S.R. 0081 Exit 44

S.R. 0465 Traffic Analysis Report

Cumberland County, Pennsylvania

prepared for

Cumberland County
and
Pennsylvania Department of Transportation
Engineering District 8-0

September 2003

prepared by

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The S.R. 0081 Exit 44 interchange is in South Middleton Township, Cumberland County, PA. Its current configuration is a diamond. At Exit 44, S.R. 0081 is grade separated, crossing above S.R. 0465 (Allen Road). S.R. 0081 and S.R. 0011 are on a geographical east-west course, even though they are marked as north/south routes. S.R. 0465 is approximately perpendicular to the interstate in a north-south course. The intersections in the study area are:

S.R. 0465 at S.R. 0011 (Ritner Highway)
S.R. 0465 at Logistics Drive
S.R. 0465 at S.R. 0081 Southbound Ramps
S.R. 0465 at S.R. 0081 Northbound Off Ramp/T-410 (Commerce Avenue)
S.R. 0465 at T-469 (Alexander Spring Road)
S.R. 0465 at True Temper Drive
S.R. 0465 at Ames Drive
S.R. 0465 at S.R. 3023 (Walnut Bottom Road).

This study investigated and identified improvement strategies for maintaining acceptable traffic operations at the above intersections in the S.R. 0465 corridor. The scope of this study was to obtain acceptable levels of service for the corridor in the design year of 2026. The design year is based on an assumed opening year of 2006 for the Exit 44 interchange improvements.

Trip generation played a large role in determining the viability of alternatives. A base year of 2002 was established for this project. Existing traffic data was collected from Automatic Traffic Recorders (ATRs) and turning movement counts. Once the existing data was collected, data was projected using a compound growth rate of 2.4% per year for 6 years until 2006. After 6 years, a lower compound growth rate-1.0% per year-was applied to the background growth to the design year. After the background growth was projected, the trips generated from the parcels of land to be developed for the build out scenario were added to the 2026 expected volumes. Two interchange alternatives were evaluated.

Interchange Alternative #1: Widened Diamond

This interchange alternative provides eight lanes for S.R. 0465 under rebuilt bridges for S.R. 0081. Two left-turn lanes and two through lanes are provided in each direction between the intersections with the S.R. 0081 ramps.

The S.R. 0081 southbound off-ramp provides two left-turn lanes and one right-turn lane, with the right-turn lane having its own designated receiving lane on S.R. 0465 northbound. The S.R. 0081 northbound off-ramp has one right-turn and one left-turn lane.

S.R. 0465 northbound. The S.R. 0081 northbound off-ramp has one right-turn and one left-turn lane.

Interchange Alternative #2: Loop Ramp in SW Quadrant

This interchange alternative provides six lanes for S.R. 0465 under rebuilt bridges for S.R. 0081. S.R. 0465 southbound traffic destined for S.R. 0081 northbound would use a one-lane loop ramp in the southwest quadrant of the interchange. S.R. 0465 northbound traffic destined for S.R. 0081 southbound would use a single left-turn lane. S.R. 0465 northbound traffic heading to S.R. 0081 northbound would use the existing S.R. 0081 northbound on-ramp. This would result in two ramps merging onto S.R. 0081 northbound.

Under the S.R. 0081 bridges, two through lanes would be provided in each direction for S.R. 0465. On the northbound side, a single left-turn lane would be provided. On the southbound side, a single deceleration lane would be provided in advance of the one-lane loop ramp.

The S.R. 0081 southbound off-ramp would provide two left-turn lanes and two right-turn lanes. The S.R. 0081 northbound off-ramp has one left-turn lane and shared through/right-turn lane, and would be realigned to intersect with East Commerce Avenue.

The relocated S.R. 0081 northbound off-ramp would cut off the current access of Whirlpool and future developments to West Commerce Avenue. This alternative proposes an access road for traffic to reach Alexander Spring Road to S.R. 0465 to reach the interchange.

Based on the alternatives analysis, Interchange Alternative #2 (Loop Ramp in SW Quadrant), has been identified as the preferred interchange configuration. Further evaluation and capacity analysis for this interchange alternative is included in this report.

Once the 2026 volumes were determined, capacity analyses were completed for intersections using the methodologies set forth in the *2000 Highway Capacity Manual* and with the assistance of the *Highway Capacity Software (HCS)*. Both 2002 existing and 2026 forecasted traffic volumes were evaluated. The 2002 and 2026 AM and PM volumes were used in the analysis.

