2045 TRAFFIC VOLUME MAPS

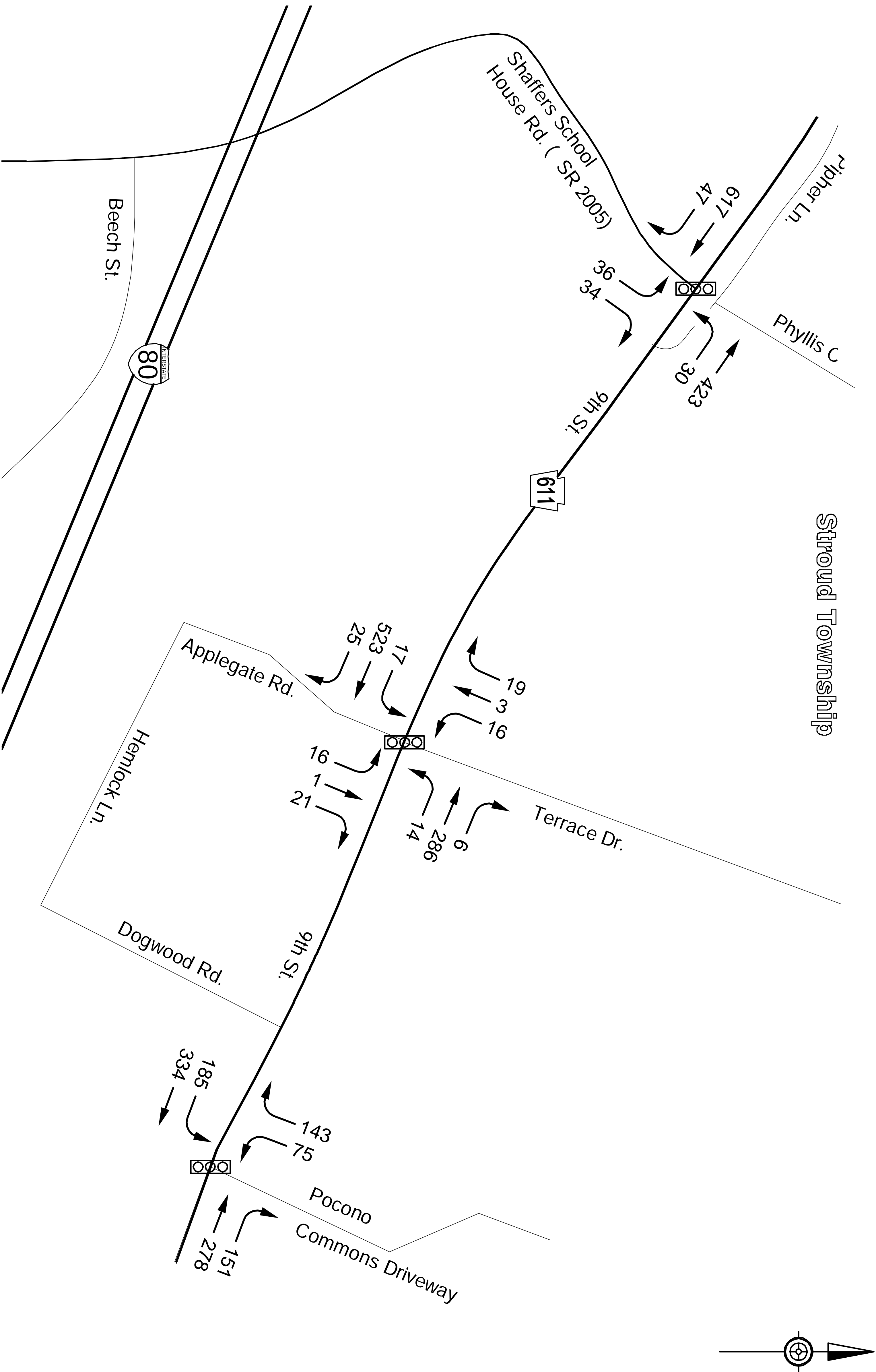FIGURE 1
NO-BUILD
A.M. PEAK HOUR
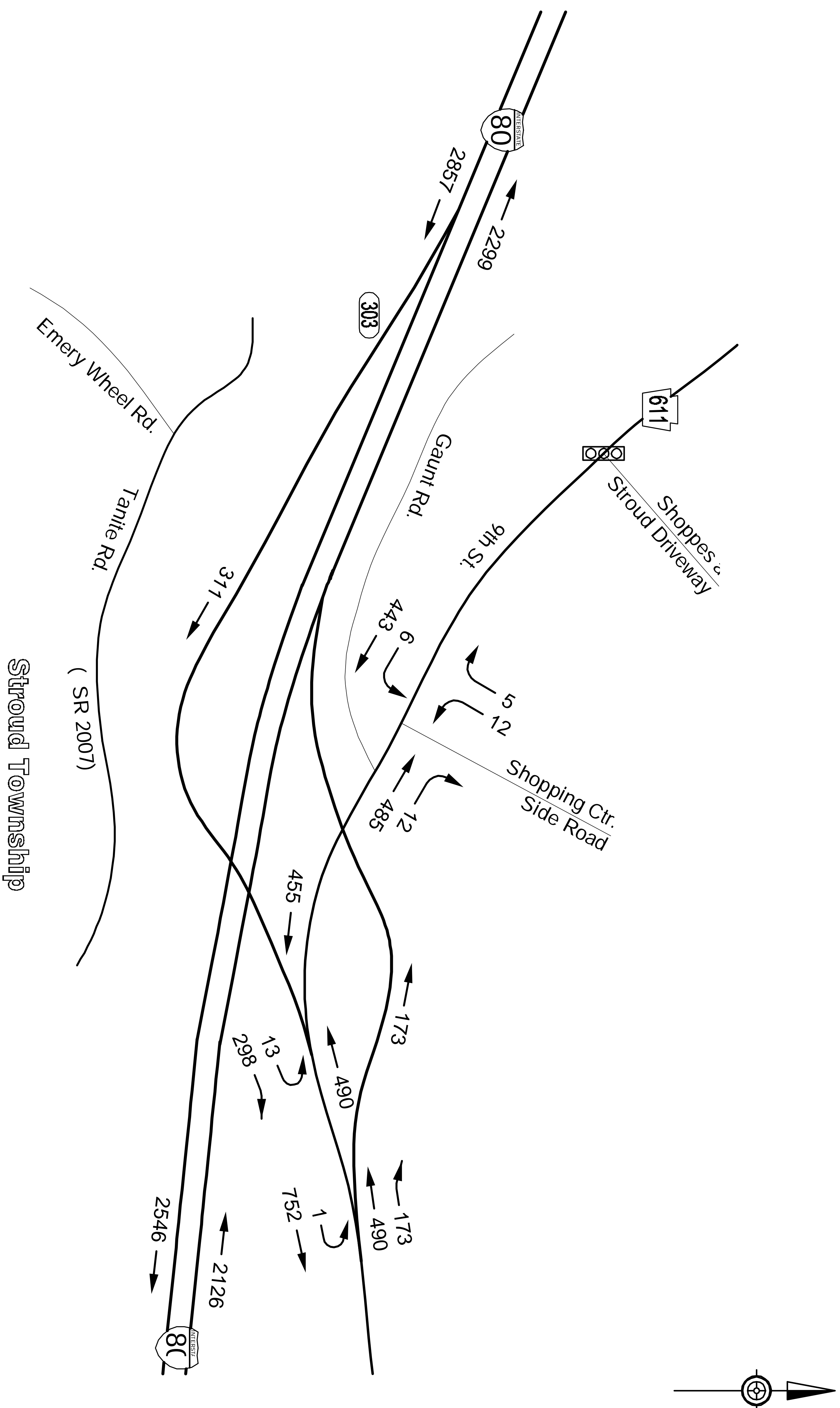2045 TRAFFIC VOLUMES

I-80 Reconstruction
Monroe County

AECOM
1700 Market Street - Suite 1600
Philadelphia, PA 19103

AECOM

1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County

FIGURE 2
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES

Stroud Township

Emery Wheel Rd.

Tanite Rd.

(SR 2007)

Gaunt Rd.

9th St.

Shoppes a
Stroud Driveway

Shopping Ctr.
Side Road

80

2857

2299

303

611

311

443
6

5
12

12
485

455

173

490

13
298

173
490

752

1

2546

2126

80

Stroud Township

Bridge St.
(SR 2009)

431
59

108
201

482
169

9th St.

611

22
3

104
796
42

24

Stroud Mall
Main Driveway

Commercial Driveway

38
12
32

28
597
37

17
13

Stroud Mall
East Driveway

58
684

51
678

611

138
4
206

93
593
2

Chipperfield Dr.
(SR 2011)

Commercial Driveway

14
4
7

91
589
7

9th St.
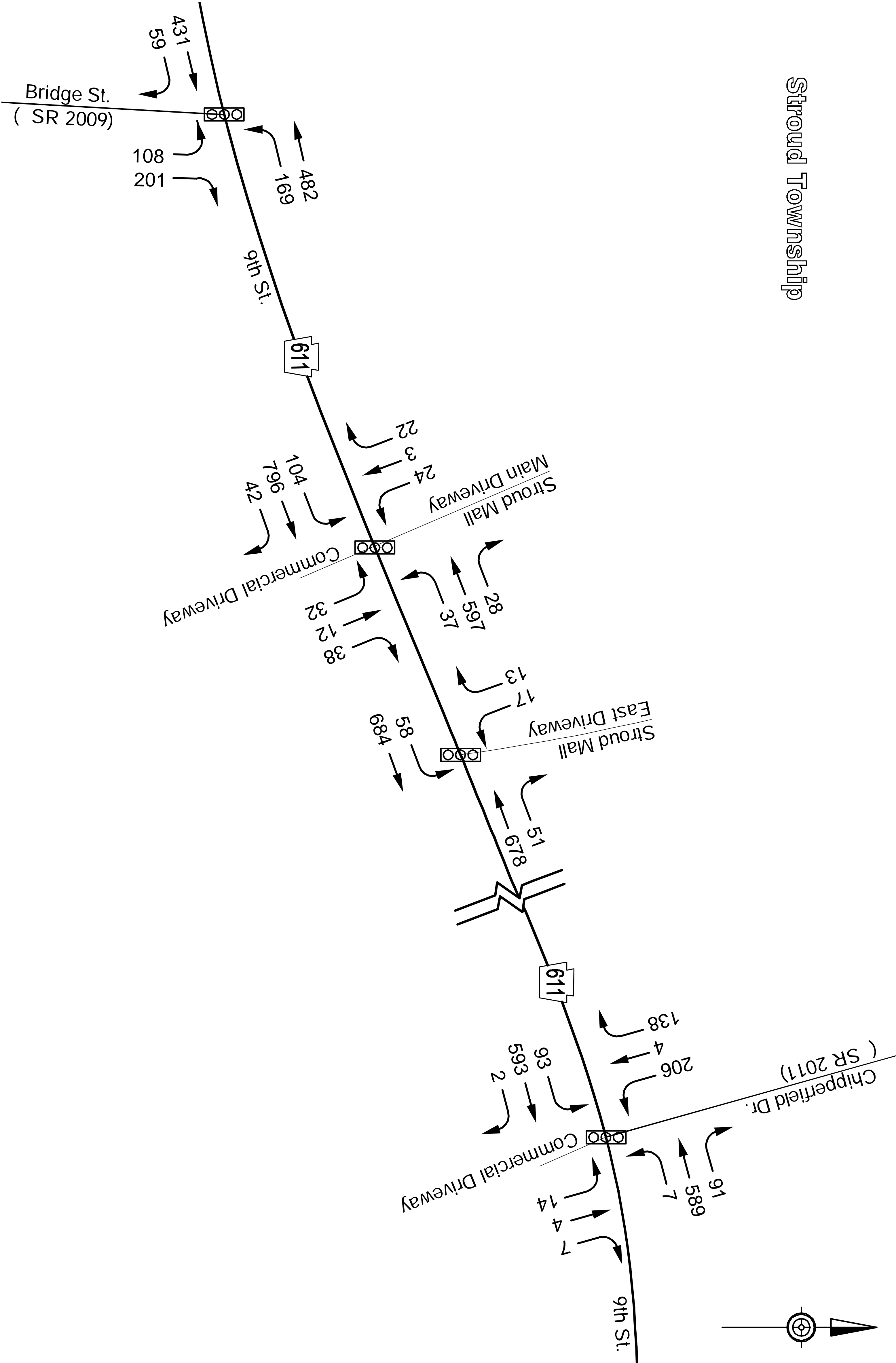
I-80 Reconstruction

Monroe County

FIGURE 3
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES
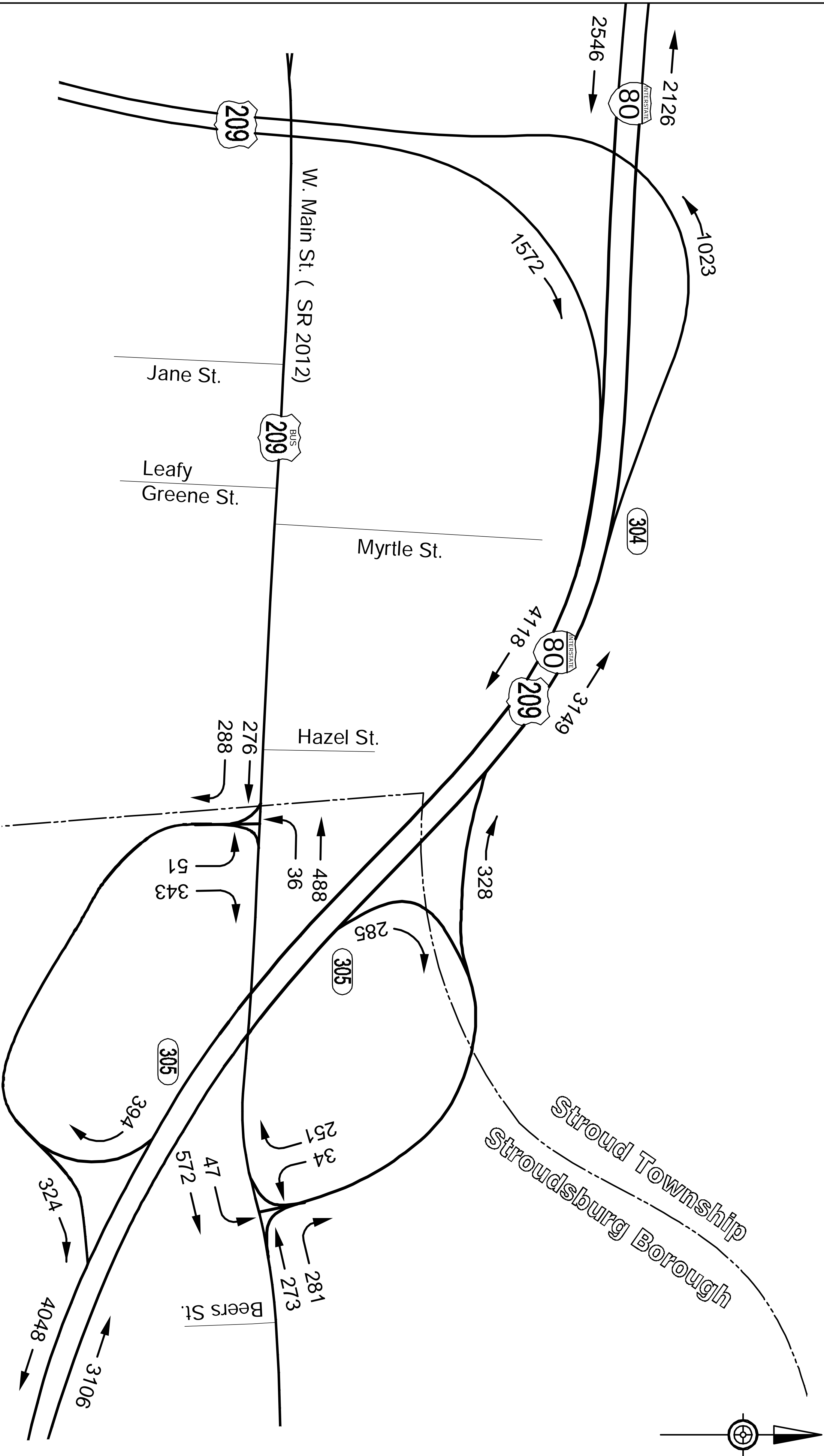
2546
2126
80 INTERSTATE
1023
1572
209
304
W. Main St. (SR 2012)
Jane St.
209 BUS
Leafy
Greene St.
Myrtle St.
4118
80 INTERSTATE
209
3149
Hazel St.
288
276
51
36
343
488
328
305
285
394
305
251
34
572
47
281
273
Beers St.
324
4048
3106
Stroud Township
Stroudsburg Borough

