



Develop Annual Arterial Congestion Report

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Research Project
Final Report 2015-32



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Final Report

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Disclaimer

Dr. Henry Liu and the University of Minnesota have equity and royalty interests in SMART Signal Technologies, Inc., a Minnesota-based private company that could commercially benefit from the results of this research. These relationships have been reviewed and managed by the University of Minnesota in accordance with its Conflict of Interests policies.

Table of Contents

1. Introduction	1
2. Data Collection	2
3. Methodology.....	3
4. Congestion Map.....	6
4.1 TH 13 Congestion Map	7
4.2 TH 55 Congestion Maps	11
4.3 TH 7 Congestion Maps	15
4.4 TH 10 Congestion Maps	19
5. Congestion summary	23
References.....	26

List of Tables

Table 1 Data collection sites and time period.....	2
Table 2 Level of Service & Average Delay.....	3
Table 3 AM Plus PM Approaches of Directional Congestion.....	23
Table 4 Number of congested approaches and duration during AM peak	24
Table 5 Number of congested approaches and duration during PM peak	25

List of Figures

Figure 1 SMART Signal iMeasure homepage.....	4
Figure 2 SMART Signal iMeasure – Performance comparison interface	4
Figure 3 Retrieved average delay data sample	5
Figure 4 Retrieved median values of average delay	5
Figure 5 Color scale for average delay	6
Figure 6 Congestion map for the eastbound of TH13.....	7
Figure 7 Congestion map for the westbound of TH13	8
Figure 8 Congestion map for the minor approaches of TH13	9
Figure 9 Congestion map for all the approaches of TH13.....	10
Figure 10 Congestion map for the eastbound of TH55.....	11
Figure 11 Congestion map for the westbound of TH55	12
Figure 12 Congestion map for the minor approaches of TH55	13
Figure 13 Congestion map for all the approaches of TH55.....	14
Figure 14 Congestion map for the eastbound of TH7.....	15
Figure 15 Congestion map for the westbound of TH7	16
Figure 16 Congestion map for the minor approaches of TH7	17
Figure 17 Congestion map for all the approaches of TH7.....	18
Figure 18 Congestion map for the eastbound of TH10.....	19
Figure 19 Congestion map for the westbound of TH10	20
Figure 20 Congestion map for the minor approaches of TH10	21
Figure 21 Congestion map for all the approaches of TH10.....	22
Figure 22 Number of congested approaches and duration during AM peak	24
Figure 23 Number of congested approaches and duration during PM peak.....	25

Executive Summary

Starting from 1993, MnDOT annually prepares a Metro Freeway System Congestion Report to document congested segments of the freeway system. However, although signalized arterial roads carry a large percentage of traffic in the Twin Cities metropolitan area, a similar congestion report has not been developed for these roads, mainly due to lack of ability of automatic traffic signal data collection and performance measurement.

In this project, based on the archived high-resolution traffic data from four major arterials equipped with the SMART-Signal system in the metro area, i.e., Trunk Highway 13, Trunk Highway 55, Trunk Highway 7, and Trunk Highway 10, we developed an innovative approach to generate an arterial traffic congestion report for the MnDOT Metro District. To be consistent with the Freeway Congestion Report, median values (i.e., 50th percentile) of average delay for each main approach were calculated for each fifteen minute interval for the periods of 5 AM to 10 AM and 2 PM to 7 PM for the midweek days (i.e. Tuesday, Wednesday, and Thursday) of the selected time period to construct the congestion maps. Results show that the main approaches of the four signalized corridors operate very efficiently during AM and PM peaks, but larger delays happen at side streets in general.

Develop Annual Arterial Congestion Report

1. Introduction

The MnDOT Metro District Arterial Congestion Report is generated based on the archived high-resolution traffic data from 4 major arterials which have been equipped with the SMART-Signal system (Liu et al., 2009, Liu & Ma, 2009, Hu & Liu, 2013, and Hu et al., 2013) in the metro area, i.e. **Trunk Highway 13, Trunk Highway 55, Trunk Highway 7 and Trunk Highway 10**. Raw data was first collected for the selected time period for each of the corridor, and then processed into different performance measures, such as average delay, based on which the congestion maps and reports are generated accordingly.

2. Data Collection

High-resolution traffic data are collected by the SMART-Signal system on 4 major arterials in the Twin Cities' metro area. There are 12 intersections on TH 13, 10 intersections on TH 55, 19 intersections on TH 7 and 5 intersections on TH 10. The list of intersections and the time of data collection for each corridor are shown in Table 1. Note that, the selected time period for analysis is based on the data availability of each corridor.

Table 1: Data collection sites and time period

Corridor	Intersection List	Selected Time Period
TH 13	12 Intersections: Lynn Ave, Washburn Ave, Nicollet Ave, Portland Ave, Parkwood Ave, West River Hills Dr, Cliff Rd, River Hills Dr, Diffley Rd, Silver Bell Rd, Blackhawk Rd, Yankee Doodle Rd	10/2013
TH 55	10 Intersections: Revere Ln, Boone Ave, Winnetka Ave, Rhode Island Ave, Glenwood Ave, Douglas Dr, Highway 100, Schaper Rd, Meadow Ln, Theodore Wirth Pkwy	09/2013
TH 7	19 Intersections: Hazeltine Blvd, Oak St, Christmas Lake Rd, Old Market Rd, Vinehill Rd, CR101, Tonkawood Rd, Williston Rd, Shady Oak Rd, 17 th Ave, 12 th Ave, 5 th Ave, 169 W Ramp, 169 E Ramp, Blake Rd, Texas Ave, Louisiana Ave, 100 W Ramp, 100 E Ramp	08/2013
TH 10	5 Intersections: Armstrong Blvd, Ramsey Blvd, Sunfish Lake Blvd, Thurston Ave, Fair oak Ave	09/2013

3. Methodology

Based on the archived raw data, various performance measures can be generated to show the arterial system performance from different angles. These performance measures include but not limited to the following: maximum queue length, total delay, average delay, total volume, green time duration, saturation level, percentage of vehicle arrival during green time, travel time, speed and etc. All of these measures are calculated on a cycle basis, and then aggregated into the desired interval.