In the design year 2026 the intersections will experience acceptable levels of service in the identified time periods.

Intersection	AM LOS	PM LOS
S.R. 0011 (Ritner Highway)	D	D
Logistics Drive	C	C
S.R. 0081 SB Ramps	C	D
S.R. 0081 NB Ramps	N/A	N/A
Commerce Avenue	C	C
Alexander Spring Road	C	C
True Temper Drive	B	C
Ames Drive	B	B
Walnut Bottom Road	B	D

Introduction

The S.R. 0081 Exit 44 interchange is located in South Middleton Township, Cumberland County, PA. Its current configuration is a diamond. At Exit 44, S.R. 0081 is grade separated, crossing above S.R. 0465. S.R. 0081 and S.R. 0011 are on a geographical east-west course even though they are marked as north/south routes. S.R. 0465 is approximately perpendicular to the interstate in a north-south course. The intersections in the study area are:

S.R. 0465 at S.R. 0011 (Ritner Highway)
S.R. 0465 at Logistics Drive
S.R. 0465 at S.R. 0081 Southbound Ramps
S.R. 0465 at S.R. 0081 Northbound Off Ramp/T-410 (Commerce Avenue)
S.R. 0465 at T-469 (Alexander Spring Road)
S.R. 0465 at True Temper Drive
S.R. 0465 at Ames Drive
S.R. 0465 at S.R. 3023 (Walnut Bottom Road).

S.R. 0011 and Logistics Drive are to the north of the interchange while the other intersections are to the south of the interchange. Currently S.R. 0011, Logistics Drive, S.R. 0081 southbound and northbound ramps are signalized. Commerce Avenue, Alexander Spring Road, True Temper Drive, Ames Drive and S.R. 3023 are unsignalized.

This study investigated and identified improvement strategies for maintaining traffic operations at the above intersections in the S.R. 0465 corridor. The scope of this study was to obtain acceptable levels of service for the corridor in the design year of 2026. The design year is based on an assumed opening year of 2006 for the interchange improvements.

Trip Generation

Trip generation played a large role in determining the viability of alternatives. Existing traffic data was collected from Automatic Traffic Recorders (ATR) and turning movement counts. Once the existing data was collected, data was projected using a compound growth rate of 2.4% per year for 6 years until 2008. After 6 years, a lower compound growth rate -1.0% per year- was applied to the background growth to the design year. After the background growth was projected, the trips generated from the parcels of land to be developed for the build out scenario were added to the 2026 expected volumes.

Within the design year parameters, this corridor is forecasted to reach full build out of all parcels that access S.R. 0465. The land use is mixed between light industrial, industrial park, warehouse, commercial and professional office. Based on these uses, trip generation rates for the industrial park, light industrial, warehouse and office land uses were developed based on the square footage of the proposed structures on the property (if plans were available) or on the acreage of the parcel (in the absence of formalized plans). The number of trips generated by the parcel was determined using a ratio of employees to building square footage (1:4500). This ratio was identified by the design team to provide more realistic trips generated compared to the ITE Trip Generation Manual. For the bank parcel, trip generation rates from ITE were applied based on the number of drive through lanes. For the medical parcel, the trip generation was developed using the number of beds that the proposed hospital would contain. The trips generated were applied to the expected opening date of 2006. The growth rate for the period from 2002 to 2006 was applied at 2.4% per year. After the opening, the background volumes continued to be increased at the rate of 1% per year, while the development traffic remained the same. **Appendix A** contains the trip generation estimates that were developed. Based on the turning movement counts that were performed, percentages of traffic distribution were identified for each intersection and the trips shown in **Appendix A** were distributed onto the network based on those percentages.

Alternative Analysis

Two interchange alternatives were evaluated.

Interchange Alternative #1: Widened Diamond

This interchange alternative provides eight lanes for S.R. 0465 under rebuilt bridges for S.R. 0081. Two left-turn lanes and two through lanes are provided in each direction between the intersections with the S.R. 0081 ramps.

The S.R. 0081 southbound off-ramp provides two left-turn lanes and one right-turn lane, with the right-turn lane having its own designated receiving lane on S.R. 0465 northbound. The S.R. 0081 northbound off-ramp has one right-turn and one left-turn lane.