I-80 Reconstruction
Monroe County

FIGURE 4
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES
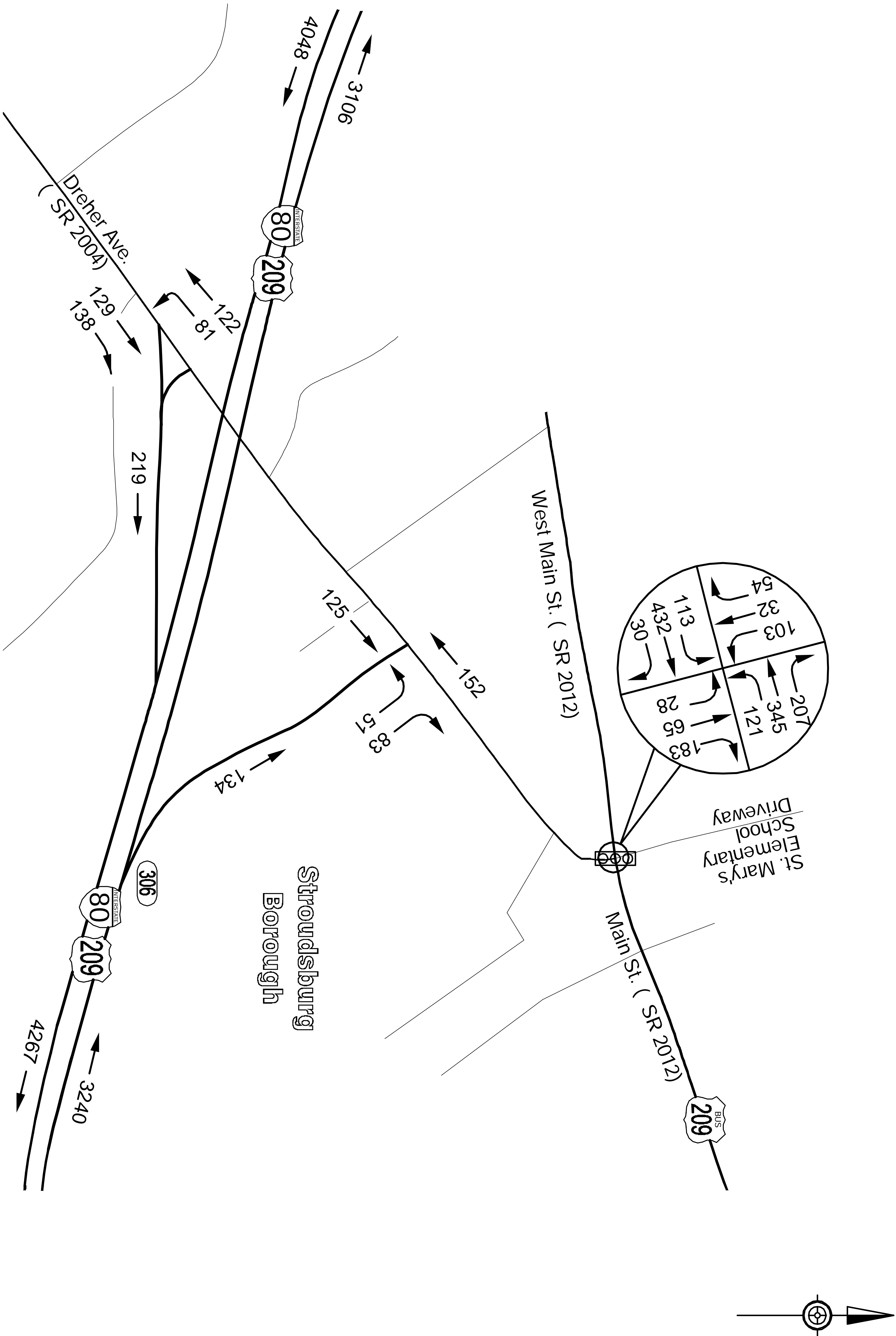
4048
3106

80 [INTERSTATE]
209 [US]

Dreher Ave.
(SR 2004)

129
138
122
81

219

125
152

83
5
134

306
80 [INTERSTATE]
209 [US]

4267
3240

Stroudsburg
Borough

West Main St. (SR 2012)

Main St. (SR 2012)

209 [BUS]

St. Mary's
Elementary
School
Driveway

113
432
30
54
32
103
207
345
121
28
65
183

FIGURE 5
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES
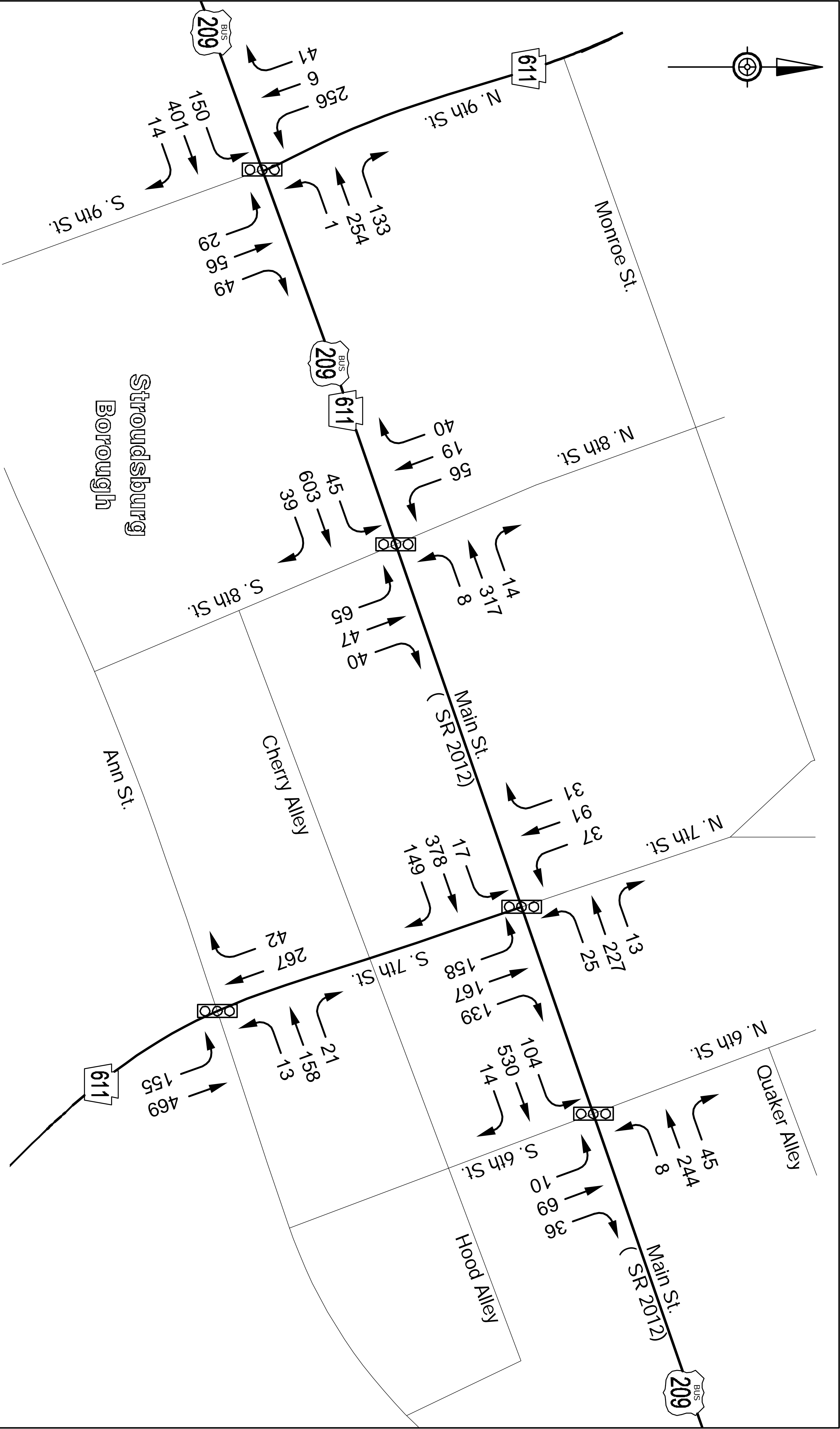
I-80 Reconstruction
Monroe County

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Philadelphia, PA 19103

FIGURE 6
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES

I-80 Reconstruction
Monroe County

AECOM
1700 Market Street - Suite 1600
Philadelphia, PA 19103

Stroudsburg Borough

Sarah St.

Main St. (SR 2012)

209 BUS

191

Quaker Alley

Ann St.

Broad St.

191

Main St. (SR 2012)

209 BUS

McConnell St.

N. 4th St.

Sarah St.

209 BUS

N. 5th St.

93
371
18

62
34
72

419

0
0

263
506
87

363
36

211
535

74
551

18
8

529
62

88

1
53
27

2
243
99

MATCHLINE

MATCHLINE

209 BUS

Kane St.

N. 3rd St.

N. 3rd St.

Main St. (SR 2012)

209 BUS

McConnell St.

209 BUS

64
49

71
662
4

13
92

I-80 Reconstruction
Monroe County

FIGURE 7
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES

AECOM

1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County
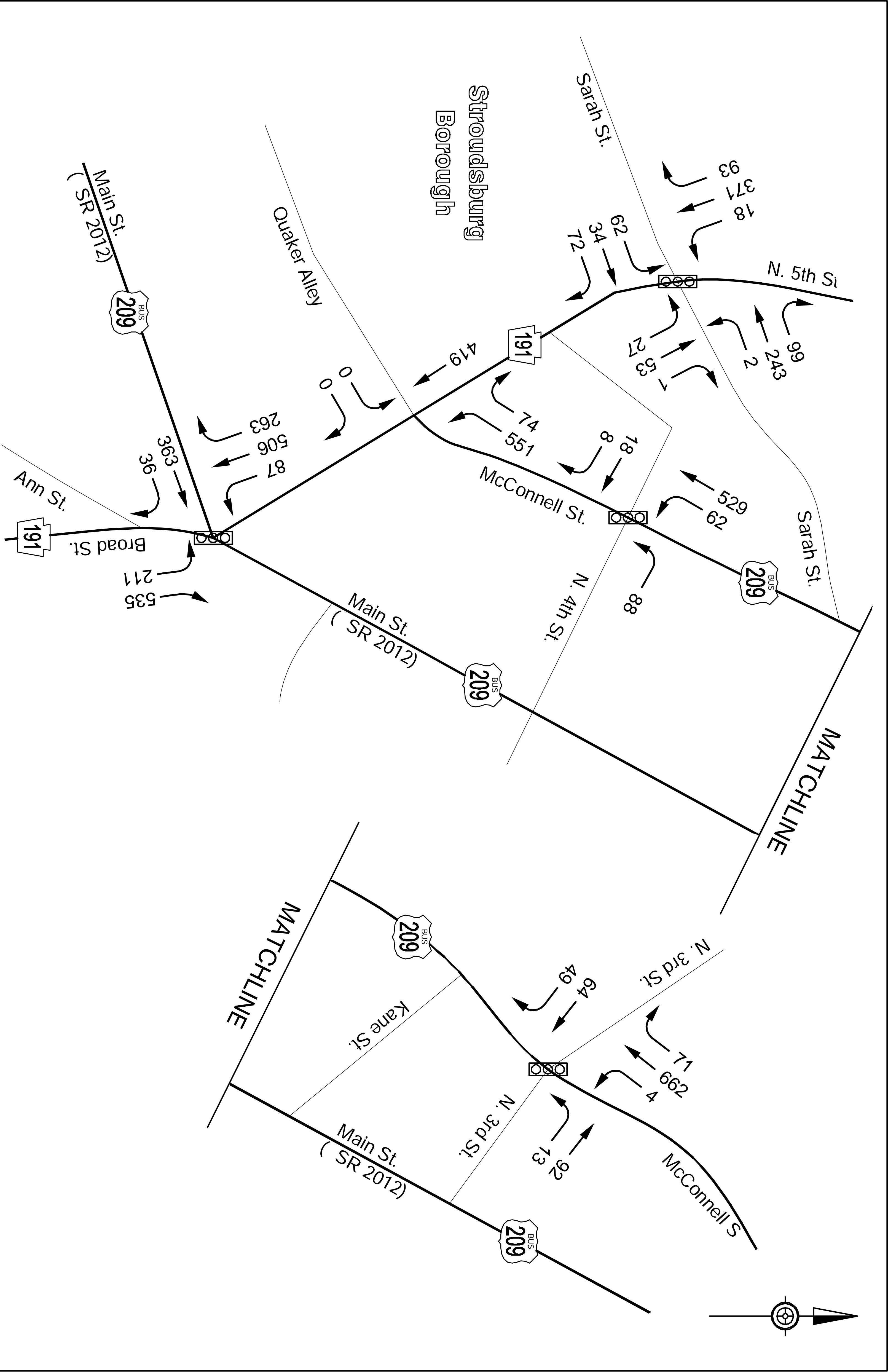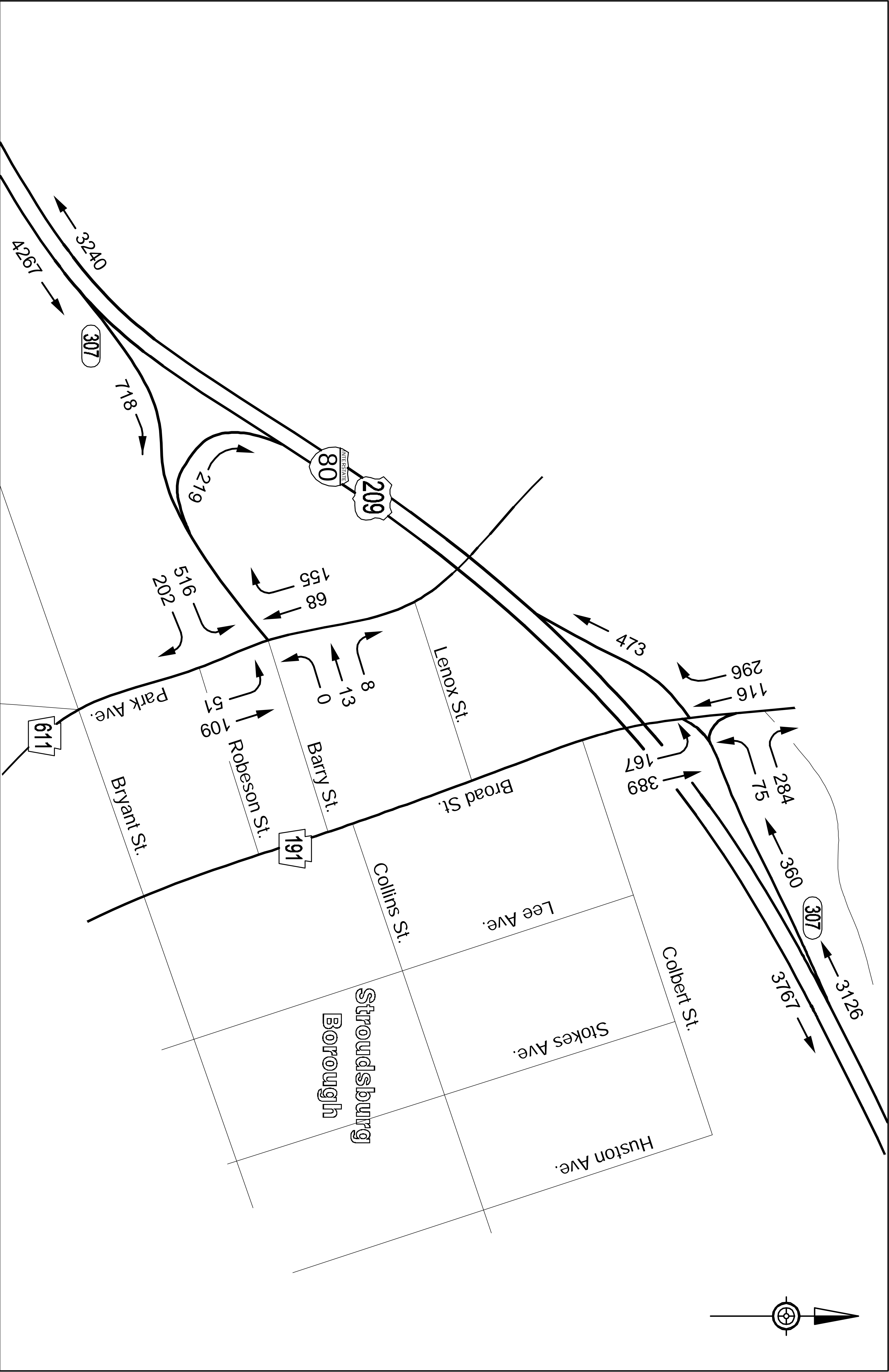
FIGURE 8
NO-BUILD
A.M. PEAK HOUR
2045 TRAFFIC VOLUMES

Map labels: 4267, 3240, 307, 718, 219, 80, 209, 516, 202, 155, 89, 68, 473, 296, 116, 8, 13, 0, 51, 109, Lenox St., 167, 389, 284, 75, 360, 307, 3767, 3126, Park Ave., 611, Bryant St., Robeson St., Barry St., Broad St., Collins St., Lee Ave., Stokes Ave., Colbert St., Huston Ave., Stroudsburg Borough, 191

Shaffers School House Rd. (SR 2005)

39
617
42
42
753
70

9th St.

