Fort Collins – Downtown Transit Center
DEIS Commuter Rail Station Evaluation

NORTH I-25 EIS
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August 20, 2007

Introduction

The North I-25 DEIS Package A alternative considers a single commuter rail route that would extend from the end of the planned RTD North Metro Commuter Rail Line and terminate in the city of Fort Collins. Proposed stations would be located in Erie, Longmont, Berthoud, Loveland, and Fort Collins.

The proposed commuter rail route follows the existing BNSF alignment which generally parallels the US 287 alignment from Fort Collins to Longmont. Between the Sugar Mill station in Longmont and the North Metro end-of-line station at SH-7, the alignment would parallel SH-119, WCR-7, and the UP Boulder branch. A map of the commuter rail route with station locations is provided in Figure 1.

The proposed Fort Collins Downtown Transit Center commuter rail station would be located on the BNSF rail line/Mason Street between Maple Street and Laporte Avenue. Two park-and-rides are being carried through the DEIS process for evaluation. The first park-and-ride consists of 100 parking spaces and would be located just east of Mason Street between Maple and Cherry Street. The second park-and-ride would be a two level parking garage allowing for 191 parking spaces located at the southwest corner of Mason Street and Maple Avenue. Both options have been analyzed in this report.

This report documents potential traffic impacts the proposed commuter rail station and both park-and-ride lots may have within the vicinity of the Downtown Fort Collins area and provides technical documentation of the traffic data analysis. The other commuter rail stations are addressed in separate reports.

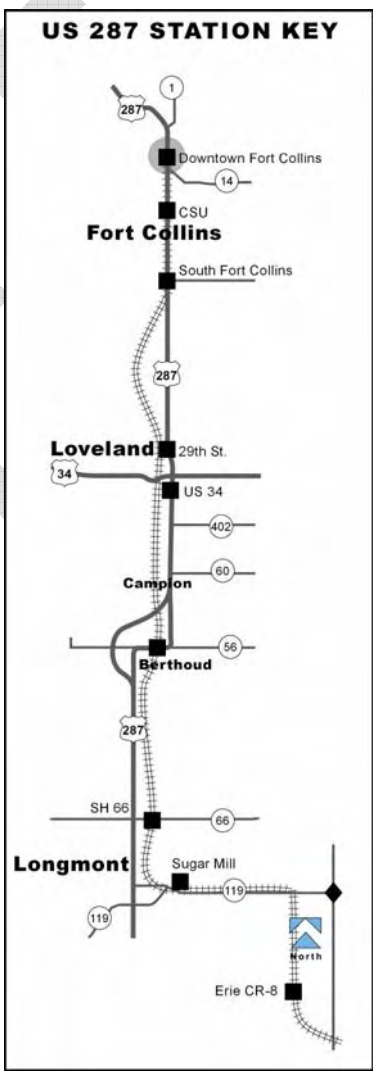

Figure 1. Vicinity Map

Existing Conditions

The proposed study area includes the following roadways and intersections.

College Avenue (US 287)

College Avenue (US 287) is a four lane, north/south major arterial that bisects downtown Fort Collins. Intersections within the area of interest on College Avenue consist of four-way traffic signals and a signalized railroad crossing. Since this is a downtown area, there is diagonal parking in the center and on both sides of College Avenue. Raised medians with landscaping are found on College Avenue at the intersections. All intersections found in the study area have designated left and right turn

lanes as well as designated crosswalks. The speed limit on College Avenue in the study area is 25 mph.

Mason Street

Another street of interest located one block to the west of College Avenue is Mason Street. Mason Street is a one-way, two-lane, northbound road with the BNSF railroad line bisecting the travel lanes. Each side of the road has a designated striped bike lane. A bus station with internal bus circulation is located on the east side of Mason Street between Laporte Avenue and Maple Street. The bus station also has a designated bulb out for busses to stop along the east side of Mason Street. Intersection control along Mason Street in the area of interest varies from stop sign control to traffic signal control. The speed limit on Mason Street in the study area is 25 mph.

Cherry Street/Willow Street/College Avenue Intersection

Cherry Street is a two lane east/west road that intersects the west side of College Avenue on the north end of downtown Fort Collins. The eastbound Cherry Street approach has designated double left turn lanes, a bike lane, and a right turn bypass. The curved UPRR railroad line crosses Cherry Street and College Avenue just south of the intersection. Approaching College Avenue from the southeast is a two lane road named Willow Street. The northwest-bound Willow Street approach has a designated left turn lane, a combination through/right turn lane, and a 4 ft wide bike lane on both sides of the street. The speed limit for the Cherry and Willow Street approaches is 25 mph. This intersection is controlled by a traffic signal.

Maple Street/Jefferson Street and College Avenue Intersection

Maple Street is an east/west two lane road located one block south of Cherry Street that intersects College Avenue from the west. This eastbound approach consists of a designated left turn lane, and a through/right lane. Diagonal parking is located on both sides of the street. Approaching from the southeast is Jefferson Street. The lane configuration on Jefferson Street tapers from four lanes to two when approaching College Avenue. Parallel parking is located on both sides of Jefferson Street where there is a four lane configuration. The Northwest-bound approach consists of a designated left turn lane, through lane, and a right turn bypass**.** The speed limit for the Maple and Jefferson Street approaches is 25 mph. This intersection is controlled by a traffic signal.

Laporte Avenue/Walnut Street/College Avenue Intersection

Laporte Avenue is a three lane, east/west road located one block south of Maple Street that intersects College Avenue from the west. The Laporte Avenue eastbound approach has a designated left turn lane, through lane, right turn lane, and a bike lane. Both sides of the street are divided by a very wide landscaped median. College Avenue is also intersected by Walnut Street from the southeast. Walnut Street is a two lane road with diagonal parking on both sides of the street. The northwest-bound approach has a designated left turn lane and through/right lane. The speed limit for the Laporte Avenue and Walnut Street approaches is 25 mph. This intersection is controlled by a traffic signal.

Laporte Avenue/Mason Street Intersection

As mentioned above, Laporte Avenue is a three lane, east/west road that intersects the one-way northbound Mason Street. Both sides of Laporte Avenue have a designated bike lane with the eastbound approach having a designated left turn lane and the westbound approach having a designated right turn lane. The speed limit on Laporte Avenue is 25 mph and this intersection is controlled by a traffic signal.

Maple Street/Mason Street Intersection

Maple Street is a minor two lane east/west road that intersects Mason Street one block north of Laporte Avenue. The only striping on this portion of Maple Street is for the crosswalks and diagonal parking that is found on both sides of the street. The speed on Maple Street is 25 mph. This intersection is controlled by two-way stop signs located on Maple Street.

Cherry Street/Mason Street Intersection

Cherry Street is a two lane east/west road that intersects Mason Street one block north of Maple Street. The intersection of Cherry Street and Mason Street is unique in that both approaches on Cherry Street and the south approach of Mason Street have railroad crossings. The BNSF railroad crossing on the east side of Mason Street is signalized in both directions. Parallel parking and bike lanes are located on both sides of Cherry Street while the center is striped as a multipurpose lane. The speed limit on Cherry Street is 25 mph. This intersection is controlled by two-way stop signs located on Mason Street.

Maple Street/Howes Street Intersection

Howes Street is a three lane, one-way, southbound road that intersects Maple Street three blocks west of College Avenue. Parallel parking is located on both sides of Howes Street while diagonal parking is located on both sides of Maple Street. This intersection is controlled by two-way stop signs located on Maple Street. Designated crosswalks are located on all four approaches. The speed limit on all four approaches is 25 mph.

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 March, 2006 at the study area intersections. Other background parameters are documented in the *DEIS Traffic Evaluation – Methodology Summary*. Figure 2a summarizes the peak hour traffic counts collected in March 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 College Avenue (US 287) between Laporte Avenue and Cherry Street is about 22,000 – 38,000 vehicles per day (vpd). ADT on Laporte Avenue is around 14,000 – 15,000 vpd. All other side streets have ADT volumes around 2,000 – 6,600 vpd.

