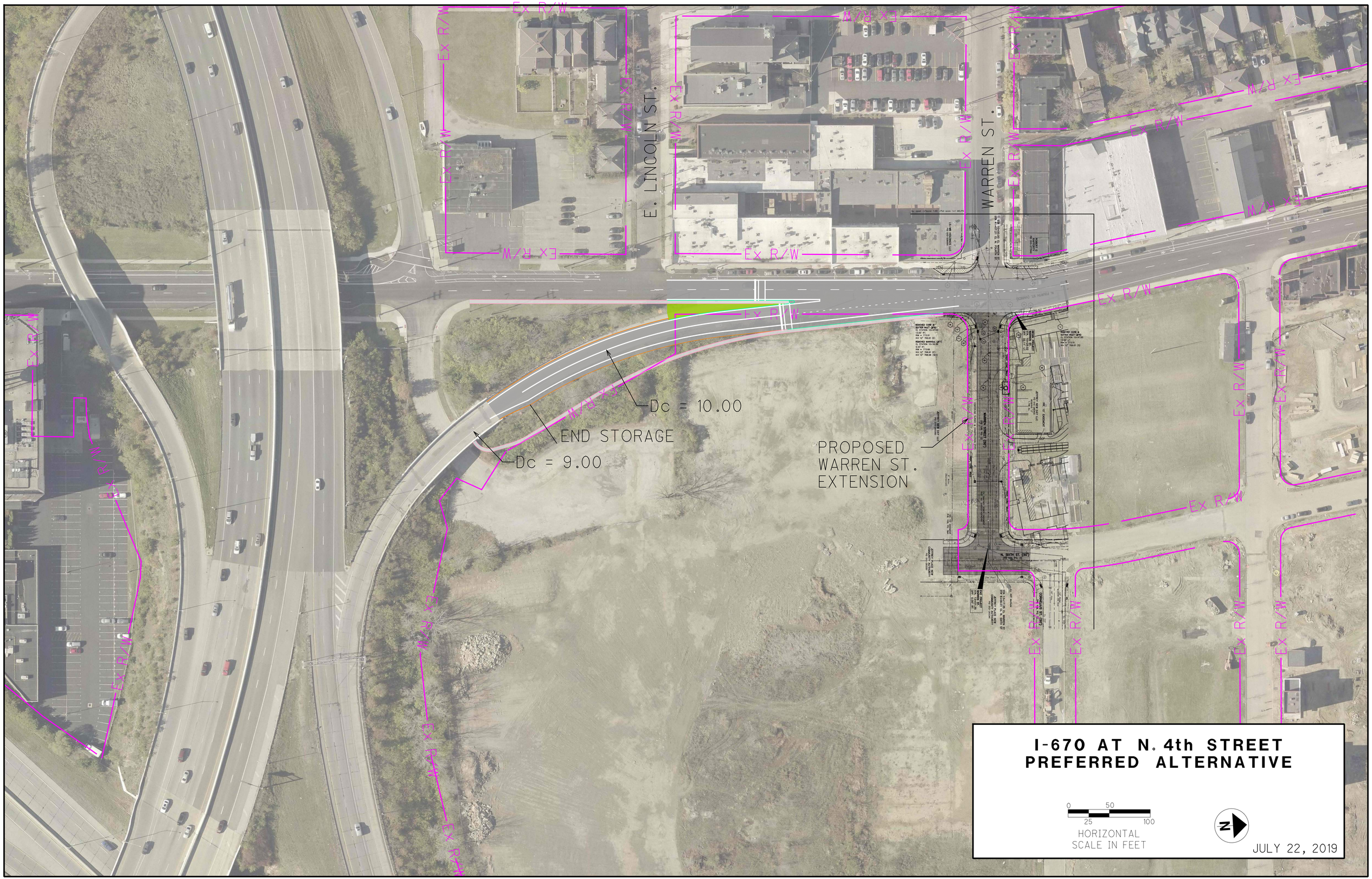
Interchange Operations Study

Appendix

October 28, 2022

Build Alternative



I-670 AT N. 4th STREET
PREFERRED ALTERNATIVE

0 50
25 100
HORIZONTAL
SCALE IN FEET

N

JULY 22, 2019

Certified Traffic Volumes

INTER-OFFICE COMMUNICATION

TO: **Drew Hurst, P.E., Transportation Engineer, District 6**

FROM: Joshua Kieselbach, P.E., Transportation Engineer, Office of Statewide Planning & Research, Modeling & Forecasting Section

SUBJECT: **FRA-670-3.75, No PID**

DATE: October 6, 2022

In reply to a request dated October 3, 2022, the review of the subject project has been completed and is approved for use on this project. Attached is a copy of the original memo and the updated plates.

If you have any questions, please contact me at Joshua.Kieselbach@dot.ohio.gov or (614) 752-5747.

c: G. Giaimo, OSPR – File

BURGESS & NIPLE Memorandum

330 Rush Alley | Columbus, Ohio 43215 | 614.459.2050

To: Andrew Hurst
ODOT District 6

July 22, 2022

From: Randy Kill, PE, PTOE
Burgess & Niple, Inc.

Subject: Procedure for Developing Certified Traffic for I-670 and N 4th Street IOS.

On behalf of City of Columbus, Burgess & Niple is conducting an intersection study for the I-670 and 4th Street Intersection Operations (IOS) Study. This memo will outline the procedure and data used to develop the traffic volumes that are being submitted for certification for the I-670 and N 4th St IOS. Because there are no changes in land use or connectivity between the No-Build and Build alternatives it is assumed that the forecast for the No-Build and Build conditions will be the same and separate No-Build and Build volumes were not developed. The Opening Year for the project will be 2025 and the Design Year will be 2045.

Certified Traffic Development

Traffic Counts

The certified traffic study area consists of Westbound Interstate 670, from east of the Southbound I-71 on-ramp to west of the NB SR 315 off-ramp including all ramps, and a section of N 4th St from Goodale Street to Warren Street. For the intersections on N 4th Street, 8-hour turning movement counts were expanded to 24-hour volumes and the 24-hour expansions are included in the Counts folder included with this submission. The N 4th Street intersections at Warren Street and the WB I-670 On-ramp were conducted on Wed April 27th, 2022, and the intersection at Goodale Street was conducted on Tuesday June 4th, 2022. The 4th Street corridor AM peak hour was identified as 8:00-9:00 AM and the PM peak hour was determined to be 4:45-5:45 PM. Ramp volumes were taken from MS2. All ramp locations used a Wednesday count from 2019, ranging in month from April to August. A mainline count was taken from an ATR located west of Goodale St Off-ramp. The I-670 mainline AM peak hour for the ramps was identified as 7:15-8:15 AM and the PM peak hour was identified as 5:00-6:00 PM.

Existing traffic counts for the ADT, AM Peak and PM Peak volumes, and truck percentages are shown on Plates 1-9.

NCHRP Adjustments

The procedures outlined in the ODOT Traffic Forecasting Manual were used to develop future traffic assignments. Travel Demand Model (TDM) outputs from the MORPC Regional model for the 2018 base year and 2050 horizon year were provided by MORPC. The assignments are included in the MORPC Model Assignments folder included with this submission.

Four NCHRP spreadsheets were developed for the study intersections and mainline ramps. Each spreadsheet includes the ADT, AM peak and PM peak traffic counts as well as the MORPC 2018 and 2050 TDM model assignments. An additional NCHRP spreadsheet was developed for the ramp locations on WB I-670. The DHV factor selected for the study intersections was based on the counts being conducted midweek between April and June for an urban principal arterial street. Using ODOT's Peak Hour to Design Hour Factor Report, a DHV factor of 1.14 was selected for all legs of the N 4th St intersections. For the freeway and ramps, the DHV factor selected was based on the average DHV factor for midweek counts between April and August. A DHV factor of 1.1 was selected for all ramps.

Future 2025 and 2045 ADT, AM Peak and PM Peak volumes are shown on Plates 10-18.

Please contact me at randy.kill@burgessniple.com or 614-459-2050 if you have any questions.

I-670 AND 4TH ST IOS
EXISTING ADT

ANAL'ST KEB
DATE 07/21/22

0
NOT TO SCALE

N

I-670 AND 4TH ST IOS
EXISTING ADT

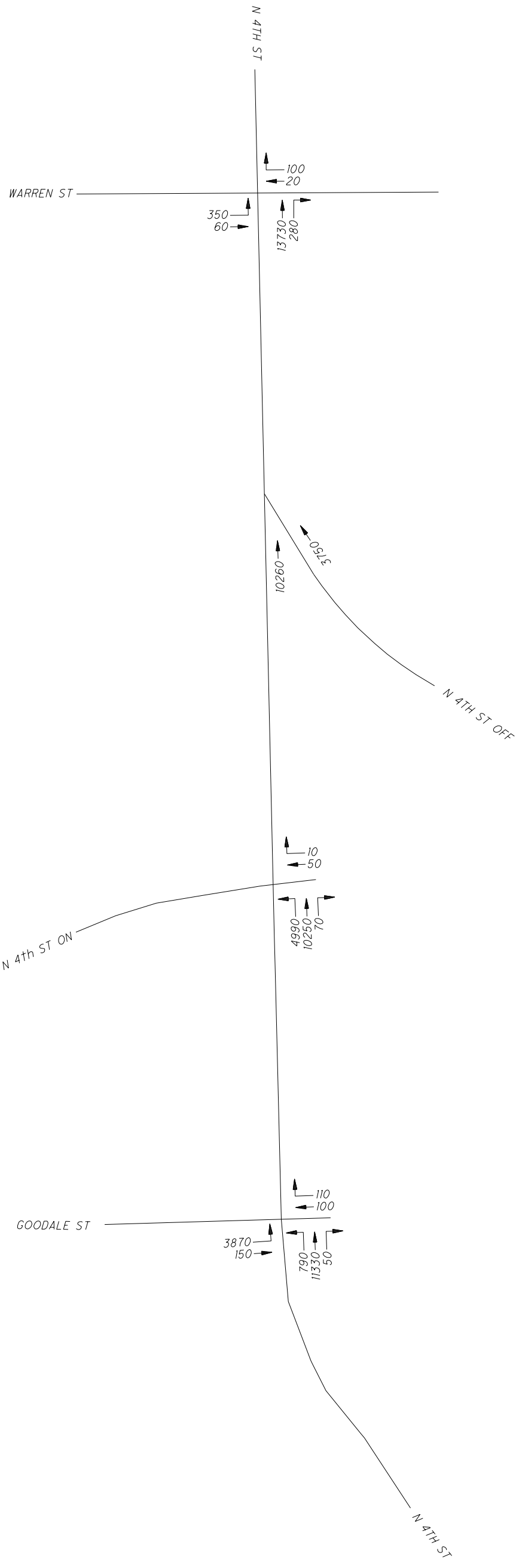
ANALYST KEB
DATE 07/21/22

0
NOT TO SCALE

2
18

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/22/2022 9:25:03 PM kbright

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/22/2022 9:25:34 PM kbright



3 / 18		**I-670 AND 4TH ST IOS EXISTING ADT**	ANALYST KEB / DATE 07/21/22	NOT TO SCALE	N

I-670 AND 4TH ST IOS
EXISTING AM/PM VOLUMES

ANALYST KEB
DATE 07/21/22

0
NOT TO SCALE

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/29/2022 1:15:50 PM kbright

NB SR 315 OFF

1720/960

GOODALE ST

1310/990

N 3RD ST ON

620/740

230/440

N 4TH ST ON

4550/4940

MATCHLINE A

850/1180

5400/6120

4090/5130

2370/4170

INTERSTATE 670

WB I-670

I-670 AND 4TH ST IOS
EXISTING AM/PM VOLUME

ANALYST: KEB

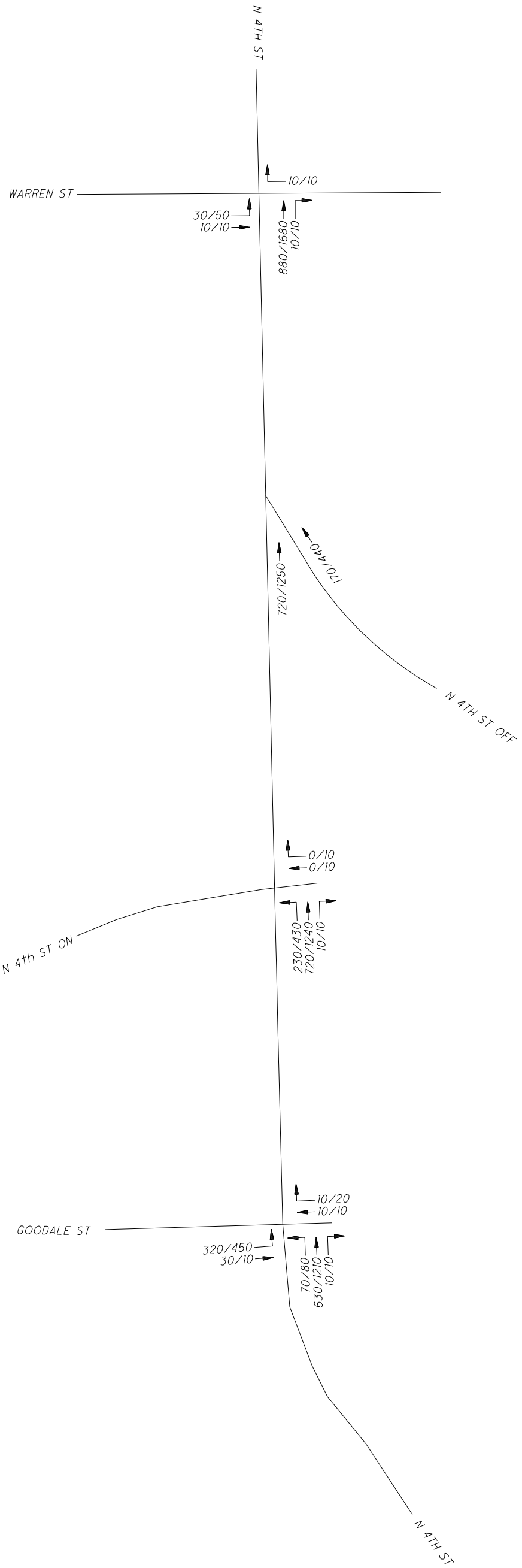
DATE: 07/21/22

0

NOT TO SCALE

5
18

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/29/2022 12:59:20 PM kbright



6/18		**I-670 AND 4TH ST IOS** **EXISTING AM/PM VOLUMES**	ANALYST KEB DATE 07/21/22	NOT TO SCALE	N

NOT TO SCALE

ANALYST KEB

DATE 07/21/22

I-670 AND 4TH ST IOS
EXISTING 24 HR/ AM/ PM TRUCKS

I-670 AND 4TH ST IOS
EXISTING 24 HR/ AM/ PM TRUCKS

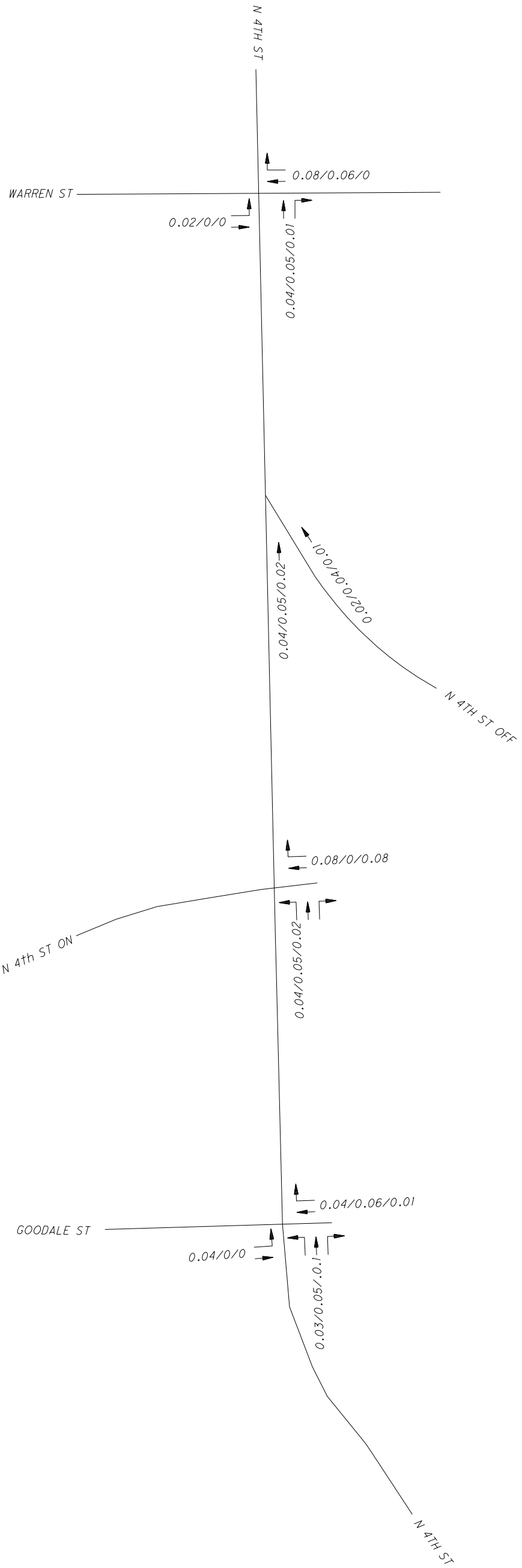
ANALYST KEB
DATE 07/21/22

0
NOT TO SCALE

8
18

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/28/2022 1:12:29 PM kbright

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/28/2022 1:14:16 PM kbright



9/18		**I-670 AND 4TH ST IOS** **EXISTING 24 HR/AM/PM TRUCKS**	ANALYST KEB DATE 07/21/22	NOT TO SCALE	N

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/22/2022 9:28:10 PM kbright

NOT TO SCALE

ANALYST KEB

DATE 07/21/22

I-670 AND 4TH ST IOS
2025 / 2045 ADT

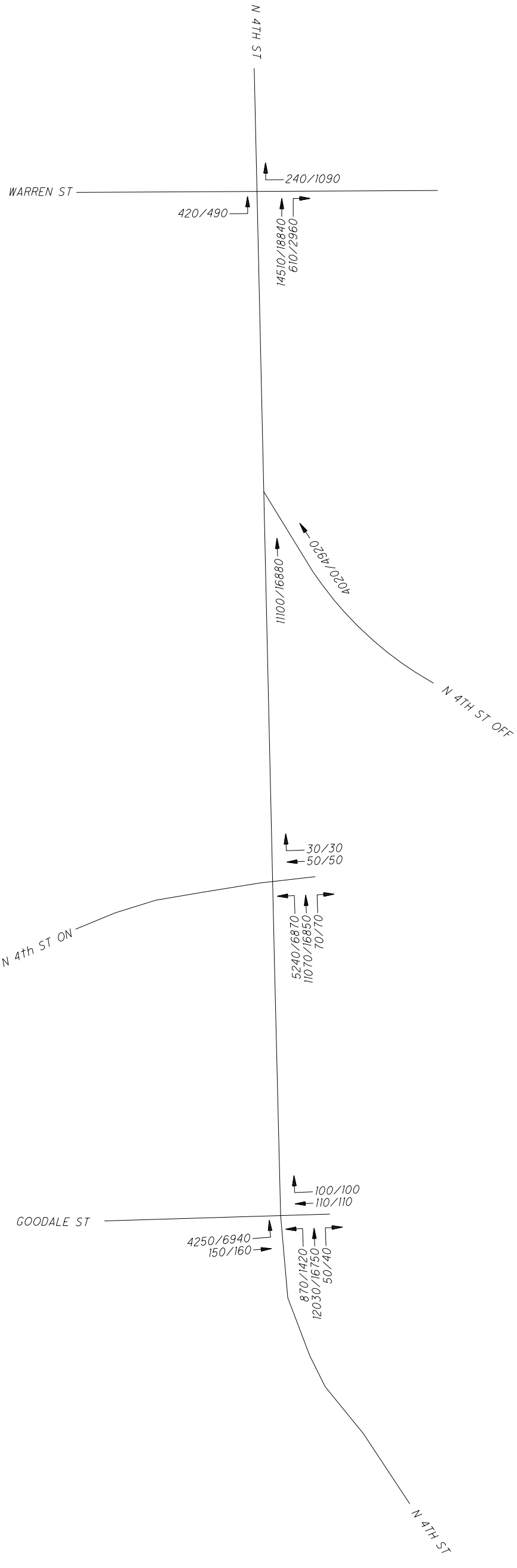
I-670 AND 4TH ST IOS
2020S / 2045 ADT

NOT TO SCALE

ANALYST KEB
DATE 07/21/22

11
18

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/28/2022 1:15:47 PM kbright



12/18		**I-670 AND 4TH ST IOS** **2025/2045 ADT**	ANALYST KEB DATE 07/21/22	NOT TO SCALE	N

I-670 AND 4TH ST IOS
2025 / 2045 AM VOLUMES

ANALYST: KEB
DATE: 07/21/22

0 NOT TO SCALE

13
18

P:\VPR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/22/2022 9:29:58 PM kbright