611

Beech St.

80

Stroud Township

Pipher Ln.

Phyllis C.

Applegate Rd.

24
573
31

24
2
8

36
3
32

14
704
31

Terrace Dr.

Hemlock Ln.

Dogwood Rd.

9th St.

274
325

337
186

217
567

Pocono Commons Driveway

AECOM
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Philadelphia, PA 19103

I-80 Reconstruction
Monroe County
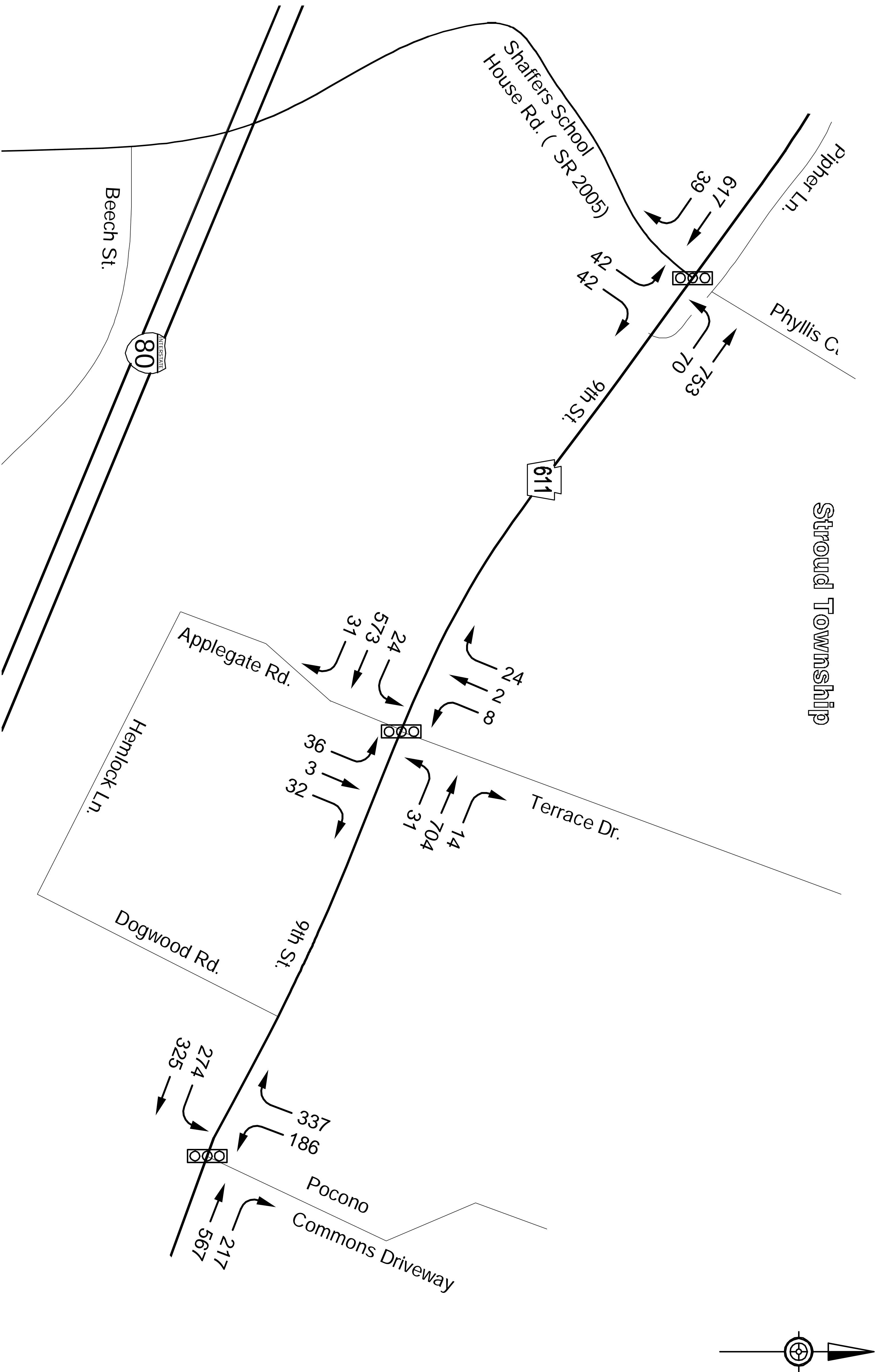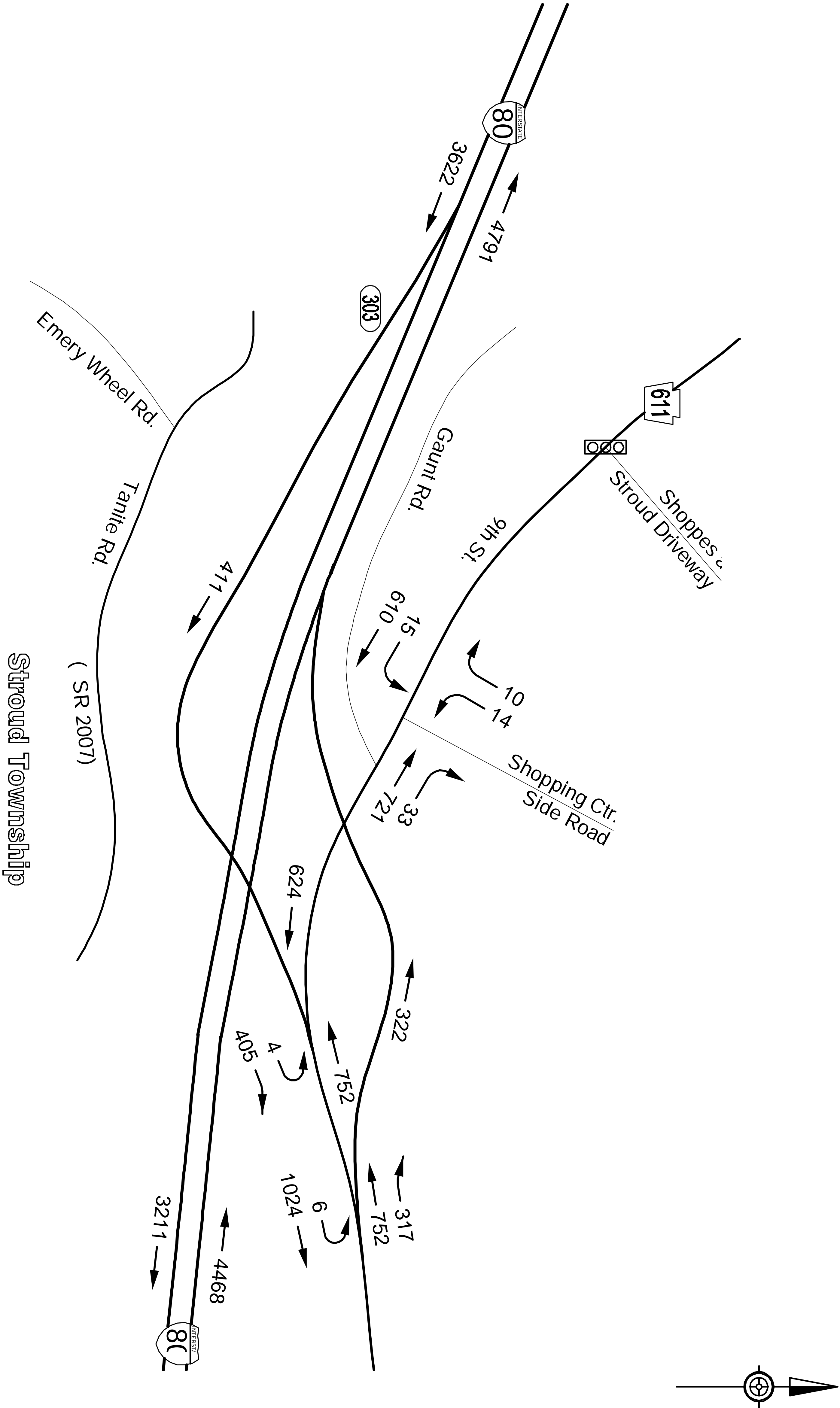
FIGURE 9
NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

Stroud Township

Emery Wheel Rd.

Tanite Rd.

(SR 2007)

Gaunt Rd.

9th St.

80 INTERSTATE

3622

4791

303

411

624

405

3211

4468

322

752

1024

6

317

752

4

752

721

33

610

15

10

14

Shopping Ctr.
Side Road

Shoppes a
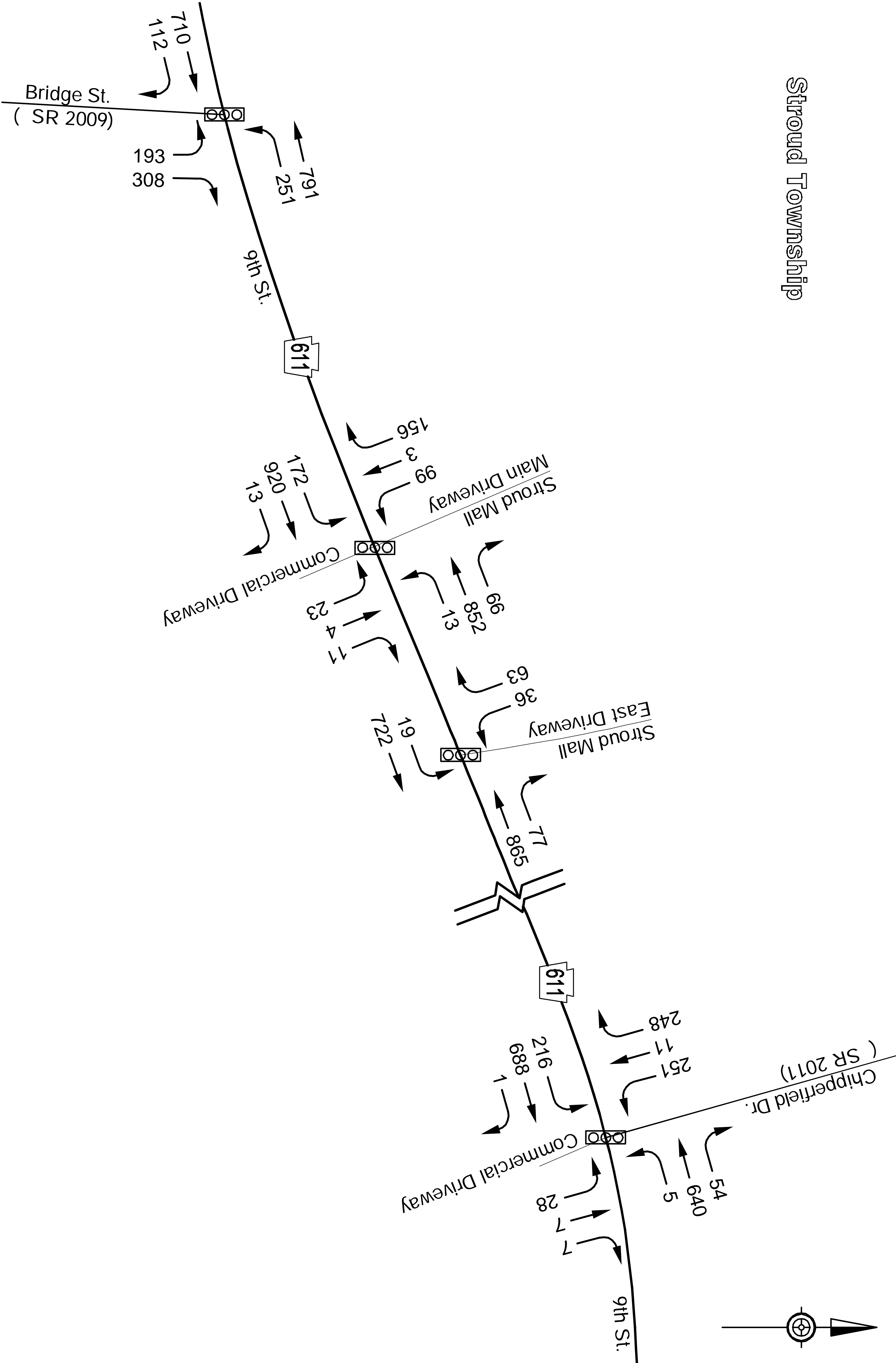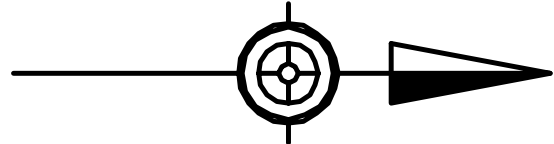Stroud Driveway

611

80 INTERSTATE

AECOM

1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction

Monroe County

FIGURE 10
NO-BUILD
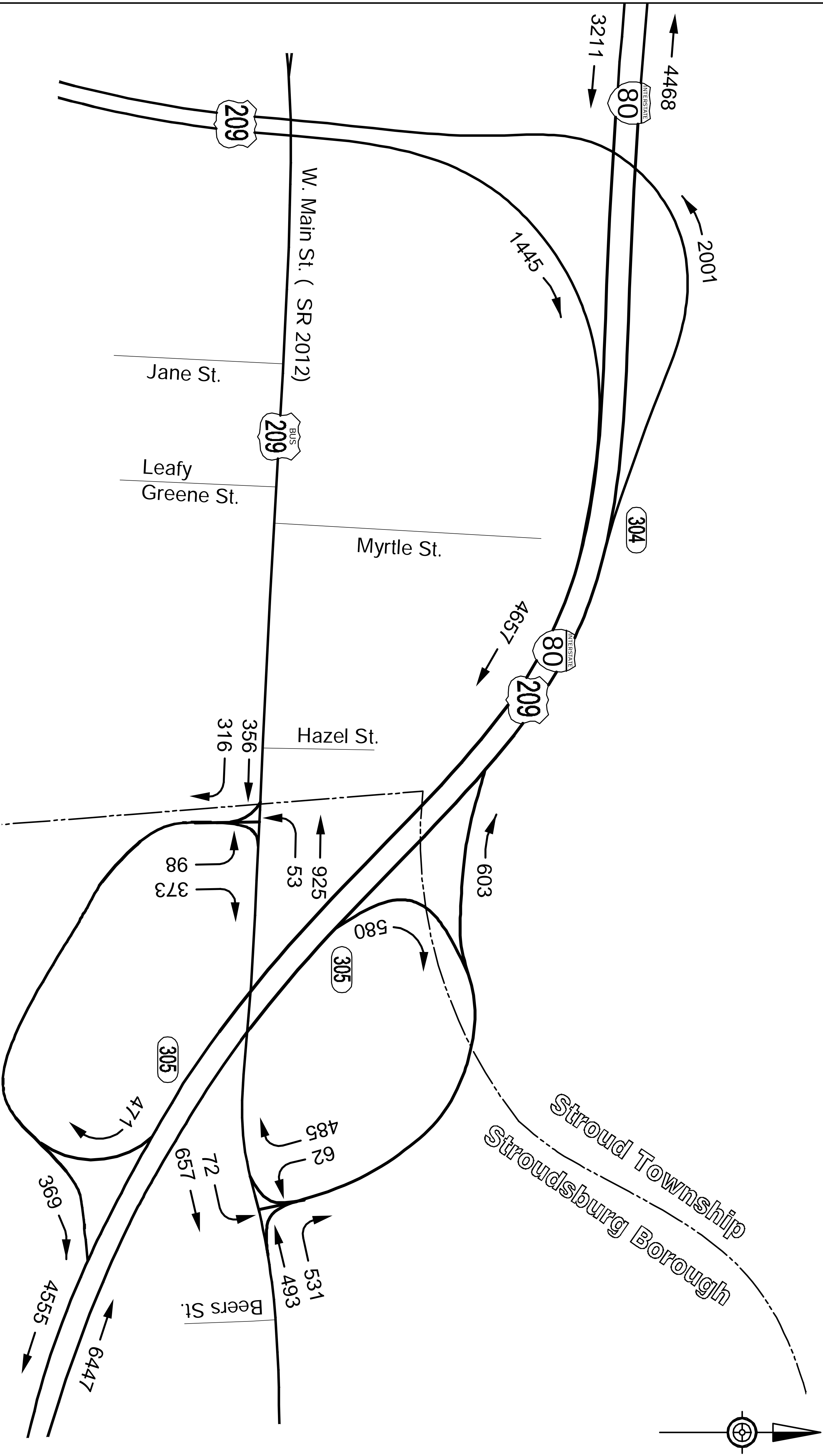P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

Stroud Township

Bridge St.
(SR 2009)

710
112

193
308

791
251

9th St.

611

156
3

172
920
13

99

Commercial Driveway

Stroud Mall
Main Driveway

66
852
13

23
4
11

36
63

Stroud Mall
East Driveway

19
722

77
865

611

248
11
251

216
688
1

Commercial Driveway

Chipperfield Dr.
(SR 2011)

28
7
7

54
640
5

9th St.