In this arterial congestion report, Level of Service is chosen as the indicator to represent the congestion level of signalized arterials. One signalized approach is considered as “congested” if it operates **at Level of Service “D”** or worse (i.e. average delay > 35 seconds/Vehicle, see Table 2) during the AM and PM peak periods. To be consistent with the Freeway Congestion Report, **median values (i.e. 50th percentile) of average delay** for each main approach are calculated for each 15 minute interval for the periods of **5:00 AM to 10:00 AM and 2:00 PM to 7:00 PM** for the midweek days (i.e. **Tuesday, Wednesday and Thursday**) of the selected time period. The location and duration of congested approaches are recorded.

Table 2: Level of Service & Average Delay

Level of Service	Average Delay (Sec./Veh.)
A	< 10
B	10 – 20
C	20 – 35
D	35 – 55
E	50 – 80
F	>80

The average delay of each intersection during the selected time periods can be directly retrieved from the SMART-Signal iMeasure interface through MnDOT webportal. The procedures are described below.

- (1) Access the SMART-Signal iMeasure interface in your browser (“Chrome” and “Firefox” are recommended).
URL: http://dotapp7.dot.state.mn.us/smartsignal/Default_iMeasure.aspx
- (2) On the left-hand side menu, go to “**Performance Comparison**” -> “**Intersection Performance Comparison**”, and choose the interested corridor (See Figure 1).
- (3) In the “**Performance Comparison**” window (see Figure 2), choose the interested intersection under “**Intersection**”, and choose the approach(es) under “**Approach**”.

Under “Performance Measures”, choose “Average Delay”. Specify the “Start Date” and “End Date” of the analysis period according to Table 1, and check “Tue, Wed, Thu” under “Day of Week”. Set “Period 2” the same as “Period 1”. The “Start Time” is “05:00:00” and “End Time” is “19:00:00”; The “Interval” is set to “15 Minutes”. Click “Save Data”, and the retrieved data will be downloaded into a “.csv” file. Note that, MnDOT Webportal will change the extension name of the downloaded files, users have to change the extension name back to “.csv”.

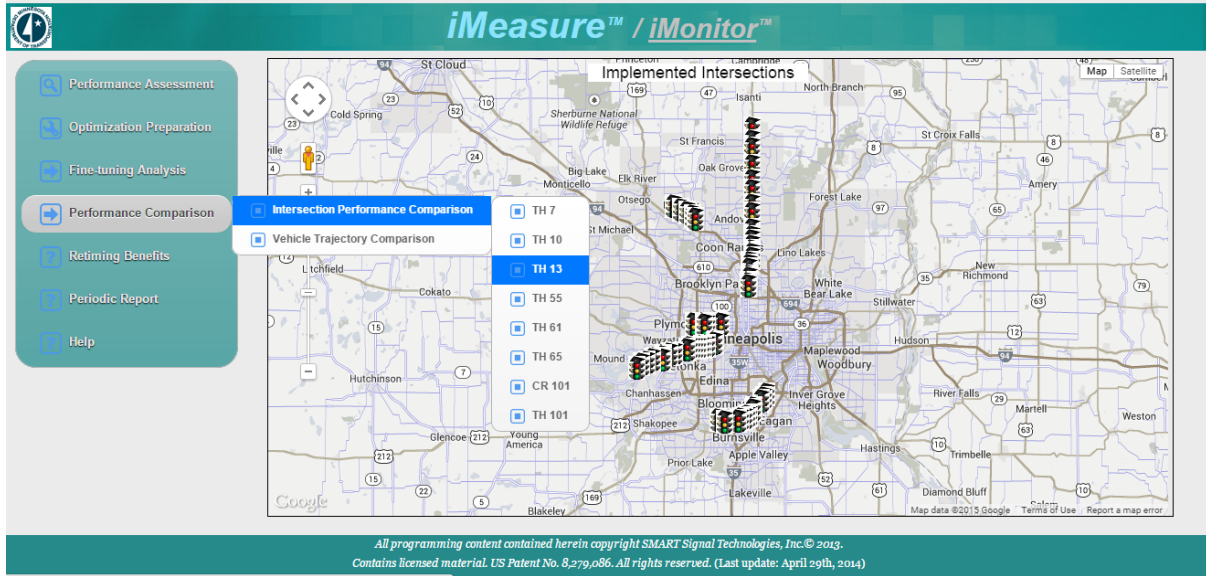


Figure 1: SMART Signal iMeasure homepage

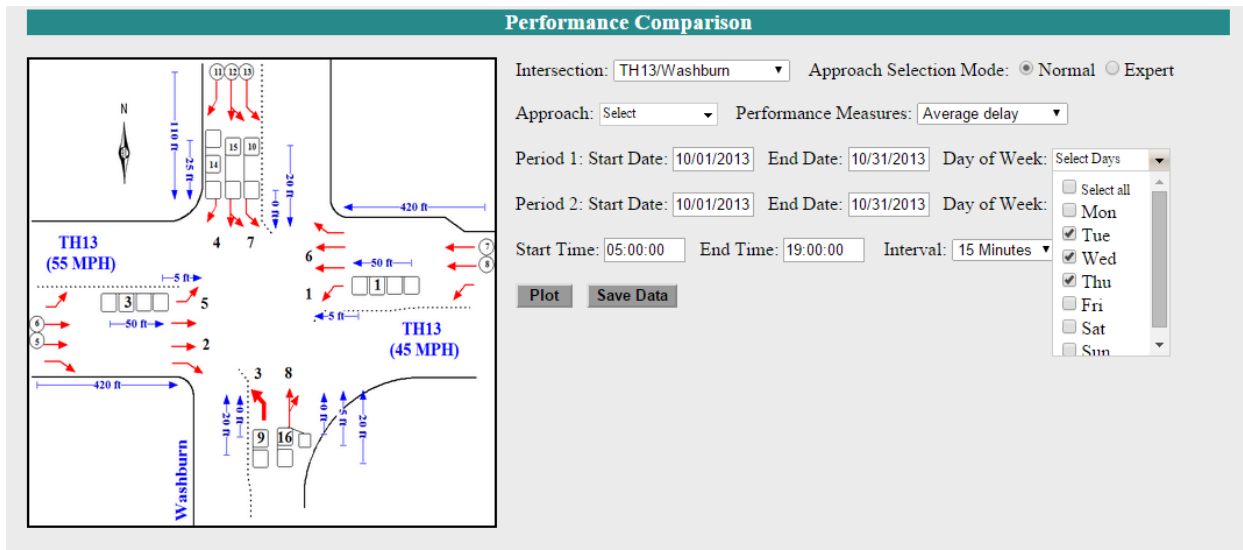


Figure 2: SMART Signal iMeasure – Performance comparison interface

(4) Open the “.csv” file in Excel. As shown in Figure 3, the first column is time stamp and the following columns are average delays for each of the selected days. The median values (i.e. 50th percentile) across all days are provided at the last several columns (see the highlighted section in Figure 4), and will be used to construct the congestion maps in the next section.

