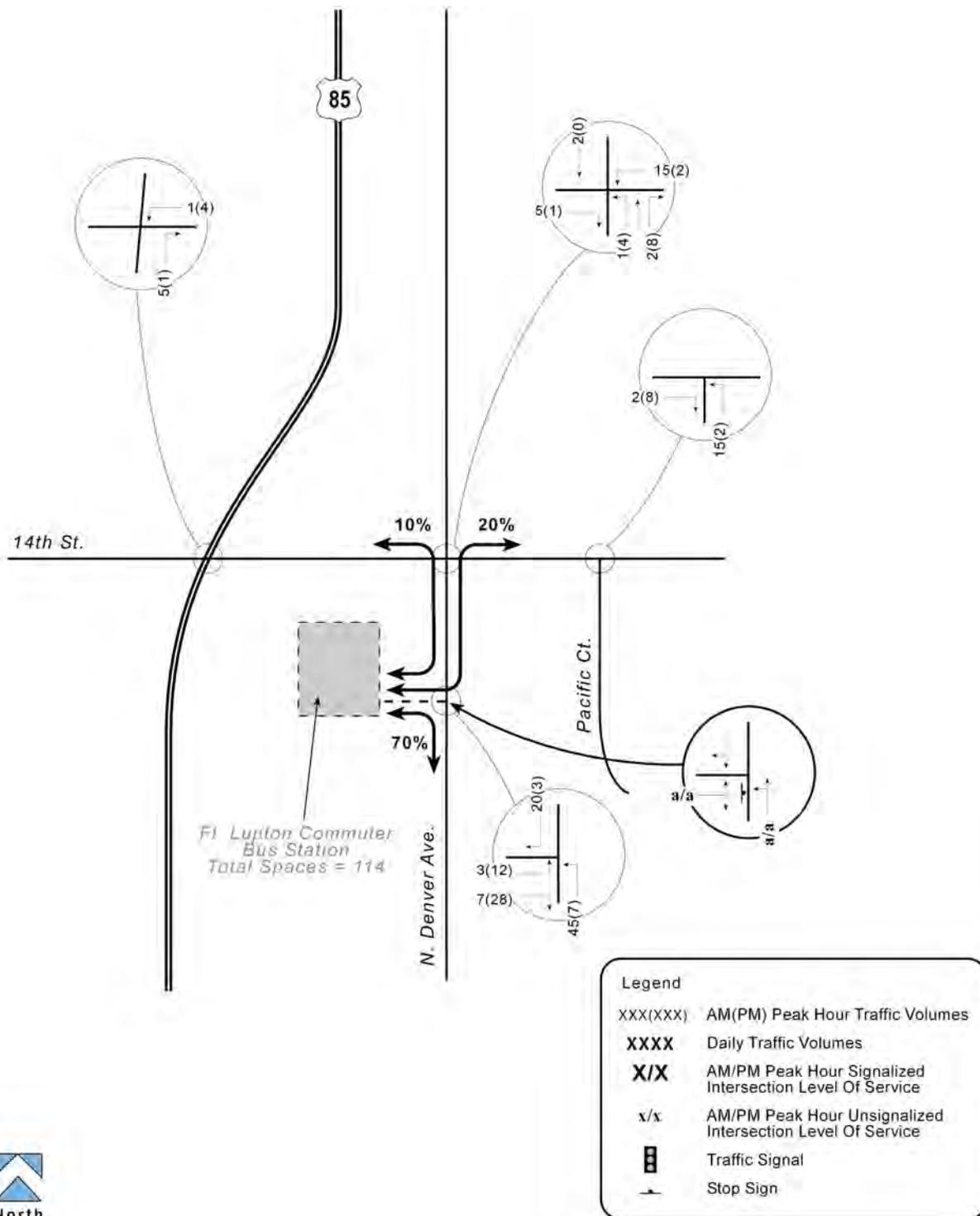


Figure 7. Park and Ride Lot Trip Distribution and Assignment

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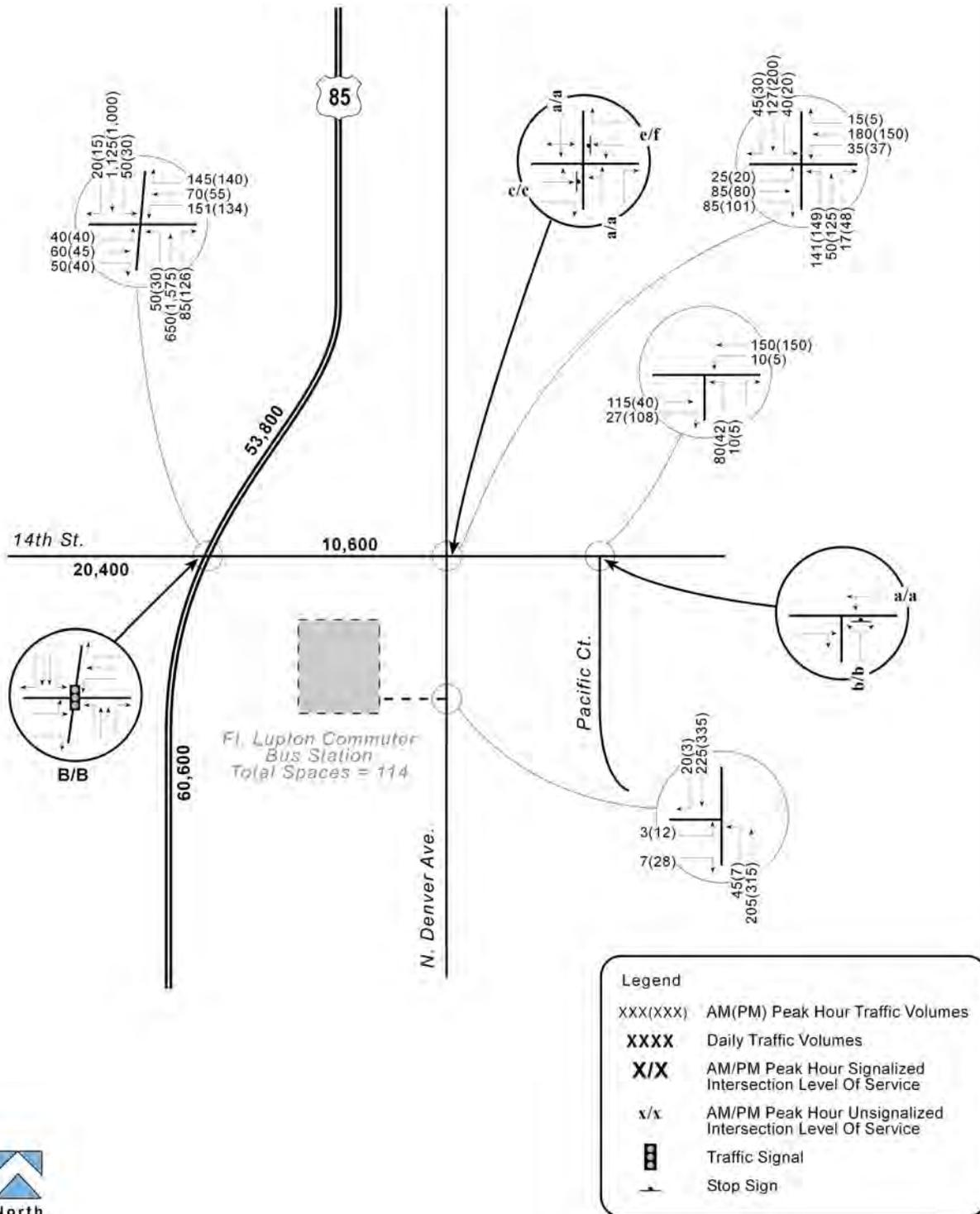


Figure 8. 2030 Package A Total Traffic Forecasts and Levels of Service

Commuter Bus Station Evaluation

2030 Package A Traffic Operations

As Figure 8 and Table 6 indicate, the signalized 14th Street/CR 14.5/US 85 intersection would operate at LOS B during both the AM and PM peak hours. The northbound approach at the unsignalized 14th Street/Pacific Avenue intersection would operate at LOS B during both the AM and PM peak hours. The westbound approach at the unsignalized 14th Street/Denver Avenue intersection would operate at LOS E during the AM peak and LOS F during the PM peak hour with considerable delay in both time periods. These are the same levels of service as in the No Action scenario.