AECOM
1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County

FIGURE 11
NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

80 ALLEGHENY
3211
4468
2001
1445
209
304
W. Main St. (SR 2012)
Jane St.
209 BUS
Leafy
Greene St.
Myrtle St.
4657
80 ALLEGHENY
209
Hazel St.
356
316
925
53
98
373
603
580
305
305
471
485
62
72
657
369
531
493
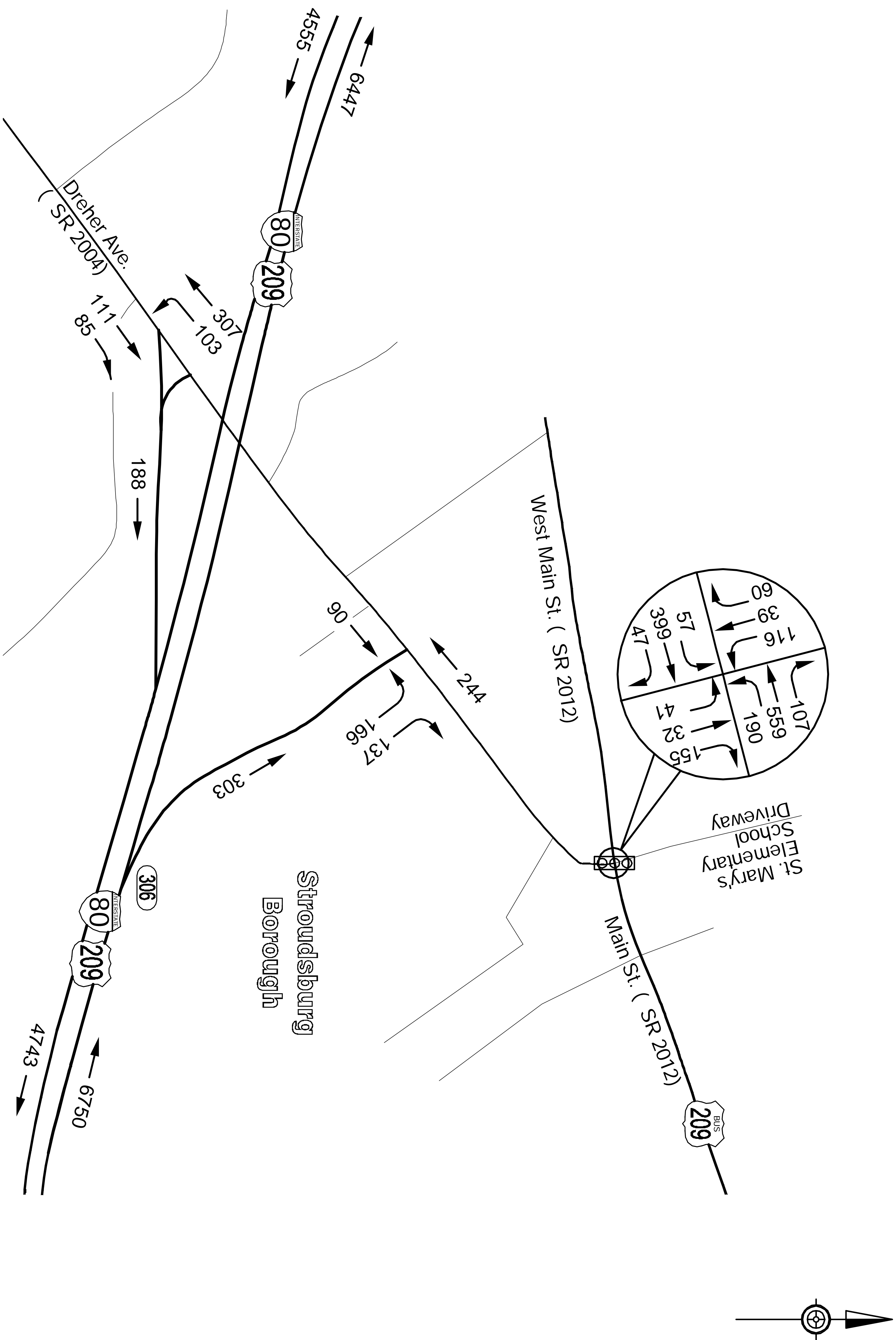4555
Beers St.
6447
Stroud Township
Stroudsburg Borough

AECOM
1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County

FIGURE 12
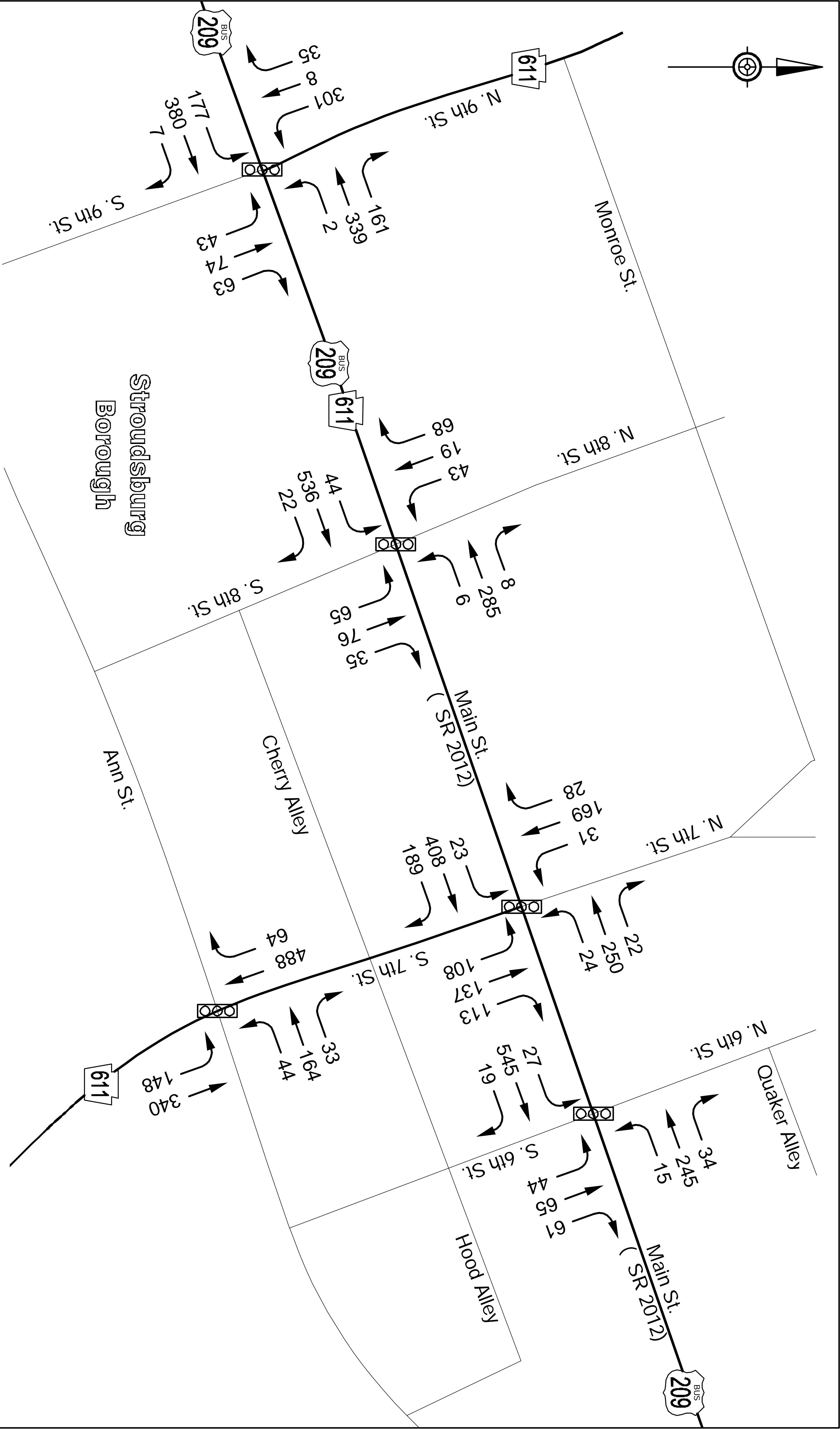NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

AECOM

1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County

FIGURE 13
NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

Dreher Ave.
(SR 2004)

4555
6447

80
209

307
103
111
85
188

Stroudsburg
Borough

90
244
166
137
303

306

80
209

4743
6750

West Main St. (SR 2012)

St. Mary's
Elementary
School
Driveway

Main St. (SR 2012)

209
BUS

60
57
399
47
39
116
41
32
155
559
190
107

209 BUS

611

N. 9th St.

S. 9th St.

35
8
301
177
380
7
161
339
2
43
74
63

Monroe St.

209 BUS
611

68
19
43

N. 8th St.

S. 8th St.

44
536
22

8
285
6

65
76
35

Stroudsburg
Borough

Main St.
(SR 2012)

Ann St.

Cherry Alley

169
28
31

N. 7th St.

23
408
189

488
64

108
137
113

22
250
24

S. 7th St.

33
164
44

340
148

611

27
545
19

N. 6th St.

Quaker Alley

34
245
15

S. 6th St.

65
44
61

Hood Alley

Main St.
(SR 2012)

209 BUS

AECOM
1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County
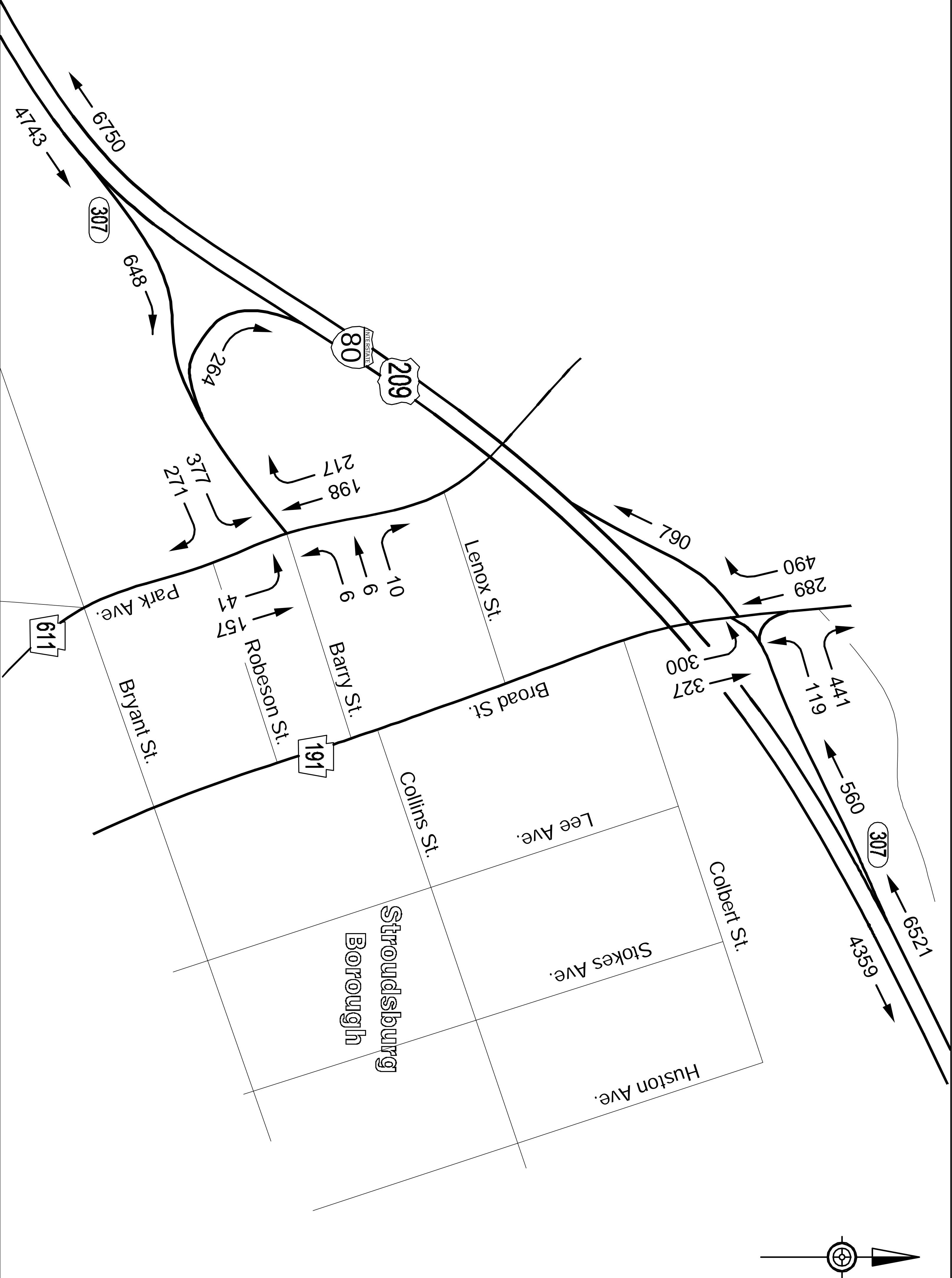
FIGURE 14
NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES
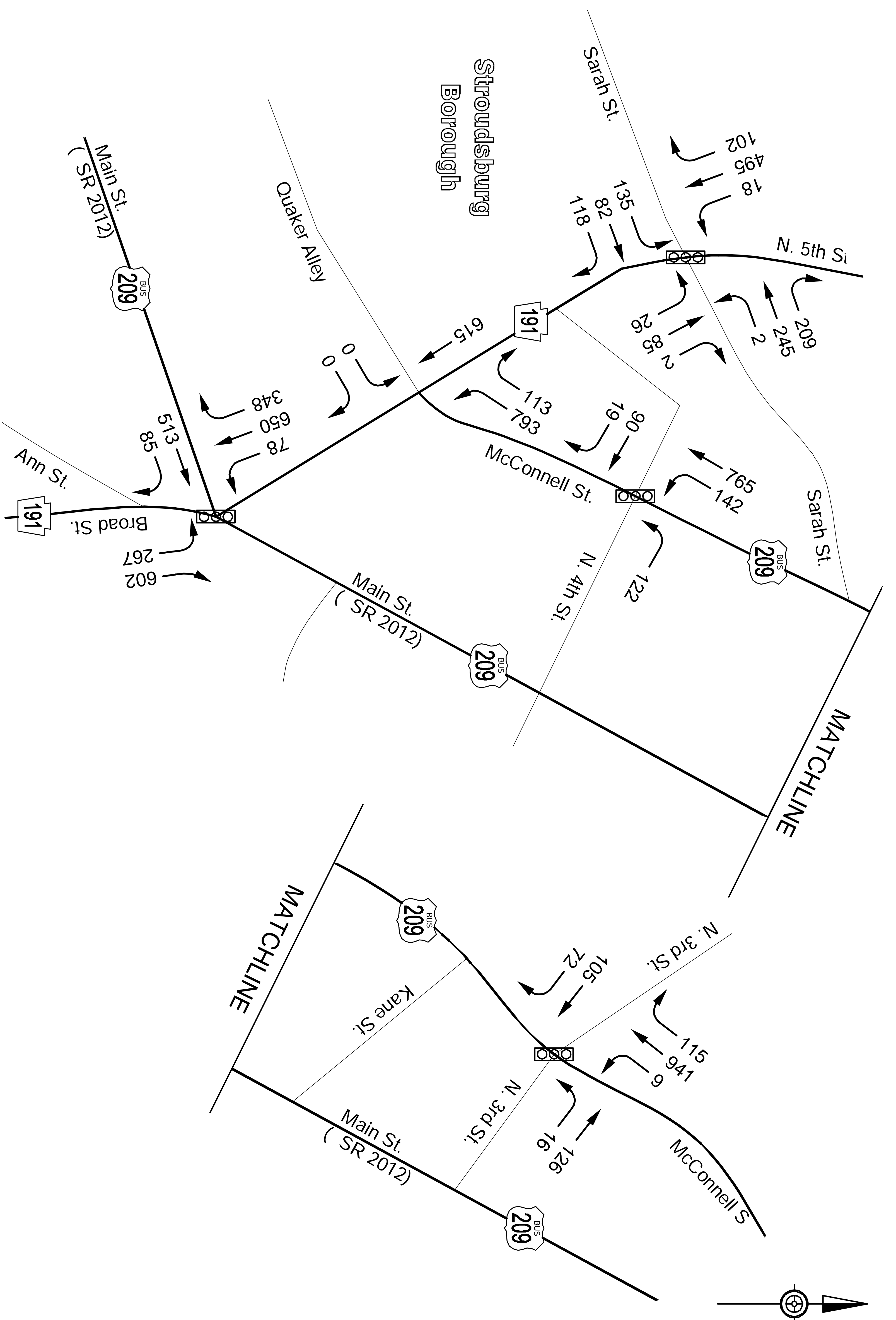
Stroudsburg
Borough

Sarah St.

102
495
18
135
82
118

N. 5th St

26
85
2

209
245
2

615

191

0

113
793

90
19

McConnell St.

765
142

122

N. 4th St.

Sarah St.

209 BUS

513
85

650
348

78

Ann St.

191

Broad St.

267
602

Main St.
(SR 2012)

209 BUS

Main St.
(SR 2012)

209 BUS

MATCHLINE

Quaker Alley

Main St.
(SR 2012)

209 BUS

MATCHLINE

209 BUS

Kane St.

