

Longmont – Sugar Mill DEIS Commuter Rail Station Evaluation

August 20, 2007

Introduction

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

Three locations for the station and park-and-ride lot are under consideration in southern Longmont. The first park-and-ride site would be located west of the historic Sugar Mill site; the second would be located just northwest of the Sugar Mill with access to Rogers Road; and the third would be located just west of the SH 119/County Line Road intersection. All three locations would be built with 150 parking spaces.

This report documents potential traffic impacts the proposed commuter rail station and lot may have within the vicinity of the proposed sites and provides technical documentation of the traffic data analysis. The other commuter rail stations are addressed in separate reports.

Existing Conditions

The proposed study area includes the following major roadways and intersections:

Ken Pratt Blvd./SH 119

Ken Pratt Blvd. was constructed in 2003 as a bypass for SH 119 through Longmont. It runs east-west through south Longmont as a four lane principal arterial. In the vicinity of the proposed BRT station, it has a speed limit of 50 mph and serves as the major regional east-west arterial in the fast-growing area of southeast Longmont.

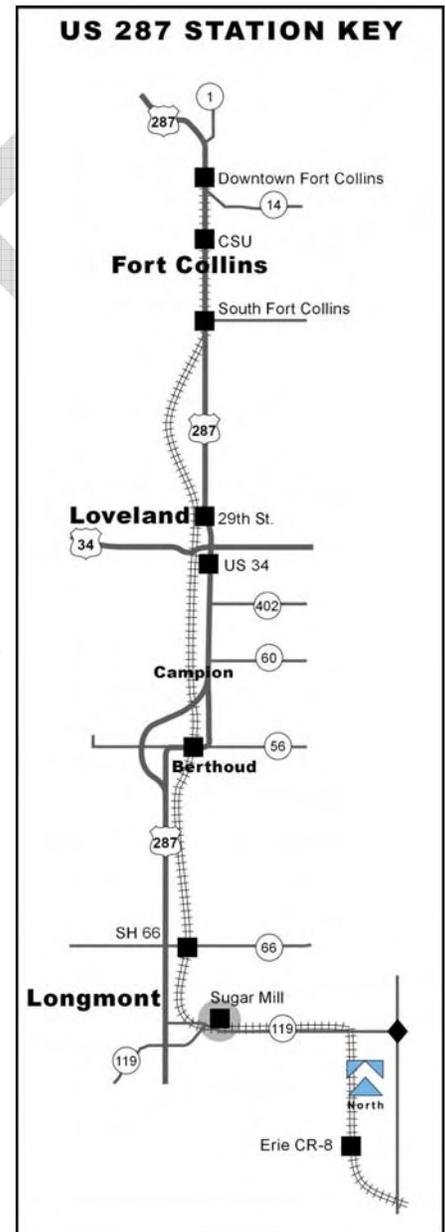


Figure 1. Vicinity Map

County Line Road

County Line Road runs north-south along the border between Boulder and Weld counties. In the vicinity of the proposed BRT station, County Line Road is a two-lane minor arterial with a speed limit of 45 mph. It intersects SH 119 at a signalized intersection. This intersection was rebuilt in 2003, as Ken Pratt Blvd. was completed. The intersection geometry on the eastbound and westbound approaches consists of two through lanes with exclusive single left- and right-turn lanes. The northbound approach consists of a shared through/right lane and a left-turn lane, and the southbound approach consists of one through lane with a left-turn and a channelized right turn lane with a westbound acceleration lane.

3rd Avenue

3rd Avenue was formerly SH 119 through Longmont prior to the construction of Ken Pratt Blvd. and still serves as a major east-west roadway in the area. In the vicinity of the proposed BRT station, 3rd Avenue is a four lane principal arterial with a speed limit of 45 mph. It intersects Ken Pratt Blvd. at a signalized intersection. The intersection geometry on the eastbound and westbound approaches consists of two through lanes with exclusive single left- and right-turn lanes. The northbound approach consists of two through lanes with exclusive left- and right-turn lanes. The southbound approach consists of two through lanes with two left-turn lanes and a right-turn lane. The northbound, southbound, and westbound right turns are all channelized with acceleration lanes.

Alpine Street

Alpine Street is two lane collector street that serves the residential neighborhood to the north of the proposed BRT station. Near the historic Sugar Mill, Alpine St. curves to the east and becomes Sugar Mill Road. It has a speed limit of 25 mph.

Alpine Street/Rogers Road Intersection

This intersection is a two-way stop sign controlled intersection with stop signs on Alpine Street. All four approaches to the intersection are single lane.

Rogers Road/Weaver Park Road Intersection

This intersection is a two-way stop sign controlled intersection with stop signs on Weaver Park Rd. All four approaches to the intersection are single lane.

Sugar Mill Road/119th Street Intersection

This intersection is a stop sign controlled intersection with a stop sign on 119th Street. All three approaches to the intersection are single lane.

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

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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 January, 2007 at the study area intersections. Other background parameters are documented in the *DEIS Traffic Evaluation – Methodology Summary*. Figures 2a and 2b summarize the traffic counts and existing average daily traffic (ADT) at the key intersections in the vicinity of Sites A and G and Site E, respectively. As shown, the ADT on SH 119 in the study area is about 39,000 vehicles per day (vpd), and the ADT on County Line Road is about 1,500 – 2,000 vpd.

Figures 2a and 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	Level of Service		Delay (seconds)	
	AM Peak	PM Peak	AM Peak	PM Peak
Ken Pratt Blvd. (SH 119)/3rd Ave.	B	C	15	20
Ken Pratt Blvd. (SH 119)/County Line Road	C	C	22	26
Alpine St./Rogers Rd. (unsignalized)				
Northbound Approach	A	A	9	9
Southbound Approach	A	A	9	9
Sugar Mill Rd./N 119th St. (unsignalized)				
Northbound Approach	A	A	9	9
Weaver Park Rd./Rogers Rd. (unsignalized)				
Southbound Approach	A	A	9	9

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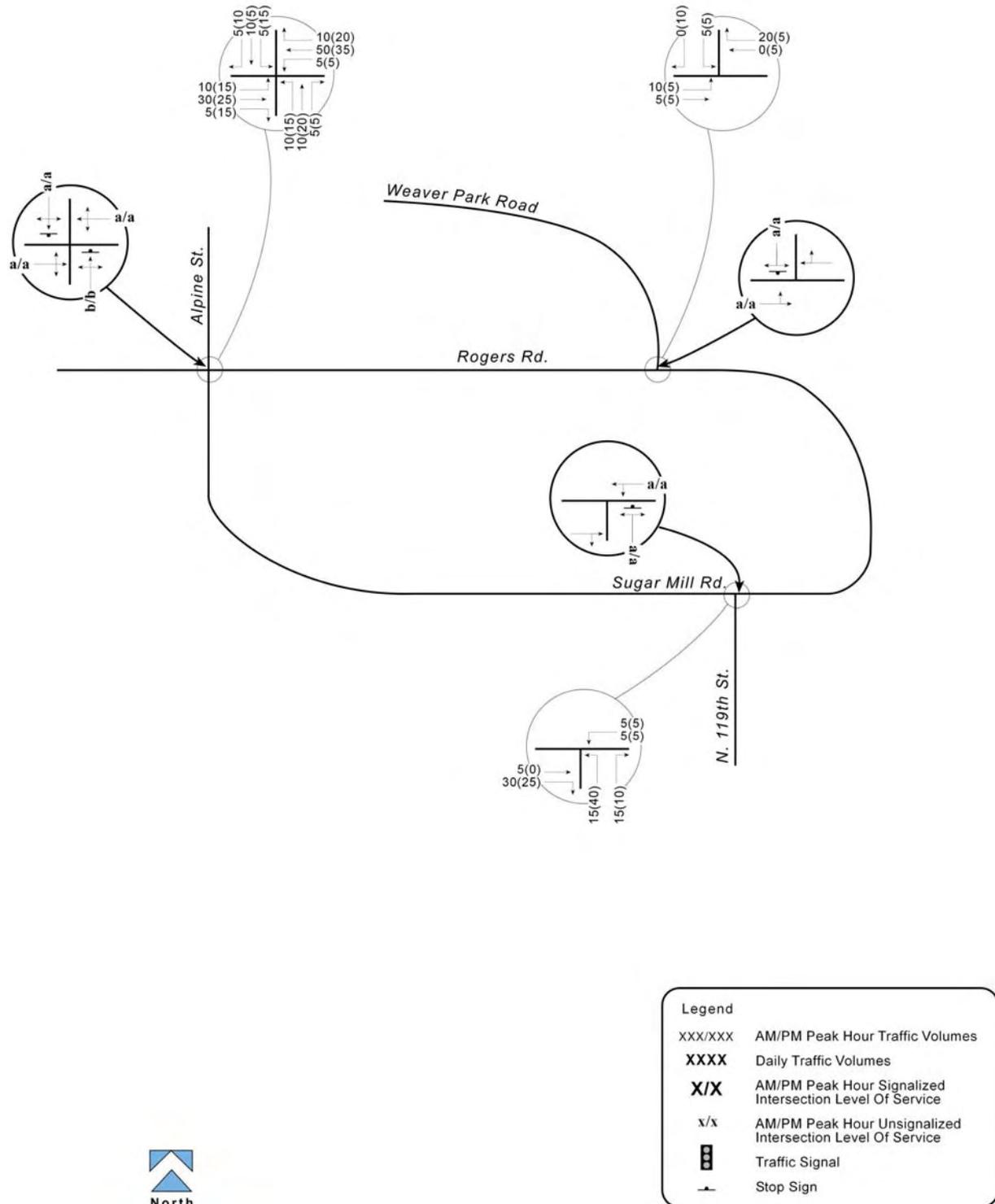