Interchange Alternative #2: Loop Ramp in SW Quadrant

This interchange alternative provides six lanes for S.R. 0465 under rebuilt bridges for S.R. 0081. S.R. 0465 southbound traffic destined for S.R. 0081 northbound would use a one-lane loop ramp in the southwest quadrant of the interchange. S.R. 0465 northbound traffic destined for S.R. 0081 southbound would use a single left-turn lane. S.R. 0465 northbound traffic heading to S.R. 0081 northbound would use the existing S.R. 0081 northbound on-ramp. This would result in two ramps merging onto S.R. 0081 northbound.

Under the I-81 bridges, two through lanes would be provided in each direction for S.R. 0465. On the northbound side, a single left-turn lane would be provided. On the southbound side, a single deceleration lane would be provided in advance of the one-lane loop ramp.

The S.R. 0081 southbound off-ramp provides two left-turn lanes and two right-turn lanes. The S.R. 0081 northbound off-ramp has one left-turn and one shared through/right lane, and would be realigned to intersect with East Commerce Avenue.

The relocated S.R. 0081 northbound off-ramp would cut off the current access of Whirlpool and future developments to West Commerce Avenue. This alternative proposes an access road for traffic to reach Alexander Spring Road to S.R. 0465 to reach the interchange.

Based on the alternative analysis, Interchange Alternative #2 (Loop Ramp in SW Quadrant), has been identified as the preferred interchange configuration. Further evaluation and capacity analysis for this interchange alternative is included in this report.

Capacity Analysis

Once the 2026 volumes were determined, capacity analyses were completed for intersections (**Exhibit 1**) using the methodologies set forth in the *2000 Highway Capacity Manual* with the assistance of the *Highway Capacity Software (HCS)*. Both 2002 existing and 2026 forecasted traffic volumes were evaluated for these analyses. **Exhibits 2, 3** and **4** show the 2002 and 2026 AM and PM volumes included in the analysis. See **Appendices B, C** and **D** for capacity analysis worksheets.

The following sections describe the operational and geometric conditions of the intersections included in the study area.

N

S.R. 0465
& RITNER
HIGHWAY

S.R. 0465
& INTERSTATE
81 SB RAMPS

S.R. 0465
& COMMERCE
AVENUE

INTERSTATE 81

S.R. 0011
RITNER HWY.

WEST PENNSBORO TOWNSHIP

BOROUGH OF CARLISLE

S.R. 0641
NEWVILLE ROAD

S.R. 0465
& TRUE
TEMPER
DRIVE

S.R. 0465
& WALNUT
BOTTOM
ROAD

DICKINSON TOWNSHIP

S.R. 0465 ALLEN ROAD

NORTH MIDDLETON TOWNSHIP

BOROUGH OF CARLISLE

SOUTH MIDDLETON TOWNSHIP

SOUTH MIDDLETON TOWNSHIP

BOROUGH OF CARLISLE

S.R. 0465 ALLEN ROAD

S.R. 3023
WALNUT BOTTOM ROAD

S.R. 0465
& NEWVILLE
ROAD
(BY OTHERS)