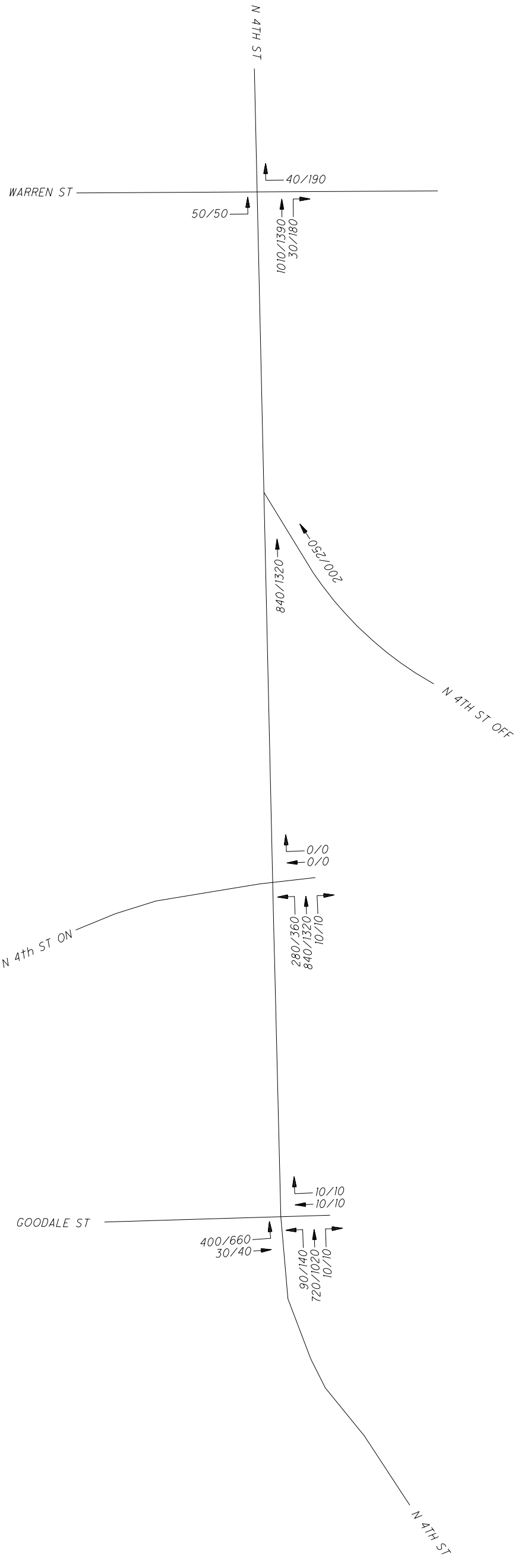
I-670 AND 4TH ST IOS
2025 / 2045 AM VOLUMES

ANALYST KEB
DATE 07/21/22

0
NOT TO SCALE

14
18

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 10/3/2022 8:32:52 AM kill



15/18		I-670 AND 4TH ST IOS 2025/2045 AM VOLUME	ANALYST KEB DATE 07/21/22	NOT TO SCALE	N

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/22/2022 9:31:29 PM kbright

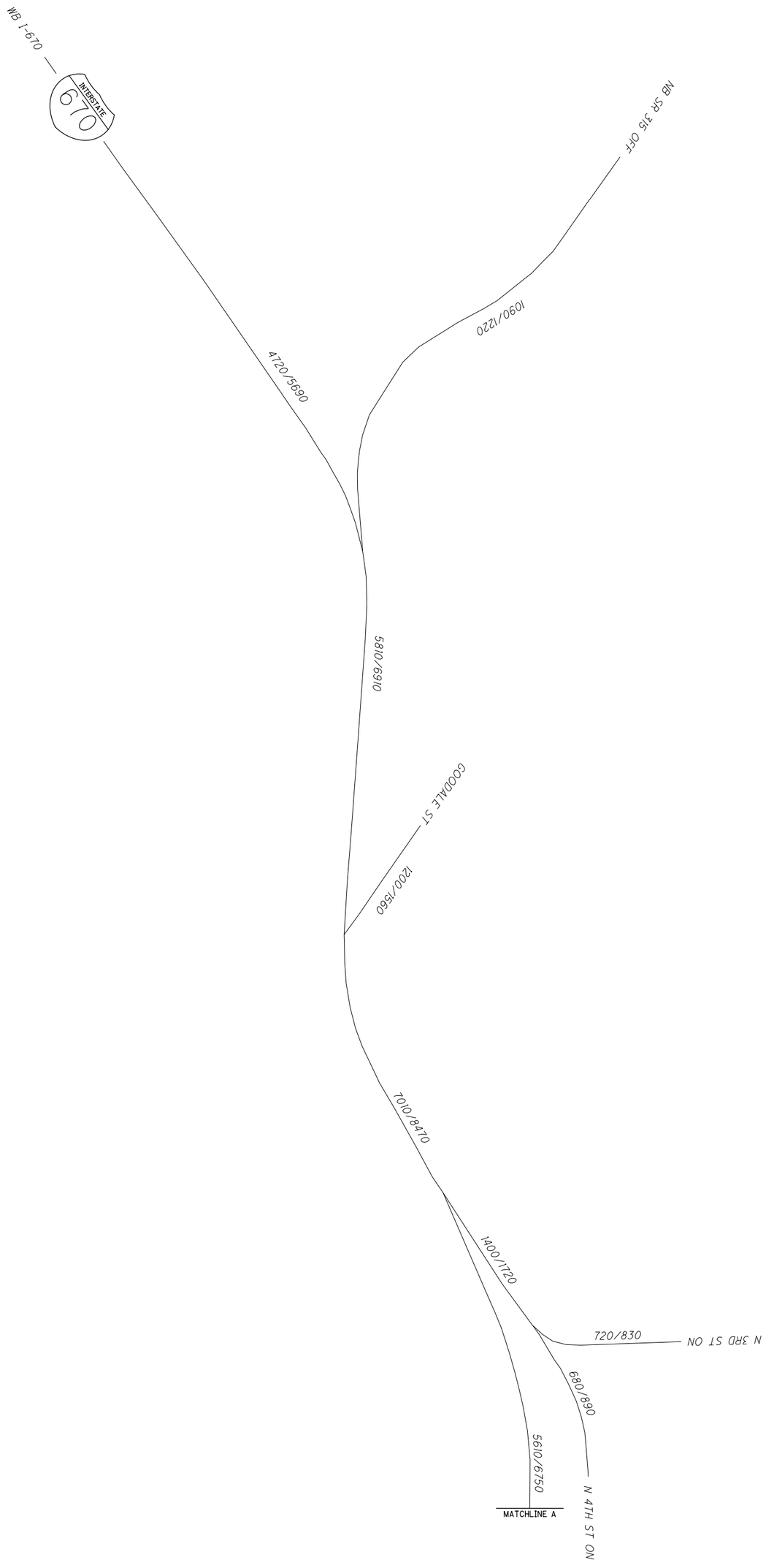
NOT TO SCALE

ANALYST KEB
DATE 07/21/22

I-670 AND 4TH ST IOS
2025 / 2045 PM VOLUMES

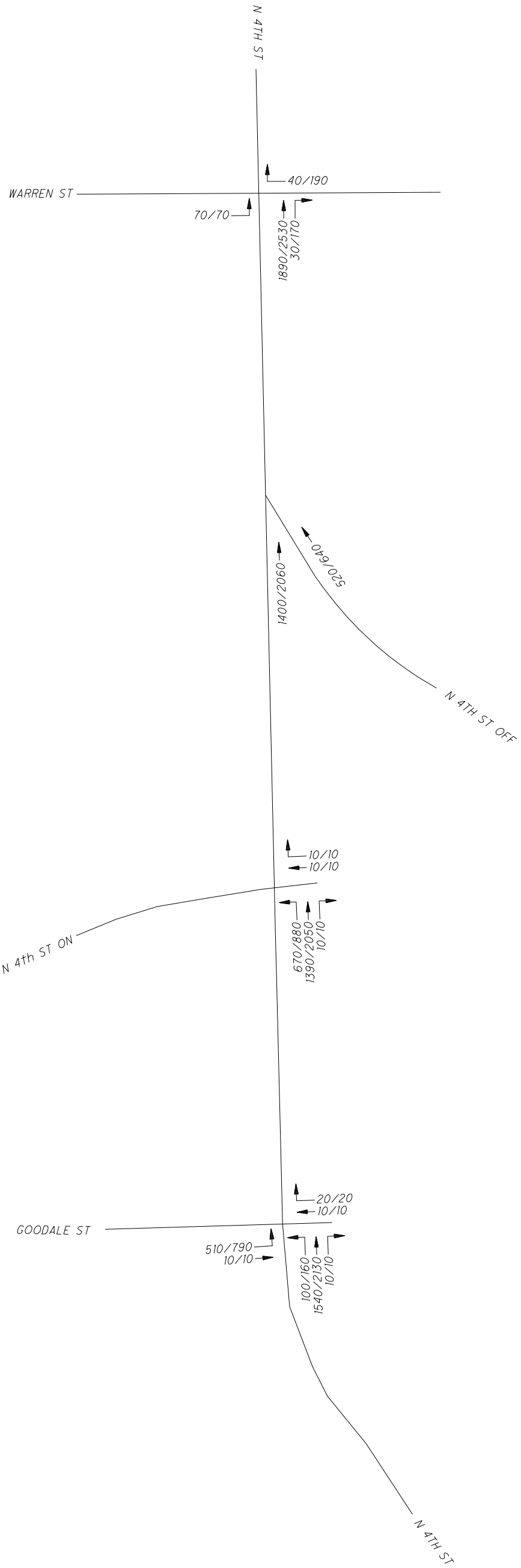
16
18

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/22/2022 9:32:00 PM kbright



17 / 18	**I-670 AND 4TH ST IOS** **2025 / 2045 PM VOLUMES**	ANALYST KEB DATE 07/21/22	0 NOT TO SCALE	N

P:\PR60328\Traffic\Certified Traffic\I-670 Certified Traffic Plates.dgn Sheet 7/28/2022 1:17:16 PM kbright



18
18

I-670 AND 4TH ST IOS
2025/2045 PM VOLUME

ANALYST KEB
DATE 07/21/22

NOT TO SCALE

N

Freeway Capacity Analysis

No-Build

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Overview

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From RAMP (SWB) - SWB				**Segment: 720491523**
	1	113.1	Yes	F
	2	117.3	Yes	F
	3	113.8	Yes	F
	4	111.8	Yes	F
	5	113.2	Yes	F
	6	118.1	Yes	F
	7	113.3	Yes	F
	8	112.3	Yes	F
	9	112.3	Yes	F
	10	114.0	Yes	F
	Average:	**50.6**	**No**	**F**
Merge - From RAMP (SWB) - SWB				**Segment: 720491585**
	1	113.1	Yes	F
	2	117.3	Yes	F
	3	113.8	Yes	F
	4	111.8	Yes	F
	5	113.2	Yes	F
	6	118.1	Yes	F
	7	113.3	Yes	F
	8	112.3	Yes	F
	9	112.3	Yes	F
	10	114.0	Yes	F
	Average:	**74.2**	**Yes**	**F**
Merge - From RAMP (SWB) - SWB				**Segment: 720491586**
	1	113.1	Yes	F
	2	117.3	Yes	F
	3	113.8	Yes	F
	4	111.8	Yes	F
	5	113.2	Yes	F
	6	118.1	Yes	F
	7	113.3	Yes	F
	8	112.3	Yes	F
	9	112.3	Yes	F

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From RAMP (SWB) - SWB				**Segment: 720491586**
	10	114.0	Yes	F
	Average:	**74.2**	**Yes**	**F**
Diverge - To RAMP (SB) - SWB				**Segment: 720491524**
	1	42.5	Yes	F
	2	41.1	Yes	F
	3	42.5	Yes	F
	4	42.4	Yes	F
	5	40.4	Yes	F
	6	40.7	Yes	F
	7	42.3	Yes	F
	8	41.9	Yes	F
	9	39.8	Yes	F
	10	42.0	Yes	F
	Average:	**50.6**	**No**	**F**
Basic - Between RAMP and N 4TH ST - WB				**Segment: 720491538**
	1	25.5	No	C
	2	25.0	No	C
	3	26.6	No	D
	4	25.0	No	C
	5	25.6	No	C
	6	26.3	No	D
	7	25.9	No	C
	8	25.3	No	C
	9	25.2	No	C
	10	26.0	No	C
	Average:	**50.6**	**No**	**F**
Basic - From RAMP - WB				**Segment: 720491540**
	1	33.4	No	D
	2	32.8	No	D
	3	31.3	No	D
	4	31.6	No	D
	5	30.1	No	D
	6	33.5	No	D
	7	33.2	No	D
	8	33.5	No	D
	9	32.9	No	D
	10	33.1	No	D
	Average:	**50.6**	**No**	**F**
Basic - Between RAMP (WB) and RAMP - SWB				**Segment: 720491525**
	1	50.7	No	F

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - Between RAMP (WB) and RAMP - SWB				**Segment: 720491525**
	2	48.5	No	F
	3	50.9	No	F
	4	50.7	No	F
	5	46.0	No	F
	6	51.8	No	F
	7	52.6	No	F
	8	51.5	No	F
	9	50.8	No	F
	10	50.3	No	F
	Average:	**50.6**	**No**	**F**
Weaving - From N 4TH ST to RAMP (WB) - WB				**Segment: 720491529**
	1	40.1	Yes	F
	2	37.8	Yes	F
	3	39.4	Yes	F
	4	40.9	Yes	F
	5	38.5	Yes	F
	6	38.9	Yes	F
	7	40.5	Yes	F
	8	39.3	Yes	F
	9	40.3	Yes	F
	10	40.8	Yes	F
	Average:	**50.6**	**No**	**F**
Weaving - From N 4TH ST to RAMP (WB) - WB				**Segment: 720491584**
	1	40.1	Yes	F
	2	37.8	Yes	F
	3	39.4	Yes	F
	4	40.9	Yes	F
	5	38.5	Yes	F
	6	38.9	Yes	F
	7	40.5	Yes	F
	8	39.3	Yes	F
	9	40.3	Yes	F
	10	40.8	Yes	F
	Average:	**74.2**	**Yes**	**F**

RAMP

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				**Segment: 720491579**
	1	29.4	No	D
	2	29.5	No	D
	3	29.1	No	D
	4	29.3	No	D

RAMP

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				**Segment: 720491579**
	5	29.3	No	D
	6	29.0	No	D
	7	29.8	No	D
	8	29.6	No	D
	9	28.9	No	D
	10	29.2	No	D
	Average:	**74.2**	**Yes**	**F**

ABOUT FREEWAY LOS
The LOS determination based on density will be overridden with LOS F when demand exceeds capacity (i.e., Over Capacity = Yes).

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Density

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From RAMP (SWB)	113.9	2.1	111.8	118.1	10
720491585	SW	Merge	From RAMP (SWB)	113.9	2.1	111.8	118.1	10
720491586	SW	Merge	From RAMP (SWB)	113.9	2.1	111.8	118.1	10
720491524	SW	Diverge	To RAMP (SB)	41.6	1.0	39.8	42.5	10
720491538	W	Basic	Between RAMP and N 4TH ST	25.6	0.5	25.0	26.6	10
720491540	W	Basic	From RAMP	32.5	1.2	30.1	33.5	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	50.4	1.9	46.0	52.6	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	39.7	1.0	37.8	40.9	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	39.7	1.0	37.8	40.9	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		29.3	0.3	28.9	29.8	10

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - VgtC

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between RAMP and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From RAMP	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Over Capacity

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between RAMP and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From RAMP	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Overview

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491524				
1	5,436	34.2	8.4	42.4
2	5,327	34.5	8.3	41.0
3	5,382	34.4	7.9	42.5
4	5,439	34.7	7.5	42.4
5	5,322	34.6	8.4	40.3
6	5,391	34.9	8.0	40.7
7	5,433	34.6	8.6	42.2
8	5,466	35.0	7.7	41.8
9	5,447	35.4	7.9	39.7
10	5,441	34.4	8.0	42.0
Average:	**5,408.4**	**34.7**	**8.1**	**41.5**
SWB on Segment ID 720491525				
1	5,502	28.2	13.6	50.6
2	5,428	29.8	14.6	48.4
3	5,481	28.6	13.5	50.8
4	5,506	28.9	13.6	50.6
5	5,441	31.2	14.3	45.9
6	5,465	28.2	13.5	51.7
7	5,493	27.8	13.3	52.5
8	5,513	28.7	13.3	51.4
9	5,524	29.1	13.9	50.7
10	5,493	29.0	13.7	50.2
Average:	**5,484.6**	**29.0**	**13.7**	**50.3**
SWB on Segment ID 720491585				
1	5,451	14.5	5.9	98.9
2	5,337	14.3	5.7	99.4
3	5,396	14.7	6.3	98.4
4	5,446	14.8	5.8	97.0
5	5,340	14.1	5.9	98.3
6	5,403	14.0	5.6	101.6
7	5,453	14.6	6.3	98.3
8	5,474	14.9	6.0	100.5
9	5,460	14.4	6.3	100.1
10	5,442	15.0	6.2	98.2

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
Average:	**5,420.2**	**14.5**	**6.0**	**99.1**
SWB on Segment ID 720491586				
1	5,440	22.6	9.5	63.1
2	5,331	22.6	9.5	62.8
3	5,382	23.4	9.3	62.6
4	5,436	23.7	9.1	61.1
5	5,323	22.9	9.4	63.7
6	5,395	22.5	9.4	63.3
7	5,436	23.6	9.2	61.3
8	5,467	23.6	9.4	61.6
9	5,448	23.4	9.4	63.1
10	5,438	23.1	9.4	61.7
Average:	**5,409.6**	**23.1**	**9.4**	**62.4**
WB on Segment ID 720491529				
1	6,805	26.1	12.6	55.8
2	6,554	26.1	14.0	51.9
3	6,748	26.0	12.4	55.5
4	6,769	25.4	12.0	57.6
5	6,631	26.3	13.2	52.3
6	6,754	25.6	12.8	54.0
7	6,791	25.0	12.1	57.0
8	6,751	26.6	12.8	55.3
9	6,808	25.3	12.3	55.0
10	6,789	25.8	12.6	56.7
Average:	**6,740.0**	**25.8**	**12.7**	**55.1**
WB on Segment ID 720491538				
1	3,392	46.4	7.8	25.5
2	3,330	47.2	7.5	24.9
3	3,361	46.0	8.0	26.5
4	3,392	47.6	7.8	25.0
5	3,309	46.6	8.2	25.5
6	3,354	45.0	8.9	26.2
7	3,383	46.3	7.9	25.8
8	3,418	46.9	7.9	25.2
9	3,401	47.3	8.0	25.2
10	3,396	46.4	7.5	25.9
Average:	**3,373.6**	**46.6**	**8.0**	**25.6**
WB on Segment ID 720491540				
1	3,137	50.4	5.5	33.3
2	3,074	51.2	5.2	32.7

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
3	3,111	50.8	5.9	31.3
4	3,145	50.8	5.8	31.5
5	3,068	51.3	5.4	30.0
6	3,102	49.6	6.4	33.4
7	3,129	50.2	6.2	33.1
8	3,162	50.1	5.8	33.4
9	3,155	51.0	5.7	32.8
10	3,138	49.9	5.9	33.0
Average:	**3,122.1**	**50.5**	**5.8**	**32.5**
WB on Segment ID 720491584				
1	6,789	40.3	8.5	35.6
2	6,544	40.9	9.4	33.8
3	6,732	40.6	8.9	34.9
4	6,755	39.6	9.1	36.2
5	6,617	40.0	9.0	34.6
6	6,737	40.4	8.4	34.7
7	6,780	39.4	9.0	35.8
8	6,733	40.0	8.8	34.8
9	6,796	39.5	8.8	36.2
10	6,767	39.3	8.5	36.4
Average:	**6,725.0**	**40.0**	**8.8**	**35.3**

RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
NB on Segment ID 720491539				
1	252	42.5	4.7	6.0
2	249	42.9	6.0	5.7
3	251	43.0	6.7	6.0
4	251	44.4	6.8	5.5
5	246	41.7	7.4	5.3
6	248	42.3	6.0	6.2
7	254	42.7	6.0	6.0
8	252	42.1	6.9	6.3
9	253	41.9	6.2	6.0
10	254	43.5	6.8	5.9
Average:	**251.0**	**42.7**	**6.4**	**5.9**
SWB on Segment ID 720491527				
1	1,282	13.1	7.9	105.5
2	1,108	11.3	6.6	104.2
3	1,249	11.4	6.5	118.4
4	1,243	10.6	4.9	123.7

RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
5	1,171	11.2	5.6	109.4
6	1,272	10.7	4.6	127.3
7	1,277	11.5	5.7	117.2
8	1,218	11.8	6.2	111.7
9	1,272	11.3	6.2	118.7
10	1,273	11.8	6.3	121.0
Average:	**1,236.5**	**11.5**	**6.1**	**115.7**
SWB on Segment ID 720491573				
1	2,045	38.3	7.3	28.1
2	1,988	38.0	6.5	27.3
3	2,015	36.3	8.4	28.9
4	2,038	37.3	7.1	29.6
5	2,002	36.9	7.9	28.9
6	2,027	38.4	6.2	27.6
7	2,043	37.6	8.2	28.3
8	2,039	38.6	6.4	27.5
9	2,042	37.6	6.6	27.4
10	2,036	37.4	7.7	28.8
Average:	**2,027.5**	**37.6**	**7.2**	**28.2**
WB on Segment ID 720491579				
1	2,370	42.6	3.9	29.3
2	2,373	42.4	4.3	29.4
3	2,372	42.9	3.8	29.1
4	2,370	42.5	4.1	29.2
5	2,375	42.6	4.1	29.2
6	2,371	42.9	4.2	28.9
7	2,372	42.5	4.2	29.8
8	2,373	42.3	4.3	29.5
9	2,374	42.8	4.2	28.9
10	2,371	42.4	4.1	29.1
Average:	**2,372.1**	**42.6**	**4.1**	**29.2**

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Volume

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	5,430.7	54.5	5,322.0	5,524.0	10
720491584	W	4,990.2	1,767.8	3,068.0	6,808.0	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	251.0	2.6	246.0	254.0	10
720491573	SW	1,632.0	407.9	1,108.0	2,045.0	10
720491579	W	2,372.1	1.7	2,370.0	2,375.0	10

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Avg Speed

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	25.3	7.6	14.0	35.4	10
720491584	W	40.7	9.5	25.0	51.3	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	42.7	0.8	41.7	44.4	10
720491573	SW	24.6	13.4	10.6	38.6	10
720491579	W	42.6	0.2	42.3	42.9	10

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Std Dev Speed

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	9.3	2.9	5.6	14.6	10
720491584	W	8.8	2.6	5.2	14.0	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	6.4	0.7	4.7	7.4	10
720491573	SW	6.6	1.0	4.6	8.4	10
720491579	W	4.1	0.2	3.8	4.3	10

Project: I-670 No Build
Scenario: No Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Density

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	63.3	22.3	39.7	101.6	10
720491584	W	37.1	11.2	24.9	57.6	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	5.9	0.3	5.3	6.3	10
720491573	SW	72.0	45.2	27.3	127.3	10
720491579	W	29.2	0.3	28.9	29.8	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Overview

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From RAMP (SWB) - SWB				**Segment: 720491523**
	1	118.3	Yes	F
	2	115.0	Yes	F
	3	117.1	Yes	F
	4	122.9	Yes	F
	5	110.9	Yes	F
	6	112.8	Yes	F
	7	119.8	Yes	F
	8	116.4	Yes	F
	9	115.7	Yes	F
	10	117.6	Yes	F
	Average:	**77.0**	**No**	**F**
Merge - From RAMP (SWB) - SWB				**Segment: 720491585**
	1	118.3	Yes	F
	2	115.0	Yes	F
	3	117.1	Yes	F
	4	122.9	Yes	F
	5	110.9	Yes	F
	6	112.8	Yes	F
	7	119.8	Yes	F
	8	116.4	Yes	F
	9	115.7	Yes	F
	10	117.6	Yes	F
	Average:	**89.9**	**Yes**	**F**
Merge - From RAMP (SWB) - SWB				**Segment: 720491586**
	1	118.3	Yes	F
	2	115.0	Yes	F
	3	117.1	Yes	F
	4	122.9	Yes	F
	5	110.9	Yes	F
	6	112.8	Yes	F
	7	119.8	Yes	F
	8	116.4	Yes	F
	9	115.7	Yes	F

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From RAMP (SWB) - SWB				**Segment: 720491586**
	10	117.6	Yes	F
	Average:	**89.9**	**Yes**	**F**
Diverge - To RAMP (SB) - SWB				**Segment: 720491524**
	1	65.7	Yes	F
	2	67.5	Yes	F
	3	67.9	Yes	F
	4	66.1	Yes	F
	5	65.2	Yes	F
	6	65.6	Yes	F
	7	68.6	Yes	F
	8	65.7	Yes	F
	9	67.8	Yes	F
	10	67.6	Yes	F
	Average:	**77.0**	**No**	**F**
Basic - Between RAMP and N 4TH ST - WB				**Segment: 720491538**
	1	67.0	No	F
	2	67.5	No	F
	3	69.0	No	F
	4	67.3	No	F
	5	65.9	No	F
	6	66.1	No	F
	7	70.1	No	F
	8	67.4	No	F
	9	67.2	No	F
	10	69.1	No	F
	Average:	**77.0**	**No**	**F**
Basic - From RAMP - WB				**Segment: 720491540**
	1	85.8	No	F
	2	86.8	No	F
	3	88.1	No	F
	4	87.0	No	F
	5	84.9	No	F
	6	84.5	No	F
	7	87.7	No	F
	8	87.4	No	F
	9	88.0	No	F
	10	86.9	No	F
	Average:	**77.0**	**No**	**F**
Basic - Between RAMP (WB) and RAMP - SWB				**Segment: 720491525**
	1	75.8	No	F

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - Between RAMP (WB) and RAMP - SWB				**Segment: 720491525**
	2	76.5	No	F
	3	80.3	No	F
	4	80.0	No	F
	5	74.5	No	F
	6	77.8	No	F
	7	79.1	No	F
	8	79.5	No	F
	9	79.7	No	F
	10	79.1	No	F
	Average:	**77.0**	**No**	**F**
Weaving - From N 4TH ST to RAMP (WB) - WB				**Segment: 720491529**
	1	46.0	Yes	F
	2	45.9	Yes	F
	3	46.9	Yes	F
	4	46.4	Yes	F
	5	45.0	Yes	F
	6	45.4	Yes	F
	7	45.7	Yes	F
	8	46.0	Yes	F
	9	45.9	Yes	F
	10	46.4	Yes	F
	Average:	**77.0**	**No**	**F**
Weaving - From N 4TH ST to RAMP (WB) - WB				**Segment: 720491584**
	1	46.0	Yes	F
	2	45.9	Yes	F
	3	46.9	Yes	F
	4	46.4	Yes	F
	5	45.0	Yes	F
	6	45.4	Yes	F
	7	45.7	Yes	F
	8	46.0	Yes	F
	9	45.9	Yes	F
	10	46.4	Yes	F
	Average:	**89.9**	**Yes**	**F**

RAMP

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				**Segment: 720491579**
	1	79.4	No	F
	2	79.8	No	F
	3	80.7	No	F
	4	80.9	No	F

RAMP

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				**Segment: 720491579**
	5	77.9	No	F
	6	78.6	No	F
	7	82.9	No	F
	8	80.0	No	F
	9	82.3	No	F
	10	81.8	No	F
	Average:	**89.9**	**Yes**	**F**

ABOUT FREEWAY LOS
The LOS determination based on density will be overridden with LOS F when demand exceeds capacity (i.e., Over Capacity = Yes).

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Density

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From RAMP (SWB)	116.7	3.4	110.9	122.9	10
720491585	SW	Merge	From RAMP (SWB)	116.7	3.4	110.9	122.9	10
720491586	SW	Merge	From RAMP (SWB)	116.7	3.4	110.9	122.9	10
720491524	SW	Diverge	To RAMP (SB)	66.8	1.2	65.2	68.6	10
720491538	W	Basic	Between RAMP and N 4TH ST	67.7	1.3	65.9	70.1	10
720491540	W	Basic	From RAMP	86.7	1.3	84.5	88.1	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	78.2	2.0	74.5	80.3	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	46.0	0.5	45.0	46.9	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	46.0	0.5	45.0	46.9	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		80.4	1.6	77.9	82.9	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - VgtC

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between RAMP and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From RAMP	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Over Capacity

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From RAMP (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between RAMP and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From RAMP	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Overview

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491524				
1	4,570	18.2	9.2	65.6
2	4,543	18.3	8.6	67.4
3	4,511	17.4	9.1	67.8
4	4,490	17.9	9.4	66.0
5	4,557	18.6	9.6	65.1
6	4,563	18.0	9.4	65.5
7	4,506	17.7	9.2	68.6
8	4,546	18.4	9.5	65.6
9	4,491	18.0	8.9	67.7
10	4,441	17.0	8.7	67.6
Average:	**4,521.8**	**18.0**	**9.2**	**66.7**
SWB on Segment ID 720491525				
1	6,309	21.9	9.0	75.6
2	6,331	21.9	8.4	76.3
3	6,264	20.6	8.1	80.1
4	6,219	20.7	8.4	79.9
5	6,330	22.9	9.4	74.3
6	6,317	21.6	8.6	77.6
7	6,227	21.0	8.4	79.0
8	6,303	21.0	8.4	79.4
9	6,230	20.9	8.6	79.6
10	6,217	21.0	8.3	79.0
Average:	**6,274.7**	**21.4**	**8.6**	**78.1**
SWB on Segment ID 720491585				
1	4,626	11.1	7.1	109.3
2	4,590	11.3	7.2	108.7
3	4,569	10.9	6.7	108.7
4	4,545	10.6	6.8	114.6
5	4,614	11.8	7.3	107.0
6	4,614	11.5	7.1	106.6
7	4,561	10.6	7.0	111.5
8	4,595	11.4	7.7	110.4
9	4,548	10.9	7.4	111.2
10	4,489	11.2	6.7	110.3

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
Average:	**4,575.1**	**11.1**	**7.1**	**109.8**
SWB on Segment ID 720491586				
1	4,596	15.3	8.3	81.2
2	4,567	15.6	8.3	79.8
3	4,538	15.4	8.5	78.9
4	4,520	15.1	8.5	79.7
5	4,585	16.0	8.7	78.5
6	4,590	15.7	8.8	78.4
7	4,535	15.0	8.9	81.3
8	4,570	15.2	8.9	78.5
9	4,521	15.0	8.3	77.8
10	4,466	15.3	8.1	80.3
Average:	**4,548.8**	**15.4**	**8.5**	**79.4**
WB on Segment ID 720491529				
1	7,516	26.4	10.2	63.3
2	7,477	24.9	10.8	62.6
3	7,553	24.8	9.8	63.9
4	7,473	24.4	9.7	66.6
5	7,479	25.4	10.9	61.4
6	7,448	25.6	10.5	63.2
7	7,519	25.2	10.1	64.5
8	7,568	25.6	9.9	63.2
9	7,520	25.0	10.8	62.9
10	7,510	25.5	10.3	64.6
Average:	**7,506.3**	**25.3**	**10.3**	**63.6**
WB on Segment ID 720491538				
1	3,830	20.4	9.8	66.9
2	3,802	20.0	9.4	67.4
3	3,781	19.3	9.6	68.9
4	3,757	19.7	10.4	67.1
5	3,816	20.9	10.5	65.8
6	3,821	20.7	10.0	66.0
7	3,774	19.0	9.6	70.0
8	3,808	20.0	10.2	67.2
9	3,755	19.7	10.1	67.1
10	3,718	19.4	9.9	69.0
Average:	**3,786.2**	**19.9**	**10.0**	**67.5**
WB on Segment ID 720491540				
1	3,422	21.4	10.0	85.6
2	3,400	21.0	8.8	86.6

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
3	3,371	20.4	9.4	87.9
4	3,355	20.8	10.1	86.9
5	3,404	21.8	10.6	84.8
6	3,414	21.5	9.8	84.3
7	3,369	20.6	9.5	87.5
8	3,403	20.8	9.8	87.2
9	3,353	20.4	9.5	87.8
10	3,321	20.6	9.6	86.7
Average:	**3,381.2**	**20.9**	**9.7**	**86.5**
WB on Segment ID 720491584				
1	7,493	38.2	7.5	41.1
2	7,455	38.3	7.7	41.2
3	7,529	38.2	7.7	42.2
4	7,451	37.8	7.9	40.7
5	7,456	39.0	7.5	40.4
6	7,424	38.4	7.8	40.4
7	7,489	38.6	7.4	40.4
8	7,540	38.4	7.3	41.2
9	7,493	37.9	7.9	41.1
10	7,479	38.4	7.1	41.3
Average:	**7,480.9**	**38.3**	**7.6**	**41.0**

RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
NB on Segment ID 720491539				
1	369	42.2	6.2	7.2
2	366	41.3	5.2	7.9
3	370	41.8	5.8	9.3
4	362	41.3	6.9	10.1
5	371	42.4	6.8	10.3
6	373	42.0	6.0	9.7
7	367	41.9	5.9	8.8
8	369	42.0	5.5	9.7
9	364	42.0	5.6	8.4
10	359	42.0	6.5	7.5
Average:	**367.0**	**41.9**	**6.0**	**8.9**
SWB on Segment ID 720491527				
1	1,216	10.6	5.1	117.0
2	1,156	10.8	5.2	110.7
3	1,298	10.7	4.7	124.2
4	1,267	10.8	4.3	123.3

RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
5	1,159	11.1	5.2	108.5
6	1,143	11.0	5.1	108.7
7	1,302	11.1	5.2	126.3
8	1,276	10.5	4.2	126.9
9	1,301	10.6	4.8	127.7
10	1,304	10.7	4.5	127.6
Average:	**1,242.2**	**10.8**	**4.8**	**120.1**

SWB on Segment ID 720491573

1	706	42.9	6.0	7.8
2	701	42.4	6.1	8.6
3	691	42.1	6.1	8.4
4	694	42.2	6.2	8.9
5	703	42.8	6.5	9.0
6	705	41.6	5.6	8.9
7	695	43.3	6.6	8.0
8	702	42.9	6.5	8.6
9	697	42.6	6.4	8.6
10	685	42.0	6.7	8.1
Average:	**697.9**	**42.5**	**6.3**	**8.5**

WB on Segment ID 720491579

1	2,966	19.9	8.7	79.2
2	3,006	20.0	8.6	79.7
3	2,976	19.7	8.6	80.5
4	2,948	19.5	9.0	80.7
5	3,003	20.7	9.1	77.7
6	2,981	20.0	8.8	78.4
7	2,938	19.1	9.0	82.8
8	2,977	19.8	9.0	79.8
9	2,955	19.0	8.7	82.1
10	2,973	19.4	8.7	81.6
Average:	**2,972.3**	**19.7**	**8.8**	**80.3**

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Volume

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	4,980.1	758.3	4,441.0	6,331.0	10
720491584	W	5,538.7	1,985.5	3,321.0	7,568.0	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	367.0	4.3	359.0	373.0	10
720491573	SW	970.1	283.1	685.0	1,304.0	10
720491579	W	2,972.3	21.8	2,938.0	3,006.0	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Avg Speed

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	16.4	3.8	10.6	22.9	10
720491584	W	26.1	7.4	19.0	39.0	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	41.9	0.4	41.3	42.4	10
720491573	SW	26.6	16.3	10.5	43.3	10
720491579	W	19.7	0.5	19.0	20.7	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Std Dev Speed

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	8.3	0.8	6.7	9.6	10
720491584	W	9.4	1.1	7.1	10.9	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	6.0	0.6	5.2	6.9	10
720491573	SW	5.6	0.8	4.2	6.7	10
720491579	W	8.8	0.2	8.6	9.1	10

Project: I-670 No Build
Scenario: No Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Density

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	83.5	16.3	65.1	114.6	10
720491584	W	64.7	16.4	40.4	87.9	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	N	8.9	1.1	7.2	10.3	10
720491573	SW	64.3	57.5	7.8	127.7	10
720491579	W	80.3	1.6	77.7	82.8	10

Freeway Capacity Analysis

Build

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Overview

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491523**
	1	112.0	Yes	F
	2	113.7	Yes	F
	3	118.2	Yes	F
	4	110.8	Yes	F
	5	115.2	Yes	F
	6	112.5	Yes	F
	7	112.1	Yes	F
	8	109.2	Yes	F
	9	115.0	Yes	F
	10	114.8	Yes	F
	Average:	**51.2**	**No**	**F**
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491585**
	1	112.0	Yes	F
	2	113.7	Yes	F
	3	118.2	Yes	F
	4	110.8	Yes	F
	5	115.2	Yes	F
	6	112.5	Yes	F
	7	112.1	Yes	F
	8	109.2	Yes	F
	9	115.0	Yes	F
	10	114.8	Yes	F
	Average:	**74.2**	**Yes**	**F**
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491586**
	1	112.0	Yes	F
	2	113.7	Yes	F
	3	118.2	Yes	F
	4	110.8	Yes	F
	5	115.2	Yes	F
	6	112.5	Yes	F
	7	112.1	Yes	F
	8	109.2	Yes	F
	9	115.0	Yes	F

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491586**
	10	114.8	Yes	F
	Average:	**74.2**	**Yes**	**F**
Diverge - To RAMP (SB) - SWB				**Segment: 720491524**
	1	40.5	Yes	F
	2	41.6	Yes	F
	3	42.7	Yes	F
	4	40.4	Yes	F
	5	41.4	Yes	F
	6	42.1	Yes	F
	7	39.4	Yes	F
	8	40.1	Yes	F
	9	41.9	Yes	F
	10	42.2	Yes	F
	Average:	**51.2**	**No**	**F**
Basic - Between 3rd/Convention Center Off-Ramp and N 4TH ST - WB				**Segment: 720491538**
	1	25.3	No	C
	2	25.0	No	C
	3	25.5	No	C
	4	26.5	No	D
	5	25.7	No	C
	6	25.6	No	C
	7	24.9	No	C
	8	25.4	No	C
	9	24.8	No	C
	10	26.2	No	D
	Average:	**51.2**	**No**	**F**
Basic - From NB I-71 ON-RAMP - WB				**Segment: 720491540**
	1	33.9	No	D
	2	35.3	No	E
	3	31.1	No	D
	4	34.4	No	D
	5	32.0	No	D
	6	33.3	No	D
	7	32.6	No	D
	8	33.7	No	D
	9	34.6	No	D
	10	34.7	No	D
	Average:	**51.2**	**No**	**F**
Basic - Between NB I-71 ON-RAMP (WB) and 3RD/4TH ON-RAMP - SWB				**Segment: 720491525**
	1	54.4	No	F

I 670

Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - Between NB I-71 ON-RAMP (WB) and 3RD/4TH ON-RAMP - SWB			**Segment: 720491525**
2	56.1	No	F
3	49.9	No	F
4	58.4	No	F
5	49.3	No	F
6	53.8	No	F
7	50.6	No	F
8	53.4	No	F
9	52.0	No	F
10	52.1	No	F
Average:	**51.2**	**No**	**F**
Weaving - From N 4TH ST to RAMP (WB) - WB			**Segment: 720491529**
1	40.4	Yes	F
2	40.7	Yes	F
3	40.4	Yes	F
4	41.3	Yes	F
5	40.6	Yes	F
6	40.7	Yes	F
7	40.0	Yes	F
8	40.1	Yes	F
9	40.9	Yes	F
10	38.6	Yes	F
Average:	**51.2**	**No**	**F**
Weaving - From N 4TH ST to RAMP (WB) - WB			**Segment: 720491584**
1	40.4	Yes	F
2	40.7	Yes	F
3	40.4	Yes	F
4	41.3	Yes	F
5	40.6	Yes	F
6	40.7	Yes	F
7	40.0	Yes	F
8	40.1	Yes	F
9	40.9	Yes	F
10	38.6	Yes	F
Average:	**74.2**	**Yes**	**F**

RAMP

Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB			**Segment: 720491579**
1	29.9	No	D
2	29.6	No	D
3	28.9	No	D
4	30.1	No	D

RAMP

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				**Segment: 720491579**
	5	29.0	No	D
	6	29.5	No	D
	7	28.9	No	D
	8	29.9	No	D
	9	29.2	No	D
	10	30.4	No	D
	Average:	**74.2**	**Yes**	**F**

ABOUT FREEWAY LOS
The LOS determination based on density will be overridden with LOS F when demand exceeds capacity (i.e., Over Capacity = Yes).