Access to the commuter bus station will be provided from Denver Avenue south of 14th Street/CR 14.5. As shown on Figure 8 and in Table 6, this access would be a single lane with stop-control on the station approach, and would operate at acceptable levels of service without any need for laneage improvements to Denver Avenue.

Table 6 2030 Package A Intersection LOS and Delay

Intersection / Movement	Level of Service		Delay (seconds)	
	AM	PM	AM	PM
US 85/14th Street/CR 14.5	B	B	12	12
4th Street/Denver Ave. (unsignalized)				
Westbound Approach	E	F	41	54
14h Street/Pacific Ave. (unsignalized)				
Northbound Approach	B	B	11	10
Park-n-Ride Access/Denver Avenue (unsignalized)				
Eastbound Approach	B	B	11	12

Proposed Mitigation

The Package A alternative includes six general purpose lanes on I-25 and commuter rail in addition to the proposed bus routes. This would result in more trip attractions towards I-25 lowering the average daily traffic and peak hour traffic volumes on US 85. However, the results of the traffic analysis indicate that some improvements will be needed to address the westbound approach of the 14th Street and Denver Avenue intersection regardless of the Package A consideration. The proposed mitigation is discussed below:

14th Street/Denver Avenue intersection

Under the No-Action alternative, the westbound approach on 14th Street would operate at LOS E during the AM peak and LOS F during the PM peak hour. The following intersection improvement is proposed.

- Construct a 150-foot left-turn lane on the westbound approach.

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This would improve operations to LOS D for that approach. Because this improvement addresses an existing deficiency, it should be considered regardless of the proposed North I-25 EIS preferred alternative.

In addition to the above improvement, the following improvements in the vicinity of the proposed Fort Lupton commuter bus station were identified in CDOT's *US 85 Access Control Plan*, December 1999:

US 85/14th Street/CR 14.5 intersection

A grade-separated interchange would replace this signalized intersection in the future. A single point urban interchange (SPUI) configuration is being considered for the ramp terminals, which would result in the least disruption to nearby properties and businesses.

Alternatives Evaluation Comparison

Traffic Operational Analysis

Table 7 compares the levels of service and delay at the study area intersections for the two packages. As the table indicates, except for the 14th Street/Denver Avenue intersection, the area in the vicinity of the Ft. Lupton commuter bus station would operate at acceptable levels of service. A 150-foot left turn lane at the 14th Street/Denver Avenue intersection would improve operations to acceptable levels of service under both the No Action and Package A alternatives.

Table 7. Intersection Level of Service and Delay

Intersection	No Action		Alternative A	
	AM Peak	PM Peak	AM Peak	PM Peak
US 85/14th Street/CR 14.5	LOS B (13 sec.)	LOS B (13 sec.)	LOS B (12sec.)	LOS B (12 sec.)
14th Street/Denver Ave. (unsignalized)				
Westbound Approach	LOS E (42 sec.)	LOS F (73 sec.)	LOS E (41 sec.)	LOS F (51 sec.)
14th Street/Pacific Ave. (unsignalized)				
Northbound Approach	LOS B (11 sec.)	LOS B (10 sec.)	LOS B (11 sec.)	LOS B (10 sec.)
Station Access/Denver Ave. (unsignalized)				
Eastbound Approach	N/A	N/A	LOS B (11 sec.)	LOS B (12 sec.)

LOS X – Level of service

##.# - Average delay in seconds per vehicle