Figure 2b and Table 2 illustrate the existing peak period levels of service at the signalized and unsignalized intersections within the study area. As shown, all of the key intersections in the study area currently operate at acceptable levels of service in 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
Cherry St./Willow St. & College Ave. (US 287)	B	C	18	23
Maple St./Jefferson St. & College Ave. (US 287)	B	B	12	15
Laporte Ave./Walnut St. & College Ave. (US 287)	B	B	14	16
Laporte Ave. & Mason St.	A	A	6	7
Maple St. & Mason St. (unsignalized)				
Eastbound Approach	B	B	11	12
Westbound Approach	B	B	11	12
Cherry St. & Mason St. (unsignalized)				
Northbound Left Turn	C	C	18	19
Northbound Through	C	C	17	16
Northbound Right Turn	B	B	11	12
Southbound Approach	C	C	18	24
Maple St. & Howes St. (unsignalized)				
Eastbound Approach	B	B	11	10
Westbound Approach	B	B	12	11

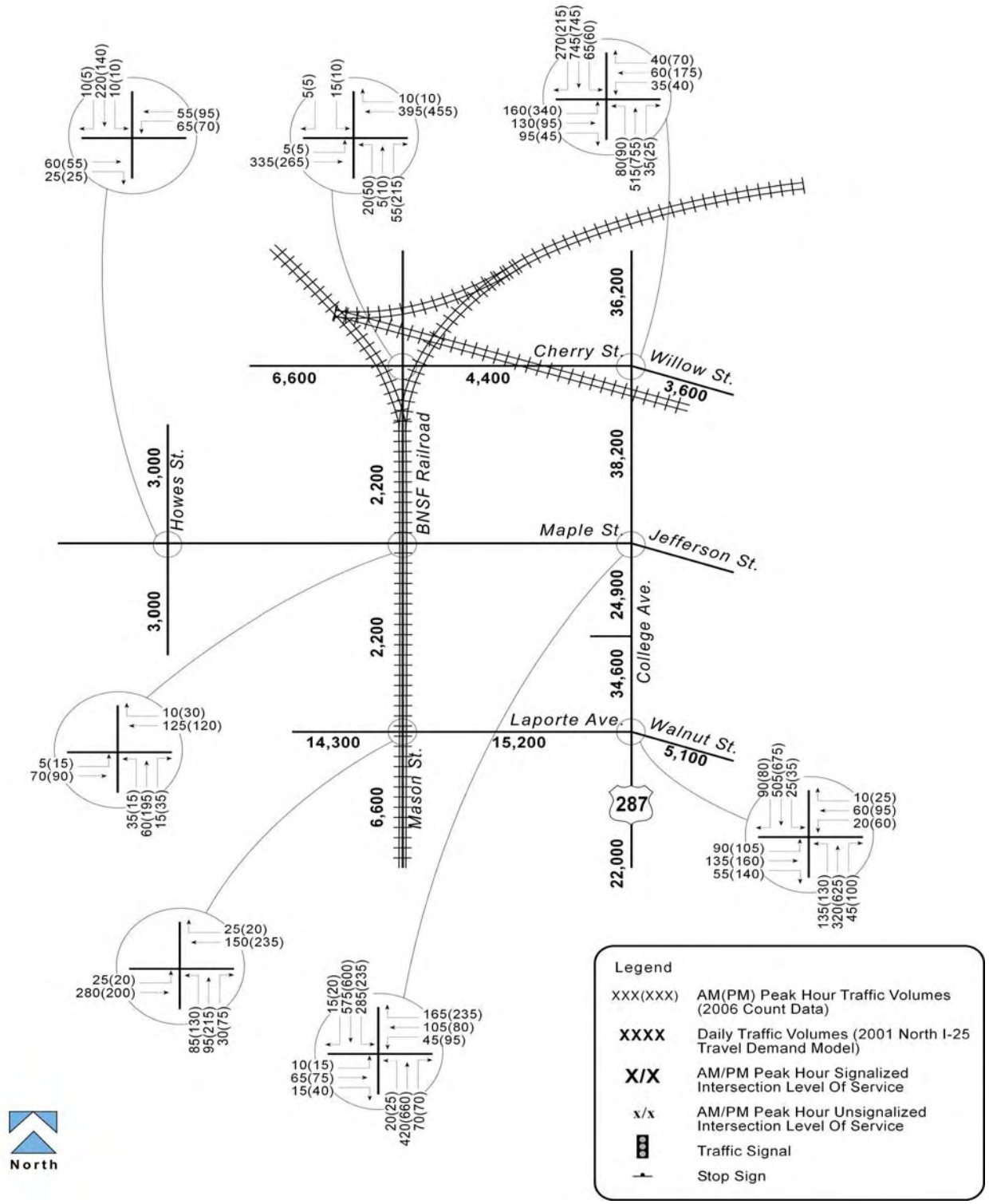

Figure 2a. Existing Conditions – Volumes

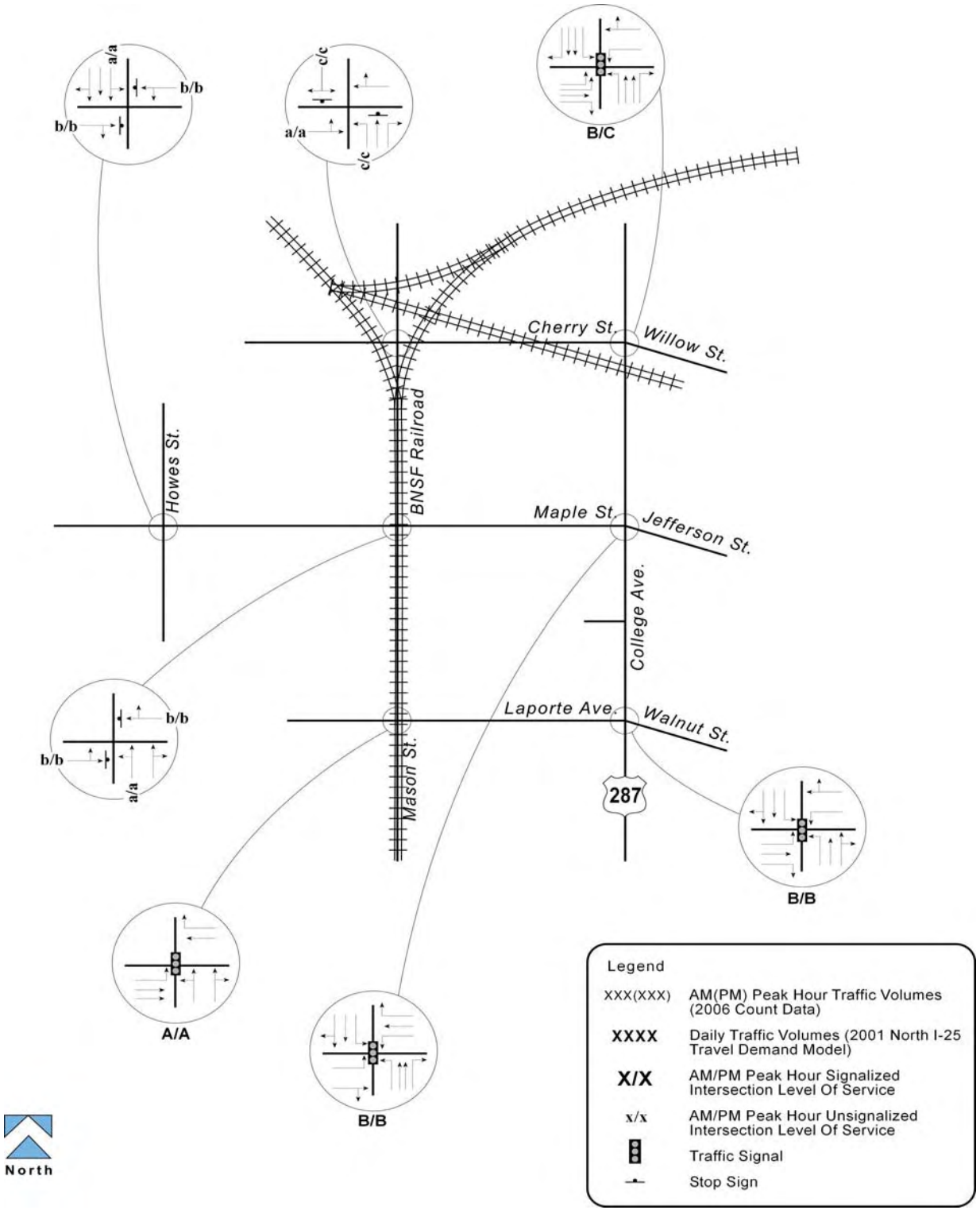

Figure 2b. Existing Conditions – Levels of Service

