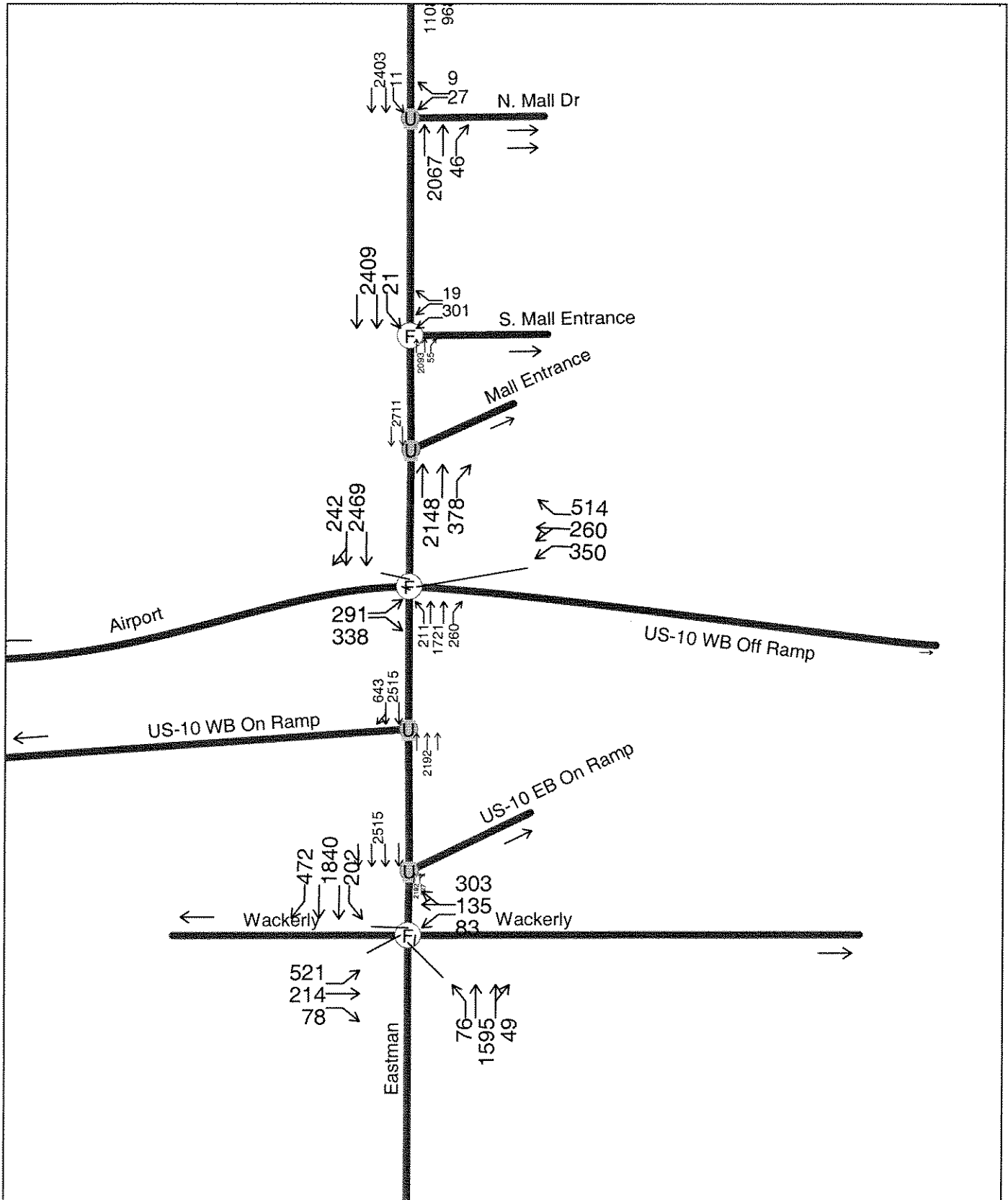
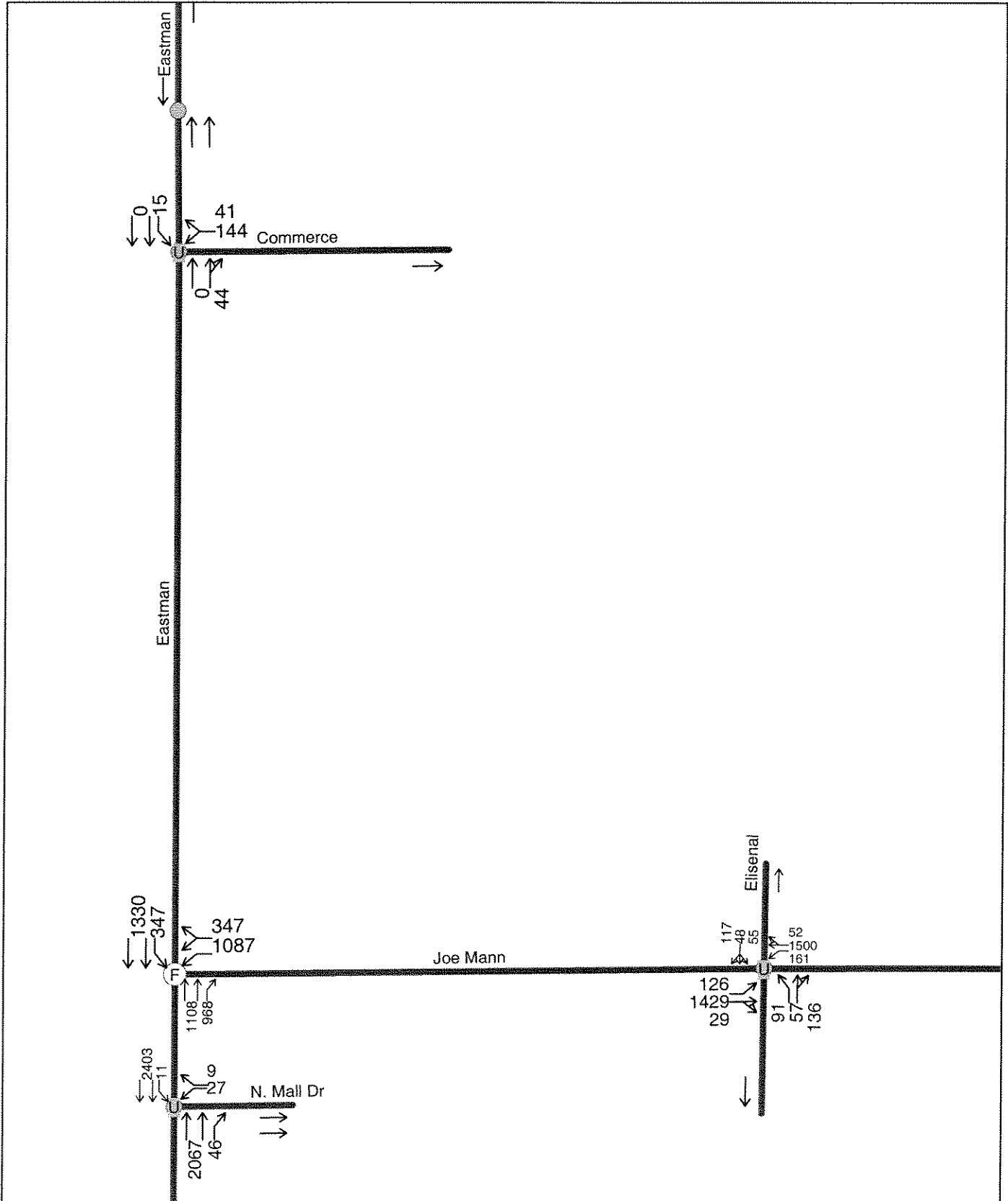