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Density

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From SB I-71 On-Ramp (SWB)	113.4	2.6	109.2	118.2	10
720491585	SW	Merge	From SB I-71 On-Ramp (SWB)	113.4	2.6	109.2	118.2	10
720491586	SW	Merge	From SB I-71 On-Ramp (SWB)	113.4	2.6	109.2	118.2	10
720491524	SW	Diverge	To RAMP (SB)	41.2	1.1	39.4	42.7	10
720491538	W	Basic	Between 3rd/Convention Center Off-Ramp and N 4TH ST	25.5	0.5	24.8	26.5	10
720491540	W	Basic	From RAMP	33.6	1.3	31.1	35.3	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	53.0	2.8	49.3	58.4	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	40.4	0.7	38.6	41.3	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	40.4	0.7	38.6	41.3	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		29.5	0.5	28.9	30.4	10

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - VgtC

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between 3rd/Convention Center Off-Ramp and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From RAMP	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Over Capacity

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between 3rd/Convention Center Off-Ramp and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From RAMP	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between RAMP (WB) and RAMP	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to RAMP (WB)	0.0	0.0	0.0	0.0	10

RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Overview

3RD/CONVENTION CENTER OFF-RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491573				
1	2,054	38.7	5.4	29.5
2	2,071	38.5	5.9	28.1
3	2,065	38.7	5.6	27.2
4	2,055	38.6	6.0	29.5
5	2,049	39.4	5.4	26.2
6	2,091	38.9	5.7	27.4
7	2,034	39.1	5.6	27.7
8	2,039	38.8	5.8	27.6
9	2,080	38.2	5.4	28.3
10	2,088	39.4	5.2	27.8
Average:	**2,062.6**	**38.8**	**5.6**	**27.9**

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491524				
1	5,483	35.7	7.1	40.5
2	5,546	35.6	7.3	41.5
3	5,501	34.2	7.8	42.7
4	5,513	35.1	7.2	40.3
5	5,476	35.2	7.8	41.4
6	5,553	35.4	7.6	42.1
7	5,391	36.5	7.5	39.3
8	5,441	35.9	7.6	40.1
9	5,518	35.0	7.3	41.9
10	5,572	35.1	8.0	42.2
Average:	**5,499.4**	**35.4**	**7.5**	**41.2**
SWB on Segment ID 720491525				
1	5,495	27.2	13.2	54.3
2	5,559	26.1	13.2	55.9
3	5,533	29.4	13.6	49.8
4	5,557	25.0	12.7	58.3
5	5,528	29.4	13.6	49.2
6	5,566	27.4	12.9	53.7
7	5,450	28.5	13.8	50.5

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
8	5,516	27.3	13.6	53.3
9	5,525	28.3	13.4	51.9
10	5,565	28.0	14.2	52.0
Average:	**5,529.4**	**27.7**	**13.4**	**52.9**
SWB on Segment ID 720491585				
1	5,498	14.9	6.2	98.5
2	5,554	14.8	6.0	95.9
3	5,508	14.3	5.6	98.6
4	5,514	14.8	5.8	99.3
5	5,498	14.7	5.8	99.7
6	5,566	14.8	5.7	100.3
7	5,408	14.4	5.9	99.3
8	5,456	14.7	5.8	97.5
9	5,532	14.9	5.6	97.5
10	5,592	15.1	6.0	96.7
Average:	**5,512.6**	**14.7**	**5.8**	**98.3**
SWB on Segment ID 720491586				
1	5,488	23.6	9.9	60.9
2	5,547	23.8	9.3	62.4
3	5,502	23.3	9.1	63.0
4	5,508	23.1	9.2	61.3
5	5,484	22.7	9.6	63.1
6	5,554	23.6	9.3	61.6
7	5,399	22.8	9.5	61.9
8	5,449	23.0	9.6	64.1
9	5,518	24.1	9.1	62.8
10	5,580	24.2	9.1	62.2
Average:	**5,502.9**	**23.4**	**9.4**	**62.3**
WB on Segment ID 720491529				
1	6,766	24.6	12.8	58.7
2	6,847	24.7	12.0	57.9
3	6,822	26.0	12.4	55.1
4	6,845	24.6	12.5	58.7
5	6,843	25.8	12.5	56.5
6	6,844	25.5	12.0	55.8
7	6,748	24.4	12.1	53.9
8	6,814	26.1	12.8	54.5
9	6,811	24.9	11.7	57.5
10	6,643	26.4	13.1	52.2
Average:	**6,798.3**	**25.3**	**12.4**	**56.1**

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
WB on Segment ID 720491538				
1	3,412	48.2	6.9	25.2
2	3,465	47.8	6.6	24.9
3	3,429	47.7	7.2	25.5
4	3,453	47.2	6.9	26.5
5	3,420	47.8	6.8	25.6
6	3,453	47.7	7.0	25.5
7	3,345	47.8	6.3	24.9
8	3,401	47.3	6.7	25.3
9	3,431	48.0	6.7	24.7
10	3,479	46.9	7.3	26.1
Average:	**3,428.8**	**47.6**	**6.8**	**25.4**
WB on Segment ID 720491540				
1	3,148	49.7	6.1	33.9
2	3,210	48.1	8.9	35.3
3	3,174	51.6	5.1	31.1
4	3,192	49.5	6.1	34.4
5	3,161	52.0	5.0	32.0
6	3,200	50.5	5.3	33.2
7	3,090	50.9	5.2	32.5
8	3,148	49.8	6.8	33.7
9	3,160	50.5	5.1	34.5
10	3,205	49.0	7.4	34.6
Average:	**3,168.8**	**50.2**	**6.1**	**33.5**
WB on Segment ID 720491584				
1	6,750	39.7	8.9	35.3
2	6,833	39.5	8.9	35.9
3	6,810	40.2	8.3	36.3
4	6,828	39.3	8.6	36.4
5	6,828	40.0	8.9	36.2
6	6,830	39.1	8.6	36.5
7	6,735	39.3	9.0	36.1
8	6,790	39.5	8.6	36.1
9	6,800	39.3	8.5	36.3
10	6,627	40.6	9.4	34.7
Average:	**6,783.1**	**39.7**	**8.8**	**36.0**

RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
NWB on Segment ID 720491539				
1	262	42.1	5.5	8.1

RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
2	255	42.7	4.3	7.1
3	252	41.8	4.4	6.0
4	259	42.7	5.4	6.2
5	259	43.5	4.6	4.9
6	251	42.4	4.6	7.1
7	253	42.8	3.4	5.1
8	257	42.5	4.9	7.2
9	268	40.2	5.2	7.6
10	270	41.0	5.0	6.2
Average:	**258.6**	**42.2**	**4.7**	**6.6**

SWB on Segment ID 720491527

1	1,253	10.5	5.5	125.4
2	1,263	11.1	5.8	118.0
3	1,261	11.8	6.2	116.4
4	1,264	11.1	6.1	118.9
5	1,291	12.1	6.9	111.5
6	1,261	11.2	6.2	123.3
7	1,280	11.6	6.8	113.4
8	1,283	10.6	5.2	124.4
9	1,269	10.2	4.6	129.7
10	1,058	12.0	7.2	94.0
Average:	**1,248.3**	**11.2**	**6.1**	**117.5**

WB on Segment ID 720491579

1	2,372	42.1	4.8	29.8
2	2,376	41.3	5.2	29.5
3	2,374	42.7	4.0	28.9
4	2,371	41.7	4.6	30.0
5	2,371	42.5	4.3	28.9
6	2,372	41.8	4.2	29.5
7	2,373	42.7	3.8	28.8
8	2,373	42.0	4.3	29.8
9	2,373	42.5	4.3	29.1
10	2,373	41.1	5.4	30.4
Average:	**2,372.8**	**42.0**	**4.5**	**29.5**

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Volume

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	2,062.6	19.8	2,034.0	2,091.0	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	5,511.1	49.4	5,391.0	5,592.0	10
720491584	W	5,044.8	1,771.4	3,090.0	6,847.0	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	258.6	6.5	251.0	270.0	10
720491527	SW	1,248.3	67.9	1,058.0	1,291.0	10
720491579	W	2,372.8	1.5	2,371.0	2,376.0	10

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Avg Speed

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	38.8	0.4	38.2	39.4	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	25.3	7.6	14.3	36.5	10
720491584	W	40.7	9.8	24.4	52.0	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	42.2	1.0	40.2	43.5	10
720491527	SW	11.2	0.7	10.2	12.1	10
720491579	W	42.0	0.6	41.1	42.7	10

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Std Dev Speed

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	5.6	0.3	5.2	6.0	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	9.0	2.9	5.6	14.2	10
720491584	W	8.5	2.6	5.0	13.1	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	4.7	0.6	3.4	5.5	10
720491527	SW	6.1	0.8	4.6	7.2	10
720491579	W	4.5	0.5	3.8	5.4	10

Project: I-670 Build
Scenario: Build AM
Run(s): Batch (10 runs)
Simulated: Various
Time: 08:00:00 - 09:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Density

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	27.9	1.0	26.2	29.5	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	63.7	21.7	39.3	100.3	10
720491584	W	37.8	11.5	24.7	58.7	10

RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	6.6	1.0	4.9	8.1	10
720491527	SW	117.5	10.0	94.0	129.7	10
720491579	W	29.5	0.5	28.8	30.4	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Overview

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491523**
	1	115.0	Yes	F
	2	117.0	Yes	F
	3	117.1	Yes	F
	4	117.4	Yes	F
	5	118.7	Yes	F
	6	115.3	Yes	F
	7	111.8	Yes	F
	8	119.2	Yes	F
	9	114.9	Yes	F
	10	119.2	Yes	F
	Average:	**76.7**	**No**	**F**
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491585**
	1	115.0	Yes	F
	2	117.0	Yes	F
	3	117.1	Yes	F
	4	117.4	Yes	F
	5	118.7	Yes	F
	6	115.3	Yes	F
	7	111.8	Yes	F
	8	119.2	Yes	F
	9	114.9	Yes	F
	10	119.2	Yes	F
	Average:	**90.0**	**Yes**	**F**
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491586**
	1	115.0	Yes	F
	2	117.0	Yes	F
	3	117.1	Yes	F
	4	117.4	Yes	F
	5	118.7	Yes	F
	6	115.3	Yes	F
	7	111.8	Yes	F
	8	119.2	Yes	F
	9	114.9	Yes	F

I 670

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From SB I-71 On-Ramp (SWB) - SWB				**Segment: 720491586**
	10	119.2	Yes	F
	Average:	**90.0**	**Yes**	**F**
Diverge - To RAMP (SB) - SWB				**Segment: 720491524**
	1	66.8	Yes	F
	2	65.2	Yes	F
	3	67.0	Yes	F
	4	68.0	Yes	F
	5	64.9	Yes	F
	6	63.6	Yes	F
	7	65.1	Yes	F
	8	68.6	Yes	F
	9	65.9	Yes	F
	10	65.1	Yes	F
	Average:	**76.7**	**No**	**F**
Basic - Between 3rd/Convention Center Off-Ramp and N 4TH ST - WB				**Segment: 720491538**
	1	68.0	No	F
	2	64.8	No	F
	3	70.0	No	F
	4	68.4	No	F
	5	63.5	No	F
	6	66.1	No	F
	7	67.8	No	F
	8	70.7	No	F
	9	69.6	No	F
	10	68.2	No	F
	Average:	**76.7**	**No**	**F**
Basic - From 4th St Off-Ramp - WB				**Segment: 720491540**
	1	86.6	No	F
	2	83.3	No	F
	3	89.6	No	F
	4	88.3	No	F
	5	80.0	No	F
	6	86.0	No	F
	7	88.5	No	F
	8	89.0	No	F
	9	87.7	No	F
	10	87.2	No	F
	Average:	**76.7**	**No**	**F**
Basic - Between NB I-71 On-RAMP (WB) and 3rd/4th On-Ramp - SWB				**Segment: 720491525**
	1	77.4	No	F

I 670

Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - Between NB I-71 On-RAMP (WB) and 3rd/4th On-Ramp - SWB			**Segment: 720491525**
2	73.5	No	F
3	80.9	No	F
4	79.8	No	F
5	71.9	No	F
6	77.1	No	F
7	79.3	No	F
8	80.6	No	F
9	79.6	No	F
10	78.0	No	F
Average:	**76.7**	**No**	**F**
Weaving - From N 4TH ST to Goodale Off-Ramp (WB) - WB			**Segment: 720491529**
1	44.7	Yes	F
2	44.0	Yes	F
3	46.9	Yes	F
4	45.1	Yes	F
5	43.0	Yes	F
6	45.6	Yes	F
7	47.1	Yes	F
8	46.4	Yes	F
9	46.9	Yes	F
10	45.3	Yes	F
Average:	**76.7**	**No**	**F**
Weaving - From N 4TH ST to Goodale Off-Ramp (WB) - WB			**Segment: 720491584**
1	44.7	Yes	F
2	44.0	Yes	F
3	46.9	Yes	F
4	45.1	Yes	F
5	43.0	Yes	F
6	45.6	Yes	F
7	47.1	Yes	F
8	46.4	Yes	F
9	46.9	Yes	F
10	45.3	Yes	F
Average:	**90.0**	**Yes**	**F**

NB I-71 ON-RAMP

Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB			**Segment: 720491579**
1	81.5	No	F
2	79.5	No	F
3	83.2	No	F
4	81.6	No	F

NB I-71 ON-RAMP

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				**Segment: 720491579**
	5	77.6	No	F
	6	80.1	No	F
	7	82.8	No	F
	8	83.4	No	F
	9	82.3	No	F
	10	81.3	No	F
	Average:	**90.0**	**Yes**	**F**

ABOUT FREEWAY LOS
The LOS determination based on density will be overridden with LOS F when demand exceeds capacity (i.e., Over Capacity = Yes).

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Density

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From SB I-71 On-Ramp (SWB)	116.6	2.3	111.8	119.2	10
720491585	SW	Merge	From SB I-71 On-Ramp (SWB)	116.6	2.3	111.8	119.2	10
720491586	SW	Merge	From SB I-71 On-Ramp (SWB)	116.6	2.3	111.8	119.2	10
720491524	SW	Diverge	To RAMP (SB)	66.0	1.6	63.6	68.6	10
720491538	W	Basic	Between 3rd/Convention Center Off-Ramp and N 4TH ST	67.7	2.3	63.5	70.7	10
720491540	W	Basic	From 4th St Off-Ramp	86.6	2.9	80.0	89.6	10
720491525	SW	Basic	Between NB I-71 On-RAMP (WB) and 3rd/4th On-Ramp	77.8	3.0	71.9	80.9	10
720491529	W	Weaving	From N 4TH ST to Goodale Off-Ramp (WB)	45.5	1.4	43.0	47.1	10
720491584	W	Weaving	From N 4TH ST to Goodale Off-Ramp (WB)	45.5	1.4	43.0	47.1	10

NB I-71 ON-RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		81.3	1.8	77.6	83.4	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - VgtC

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between 3rd/Convention Center Off-Ramp and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From 4th St Off-Ramp	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between NB I-71 On-RAMP (WB) and 3rd/4th On-Ramp	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to Goodale Off-Ramp (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to Goodale Off-Ramp (WB)	0.0	0.0	0.0	0.0	10

NB I-71 ON-RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Freeway Segment Level of Service - Over Capacity

I 670

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491523	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491585	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491586	SW	Merge	From SB I-71 On-Ramp (SWB)	0.0	0.0	0.0	0.0	10
720491524	SW	Diverge	To RAMP (SB)	0.0	0.0	0.0	0.0	10
720491538	W	Basic	Between 3rd/Convention Center Off-Ramp and N 4TH ST	0.0	0.0	0.0	0.0	10
720491540	W	Basic	From 4th St Off-Ramp	0.0	0.0	0.0	0.0	10
720491525	SW	Basic	Between NB I-71 On-RAMP (WB) and 3rd/4th On-Ramp	0.0	0.0	0.0	0.0	10
720491529	W	Weaving	From N 4TH ST to Goodale Off-Ramp (WB)	0.0	0.0	0.0	0.0	10
720491584	W	Weaving	From N 4TH ST to Goodale Off-Ramp (WB)	0.0	0.0	0.0	0.0	10

NB I-71 ON-RAMP

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
720491579	W	Basic		0.0	0.0	0.0	0.0	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Overview

3RD/4TH ON-RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491527				
1	1,157	10.7	4.7	113.8
2	1,033	10.8	5.0	97.4
3	1,287	11.0	5.0	126.5
4	1,185	10.8	5.4	116.4
5	1,012	11.2	5.5	97.1
6	1,216	11.2	5.6	116.9
7	1,313	11.3	5.3	126.1
8	1,287	10.8	4.9	128.3
9	1,298	10.6	3.9	129.7
10	1,163	10.7	5.0	113.4
Average:	**1,195.1**	**10.9**	**5.0**	**116.6**

3RD/CONVENTION CENTER OFF-RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491573				
1	705	41.4	5.1	8.2
2	713	41.4	5.1	9.1
3	675	41.2	5.1	8.4
4	672	41.8	5.8	9.2
5	699	41.2	5.1	8.9
6	697	42.1	5.5	9.3
7	664	41.9	6.0	8.3
8	682	42.1	5.1	8.3
9	679	41.7	5.0	8.4
10	672	41.6	6.1	8.7
Average:	**685.8**	**41.6**	**5.4**	**8.7**

4TH ST OFF-RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
NWB on Segment ID 720491539				
1	371	39.5	5.7	10.8
2	376	39.5	5.2	11.4
3	371	39.5	4.6	9.3
4	370	39.3	4.6	11.0

4TH ST OFF-RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
5	377	38.4	5.3	8.4
6	368	38.0	4.7	10.1
7	361	37.6	4.5	8.9
8	366	39.0	5.3	10.8
9	360	38.8	5.6	10.3
10	356	38.3	4.8	9.1
Average:	**367.6**	**38.8**	**5.0**	**10.0**

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
SWB on Segment ID 720491524				
1	4,543	18.0	8.9	66.7
2	4,641	19.2	9.3	65.2
3	4,456	17.5	8.9	66.9
4	4,446	17.2	9.1	67.9
5	4,618	19.5	9.4	64.8
6	4,541	18.7	9.2	63.6
7	4,442	18.5	10.0	65.0
8	4,453	17.3	8.9	68.5
9	4,444	17.8	9.3	65.8
10	4,481	18.1	9.3	65.1
Average:	**4,506.5**	**18.2**	**9.2**	**66.0**
SWB on Segment ID 720491525				
1	6,263	21.7	8.7	77.2
2	6,378	23.1	9.4	73.3
3	6,195	20.6	8.2	80.8
4	6,196	20.8	8.5	79.6
5	6,352	23.4	10.4	71.8
6	6,286	21.8	8.6	76.9
7	6,195	20.8	8.5	79.1
8	6,173	20.6	8.7	80.4
9	6,209	21.0	8.4	79.4
10	6,278	21.3	8.7	77.9
Average:	**6,252.5**	**21.5**	**8.8**	**77.6**
SWB on Segment ID 720491585				
1	4,602	11.4	7.2	106.0
2	4,694	12.0	7.1	106.9
3	4,514	10.8	7.0	110.2
4	4,496	11.2	7.0	108.8
5	4,668	11.6	6.6	108.5
6	4,589	11.3	7.3	109.5