Figure 3. No Action Alternative

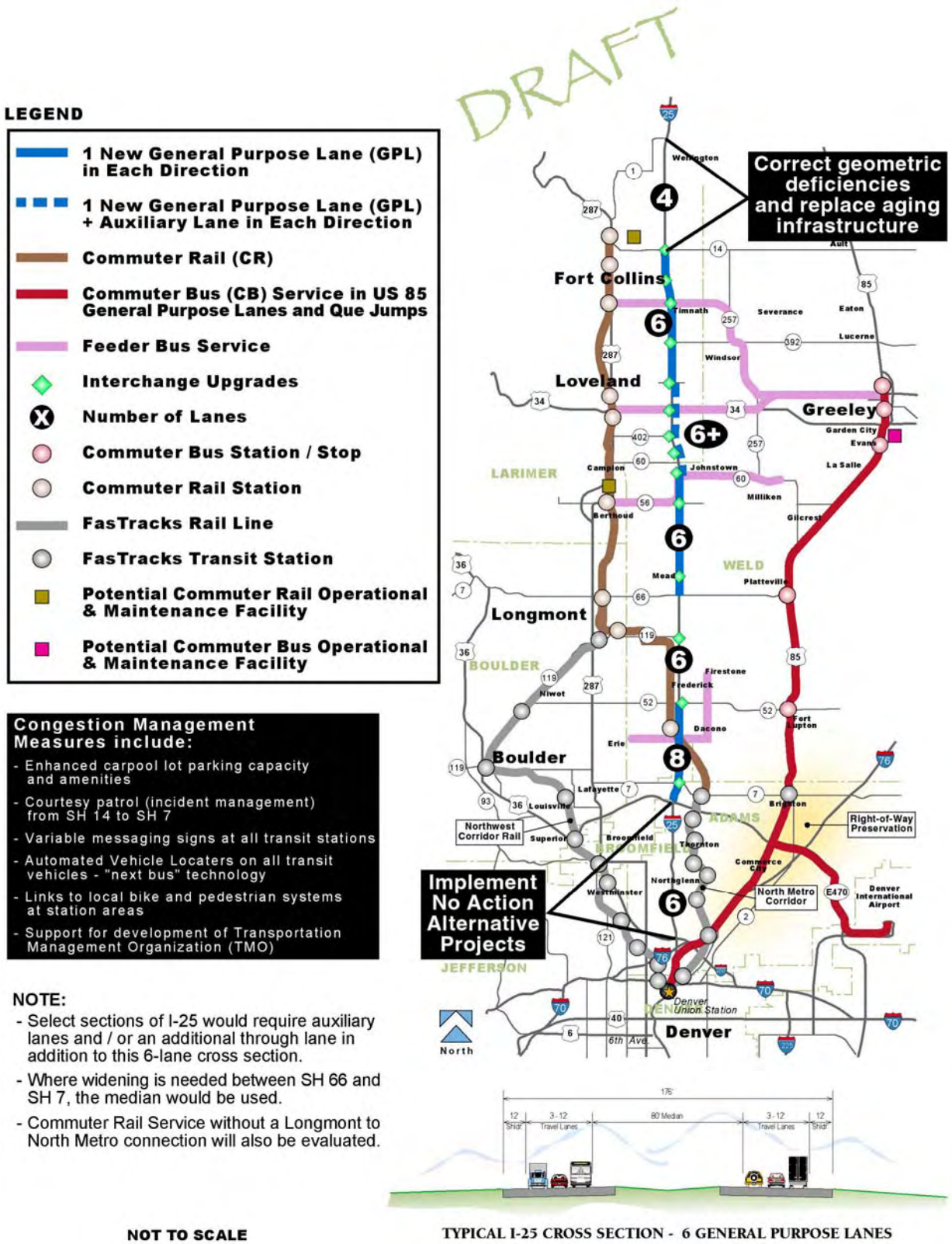

Figure 4. Package A Alternative

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 Collins Downtown 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 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 traffic on College Avenue (US 287) between Laporte Avenue and Cherry Street is about 30,000 – 52,000 vehicles per day (vpd). ADT on Laporte Avenue/Walnut Street is around 8,000 – 17,000 vpd. All other side streets have ADT volumes around 3,000 – 10,000 vpd. This represents significant growth in the area compared to existing conditions.

During the AM and PM peak hours, both the northbound and southbound lanes on College Avenue (US-287) carry heavy amounts of traffic and the volume split is nearly equal in both directions. As noted earlier, these No Action volumes were also assumed to represent Package B results.

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 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.