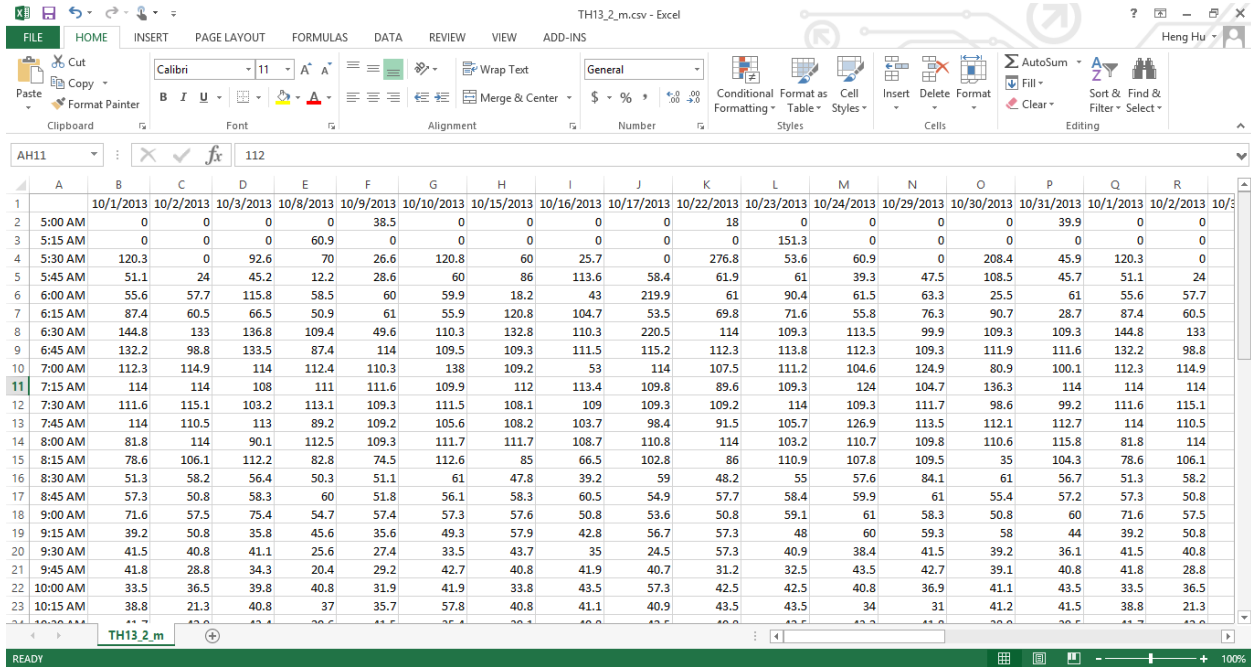


Figure 3: Retrieved average delay data sample

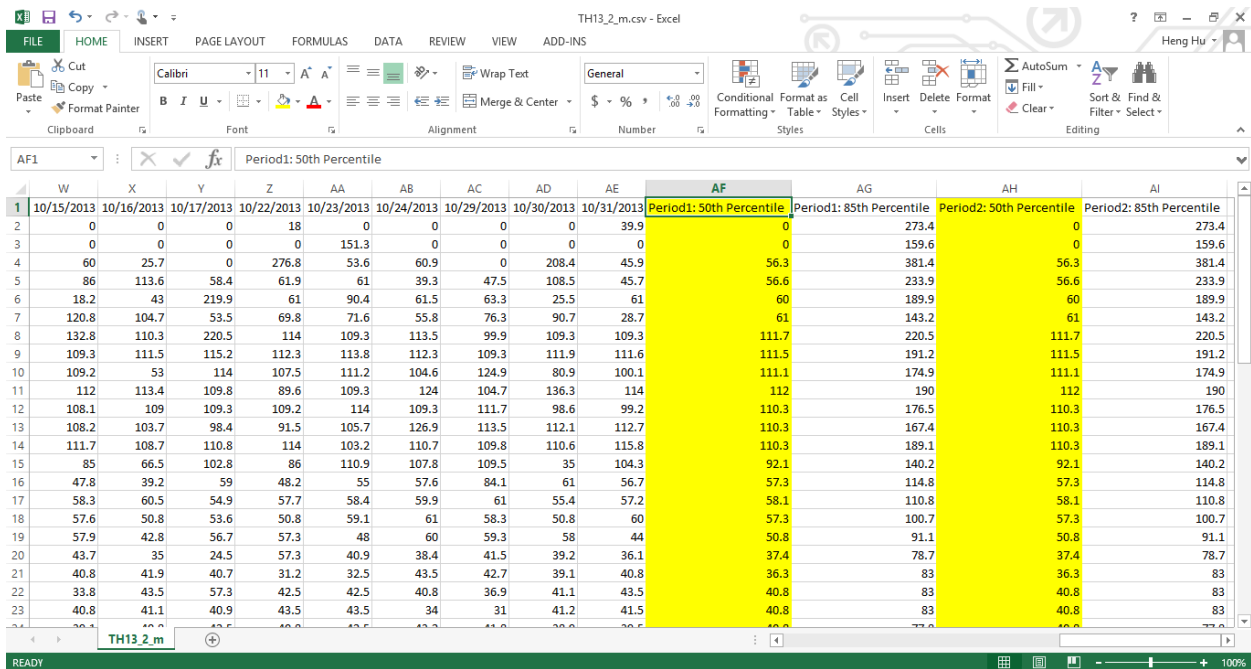


Figure 4: Retrieved median values of average delay

4. Congestion Map

To better understand how congestion evolves, a congestion map (i.e. a time-space table) can be generated based on the median values of average delay retrieved in the previous section. The color of each cell is determined based on the average delay values (see the color scale in Figure 5), which is consistent with the Level of Service definition for signalized intersections. Engineers can easily identify the most and least congested time and location on a specific corridor during the day. The detailed congestion maps for each of the corridor are listed below.