Figure 2a. Existing Conditions – Sugar Mill Area

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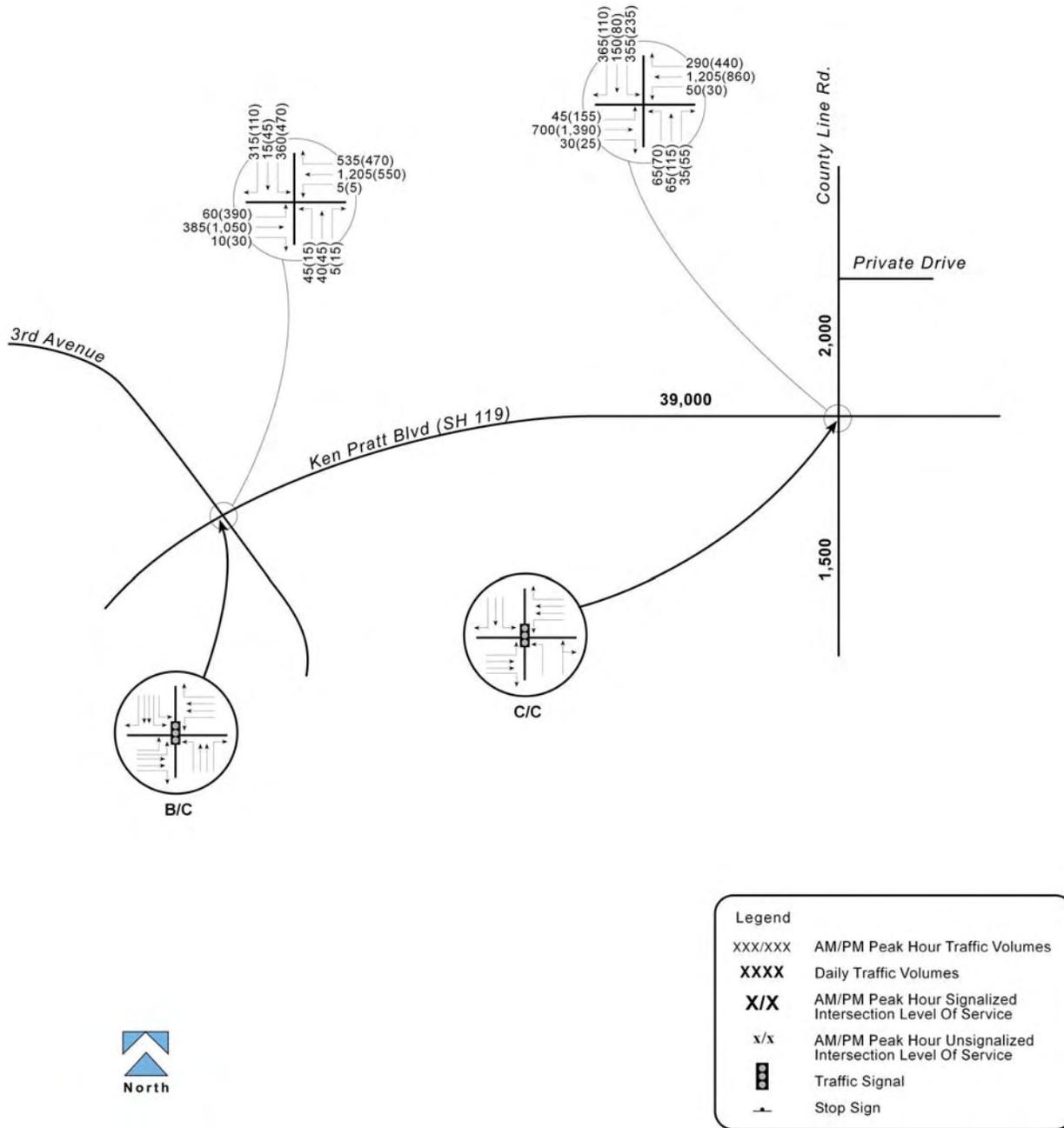


Figure 2b. Existing Conditions – County Line Area

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 Sugar Mill 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 was found to differ greatly from existing conditions in the area due to the construction of Ken Pratt Blvd. in 2003. Therefore, the DRCOG Travel Demand Model – year 2005 was used in conjunction with the North I-25 Travel Demand Model – 2030 No Action, and 2030 Package A. Results from these models were utilized to calculate the growth factors over a 25 year period.

Since the actual traffic counts were conducted in year 2007, the growth factors were adjusted to reflect a 23 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 Figures 5a and 5b. As shown, the average daily volume on SH 119 in the study area is around 56,000 – 66,000 vehicles per day (vpd), and on County Line Road the ADT is about 11,000 – 20,000 vpd. This represents significant growth in the area compared to existing conditions.

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 Figures 6a (sites A and G) and 6b (site E) – 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.

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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

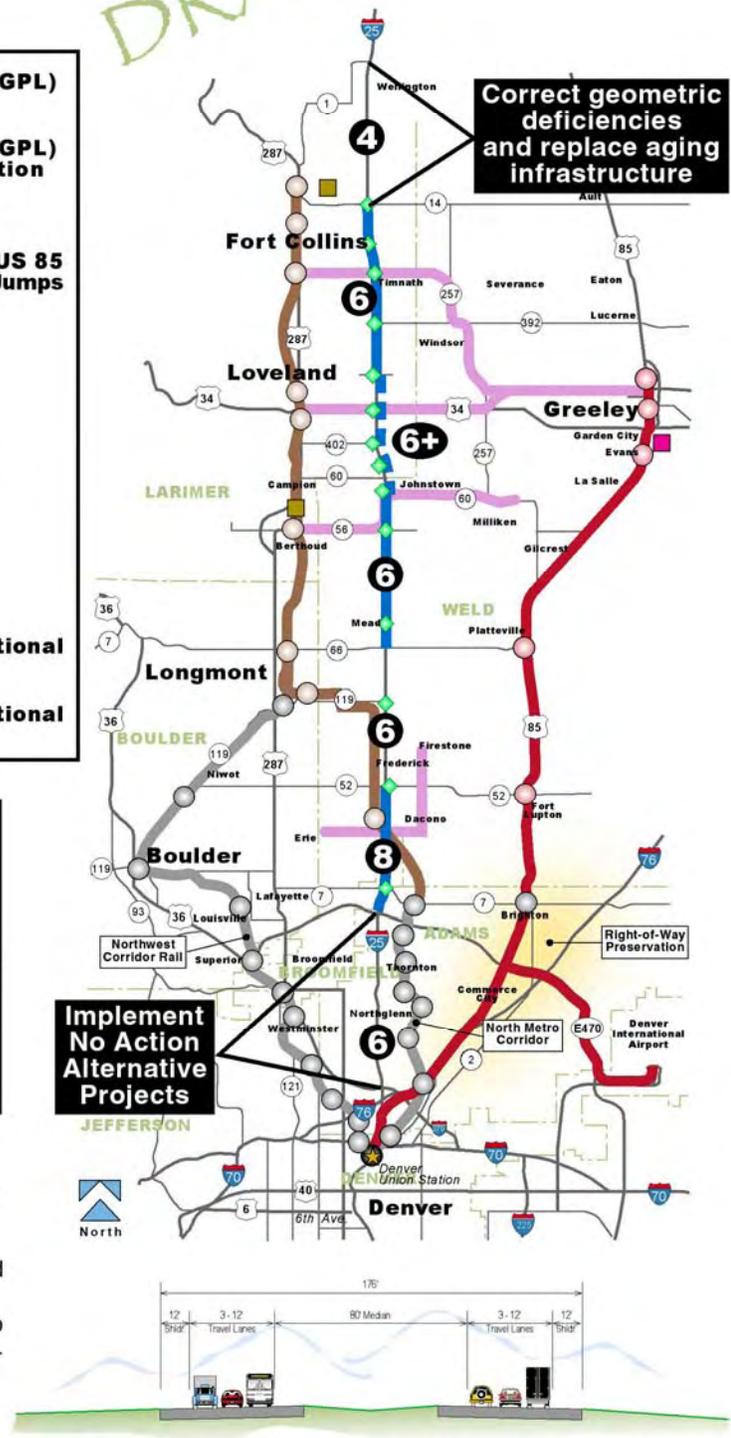
Congestion Management Measures include:

- 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

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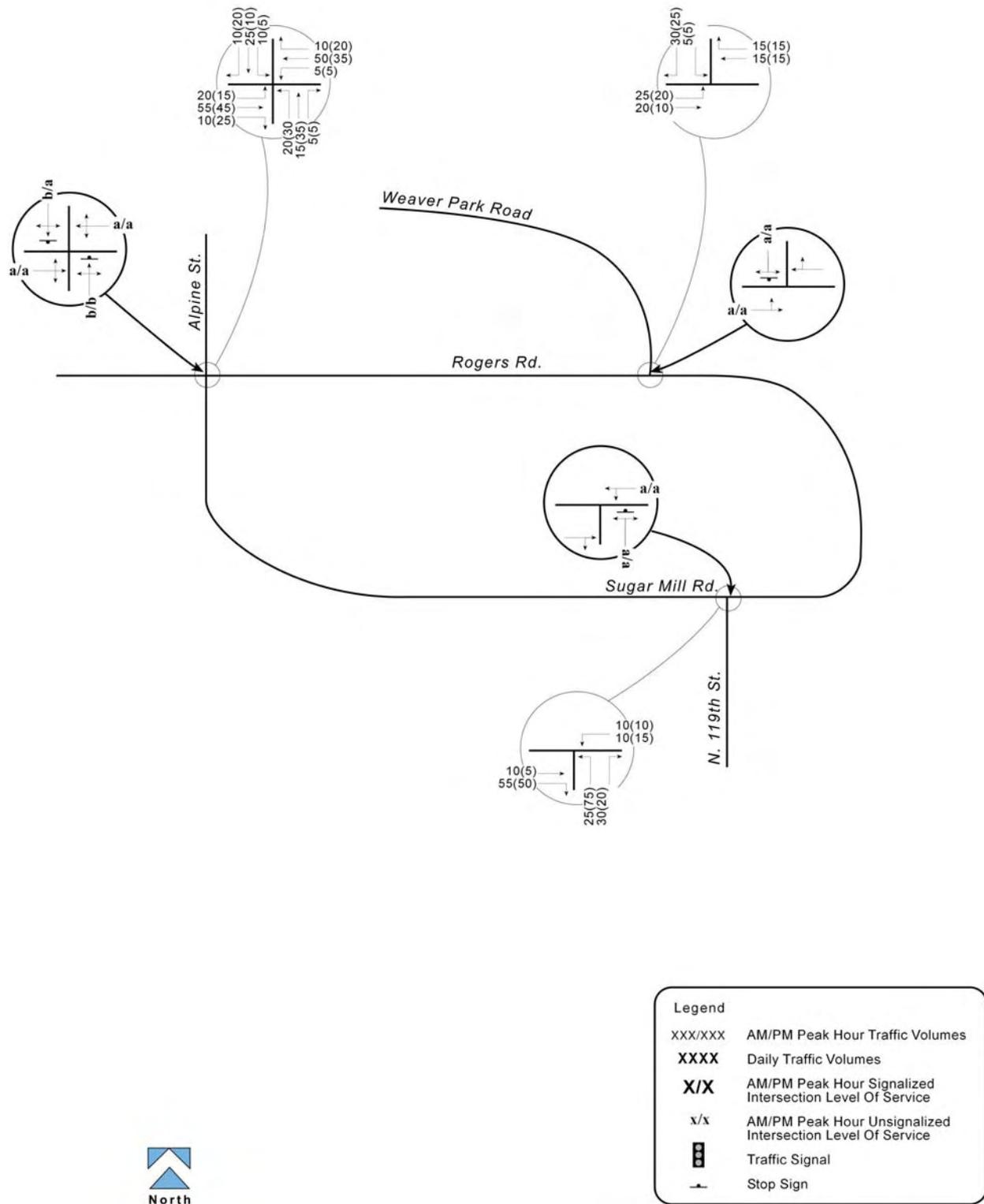


Figure 5a. 2030 No Action Forecasts and Levels of Service – Sugar Mill Area

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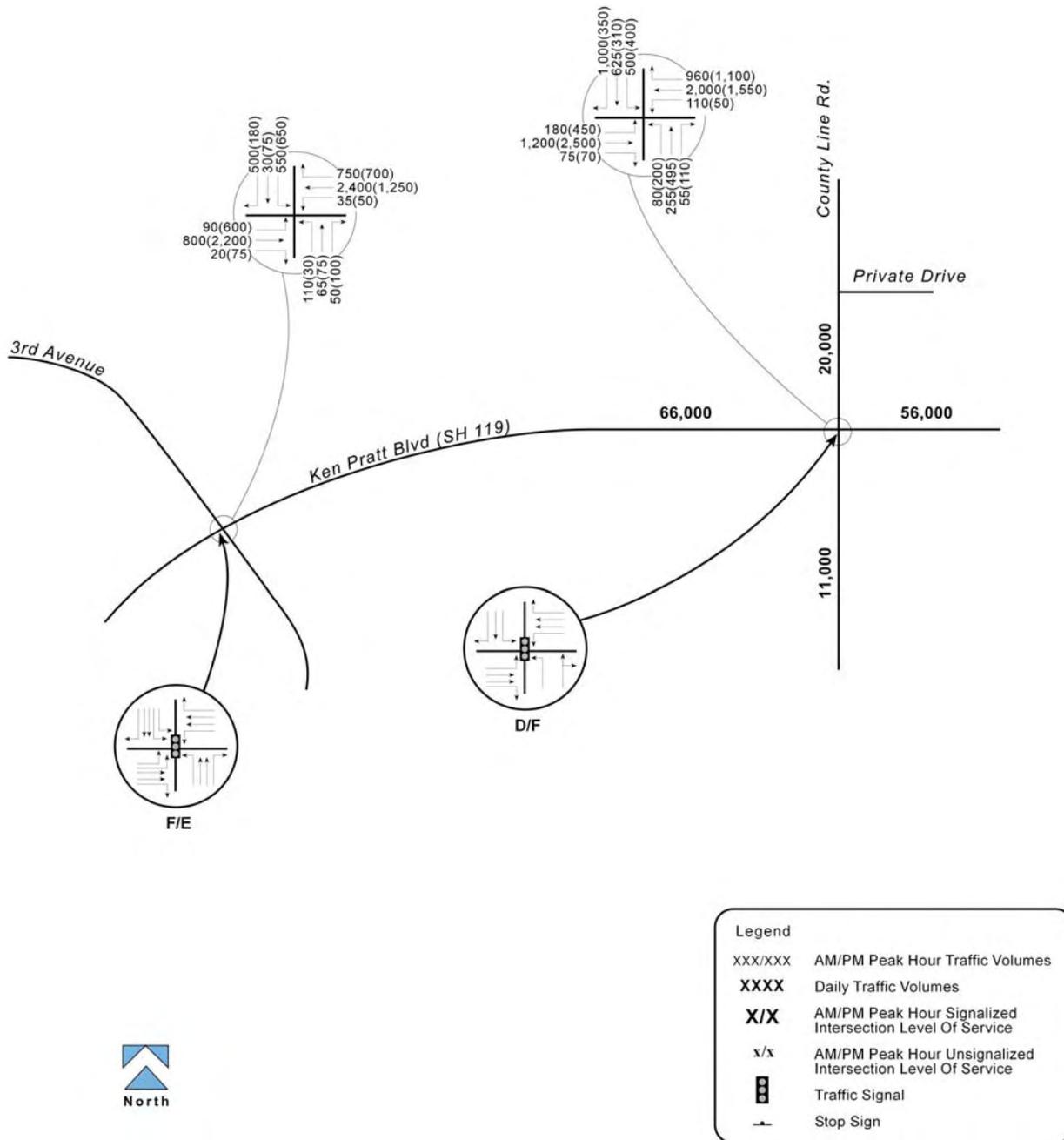