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
7	4,490	11.0	7.3	108.5
8	4,512	10.8	6.7	113.4
9	4,484	11.2	7.9	108.0
10	4,533	10.7	6.9	110.3
Average:	**4,558.2**	**11.2**	**7.1**	**109.0**
SWB on Segment ID 720491586				
1	4,568	15.3	8.8	79.2
2	4,666	16.0	8.4	77.2
3	4,482	14.3	8.5	81.5
4	4,474	15.1	8.7	79.0
5	4,642	15.9	8.5	78.0
6	4,567	16.2	9.1	79.2
7	4,466	15.4	8.9	78.9
8	4,480	14.7	8.6	81.6
9	4,460	15.4	8.8	81.1
10	4,506	14.6	8.6	80.8
Average:	**4,531.1**	**15.3**	**8.7**	**79.7**
WB on Segment ID 720491529				
1	7,409	25.5	10.6	61.0
2	7,401	27.3	11.2	58.8
3	7,473	24.5	10.4	65.0
4	7,371	25.1	10.9	61.2
5	7,354	27.6	11.8	56.7
6	7,489	25.5	10.6	62.4
7	7,499	24.9	10.4	63.9
8	7,448	24.4	10.5	63.1
9	7,496	25.0	10.4	64.7
10	7,431	25.7	10.3	61.9
Average:	**7,437.1**	**25.6**	**10.7**	**61.9**
WB on Segment ID 720491538				
1	3,800	20.0	9.4	67.8
2	3,890	21.1	9.7	64.7
3	3,741	18.8	9.1	69.9
4	3,739	19.3	9.6	68.2
5	3,880	21.5	10.7	63.4
6	3,809	20.3	10.1	66.0
7	3,737	19.3	9.6	67.7
8	3,732	19.0	9.6	70.6
9	3,728	19.0	9.5	69.5
10	3,767	19.7	10.1	68.1
Average:	**3,782.3**	**19.8**	**9.7**	**67.6**

I 670

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
WB on Segment ID 720491540				
1	3,392	20.9	8.9	86.4
2	3,476	22.3	9.7	83.2
3	3,332	19.9	8.5	89.4
4	3,331	20.4	9.5	88.1
5	3,464	23.2	11.2	79.8
6	3,403	21.2	9.7	85.9
7	3,337	20.4	9.4	88.3
8	3,329	19.9	8.9	88.8
9	3,329	20.1	9.0	87.5
10	3,376	20.9	9.4	87.0
Average:	**3,376.9**	**20.9**	**9.4**	**86.4**
WB on Segment ID 720491584				
1	7,387	38.9	7.9	40.1
2	7,376	39.2	7.7	39.8
3	7,446	37.9	7.6	41.8
4	7,348	38.5	7.9	40.6
5	7,330	39.7	7.9	39.1
6	7,461	38.2	7.6	40.9
7	7,470	38.1	7.7	42.4
8	7,424	38.0	7.5	41.7
9	7,466	37.6	7.6	41.9
10	7,406	39.0	7.6	40.6
Average:	**7,411.4**	**38.5**	**7.7**	**40.9**

NB I-71 ON-RAMP

Run	Volume	Average Speed (mph)	Std Dev Speed (mph)	Average Density (pc/mi/ln)
WB on Segment ID 720491579				
1	2,953	19.4	9.2	81.3
2	2,975	19.9	9.0	79.3
3	2,943	18.8	8.5	83.1
4	2,942	19.1	8.8	81.4
5	2,968	20.5	9.7	77.5
6	2,959	19.7	8.8	80.0
7	2,940	19.1	8.7	82.6
8	2,927	18.8	8.8	83.3
9	2,950	19.2	8.7	82.1
10	2,983	19.5	8.4	81.1
Average:	**2,954.0**	**19.4**	**8.9**	**81.2**

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Volume

3RD/4TH ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491527	SW	1,195.1	107.6	1,012.0	1,313.0	10

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	685.8	16.5	664.0	713.0	10

4TH ST OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	367.6	6.9	356.0	377.0	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	4,962.1	758.1	4,442.0	6,378.0	10
720491584	W	5,501.9	1,953.0	3,329.0	7,499.0	10

NB I-71 ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491579	W	2,954.0	17.4	2,927.0	2,983.0	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Avg Speed

3RD/4TH ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491527	SW	10.9	0.2	10.6	11.3	10

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	41.6	0.3	41.2	42.1	10

4TH ST OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	38.8	0.7	37.6	39.5	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	16.5	3.9	10.7	23.4	10
720491584	W	26.2	7.6	18.8	39.7	10

NB I-71 ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491579	W	19.4	0.5	18.8	20.5	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Std Dev Speed

3RD/4TH ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491527	SW	5.0	0.5	3.9	5.6	10

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	5.4	0.4	5.0	6.1	10

4TH ST OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	5.0	0.4	4.5	5.7	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	8.5	0.9	6.6	10.4	10
720491584	W	9.4	1.2	7.5	11.8	10

NB I-71 ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491579	W	8.9	0.4	8.4	9.7	10

Project: I-670 Build
Scenario: Build PM
Run(s): Batch (10 runs)
Simulated: Various
Time: 16:00:00 - 17:00:00
Interval: Summary
Selection: Selection

Segment Statistics - Density

3RD/4TH ON-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491527	SW	116.6	11.9	97.1	129.7	10

3RD/CONVENTION CENTER OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491573	SW	8.7	0.4	8.2	9.3	10

4TH ST OFF-RAMP

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491539	NW	10.0	1.0	8.4	11.4	10

I 670

Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491586	SW	83.1	16.2	63.6	113.4	10
720491584	W	64.2	16.6	39.1	89.4	10

NB I-71 ON-RAMP

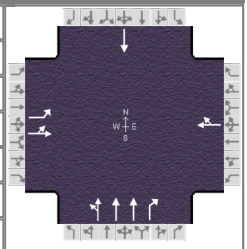
Segment ID	Direction	Average	Std Deviation	Minimum	Maximum	# Samples
720491579	W	81.2	1.8	77.5	83.3	10

Intersection Analysis

No-Build

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 No Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	69.9	28.0	4.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

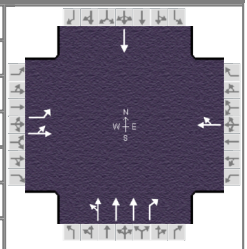
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	
Initial Queue (Q_b), veh/h	0	0			0	0	0	0	0		0	
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900	1900	1900		1900	
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	0	0			6			5	5		0	
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0	0	0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3			3	3	3	3	3		3	
Upstream Filtering (*I*)	1.00	1.00			1.00	1.00	1.00	1.00	1.00		1.00	
Lane Width (*W*), ft	12.0	12.0			12.0			12.0	12.0		12.0	
Turn Bay Length, ft	230	0			130			700	170		0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35	35	35		35	

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		73.0		19.0		28.0		28.0
Yellow Change Interval (*Y*), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R_c), s		2.0		2.0		2.0		0.0
Minimum Green (G_{min}), s		8		8		20		6
Start-Up Lost Time (*l*t), s	2.0	2.0		2.0	2.0	2.0		2.0
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0	2.0		2.0
Passage (*PT*), s		2.0		2.0		2.0		2.0
Recall Mode		Off		Off		Min		Min
Dual Entry		Yes		Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 No Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	69.9	28.0	4.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

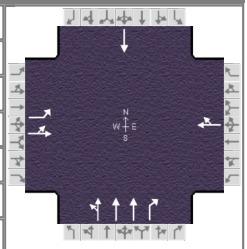
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		10.0		12.0		7.0		8.0
Phase Duration, s		34.0		10.0		75.9		75.9
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.1		3.2		0.0		0.0
Queue Clearance Time (g_s), s		26.6		3.5				
Green Extension Time (g_e), s		1.4		0.0		0.0		0.0
Phase Call Probability		1.00		0.50				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18	5	2	12		6	
Adjusted Flow Rate (*v*), veh/h	382	355			21		409	812	11		0	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1820			1662		1644	1662	1547		1900	
Queue Service Time (g_s), s	24.6	22.3			1.5		13.9	16.2	0.3		0.0	
Cycle Queue Clearance Time (g_c), s	24.6	22.3			1.5		16.3	16.2	0.3		0.0	
Green Ratio (*g/C*)	0.23	0.23			0.03		0.58	0.58	0.58		0.58	
Capacity (*c*), veh/h	423	425			56		999	1937	902		1107	
Volume-to-Capacity Ratio (*X*)	0.904	0.834			0.377		0.409	0.419	0.012		0.000	
Back of Queue (*Q*), ft/ln (95 th percentile)	417.9	382.2			30.4		255.8	259.7	5.6		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	16.7	15.3			1.2		10.2	10.0	0.2		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.82	0.00			0.23		0.38	0.37	0.03		0.00	
Uniform Delay (d_1), s/veh	44.7	43.8			56.8		13.8	13.8	10.5		0.0	
Incremental Delay (d_2), s/veh	3.0	1.7			1.6		1.2	0.7	0.0		0.0	
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0		0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	47.7	45.4			58.3		15.0	14.5	10.5		0.0	
Level of Service (LOS)	D	D			E		B	B	B			
Approach Delay, s/veh / LOS	46.6	D		58.3	E		14.6	B		0.0		
Intersection Delay, s/veh / LOS	26.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.16	B	1.67	B	1.89	B
Bicycle LOS Score / LOS	1.70	B	0.52	A	1.16	A	0.49	A

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 No Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	69.9	28.0	4.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

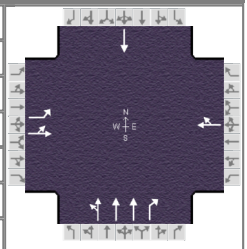
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	0.953	1.000	1.000	0.961	0.961	1.000	1.000	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.917	0.917		0.900	0.900		1.000	1.000	
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.000		0.000	0.847		0.000	1.000
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1810	1820	0	0	831	831	592	4375	1547	0	1900	0
Proportion of Vehicles Arriving on Green (P)	0.23	0.23	0.00	0.00	0.03	0.03	0.58	0.58	0.58	0.00	0.00	0.00
Incremental Delay Factor (k)	0.04	0.04			0.04		0.50	0.50	0.50			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		4.0		6.0		6.0		6.0
Green Ratio (g/C)		0.23		0.03		0.58		0.58
Permitted Saturation Flow Rate (s_p), veh/h/ln		1810		0		1440		534
Shared Saturation Flow Rate (s_{sh}), veh/h/ln						0		0
Permitted Effective Green Time (g_p), s		0.0		0.0		69.9		0.0
Permitted Service Time (g_u), s		0.0		0.0		69.9		0.0
Permitted Queue Service Time (g_{ps}), s						13.9		
Time to First Blockage (g_f), s		0.0		0.0		2.4		69.9
Queue Service Time Before Blockage (g_{fs}), s						2.4		
Protected Right Saturation Flow (s_R), veh/h/ln						0		
Protected Right Effective Green Time (g_R), s						0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.557	0.000	1.389	0.000	0.972	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.161	0.000	0.169	0.000	0.094	0.000	0.091
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	67.24	56.03		67.20	1165.55	10.44	1198.88	9.63
Bicycle F_w / F_v	-3.64	1.22	-3.64	0.03	-3.64	0.68	-3.64	0.00

HCS7 Signalized Intersection Results Graphical Summary

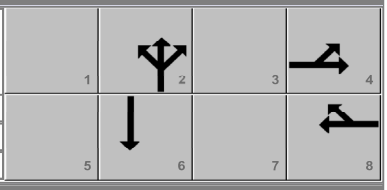
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 No Build - AM Peak Hour				



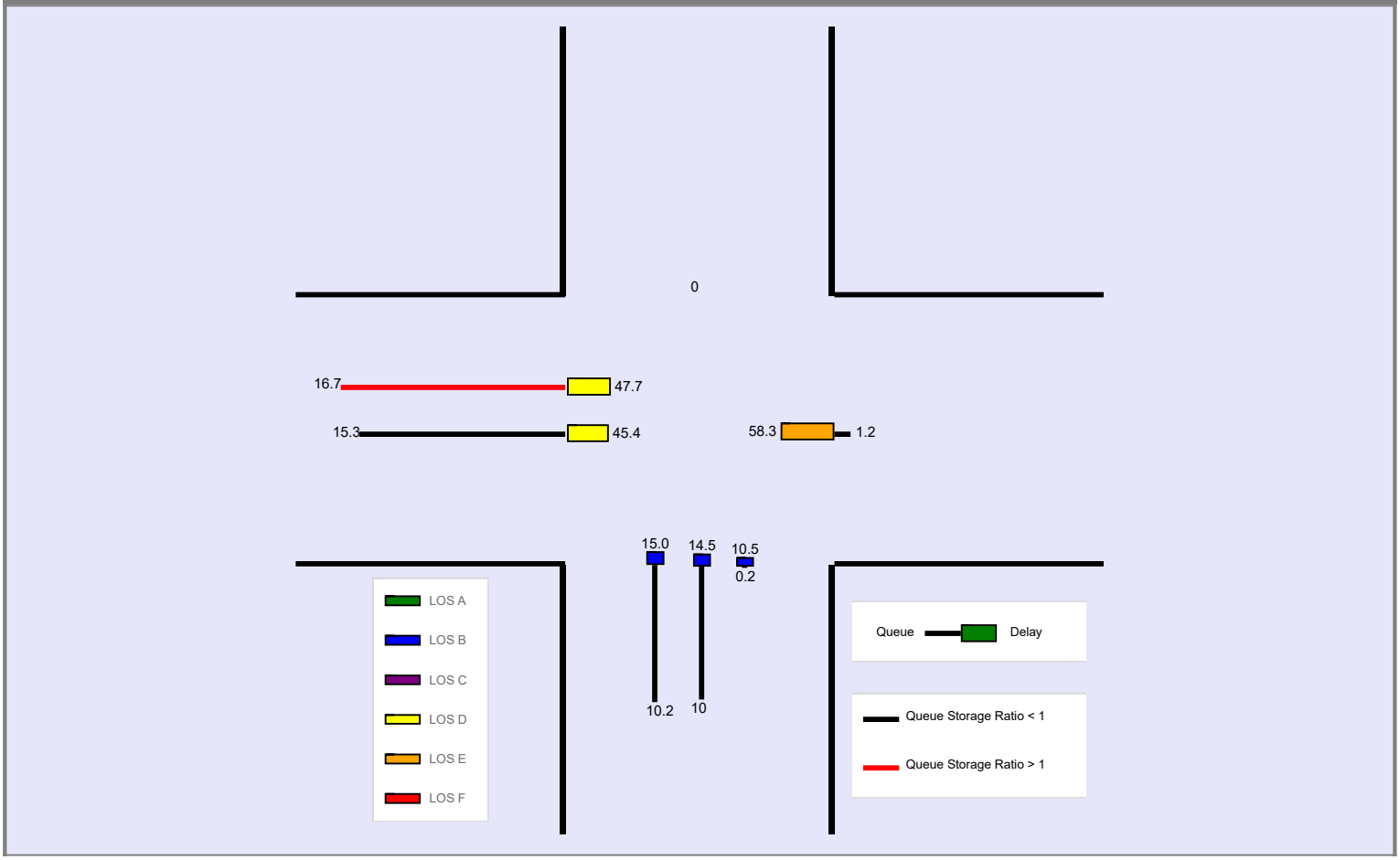
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	69.9	28.0	4.0	0.0	0.0	0.0	
Yellow	4.0	4.0	4.0	0.0	0.0	0.0	
Red	2.0	2.0	2.0	0.0	0.0	0.0	



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	417.9	382.2			30.4		255.8	259.7	5.6		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	16.7	15.3			1.2		10.2	10.0	0.2		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.82	0.00			0.23		0.38	0.37	0.03		0.00	
Control Delay (*d*), s/veh	47.7	45.4			58.3		15.0	14.5	10.5		0.0	
Level of Service (LOS)	D	D			E		B	B	B			
Approach Delay, s/veh / LOS	46.6	D		58.3	E		14.6	B		0.0		
Intersection Delay, s/veh / LOS	26.9						C					



--- Messages ---

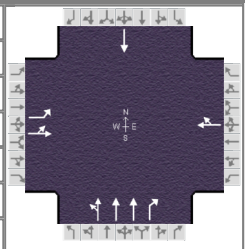
WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

HCS7 Signalized Intersection Input Data

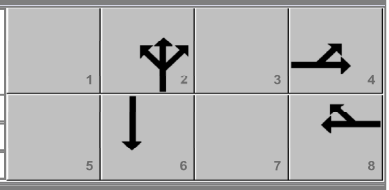
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 No Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	63.0	33.7	5.3	0.0	0.0	0.0	
Yellow	4.0	4.0	4.0	0.0	0.0	0.0	
Red	2.0	2.0	2.0	0.0	0.0	0.0	



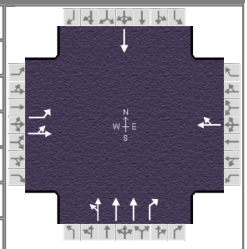
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	
Initial Queue (Q_b), veh/h	0	0			0	0	0	0	0		0	
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900	1900	1900		1900	
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	0	0			1			10	10		0	
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0	0	0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3			3	3	3	3	3		3	
Upstream Filtering (*I*)	1.00	1.00			1.00	1.00	1.00	1.00	1.00		1.00	
Lane Width (*W*), ft	12.0	12.0			12.0			12.0	12.0		12.0	
Turn Bay Length, ft	230	0			130			700	170		0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35	35	35		35	

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		56.0		18.0		46.0		46.0
Yellow Change Interval (*Y*), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R_c), s		2.0		2.0		2.0		2.0
Minimum Green (G_{min}), s		8		8		20		6
Start-Up Lost Time (*l*t), s	2.0	2.0		2.0	2.0	2.0		2.0
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0	2.0		2.0
Passage (*PT*), s		2.0		2.0		2.0		2.0
Recall Mode		Off		Off		Min		Min
Dual Entry		Yes		Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 No Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	63.0	33.7	5.3	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

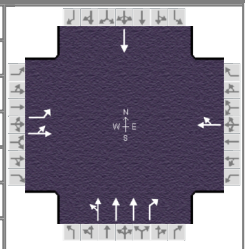
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		10.0		12.0		7.0		8.0
Phase Duration, s		39.7		11.3		69.0		69.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.1		3.3		0.0		0.0
Queue Clearance Time (g_s), s		32.0		4.2				
Green Extension Time (g_e), s		1.6		0.0		0.0		0.0
Phase Call Probability		1.00		0.66				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18	5	2	12		6	
Adjusted Flow Rate (*v*), veh/h	467	393			32		860	1603	11		0	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1812			1683		1648	1594	1485		1900	
Queue Service Time (g_s), s	30.0	23.9			2.2		61.2	57.6	0.4		0.0	
Cycle Queue Clearance Time (g_c), s	30.0	23.9			2.2		62.1	57.6	0.4		0.0	
Green Ratio (*g/C*)	0.28	0.28			0.04		0.53	0.53	0.53		0.53	
Capacity (*c*), veh/h	508	509			74		902	1675	780		998	
Volume-to-Capacity Ratio (*X*)	0.920	0.773			0.436		0.953	0.957	0.014		0.000	
Back of Queue (*Q*), ft/ln (95 th percentile)	518.8	400.9			44.3		903.4	855.8	7		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	20.8	16.0			1.8		36.1	31.7	0.3		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	2.26	0.00			0.34		1.39	1.22	0.04		0.00	
Uniform Delay (d_1), s/veh	41.8	39.6			55.9		28.2	27.2	13.6		0.0	
Incremental Delay (d_2), s/veh	9.6	1.4			1.5		20.6	13.9	0.0		0.0	
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0		0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	51.5	41.0			57.4		48.8	41.1	13.6		0.0	
Level of Service (LOS)	D	D			E		D	D	B			
Approach Delay, s/veh / LOS	46.7	D		57.4	E		43.6	D		0.0		
Intersection Delay, s/veh / LOS	44.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.16	B	1.68	B	1.90	B
Bicycle LOS Score / LOS	1.91	B	0.54	A	1.85	B	0.49	A

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 No Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	63.0	33.7	5.3	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

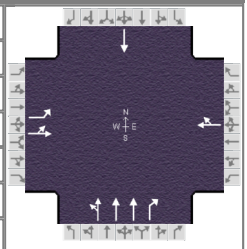
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	0.992	1.000	1.000	0.922	0.922	1.000	1.000	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.893	0.893		0.941	0.941		1.000	1.000	
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.000		0.000	0.847		0.000	1.000
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1810	1812	0	0	561	1122	330	4506	1485	0	1900	0
Proportion of Vehicles Arriving on Green (P)	0.28	0.28	0.00	0.00	0.04	0.04	0.53	0.53	0.53	0.00	0.00	0.00
Incremental Delay Factor (k)	0.15	0.06			0.04		0.50	0.50	0.50			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		4.0		6.0		6.0		6.0
Green Ratio (g/C)		0.28		0.04		0.53		0.53
Permitted Saturation Flow Rate (s_p), veh/h/ln		1810		0		1440		164
Shared Saturation Flow Rate (s_{sh}), veh/h/ln						0		0
Permitted Effective Green Time (g_p), s		0.0		0.0		63.0		0.0
Permitted Service Time (g_u), s		0.0		0.0		63.0		0.0
Permitted Queue Service Time (g_{ps}), s						61.2		
Time to First Blockage (g_f), s		0.0		0.0		0.9		63.0
Queue Service Time Before Blockage (g_{fs}), s						0.9		
Protected Right Saturation Flow (s_R), veh/h/ln						0		
Protected Right Effective Green Time (g_R), s						0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.557	0.000	1.389	0.000	0.972	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.161	0.000	0.169	0.000	0.104	0.000	0.104
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	87.84	54.85		67.20	1050.74	13.52	1050.74	13.52
Bicycle F_w / F_v	-3.64	1.42	-3.64	0.05	-3.64	1.36	-3.64	0.00