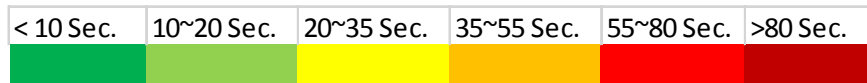


Figure 5: Color scale for average delay

4.1 TH 13 Congestion Map

(1) Mainline - Eastbound

	Lynn	Washburn	Nicollet	Portland	Parkwood	W River	Cliff	River Hill	Diffley	Silver Bel	Blackhaw	Yankee Dr
5:00 AM	1.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	3.7	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	7.3	2.5	3.8	0.0	0.0	0.0	6.0	0.0	0.7	4.0	0.0	0.0
5:45 AM	8.1	8.1	7.1	0.0	2.7	0.0	2.7	4.5	0.0	5.5	0.8	0.0
6:00 AM	9.3	6.4	8.6	0.0	1.9	0.0	2.6	6.8	1.2	5.8	0.0	0.0
6:15 AM	13.7	12.2	10.6	0.0	1.8	1.7	3.6	7.5	0.9	8.3	0.0	5.9
6:30 AM	15.9	19.1	17.7	0.9	1.3	15.2	2.8	1.6	5.6	16.0	1.3	2.6
6:45 AM	16.4	25.1	30.2	1.6	1.8	14.5	3.5	0.7	4.3	17.4	0.6	3.7
7:00 AM	17.6	22.6	33.3	4.4	1.4	12.3	5.4	1.8	4.5	15.1	0.7	5.6
7:15 AM	19.9	20.6	34.6	4.8	2.6	10.4	6.7	5.8	5.2	10.9	0.9	4.5
7:30 AM	24.4	18.8	34.8	1.9	3.4	16.3	7.8	5.6	4.5	13.8	1.2	8.8
7:45 AM	22.6	23.7	32.6	1.1	2.6	17.8	5.5	2.9	3.8	14.3	1.1	10.4
8:00 AM	17.9	24.3	33.6	1.2	2.3	17.6	5.2	3.4	4.1	14.1	0.9	4.6
8:15 AM	15.5	25.2	30.6	1.0	2.0	18.4	4.6	5.6	4.9	12.0	1.6	2.9
8:30 AM	19.7	18.8	19.3	1.6	2.9	6.2	4.9	3.3	4.4	16.4	2.3	13.0
8:45 AM	21.0	22.9	17.0	1.7	3.0	5.9	3.8	2.3	4.2	18.7	3.3	11.4
9:00 AM	16.7	24.6	15.5	1.3	2.2	6.7	4.3	2.1	4.9	15.9	2.8	8.1
9:15 AM	10.8	20.9	13.9	1.8	2.7	7.1	2.9	2.3	5.3	16.8	0.8	5.5
9:30 AM	6.9	19.5	14.2	3.3	2.9	4.6	5.6	9.3	1.5	11.1	1.9	9.0
9:45 AM	8.7	18.0	15.6	1.9	1.4	4.3	5.6	8.2	1.3	10.3	1.1	7.7
10:00 AM	5.4	18.2	14.6	2.2	2.6	3.5	5.6	5.6	0.0	10.0	2.0	0.0
10:15 AM	7.5	16.0	13.8	2.6	2.7	3.3	5.5	8.2	0.0	7.0	0.8	6.9
10:30 AM	5.9	15.3	15.1	1.7	3.4	4.3	5.6	6.6	1.3	9.3	0.0	5.2
10:45 AM	6.0	17.4	14.7	2.2	3.8	3.9	5.1	6.7	0.0	10.3	0.8	8.1
11:00 AM	9.6	18.1	20.3	3.3	5.5	9.9	11.2	3.5	1.8	14.1	1.9	8.7
11:15 AM	12.4	15.1	21.7	4.6	4.3	10.5	9.9	8.2	0.0	11.8	1.3	8.4
11:30 AM	11.2	20.0	21.7	3.4	5.3	9.4	11.9	9.6	0.0	14.6	2.3	8.6
11:45 AM	9.3	20.3	20.7	3.4	5.1	8.8	10.8	7.5	0.0	14.8	1.6	9.0
12:00 PM	10.8	23.8	20.5	3.4	6.9	11.3	11.2	6.2	1.7	14.8	4.2	9.4
12:15 PM	9.3	23.0	21.5	3.3	6.1	10.6	11.7	7.5	0.0	16.8	2.1	11.8
12:30 PM	10.6	18.1	21.0	2.9	7.0	11.7	11.2	8.6	0.0	14.8	3.0	11.2
12:45 PM	11.5	24.4	22.9	3.6	6.5	9.9	10.9	7.9	1.5	14.8	2.3	10.6
1:00 PM	7.9	16.6	21.0	2.5	7.5	10.9	10.7	6.4	0.0	15.8	1.9	11.3
1:15 PM	9.0	15.8	22.1	2.6	6.3	9.4	12.0	6.4	2.6	14.8	0.0	8.5
1:30 PM	31.0	28.3	23.2	4.3	2.6	8.1	5.7	2.9	5.3	16.9	2.0	8.8
1:45 PM	32.5	25.6	22.8	2.9	3.0	7.0	5.8	3.6	5.3	17.7	1.9	9.4
2:00 PM	32.5	17.9	23.7	7.1	3.1	8.5	8.0	4.2	5.3	17.5	1.8	7.9
2:15 PM	31.2	27.3	26.8	19.1	3.5	9.3	7.7	4.9	7.3	18.2	3.0	9.6
2:30 PM	31.7	29.7	29.0	5.2	2.5	7.2	8.3	6.0	7.1	18.8	2.2	11.3
2:45 PM	30.5	31.5	27.4	5.2	1.7	7.9	6.3	4.1	5.8	18.1	1.7	11.0
3:00 PM	14.8	23.9	20.9	8.1	3.5	21.2	8.4	5.3	5.5	19.3	3.1	13.9
3:15 PM	17.0	26.5	17.7	13.1	3.4	25.0	6.0	4.6	4.8	19.8	3.0	9.3
3:30 PM	14.7	26.6	29.3	11.2	2.8	25.5	6.6	4.7	2.9	17.7	4.5	12.3
3:45 PM	17.1	27.7	25.4	10.2	3.4	27.9	5.0	5.2	2.1	22.0	4.8	12.3
4:00 PM	17.4	22.7	25.9	13.2	3.6	23.8	6.7	9.4	3.2	21.6	4.3	10.4
4:15 PM	19.8	27.1	31.7	9.8	3.5	25.5	7.0	5.3	4.4	22.2	3.5	14.4
4:30 PM	20.2	28.1	24.0	9.3	4.2	25.4	6.1	6.0	4.4	17.8	4.4	18.3
4:45 PM	23.7	27.8	35.1	10.9	3.4	28.0	7.0	6.8	3.8	23.4	4.4	14.7
5:00 PM	20.4	28.7	29.7	11.8	5.5	26.6	8.6	7.8	3.5	19.6	5.6	15.9
5:15 PM	22.0	28.6	29.2	10.8	3.9	24.4	10.4	5.8	3.8	21.3	4.1	16.4
5:30 PM	18.0	25.3	31.3	9.3	2.8	23.1	7.6	5.2	2.9	22.0	7.3	13.4
5:45 PM	17.1	24.0	28.2	7.7	2.6	29.8	6.8	3.9	3.3	21.5	3.7	10.5
6:00 PM	12.2	23.3	24.0	12.3	3.3	26.6	6.6	5.4	3.3	16.5	4.3	7.2
6:15 PM	13.5	23.4	25.3	12.4	2.6	23.4	5.6	3.9	3.0	17.9	4.6	7.5
6:30 PM	11.8	14.5	21.3	3.3	5.6	10.4	15.4	5.6	1.8	16.4	3.2	7.6
6:45 PM	6.3	9.0	20.3	4.0	4.7	9.4	11.5	8.2	0.0	13.4	2.8	6.0