S.R. 0465
& AMES
DRIVE

S.R. 0465
& ALEXANDER
SPRING
ROAD

S.R. 0465
& INTERSTATE
81 NB RAMPS

S.R. 0465
& LOGISTICS
DRIVE

NOT TO SCALE

EXHIBIT 1

S.R. 0081 EXIT 44 INTERSECTIONS WITHIN THE STUDY CORRIDOR

Gannett Fleming

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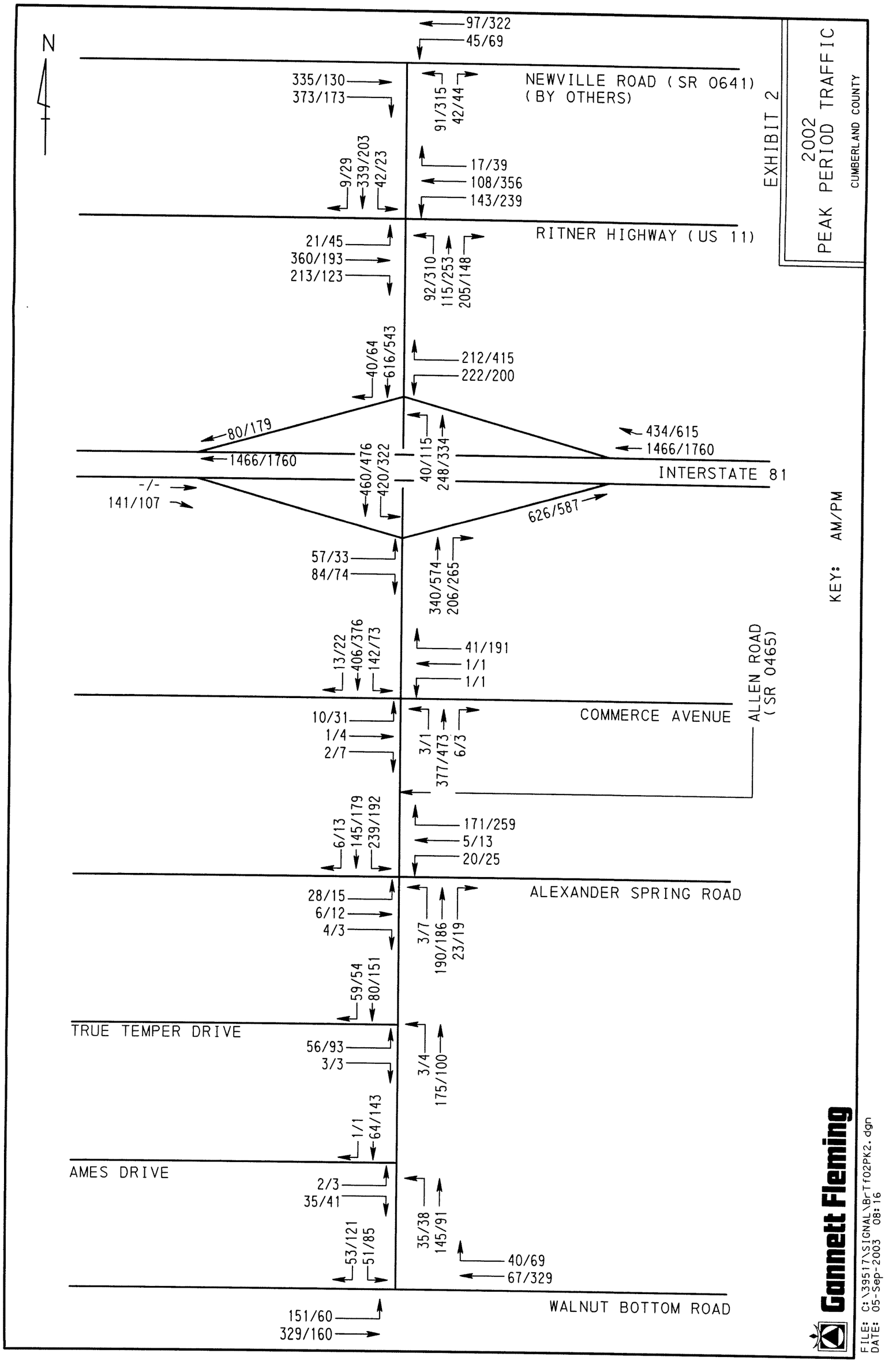
EXHIBIT 2
2002
PEAK PERIOD TRAFFIC
CUMBERLAND COUNTY
N
KEY: AM/PM
NEWVILLE ROAD (SR 0641)
(BY OTHERS)
RITNER HIGHWAY (US 11)
INTERSTATE 81
ALLEN ROAD
(SR 0465)
COMMERCE AVENUE
ALEXANDER SPRING ROAD
TRUE TEMPER DRIVE
AMES DRIVE
WALNUT BOTTOM ROAD
97/322
45/69
335/130
373/173
91/315
42/44
9/29
339/203
42/23
17/39
108/356
143/239
21/45
360/193
213/123
92/310
115/253
205/148
40/64
616/543
212/415
222/200
80/179
1466/1760
460/476
420/322
40/115
248/334
434/615
1466/1760
-/-
141/107
626/587
57/33
84/74
340/574
206/265
13/22
406/376
142/73
41/191
1/1
1/1
10/31
1/4
2/7
3/1
377/473
6/3
6/13
145/179
239/192
171/259
5/13
20/25
28/15
6/12
4/3
3/7
190/186
23/19
59/54
80/151
56/93
3/3
3/4
175/100
1/1
64/143
2/3
35/41
35/38
145/91
53/121
51/85
40/69
67/329
151/60
329/160
Gannett Fleming
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N