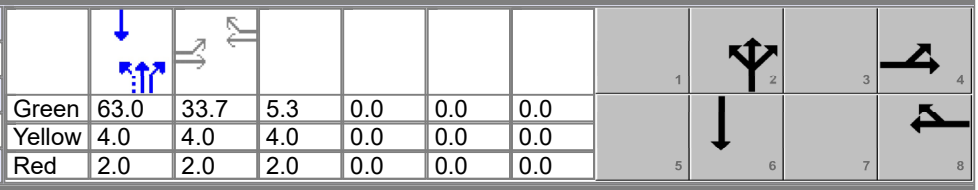
HCS7 Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 No Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 No Build - PM Peak Hour				



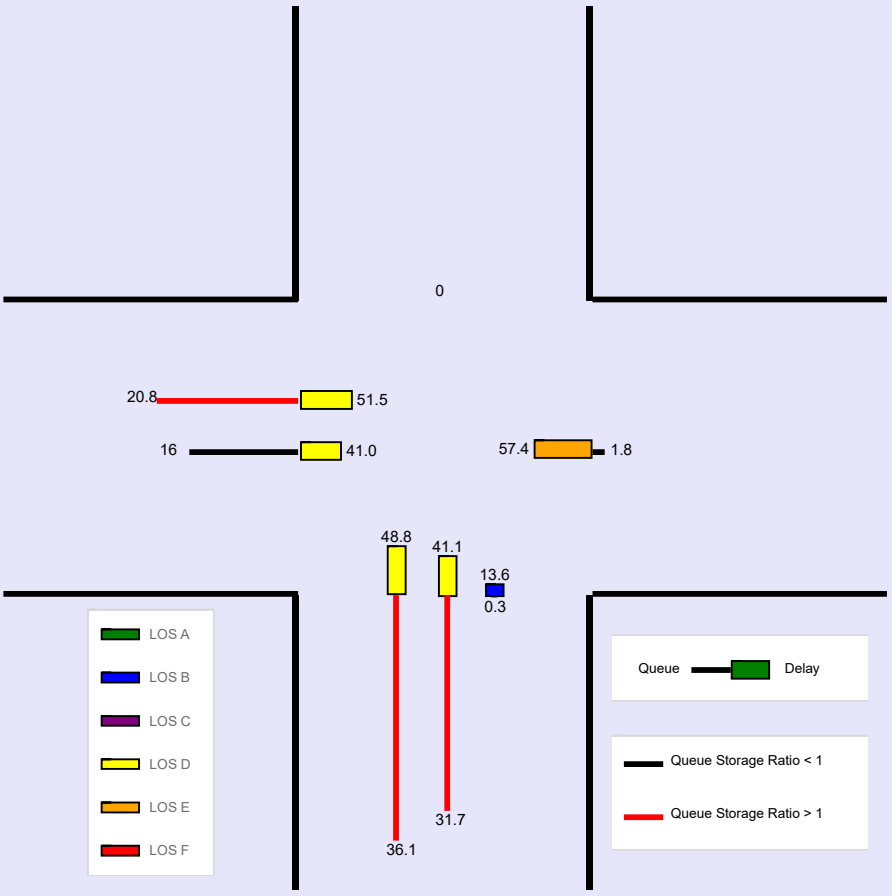
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	63.0	33.7	5.3	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	518.8	400.9			44.3		903.4	855.8	7		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	20.8	16.0			1.8		36.1	31.7	0.3		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	2.26	0.00			0.34		1.39	1.22	0.04		0.00	
Control Delay (*d*), s/veh	51.5	41.0			57.4		48.8	41.1	13.6		0.0	
Level of Service (LOS)	D	D			E		D	D	B			
Approach Delay, s/veh / LOS	46.7	D		57.4	E		43.6	D		0.0		
Intersection Delay, s/veh / LOS	44.6						D					



--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

HCS7 Two-Way Stop-Control Report

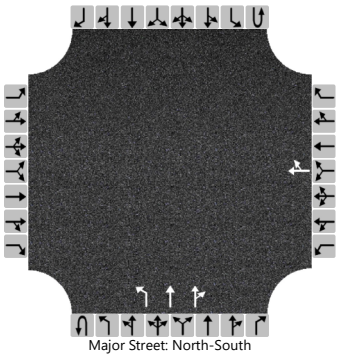
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/19/2022
Analysis Year	2045
Time Analyzed	No Build AM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and I-670 On-Ramp - 2045 No Build

Site Information

Intersection	N 4th St & I-670 On-Ramp
Jurisdiction	
East/West Street	I-670 On-Ramp
North/South Street	N 4th St
Peak Hour Factor	0.93
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	1	2	0	0	0	0	0
Configuration								TR		L	T	TR				
Volume (veh/h)							0	0		360	1320	10				
Percent Heavy Vehicles (%)							0	0		5						
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)							6.5	6.9		5.3						
Critical Headway (sec)							6.50	6.90		5.40						
Base Follow-Up Headway (sec)							4.0	3.3		3.1						
Follow-Up Headway (sec)							4.00	3.30		3.15						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)								0		387						
Capacity, c (veh/h)										1143						
v/c Ratio										0.34						
95% Queue Length, Q_{95} (veh)										1.5						
Control Delay (s/veh)										9.8						
Level of Service (LOS)										A						
Approach Delay (s/veh)										2.1						
Approach LOS																

HCS7 Two-Way Stop-Control Report

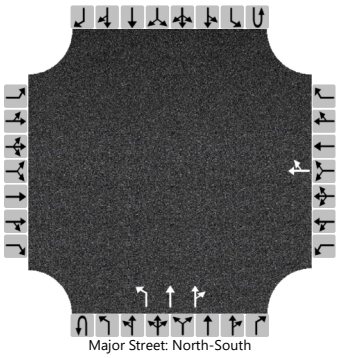
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/28/2022
Analysis Year	2045
Time Analyzed	No Build PM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and I-670 On-Ramp - 2045 No Build

Site Information

Intersection	N 4th St & I-670 On-Ramp
Jurisdiction	
East/West Street	I-670 On-Ramp
North/South Street	N 4th St
Peak Hour Factor	0.91
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	1	2	0	0	0	0	0
Configuration								TR		L	T	TR				
Volume (veh/h)							0	0		280	840	10				
Percent Heavy Vehicles (%)							8	8		2						
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)							6.5	6.9		5.3						
Critical Headway (sec)							6.66	7.06		5.34						
Base Follow-Up Headway (sec)							4.0	3.3		3.1						
Follow-Up Headway (sec)							4.08	3.38		3.12						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)								0		308						
Capacity, c (veh/h)										1154						
v/c Ratio										0.27						
95% Queue Length, Q_{95} (veh)										1.1						
Control Delay (s/veh)										9.3						
Level of Service (LOS)										A						
Approach Delay (s/veh)										2.3						
Approach LOS																

HCS7 Two-Way Stop-Control Report

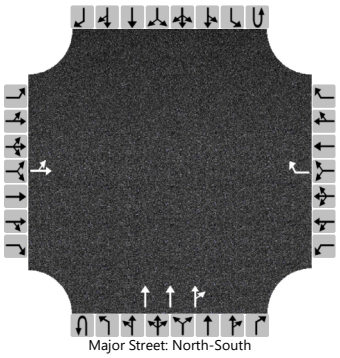
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/19/2022
Analysis Year	2045
Time Analyzed	No Build AM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and Warren St - 2045 No Build

Site Information

Intersection	N 4th St & Warren St
Jurisdiction	
East/West Street	Warren St
North/South Street	N 4th St
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	0	3	0	0	0	0	0
Configuration		LT						R			T	TR				
Volume (veh/h)		50	10					40			1010	30				
Percent Heavy Vehicles (%)		0	0					6								
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized					No											
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		6.4	6.5					7.1								
Critical Headway (sec)		6.40	6.50					7.22								
Base Follow-Up Headway (sec)		3.8	4.0					3.9								
Follow-Up Headway (sec)		3.80	4.00					3.96								

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		65						43								
Capacity, c (veh/h)		394						393								
v/c Ratio		0.17						0.11								
95% Queue Length, Q_{95} (veh)		0.6						0.4								
Control Delay (s/veh)		15.9						15.3								
Level of Service (LOS)		C						C								
Approach Delay (s/veh)	15.9				15.3											
Approach LOS	C				C											

HCS7 Two-Way Stop-Control Report

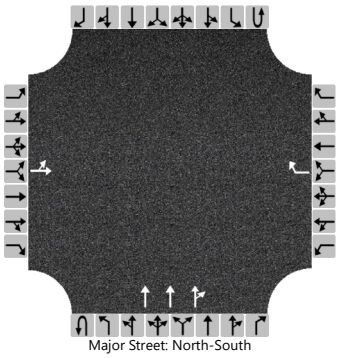
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/19/2022
Analysis Year	2045
Time Analyzed	No Build PM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and Warren St - 2045 No Build

Site Information

Intersection	N 4th St and Warren St
Jurisdiction	
East/West Street	Warren St
North/South Street	N 4th St
Peak Hour Factor	0.91
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	0	3	0	0	0	0	0
Configuration		LT						R			T	TR				
Volume (veh/h)		50	10					190			1390	180				
Percent Heavy Vehicles (%)		0	0					0								
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized					No											
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		6.4	6.5					7.1								
Critical Headway (sec)		6.40	6.50					7.10								
Base Follow-Up Headway (sec)		3.8	4.0					3.9								
Follow-Up Headway (sec)		3.80	4.00					3.90								

Delay, Queue Length, and Level of Service

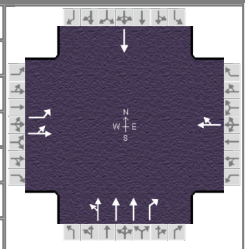
Flow Rate, v (veh/h)		66						209								
Capacity, c (veh/h)		85						259								
v/c Ratio		0.77						0.81								
95% Queue Length, Q_{95} (veh)		3.9						6.2								
Control Delay (s/veh)		127.9						58.5								
Level of Service (LOS)		F						F								
Approach Delay (s/veh)	127.9				58.5											
Approach LOS	F				F											

Intersection Analysis

Build

HCS7 Signalized Intersection Input Data

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	69.9	28.0	4.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

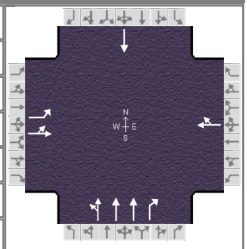
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	
Initial Queue (Q_b), veh/h	0	0			0	0	0	0	0		0	
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900	1900	1900		1900	
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	0	0			6			5	5		0	
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0	0	0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3			3	3	3	3	3		3	
Upstream Filtering (*I*)	1.00	1.00			1.00	1.00	1.00	1.00	1.00		1.00	
Lane Width (*W*), ft	12.0	12.0			12.0			12.0	12.0		12.0	
Turn Bay Length, ft	230	0			130			700	170		0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35	35	35		35	

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		73.0		19.0		28.0		28.0
Yellow Change Interval (*Y*), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R_c), s		2.0		2.0		2.0		0.0
Minimum Green (G_{min}), s		8		8		20		6
Start-Up Lost Time (*l1*), s	2.0	2.0		2.0	2.0	2.0		2.0
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0	2.0		2.0
Passage (*PT*), s		2.0		2.0		2.0		2.0
Recall Mode		Off		Off		Min		Min
Dual Entry		Yes		Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	69.9	28.0	4.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

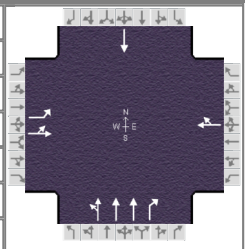
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		10.0		12.0		7.0		8.0
Phase Duration, s		34.0		10.0		75.9		75.9
Change Period, (*Y+R c*), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.1		3.2		0.0		0.0
Queue Clearance Time (*g s*), s		26.6		3.5				
Green Extension Time (*g e*), s		1.4		0.0		0.0		0.0
Phase Call Probability		1.00		0.50				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18	5	2	12		6	
Adjusted Flow Rate (*v*), veh/h	382	355			21		409	812	11		0	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1820			1662		1644	1662	1547		1900	
Queue Service Time (*g s*), s	24.6	22.3			1.5		13.9	16.2	0.3		0.0	
Cycle Queue Clearance Time (*g c*), s	24.6	22.3			1.5		16.3	16.2	0.3		0.0	
Green Ratio (*g/C*)	0.23	0.23			0.03		0.58	0.58	0.58		0.58	
Capacity (*c*), veh/h	423	425			56		999	1937	902		1107	
Volume-to-Capacity Ratio (*X*)	0.904	0.834			0.377		0.409	0.419	0.012		0.000	
Back of Queue (*Q*), ft/ln (95 th percentile)	417.9	382.2			30.4		255.8	259.7	5.6		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	16.7	15.3			1.2		10.2	10.0	0.2		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.82	0.00			0.23		0.38	0.37	0.03		0.00	
Uniform Delay (*d 1*), s/veh	44.7	43.8			56.8		13.8	13.8	10.5		0.0	
Incremental Delay (*d 2*), s/veh	3.0	1.7			1.6		1.2	0.7	0.0		0.0	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0		0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	47.7	45.4			58.3		15.0	14.5	10.5		0.0	
Level of Service (LOS)	D	D			E		B	B	B			
Approach Delay, s/veh / LOS	46.6	D		58.3	E		14.6	B		0.0		
Intersection Delay, s/veh / LOS	26.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.16	B	1.67	B	1.89	B
Bicycle LOS Score / LOS	1.70	B	0.52	A	1.16	A	0.49	A

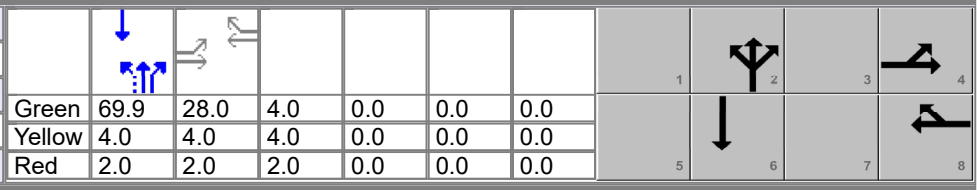
HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	69.9	28.0	4.0	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

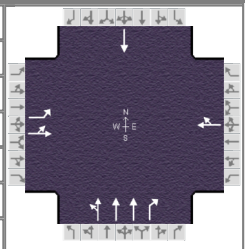
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	0.953	1.000	1.000	0.961	0.961	1.000	1.000	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.917	0.917		0.900	0.900		1.000	1.000	
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.000		0.000	0.847		0.000	1.000
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1810	1820	0	0	831	831	592	4375	1547	0	1900	0
Proportion of Vehicles Arriving on Green (P)	0.23	0.23	0.00	0.00	0.03	0.03	0.58	0.58	0.58	0.00	0.00	0.00
Incremental Delay Factor (k)	0.04	0.04			0.04		0.50	0.50	0.50			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		4.0		6.0		6.0		6.0
Green Ratio (g/C)		0.23		0.03		0.58		0.58
Permitted Saturation Flow Rate (s_p), veh/h/ln		1810		0		1440		534
Shared Saturation Flow Rate (s_{sh}), veh/h/ln						0		0
Permitted Effective Green Time (g_p), s		0.0		0.0		69.9		0.0
Permitted Service Time (g_u), s		0.0		0.0		69.9		0.0
Permitted Queue Service Time (g_{ps}), s						13.9		
Time to First Blockage (g_f), s		0.0		0.0		2.4		69.9
Queue Service Time Before Blockage (g_{fs}), s						2.4		
Protected Right Saturation Flow (s_R), veh/h/ln						0		
Protected Right Effective Green Time (g_R), s						0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.557	0.000	1.389	0.000	0.972	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.161	0.000	0.169	0.000	0.094	0.000	0.091
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	67.24	56.03		67.20	1165.55	10.44	1198.88	9.63
Bicycle F_w / F_v	-3.64	1.22	-3.64	0.03	-3.64	0.68	-3.64	0.00

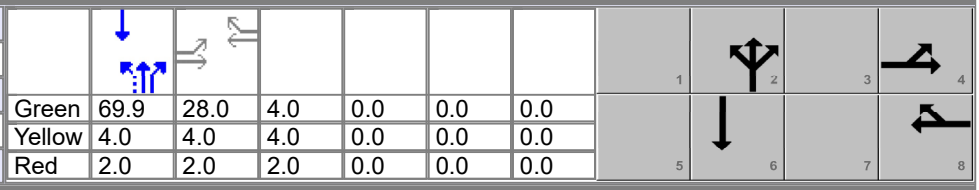
HCS7 Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St AM.xus		
Project Description	2045 Build - AM Peak Hour				



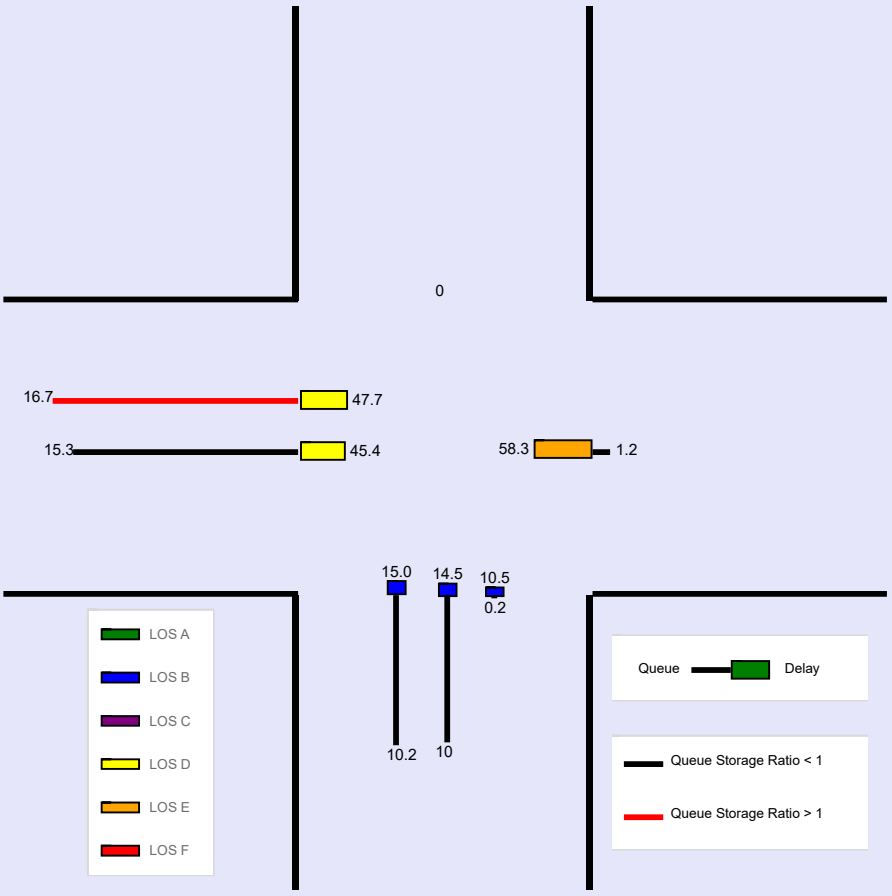
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	660	40			10	10	140	1020	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	69.9	28.0	4.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	417.9	382.2			30.4		255.8	259.7	5.6		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	16.7	15.3			1.2		10.2	10.0	0.2		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	1.82	0.00			0.23		0.38	0.37	0.03		0.00	
Control Delay (*d*), s/veh	47.7	45.4			58.3		15.0	14.5	10.5		0.0	
Level of Service (LOS)	D	D			E		B	B	B			
Approach Delay, s/veh / LOS	46.6	D		58.3	E		14.6	B		0.0		
Intersection Delay, s/veh / LOS	26.9						C					



--- Messages ---

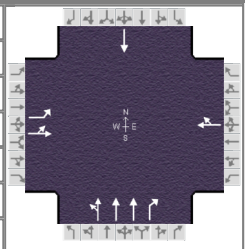
WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