105
72

N. 3rd St.

115
941
9

N. 3rd St.

16
126

McConnell S

209 BUS

I-80 Reconstruction
Monroe County

FIGURE 15
NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

AECOM

1700 Market Street - Suite 1600
Philadelphia, PA 19103

I-80 Reconstruction
Monroe County

FIGURE 16
NO-BUILD
P.M. PEAK HOUR
2045 TRAFFIC VOLUMES

Stroudsburg Borough

4743
6750
307
648
264
80
209
377
271
217
198
790
490
289
300
327
10
9
9
41
157
441
119
560
307
6521
4359
611
191

Park Ave.
Bryant St.
Robeson St.
Barry St.
Lenox St.
Collins St.
Broad St.
Lee Ave.
Stokes Ave.
Colbert St.
Huston Ave.

FREEWAY SEGMENT
HCS ANALYSIS

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 303 and 304*
Date Performed	*7/22/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*2546*	veh/h	Peak-Hour Factor, PHF	*0.94*	
AADT		veh/day	%Trucks and Buses, P_T	*10*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)			Design (N)		
			Design LOS		
$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	*1654*	pc/h/ln	$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h/ln
S	*67.6*	mph	S		mph
$D = v_p / S$	*24.5*	pc/mi/ln	$D = v_p / S$		pc/mi/ln
LOS	*C*		Required Number of Lanes, N		

Glossary / Factor Location

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 303 and 304*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2025*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*3211*	veh/h	Peak-Hour Factor, PHF	*0.94*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs | Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures | Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   *2139*   pc/h/ln

S   *59.8*   mph

D = v_p / S   *35.8*   pc/mi/ln

LOS   *E*

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   pc/h/ln

S   mph

D = v_p / S   pc/mi/ln

Required Number of Lanes, N

Glossary | Factor Location

Glossary		
N - Number of lanes	S - Speed	
V - Hourly volume	D - Density	
v_p - Flow rate	FFS - Free-flow speed	
LOS - Level of service	BFFS - Base free-flow speed	
DDHV - Directional design hour volume		

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8

E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9

f_p - Page 11-18   TRD - Page 11-11

LOS, S, FFS, v_p - Exhibits 11-2, 11-3

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information			*Site Information*	
Analyst	*AJM*		Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*		From/To	*Between Ints. 304 and 305*
Date Performed	*7/24/2013*		Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*		Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*4118*	veh/h	Peak-Hour Factor, PHF	*0.91*	
AADT		veh/day	%Trucks and Buses, P_T	*10*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$	*2763*	pc/h/ln
S	*41.7*	mph
D = v_p / S	*66.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 304 and 305*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*4656*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

| f_p | *0.95* | E_R | *2.0* |
| E_T | *2.5* | $f_{HV} = 1/[1+P_T(E_T-1)+P_R(E_R-1)]$ | *0.840* |

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ = *3070* pc/h/ln

S = *29.4* mph

D = v_p / S = *104.3* pc/mi/ln

LOS = *F*

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln

S mph

D = v_p / S pc/mi/ln

Required Number of Lanes, N

Glossary

N - Number of lanes   S - Speed
V - Hourly volume   D - Density
v_p - Flow rate   FFS - Free-flow speed
LOS - Level of service   BFFS - Base free-flow speed
DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12 f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13 f_{LC} - Exhibit 11-9
f_p - Page 11-18   TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 305 and 306*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*4048*	veh/h	Peak-Hour Factor, PHF	*0.87*	
AADT		veh/day	%Trucks and Buses, P_T	*10*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.50*	ramps/mi	TRD Adjustment	*4.5*	mph
FFS (measured)		mph	FFS	*70.9*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)			Design (N)		
			Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2841*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*38.8*	mph	S		mph
D = v_p / S	*73.3*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*F*		Required Number of Lanes, N		

Glossary / Factor Location

N - Number of lanes	S - Speed		
V - Hourly volume	D - Density	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 11-18	TRD - Page 11-11
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 305 and 306*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*4555*	veh/h	Peak-Hour Factor, PHF	*0.96*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.50*	ramps/mi	TRD Adjustment	*4.5*	mph
FFS (measured)		mph	FFS	*70.9*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2972*	pc/h/ln	Design LOS
S	*33.6*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p) pc/h/ln
D = v_p / S	*88.5*	pc/mi/ln	S mph
LOS	*F*		D = v_p / S pc/mi/ln
			Required Number of Lanes, N

Glossary / Factor Location

N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 306 and 307*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*4267*	veh/h	Peak-Hour Factor, PHF	*0.83*	
AADT		veh/day	%Trucks and Buses, P_T	*8*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.83*	ramps/mi	TRD Adjustment	*5.3*	mph
FFS (measured)		mph	FFS	*70.1*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*3058*	pc/h/ln
S	*30.0*	mph
D = v_p / S	*102.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information			*Site Information*	
Analyst	*AJM*		Highway/Direction of Travel	*I-80 Eastbound*
Agency or Company	*AECOM*		From/To	*Between Ints. 306 and 307*
Date Performed	*7/24/2013*		Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*		Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*4743*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs			**Calc Speed Adj and FFS**		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.83*	ramps/mi	TRD Adjustment	*5.3*	mph
FFS (measured)		mph	FFS	*70.1*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures			**Design (N)**		
			Design (N)		
Operational (LOS)			Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2985*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*33.0*	mph	S		mph
D = v_p / S	*90.3*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*F*		Required Number of Lanes, N		

Glossary		**Factor Location**	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 303 and 304*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2126*	veh/h	Peak-Hour Factor, PHF	*0.97*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs

			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures

Operational (LOS)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1373*	pc/h/ln
S	*69.7*	mph
D = v_p / S	*19.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 303 and 304*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*4468*	veh/h	Peak-Hour Factor, PHF	*0.97*	
AADT		veh/day	%Trucks and Buses, P_T	*13*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.830*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

LOS and Performance Measures

Operational (LOS)

$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$ *2921*   pc/h/ln

S	*35.6*	mph
D = v_p / S	*82.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS

$v_p = (V \text{ or DDHV}) / (PHF \times N \times f_{HV} \times f_p)$ pc/h/ln

S	mph
D = v_p / S	pc/mi/ln

Required Number of Lanes, N

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 304 and 305*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*3149*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2076*	pc/h/ln
S	*61.1*	mph
D = v_p / S	*34.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 304 and 305*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*6470*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*13*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.830*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.67*	ramps/mi	TRD Adjustment	*5.0*	mph
FFS (measured)		mph	FFS	*70.4*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*4230*	pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
LOS	*F*	

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary / Factor Location

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 305 and 306*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*3106*	veh/h	Peak-Hour Factor, PHF	*0.93*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Speed Inputs			Calc Speed Adj and FFS		
Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.50*	ramps/mi	TRD Adjustment	*4.5*	mph
FFS (measured)		mph	FFS	*70.9*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   *2092*   pc/h/ln

S   *60.8*   mph

D = v_p / S   *34.4*   pc/mi/ln

LOS   *D*

Design (N)

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   pc/h/ln

S   mph

D = v_p / S   pc/mi/ln

Required Number of Lanes, N

Glossary / Factor Location

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 305 and 306*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description   *Interstate 80 Reconstruction*

☑ Oper.(LOS)   ☐ Des.(N)   ☐ Planning Data

Flow Inputs

Volume, V	*6447*	veh/h	Peak-Hour Factor, PHF	*0.96*	
AADT		veh/day	%Trucks and Buses, P_T	*13*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.830*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.50*	ramps/mi	TRD Adjustment	*4.5*	mph
FFS (measured)		mph	FFS	*70.9*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   *4259*   pc/h/ln

S   mph

D = v_p / S   pc/mi/ln

LOS   *F*

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)   pc/h/ln

S   mph

D = v_p / S   pc/mi/ln

Required Number of Lanes, N

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		*Site Information*	
Analyst	*AJM*	Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*	From/To	*Between Ints. 306 and 307*
Date Performed	*7/24/2013*	Jurisdiction	
Analysis Time Period	*A.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*	
☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*3240*	veh/h	Peak-Hour Factor, PHF	*0.91*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.83*	ramps/mi	TRD Adjustment	*5.3*	mph
FFS (measured)		mph	FFS	*70.1*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2230*	pc/h/ln
S	*57.7*	mph
D = v_p / S	*38.7*	pc/mi/ln
LOS	*E*	

Design (N)

Design LOS

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information			*Site Information*	
Analyst	*AJM*		Highway/Direction of Travel	*I-80 Westbound*
Agency or Company	*AECOM*		From/To	*Between Ints. 306 and 307*
Date Performed	*7/24/2013*		Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*		Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*

☑ Oper.(LOS)	☐ Des.(N)	☐ Planning Data

Flow Inputs

Volume, V	*6750*	veh/h	Peak-Hour Factor, PHF	*0.96*	
AADT		veh/day	%Trucks and Buses, P_T	*12*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*1*	
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*	
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*	
			Up/Down %		

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.840*

Speed Inputs / Calc Speed Adj and FFS

Lane Width	*12.0*	ft			
Rt-Side Lat. Clearance	*6.0*	ft	f_{LW}	*0.0*	mph
Number of Lanes, N	*2*		f_{LC}	*0.0*	mph
Total Ramp Density, TRD	*1.83*	ramps/mi	TRD Adjustment	*5.3*	mph
FFS (measured)		mph	FFS	*70.1*	mph
Base free-flow Speed, BFFS	*75.4*	mph			

LOS and Performance Measures / Design (N)

Operational (LOS)

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ = *4404* pc/h/ln

S = mph

$D = v_p / S$ = pc/mi/ln

LOS = *F*

Design (N)

Design LOS

$v_p = (V \text{ or } DDHV) / (PHF \times N \times f_{HV} \times f_p)$ = pc/h/ln

S = mph

$D = v_p / S$ = pc/mi/ln

Required Number of Lanes, N

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMP JUNCTION
HCS ANALYSIS

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 304 from Route 209
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{up} =   ft

V_u =   veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☑ Yes   ☐ On

☐ No   ☑ Off

L_{down} =   1360 ft

V_D =   394 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2546	0.94	Rolling	10	1	0.862	0.95	3307
Ramp	1572	0.94	Rolling	5	1	0.922	0.95	1910
UpStream								
DownStream	394	0.82	Rolling	2	0	0.971	0.95	521

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) / Estimation of v_{12} (Diverge)

Merge Areas — Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   1.000 using Equation (Exhibit 25-5)

V_{12} =   3307 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} =   pc/h (Equation 25-8)

Diverge Areas — Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   using Equation (Exhibit 25-12)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

Merge

	Actual	Capacity	LOS F?
V_{FO}	5217	Exhibit 25-7	Yes

Diverge

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area / Flow Entering Diverge Influence Area

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	5217	Exhibit 25-7 4600:All	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F)

Merge

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R =   40.3 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Diverge

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination

Merge

M_S =   0.984 (Exibit 25-19)

S_R =   42.4 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   42.4 mph (Exhibit 25-14)

Diverge

D_S =   (Exhibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 304 from Route 209
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp

☐ Yes ☐ On
☑ No ☐ Off

L_{up} = ____ ft

V_u = ____ veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☑ Yes ☐ On
☐ No ☑ Off

L_{down} = 1360 ft

V_D = 471 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3211	0.94	Rolling	12	1	0.840	0.95	4279
Ramp	1445	0.94	Rolling	2	1	0.962	0.95	1683
UpStream								
DownStream	471	0.86	Rolling	3	0	0.957	0.95	602

Merge Areas	Diverge Areas

Estimation of v_{12} | Estimation of v_{12}

Merge	Diverge
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = ____ (Equation 25-2 or 25-3)	L_{EQ} = ____ (Equation 25-8 or 25-9)
P_{FM} = 1.000 using Equation (Exhibit 25-5)	P_{FD} = ____ using Equation (Exhibit 25-12)
V_{12} = 4279 pc/h	V_{12} = ____ pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34} ____ pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = ____ pc/h (Equation 25-8)	If Yes,V_{12a} = ____ pc/h (Equation 25-18)

Capacity Checks | Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
				V_F		Exhibit 25-14	
V_{FO}	5962	Exhibit 25-7	Yes	$V_{FO} = V_F - V_R$		Exhibit 25-14	
				V_R		Exhibit 25-3	

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}	5962	Exhibit 25-7 4600:All	Yes	V_{12}		Exhibit 25-14	

Level of Service Determination (if not F) | Level of Service Determination (if not F)

Merge	Diverge
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = 46.2 (pc/mi/ln)	D_R = ____ (pc/mi/ln)
LOS = F (Exhibit 25-4)	LOS = ____ (Exhibit 25-4)

Speed Determination | Speed Determination

Merge	Diverge
M_S = 1.780 (Exibit 25-19)	D_S = ____ (Exhibit 25-19)
S_R = 20.2 mph (Exhibit 25-19)	S_R = ____ mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)	S_0 = ____ mph (Exhibit 25-19)
S = 20.2 mph (Exhibit 25-14)	S = ____ mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		*Site Information*	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 305 from W. Main Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☑ Yes ☐ On		☐ Yes ☐ On
☐ No ☑ Off		☑ No ☐ Off
L_{up} = 800 ft		L_{down} = ft
V_u = 394 veh/h	S_{FF} = 70.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3724	0.91	Rolling	10	1	0.862	0.95	4997
Ramp	324	0.74	Rolling	0	0	1.000	0.95	461
UpStream	394	0.82	Rolling	2	0	0.971	0.95	521
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12}	*Estimation of v_{12}*
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 25-2 or 25-3)	L_{EQ} = (Equation 25-8 or 25-9)
P_{FM} = 1.000 using Equation (Exhibit 25-5)	P_{FD} = using Equation (Exhibit 25-12)
V_{12} = 4997 pc/h	V_{12} = pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 25-8)	If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

Capacity Checks					*Capacity Checks*			
	Actual	Capacity	LOS F?			Actual	Capacity	LOS F?
					V_F		Exhibit 25-14	
V_{FO}	5458	Exhibit 25-7	Yes		$V_{FO} = V_F - V_R$		Exhibit 25-14	
					V_R		Exhibit 25-3	

Flow Entering Merge Influence Area / Flow Entering Diverge Influence Area

Flow Entering Merge Influence Area				*Flow Entering Diverge Influence Area*			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}	5458	Exhibit 25-7 4600:All	Yes	V_{12}		Exhibit 25-14	

Level of Service Determination (if not F)	*Level of Service Determination (if not F)*
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = 46.8 (pc/mi/ln)	D_R = (pc/mi/ln)
LOS = F (Exhibit 25-4)	LOS = (Exhibit 25-4)

Speed Determination	*Speed Determination*
M_S = 1.224 (Exibit 25-19)	D_S = (Exhibit 25-19)
S_R = 35.7 mph (Exhibit 25-19)	S_R = mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)	S_0 = mph (Exhibit 25-19)
S = 35.7 mph (Exhibit 25-14)	S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information   Site Information

Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 305 from W. Main Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp

☑ Yes   ☐ On

☐ No   ☑ Off

L_{up} =   800   ft

V_u =   471 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{down} =   ft

V_D =   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4186	0.95	Rolling	12	1	0.840	0.95	5519
Ramp	369	0.96	Rolling	0	0	1.000	0.95	405
UpStream	471	0.86	Rolling	3	0	0.957	0.95	602
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge)   Estimation of v_{12} (Diverge)

Merge:

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   1.000   using Equation (Exhibit 25-5)

V_{12} =   5519   pc/h

V_3 or V_{av34} 0   pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge:

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   using Equation (Exhibit 25-12)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks (Merge)   Capacity Checks (Diverge)

	Actual	Capacity	LOS F?
V_{FO}	5924	Exhibit 25-7	Yes

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area   Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	5924	Exhibit 25-7 4600:All	Yes

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F) — Merge   Level of Service Determination (if not F) — Diverge

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   50.4 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination (Merge)   Speed Determination (Diverge)

M_S =   1.767 (Exibit 25-19)

S_R =   20.5 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   20.5 mph (Exhibit 25-14)

D_S =   (Exhibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 306 from Dreher Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp

☑ Yes   ☑ On

☐ No   ☐ Off

L_{up} =   2100   ft

V_u =   324 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{down} =   ft

V_D =   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4048	0.87	Rolling	10	1	0.862	0.95	5681
Ramp	219	0.67	Rolling	1	0	0.985	0.95	349
UpStream	324	0.74	Rolling	0	0	1.000	0.95	461
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge Areas

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   1.000   using Equation (Exhibit 25-5)

V_{12} =   5681 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} =   pc/h (Equation 25-8)

Diverge Areas

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   using Equation (Exhibit 25-12)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} =   pc/h (Equation 25-18)

Capacity Checks | Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}	6030	Exhibit 25-7	Yes

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	6030	Exhibit 25-7 4600:All	Yes

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F) | Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   50.3 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination | Speed Determination

M_S =   1.920 (Exibit 25-19)

S_R =   16.2 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   16.2 mph (Exhibit 25-14)