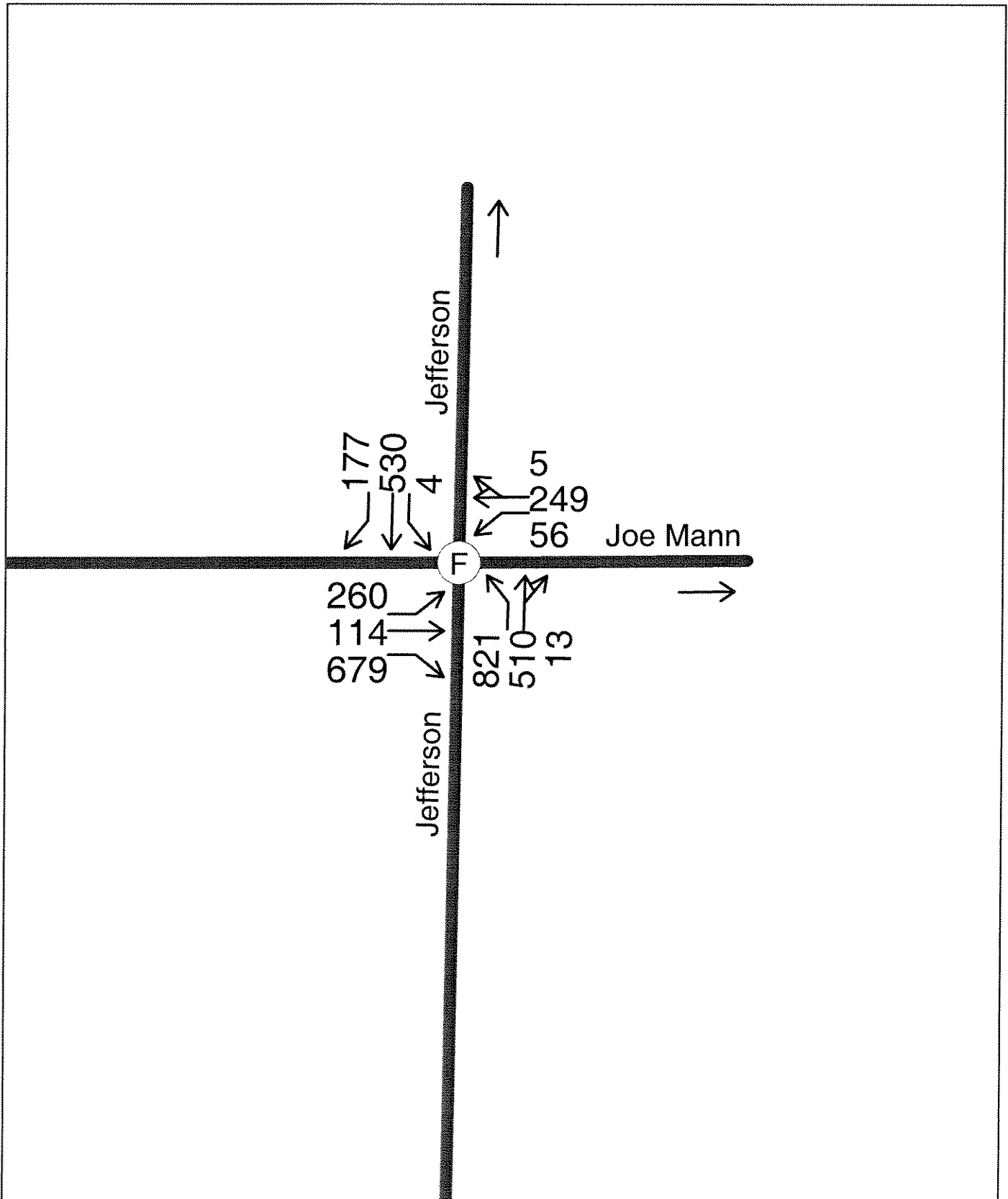
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