Figure 6: Congestion map for the eastbound of TH13

(2) Mainline - Westbound

	Lynn	Washburn	Nicollet	Portland	Parkwood	W River	Cliff	River Hill	Diffley	Silver Bel	Blackhaw	Yankee D
5:00 AM	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	2.4	2.1	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	5.4	6.7	8.5	1.0	2.7	0.0	4.1	0.0	0.0	0.0	0.0	0.0
5:45 AM	4.3	7.9	8.3	1.5	5.4	0.0	8.3	0.0	0.0	3.5	0.0	9.6
6:00 AM	3.5	11.9	10.4	1.6	4.7	0.0	9.9	0.0	0.0	4.9	0.0	12.6
6:15 AM	2.9	16.6	6.9	1.6	6.4	1.4	12.4	1.7	2.4	6.8	0.0	15.9
6:30 AM	19.0	13.2	13.6	3.3	10.9	2.2	6.1	1.9	6.6	8.1	1.5	24.2
6:45 AM	20.2	9.0	15.9	5.7	14.7	2.2	8.2	3.0	8.2	7.1	1.1	24.2
7:00 AM	27.1	11.5	8.7	10.1	19.7	2.1	6.2	5.9	9.4	7.9	0.0	27.2
7:15 AM	24.8	12.0	15.9	11.9	23.3	5.2	5.7	11.9	6.1	16.2	0.0	50.3
7:30 AM	24.2	10.8	16.5	5.4	21.0	4.4	7.0	10.4	6.2	13.8	0.0	54.2
7:45 AM	26.3	13.8	18.6	5.2	22.6	9.6	7.0	7.9	5.4	15.4	0.0	57.5
8:00 AM	23.8	15.1	11.4	4.3	17.0	6.4	8.1	7.9	6.9	13.9	0.0	54.3
8:15 AM	30.3	18.3	12.5	4.0	17.7	7.1	8.9	12.0	6.8	12.6	0.0	48.9
8:30 AM	5.4	24.9	5.5	1.2	11.1	2.5	8.4	2.6	11.0	12.0	3.8	27.4
8:45 AM	4.9	24.0	6.1	1.1	8.8	2.9	11.3	2.1	8.8	9.9	1.7	25.7
9:00 AM	3.6	25.3	6.8	1.5	6.6	1.9	9.9	0.0	8.5	7.6	2.6	24.3
9:15 AM	5.0	30.0	5.7	1.1	6.8	1.9	11.3	1.9	8.8	9.4	1.7	22.8
9:30 AM	4.4	21.8	4.9	2.6	5.4	3.6	14.1	3.5	4.5	9.2	3.1	19.1
9:45 AM	4.7	18.5	5.7	2.5	4.7	2.8	15.7	3.3	5.8	9.9	1.4	18.9
10:00 AM	4.5	20.7	3.7	2.8	6.1	2.0	15.9	2.7	4.5	8.0	1.9	16.8
10:15 AM	3.5	19.8	4.4	2.1	6.3	0.0	13.2	1.6	3.8	8.3	1.6	20.2
10:30 AM	3.2	23.8	4.9	2.3	7.8	3.4	13.6	2.5	4.2	8.4	1.9	17.5
10:45 AM	4.6	19.2	4.5	2.0	8.3	4.2	14.8	2.8	4.3	9.3	2.0	17.2
11:00 AM	4.9	18.2	11.0	6.9	8.9	2.5	15.2	3.0	5.7	10.8	1.6	24.8
11:15 AM	5.7	25.9	12.0	11.4	6.9	1.9	17.4	2.3	5.6	9.5	2.2	24.8
11:30 AM	5.6	24.9	12.9	7.0	7.8	2.5	17.1	2.9	6.8	9.5	1.4	26.7
11:45 AM	4.0	30.2	9.1	5.7	7.8	3.6	18.7	2.9	5.7	10.5	1.4	28.0
12:00 PM	6.1	27.1	14.0	5.8	7.5	1.9	19.1	2.9	7.0	12.1	3.0	26.0
12:15 PM	6.3	26.5	14.0	7.0	7.4	3.5	19.2	2.3	5.4	11.1	1.3	28.0
12:30 PM	6.3	26.3	12.1	6.5	9.4	2.4	16.7	3.6	6.5	10.9	1.3	27.3
12:45 PM	5.7	24.7	12.6	6.0	7.0	3.7	16.7	3.3	7.2	9.5	1.2	28.3
1:00 PM	5.5	25.0	11.1	6.0	8.2	3.3	17.1	3.2	7.7	10.3	1.4	27.6
1:15 PM	4.6	29.6	10.8	7.3	7.8	1.8	17.1	2.8	7.4	8.9	0.0	24.6
1:30 PM	7.4	17.8	5.5	1.5	10.9	0.0	14.8	2.3	9.8	9.0	0.0	24.8
1:45 PM	7.5	14.8	4.7	1.7	15.3	2.2	12.6	1.7	10.8	9.1	1.5	23.5
2:00 PM	7.0	12.5	6.3	3.4	12.9	2.0	14.2	2.1	11.5	9.3	2.8	24.8
2:15 PM	6.8	18.0	8.8	5.1	16.5	1.9	13.7	4.2	13.5	10.2	2.1	23.5
2:30 PM	10.2	19.5	6.2	1.3	15.0	2.7	12.1	3.7	14.3	9.6	3.0	22.2
2:45 PM	11.3	13.6	6.4	1.1	14.2	3.8	12.7	5.8	12.8	11.7	1.8	22.4
3:00 PM	12.4	19.8	10.1	1.7	8.4	14.1	22.4	5.3	11.6	13.8	1.7	23.5
3:15 PM	13.3	15.6	9.2	1.1	7.9	12.4	21.4	4.8	18.5	15.3	1.0	21.9
3:30 PM	3.6	17.0	12.4	1.8	8.1	11.5	22.0	4.5	15.9	14.1	2.8	29.6
3:45 PM	12.8	18.2	10.0	1.8	5.8	11.6	20.0	4.6	16.1	13.9	1.8	28.5
4:00 PM	12.1	18.6	13.6	2.7	7.6	11.4	21.4	4.8	19.3	15.2	2.6	29.8
4:15 PM	8.7	24.3	11.5	1.9	8.3	22.5	21.2	4.6	19.7	17.2	2.0	28.9
4:30 PM	11.8	26.3	14.3	2.7	5.8	12.7	22.6	5.0	21.1	19.0	3.6	34.4
4:45 PM	11.6	26.0	12.3	1.8	7.2	11.5	23.7	4.1	22.9	14.3	3.2	34.4
5:00 PM	11.2	24.0	13.1	3.3	6.7	10.3	22.6	6.2	21.0	17.3	4.5	31.7
5:15 PM	11.1	27.6	14.3	1.8	6.2	11.4	28.8	3.9	22.2	14.5	2.2	31.2
5:30 PM	11.3	23.4	10.8	2.0	7.0	12.1	21.8	4.6	18.2	12.5	1.4	29.7
5:45 PM	9.5	20.8	11.6	1.8	6.4	18.2	18.1	4.6	18.7	13.1	1.4	25.6
6:00 PM	3.8	16.1	12.5	1.4	9.9	11.8	18.9	3.4	14.8	11.8	1.5	21.6
6:15 PM	4.5	10.4	7.5	2.2	6.8	15.4	18.3	3.6	12.8	15.3	1.0	20.6
6:30 PM	8.1	21.5	13.8	7.6	10.0	6.0	15.8	3.9	7.8	10.4	2.7	16.7
6:45 PM	3.1	18.9	14.4	7.6	8.1	4.1	14.2	2.6	8.0	9.4	1.8	14.1