Figure 5b. 2030 No Action Forecasts and Levels of Service – County Line Area

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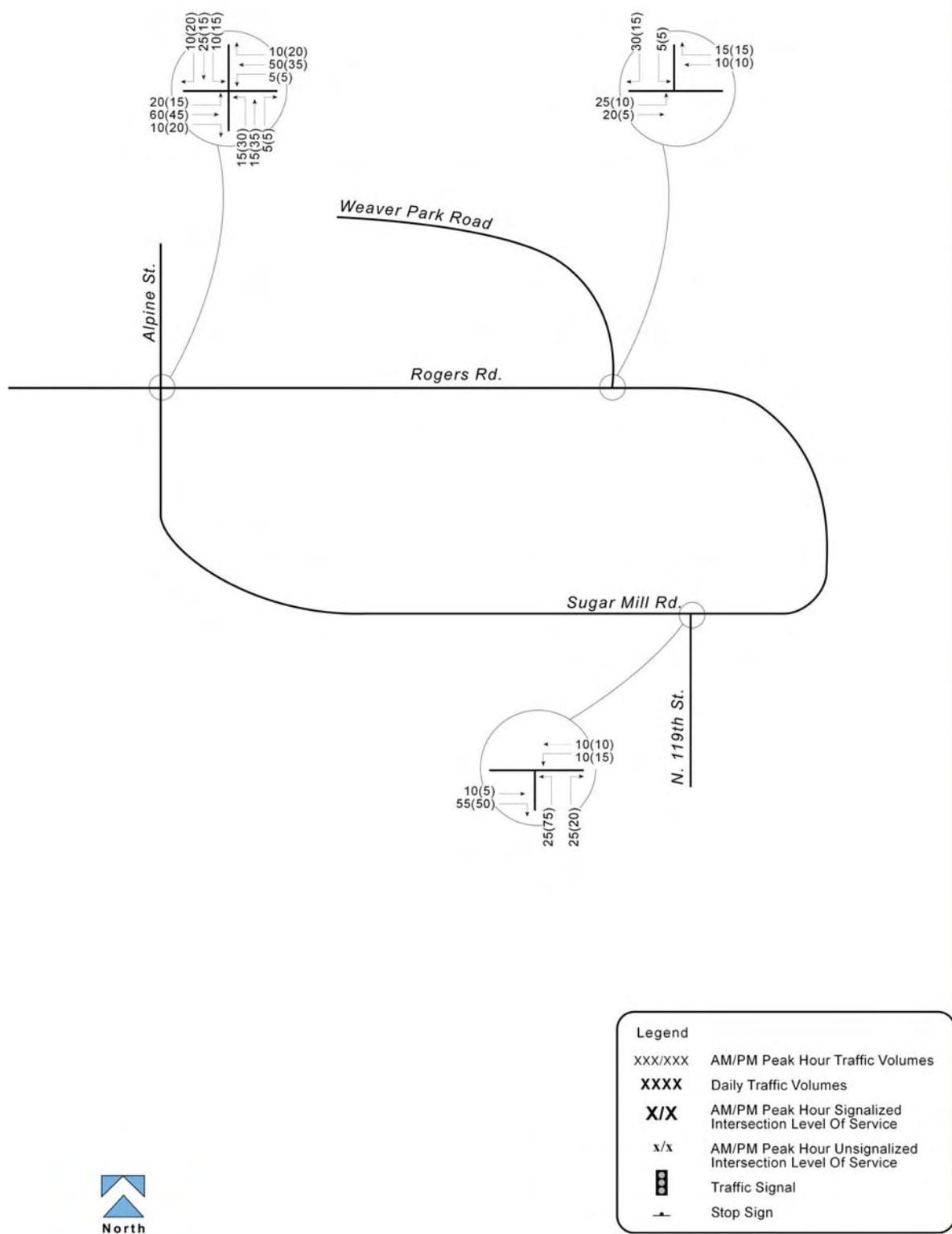
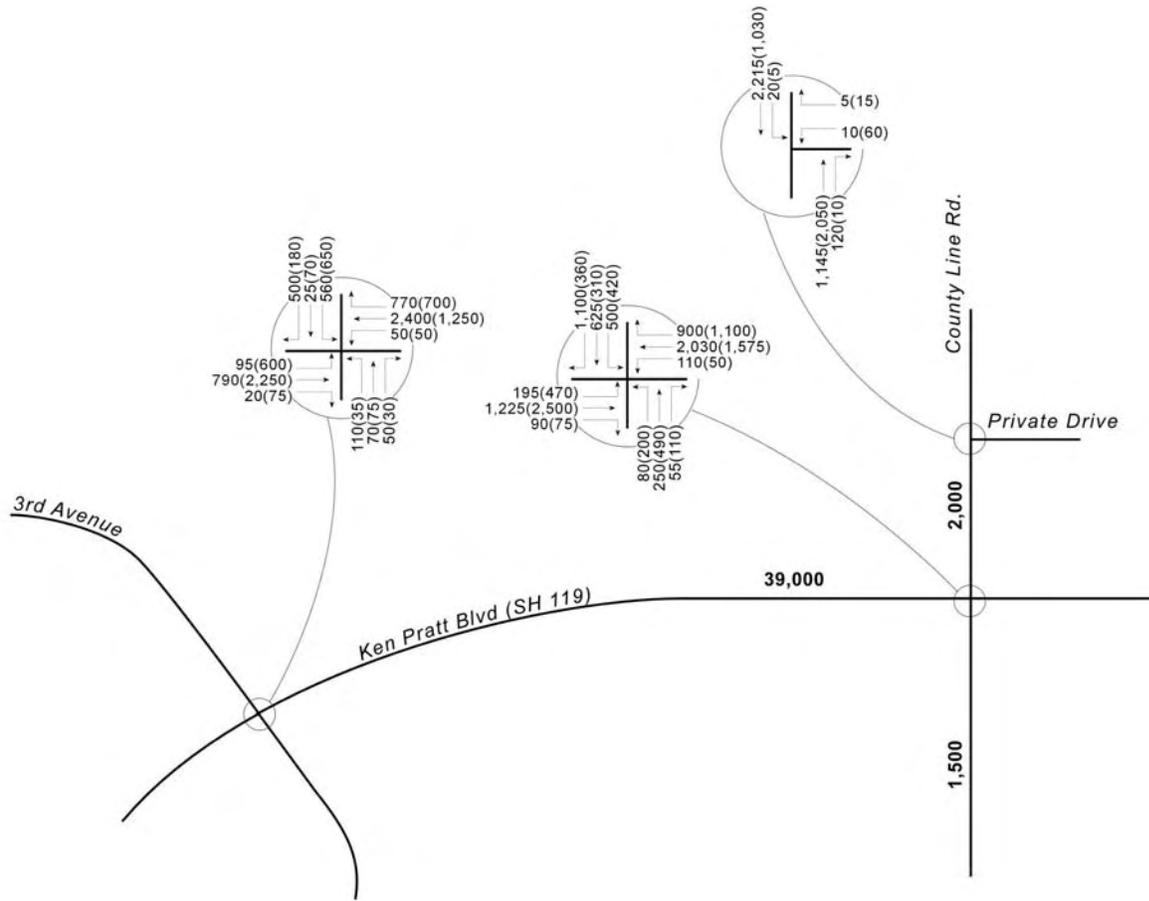


Figure 6a. 2030 Package A Background Traffic Forecasts – Sugar Mill Area

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Legend

- XXX/XXX AM/PM Peak Hour Traffic Volumes
- XXXX Daily Traffic Volumes
- X/X AM/PM Peak Hour Signalized Intersection Level Of Service
- x/x AM/PM Peak Hour Unsignalized Intersection Level Of Service
-  Traffic Signal
-  Stop Sign

Figure 6b. 2030 Package A Background Traffic Forecasts – County Line Area

Park-and-Ride Trip Generation

The number of proposed spaces at the Sugar Mill 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%

Three potential sites for the commuter rail station have been evaluated for the Sugar Mill location. The first, Site A, would be located south of Sugar Mill Road about 1/2 mile west of N. 119th St. with access provided from Sugar Mill Road. The second, Site G, would be located south of Rogers Road at the Weaver Park Road intersection with access provided from Rogers Road. The third, Site E would be located north of Ken Pratt Blvd about 1/2 mile west of County Line Road with access provided from County Line Road. The future peak hour traffic from the proposed station is shown in Table 5.