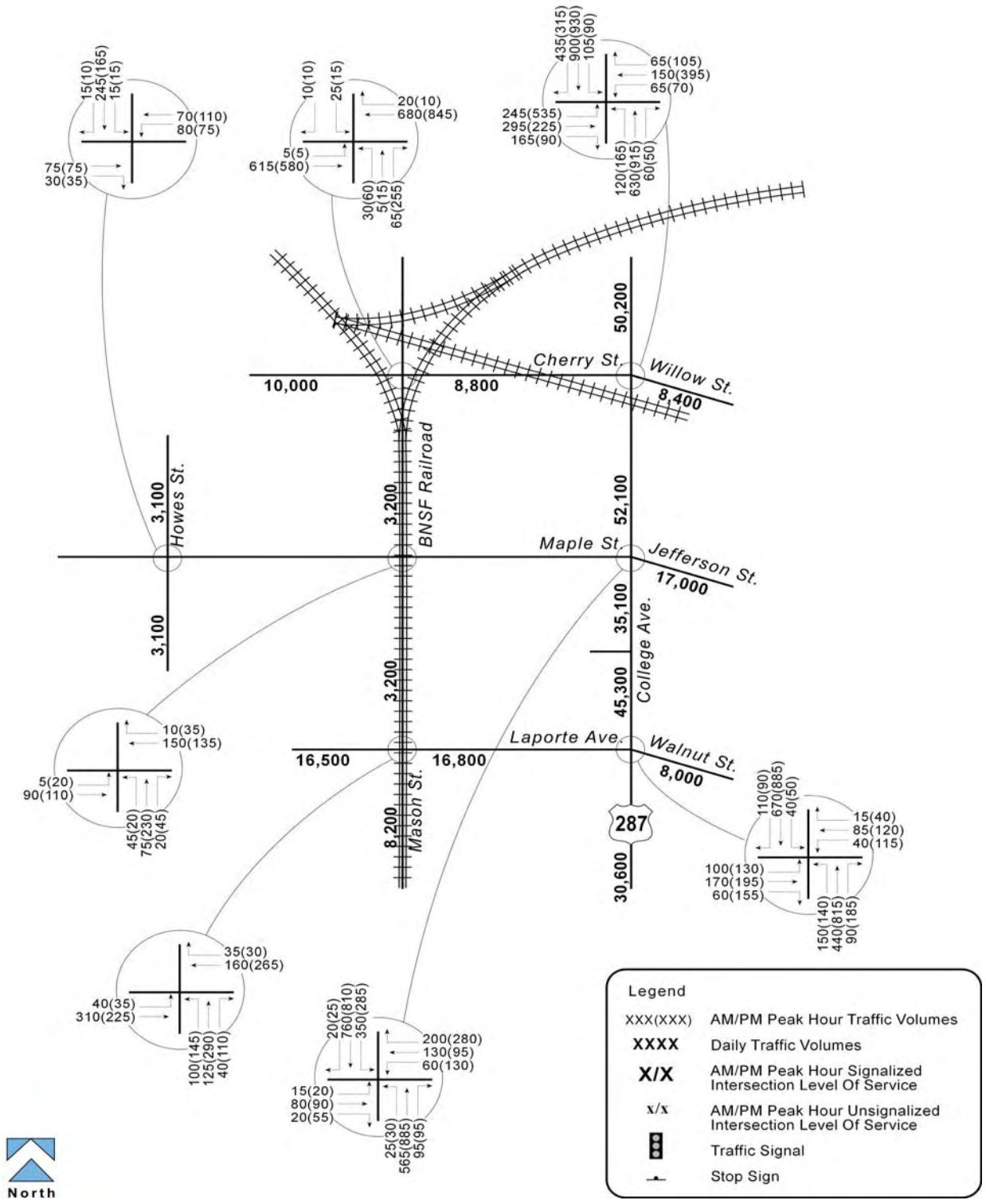

Figure 5. 2030 No Action Forecasts

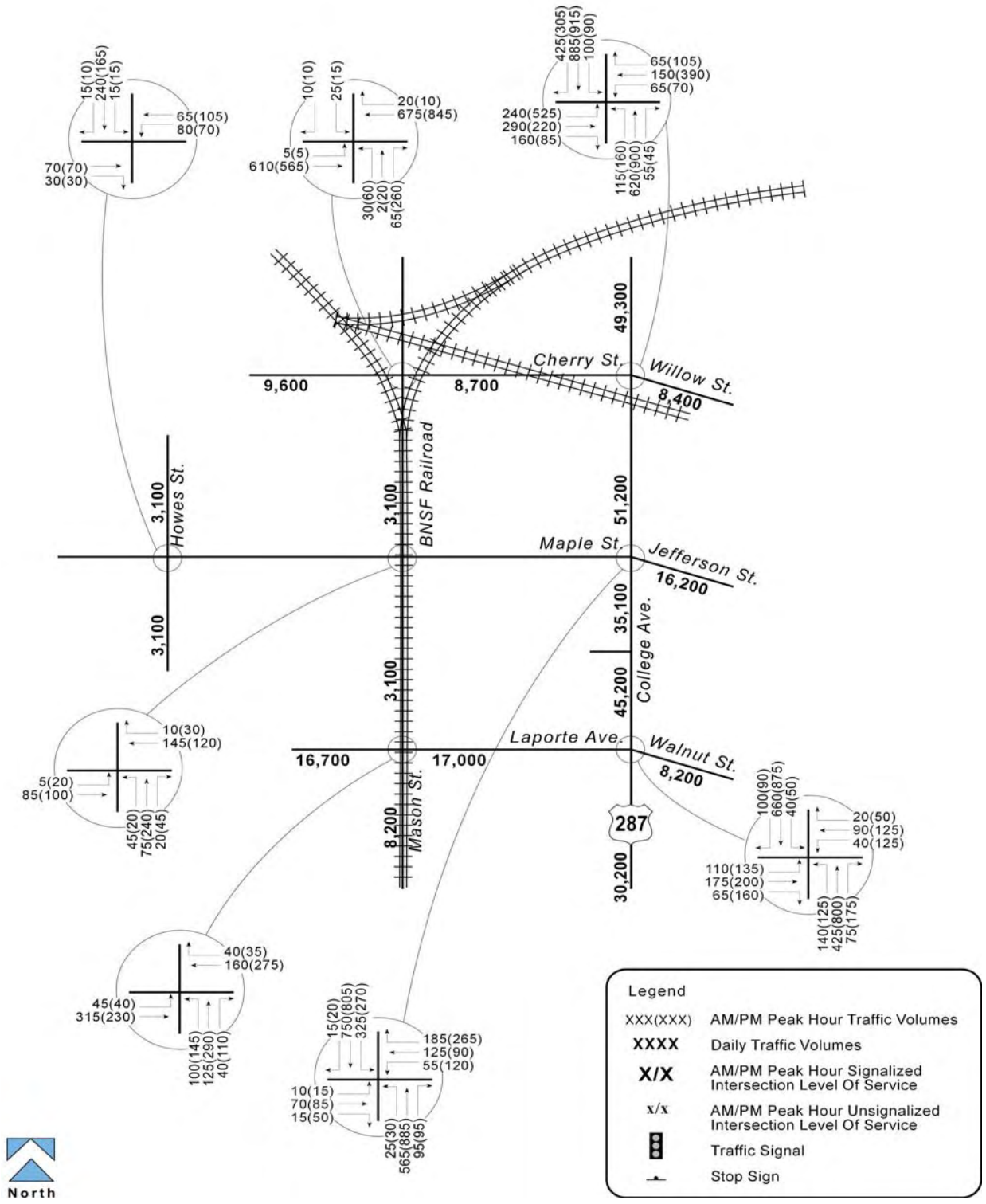

Figure 6. 2030 Package A Background Traffic Forecasts

Park-and-Ride Trip Generation

The number of proposed spaces at the Fort Collins Downtown 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 3.

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%

Two potential sites for the computer rail station have been evaluated for Downtown Fort Collins. The first, Site A, with a total of 100 parking spaces would be located on the northeast corner of the Mason Street/Maple Street intersection with access provided from Mason Street. The second, Site C, is a parking structure with 191 parking spaces that would be located on the southwest corner of the Mason Street/Maple Street intersection with access provided from Maple Street. The future peak hour traffic from the proposed station is shown in Table 4.

Table 4. Future Peak Hour Traffic from the Downtown Transit Center Park-and-Ride Lots

Location	Daily Trips	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Site A PNR Lot	120	58	8	66	9	36	45
Site C PNR Lot	230	112	16	128	17	68	85

Trip Distribution

The distribution of trips to and from each proposed park-and-ride site was estimated based on assumptions about likely origins and destinations of trips from residential land uses. It was assumed that the access to park-and-ride lot site A would be provided from Mason Street. All trips from this lot would use Mason Street as the primary route to access the surrounding streets. Access to site C would occur at an existing alley intersection on Maple St. west of Mason St. The peak hour trip generation and distribution estimates for the proposed park-and-ride lots are shown in Figures 7a and 7b. 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 Figures 8a and 8b.

2030 No Action Traffic Operations

Figure 9 and Table 5 show the projected levels of service at the study area intersections under the No Action scenario. As indicated, all of the intersections within the study area would operate at acceptable levels of service during both AM and PM peak hours. However, after examining the operations of individual approaches, it is clear that some operate at unacceptable levels of service. During the PM peak hour, the eastbound left turn lane and the westbound through/right turn lane of the Cherry Street and College Avenue intersection would operate at an unacceptable LOS E. Both have considerable delay. The other intersection that would experience unacceptable levels of service is Cherry and Mason Street. The northbound left turn lane would operate at LOS F during both AM and PM peak hours with considerable amounts of delay. The northbound through
lane would operate at an unacceptable LOS F during the PM peak hour. Finally, the southbound approach would operate at LOS F during both AM and PM peak hours with considerable delay.

Table 5. 2030 No-Action Intersection LOS and Delay

Intersection / Movement	Level of Service		Delay (seconds)	
	AM	PM	AM	PM
Cherry St./Willow St. & College Ave. (US 287)	C	D	26	44
Maple St./Jefferson St. & College Ave. (US 287)	B	C	15.8	24
Laporte Ave./Walnut St. & College Ave. (US 287)	B	C	15.9	20
Laporte Ave. & Mason St.	A	A	6	7
Maple St. & Mason St. (unsignalized)				
Eastbound Approach	B	B	11	14
Westbound Approach	B	B	12	13
Cherry St. & Mason St. (unsignalized)				
Northbound Left Turn	F	F	53	>100
Northbound Thru	D	F	33	71*
Northbound Right Turn	B	C	14	22
Southbound Approach	F	F	56	>100
Maple St. & Howes St. (unsignalized)				
Eastbound Approach	B	B	12	11
Westbound Approach	B	B	12	13

2030 Package A Traffic Operations

Total Traffic LOS

Figure 10a depicts projected conditions for site A and figure 10b depicts conditions for site C. With either proposed site, as summarized in Table 6, all evaluated intersections within the study area would operate at acceptable levels of service during both AM and PM peak hours under the Package A scenario. However, after investigating the operations of individual approaches, it is clear that some operate at unacceptable levels of service. During the PM peak hour, the eastbound left turn lane and the westbound through/right turn lane of the Cherry Street and College Avenue intersection would operate at an unacceptable LOS E. Both have considerable delay. The other intersection that would experience unacceptable levels of service is Cherry

