

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation

August 20, 2007

Introduction

The North I-25 DEIS Package B alternative considers three bus-rapid-transit (BRT) routes: one that would extend from the Denver Union Station (DUS) and terminate in Fort Collins at the proposed Fort Collins South Transit Center; a second that would extend from the Denver International Airport (DIA) and also terminate in Fort Collins; and a third route from DUS to downtown Greeley. Stations would be located at various interchanges along I-25, as well as along both US 34 east of I-25 and Harmony Road west of I-25.

This report documents the potential traffic impacts of the proposed BRT station in the vicinity of Harmony & Timberline in Fort Collins and provides technical documentation of the traffic data analysis. The other proposed BRT stations are addressed in separate reports.

Existing Conditions

The proposed BRT station would be located southwest of the Harmony Road/Timberline Road intersection. Parking for the station would be provide as part of a shared agreement with a movie theater at the location. Because parking at the movie theater is generally needed in the evening, and parking demand for the BRT system would generally occur during the day, a shared parking facility is feasible. In addition to the movie theater, the area includes several land use types including residential, commercial, retail development, and small offices. For the purposes of this analysis, traffic operations have been analyzed at the Harmony/Timberline intersection. A description of these roadways and this intersection is provided below.

Harmony Road/Timberline Road Intersection

Harmony Road is a four-lane principal arterial that serves as a major east-west roadway in south Fort Collins. Timberline Road is a four-lane north-south principal arterial. Both roadways serve regional travel demand in addition to local needs. This intersection is signalized. The intersection geometry consists of two through lanes, two left turn lanes, and a right turn lane on all four approaches.

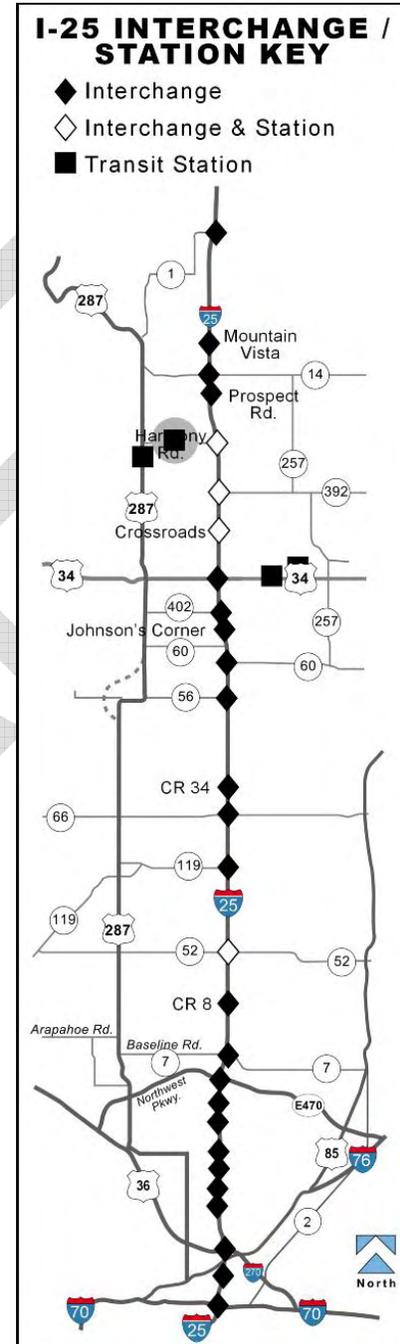


Figure 1. Vicinity Map

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 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*.

Daily traffic on Harmony is about 32,000 – 33,000 vehicles per day (vpd); and daily traffic on Timberline is about 9,000 vpd south of Harmony and about 16,000 vpd north of Harmony. Figure 2 shows the existing AM and PM turning movement counts, intersection level of service, and intersection geometry at Harmony/Timberline.

In the AM peak hour, the Harmony Rd./Timberline Rd. intersection operates at LOS D with 38.6 seconds of average vehicle delay; and in the PM peak hour, this intersection operates at LOS D with 54.7 seconds of average vehicle delay.