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
Sugar Mill PNR Lot	310	88	13	101	14	54	68

Trip Distribution

The trip distribution and assignment for each potential station location was determined based on existing and future land use patterns in the vicinity of the site. The peak hour trip generation and distribution estimates for the proposed park-and-ride lot are shown in Figures 7a, 7b, and 7c. 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, 8b, and 8c. In general, daily traffic is projected to be slightly higher on SH 119 in the Package A alternative, as more regional traffic is attracted to the improved I-25 corridor.

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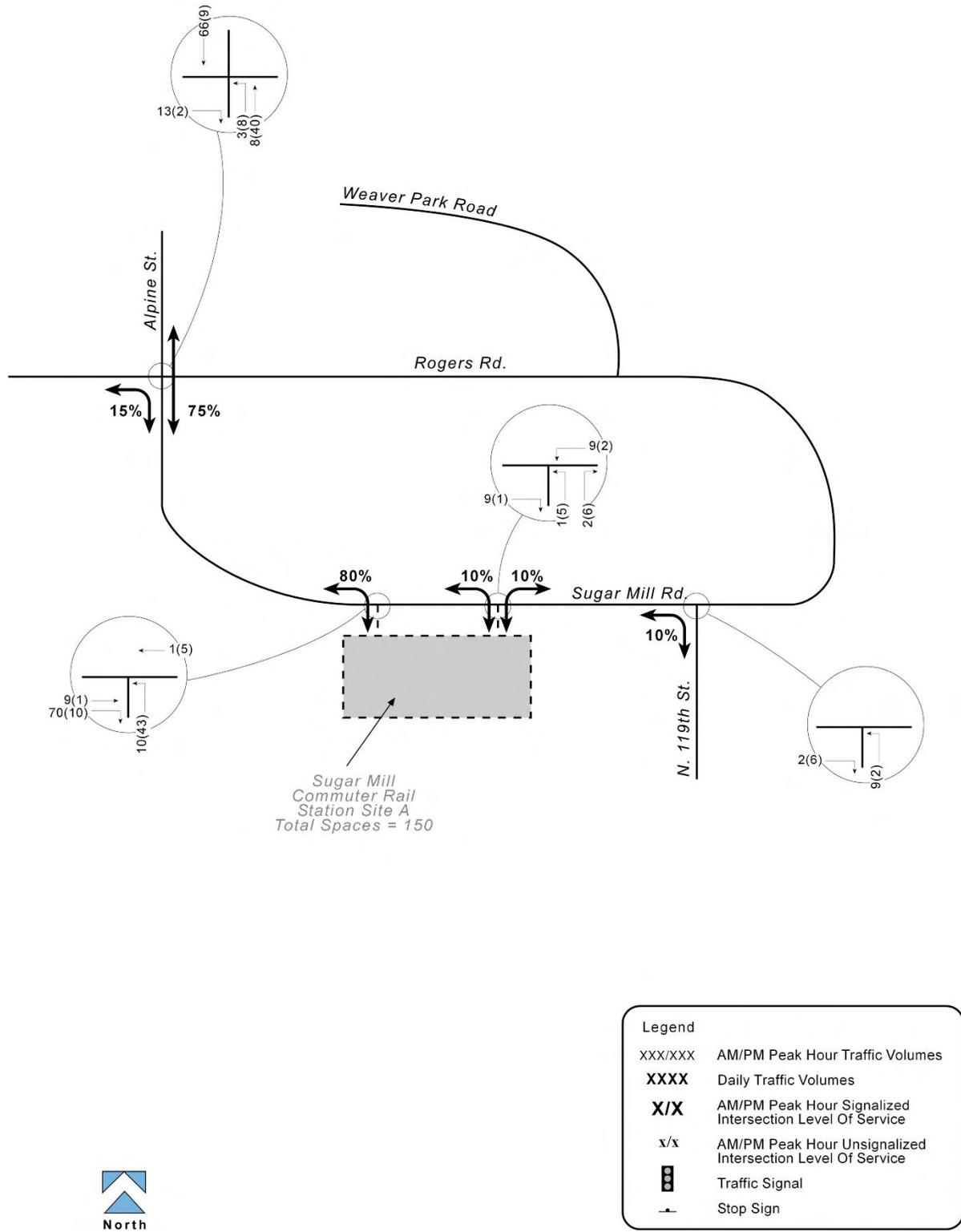


Figure 7a. Park and Ride Lot Trip Distribution and Assignment – Site A

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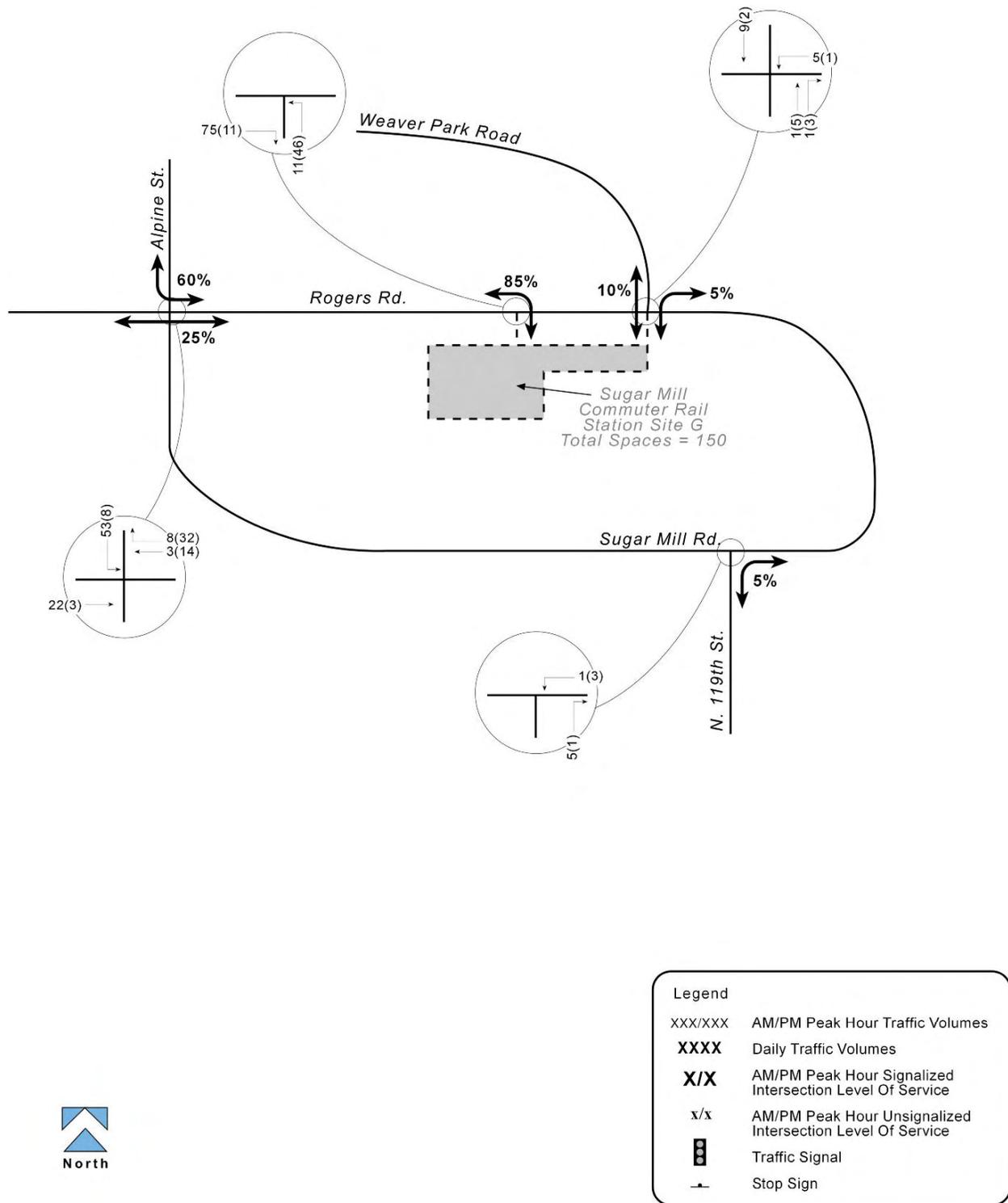