Figure 7: Congestion map for the westbound of TH13

(3) Minor Approaches

	Lynn	Washburn	Nicollet	Portland	Parkwood	W River	Cliff	River Hill	Diffley	Silver Bel	Blackhaw	Yankee D
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	3.4	56.3	17.5	0.0	0.0	16.5	8.5	0.0	0.0	0.0	0.0	0.0
5:45 AM	6.7	56.6	34.6	0.0	0.0	41.8	25.5	0.0	0.0	0.0	0.0	0.0
6:00 AM	6.7	60.0	32.0	0.0	26.9	40.4	27.8	0.0	0.0	0.0	0.0	0.0
6:15 AM	4.8	61.0	32.0	0.0	38.8	41.0	31.1	0.0	0.0	0.0	0.0	0.0
6:30 AM	0.0	111.7	48.9	42.8	58.3	68.7	67.3	0.0	30.1	0.0	0.0	0.0
6:45 AM	0.0	111.5	52.7	48.7	61.0	62.0	64.6	10.9	35.8	0.0	0.0	0.0
7:00 AM	7.5	111.1	55.5	46.9	50.6	62.2	67.8	3.9	24.1	15.0	0.0	21.3
7:15 AM	7.1	112.0	54.4	46.3	53.0	61.9	62.3	21.2	37.1	25.3	0.0	37.5
7:30 AM	10.8	110.3	56.8	53.9	57.6	58.0	65.3	19.3	29.3	13.8	0.0	38.5
7:45 AM	11.7	110.3	56.2	50.9	56.8	58.8	67.8	22.7	35.3	25.5	32.3	33.9
8:00 AM	11.8	110.3	54.6	59.3	57.8	60.5	67.8	21.0	29.2	29.8	0.0	36.9
8:15 AM	13.7	92.1	56.8	52.4	56.1	57.1	62.6	20.6	10.3	0.0	0.0	26.9
8:30 AM	6.8	57.3	52.0	39.2	48.5	55.4	51.8	12.6	22.8	0.0	0.0	0.0
8:45 AM	6.8	58.1	52.8	44.4	53.3	54.6	53.5	10.1	0.0	0.0	0.0	0.0
9:00 AM	6.7	57.3	51.7	29.0	48.5	56.8	50.1	0.0	0.0	0.0	0.0	0.0
9:15 AM	0.0	50.8	51.2	41.6	55.3	50.5	46.0	0.0	0.0	0.0	0.0	0.0
9:30 AM	8.4	37.4	35.4	0.0	33.6	36.3	33.8	0.0	0.0	0.0	0.0	0.0
9:45 AM	6.3	36.3	35.8	0.0	30.9	37.4	32.7	0.0	0.0	0.0	0.0	0.0
10:00 AM	8.2	40.8	39.7	0.0	38.8	38.0	34.2	0.0	0.0	0.0	0.0	0.0
10:15 AM	10.3	40.8	39.3	0.0	33.2	39.6	32.6	0.0	0.0	0.0	0.0	0.0
10:30 AM	5.7	40.8	39.3	0.0	32.7	36.0	34.3	0.0	0.0	0.0	0.0	0.0
10:45 AM	5.3	40.8	39.3	0.0	37.5	35.7	32.1	0.0	0.0	0.0	0.0	0.0
11:00 AM	0.0	43.3	41.1	22.4	37.3	37.5	29.6	0.0	0.0	0.0	0.0	0.0
11:15 AM	4.0	49.4	41.0	28.5	33.0	40.9	26.4	0.0	0.0	0.0	0.0	0.0
11:30 AM	6.4	44.2	41.8	28.5	41.3	38.3	26.1	0.0	0.0	0.0	0.0	0.0
11:45 AM	7.5	46.4	41.8	21.4	34.7	40.8	31.3	0.0	0.0	0.0	0.0	30.2
12:00 PM	8.4	47.9	41.8	22.5	33.5	41.1	31.3	0.0	0.0	0.0	0.0	29.6
12:15 PM	3.9	48.0	41.8	25.7	34.7	40.9	32.5	0.0	0.0	0.0	0.0	33.6
12:30 PM	5.9	48.7	41.8	22.3	34.7	40.5	31.9	0.0	0.0	0.0	0.0	28.4
12:45 PM	4.0	44.7	41.8	0.0	34.7	38.2	31.3	0.0	0.0	0.0	0.0	30.5
1:00 PM	6.5	44.3	41.8	0.0	34.7	38.0	25.6	0.0	0.0	0.0	0.0	18.7
1:15 PM	8.4	49.8	41.8	0.0	34.7	37.5	28.8	0.0	0.0	0.0	0.0	0.0
1:30 PM	10.6	66.2	55.4	45.8	43.3	54.2	46.2	0.0	29.8	0.0	0.0	0.0
1:45 PM	15.7	65.2	55.8	26.0	48.5	54.3	46.2	0.0	21.3	0.0	0.0	0.0
2:00 PM	11.2	65.2	55.8	32.2	43.4	55.4	47.1	0.0	0.0	0.0	0.0	18.2
2:15 PM	11.8	61.9	55.8	34.3	43.1	54.8	48.2	0.0	27.0	0.0	0.0	0.0
2:30 PM	7.9	59.2	55.8	42.8	44.6	54.7	50.1	0.0	0.0	0.0	0.0	0.0
2:45 PM	6.6	57.6	55.8	42.9	46.9	55.8	46.1	0.0	12.3	0.0	0.0	0.0
3:00 PM	17.4	64.2	65.7	59.4	55.4	67.0	55.3	21.5	46.4	0.0	14.5	31.0
3:15 PM	17.7	70.8	68.8	63.2	57.9	70.4	57.9	26.8	0.0	34.2	3.6	24.2
3:30 PM	9.6	70.2	69.6	64.1	57.1	69.8	57.6	18.9	17.4	35.0	22.2	43.8
3:45 PM	18.3	70.8	67.3	59.9	60.4	70.0	58.0	18.2	39.2	42.5	18.5	35.7
4:00 PM	12.7	62.8	69.5	65.3	54.9	73.3	62.7	0.0	17.0	41.4	32.5	42.3
4:15 PM	9.5	65.1	71.9	64.5	55.0	70.9	56.7	33.3	35.8	34.7	0.0	43.6
4:30 PM	16.4	65.2	68.8	62.4	55.8	71.7	62.4	14.2	43.1	40.9	22.7	46.0
4:45 PM	15.4	60.2	68.7	65.3	57.0	69.7	59.1	0.0	43.3	34.0	0.0	38.3
5:00 PM	15.7	61.3	72.3	58.4	53.8	73.3	62.3	0.0	46.6	42.9	8.7	42.9
5:15 PM	10.3	65.1	71.4	58.7	57.1	73.3	58.7	22.3	26.8	37.0	0.0	33.6
5:30 PM	13.8	67.3	67.3	54.6	58.3	69.9	56.9	0.0	38.2	32.3	0.0	38.6
5:45 PM	14.3	70.2	69.9	56.8	58.9	69.8	56.5	15.4	38.9	34.1	0.0	0.0
6:00 PM	12.8	70.2	70.3	64.3	62.8	72.6	59.3	0.0	28.8	38.3	0.0	0.0
6:15 PM	8.0	70.8	69.9	47.2	54.9	69.8	59.4	0.0	29.1	0.0	0.0	0.0
6:30 PM	0.0	44.5	41.8	0.0	41.3	38.2	34.4	0.0	0.0	0.0	0.0	0.0
6:45 PM	0.0	47.7	42.2	22.0	32.1	37.5	35.0	0.0	0.0	0.0	0.0	0.0