2030 Conditions

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

- 1) No Action Alternative
- 2) Package B: TEL + BRT

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation

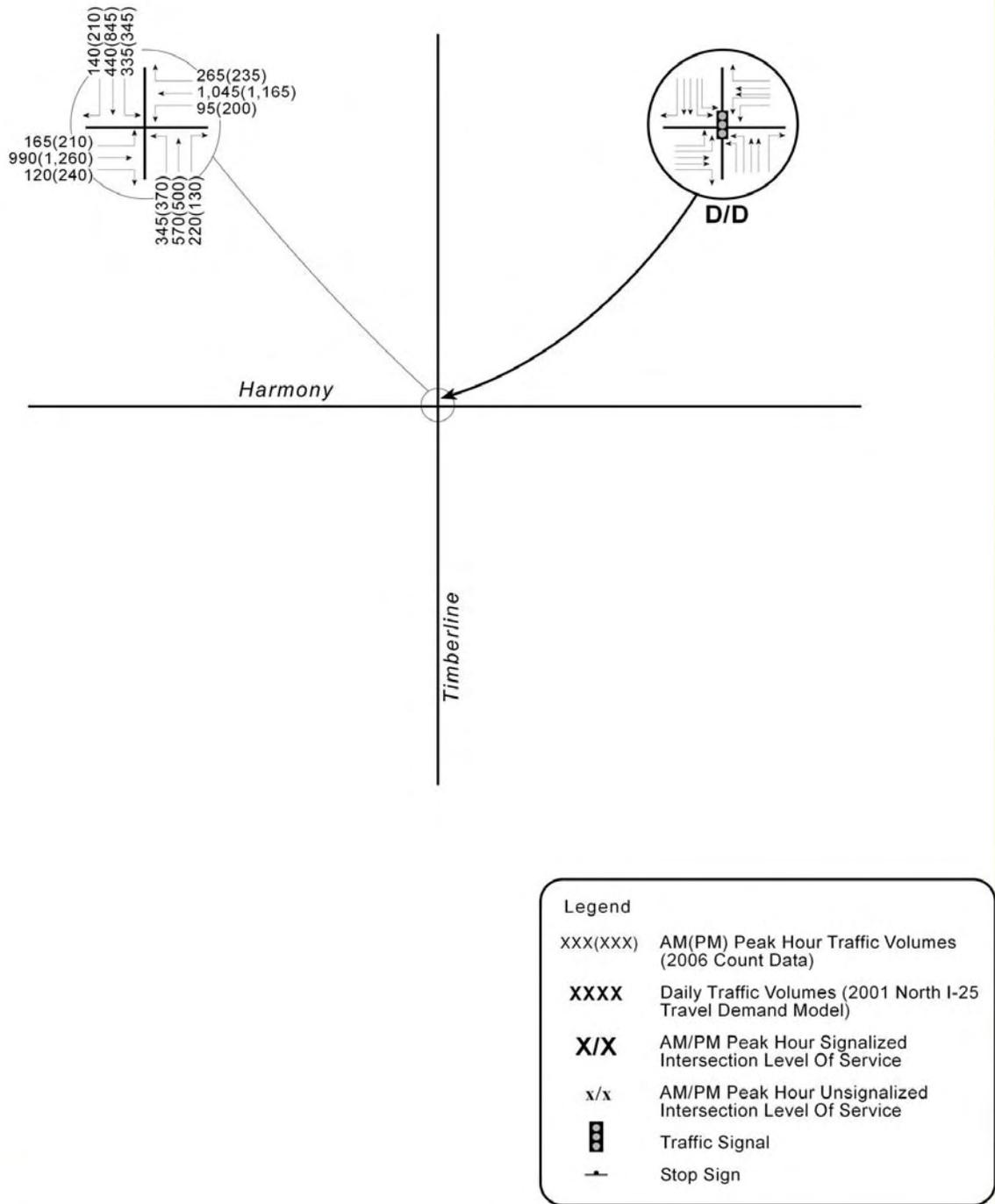


Figure 2. Existing Conditions

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation

Page 4 of 16

These packages are illustrated in Figures 3 and 4. Since there are no project elements in the Harmony/Timberline area in Package A, the No-Action results are representative of Package A conditions. In developing peak hour turning movements at the study area intersections, the North I-25 Travel Demand Model - 2001 base year was used in conjunction with the North I-25 Travel Demand Model – 2030 No Action, and 2030 Package B. Results from these models were utilized to calculate the growth factors over a 29 year period.

Since the actual traffic 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.

2030 No Action Traffic Volumes

The 2030 No Action daily and peak hour projections for the study area intersections are shown in Figure 5. Traffic is projected to grow significantly, with about 60,000 vpd on Harmony and about 35,000 vpd on Timberline. This growth has an impact on operations at the Harmony/Timberline intersection. Figure 5 shows the projected turning movements and levels of service.

2030 No Action Traffic Operations