Figure 7b. Park and Ride Lot Trip Distribution and Assignment – Site G

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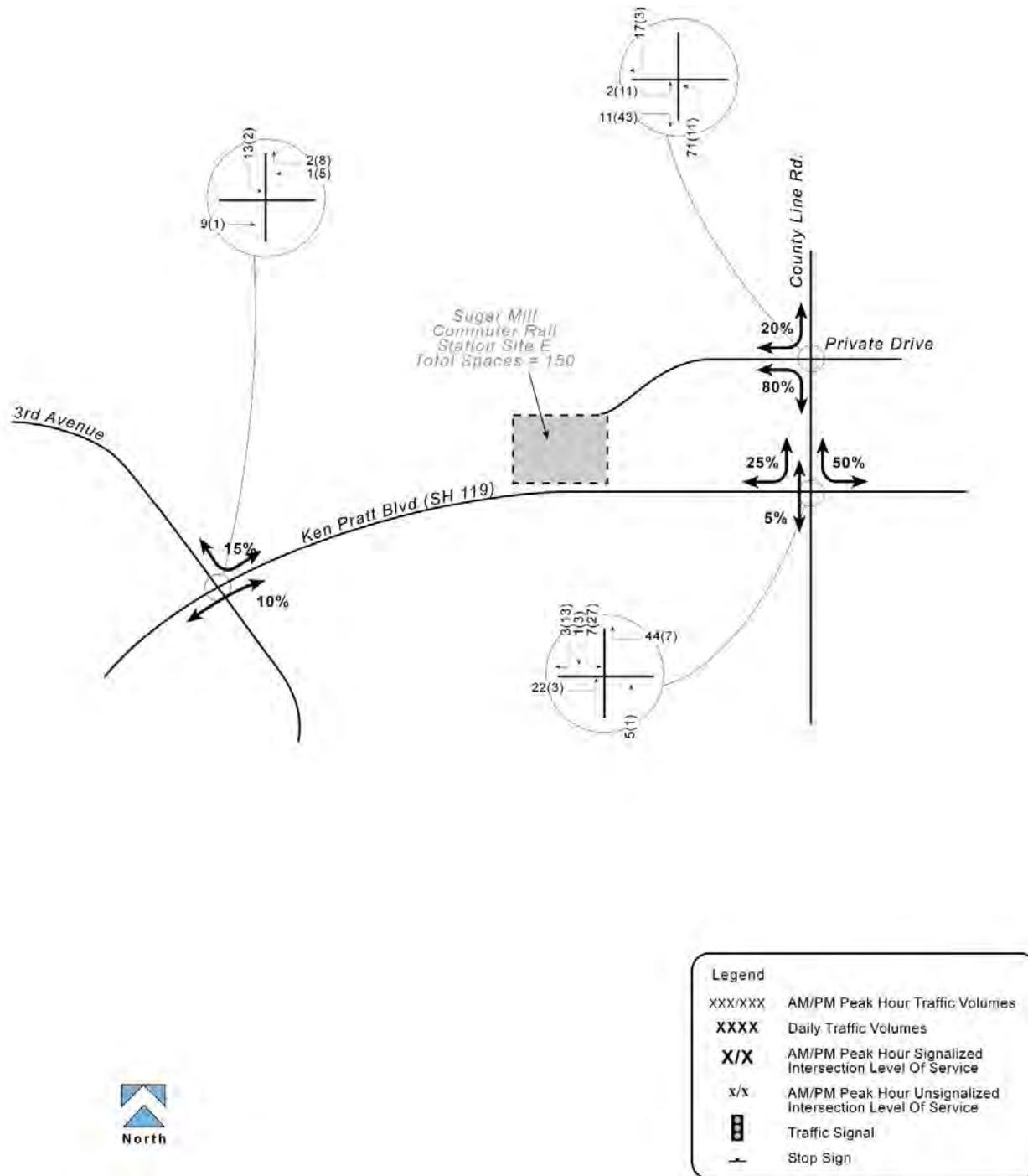