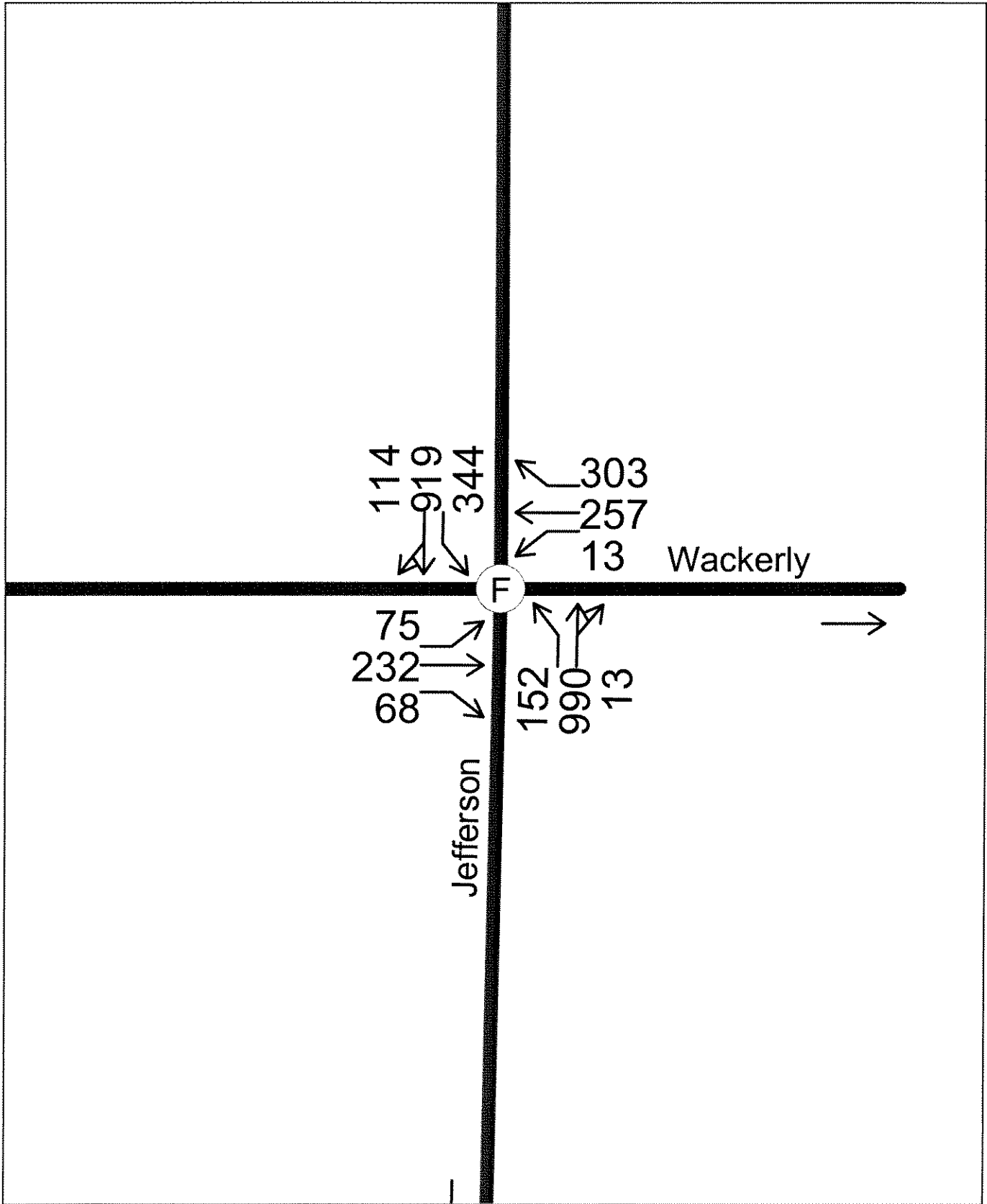