Figure 8: Congestion map for the minor approaches of TH13

(4) All Approaches

	Lynn	Washburn	Nicollet	Portland	Parkwood	W River	Cliff	River Hill	Diffley	Silver Bel	Blackhaw	Yankee D
5:00 AM	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	1.9	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	6.2	6.1	7.6	0.0	0.0	3.1	6.4	0.0	0.0	0.0	0.0	0.0
5:45 AM	6.8	10.0	12.2	0.0	3.6	4.9	10.1	0.0	0.0	0.9	0.0	0.0
6:00 AM	6.8	17.8	13.8	0.0	4.5	3.7	10.8	0.0	0.0	2.5	0.0	0.0
6:15 AM	8.3	30.1	16.3	0.0	6.9	6.1	14.6	0.5	0.0	6.8	0.0	0.0
6:30 AM	14.2	37.6	30.7	2.6	19.9	38.4	52.5	1.6	6.6	10.8	0.0	8.9
6:45 AM	15.6	76.0	35.9	7.2	33.0	29.8	47.5	1.7	6.6	9.8	0.0	8.6
7:00 AM	17.1	70.5	36.6	15.7	33.6	23.4	52.0	3.8	7.5	10.8	0.0	13.3
7:15 AM	16.1	80.6	37.8	18.8	38.7	34.4	50.6	11.6	7.5	14.1	0.0	18.3
7:30 AM	21.0	55.1	39.0	11.5	38.5	34.3	51.6	10.4	5.8	13.8	0.0	27.7
7:45 AM	20.3	77.2	40.5	7.1	40.6	37.0	54.2	6.2	5.3	15.4	0.8	27.8
8:00 AM	17.5	73.9	37.4	5.9	33.7	37.7	54.7	7.2	5.7	14.6	0.0	27.0
8:15 AM	17.8	48.7	38.2	4.5	36.4	34.7	52.0	13.3	5.9	10.9	0.0	17.6
8:30 AM	14.5	36.1	31.2	1.8	27.7	29.4	38.5	3.4	7.2	13.8	1.6	17.1
8:45 AM	14.2	41.0	28.0	1.9	29.0	29.4	39.1	2.3	5.8	13.4	1.4	16.2
9:00 AM	10.7	42.9	27.8	1.6	21.1	31.8	34.6	0.0	6.0	9.3	1.1	11.4
9:15 AM	7.7	38.1	23.1	2.0	27.7	20.9	26.5	0.0	6.3	10.3	0.0	5.4
9:30 AM	6.0	29.1	19.2	2.2	13.7	12.5	20.1	3.2	2.9	7.6	1.3	4.5
9:45 AM	6.6	28.0	19.3	1.3	7.1	13.1	20.1	1.9	2.4	6.6	0.0	6.8
10:00 AM	5.2	31.0	20.2	1.5	10.8	8.7	20.7	1.7	1.9	6.8	1.1	0.0
10:15 AM	5.9	28.9	19.1	1.8	9.2	10.1	19.8	0.0	1.7	4.6	0.0	0.0
10:30 AM	4.3	34.3	19.7	1.5	13.6	12.3	20.4	1.3	1.8	6.6	0.0	0.0
10:45 AM	5.3	31.0	19.4	1.9	14.1	13.9	19.6	1.3	2.0	6.6	0.0	8.0
11:00 AM	6.6	33.2	24.9	6.0	17.0	16.2	18.9	1.7	2.8	9.5	0.0	14.1
11:15 AM	8.3	39.8	24.3	11.4	15.6	16.2	19.0	1.9	2.5	9.0	0.9	16.1
11:30 AM	8.1	36.1	26.5	5.9	20.7	19.0	19.2	2.2	3.0	10.0	0.0	17.9
11:45 AM	6.8	36.4	25.6	4.2	16.9	17.9	21.9	2.3	3.3	11.7	1.1	20.3
12:00 PM	8.5	40.2	27.6	5.5	18.8	18.9	22.8	2.3	3.7	12.4	3.1	18.7
12:15 PM	7.0	36.9	29.0	5.6	20.6	18.8	24.5	1.9	2.9	13.1	0.9	22.0
12:30 PM	8.4	39.3	26.3	4.8	20.8	20.7	22.6	2.8	2.7	12.7	1.5	18.7
12:45 PM	8.0	35.5	27.1	3.9	20.7	19.1	22.8	2.5	3.8	10.7	1.1	22.8