Figure 7c. Park and Ride Lot Trip Distribution and Assignment – Site E

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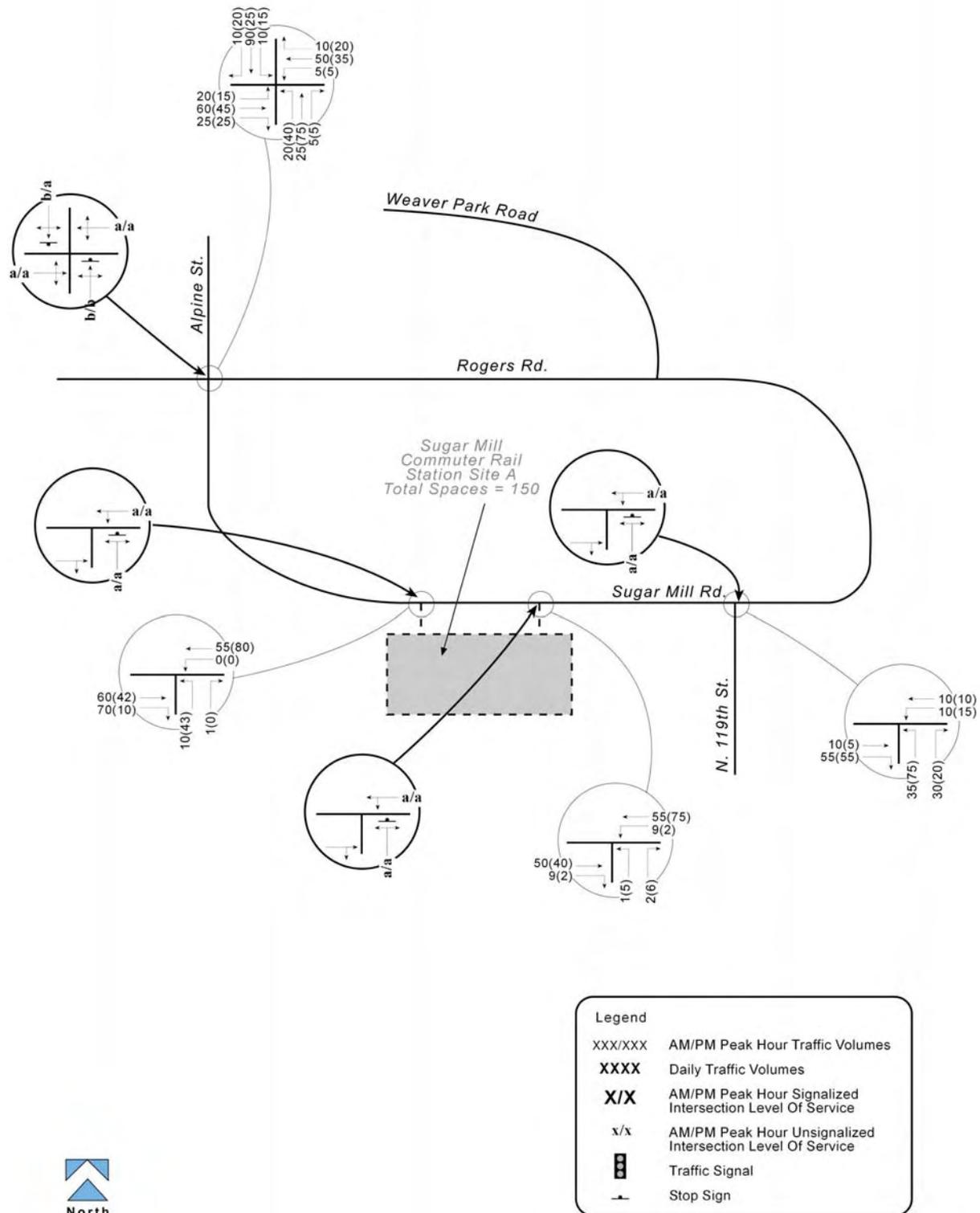
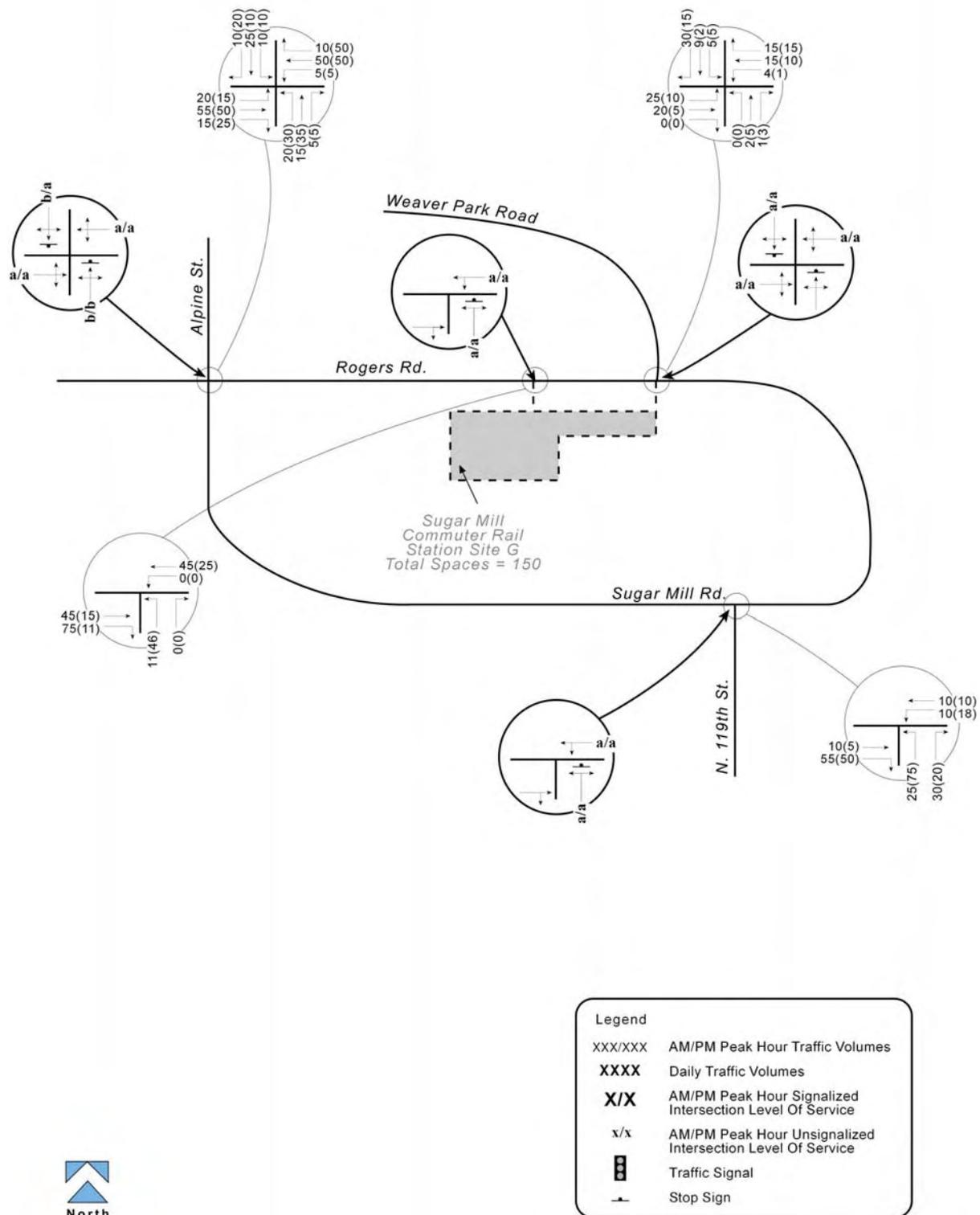
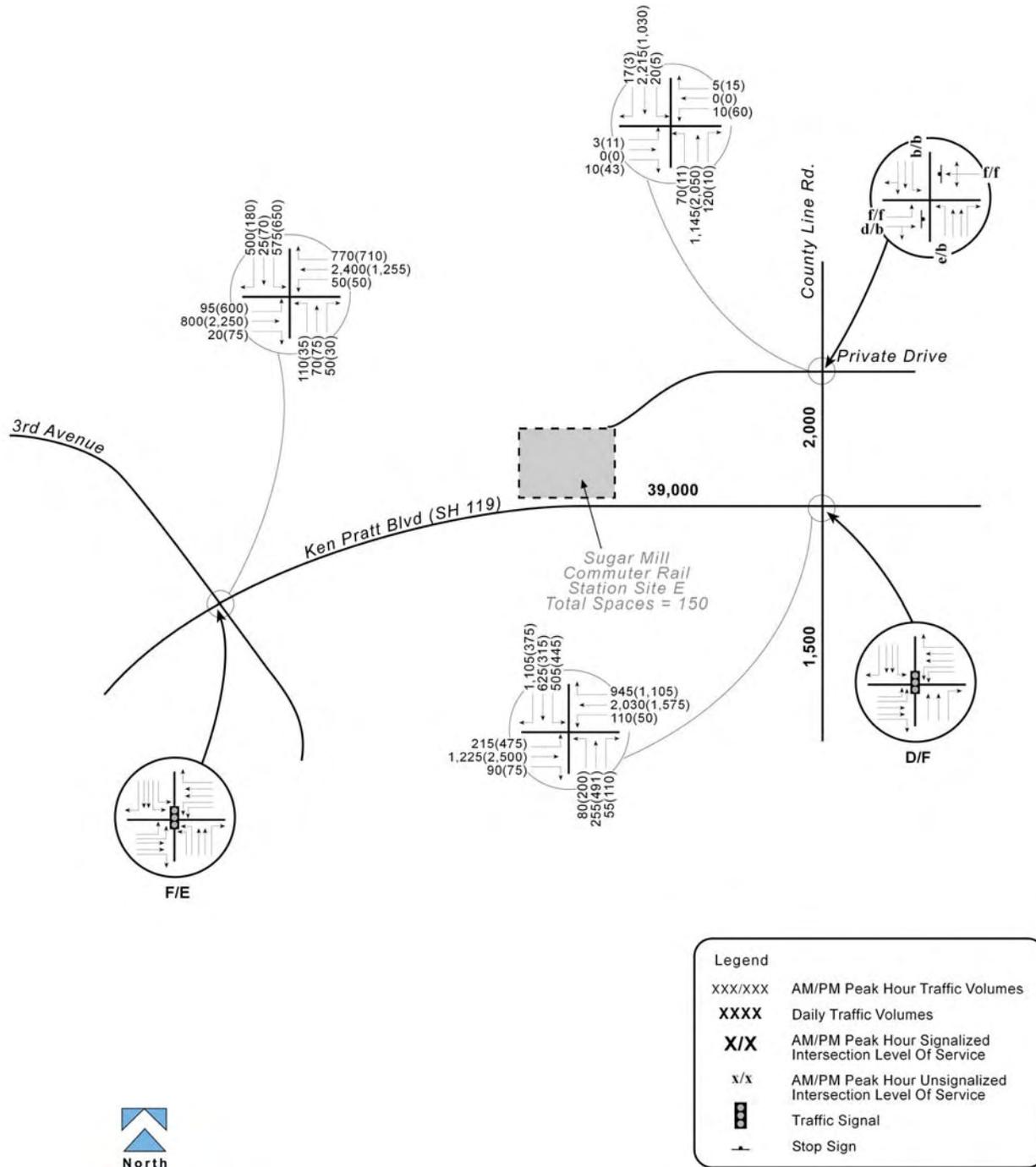


Figure 8a. 2030 Package A Total Traffic Forecasts and Levels of Service – Site A

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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, under guidance from the City of Longmont, it was assumed that County Line Road would be expanded to a four-lane roadway, since that geometry is more representative of true future No Action conditions in the area, and proposed development in the area currently is designing the road as a four-lane facility. Also, the intersection of Ken Pratt Blvd./3rd Avenue was assumed to fully utilize the existing intersection footprint, which includes westbound and northbound double left-turn lanes.