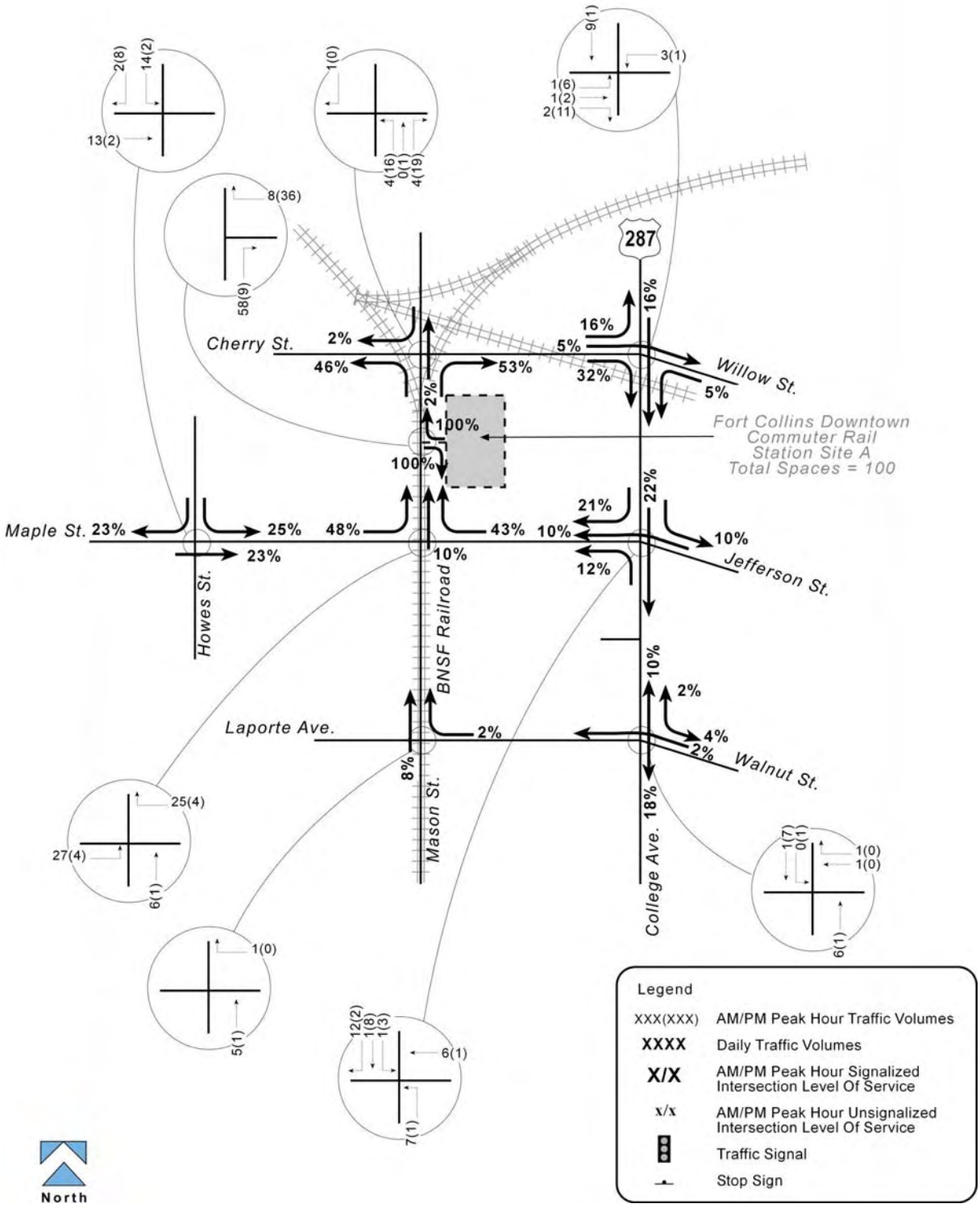

Figure 7a. Park and Ride Lot Trip Distribution and Assignment – Site A

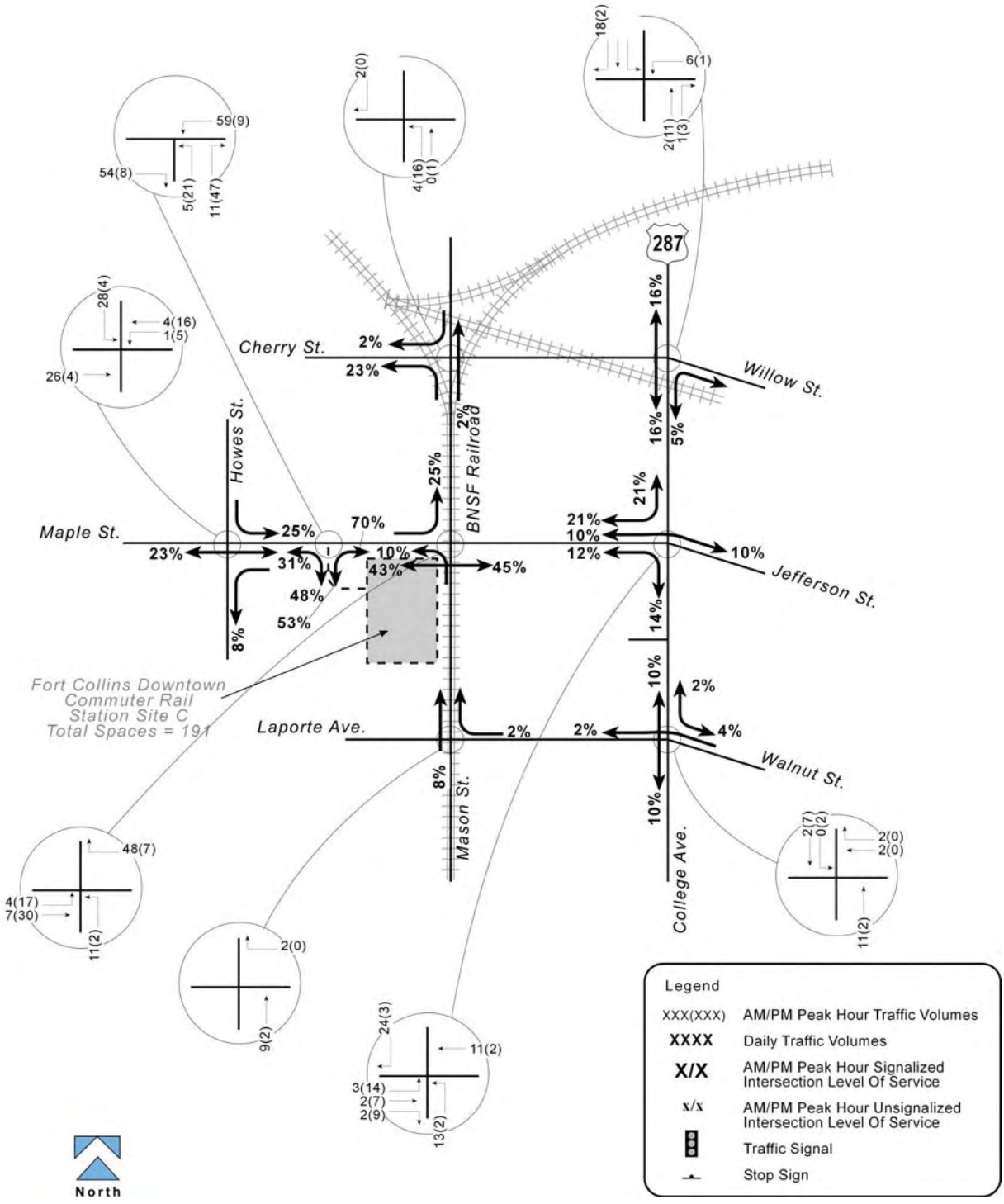

Figure 7b. Park and Ride Lot Trip Distribution and Assignment – Site C

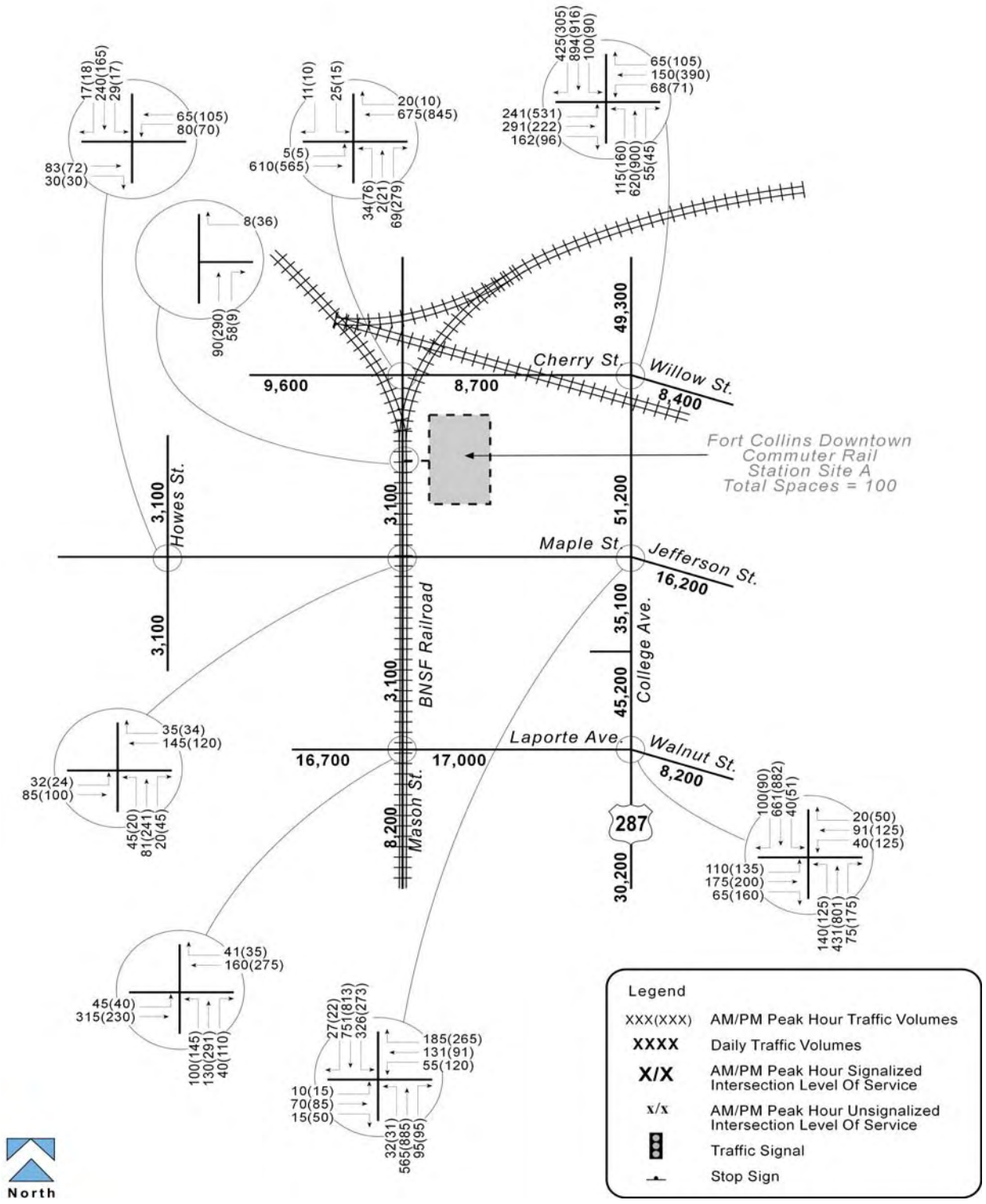

Figure 8a. 2030 Package A Total Traffic Forecasts – Site A

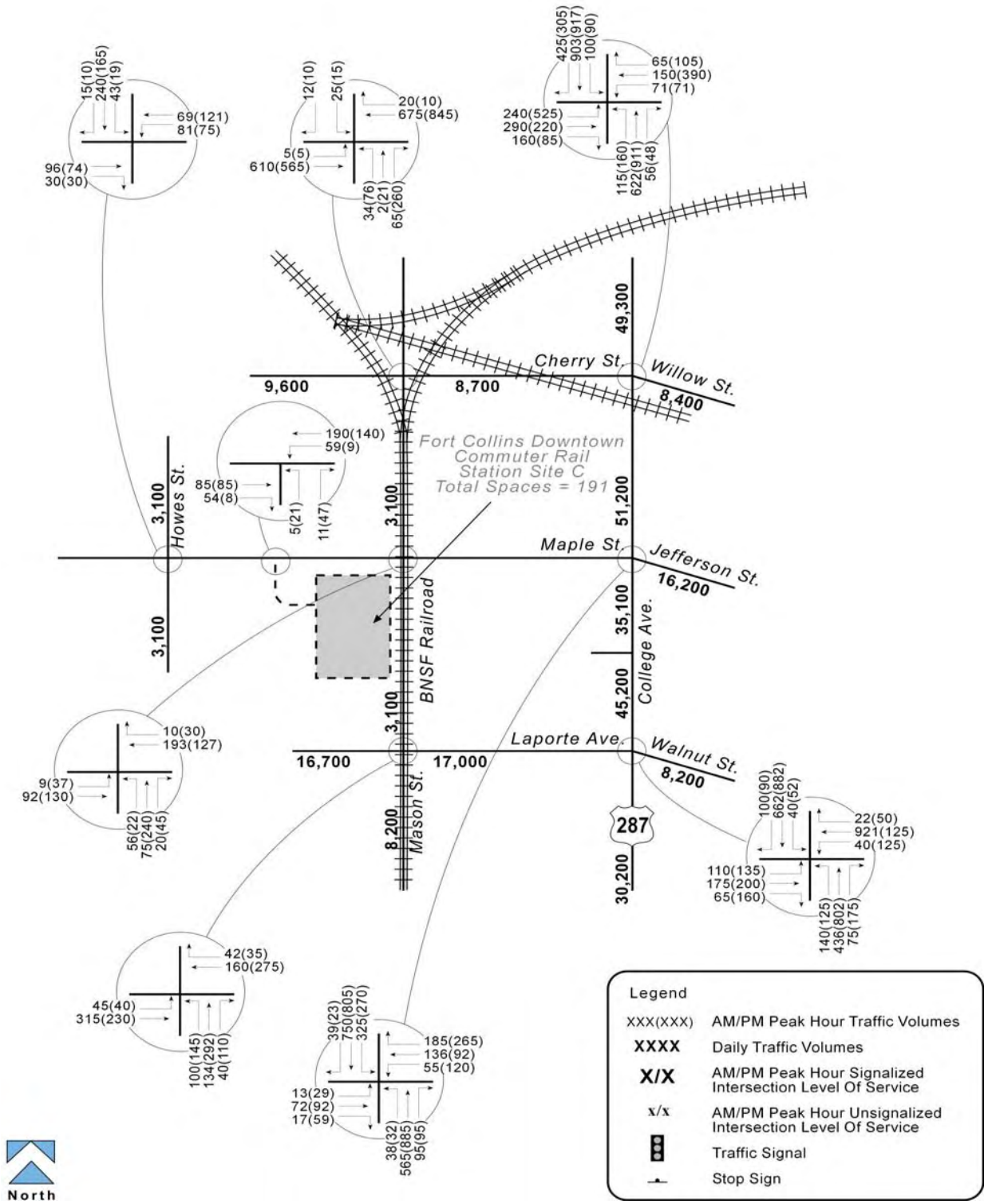

Figure 8b. 2030 Package A Total Traffic Forecasts – Site C

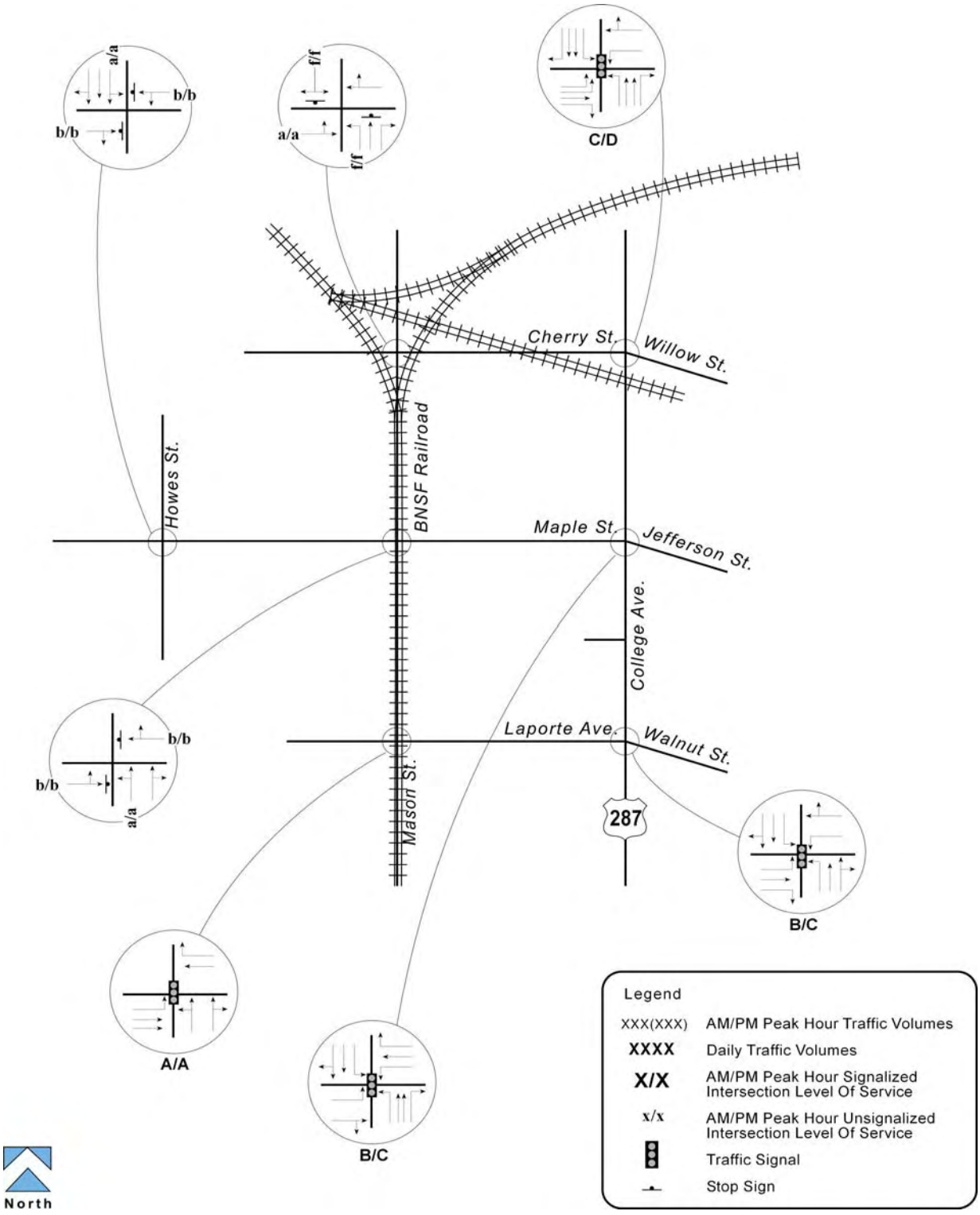

Figure 9. 2030 No Action Levels of Service

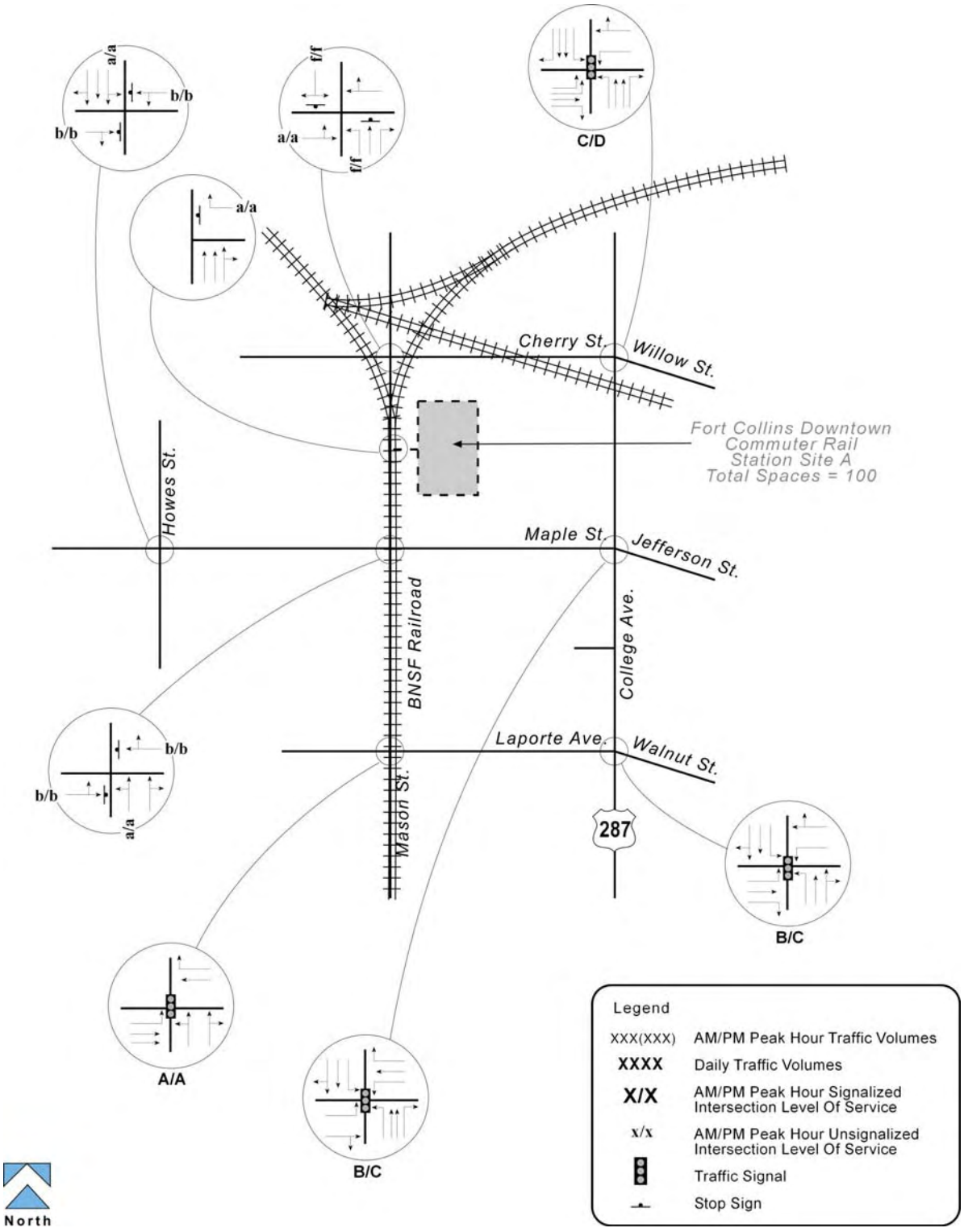

Figure 10a. 2030 Package A Total Levels of Service – Site A

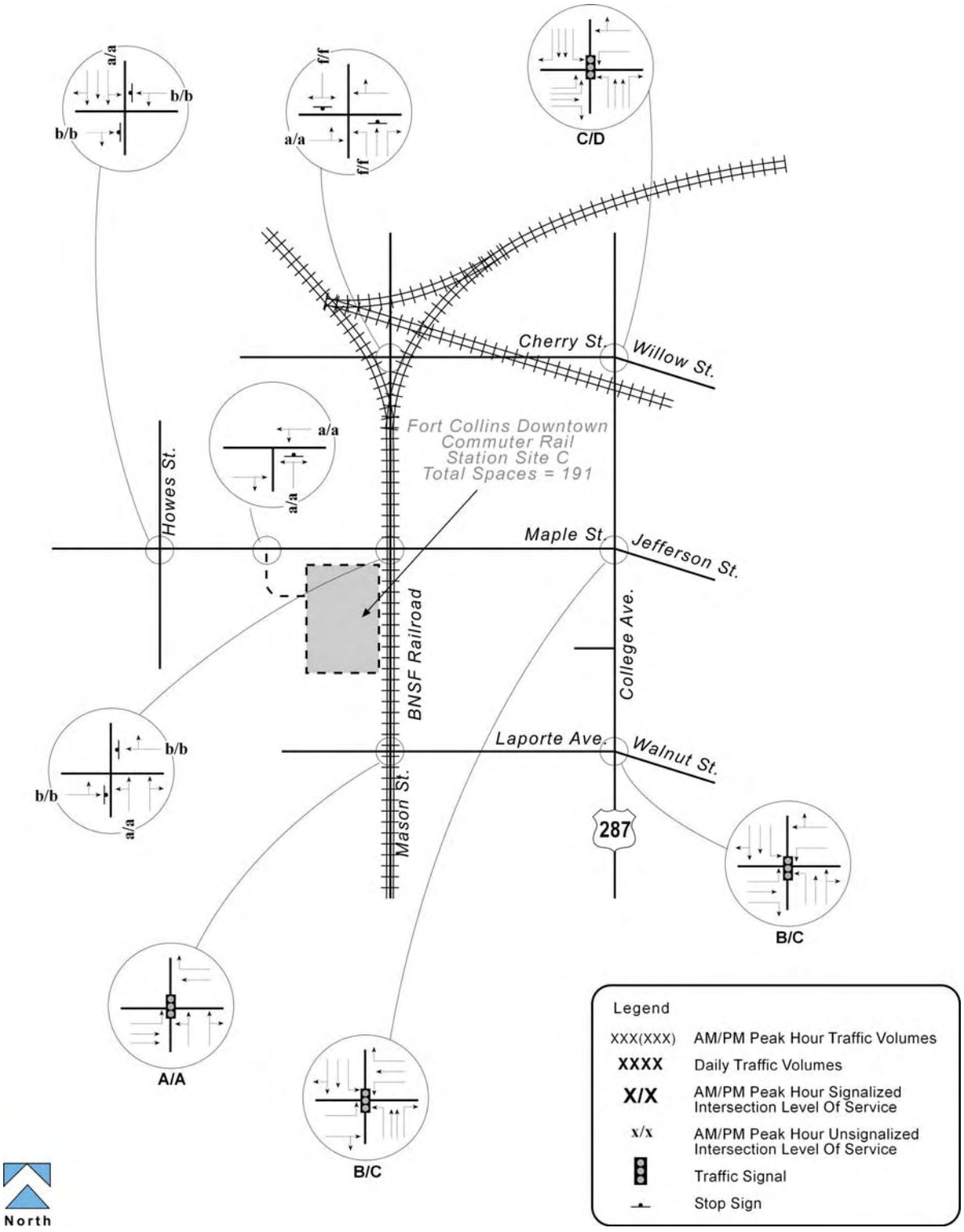

Figure 10b. 2030 Package A Total Levels of Service – Site C

and Mason Street. The northbound left turn lane would operate at LOS F during both AM and PM peak hours resulting in considerable queue length and delay with significantly greater amounts during the PM peak hour. The northbound through lane would operate at an unacceptable LOS F during the PM peak hour. Finally, the southbound approach would operate at LOS F during both AM and PM peak hours resulting in considerable queue length and delay.

Table 6 summarizes the 2030 Package A LOS and average vehicle delay for site A at the study area intersections.