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Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	521	214	78	83	135	76	1595	202	1840	472
Turn Type	pm+pt		Perm	pm+pt		pm+pt		pm+pt		pm+ov
Protected Phases	7	4		3	8	5	2	1	6	7
Permitted Phases	4		4	8		2		6		6
Detector Phases	7	4	4	3	8	5	2	1	6	7
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0	5.0
Minimum Split (s)	11.1	22.1	22.1	11.1	22.1	11.3	22.3	11.3	22.3	11.1
Total Split (s)	13.0	31.0	31.0	13.0	31.0	13.0	43.0	13.0	43.0	13.0
Total Split (%)	13.0%	31.0%	31.0%	13.0%	31.0%	13.0%	43.0%	13.0%	43.0%	13.0%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	4.3	4.3	4.3	4.3	3.6
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	C-Max	None	C-Max	None
Act Effct Green (s)	36.8	29.6	29.6	35.8	27.0	47.8	39.0	48.8	41.6	54.6
Actuated g/C Ratio	0.37	0.30	0.30	0.36	0.27	0.48	0.39	0.49	0.42	0.55
v/c Ratio	2.40	0.42	0.16	0.23	0.90	0.36	1.43	0.93	1.36	0.49
Control Delay	659.5	32.5	7.2	20.7	48.5	16.7	227.5	40.1	191.4	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	659.5	32.5	7.2	20.7	48.5	16.7	227.5	40.1	191.4	3.6
LOS	F	C	A	C	D	B	F	D	F	A
Approach Delay		431.5			44.1		218.1		144.0	
Approach LOS		F			D		F		F	