Based on the North Front Range MPO fiscally constrained 2030 transportation plan, it was assumed for 2030 analysis that Harmony Road and Timberline Road would both be expanded to three lanes in each direction. With this improvement, the intersection is projected to operate at LOS E with 62.6 seconds of average vehicle delay and LOS F with >100 seconds of average vehicle delay in the AM and PM peak hours, respectively.

2030 Package B Traffic Volumes

The same methodology used to develop the 2030 No Action volumes was applied to estimate 2030 background traffic volumes for the Package B alternative. In general, Package B daily traffic projections in the vicinity of the Harmony/Timberline station are slightly higher on Harmony – about 62,000 vpd – and slightly lower on Timberline – about 33,000 – as north/south traffic is attracted to the improved I-25 corridor. These volumes are summarized in Figure 6. 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, peak hour site traffic associated with the development of the commuter rail station and park-and-ride lots 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.

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation



LEGEND

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

DRAFT



Figure 3. No Action Alternative

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation



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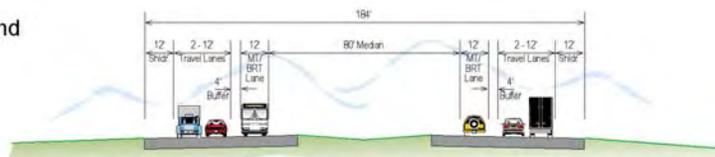
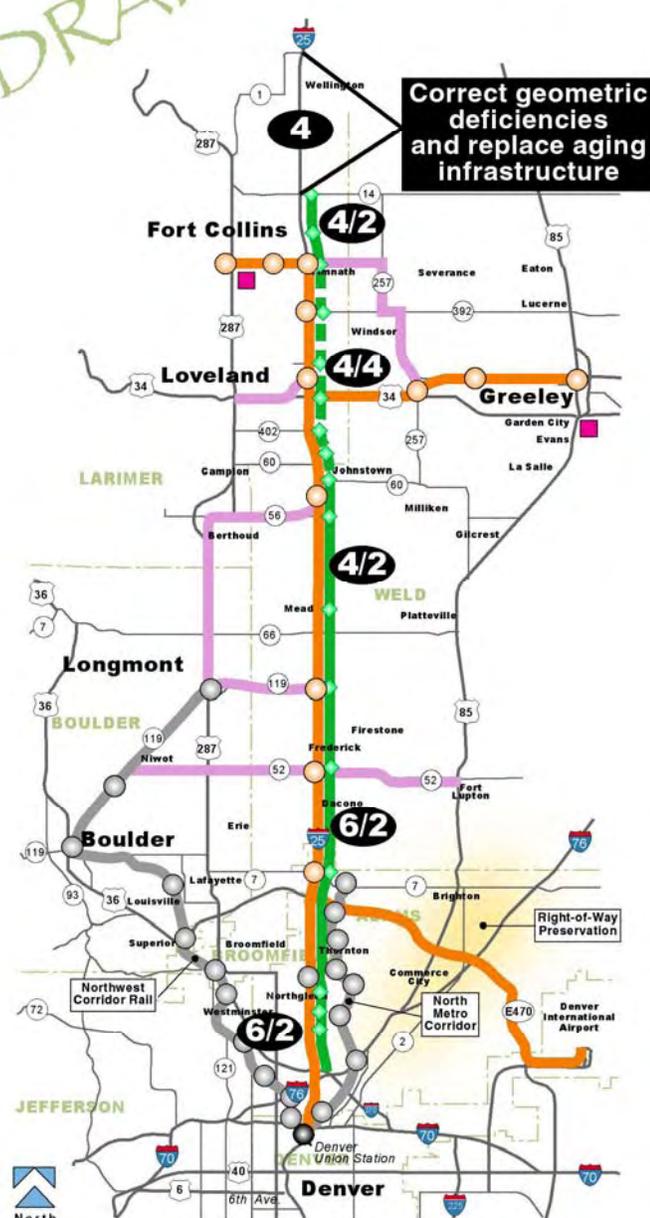
LEGEND