Table 6. 2030 Package A Intersection LOS and Delay

Intersection / Movement	Level of Service		Delay (seconds)	
	AM	PM	AM	PM
	Site A Scenario/Site C Scenario			
Cherry St./Willow St. & College Ave. (US 287)	C/C	D/D	25/25	43/43
Maple St./Jefferson St. & College Ave. (US 287)	B/B	C/C	15/16	23/22.
Laporte Ave./Walnut St. & College Ave. (US 287)	B/B	C/C	16/16	201/21
Laporte Ave. & Mason St.	A/A	A/A	6/6	7/7
Maple St. & Mason St. (unsignalized)				
Eastbound Approach	B/B	B/B	12/12	14/15
Westbound Approach	B/B	B/B	12/13	13/13
Cherry St. & Mason St. (unsignalized)				
Northbound Left Turn	F/F	F/F	55/55	>100/>100
Northbound Through	D/D	F/F	33/33	77/77
Northbound Right Turn	B/B	C/C	14/14	24/22
Southbound Approach	F/F	F/F	55/53	>100/>100
Maple St. & Howes St. (unsignalized)				
Eastbound Approach	B/B	B/B	12/13	11/11
Westbound Approach	B/B	B/B	14/15	13/13
Site A Access (unsignalized)				
Westbound Right Turn	A/-	A/-	9/-	9/-
Site C Access (unsignalized)				
Northbound Approach	-/A	-/A	-/10	-/10

Proposed Mitigation

The Package A alternative includes six general purpose lanes on I-25 and commuter rail in addition to the proposed commuter bus routes. This would result in more trip attractions towards I-25 lowering the average daily traffic and peak hour traffic volumes on US 287. However, the