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 13 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 2.40  
 Intersection Signal Delay: 199.5  
 Intersection Capacity Utilization 124.8%  
 Analysis Period (min) 15

Intersection LOS: F  
 ICU Level of Service H

**Splits and Phases: 3: Wackerly & Eastman**

ø1	ø2	ø3	ø4
13 s	43 s	13 s	31 s
ø5	ø6	ø7	ø8
13 s	43 s	13 s	31 s



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT
Lane Configurations									
Volume (vph)	291	338	350	260	514	211	1721	260	2469
Turn Type	Prot	custom	Split		Prot	pm+pt		Free	
Protected Phases	3	3	4	4	4	1	1 2		2
Permitted Phases		1				1 2		Free	
Detector Phases	3	3	4	4	4	1	1 2		2
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0			10.0
Minimum Split (s)	11.0	11.0	17.0	17.0	17.0	11.3			35.3
Total Split (s)	21.0	21.0	18.0	18.0	18.0	13.0	61.0	0.0	48.0
Total Split (%)	21.0%	21.0%	18.0%	18.0%	18.0%	13.0%	61.0%	0.0%	48.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	4.3			4.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.0			2.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lead			Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes
Recall Mode	None	None	None	None	None	None			C-Max
Act Effct Green (s)	17.0	26.0	14.0	14.0	14.0	53.0	57.0	100.0	44.0
Actuated g/C Ratio	0.17	0.26	0.14	0.14	0.14	0.53	0.57	1.00	0.44
v/c Ratio	1.05	0.88	1.37	1.38	2.25	0.98	0.93	0.18	2.45
Control Delay	107.2	45.8	227.9	230.0	599.3	45.5	23.6	0.0	673.3
Queue Delay	106.5	0.0	0.0	0.0	29.5	0.0	114.8	0.0	0.0
Total Delay	213.7	45.8	227.9	230.0	628.8	45.5	138.4	0.0	673.3
LOS	F	D	F	F	F	D	F	A	F
Approach Delay				411.9			113.1		673.3
Approach LOS				F			F		F

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 13 (13%), Referenced to phase 2:NBSB, Start of Green  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 2.45  
 Intersection Signal Delay: 392.7  
 Intersection Capacity Utilization 133.6%  
 Analysis Period (min) 15  
 Intersection LOS: F  
 ICU Level of Service H