D_S =   (Exhibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 306 from Dreher Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☑ Yes ☑ On		☐ Yes ☐ On
☐ No ☐ Off		☑ No ☐ Off
L_{up} = 2100 ft	S_{FF} = 70.0 mph S_{FR} = 35.0 mph	L_{down} = ft
V_u = 369 veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4555	0.96	Rolling	12	1	0.840	0.95	5943
Ramp	188	0.81	Rolling	1	0	0.985	0.95	248
UpStream	369	0.96	Rolling	0	0	1.000	0.95	405
DownStream								

Merge Areas	Diverge Areas
Estimation of v_{12}	**Estimation of v_{12}**
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 25-2 or 25-3)	L_{EQ} = (Equation 25-8 or 25-9)
P_{FM} = 1.000 using Equation (Exhibit 25-5)	P_{FD} = using Equation (Exhibit 25-12)
V_{12} = 5943 pc/h	V_{12} = pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 25-8)	If Yes,V_{12a} = pc/h (Equation 25-18)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
				V_F		Exhibit 25-14	
V_{FO}	6191	Exhibit 25-7	Yes	$V_{FO} = V_F - V_R$		Exhibit 25-14	
				V_R		Exhibit 25-3	

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}	6191	Exhibit 25-7 4600:All	Yes	V_{12}		Exhibit 25-14	

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = 51.6 (pc/mi/ln)	D_R = (pc/mi/ln)
LOS = F (Exhibit 25-4)	LOS = (Exhibit 25-4)

Speed Determination	Speed Determination
M_S = 2.203 (Exibit 25-19)	D_S = (Exhibit 25-19)
S_R = 8.3 mph (Exhibit 25-19)	S_R = mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)	S_0 = mph (Exhibit 25-19)
S = 8.3 mph (Exhibit 25-14)	S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 307 from Park Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp

☑ Yes   ☐ On

☐ No   ☑ Off

L_{up} =   950 ft

V_u =   718 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{down} =   ft

V_D =   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3549	0.83	Rolling	8	1	0.885	0.95	5086
Ramp	219	0.85	Rolling	4	0	0.943	0.95	287
UpStream	718	0.82	Rolling	6	0	0.917	0.95	1005
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge)

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   1.000 using Equation (Exhibit 25-5)

V_{12} =   5086 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Estimation of v_{12} (Diverge)

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   using Equation (Exhibit 25-12)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks (Merge)

	Actual	Capacity	LOS F?
V_{FO}	5373	Exhibit 25-7	Yes

Capacity Checks (Diverge)

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	5373	Exhibit 25-7 4600:All	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F) (Merge)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   45.7 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Level of Service Determination (if not F) (Diverge)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination (Merge)

M_S =   1.145 (Exibit 25-19)

S_R =   37.9 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   37.9 mph (Exhibit 25-14)

Speed Determination (Diverge)

D_S =   (Exhibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		*Site Information*	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 307 from Park Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp

☑ Yes   ☐ On

☐ No   ☑ Off

L_{up} =   950 ft

V_u =   648 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{down} =   ft

V_D =   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4095	0.97	Rolling	10	1	0.862	0.95	5155
Ramp	264	0.63	Rolling	1	0	0.985	0.95	448
UpStream	648	0.84	Rolling	2	0	0.971	0.95	836
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) / *Estimation of v_{12}* (Diverge)

Merge:

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   1.000 using Equation (Exhibit 25-5)

V_{12} =   5155 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge:

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   using Equation (Exhibit 25-12)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

Merge:

	Actual	Capacity	LOS F?
V_{FO}	5603	Exhibit 25-7	Yes

Diverge:

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area / *Flow Entering Diverge Influence Area*

	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}	5603	Exhibit 25-7 4600:All	Yes	V_{12}		Exhibit 25-14	

Level of Service Determination (if not F)

Merge:

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   47.5 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Diverge:

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination

Merge:

M_S =   1.362 (Exibit 25-19)

S_R =   31.9 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   31.9 mph (Exhibit 25-14)

Diverge:

D_S =   (Exhibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 303 from Route 611
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp

☑ Yes   ☐ On

☐ No   ☑ Off

L_{up} = 4630 ft

V_u = 1023 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2126	0.97	Rolling	12	1	0.840	0.95	2745
Ramp	173	0.74	Rolling	2	0	0.971	0.95	253
UpStream	1023	0.94	Rolling	8	1	0.885	0.95	1295
DownStream								

Merge Areas / Diverge Areas

Estimation of v_{12} (Merge)

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} = 1.000 using Equation (Exhibit 25-5)

V_{12} = 2745 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Estimation of v_{12} (Diverge)

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   using Equation (Exhibit 25-12)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}	2998	Exhibit 25-7	No

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area / Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	2998	Exhibit 25-7 4600:All	No

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R = 22.0 (pc/mi/ln)

LOS = C (Exhibit 25-4)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination

M_S = 0.324 (Exibit 25-19)

S_R = 60.9 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 60.9 mph (Exhibit 25-14)

D_S =   (Exhibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information			*Site Information*	
Analyst	AJM		Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM		Junction	Int. 303 from Route 611
Date Performed	7/24/2013		Jurisdiction	
Analysis Time Period	P.M. Peak Hour		Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☑ Yes ☐ On		☐ Yes ☐ On
☐ No ☑ Off		☑ No ☐ Off
L_{up} = 4630 ft	S_{FF} = 70.0 mph S_{FR} = 35.0 mph	L_{down} = ft
V_u = 2001 veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4468	0.97	Rolling	13	1	0.830	0.95	5843
Ramp	322	0.87	Rolling	1	0	0.985	0.95	395
UpStream	2001	0.94	Rolling	2	1	0.962	0.95	2330
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12}	*Estimation of v_{12}*
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 25-2 or 25-3)	L_{EQ} = (Equation 25-8 or 25-9)
P_{FM} = 1.000 using Equation (Exhibit 25-5)	P_{FD} = using Equation (Exhibit 25-12)
V_{12} = 5843 pc/h	V_{12} = pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 25-8)	If Yes,V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}	6238	Exhibit 25-7	Yes

		Actual	Capacity	LOS F?
	V_F		Exhibit 25-14	
	$V_{FO} = V_F - V_R$		Exhibit 25-14	
	V_R		Exhibit 25-3	

Capacity Checks

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	6238	Exhibit 25-7 4600:All	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R =   47.2 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Speed Determination

M_S =   2.242 (Exibit 25-19)

S_R=   7.2 mph (Exhibit 25-19)

S_0=   N/A mph (Exhibit 25-19)

S =   7.2 mph (Exhibit 25-14)

Speed Determination

D_S =   (Exhibit 25-19)

S_R=   mph (Exhibit 25-19)

S_0=   mph (Exhibit 25-19)

S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 307 from Broad Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp
☑ Yes   ☐ On
☐ No   ☑ Off
L_{up} = 1600 ft
V_u = 360 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes   ☐ On
☑ No   ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2766	0.91	Rolling	12	1	0.840	0.95	3807
Ramp	473	0.91	Rolling	6	0	0.917	0.95	596
UpStream	360	0.90	Rolling	3	0	0.957	0.95	440
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge Areas — Estimation of v_{12}

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)
P_{FM} =   1.000   using Equation (Exhibit 25-5)
V_{12} =   3807   pc/h
V_3 or V_{av34} 0   pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge Areas — Estimation of v_{12}

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)
P_{FD} =   using Equation (Exhibit 25-12)
V_{12} =   pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks (Merge)

	Actual	Capacity	LOS F?
V_{FO}	4403	Exhibit 25-7	No

Capacity Checks (Diverge)

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	4403	Exhibit 25-7 4600:All	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F) — Merge

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   38.4 (pc/mi/ln)
LOS =   E (Exhibit 25-4)

Level of Service Determination (if not F) — Diverge

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   (pc/mi/ln)
LOS =   (Exhibit 25-4)

Speed Determination — Merge

M_S =   0.627 (Exibit 25-19)
S_R =   52.4 mph (Exhibit 25-19)
S_0 =   N/A mph (Exhibit 25-19)
S =   52.4 mph (Exhibit 25-14)

Speed Determination — Diverge

D_S =   (Exhibit 25-19)
S_R =   mph (Exhibit 25-19)
S_0 =   mph (Exhibit 25-19)
S =   mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 307 from Broad Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp
☑ Yes   ☐ On
☐ No   ☑ Off
L_{up} = 1600 ft
V_u = 560 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes   ☐ On
☑ No   ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5961	0.96	Rolling	12	1	0.840	0.95	7778
Ramp	790	0.89	Rolling	1	0	0.985	0.95	948
UpStream	560	0.88	Rolling	1	0	0.985	0.95	680
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge:

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)
P_{FM} = 1.000 using Equation (Exhibit 25-5)
V_{12} = 7778 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge:

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)
P_{FD} =   using Equation (Exhibit 25-12)
V_{12} =   pc/h
V_3 or V_{av34} pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks | Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}	8726	Exhibit 25-7	Yes

	Actual	Capacity	LOS F?
V_F		Exhibit 25-14	
$V_{FO} = V_F - V_R$		Exhibit 25-14	
V_R		Exhibit 25-3	

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}	8726	Exhibit 25-7 4600:All	Yes

	Actual	Max Desirable	Violation?
V_{12}		Exhibit 25-14	

Level of Service Determination (if not F) | Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R = 72.0 (pc/mi/ln)
LOS = F (Exhibit 25-4)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R = (pc/mi/ln)
LOS = (Exhibit 25-4)

Speed Determination | Speed Determination

M_S = 24.336 (Exibit 25-19)
S_R = -611.4 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = -611.4 mph (Exhibit 25-14)

D_S = (Exhibit 25-19)
S_R = mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)
S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 303 to Route 611
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp
☐ Yes   ☐ On
☑ No   ☐ Off
L_{up} = ___ ft
V_u = ___ veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☑ Yes   ☑ On
☐ No   ☐ Off
L_{down} = 5500 ft
V_D = 1572 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2857	0.94	Rolling	10	1	0.862	0.95	3711
Ramp	311	0.72	Rolling	1	0	0.985	0.95	461
UpStream								
DownStream	1572	0.94	Rolling	5	1	0.922	0.95	1910

Merge Areas	Diverge Areas

Estimation of v_{12}

Merge Areas

$$V_{12} = V_F (P_{FM})$$

L_{EQ} = ___ (Equation 25-2 or 25-3)
P_{FM} = ___ using Equation (Exhibit 25-5)
V_{12} = ___ pc/h
V_3 or V_{av34} ___ pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = ___ pc/h (Equation 25-8)

Diverge Areas

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} = ___ (Equation 25-8 or 25-9)
P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = 3711 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = ___ pc/h (Equation 25-18)

Capacity Checks

Merge Areas

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

Diverge Areas

	Actual	Capacity	LOS F?
V_F	3711	Exhibit 25-14	4800	No
$V_{FO} = V_F - V_R$	3250	Exhibit 25-14	4800	No
V_R	461	Exhibit 25-3	2000	No

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	3711	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

Merge Areas

$$D_R = 5.475 + 0.00734 \, v_R + 0.0078 \, V_{12} - 0.00627 \, L_A$$

D_R = ___ (pc/mi/ln)
LOS = ___ (Exhibit 25-4)

Diverge Areas

$$D_R = 4.252 + 0.0086 \, V_{12} - 0.009 \, L_D$$

D_R = 29.9 (pc/mi/ln)
LOS = D (Exhibit 25-4)

Speed Determination

Merge Areas

M_S = ___ (Exibit 25-19)
S_R = ___ mph (Exhibit 25-19)
S_0 = ___ mph (Exhibit 25-19)
S = ___ mph (Exhibit 25-14)

Diverge Areas

D_S = 0.469 (Exhibit 25-19)
S_R = 56.9 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 56.9 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 303 to Route 611
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☐ Yes ☐ On		☑ Yes ☑ On
☑ No ☐ Off		☐ No ☐ Off
L_{up} = ft		L_{down} = 5500 ft
V_u = veh/h	S_{FF} = 70.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = 1445 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3622	0.94	Rolling	12	1	0.840	0.95	4827
Ramp	411	0.97	Rolling	1	0	0.985	0.95	453
UpStream								
DownStream	1445	0.94	Rolling	2	1	0.962	0.95	1683

Merge Areas	Diverge Areas
Estimation of v_{12}	**Estimation of v_{12}**
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 25-2 or 25-3)	L_{EQ} = (Equation 25-8 or 25-9)
P_{FM} = using Equation (Exhibit 25-5)	P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = pc/h	V_{12} = 4827 pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)	If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7		V_F	4827	Exhibit 25-14 4800	Yes
				$V_{FO} = V_F - V_R$	4374	Exhibit 25-14 4800	No
				V_R	453	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7		V_{12}	4827	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = (pc/mi/ln)	D_R = 39.5 (pc/mi/ln)
LOS = (Exhibit 25-4)	LOS = F (Exhibit 25-4)

Speed Determination	Speed Determination
M_S = (Exibit 25-19)	D_S = 0.469 (Exhibit 25-19)
S_R = mph (Exhibit 25-19)	S_R = 56.9 mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)	S_0 = N/A mph (Exhibit 25-19)
S = mph (Exhibit 25-14)	S = 56.9 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 305 to W. Main Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description　　Interstate 80 Reconstruction			

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☐ Yes　　☐ On		☑ Yes　　☑ On
☑ No　　☐ Off		☐ No　　☐ Off
L_{up} =　　　　ft		L_{down} =　　700　ft
V_u =　　　　veh/h	S_{FF} = 70.0 mph　　　　　S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D =　　324　veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4118	0.91	Rolling	10	1	0.862	0.95	5526
Ramp	394	0.82	Rolling	2	0	0.971	0.95	521
UpStream								
DownStream	324	0.74	Rolling	0	0	1.000	0.95	461

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge Areas)

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =　　　　(Equation 25-2 or 25-3)
P_{FM} =　　　　using Equation　(Exhibit 25-5)
V_{12} =　　　　pc/h
V_3 or V_{av34}　　　　pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} =　　　　pc/h (Equation 25-8)

Estimation of v_{12} (Diverge Areas)

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =　　　　(Equation 25-8 or 25-9)
P_{FD} =　　1.000　using Equation (Exhibit 25-12)
V_{12} =　　5526　pc/h
V_3 or V_{av34}　　　　0　pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} =　　　　pc/h (Equation 25-18)

Capacity Checks (Merge)

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

Capacity Checks (Diverge)

	Actual	Capacity	LOS F?
V_F	5526	Exhibit 25-14　4800	Yes
$V_{FO} = V_F - V_R$	5005	Exhibit 25-14　4800	Yes
V_R	521	Exhibit 25-3　2000	No

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	5526	Exhibit 25-14　4400:All	Yes

Level of Service Determination (if not F) (Merge)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =　　(pc/mi/ln)
LOS =　　(Exhibit 25-4)

Level of Service Determination (if not F) (Diverge)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =　　50.3 (pc/mi/ln)
LOS =　　F (Exhibit 25-4)

Speed Determination (Merge)

M_S =　　(Exibit 25-19)
S_R =　　mph (Exhibit 25-19)
S_0 =　　mph (Exhibit 25-19)
S =　　mph (Exhibit 25-14)

Speed Determination (Diverge)

D_S =　　0.475 (Exhibit 25-19)
S_R =　　56.7 mph (Exhibit 25-19)
S_0 =　　N/A mph (Exhibit 25-19)
S =　　56.7 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 305 to W. Main Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☐ Yes ☐ On		☑ Yes ☑ On
☑ No ☐ Off		☐ No ☐ Off
L_{up} = ft		L_{down} = 700 ft
V_u = veh/h	S_{FF} = 70.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = 369 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4657	0.95	Rolling	12	1	0.840	0.95	6141
Ramp	471	0.86	Rolling	3	0	0.957	0.95	602
UpStream								
DownStream	369	0.96	Rolling	0	0	1.000	0.95	405

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge	Diverge
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 25-2 or 25-3)	L_{EQ} = (Equation 25-8 or 25-9)
P_{FM} = using Equation (Exhibit 25-5)	P_{FD} = 1.000 using Equation (Exhibit 25-12)
V_{12} = pc/h	V_{12} = 6141 pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 25-8)	If Yes, V_{12a} = pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7		V_F	6141	Exhibit 25-14 4800	Yes
				$V_{FO} = V_F - V_R$	5539	Exhibit 25-14 4800	Yes
				V_R	602	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7		V_{12}	6141	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F)

Merge	Diverge
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R = (pc/mi/ln)	D_R = 55.6 (pc/mi/ln)
LOS = (Exhibit 25-4)	LOS = F (Exhibit 25-4)

Speed Determination

Merge	Diverge
M_S = (Exibit 25-19)	D_S = 0.482 (Exhibit 25-19)
S_R = mph (Exhibit 25-19)	S_R = 56.5 mph (Exhibit 25-19)
S_0 = mph (Exhibit 25-19)	S_0 = N/A mph (Exhibit 25-19)
S = mph (Exhibit 25-14)	S = 56.5 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 307 to Park Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{up} =   ft