Cherry St./Mason St. intersection would operate at poor levels of service in both the No Action and Package A alternatives. This intersection may require future signalization and operations should be monitored for signal warrant analysis.

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, traffic generated by the proposed park-and-ride would have little effect on traffic operations at key intersections in the area. Still, improvements to some intersections may be required by year 2030, based on No Action conditions.

Table 7. Intersection Level of Service and Delay

Intersection	No Action		Package A (Site A)		Package A (Site C)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Cherry St./Willow St. & College Ave. (US 287)	LOS C (26	LOS D (44)	LOS C (25)	LOS D (43)	LOS C (25)	LOS D (43)
Maple St./Jefferson St. & College Ave. (US 287)	LOS B (16)	LOS C (24)	LOS B (15)	LOS C (23)	LOS B (16)	LOS C (22)
Laporte Ave./Walnut St. & College Ave. (US 287)	LOS B (16)	LOS C (20)	LOS B (16)	LOS C (21)	LOS B (16)	LOS C (21)
Laporte Ave. & Mason St.	LOS A (6)	LOS A (7)	LOS A (6)	LOS A (7)	LOS A (6)	LOS A (7)
Maple St. & Mason St. (unsignalized)						
Eastbound Approach	LOS B (11)	LOS B (14)	LOS B (12)	LOS B (14)	LOS B (12)	LOS B (15)
Westbound Approach	LOS B (12)	LOS B (13)	LOS B (12)	LOS B (13)	LOS B (13)	LOS B (13)
Cherry St. & Mason St. (unsignalized)						
Northbound Left Turn	LOS F (53)	LOS F (>100)	LOS F (55)	LOS F (>100)	LOS F (55)	LOS F (>100)
Northbound Thru	LOS D (33)	LOS F (71)	LOS D (33)	LOS F (77)	LOS D (33)	LOS F (77)
Northbound Right Turn	LOS B (14)	LOS C (22)	LOS B (14)	LOS C (24)	LOS B (14)	LOS C (22)
Southbound Approach	LOS F (56)	LOS F (>100)	LOS F (55)	LOS F (>100)	LOS F (53)	LOS F (>100)
Maple St. & Howes St. (unsignalized)						
Eastbound Approach	LOS B (12)	LOS B (11)	LOS B (12)	LOS B (11)	LOS B (13)	LOS B (11)
Westbound Approach	LOS B (12	LOS B (13)	LOS B (14)	LOS B (13)	LOS B (15)	LOS B (13)

Table 7. Intersection Level of Service and Delay (continued)

Intersection	No Action		Package A (Site A)		Package A (Site C)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Park and Ride Access – Site A (unsignalized)						
Westbound Right Turn	N/A	N/A	LOS A (9)	LOS A (9)	N/A	N/A
Park and Ride Access – Site C (unsignalized)						
Northbound Approach	N/A	N/A	N/A	N/A	LOS A (10)	LOS A (10)

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