AMES DRIVE

TRUE TEMPER DRIVE

I-81 NB OFF-RAMP

610/340

990/1260

2730/3280

210/690

240/100
450/220

100/250
110/200

10/10
50/60

10/10
150/370

80/130
10/10

80/80
170/380

100/240
20/30
30/50

200/120
260/380
330/270

370/200
10/10
240/130

560/640
330/170

990/1260
890/860

130/410
1300/1640

370/240
520/210
50/50

40/80
690/940
100/110

620/290
460/180
50/30

20/60
70/200
10/30

50/50
240/140

10/10
290/160

40/30
270/260
40/40

570/800
10/10

590/760
390/670

80/280
570/490

210/400
700/730
280/220

180/570
190/110
80/80

100/450

80/110

30/60

10/20

240/360

100/440
20/20

390/670

1010/980
570/420

200/330

140/490

30/80

70/110

130/440

30/20

WALNUT BOTTOM ROAD

ALEXANDER SPRING ROAD

COMMERCE AVENUE

INTERSTATE 81

LOGISTICS DRIVE
(SEE DETAIL)

RITNER HIGHWAY (US 11)

NEWVILLE ROAD (SR 0641)
(BY OTHERS)

ALLEN ROAD
(SR 0465)

ALLEN ROAD
(SR 0465)

1250/1470
20/20

1310/1170
170/190

LOGISTICS
DRIVE

20/20
170/190

1570/1400
4310/4680

KEY: AM/PM

Gannett Fleming

EXHIBIT 3

2026 BUILD (LOOP)
PEAK PERIOD TRAFFIC

CUMBERLAND COUNTY

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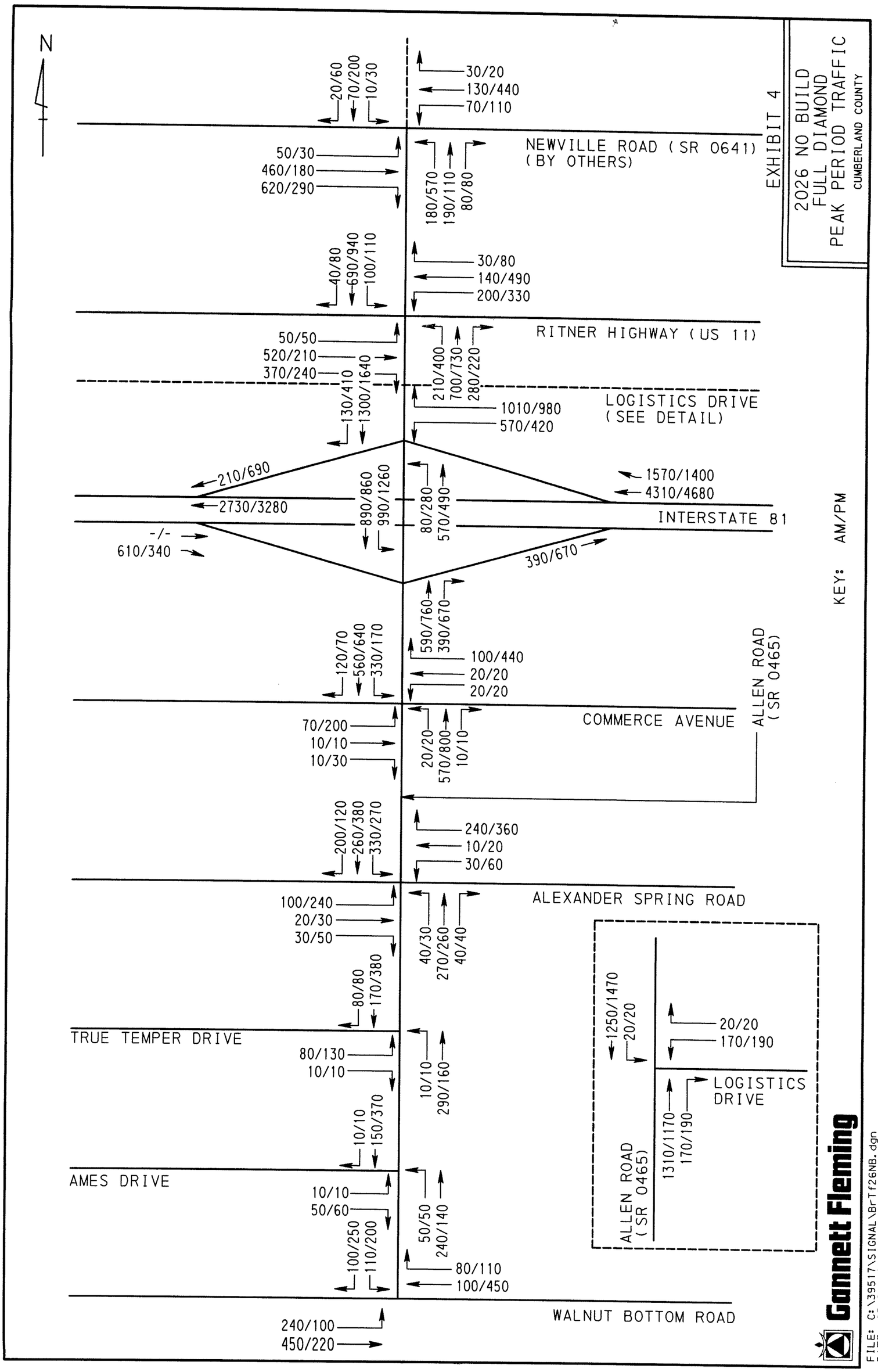
N
EXHIBIT 4
2026 NO BUILD
FULL DIAMOND
PEAK PERIOD TRAFFIC
CUMBERLAND COUNTY
KEY: AM/PM
NEWVILLE ROAD (SR 0641)
(BY OTHERS)
RITNER HIGHWAY (US 11)
LOGISTICS DRIVE
(SEE DETAIL)
INTERSTATE 81
ALLEN ROAD
(SR 0465)
COMMERCE AVENUE
ALEXANDER SPRING ROAD
TRUE TEMPER DRIVE
AMES DRIVE
WALNUT BOTTOM ROAD
LOGISTICS
DRIVE
ALLEN ROAD
(SR 0465)
Gannett Fleming
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SHORT REPORT