- 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**
- X **Number of Lanes: General Purpose/Tolled Express Lanes**
- Bus Rapid Transit Station**
- FasTracks Rail Line**
- FasTracks 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.



NOT TO SCALE

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

Figure 4. Package B Alternative

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation

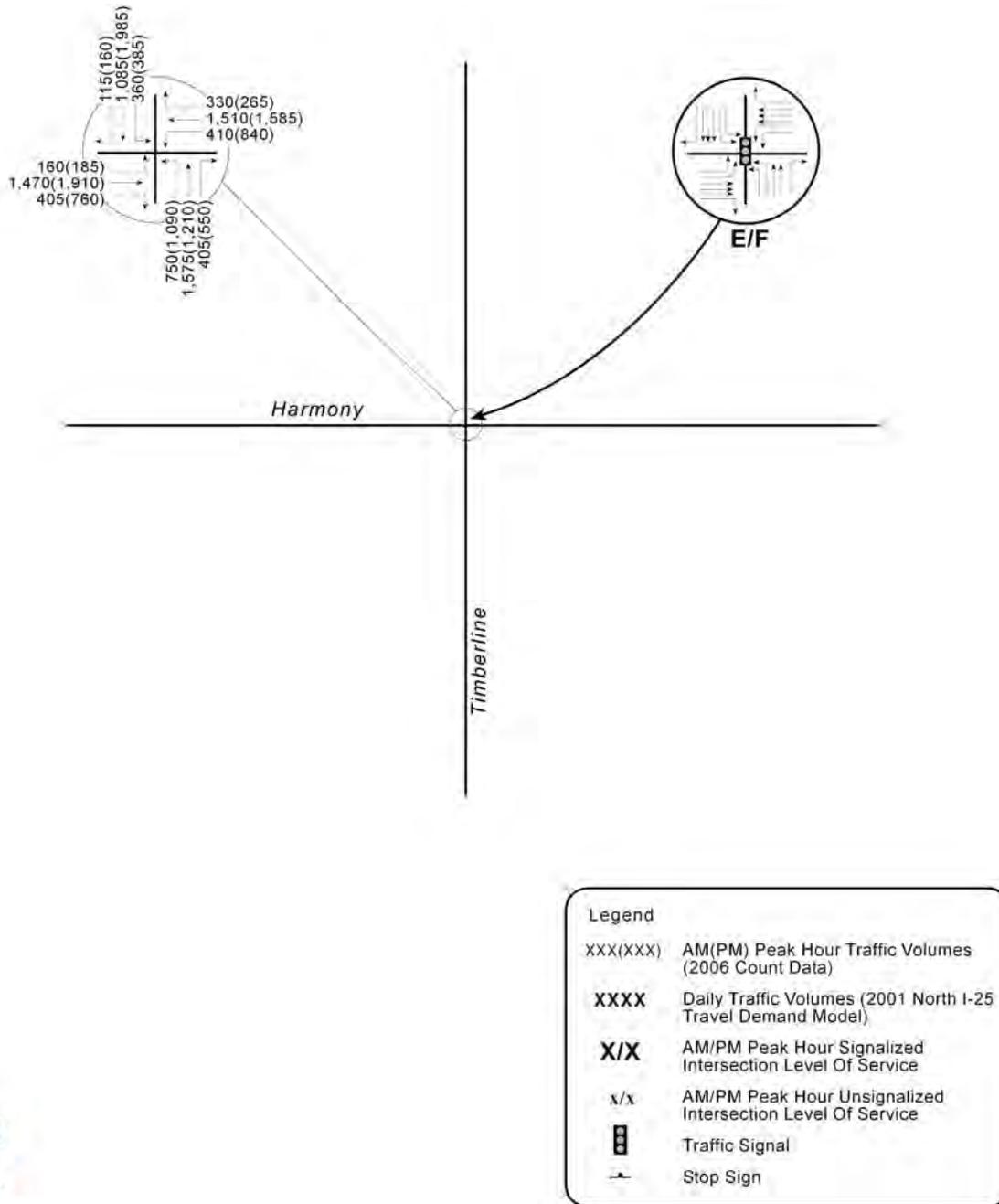


Figure 5. 2030 No Action Traffic Forecasts and Levels of Service

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation

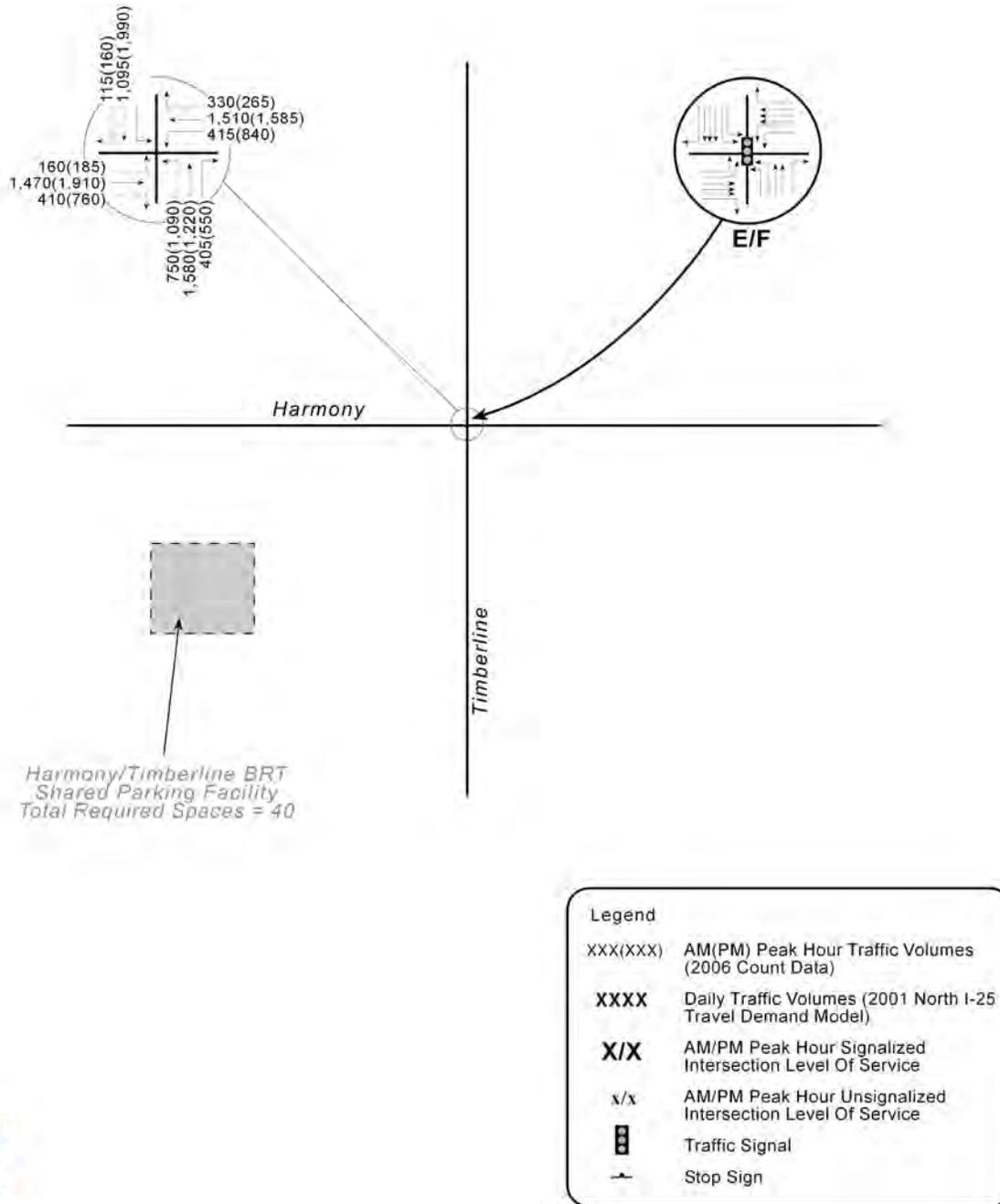


Figure 6. 2030 Package B Traffic Forecasts and Levels of Service

Park-and-Ride Trip Generation

The number of required spaces at the Harmony/Timberline park-n-ride site lot was determined using the methodology outlined in the *North I-25 DEIS Parking Results* report (Carter & Burgess, November 2006). Because this is a shared facility, no spaces will be constructed as part of the project. Using the results of the above 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 3. 