V_u =   veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☑ Yes   ☑ On

☐ No   ☐ Off

L_{down} =   810   ft

V_D =   219   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4267	0.83	Rolling	8	1	0.885	0.95	6115
Ramp	718	0.82	Rolling	6	0	0.917	0.95	1005
UpStream								
DownStream	219	0.85	Rolling	4	0	0.943	0.95	287

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge:

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   using Equation (Exhibit 25-5)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge:

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   1.000   using Equation (Exhibit 25-12)

V_{12} =   6115 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

	Actual	Capacity	LOS F?
V_F	6115	Exhibit 25-14 4800	Yes
$V_{FO} = V_F - V_R$	5110	Exhibit 25-14 4800	Yes
V_R	1005	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

	Actual	Max Desirable	Violation?
V_{12}	6115	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F)

Merge:

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Diverge:

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   55.5 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Speed Determination

Merge:

M_S =   (Exibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-14)

Diverge:

D_S =   0.518 (Exhibit 25-19)

S_R =   55.5 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   55.5 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Eastbound
Agency or Company	AECOM	Junction	Int. 307 to Park Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{up} =   ft

V_u =   veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☑ Yes   ☑ On

☐ No   ☐ Off

L_{down} =   810   ft

V_D =   264   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4743	0.97	Rolling	10	1	0.862	0.95	5971
Ramp	648	0.84	Rolling	2	0	0.971	0.95	836
UpStream								
DownStream	264	0.63	Rolling	1	0	0.985	0.95	448

Merge Areas | Diverge Areas

Estimation of v_{12} (Merge)

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   using Equation (Exhibit 25-5)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Estimation of v_{12} (Diverge)

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   1.000   using Equation (Exhibit 25-12)

V_{12} =   5971   pc/h

V_3 or V_{av34} 0   pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

	Actual	Capacity	LOS F?
V_F	5971	Exhibit 25-14 4800	Yes
$V_{FO} = V_F - V_R$	5135	Exhibit 25-14 4800	Yes
V_R	836	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

	Actual	Max Desirable	Violation?
V_{12}	5971	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   54.3 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Speed Determination

M_S =   (Exibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-14)

D_s =   0.503 (Exhibit 25-19)

S_R =   55.9 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   55.9 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 305 to W. Main Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045

Project Description　Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☐ Yes　☐ On		☑ Yes　☑ On
☑ No　☐ Off		☐ No　☐ Off
L_{up} =　　ft		L_{down} =　740　ft
V_u =　veh/h	S_{FF} = 70.0 mph　　　S_{FR} = 35.0 mph　　Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D =　328　veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3106	0.93	Rolling	12	1	0.840	0.95	4184
Ramp	285	0.84	Rolling	1	0	0.985	0.95	363
UpStream								
DownStream	328	0.87	Rolling	2	0	0.971	0.95	409

Merge Areas	Diverge Areas
Estimation of v_{12}	**Estimation of v_{12}**
$V_{12} = V_F (P_{FM})$	$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} =　　(Equation 25-2 or 25-3)	L_{EQ} =　　(Equation 25-8 or 25-9)
P_{FM} =　　using Equation　(Exhibit 25-5)	P_{FD} =　1.000　using Equation (Exhibit 25-12)
V_{12} =　　pc/h	V_{12} =　4184　pc/h
V_3 or V_{av34}　　pc/h (Equation 25-4 or 25-5)	V_3 or V_{av34}　　0　pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No	Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No	Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} =　　pc/h (Equation 25-8)	If Yes,V_{12a} =　　pc/h (Equation 25-18)

Capacity Checks				Capacity Checks			
	Actual	Capacity	LOS F?		Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7		V_F	4184	Exhibit 25-14　4800	No
				$V_{FO} = V_F - V_R$	3821	Exhibit 25-14　4800	No
				V_R	363	Exhibit 25-3　2000	No

Flow Entering Merge Influence Area				Flow Entering Diverge Influence Area			
	Actual	Max Desirable	Violation?		Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7		V_{12}	4184	Exhibit 25-14　4400:All	No

Level of Service Determination (if not F)	Level of Service Determination (if not F)
$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$	$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R =　(pc/mi/ln)	D_R =　39.2 (pc/mi/ln)
LOS =　(Exhibit 25-4)	LOS =　E (Exhibit 25-4)

Speed Determination	Speed Determination
M_S =　(Exibit 25-19)	D_s =　0.461 (Exhibit 25-19)
S_R=　mph (Exhibit 25-19)	S_R=　57.1 mph (Exhibit 25-19)
S_0=　mph (Exhibit 25-19)	S_0=　N/A mph (Exhibit 25-19)
S =　mph (Exhibit 25-14)	S =　57.1 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		*Site Information*	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 305 to W. Main Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp

☐ Yes   ☐ On

☑ No   ☐ Off

L_{up} =   ft

V_u =   veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☑ Yes   ☑ On

☐ No   ☐ Off

L_{down} =   740   ft

V_D =   603   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	6447	0.96	Rolling	13	1	0.830	0.95	8518
Ramp	580	0.90	Rolling	1	0	0.985	0.95	689
UpStream								
DownStream	603	0.78	Rolling	1	0	0.985	0.95	826

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge)

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   using Equation (Exhibit 25-5)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Estimation of v_{12} (Diverge)

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   1.000   using Equation (Exhibit 25-12)

V_{12} =   8518 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks (Merge)

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

Capacity Checks (Diverge)

	Actual	Capacity	LOS F?
V_F	8518	Exhibit 25-14	4800	Yes
$V_{FO} = V_F - V_R$	7829	Exhibit 25-14	4800	Yes
V_R	689	Exhibit 25-3	2000	No

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	8518	Exhibit 25-14	4400:All	Yes

Level of Service Determination (if not F) (Merge)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Level of Service Determination (if not F) (Diverge)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R =   76.4 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Speed Determination (Merge)

M_S =   (Exibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-14)

Speed Determination (Diverge)

D_s =   0.490 (Exhibit 25-19)

S_R =   56.3 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   56.3 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

General Information		Site Information	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 306 to Dreher Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp
☑ Yes   ☑ On
☐ No   ☐ Off
L_{up} = 3680 ft
V_u = 473 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes   ☐ On
☑ No   ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3240	0.91	Rolling	12	1	0.840	0.95	4460
Ramp	134	0.66	Rolling	3	0	0.957	0.95	223
UpStream	473	0.91	Rolling	6	0	0.917	0.95	596
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge Areas — Estimation of v_{12}

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)
P_{FM} =   using Equation (Exhibit 25-5)
V_{12} =   pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge Areas — Estimation of v_{12}

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)
P_{FD} = 1.000   using Equation (Exhibit 25-12)
V_{12} = 4460 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

	Actual	Capacity	LOS F?
V_F	4460	Exhibit 25-14 4800	No
$V_{FO} = V_F - V_R$	4237	Exhibit 25-14 4800	No
V_R	223	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

	Actual	Max Desirable	Violation?
V_{12}	4460	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   (pc/mi/ln)
LOS =   (Exhibit 25-4)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R = 41.3 (pc/mi/ln)
LOS = E (Exhibit 25-4)

Speed Determination

M_S =   (Exibit 25-19)
S_R =   mph (Exhibit 25-19)
S_0 =   mph (Exhibit 25-19)
S =   mph (Exhibit 25-14)

D_s = 0.448 (Exhibit 25-19)
S_R = 57.5 mph (Exhibit 25-19)
S_0 = N/A mph (Exhibit 25-19)
S = 57.5 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information | Site Information

Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 306 to Dreher Avenue
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

Inputs

Upstream Adj Ramp
☑ Yes   ☑ On
☐ No   ☐ Off
L_{up} =   3680   ft
V_u =   790 veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph
Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes   ☐ On
☑ No   ☐ Off
L_{down} =   ft
V_D =   veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	6750	0.96	Rolling	12	1	0.840	0.95	8808
Ramp	303	0.82	Rolling	3	0	0.957	0.95	406
UpStream	790	0.89	Rolling	1	0	0.985	0.95	948
DownStream								

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) | Estimation of v_{12} (Diverge)

Merge Areas — Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} =   (Equation 25-2 or 25-3)
P_{FM} =   using Equation (Exhibit 25-5)
V_{12} =   pc/h
V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} =   pc/h (Equation 25-8)

Diverge Areas — Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} =   (Equation 25-8 or 25-9)
P_{FD} =   1.000   using Equation (Exhibit 25-12)
V_{12} =   8808 pc/h
V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} =   pc/h (Equation 25-18)

Capacity Checks | Capacity Checks

Merge — Capacity Checks

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

Diverge — Capacity Checks

	Actual	Capacity	LOS F?
V_F	8808	Exhibit 25-14 4800	Yes
$V_{FO} = V_F - V_R$	8402	Exhibit 25-14 4800	Yes
V_R	406	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area | Flow Entering Diverge Influence Area

Merge

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

Diverge

	Actual	Max Desirable	Violation?
V_{12}	8808	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F) | Level of Service Determination (if not F)

Merge

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$
D_R =   (pc/mi/ln)
LOS =   (Exhibit 25-4)

Diverge

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$
D_R =   78.7 (pc/mi/ln)
LOS =   F (Exhibit 25-4)

Speed Determination | Speed Determination

Merge

M_S =   (Exibit 25-19)
S_R =   mph (Exhibit 25-19)
S_0 =   mph (Exhibit 25-19)
S =   mph (Exhibit 25-14)

Diverge

D_S =   0.465 (Exhibit 25-19)
S_R =   57.0 mph (Exhibit 25-19)
S_0 =   N/A mph (Exhibit 25-19)
S =   57.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		*Site Information*	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 307 to Broad Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045
Project Description	Interstate 80 Reconstruction		

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} =   ft

V_u =   veh/h

Terrain: Rolling

S_{FF} = 70.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☑ Yes ☑ On

☐ No ☐ Off

L_{down} = 1470 ft

V_D = 473 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3126	0.91	Rolling	12	1	0.840	0.95	4303
Ramp	360	0.90	Rolling	3	0	0.957	0.95	440
UpStream								
DownStream	473	0.91	Rolling	6	0	0.917	0.95	596

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge) / Estimation of v_{12} (Diverge)

Merge Areas — Estimation of v_{12}

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   using Equation (Exhibit 25-5)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Diverge Areas — Estimation of v_{12}

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} = 1.000 using Equation (Exhibit 25-12)

V_{12} = 4303 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks

Merge

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

Diverge

	Actual	Capacity	LOS F?
V_F	4303	Exhibit 25-14	4800	No
$V_{FO} = V_F - V_R$	3863	Exhibit 25-14	4800	No
V_R	440	Exhibit 25-3	2000	No

Flow Entering Merge Influence Area / Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

	Actual	Max Desirable	Violation?
V_{12}	4303	Exhibit 25-14	4400:All	No

Level of Service Determination (if not F)

Merge:

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Diverge:

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

D_R = 39.9 (pc/mi/ln)

LOS = E (Exhibit 25-4)

Speed Determination

Merge:

M_S =   (Exibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-14)

Diverge:

D_S = 0.468 (Exhibit 25-19)

S_R = 56.9 mph (Exhibit 25-19)

S_0 = N/A mph (Exhibit 25-19)

S = 56.9 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		*Site Information*	
Analyst	AJM	Freeway/Dir of Travel	I-80 Westbound
Agency or Company	AECOM	Junction	Int. 307 to Broad Street
Date Performed	7/24/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045
Project Description Interstate 80 Reconstruction			

Inputs

Upstream Adj Ramp	Terrain: Rolling	Downstream Adj Ramp
☐ Yes ☐ On		☑ Yes ☑ On
☑ No ☐ Off		☐ No ☐ Off
L_{up} = ft		L_{down} = 1470 ft
V_u = veh/h	S_{FF} = 70.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D, V_R, V_f)	V_D = 790 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	6521	0.96	Rolling	12	1	0.840	0.95	8509
Ramp	560	0.88	Rolling	1	0	0.985	0.95	680
UpStream								
DownStream	790	0.89	Rolling	1	0	0.985	0.95	948

Merge Areas	Diverge Areas

Estimation of v_{12} (Merge)

$$V_{12} = V_F (P_{FM})$$

L_{EQ} =   (Equation 25-2 or 25-3)

P_{FM} =   using Equation   (Exhibit 25-5)

V_{12} =   pc/h

V_3 or V_{av34} pc/h (Equation 25-4 or 25-5)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} =   pc/h (Equation 25-8)

Estimation of v_{12} (Diverge)

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

L_{EQ} =   (Equation 25-8 or 25-9)

P_{FD} =   1.000   using Equation (Exhibit 25-12)

V_{12} =   8509 pc/h

V_3 or V_{av34} 0 pc/h (Equation 25-15 or 25-16)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} =   pc/h (Equation 25-18)

Capacity Checks (Merge)

	Actual	Capacity	LOS F?
V_{FO}		Exhibit 25-7	

Capacity Checks (Diverge)

	Actual	Capacity	LOS F?
V_F	8509	Exhibit 25-14 4800	Yes
$V_{FO} = V_F - V_R$	7829	Exhibit 25-14 4800	Yes
V_R	680	Exhibit 25-3 2000	No

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
V_{R12}		Exhibit 25-7	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
V_{12}	8509	Exhibit 25-14 4400:All	Yes

Level of Service Determination (if not F) (Merge)

$$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$$

D_R =   (pc/mi/ln)

LOS =   (Exhibit 25-4)

Level of Service Determination (if not F) (Diverge)

$$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$$

D_R =   76.1 (pc/mi/ln)

LOS =   F (Exhibit 25-4)

Speed Determination (Merge)

M_S =   (Exibit 25-19)

S_R =   mph (Exhibit 25-19)

S_0 =   mph (Exhibit 25-19)

S =   mph (Exhibit 25-14)

Speed Determination (Diverge)

D_S =   0.489 (Exhibit 25-19)

S_R =   56.3 mph (Exhibit 25-19)

S_0 =   N/A mph (Exhibit 25-19)

S =   56.3 mph (Exhibit 25-15)

WEAVE HCS ANALYSIS

Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET

General Information		Site Information	

Analyst	JRE		
Agency/Company	AECOM	Freeway/Dir of Travel	I-80 Westbound
Date Performed	7/24/2013	Weaving Segment Location	Int. 305 to 304
Analysis Time Period	A.M. Peak Hour	Analysis Year	No Build 2045

Project Description *Interstate 80 Reconstruction*

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	3	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	565ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Rolling

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1930	0.95	12	1	2.5	2.0	0.840	0.95	2545
V_{RF}	196	0.87	2	0	2.5	2.0	0.971	0.95	244
V_{FR}	891	0.94	8	1	2.5	2.0	0.885	0.95	1127
V_{RR}	132	0.87	2	0	2.5	2.0	0.971	0.95	165
V_{NW}	2710							V =	4081
V_W	1371								
VR	0.336								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	1371 lc/h
Interchange density, ID	1.7 int/mi	Weaving lane changes, LC_W	1497 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	287 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	1784 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	260

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	4081 pc/h	Weaving intensity factor, W	0.560
Weaving segment capacity, c_w	4756 veh/h	Weaving segment speed, S	52.4 mph
Weaving segment v/c ratio	0.685	Average weaving speed, S_w	50.3 mph
Weaving segment density, D	25.9 pc/mi/ln	Average non-weaving speed, S_{NW}	53.6 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	5973 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Interstate 80 Reconstruction

FREEWAY WEAVING WORKSHEET

General Information		Site Information	

Analyst	JRE		
Agency/Company	AECOM	Freeway/Dir of Travel	I-80 Westbound
Date Performed	7/24/2013	Weaving Segment Location	Int. 305 to 304
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description *Interstate 80 Reconstruction*

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	3	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	565ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Rolling

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4108	0.97	13	1	2.5	2.0	0.830	0.95	5372
V_{RF}	360	0.78	1	0	2.5	2.0	0.985	0.95	493
V_{FR}	1758	0.94	2	1	2.5	2.0	0.962	0.95	2047
V_{RR}	243	0.78	1	0	2.5	2.0	0.985	0.95	333
V_{NW}	5705							$V =$	8245
V_W	2540								
VR	0.308								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	lc/h
Interchange density, ID	1.7 int/mi	Weaving lane changes, LC_W	lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	369

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	8245 pc/h	Weaving intensity factor, W	
Weaving segment capacity, c_w	4752 veh/h	Weaving segment speed, S	mph
Weaving segment v/c ratio	1.368	Average weaving speed, S_w	mph
Weaving segment density, D	pc/mi/ln	Average non-weaving speed, S_{NW}	mph
Level of Service, LOS	F	Maximum weaving length, L_{MAX}	5671 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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UNSIGNALIZED INTERSECTION
HCS ANALYSIS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	AJM
Agency/Co.	AECOM
Date Performed	8/2/2013
Analysis Time Period	A.M. Peak Hour

Site Information

Intersection	SR 611 & I-80 EB Off Ramp
Jurisdiction	
Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