General Information		Site Information	
Analyst	EER	Intersection	ALLEN & 81 NB RAMP
Agency or Co.	GANNETT FLEMING, INC.	Area Type	All other areas
Date Performed	5/14/03	Jurisdiction	CARLISLE
Time Period	AM PEAK	Analysis Year	2026

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	1	0	0	0	0	0	1	0	1	1	0
Lane group		LTR						T		L	T	
Volume (vph)	360	1	240					190		990	890	
% Heavy veh	2	2	2					19		1	1	
PHF	0.90	0.90	0.90					0.90		0.90	0.90	
Actuated (P/A)	P	P	P					P		P	P	
Startup lost time		2.0						2.0		2.0	2.0	
Ext. eff. green		2.0						2.0		2.0	2.0	
Arrival type		3						3		3	3	
Unit Extension		3.0						3.0		3.0	3.0	
Ped/Bike/RTOR Volume	0		0	0			0					
Lane Width		12.0						12.0		12.0	12.0	
Parking/Grade/Parking	N	0	N	N		N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr		0						0		0	0	
Unit Extension		3.0						3.0		3.0	3.0	

Phasing	EB Only	02	03	04	SB Only	NS Perm	07	08
Timing	G = 17.0	G =	G =	G =	G = 29.0	G = 38.0	G =	G =
	Y = 7	Y =	Y =	Y =	Y = 6	Y = 6	Y =	Y =

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 103.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		666						211		1100	989	
Lane group cap.		282						589		870	1333	
v/c ratio		2.36						0.36		1.26	0.74	
Green ratio		0.17						0.37		0.71	0.71	
Unif. delay d1		43.0						23.6		11.5	9.2	
Delay factor k		0.50						0.50		0.50	0.50	
Increm. delay d2		623.6						1.7		128.2	3.8	
PF factor		1.000						1.000		1.000	1.000	
Control delay		666.6						25.3		139.7	13.0	
Lane group LOS		F						C		F	B	
Apprch. delay	666.6						25.3			79.7		
Approach LOS	F						C			E		
Intersec. delay	207.6			Intersection LOS						F		

S.R. 0465 at S.R. 0011 (Ritner Highway)

Existing

This intersection is a four-leg signalized intersection. S.R. 0011 is slightly skewed on both the east and west approach to S.R. 0465. The existing lane configurations are as follows:

Northbound S.R. 0465 - Single left-turn lane, single shared through/right-turn lane.
Southbound S.R. 0465 – Single left-turn lane, single shared through/right-turn lane.
Eastbound S.R. 0011 – Single left-turn lane, single shared through/right-turn lane.
Westbound S.R. 0011 – Single left-turn lane, single shared through/right-turn lane.

This signal operates with four phases during the analysis periods. During the AM peak period the cycle length is 95 seconds; for other time periods the cycle length is 70 seconds. The intersection operates at a level of service "D" for the AM peak period and "F" for the PM peak period.