As Figure 5 and Table 3 indicate, the key intersections in the vicinity of Site E – Ken Pratt Blvd./3rd Avenue and Ken Pratt Blvd./County Line Road – are projected to operate at unacceptable levels of service in the 2030 No Action alternative. Meanwhile, key intersections in the vicinity of Sites A and G are projected to operate at acceptable levels of service.

Table 3. 2030 No Action Intersection LOS and Delay

Intersection	Level of Service		Delay (seconds)	
	AM Peak	PM Peak	AM Peak	PM Peak
Ken Pratt Blvd. (SH 119)/3rd Ave.	F	E	97	69
Ken Pratt Blvd. (SH 119)/County Line Road	D	F	44	145
Alpine St./Rogers Rd. (unsignalized)				
Northbound Approach	B	B	10	10
Southbound Approach	B	A	10	9
Sugar Mill Rd./N 119th St. (unsignalized)				
Northbound Approach	A	A	9	9
Weaver Park Rd./Rogers Rd. (unsignalized)				
Southbound Approach	A	A	9	9

2030 Package A Traffic Operations

Commuter Rail Station Site A

As Figure 8a and Table 6 indicate, key intersections in the vicinity of the Sugar Mill Commuter Rail Station Site A would operate at acceptable levels of service in the Package A alternative, without improvements to the local road network. Two access points to the commuter rail station will be provided from Sugar Mill Road west of 119th Street. As shown on Figure 8a and in Table 6, both access points 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 Sugar Mill Road.

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Table 6. 2030 Package A – Site A Intersection LOS and Delay

Intersection	Level of Service		Delay (seconds)	
	AM Peak	PM Peak	AM Peak	PM Peak
Alpine St./Rogers Rd. (unsignalized)				
Northbound Approach	B	B	11	11
Southbound Approach	B	A	11	10
Sugar Mill Rd./N 119th St. (unsignalized)				
Northbound Approach	A	A	9	9
Weaver Park Rd./Rogers Rd. (unsignalized)				
Southbound Approach	A	A	9	9
Site A Access 1/Sugar Mill Rd. (unsignalized)				
Northbound Approach	A	A	9	10
Site A Access 2/Sugar Mill Rd. (unsignalized)				
Northbound Approach	A	A	9	9

Commuter Rail Station Site G

As Figure 8b and Table 8 indicate, key intersections in the vicinity of the Sugar Mill Commuter Rail Station Site G would operate at acceptable levels of service in the Package A alternative, without improvements to the local road network. Two access points to the commuter rail station will be provided from Rogers Road, one at the existing Weaver Park Road intersection, and one west of this intersection. As shown on Figure 8b and in Table 7, both access points 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 Rogers Road.

Table 7. 2030 Package A – Site G Intersection LOS and Delay

Intersection	No Action		Package A	
	AM Peak	PM Peak	AM Peak	PM Peak
Alpine St./Rogers Rd. (unsignalized)				
Northbound Approach	B	B	10	11
Southbound Approach	B	A	10	10
Sugar Mill Rd./N 119th St. (unsignalized)				
Northbound Approach	A	A	9	9
Weaver Park Rd./Rogers Rd. (unsignalized)				
Northbound Approach (Site G Access 1)	A	A	9	9
Southbound Approach	A	A	9	9
Site G Access 2/Rogers Rd. (unsignalized)				
Northbound Approach	A	A	9	9

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Commuter Rail Station Site E

As Figure 8c and Table 8 indicate, key intersections in the vicinity of the Sugar Mill Commuter Rail Station Site E would operate at unacceptable levels of service in the Package A alternative, without improvements to the local road network.

One access to the commuter rail station will be provided from County Line Road at an existing intersection for a private drive on the east side of County Line Road. As shown on Figure 8c and in Table 8, this access would consist of a two lane approach with stop-control, and the eastbound left turn movement is projected to operate at LOS F in both peak hours. It is not uncommon for movements from driveways and side streets along higher volume roadways to experience poor levels of service, however. As noted in Chapter 17 (Unsignalized Intersections) of the Highway Capacity Manual (2000):

In evaluating the overall performance of two-way stop control intersections, it is important to consider measures of effectiveness in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th percentile queue lengths. By focusing on a single measure of effectiveness for the worst movement only, such as delay for the minor street left turn, users may make less effective traffic control decisions.

A more detailed analysis of the intersection indicated the v/c ratio for the eastbound left turn movement was 0.80 and the 95th percentile queue length was about 50 feet, which indicated acceptable traffic operations. Therefore, no additional improvements are recommended at that location. However, this existing “T” intersection should be monitored as traffic increases in the area, and signal warrant analyses should be conducted as this growth occurs.

Table 8. 2030 Package A – Site E Intersection LOS and Delay

Intersection	No Action		Package A	
	AM Peak	PM Peak	AM Peak	PM Peak
Ken Pratt Blvd. (SH 119)/3rd Ave.	F	E	105	74
Ken Pratt Blvd. (SH 119)/County Line Road	D	F	43	149
Site E Access/County Line Rd. (unsignalized)				
Eastbound Left	F*	F*	>100*	>100*
Eastbound Right	D	B	27	14
* Queue lengths for this movement are less than 50 feet and volume/capacity ratios are less than 1.5, so operations are acceptable. However, this existing “T” intersection should be monitored for signal warrant analysis based on future traffic growth.				

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, which slightly increases daily volumes on SH 119. However, the results of the traffic analysis indicate that some improvements will be needed to address the intersections of Ken Pratt Blvd. (SH 119)/3rd Ave. and Ken Pratt Blvd. (SH 119)/County Line Road regardless of the Package A consideration. In order to accommodate future projected traffic conditions, Ken Pratt Blvd. would require 3 through lanes in each direction.

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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, the intersections in the vicinity of sites A and G would operate acceptably, while the intersections in the vicinity of site E would require improvements in the No Action alternative, and are only slightly affected by Package A.

Table 9. Intersection Level of Service and Delay

Intersection	No Action		Package A*	
	AM Peak	PM Peak	AM Peak	PM Peak
Ken Pratt Blvd. (SH 119)/3rd Ave.	LOS F (97 sec.)	LOS E (69 sec.)	LOS F (105 sec.)	LOS E (74 sec.)
Ken Pratt Blvd. (SH 119)/County Line Road	LOS D (44 sec.)	LOS F (145 sec.)	LOS D (46 sec.)	LOS F (149 sec.)
Alpine St./Rogers Rd. (unsignalized)				
Northbound Approach	LOS B (10 sec.)	LOS B (10 sec.)	LOS B (11 sec.)	LOS B (11 sec.)
Southbound Approach	LOS B (10 sec.)	LOS A (9 sec.)	LOS B (11.3 sec.)	LOS A (10 sec.)
Sugar Mill Rd./N 119th St. (unsignalized)				
Northbound Approach	LOS A (9 sec.)	LOS A (9 sec.)	LOS A (9 sec.)	LOS A (9 sec.)
Weaver Park Rd./Rogers Rd. (unsignalized)				
Northbound Approach (Site G Access 1)	N/A	N/A	LOS A (9.3 sec.)	LOS A (9 sec.)
Southbound Approach	LOS A (9 sec.)	LOS A (9 sec.)	LOS A (9 sec.)	LOS A (9 sec.)
Site G Access 2/Rogers Rd. (unsignalized)				
Northbound Approach	N/A	N/A	LOS A (9 sec.)	LOS A (9 sec.)
Site A Access 1/Sugar Mill Rd. (unsignalized)				
Northbound Approach	N/A	N/A	LOS A (9sec.)	LOS A (10 sec.)
Site A Access 2/Sugar Mill Rd. (unsignalized)				
Northbound Approach	N/A	N/A	LOS A (9 sec.)	LOS A (9 sec.)
Site E Access/County Line Rd. (unsignalized)				
Eastbound Left	N/A	N/A	LOS F (>100 sec.)	LOS F (>100 sec.)
Eastbound Right	N/A	N/A	LOS D (27 sec.)	LOS B (14 sec.)

* In the Package A alternative, where two potential sites would impact nearby intersections (sites A and G), the worst case is reported in this table.

LOS X – Level of service

##.# - Average delay in seconds per vehicle

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