HCS7 Signalized Intersection Input Data

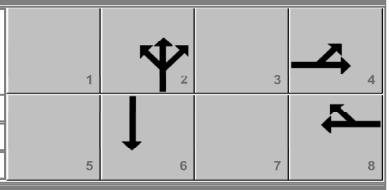
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	63.0	33.7	5.3	0.0	0.0	0.0	
Yellow	4.0	4.0	4.0	0.0	0.0	0.0	
Red	2.0	2.0	2.0	0.0	0.0	0.0	



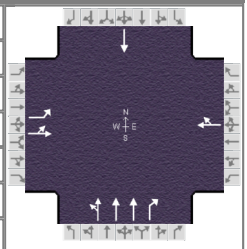
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	
Initial Queue (Q_b), veh/h	0	0			0	0	0	0	0		0	
Base Saturation Flow Rate (s_o), veh/h	1900	1900			1900	1900	1900	1900	1900		1900	
Parking (N_m), man/h		None			None			None			None	
Heavy Vehicles (P_{HV}), %	0	0			1			10	10		0	
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0	0	0	0	
Buses (N_b), buses/h	0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (*AT*)	3	3			3	3	3	3	3		3	
Upstream Filtering (*I*)	1.00	1.00			1.00	1.00	1.00	1.00	1.00		1.00	
Lane Width (*W*), ft	12.0	12.0			12.0			12.0	12.0		12.0	
Turn Bay Length, ft	230	0			130			700	170		0	
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h	35	35			35	35	35	35	35		35	

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s		56.0		18.0		46.0		46.0
Yellow Change Interval (*Y*), s		4.0		4.0		4.0		4.0
Red Clearance Interval (R_c), s		2.0		2.0		2.0		2.0
Minimum Green (G_{min}), s		8		8		20		6
Start-Up Lost Time (*l1*), s	2.0	2.0		2.0	2.0	2.0		2.0
Extension of Effective Green (*e*), s	2.0	2.0		2.0	2.0	2.0		2.0
Passage (*PT*), s		2.0		2.0		2.0		2.0
Recall Mode		Off		Off		Min		Min
Dual Entry		Yes		Yes		Yes		Yes
Walk (*Walk*), s		0.0		0.0		0.0		0.0
Pedestrian Clearance Time (*PC*), s		0.0		0.0		0.0		0.0

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25	0	No	25	0	No	25	0	No	25
Walkway / Crosswalk Width / Length, ft	9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb	0	0	No	0	0	No	0	0	No	0	0	No
Width Outside / Bike Lane / Shoulder, ft	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Signal / Occupied Parking	No	0.50		No	0.50		No	0.50		No	0.50	

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	63.0	33.7	5.3	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

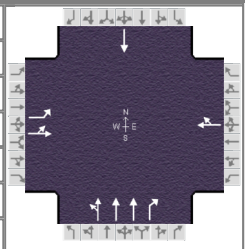
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		10.0		12.0		7.0		8.0
Phase Duration, s		39.7		11.3		69.0		69.0
Change Period, (*Y+R c*), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		3.1		3.3		0.0		0.0
Queue Clearance Time (*g s*), s		32.0		4.2				
Green Extension Time (*g e*), s		1.6		0.0		0.0		0.0
Phase Call Probability		1.00		0.66				
Max Out Probability		0.00		0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18	5	2	12		6	
Adjusted Flow Rate (*v*), veh/h	467	393			32		860	1603	11		0	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1810	1812			1683		1648	1594	1485		1900	
Queue Service Time (*g s*), s	30.0	23.9			2.2		61.2	57.6	0.4		0.0	
Cycle Queue Clearance Time (*g c*), s	30.0	23.9			2.2		62.1	57.6	0.4		0.0	
Green Ratio (*g/C*)	0.28	0.28			0.04		0.53	0.53	0.53		0.53	
Capacity (*c*), veh/h	508	509			74		902	1675	780		998	
Volume-to-Capacity Ratio (*X*)	0.920	0.773			0.436		0.953	0.957	0.014		0.000	
Back of Queue (*Q*), ft/ln (95 th percentile)	518.8	400.9			44.3		903.4	855.8	7		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	20.8	16.0			1.8		36.1	31.7	0.3		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	2.26	0.00			0.34		1.39	1.22	0.04		0.00	
Uniform Delay (*d 1*), s/veh	41.8	39.6			55.9		28.2	27.2	13.6		0.0	
Incremental Delay (*d 2*), s/veh	9.6	1.4			1.5		20.6	13.9	0.0		0.0	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0		0.0	0.0	0.0		0.0	
Control Delay (*d*), s/veh	51.5	41.0			57.4		48.8	41.1	13.6		0.0	
Level of Service (LOS)	D	D			E		D	D	B			
Approach Delay, s/veh / LOS	46.7	D		57.4	E		43.6	D		0.0		
Intersection Delay, s/veh / LOS	44.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.32	B	2.16	B	1.68	B	1.90	B
Bicycle LOS Score / LOS	1.91	B	0.54	A	1.85	B	0.49	A

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	63.0	33.7	5.3	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	2.0	2.0	2.0	0.0	0.0	0.0				

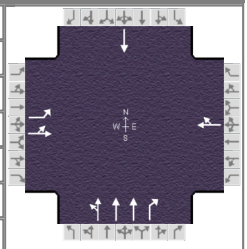
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (f_{HVg})	1.000	1.000	1.000	1.000	0.992	1.000	1.000	0.922	0.922	1.000	1.000	1.000
Parking Activity Adjustment Factor (f_p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (f_{bb})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (f_a)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})	0.952	0.000		0.893	0.893		0.941	0.941		1.000	1.000	
Right-Turn Adjustment Factor (f_{RT})		1.000	1.000		0.000	0.000		0.000	0.847		0.000	1.000
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (f_{wz})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (f_{DDI})	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	1810	1812	0	0	561	1122	330	4506	1485	0	1900	0
Proportion of Vehicles Arriving on Green (P)	0.28	0.28	0.00	0.00	0.04	0.04	0.53	0.53	0.53	0.00	0.00	0.00
Incremental Delay Factor (k)	0.15	0.06			0.04		0.50	0.50	0.50			

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)		4.0		6.0		6.0		6.0
Green Ratio (g/C)		0.28		0.04		0.53		0.53
Permitted Saturation Flow Rate (s_p), veh/h/ln		1810		0		1440		164
Shared Saturation Flow Rate (s_{sh}), veh/h/ln						0		0
Permitted Effective Green Time (g_p), s		0.0		0.0		63.0		0.0
Permitted Service Time (g_u), s		0.0		0.0		63.0		0.0
Permitted Queue Service Time (g_{ps}), s						61.2		
Time to First Blockage (g_f), s		0.0		0.0		0.9		63.0
Queue Service Time Before Blockage (g_{fs}), s						0.9		
Protected Right Saturation Flow (s_R), veh/h/ln						0		
Protected Right Effective Green Time (g_R), s						0.0		

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	1.557	0.000	1.389	0.000	0.972	0.000	1.198	0.000
Pedestrian F_s / F_{delay}	0.000	0.161	0.000	0.169	0.000	0.104	0.000	0.104
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	87.84	54.85		67.20	1050.74	13.52	1050.74	13.52
Bicycle F_w / F_v	-3.64	1.42	-3.64	0.05	-3.64	1.36	-3.64	0.00

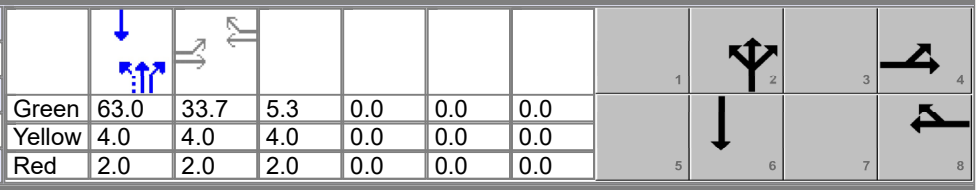
HCS7 Signalized Intersection Results Graphical Summary

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.93
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St & Goodale St	File Name	N 4th St and Goodale St PM.xus		
Project Description	2045 Build - PM Peak Hour				



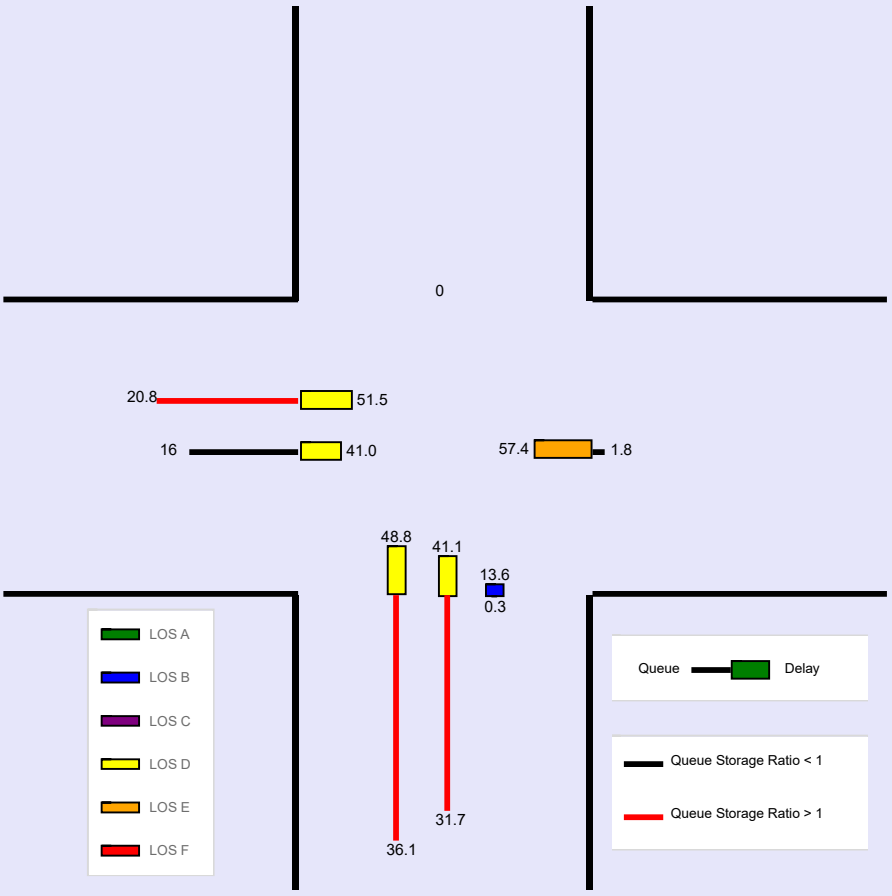
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	790	10			10	20	160	2130	10		0	

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	63.0	33.7	5.3	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)	518.8	400.9			44.3		903.4	855.8	7		0	
Back of Queue (*Q*), veh/ln (95 th percentile)	20.8	16.0			1.8		36.1	31.7	0.3		0.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	2.26	0.00			0.34		1.39	1.22	0.04		0.00	
Control Delay (*d*), s/veh	51.5	41.0			57.4		48.8	41.1	13.6		0.0	
Level of Service (LOS)	D	D			E		D	D	B			
Approach Delay, s/veh / LOS	46.7	D		57.4	E		43.6	D		0.0		
Intersection Delay, s/veh / LOS	44.6						D					



--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

HCS7 Two-Way Stop-Control Report

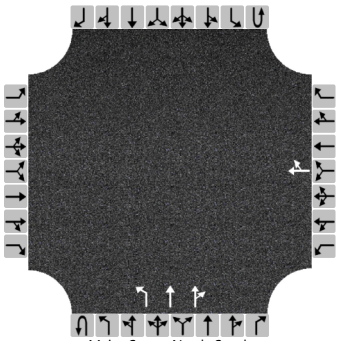
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/19/2022
Analysis Year	2045
Time Analyzed	Build AM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and I-670 On-Ramp - 2045 Build

Site Information

Intersection	N 4th St & I-670 On-Ramp
Jurisdiction	
East/West Street	I-670 On-Ramp
North/South Street	N 4th St
Peak Hour Factor	0.93
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	1	2	0	0	0	0	0
Configuration								TR		L	T	TR				
Volume (veh/h)							0	0		360	1320	10				
Percent Heavy Vehicles (%)							0	0		5						
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)							6.5	6.9		5.3						
Critical Headway (sec)							6.50	6.90		5.40						
Base Follow-Up Headway (sec)							4.0	3.3		3.1						
Follow-Up Headway (sec)							4.00	3.30		3.15						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)								0		387						
Capacity, c (veh/h)										1143						
v/c Ratio										0.34						
95% Queue Length, Q_{95} (veh)										1.5						
Control Delay (s/veh)										9.8						
Level of Service (LOS)										A						
Approach Delay (s/veh)									2.1							
Approach LOS																

HCS7 Two-Way Stop-Control Report

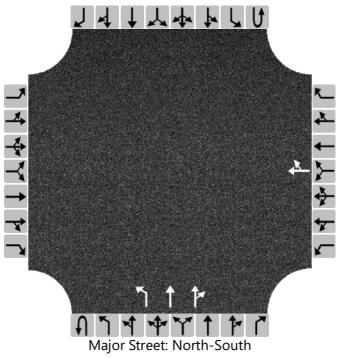
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/28/2022
Analysis Year	2045
Time Analyzed	Build PM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and I-670 On-Ramp - 2045 Build

Site Information

Intersection	N 4th St & I-670 On-Ramp
Jurisdiction	
East/West Street	I-670 On-Ramp
North/South Street	N 4th St
Peak Hour Factor	0.91
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	1	2	0	0	0	0	0
Configuration								TR		L	T	TR				
Volume (veh/h)							0	0		280	840	10				
Percent Heavy Vehicles (%)							8	8		2						
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

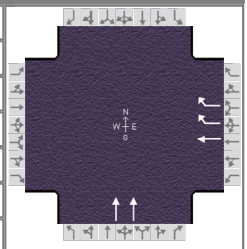
Base Critical Headway (sec)							6.5	6.9		5.3						
Critical Headway (sec)							6.66	7.06		5.34						
Base Follow-Up Headway (sec)							4.0	3.3		3.1						
Follow-Up Headway (sec)							4.08	3.38		3.12						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)								0		308						
Capacity, c (veh/h)										1154						
v/c Ratio										0.27						
95% Queue Length, Q_{95} (veh)										1.1						
Control Delay (s/veh)										9.3						
Level of Service (LOS)										A						
Approach Delay (s/veh)									2.3							
Approach LOS																

HCS7 Signalized Intersection Input Data

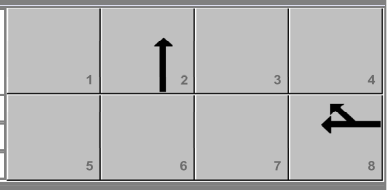
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.96
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off AM.xus		
Project Description	2045 Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	250		1320				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	88.0	20.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



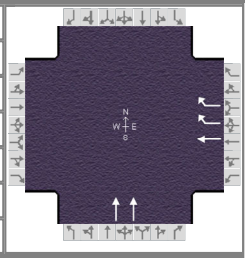
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	250		1320				
Initial Queue (Q_b), veh/h					0	0		0				
Base Saturation Flow Rate (s_o), veh/h					1900	1900		1900				
Parking (N_m), man/h					None			None				
Heavy Vehicles (P_{HV}), %					0	4		5				
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N_b), buses/h				0	0	0	0	0	0			
Arrival Type (*AT*)					3	3		3				
Upstream Filtering (*I*)					1.00	1.00		1.00				
Lane Width (*W*), ft					12.0	12.0		12.0				
Turn Bay Length, ft					0	540		350				
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h					35	35		35				

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s				93.0		27.0		
Yellow Change Interval (*Y*), s				4.0		4.0		
Red Clearance Interval (R_c), s				2.0		2.0		
Minimum Green (G_{min}), s				20		20		
Start-Up Lost Time (*l*t), s				2.0		2.0		
Extension of Effective Green (*e*), s				2.0		2.0		
Passage (*PT*), s				2.0		2.0		
Recall Mode				Off		Min		
Dual Entry				Yes		Yes		
Walk (*Walk*), s		0.0				0.0		
Pedestrian Clearance Time (*PC*), s		0.0				0.0		

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25				0	No	25			
Walkway / Crosswalk Width / Length, ft	9.0	12	0				9.0	12	0			
Street Width / Island / Curb		0		0		No	0	0	No			
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0			
Pedestrian Signal / Occupied Parking	No				0.50		No	0.50				

HCS7 Signalized Intersection Results Summary

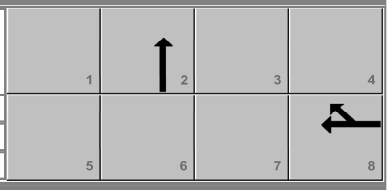
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.96
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off AM.xus		
Project Description	2045 Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	250		1320				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	88.0	20.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



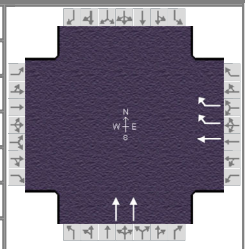
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		
Case Number				11.0		8.0		
Phase Duration, s				26.0		94.0		
Change Period, (*Y+R c*), s				6.0		6.0		
Max Allow Headway (*MAH*), s				3.4		0.0		
Queue Clearance Time (*g s*), s				12.4				
Green Extension Time (*g e*), s				0.7		0.0		
Phase Call Probability				1.00				
Max Out Probability				0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					8	18		2				
Adjusted Flow Rate (*v*), veh/h					0	260		1375				
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1900	1381		1738				
Queue Service Time (*g s*), s					0.0	10.4		20.9				
Cycle Queue Clearance Time (*g c*), s					0.0	10.4		20.9				
Green Ratio (*g/C*)					0.17	0.17		0.73				
Capacity (*c*), veh/h					317	460		2549				
Volume-to-Capacity Ratio (*X*)					0.000	0.566		0.539				
Back of Queue (*Q*), ft/ln (95 th percentile)					0	165.8		290.7				
Back of Queue (*Q*), veh/ln (95 th percentile)					0.0	6.4		11.2				
Queue Storage Ratio (*RQ*) (95 th percentile)					0.00	0.31		0.83				
Uniform Delay (*d 1*), s/veh					0.0	46.0		7.1				
Incremental Delay (*d 2*), s/veh					0.0	0.4		0.8				
Initial Queue Delay (*d 3*), s/veh					0.0	0.0		0.0				
Control Delay (*d*), s/veh					0.0	46.4		7.9				
Level of Service (LOS)						D		A				
Approach Delay, s/veh / LOS	0.0			46.4		D	7.9		A	0.0		
Intersection Delay, s/veh / LOS	14.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.74	B	1.74	B	1.86	B	1.45	A
Bicycle LOS Score / LOS			0.92	A	1.62	B		

HCS7 Signalized Intersection Intermediate Values

General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.96
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off AM.xus		
Project Description	2045 Build - AM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	250		1320				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	88.0	20.0	0.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	0.0	0.0	0.0	0.0				
Red	2.0	2.0	0.0	0.0	0.0	0.0				

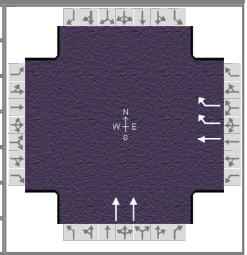
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000			
Heavy Vehicles and Grade Factor (f_{HVg})				1.000	1.000	0.969	1.000	0.961	1.000			
Parking Activity Adjustment Factor (f_p)	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Bus Blockage Adjustment Factor (f_{bb})	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000			
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	0.885	1.000	0.952	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})				1.000	1.000		1.000	1.000				
Right-Turn Adjustment Factor (f_{RT})					0.000	0.847		1.000	1.000			
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})				1.000			1.000					
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})						1.000			1.000			
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000			
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000			
Movement Saturation Flow Rate (s), veh/h				0	1900	2761	0	3652	0			
Proportion of Vehicles Arriving on Green (P)	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.73	0.00	0.00	0.00	0.00
Incremental Delay Factor (k)						0.04		0.50				

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)				4.0		6.0		
Green Ratio (g/C)				0.17		0.73		
Permitted Saturation Flow Rate (s_p), veh/h/ln				0		1440		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln						0		
Permitted Effective Green Time (g_p), s				0.0		0.0		
Permitted Service Time (g_u), s				0.0		0.0		
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s				0.0		88.0		
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0				
Protected Right Effective Green Time (g_R), s				0.0				

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	0.972	0.000	1.198	0.000	0.681	0.000
Pedestrian F_s / F_{delay}	0.000	0.167	0.000	0.169	0.000	0.058	0.000	0.167
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	-83.33	65.10		67.20	1466.69	4.27	-83.33	65.10
Bicycle F_w / F_v	-3.64		-3.64	0.43	-3.64	1.13	-3.64	