Proposed

For the proposed condition in the year 2026 the lane configurations are as follows:

Northbound S.R. 0465 – Double left-turn lane, single through lane, single shared through/right-turn lane.
Southbound S.R. 0465 – Single left-turn lane, single through lane, single shared through/right-turn lane.
Eastbound S.R. 0011 – Single left-turn lane, single through lane, single right-turn lane.
Westbound S.R. 0011 – Double left-turn lane, single through lane, single shared through/right-turn lane.

This signal will operate with four phases during all of the analysis periods. During the PM peak period the cycle length will be 125 seconds; for other time periods the cycle length will be 120 seconds. The intersection is forecasted to operate at a level of service "D" for both the AM and PM peak periods.

S.R. 0465 at Logistics Drive

Existing

This intersection forms a "T" intersection with S.R. 0465. Currently, this signal is in place but not functioning.

Proposed

For the proposed condition in the year 2026 the lane configurations are as follows:

Northbound S.R. 0465 - Single through lane, single shared through/right-turn lane.
Southbound S.R. 0465 – Single left-turn lane, two through lanes.
Westbound Logistics Drive – Single lane for all turns.

This signal will operate with two phases during the analysis periods. During the PM peak period the cycle length will be 125 seconds; for other time periods the cycle length will be 120 seconds. The intersection is forecasted to operate at a level of service "C" for both the AM and PM peak periods.

S.R. 0465 at S.R. 0081 Southbound Ramps

Existing

This intersection is a four-leg signalized intersection. The existing S.R. 0081 southbound off-ramp is skewed acutely with northbound S.R. 0465. The existing S.R. 0081 southbound on-ramp is skewed obtusely with southbound S.R. 0465. The existing lane configurations are as follows:

Northbound S.R. 0465 - Single left-turn lane, single through lane.
Southbound S.R. 0465 – Single shared through/right-turn lane.
S.R. 0081 Southbound Off-Ramp - Single shared through/left-turn lane, single right-turn lane.
S.R. 0081 Southbound On-Ramp – Single departure lane.

This signal operates with seven phases during all analysis periods and has two emergency pre-emption phases. Specific timing information was not available; however, the timings were based on the maximum allowable time obtained from the permit sheets. Based on developed existing cycle lengths of 76 seconds for the AM peak period and 84 seconds for the PM peak period a level of service "C" was obtained for the AM peak period and a level of service "D" was obtained for the PM peak period.

Proposed

For the proposed condition in the year 2026 the lane configurations are as follows:

Northbound S.R. 0465 – Single left-turn lane, two through lanes.
Southbound S.R. 0465 – Three through lanes, free right-turn lane.
S.R. 0081 Southbound Off-Ramp – Double left-turn lane, double right-turn lane.
S.R. 0081 Southbound On-Ramp – Single departure lane.

This signal will operate with three phases during all of the analysis periods. During the PM peak period the cycle length will be 125 seconds and for all other time periods the cycle length will be 120 seconds. The intersection is forecasted to operate at a level of service "C" for the AM peak period and "D" for the PM peak period.

S.R. 0465 at Alexander Spring Road

Existing

This intersection is a four-leg unsignalized intersection. Alexander Spring Road intersects northbound S.R. 0465 obtusely and southbound S.R. 0465 approximately perpendicularly. The existing lane configurations are as follows:

Northbound S.R. 0465 - Single lane for all turns.
Southbound S.R. 0465 – Single lane for all turns.
Eastbound Alexander Spring Road – Single lane for all turns.
Westbound Alexander Spring Road – Single shared through/left-turn lane, single right-turn lane.

Proposed

For the proposed condition in the year 2026 the intersection will be signalized and have the following lane configurations:

Northbound S.R. 0465 – Single left-turn lane, single shared through/right-turn lane.
Southbound S.R. 0465 – Single left-turn lane, single through lane, single right-turn lane.
Eastbound Alexander Spring Road – Single left-turn lane, single shared through/right-turn lane.
Westbound Alexander Spring Road– Single shared through/left-turn lane, free right-turn lane.

This signal will operate with four phases during the analysis periods. During the PM peak period the cycle length will be 125 seconds, and for all other time periods the cycle length will be 120 seconds. The intersection is forecasted to operate at a level of service "C" for the AM and PM peak periods.

S.R. 0465 at True Temper Drive

Existing

This intersection is an unsignalized "T" intersection. True Temper Drive intersects S.R. 0465 approximately perpendicular. The existing lane configurations are as follows:

Northbound S.R. 0465 - Single lane for all turns.
Southbound S.R. 0465 – Single lane for all turns.
Eastbound True Temper Drive – Single lane for all turns.