Splits and Phases: 8: Airport & Eastman

ø1	ø2	ø3	ø4
13 s	48 s	21 s	18 s



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↗	↑↑	↗	↖	↑↑
Volume (vph)	301	19	2093	55	21	2409
Turn Type	custom			Perm	Perm	
Protected Phases	4	4	2			6
Permitted Phases		4		2	6	
Detector Phases	4	4	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	23.0	23.0	22.1	22.1	22.1	22.1
Total Split (s)	31.4	31.4	68.6	68.6	68.6	68.6
Total Split (%)	31.4%	31.4%	68.6%	68.6%	68.6%	68.6%
Yellow Time (s)	3.5	3.5	4.3	4.3	4.3	4.3
All-Red Time (s)	2.5	2.5	1.8	1.8	1.8	1.8
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Max	Max	Max	Max
Act Effect Green (s)	27.4	27.4	64.6	64.6	64.6	64.6
Actuated g/C Ratio	0.27	0.27	0.65	0.65	0.65	0.65
v/c Ratio	0.35	0.05	1.00	0.06	0.31	1.15
Control Delay	30.4	19.5	29.0	4.8	7.7	83.5
Queue Delay	0.0	0.0	95.7	0.0	0.0	0.0
Total Delay	30.4	19.5	124.6	4.8	7.7	83.5
LOS	C	B	F	A	A	F
Approach Delay	29.8		121.6			82.9
Approach LOS	C		F			F

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 33 (33%), Referenced to phase 2:NBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.15  
 Intersection Signal Delay: 96.4  
 Intersection Capacity Utilization 81.8%  
 Analysis Period (min) 15  
 Intersection LOS: F  
 ICU Level of Service D

Splits and Phases: 13: S. Mall Entrance & Eastman

↑ ø2	↖ ø4
68.6 s	31.4 s
↓ ø6	
68.6 s	

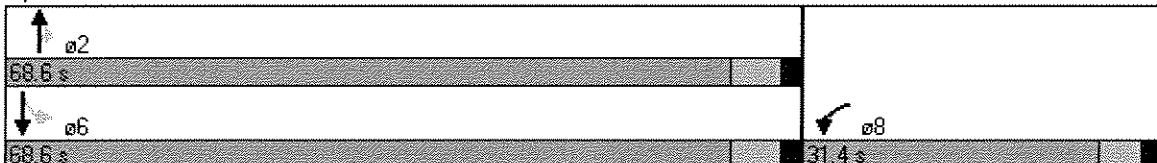


Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Configurations	↔↔↔	↑↑	↗	↖	↑↑
Volume (vph)	1087	1108	968	347	1330
Turn Type			Perm	Perm	
Protected Phases	8	2			6
Permitted Phases			2	6	
Detector Phases	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.2	22.2	22.2	22.2
Total Split (s)	31.4	68.6	68.6	68.6	68.6
Total Split (%)	31.4%	68.6%	68.6%	68.6%	68.6%
Yellow Time (s)	3.5	4.3	4.3	4.3	4.3
All-Red Time (s)	2.5	1.9	1.9	1.9	1.9
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	Max
Act Effct Green (s)	27.4	64.6	64.6	64.6	64.6
Actuated g/C Ratio	0.27	0.65	0.65	0.65	0.65
v/c Ratio	1.64	0.53	0.76	1.75	0.63
Control Delay	319.6	8.4	6.0	378.0	12.2
Queue Delay	0.0	0.0	1.4	0.0	0.0
Total Delay	319.6	8.4	7.4	378.0	12.2
LOS	F	A	A	F	B
Approach Delay	319.6	7.9			87.8
Approach LOS	F	A			F

**Intersection Summary**

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 37 (37%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 45  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.75  
 Intersection Signal Delay: 119.9  
 Intersection Capacity Utilization 101.8%  
 Analysis Period (min) 15  
 Intersection LOS: F  
 ICU Level of Service G

Splits and Phases: 16: Joe Mann & Eastman





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	260	114	679	56	249	821	510	4	530	177
Turn Type	Perm		Perm	Perm		Perm		Perm		Perm
Protected Phases		4			8		2		6	
Permitted Phases	4		4	8		2		6		6
Detector Phases	4	4	4	8	8	2	2	6	6	6
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	20.1	20.1	20.1	20.1	20.1
Total Split (s)	36.1	36.1	36.1	36.1	36.1	53.9	53.9	53.9	53.9	53.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	40.1%	59.9%	59.9%	59.9%	59.9%	59.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.6	3.6
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	0.0	0.0	0.0	0.0	0.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effect Green (s)	32.1	32.1	32.1	32.1	32.1	49.9	49.9	49.9	49.9	49.9
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.36	0.55	0.55	0.55	0.55	0.55
v/c Ratio	0.90	0.19	0.99	0.14	0.42	2.75	0.55	0.01	0.56	0.21
Control Delay	61.7	20.9	49.7	20.7	24.2	814.0	15.4	9.2	15.6	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.7	20.9	49.7	20.7	24.2	814.0	15.4	9.2	15.6	4.3
LOS	E	C	D	C	C	F	B	A	B	A
Approach Delay		49.5			23.6		503.3		12.7	
Approach LOS		D			C		F		B	