East/West Street: SR 611 (N. 9th Street)   North/South Street: I-80 EB Off Ramp

Intersection Orientation: East-West   Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		857			923	
Peak-Hour Factor, PHF	1.00	0.88	1.00	1.00	0.87	1.00
Hourly Flow Rate, HFR (veh/h)	0	973	0	0	1060	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)			298			
Peak-Hour Factor, PHF	1.00	1.00	0.72	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	413	0	0	0
Percent Heavy Vehicles	0	0	1	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			1			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (veh/h)					413			
C (m) (veh/h)					320			
v/c					1.29			
95% queue length					19.55			
Control Delay (s/veh)					185.6			
LOS					F			
Approach Delay (s/veh)	--	--	185.6					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	AJM	Intersection	SR 611 & I-80 EB Off Ramp
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	P.M. Peak Hour		

Site Information

Project Description   Interstate 80 Reconstruction

East/West Street: SR 611 (N. 9th Street)   North/South Street: I-80 EB Off Ramp

Intersection Orientation: East-West   Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1176			1417	
Peak-Hour Factor, PHF	1.00	0.92	1.00	1.00	0.96	1.00
Hourly Flow Rate, HFR (veh/h)	0	1278	0	0	1476	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)			407			
Peak-Hour Factor, PHF	1.00	1.00	0.98	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	415	0	0	0
Percent Heavy Vehicles	0	0	1	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			1			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (veh/h)					415			
C (m) (veh/h)					211			
v/c					1.97			
95% queue length					30.59			
Control Delay (s/veh)					489.4			
LOS					F			
Approach Delay (s/veh)	--	--	489.4					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	AJM
Agency/Co.	AECOM
Date Performed	8/2/2013
Analysis Time Period	A.M. Peak Hour

Site Information

Intersection	SR 611 & Shopping Ctr Side Rd
Jurisdiction	
Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

East/West Street: SR 611 (N. 9th Street)

North/South Street: Shopping Center Side Road

Intersection Orientation: East-West

Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	11	835			914	23
Peak-Hour Factor, PHF	0.38	0.86	1.00	1.00	0.88	0.60
Hourly Flow Rate, HFR (veh/h)	28	970	0	0	1038	38
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				23		9
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.60	1.00	0.63
Hourly Flow Rate, HFR (veh/h)	0	0	0	38	0	14
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			-2	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	28						52	
C (m) (veh/h)	503						239	
v/c	0.06						0.22	
95% queue length	0.18						0.81	
Control Delay (s/veh)	12.6						24.2	
LOS	B						C	
Approach Delay (s/veh)	--	--					24.2	
Approach LOS	--	--					C	

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TWO-WAY STOP CONTROL SUMMARY						

General Information

		Site Information	
Analyst	AJM	Intersection	SR 611 & Shopping Ctr Side Rd
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	P.M. Peak Hour		

Project Description	Interstate 80 Reconstruction
East/West Street: SR 611 (N. 9th Street)	North/South Street: Shopping Center Side Road
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	28	1150			1359	62
Peak-Hour Factor, PHF	0.54	0.91	1.00	1.00	0.96	0.69
Hourly Flow Rate, HFR (veh/h)	51	1263	0	0	1415	89
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	1	1	0	0	1	0
Configuration	L	T				TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				26		19
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.70	1.00	0.50
Hourly Flow Rate, HFR (veh/h)	0	0	0	37	0	38
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			-2	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
v (veh/h)	51						75	
C (m) (veh/h)	348						152	
v/c	0.15						0.49	
95% queue length	0.51						2.35	
Control Delay (s/veh)	17.1						49.8	
LOS	C						E	
Approach Delay (s/veh)	--	--					49.8	
Approach LOS	--	--					E	

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TWO-WAY STOP CONTROL SUMMARY

General Information

		Site Information	
Analyst	*AJM*	Intersection	*W. Main Street & I-80 EB Ramps*
Agency/Co.	*AECOM*	Jurisdiction	
Date Performed	*8/2/2013*	Analysis Year	*No Build 2045*
Analysis Time Period	*A.M. Peak Hour*		

Project Description   *Interstate 80 Reconstruction*

East/West Street: *W. Main Street (SR 2012)*   North/South Street: *I-80 EB Ramps*

Intersection Orientation: *East-West*   Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		479	288	36	697	
Peak-Hour Factor, PHF	1.00	0.95	0.81	0.43	0.91	1.00
Hourly Flow Rate, HFR (veh/h)	0	504	355	83	765	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	0
Configuration		T	R	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	51		343			
Peak-Hour Factor, PHF	0.75	1.00	0.77	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	68	0	445	0	0	0
Percent Heavy Vehicles	4	0	2	0	0	0
Percent Grade (%)	-1			0		
Flared Approach		Y			N	
Storage		5			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		83		513				
C (m) (veh/h)		601		695				
v/c		0.14		0.74				
95% queue length		0.48		6.56				
Control Delay (s/veh)		11.9		29.0				
LOS		B		D				
Approach Delay (s/veh)	--	--	29.0					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*AJM*	Intersection	*W. Main Street & I-80 EB Ramps*
Agency/Co.	*AECOM*		
Date Performed	*8/2/2013*	Jurisdiction	
Analysis Time Period	*P.M. Peak Hour*	Analysis Year	*No Build 2045*

Project Description	*Interstate 80 Reconstruction*
East/West Street: *W. Main Street (SR 2012)*	North/South Street: *I-80 EB Ramps*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		607	317	53	1347	
Peak-Hour Factor, PHF	1.00	0.90	0.93	0.70	0.88	1.00
Hourly Flow Rate, HFR (veh/h)	0	674	340	75	1530	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type			Undivided			
RT Channelized			0			0
Lanes	0	1	1	0	1	0
Configuration		T	R	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	98		373			
Peak-Hour Factor, PHF	0.87	1.00	0.85	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	112	0	438	0	0	0
Percent Heavy Vehicles	2	0	3	0	0	0
Percent Grade (%)		-1			0	
Flared Approach		Y			N	
Storage		5			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		75		550				
C (m) (veh/h)		525		155				
v/c		0.14		3.55				
95% queue length		0.50		53.25				
Control Delay (s/veh)		13.0		1206				
LOS		B		F				
Approach Delay (s/veh)	--	--	1206					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*AJM*	Intersection	*W. Main Street & I-80 WB Ramps*
Agency/Co.	*AECOM*	Jurisdiction	
Date Performed	*8/2/2013*	Analysis Year	*No Build 2045*
Analysis Time Period	*A.M. Peak Hour*		

Project Description   *Interstate 80 Reconstruction*

East/West Street: *W. Main Street (SR 2012)*   North/South Street: *I-80 WB Ramps*

Intersection Orientation: *East-West*   Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*47*	*775*			*482*	*281*
Peak-Hour Factor, PHF	*0.69*	*0.85*	*1.00*	*1.00*	*0.87*	*0.83*
Hourly Flow Rate, HFR (veh/h)	*68*	*911*	*0*	*0*	*554*	*338*
Percent Heavy Vehicles	*4*	*--*	*--*	*0*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LT*				*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*34*		*251*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.75*	*1.00*	*0.85*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*45*	*0*	*295*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*1*
Percent Grade (%)		*0*			*-1*	
Flared Approach		*N*			*Y*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*68*						*340*	
C (m) (veh/h)	*576*						*520*	
v/c	*0.12*						*0.65*	
95% queue length	*0.40*						*4.69*	
Control Delay (s/veh)	*12.1*						*24.1*	
LOS	*B*						*C*	
Approach Delay (s/veh)	*--*	*--*					*24.1*	
Approach LOS	*--*	*--*					*C*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	AJM
Agency/Co.	AECOM
Date Performed	8/2/2013
Analysis Time Period	P.M. Peak Hour

Site Information

Intersection	W. Main Street & I-80 WB Ramps
Jurisdiction	
Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

East/West Street: W. Main Street (SR 2012)	North/South Street: I-80 WB Ramps	
Intersection Orientation: East-West	Study Period (hrs): 0.25	

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	72	908			882	531
Peak-Hour Factor, PHF	0.79	0.91	1.00	1.00	0.91	0.73
Hourly Flow Rate, HFR (veh/h)	91	997	0	0	969	727
Percent Heavy Vehicles	3	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				62		518
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.83	1.00	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	0	74	0	609
Percent Heavy Vehicles	0	0	0	0	0	1
Percent Grade (%)		0			-1	
Flared Approach		N			Y	
Storage		0			1	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	91						683	
C (m) (veh/h)	289						195	
v/c	0.31						3.50	
95% queue length	1.31						64.94	
Control Delay (s/veh)	23.1						1175	
LOS	C						F	
Approach Delay (s/veh)	--	--					1175	
Approach LOS	--	--					F	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	AJM	Intersection	Dreher Ave. & I-80 EB On Ramp
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	A.M. Peak Hour		

Project Description	Interstate 80 Reconstruction	
East/West Street: Dreher Avenue (SR 2004)		North/South Street: I-80 EB On Ramp
Intersection Orientation: East-West		Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		243	138	81	171	
Peak-Hour Factor, PHF	1.00	0.85	0.59	0.90	0.95	1.00
Hourly Flow Rate, HFR (veh/h)	0	285	233	90	180	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration						

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT						
v (veh/h)		90						
C (m) (veh/h)		796						
v/c		0.11						
95% queue length		0.38						
Control Delay (s/veh)		10.1						
LOS		B						
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

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General Information		Site Information	
Analyst	AJM	Intersection	Dreher Ave. & I-80 EB On Ramp
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	P.M. Peak Hour		

Project Description	Interstate 80 Reconstruction

East/West Street:	Dreher Avenue (SR 2004)	North/South Street:	I-80 EB On Ramp
Intersection Orientation:	East-West	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		209	85	104	441	
Peak-Hour Factor, PHF	1.00	0.82	0.66	0.76	0.79	1.00
Hourly Flow Rate, HFR (veh/h)	0	254	128	136	558	0
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type			Undivided			
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)						
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration						

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT						
v (veh/h)		136						
C (m) (veh/h)		880						
v/c		0.15						
95% queue length		0.55						
Control Delay (s/veh)		9.8						
LOS		A						
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	AJM	Intersection	Dreher Ave. & I-80 WB Off Ramp
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	A.M. Peak Hour		

Project Description	Interstate 80 Reconstruction		
East/West Street:	Dreher Avenue (SR 2004)	North/South Street:	I-80 WB Off Ramp
Intersection Orientation:	East-West	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		236			215	
Peak-Hour Factor, PHF	1.00	0.80	1.00	1.00	0.77	1.00
Hourly Flow Rate, HFR (veh/h)	0	294	0	0	279	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	51		83			
Peak-Hour Factor, PHF	0.61	1.00	0.69	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	83	0	120	0	0	0
Percent Heavy Vehicles	0	0	5	0	0	0
Percent Grade (%)		-1			0	
Flared Approach		Y			N	
Storage		1			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration				LR				
v (veh/h)				203				
C (m) (veh/h)				1328				
v/c				0.15				
95% queue length				0.54				
Control Delay (s/veh)				11.3				
LOS				B				
Approach Delay (s/veh)	--	--		11.3				
Approach LOS	--	--		B				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	AJM	Intersection	Dreher Ave. & I-80 WB Off Ramp
Agency/Co.	AECOM		
Date Performed	8/2/2013	Jurisdiction	
Analysis Time Period	P.M. Peak Hour	Analysis Year	No Build 2045

Project Description	Interstate 80 Reconstruction
East/West Street: Dreher Avenue (SR 2004)	North/South Street: I-80 WB Off Ramp
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		170			369	
Peak-Hour Factor, PHF	1.00	0.94	1.00	1.00	0.71	1.00
Hourly Flow Rate, HFR (veh/h)	0	180	0	0	519	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		T			T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	166		138			
Peak-Hour Factor, PHF	0.88	1.00	0.65	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	188	0	212	0	0	0
Percent Heavy Vehicles	2	0	4	0	0	0
Percent Grade (%)		-1			0	
Flared Approach		Y			N	
Storage		1			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration				LR				
v (veh/h)				400				
C (m) (veh/h)				807				
v/c				0.50				
95% queue length				2.79				
Control Delay (s/veh)				13.8				
LOS				B				
Approach Delay (s/veh)	--	--		13.8				
Approach LOS	--	--		B				

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	AJM
Agency/Co.	AECOM
Date Performed	8/2/2013
Analysis Time Period	A.M. Peak Hour

Site Information

Intersection	Park Avenue & I-80 EB Ramps
Jurisdiction	
Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

East/West Street: I-80 EB Ramps/Barry Street

Intersection Orientation: North-South

North/South Street: Park Avenue (SR 611)

Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	51	205			128	155
Peak-Hour Factor, PHF	0.84	0.83	1.00	1.00	0.85	0.82
Hourly Flow Rate, HFR (veh/h)	60	246	0	0	150	189
Percent Heavy Vehicles	4	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	516		202	0	13	15
Peak-Hour Factor, PHF	0.77	1.00	0.92	0.90	0.58	0.67
Hourly Flow Rate, HFR (veh/h)	670	0	219	0	22	22
Percent Heavy Vehicles	4	0	8	0	14	13
Percent Grade (%)	-1			-3		
Flared Approach	Y			N		
Storage	1			0		
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration	LR			LTR		

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR			LR	
v (veh/h)	60			44			889	
C (m) (veh/h)	906			499			454	
v/c	0.07			0.09			1.96	
95% queue length	0.21			0.29			59.94	
Control Delay (s/veh)	9.3			12.9			459.7	
LOS	A			B			F	
Approach Delay (s/veh)	--	--	12.9			459.7		
Approach LOS	--	--	B			F		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	AJM
Agency/Co.	AECOM
Date Performed	8/2/2013
Analysis Time Period	P.M. Peak Hour

Site Information

Intersection	Park Avenue & I-80 EB Ramps
Jurisdiction	
Analysis Year	No Build 2045

Project Description   Interstate 80 Reconstruction

East/West Street: I-80 EB Ramps/Barry Street

Intersection Orientation: North-South

North/South Street: Park Avenue (SR 611)

Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	40	296			373	219
Peak-Hour Factor, PHF	0.66	0.79	1.00	1.00	0.75	0.60
Hourly Flow Rate, HFR (veh/h)	60	374	0	0	497	364
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	377		271	11	6	19
Peak-Hour Factor, PHF	0.83	1.00	0.78	0.50	0.38	0.63
Hourly Flow Rate, HFR (veh/h)	454	0	347	22	15	30
Percent Heavy Vehicles	1	0	3	0	0	10
Percent Grade (%)		-1			-3	
Flared Approach		Y			N	
Storage		1			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration		LR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR			LR	
v (veh/h)	60			67			801	
C (m) (veh/h)	601			104			217	
v/c	0.10			0.64			3.69	
95% queue length	0.33			3.21			76.91	
Control Delay (s/veh)	11.7			87.8			1255	
LOS	B			F			F	
Approach Delay (s/veh)	--	--		87.8			1255	
Approach LOS	--	--		F			F	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	AJM	Intersection	Broad Street & I-80 WB Ramps
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	A.M. Peak Hour		

Project Description	Interstate 80 Reconstruction

East/West Street: I-80 WB Ramps   North/South Street: Broad Street (SR 191)

Intersection Orientation: North-South   Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	177	733			219	296
Peak-Hour Factor, PHF	0.78	0.78	1.00	1.00	0.88	0.84
Hourly Flow Rate, HFR (veh/h)	226	939	0	0	248	352
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				75		285
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.83	1.00	0.88
Hourly Flow Rate, HFR (veh/h)	0	0	0	90	0	323
Percent Heavy Vehicles	0	0	0	3	0	3
Percent Grade (%)		0			-1	
Flared Approach		N			Y	
Storage		0			2	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LR				
v (veh/h)	226			413				
C (m) (veh/h)	736			213				
v/c	0.31			1.94				
95% queue length	1.30			30.14				
Control Delay (s/veh)	12.0			476.9				
LOS	B			F				
Approach Delay (s/veh)	--	--		476.9				
Approach LOS	--	--		F				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	AJM	Intersection	Broad Street & I-80 WB Ramps
Agency/Co.	AECOM	Jurisdiction	
Date Performed	8/2/2013	Analysis Year	No Build 2045
Analysis Time Period	P.M. Peak Hour		

Project Description   Interstate 80 Reconstruction

East/West Street: I-80 WB Ramps | North/South Street: Broad Street (SR 191)
Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	300	616			545	490
Peak-Hour Factor, PHF	0.72	0.92	1.00	1.00	0.94	0.83
Hourly Flow Rate, HFR (veh/h)	416	669	0	0	579	590
Percent Heavy Vehicles	1	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				119		441
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.79	1.00	0.91
Hourly Flow Rate, HFR (veh/h)	0	0	0	150	0	484
Percent Heavy Vehicles	0	0	0	3	0	1
Percent Grade (%)		0			-1	
Flared Approach		N			Y	
Storage		0			2	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LR				
v (veh/h)	416			634				
C (m) (veh/h)	461			16				
v/c	0.90			39.63				
95% queue length	9.99			80.21				
Control Delay (s/veh)	51.3			17839				
LOS	F			F				
Approach Delay (s/veh)	--	--		17839				
Approach LOS	--	--		F				

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