Proposed

For the proposed condition in the year 2026 the intersection will remain unsignalized and have the following lane configurations:

Northbound S.R. 0465 – Single through lane, center left-turn lane.
Southbound S.R. 0465 – Single lane for all turns.
Eastbound True Temper Drive – Single lane for all turns.

The intersection is forecasted to operate at a level of service of "B" for the AM peak period and "C" for the PM peak period.

S.R. 0465 at Ames Drive

Existing

This intersection is an unsignalized "T" intersection. Ames Drive intersects S.R. 0465 on a horizontal curve to the right. The existing lane configurations are as follows:

Northbound S.R. 0465 - Single lane for all turns.
Southbound S.R. 0465 – Single lane for all turns.
Eastbound Ames Drive – Single lane for all turns.

Proposed

For the proposed condition in the year 2026 the intersection will remain unsignalized and have the following lane configurations:

Northbound S.R. 0465 – Single through lane, center left-turn lane.
Southbound S.R. 0465 – Single lane for all turns.
Eastbound Ames Drive – Single lane for all turns.

The intersection is forecasted to operate at a level of service of "B" for the AM peak and PM peak periods.

S.R. 0465 at Walnut Bottom Road

Existing

This intersection is an unsignalized "T" intersection. Walnut Bottom Road intersects S.R. 0465 at a slight skew. The existing lane configurations are as follows:

Southbound S.R. 0465 – Single lane for all turns.
Eastbound Walnut Bottom Road – Single lane for all turns.
Westbound Walnut Bottom Road – Single lane for all turns.

Proposed

For the proposed condition in the year 2026 the intersection will be signalized and have the following lane configurations:

Southbound S.R. 0465 – Single left-turn lane, single right-turn lane.
Eastbound Walnut Bottom Road – Single left-turn lane, single through lane.
Westbound Walnut Bottom Road – Single through lane, free right.

This signal will operate with three phases during the analysis periods. During the PM peak period the cycle length will be 125 seconds and for all other time periods the cycle length will be 110 seconds. The intersection is forecasted to operate at a level of service "B" for the AM peak period and "D" for the PM peak period.

Summary

In the year 2026 all of the intersections will experience acceptable levels of service for operation in all identified time periods. The following three exhibits show the existing, projected no build, and projected build overall intersection levels of service. Detailed lane group levels of service and v/c ratios can be found in **Appendix E**.

AASHTO Queue Analysis Results can be found in **Appendix F**.

Exhibit 5: 2002 Existing Overall Intersection Level of Service for S.R. 0465

Intersection	AM LOS	PM LOS
S.R. 0011 (Ritner Highway)	D	F
Logistics Drive	N/A	N/A
S.R. 0081 SB Ramps	C	D
S.R. 0081 NB Ramps	B	C
Commerce Avenue*	WB-B,EB-F	WB-C,EB-F
Alexander Spring Road*	WB-C,EB-F	WB-C,EB-E
True Temper Drive*	EB-B	EB-B
Ames Drive*	EB-A	EB-B
Walnut Bottom Road*	SB-C	SB-C

*Denotes Unsignalized Intersections

Exhibit 6: 2026 Projected No Build Overall Intersection Level of Service for S.R. 0465

Intersection	AM LOS	PM LOS
S.R. 0011 (Ritner Highway)	F	F
Logistics Drive	F	F
S.R. 0081 SB Ramps	F	F
S.R. 0081 NB Ramps	F	F
Commerce Avenue*	WB-F,EB-F	WB-F,EB-F

Exhibit 6: 2026 Projected No Build Overall Intersection Level of Service for S.R. 0465		
Intersection	AM LOS	PM LOS
Alexander Spring Road*	WB-F,EB-F	WB-F,EB-F
True Temper Drive*	EB-B	EB-C
Ames Drive*	EB-B	EB-B
Walnut Bottom Road*	SB-F	SB-F

*Denotes Unsignalized Intersections

Exhibit 7: 2026 Projected Level of Service for S.R. 0465		
Intersection	AM LOS	PM LOS
S.R. 0011 (Ritner Highway)	D	D
Logistics Drive	C	C
S.R. 0081 SB Ramps	C	D
S.R. 0081 NB Ramps	N/A	N/A
Commerce Avenue	C	C
Alexander Spring Road	C	C
True Temper Drive*	B	C
Ames Drive*	B	B
Walnut Bottom Road	B	D

*Denotes Unsignalized Intersections