HCS7 Signalized Intersection Results Graphical Summary

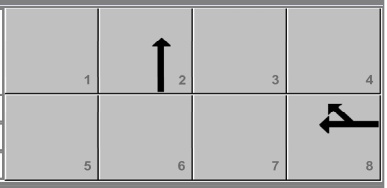
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak Hour	PHF	0.96
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 7:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off AM.xus		
Project Description	2045 Build - AM Peak Hour				



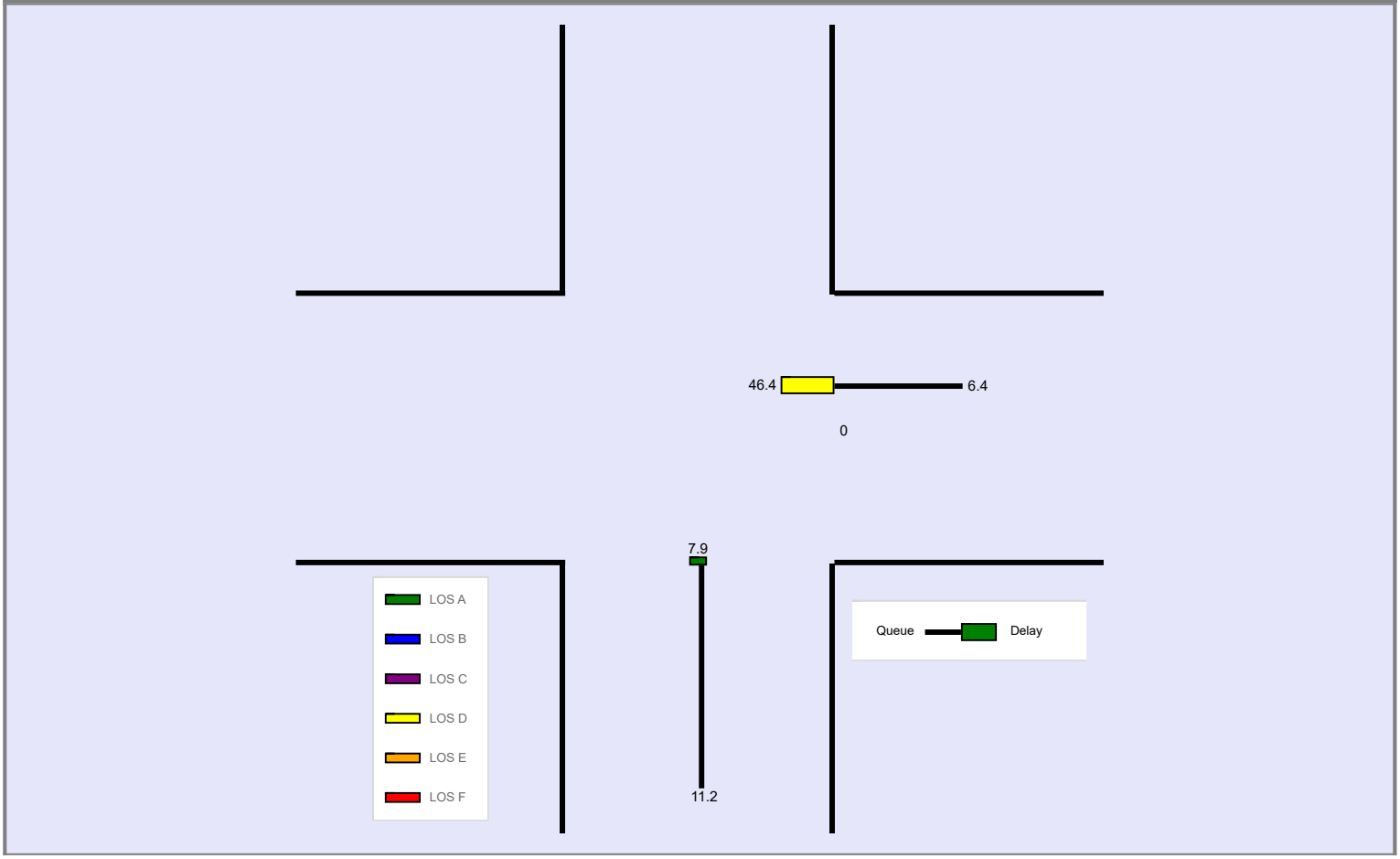
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	250		1320				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	88.0	20.0	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)					0	165.8		290.7				
Back of Queue (*Q*), veh/ln (95 th percentile)					0.0	6.4		11.2				
Queue Storage Ratio (*RQ*) (95 th percentile)					0.00	0.31		0.83				
Control Delay (*d*), s/veh					0.0	46.4		7.9				
Level of Service (LOS)						D		A				
Approach Delay, s/veh / LOS	0.0			46.4		D	7.9		A	0.0		
Intersection Delay, s/veh / LOS	14.0						B					



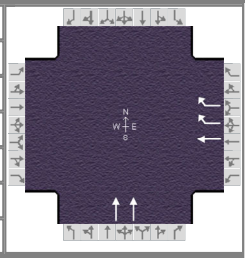
--- Messages ---

No errors or warnings exist.

--- Comments ---

HCS7 Signalized Intersection Input Data

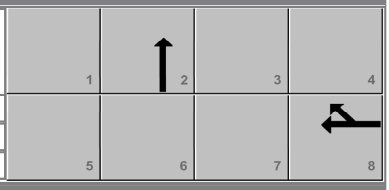
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off PM.xus		
Project Description	2045 Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	640		2060				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	76.3	31.7	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



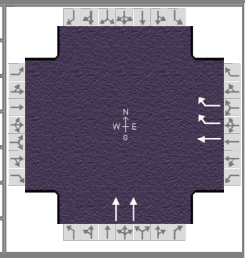
Traffic Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	640		2060				
Initial Queue (Q_b), veh/h					0	0		0				
Base Saturation Flow Rate (s_o), veh/h					1900	1900		1900				
Parking (N_m), man/h					None			None				
Heavy Vehicles (P_{HV}), %					0	1		2				
Ped / Bike / RTOR, /h	0	0		0	0	0	0	0		0	0	
Buses (N_b), buses/h				0	0	0	0	0	0			
Arrival Type (*AT*)					3	3		3				
Upstream Filtering (*I*)					1.00	1.00		1.00				
Lane Width (*W*), ft					12.0	12.0		12.0				
Turn Bay Length, ft					0	540		350				
Grade (*Pg*), %		0			0			0			0	
Speed Limit, mi/h					35	35		35				

Phase Information	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green (G_{max}) or Phase Split, s				73.0		47.0		
Yellow Change Interval (*Y*), s				4.0		4.0		
Red Clearance Interval (R_c), s				2.0		2.0		
Minimum Green (G_{min}), s				20		20		
Start-Up Lost Time (*l1*), s				2.0		2.0		
Extension of Effective Green (*e*), s				2.0		2.0		
Passage (*PT*), s				2.0		2.0		
Recall Mode				Off		Min		
Dual Entry				Yes		Yes		
Walk (*Walk*), s		0.0				0.0		
Pedestrian Clearance Time (*PC*), s		0.0				0.0		

Multimodal Information	EB			WB			NB			SB		
85th % Speed / Rest in Walk / Corner Radius	0	No	25				0	No	25			
Walkway / Crosswalk Width / Length, ft	9.0	12	0				9.0	12	0			
Street Width / Island / Curb		0		0		No	0	0	No			
Width Outside / Bike Lane / Shoulder, ft				12	5.0	2.0	12	5.0	2.0			
Pedestrian Signal / Occupied Parking	No				0.50		No	0.50				

HCS7 Signalized Intersection Results Summary

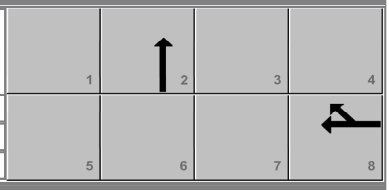
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off PM.xus		
Project Description	2045 Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	640		2060				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	76.3	31.7	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



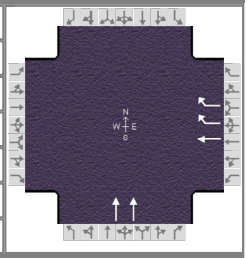
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2		
Case Number				11.0		8.0		
Phase Duration, s				37.7		82.3		
Change Period, (*Y+R c*), s				6.0		6.0		
Max Allow Headway (*MAH*), s				3.4		0.0		
Queue Clearance Time (*g s*), s				29.6				
Green Extension Time (*g e*), s				2.1		0.0		
Phase Call Probability				1.00				
Max Out Probability				0.00				

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					8	18		2				
Adjusted Flow Rate (*v*), veh/h					0	674		2168				
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1900	1414		1781				
Queue Service Time (*g s*), s					0.0	27.6		68.0				
Cycle Queue Clearance Time (*g c*), s					0.0	27.6		68.0				
Green Ratio (*g/C*)					0.26	0.26		0.64				
Capacity (*c*), veh/h					502	746		2265				
Volume-to-Capacity Ratio (*X*)					0.000	0.902		0.957				
Back of Queue (*Q*), ft/ln (95 th percentile)					0	371.8		948.2				
Back of Queue (*Q*), veh/ln (95 th percentile)					0.0	14.8		37.3				
Queue Storage Ratio (*RQ*) (95 th percentile)					0.00	0.69		2.71				
Uniform Delay (*d 1*), s/veh					0.0	42.7		20.3				
Incremental Delay (*d 2*), s/veh					0.0	1.7		11.2				
Initial Queue Delay (*d 3*), s/veh					0.0	0.0		0.0				
Control Delay (*d*), s/veh					0.0	44.4		31.6				
Level of Service (LOS)						D		C				
Approach Delay, s/veh / LOS	0.0			44.4		D	31.6		C	0.0		
Intersection Delay, s/veh / LOS	34.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.74	B	1.74	B	1.88	B	1.45	A
Bicycle LOS Score / LOS			1.60	B	2.28	B		

HCS7 Signalized Intersection Intermediate Values

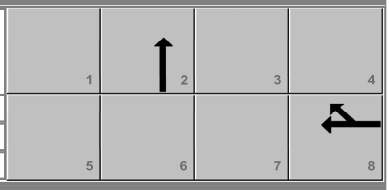
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off PM.xus		
Project Description	2045 Build - PM Peak Hour				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	640		2060				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	76.3	31.7	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



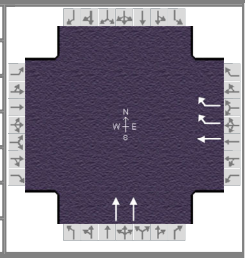
Saturation Flow / Delay	L	T	R	L	T	R	L	T	R	L	T	R
Lane Width Adjustment Factor (f_w)				1.000	1.000	1.000	1.000	1.000	1.000			
Heavy Vehicles and Grade Factor (f_{HVg})				1.000	1.000	0.992	1.000	0.984	1.000			
Parking Activity Adjustment Factor (f_p)	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Bus Blockage Adjustment Factor (f_{bb})	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Area Type Adjustment Factor (f_a)				1.000	1.000	1.000	1.000	1.000	1.000			
Lane Utilization Adjustment Factor (f_{LU})	1.000	1.000	1.000	1.000	1.000	0.885	1.000	0.952	1.000	1.000	1.000	1.000
Left-Turn Adjustment Factor (f_{LT})				1.000	1.000		1.000	1.000				
Right-Turn Adjustment Factor (f_{RT})					0.000	0.847		1.000	1.000			
Left-Turn Pedestrian Adjustment Factor (f_{Lpb})				1.000			1.000					
Right-Turn Ped-Bike Adjustment Factor (f_{Rpb})						1.000			1.000			
Work Zone Adjustment Factor (f_{wz})				1.000	1.000	1.000	1.000	1.000	1.000			
DDI Factor (f_{DDI})				1.000	1.000	1.000	1.000	1.000	1.000			
Movement Saturation Flow Rate (s), veh/h				0	1900	2828	0	3741	0			
Proportion of Vehicles Arriving on Green (P)	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.64	0.00	0.00	0.00	0.00
Incremental Delay Factor (k)						0.04		0.50				

Signal Timing / Movement Groups	EBL	EBT/R	WBL	WBT/R	NBL	NBT/R	SBL	SBT/R
Lost Time (t_L)				4.0		6.0		
Green Ratio (g/C)				0.26		0.64		
Permitted Saturation Flow Rate (s_p), veh/h/ln				0		1440		
Shared Saturation Flow Rate (s_{sh}), veh/h/ln						0		
Permitted Effective Green Time (g_p), s				0.0		0.0		
Permitted Service Time (g_u), s				0.0		0.0		
Permitted Queue Service Time (g_{ps}), s								
Time to First Blockage (g_f), s				0.0		76.3		
Queue Service Time Before Blockage (g_{fs}), s								
Protected Right Saturation Flow (s_R), veh/h/ln				0				
Protected Right Effective Green Time (g_R), s				0.0				

Multimodal	EB		WB		NB		SB	
Pedestrian F_w / F_v	0.972	0.000	0.972	0.000	1.198	0.000	0.681	0.000
Pedestrian F_s / F_{delay}	0.000	0.167	0.000	0.169	0.000	0.083	0.000	0.167
Pedestrian M_{corner} / M_{cw}								
Bicycle c_b / d_b	-83.33	65.10		67.20	1272.04	7.95	-83.33	65.10
Bicycle F_w / F_v	-3.64		-3.64	1.11	-3.64	1.79	-3.64	

HCS7 Signalized Intersection Results Graphical Summary

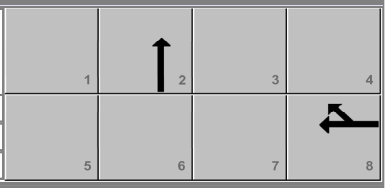
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	Kyle Bright	Analysis Date	Oct 19, 2022	Area Type	Other
Jurisdiction		Time Period	PM Peak Hour	PHF	0.95
Urban Street	N 4th St	Analysis Year	2045 Build	Analysis Period	1> 17:00
Intersection	N 4th St and I-670 Off-R…	File Name	N 4th St and I-670 Off PM.xus		
Project Description	2045 Build - PM Peak Hour				



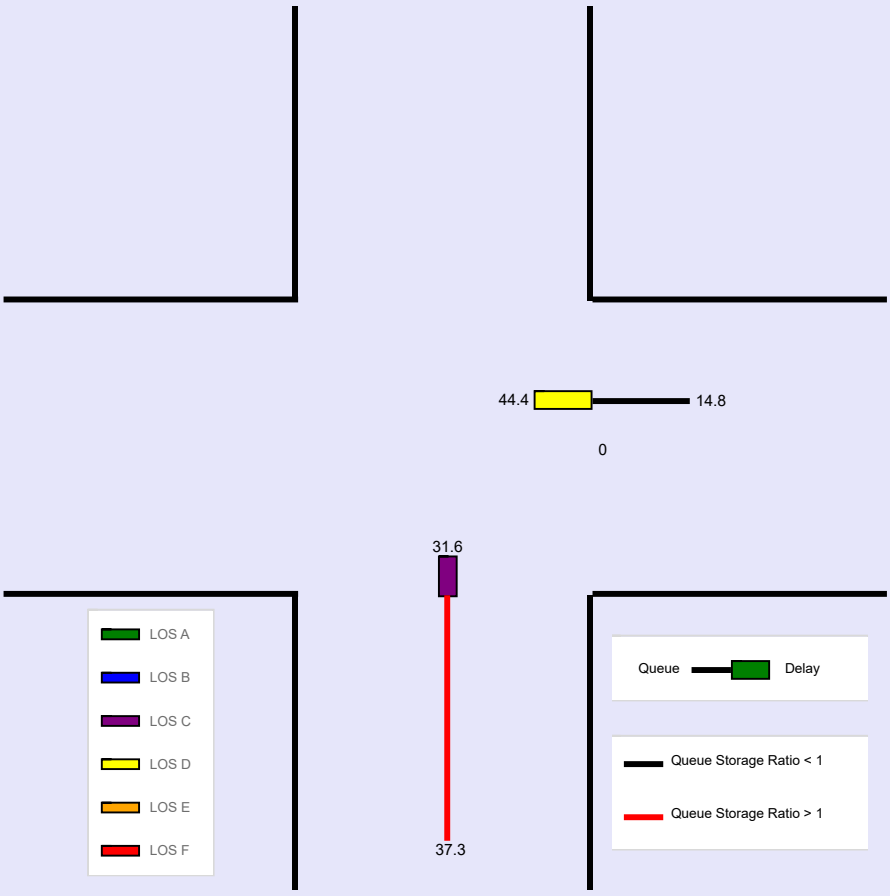
Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h					0	640		2060				

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	76.3	31.7	0.0	0.0	0.0	0.0	
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
Red	2.0	2.0	0.0	0.0	0.0	0.0	



Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Back of Queue (*Q*), ft/ln (95 th percentile)					0	371.8		948.2				
Back of Queue (*Q*), veh/ln (95 th percentile)					0.0	14.8		37.3				
Queue Storage Ratio (*RQ*) (95 th percentile)					0.00	0.69		2.71				
Control Delay (*d*), s/veh					0.0	44.4		31.6				
Level of Service (LOS)						D		C				
Approach Delay, s/veh / LOS	0.0			44.4		D	31.6		C	0.0		
Intersection Delay, s/veh / LOS	34.6						C					



--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

HCS7 Two-Way Stop-Control Report

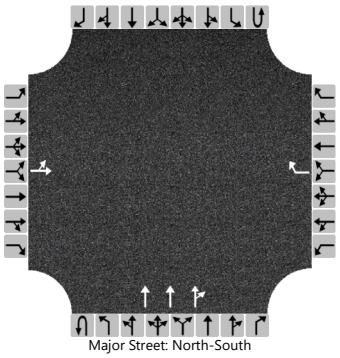
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/19/2022
Analysis Year	2045
Time Analyzed	Build AM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and Warren St - 2045 Build

Site Information

Intersection	N 4th St & Warren St
Jurisdiction	
East/West Street	Warren St
North/South Street	N 4th St
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	0	3	0	0	0	0	0
Configuration		LT						R			T	TR				
Volume (veh/h)		50	10					40			1010	30				
Percent Heavy Vehicles (%)		0	0					6								
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized					No											
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		6.4	6.5					7.1								
Critical Headway (sec)		6.40	6.50					7.22								
Base Follow-Up Headway (sec)		3.8	4.0					3.9								
Follow-Up Headway (sec)		3.80	4.00					3.96								

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		65						43								
Capacity, c (veh/h)		394						393								
v/c Ratio		0.17						0.11								
95% Queue Length, Q_{95} (veh)		0.6						0.4								
Control Delay (s/veh)		15.9						15.3								
Level of Service (LOS)		C						C								
Approach Delay (s/veh)	15.9				15.3											
Approach LOS	C				C											

HCS7 Two-Way Stop-Control Report

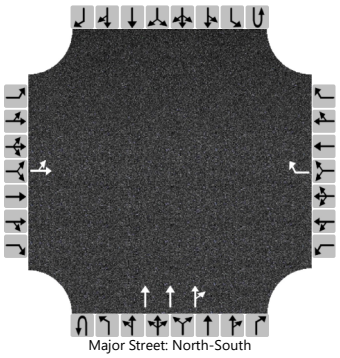
General Information

Analyst	Kyle Bright
Agency/Co.	Burgess & Niple
Date Performed	10/19/2022
Analysis Year	2045
Time Analyzed	Build PM Peak Hour
Intersection Orientation	North-South
Project Description	N 4th St and Warren St - 2045 Build

Site Information

Intersection	N 4th St and Warren St
Jurisdiction	
East/West Street	Warren St
North/South Street	N 4th St
Peak Hour Factor	0.91
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	0	3	0	0	0	0	0
Configuration		LT						R			T	TR				
Volume (veh/h)		50	10					190			1390	180				
Percent Heavy Vehicles (%)		0	0					0								
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized					No											
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		6.4	6.5					7.1								
Critical Headway (sec)		6.40	6.50					7.10								
Base Follow-Up Headway (sec)		3.8	4.0					3.9								
Follow-Up Headway (sec)		3.80	4.00					3.90								

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		66						209								
Capacity, c (veh/h)		85						259								
v/c Ratio		0.77						0.81								
95% Queue Length, Q_{95} (veh)		3.9						6.2								
Control Delay (s/veh)		127.9						58.5								
Level of Service (LOS)		F						F								
Approach Delay (s/veh)	127.9				58.5											
Approach LOS	F				F											