**Intersection Summary**

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 58 (64%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 130  
 Control Type: Pretimed  
 Maximum v/c Ratio: 2.75  
 Intersection Signal Delay: 217.9  
 Intersection Capacity Utilization 114.5%  
 Analysis Period (min) 15  
 Intersection LOS: F  
 ICU Level of Service H

Splits and Phases: 18: Joe Mann & Jefferson

ø2	ø4
53.9 s	36.1 s
ø6	ø8
53.9 s	36.1 s



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↑
Volume (vph)	75	232	68	13	257	303	152	990	344	919
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	
Protected Phases		4			8			2		6
Permitted Phases	4		4	8		8	2		6	
Detector Phases	4	4	4	8	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	26.5	26.5	26.5	26.5	26.5	26.5	33.5	33.5	33.5	33.5
Total Split (s)	39.9	39.9	39.9	39.9	39.9	39.9	50.1	50.1	50.1	50.1
Total Split (%)	44.3%	44.3%	44.3%	44.3%	44.3%	44.3%	55.7%	55.7%	55.7%	55.7%
Yellow Time (s)	4.3	4.3	4.3	4.3	4.3	4.3	3.6	3.6	3.6	3.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9

Lead/Lag

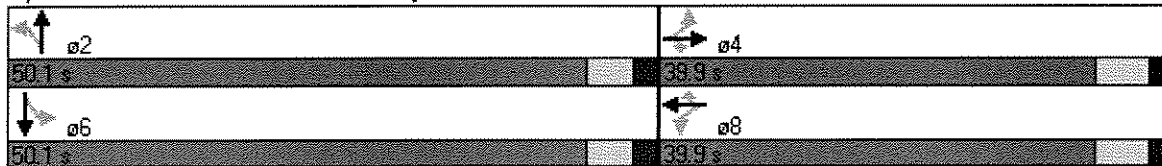
Lead-Lag Optimize?

Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	35.9	35.9	35.9	35.9	35.9	35.9	46.1	46.1	46.1	46.1
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40	0.51	0.51	0.51	0.51
v/c Ratio	0.22	0.34	0.11	0.04	0.38	0.49	1.99	1.14	4.51	1.19
Control Delay	20.0	20.4	4.9	17.0	21.0	18.9	505.5	101.1	1608.1	114.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	20.4	4.9	17.0	21.0	18.9	505.5	101.1	1608.1	114.7
LOS	B	C	A	B	C	B	F	F	F	F
Approach Delay		17.5			19.8			154.2		487.8
Approach LOS		B			B			F		F

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 120	
Control Type: Pretimed	
Maximum v/c Ratio: 4.51	
Intersection Signal Delay: 249.4	Intersection LOS: F
Intersection Capacity Utilization 103.0%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 32: Wackerly & Jefferson



PM - 2026

HCS2000: Two-Lane Highways Release 4.1c

DLZ

Phone: Fax:  
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst Agency/Co. Date Performed Analysis Time Period Highway From/To Jurisdiction Analysis Year Description  
AIngle DLZ 10/06/05 PM Peak Joe Mann Eastman / Jefferson City of Midland 2026

Input Data

Highway class Class 1 Peak-hour factor, PHF 0.92  
Shoulder width 2.0 ft % Trucks and buses 2 %  
Lane width 12.0 ft % Trucks crawling 0.0 %  
Segment length 1.0 mi Truck crawl speed 0.0 mi/hr  
Terrain type Level % Recreational vehicles 0 %  
Grade: Length mi % No-passing zones 100 %  
Up/down % Access points/mi 10 /mi