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 Harmony/Timberline BRT station and park-and-ride would be located at the existing movie theater parking lot and would require about 40 spaces. The future peak hour traffic from the proposed park-and-ride lot was determined and is shown in Table 5 below.

Table 4. Future Peak Hour Traffic from the Downtown Loveland US 34 Park-and-Ride Lot

Location	Daily Trips	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Harmony/Timberline	90	23	4	27	4	14	18

Trip Distribution

The trip distribution and assignment for the station was determined based on existing and future residential land use patterns in the vicinity of the site. It was assumed that the access to the station would be provided from Timberwood Drive just south of Harmony on Timberline. Trip distribution from the park-and-ride through the Harmony/Timberline intersection is as follows, to/from: north – 50%; south – 20%; east – 10%; west – 20%.

2030 Package B Traffic Operations

Due to the shift in travel patterns caused by the improvements to I-25, traffic operations change slightly with the implementation of Package B. However, the effect of the traffic generated by the Harmony/Timberline park-and-ride lot is minimal. Overall LOS at the Harmony/Timberline intersection does not change from the No Action alternative to Package B. The intersection is projected to operate at LOS E with 60.2 seconds of average vehicle delay and LOS F with >100

Fort Collins – Harmony & Timberline DEIS BRT Station Evaluation

seconds of average vehicle delay in the AM and PM peak hours, respectively. Figure 6 summarizes the level of service analysis for Package B.

Alternatives Evaluation Comparison

Traffic Operational Analysis

Table 5 compares the levels of service and delay at the study area intersections for the two packages. As shown there is no change in LOS at the Harmony/Timberline intersection with the implementation of Package B.

Table 5. Intersection Level of Service and Delay

Intersection	No Action		Package B	
	AM Peak	PM Peak	AM Peak	PM Peak
Harmony Rd./Timberline Rd.	LOS E (63 sec.)	LOS F (>100 sec.)	LOS E (60 sec.)	LOS F (>100 sec.)

LOS X – Level of service
- Average delay in seconds per vehicle