Analysis direction volume, Vd 1713 veh/h  
Opposing direction volume, Vo 1584 veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.5*	1.5*
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adj. factor, (note-5) fHV	0.990	0.990
Grade adj. factor, (note-1) fG	1.00	1.00
Directional flow rate, (note-2) vi	1881 pc/h	1739 pc/h

Free-Flow Speed from Field Measurement:

Field measured speed, (note-3) S FM - mi/h  
Observed volume, (note-3) Vf - veh/h  
Estimated Free-Flow Speed:  
Base free-flow speed, (note-3) BFFS ~~45.0~~ mi/h = 37 mph  
Adj. for lane and shoulder width, (note-3) fLS 2.6 mi/h  
Adj. for access points, (note-3) fA 2.5 mi/h

Free-flow speed, FFSd ~~39.9~~ mi/h = 37 - 2.6 - 2.5 = 31.9 mph

Adjustment for no-passing zones, fnp 0.6 mi/h  
Average travel speed, ATSD ~~11.2~~ mi/h = 31.9 - 0.00776(3620) - 0.6 = 3.2 mph

*Handwritten notes:*  
 $V_p = 1881 + 1739 = 3620$   
for directional  $v_i > 1700$  pc/h  
 $\Rightarrow$  LOS F, exceeds saturation flow rate for single lane

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.5*	1.5*
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.990	0.990
Grade adjustment factor, (note-1) fG	1.00	1.00
Directional flow rate, (note-2) vi	1881 pc/h	1739 pc/h
Base percent time-spent-following, (note-4) BPTSFd	94.9 %	

Adjustment for no-passing zones, fnp 1.7  
 Percent time-spent-following, PTSFd 96.6 %

PM-2026

### Level of Service and Other Performance Measures

Level of service, LOS F ✓  
 Volume to capacity ratio, v/c 1.11  
 Peak 15-min vehicle-miles of travel, VMT15 465 veh-mi  
 Peak-hour vehicle-miles of travel, VMT60 1713 veh-mi  
 Peak 15-min total travel time, TT15 41.5 veh-h

#### Notes:

1. If the highway is extended segment (level) or rolling terrain, fG = 1.0
2. If  $v_i$  ( $v_d$  or  $v_o$ )  $\geq 1,700$  pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

### Passing Lane Analysis

Total length of analysis segment, Lt 1.0 mi  
 Length of two-lane highway upstream of the passing lane, Lu mi  
 Length of passing lane including tapers, Lpl mi  
 Average travel speed, ATSD (from above) 11.2 mi/h  
 Percent time-spent-following, PTSFd (from above) 96.6  
 Level of service,(note-1) LOSd (from above) F

### Average Travel Speed

Downstream length of two-lane highway within effective  
 length of passing lane for average travel speed, Lde 1.70 mi  
 Length of two-lane highway downstream of effective  
 length of the passing lane for average travel speed, Ld mi  
 Adj. factor for the effect of passing lane  
 on average speed, fpl 1.11  
 Average travel speed including passing lane,(note-2) ATSp

### Percent Time-Spent-Following

Downstream length of two-lane highway within effective length  
 of passing lane for percent time-spent-following, Lde 3.60 mi  
 Length of two-lane highway downstream of effective length of  
 the passing lane for percent time-spent-following, Ld mi  
 Adj. factor for the effect of passing lane  
 on percent time-spent-following, fpl 0.62  
 Percent time-spent-following  
 including passing lane,(note-3) PTSFpl %

### Level of Service and Other Performance Measures (note-4)

Level of service including passing lane, LOSpl  
 Peak 15-min total travel time, TT15 veh-h

#### Notes:

1. If LOSd = F, passing lane analysis cannot be performed.
2. If  $L_d < 0$ , use alternative Equation 20-22.
3. If  $L_d < 0$ , use alternative Equation 20-20.
4. v/c, VMT15, and VMT60 are calculated on Directional Two-Lane Highway Segment Worksheet.