1:00 PM	6.9	37.1	27.5	3.5	20.7	20.1	19.1	1.7	3.7	12.6	0.9	18.6
1:15 PM	7.4	39.2	26.3	3.5	17.4	15.8	20.9	2.0	4.0	9.8	0.0	14.3
1:30 PM	18.8	48.8	30.2	4.9	27.3	25.8	32.8	1.6	8.1	11.4	0.0	14.1
1:45 PM	20.5	45.9	31.7	2.4	30.8	28.7	31.1	1.4	8.4	9.8	0.0	16.0
2:00 PM	19.0	42.7	33.5	8.6	28.1	31.2	34.0	2.5	7.8	9.6	1.5	17.0
2:15 PM	19.4	44.4	35.8	21.0	26.5	30.8	36.5	3.1	10.8	10.5	1.7	11.9
2:30 PM	18.6	43.4	40.4	6.4	28.0	36.1	37.8	4.3	10.3	12.2	2.3	14.1
2:45 PM	18.8	42.7	35.3	5.9	25.2	36.4	32.7	4.7	9.2	11.4	1.1	11.5
3:00 PM	14.5	43.6	42.3	14.4	42.2	47.1	45.2	5.9	10.1	16.4	2.3	21.6
3:15 PM	14.9	51.3	38.9	23.5	42.3	51.1	42.9	5.6	10.2	18.6	1.6	15.5
3:30 PM	11.8	52.1	44.6	22.2	44.3	52.1	42.3	5.5	9.0	17.6	4.1	29.4
3:45 PM	15.7	47.0	47.1	12.7	37.9	55.4	48.4	5.1	8.0	20.4	3.7	22.6
4:00 PM	14.5	45.4	48.2	39.3	43.9	52.7	49.6	5.8	10.6	20.9	4.3	28.3
4:15 PM	14.9	49.0	46.4	28.1	40.4	56.1	45.8	6.9	11.8	22.4	2.7	26.6
4:30 PM	16.6	46.9	50.5	29.2	36.1	53.6	51.3	5.5	13.1	20.6	4.2	34.2
4:45 PM	19.0	44.2	47.2	32.7	45.2	51.7	46.5	5.0	16.1	21.6	2.9	29.5
5:00 PM	16.4	45.3	47.6	34.1	41.9	60.5	52.1	6.1	13.2	22.5	5.3	30.5
5:15 PM	16.4	44.2	48.2	27.8	43.0	56.3	48.9	5.5	11.9	21.3	3.0	26.1
5:30 PM	14.9	43.6	42.7	21.5	46.6	53.8	45.4	4.1	11.0	19.0	2.7	23.3
5:45 PM	14.2	42.7	50.1	9.6	36.6	57.6	46.0	4.5	10.1	18.9	1.1	14.7
6:00 PM	9.4	45.3	46.6	22.7	50.2	50.6	42.4	4.3	8.6	16.5	2.5	13.4
6:15 PM	10.7	39.7	39.0	13.0	35.1	56.0	44.0	3.1	7.8	15.2	1.1	7.3
6:30 PM	8.5	32.6	28.0	4.7	18.7	19.5	24.0	3.1	4.8	13.5	2.5	5.7
6:45 PM	3.1	30.5	26.5	6.6	11.9	21.2	23.6	2.4	2.9	9.8	0.0	0.0

Figure 9: Congestion map for all the approaches of TH13

4.2 TH 55 Congestion Maps

(1) Mainline – Eastbound

	Revere	Boone	Winnetka	Rhode Isl	Glenwood	Douglas	HW 100	Schaper	Meadow	Wirth
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	0.7	1.9	0.0	1.6	0.0	4.0	8.0	0.0	0.0	2.3
5:45 AM	0.0	4.5	2.2	0.0	0.0	2.4	5.5	2.3	0.4	3.5
6:00 AM	1.0	7.7	0.0	0.0	0.0	0.4	8.5	0.0	0.3	2.0
6:15 AM	2.2	10.0	2.7	0.0	0.7	1.8	6.2	1.4	1.1	1.8
6:30 AM	3.2	18.2	3.6	0.0	3.3	24.6	12.6	1.9	1.8	4.0
6:45 AM	5.2	26.3	2.9	0.0	2.6	9.3	15.4	3.0	1.9	4.7
7:00 AM	1.8	21.7	7.6	1.0	1.5	14.3	37.2	1.7	0.9	1.9
7:15 AM	1.9	33.1	10.8	1.9	1.5	22.0	27.6	1.8	1.4	1.4
7:30 AM	9.7	33.4	16.7	1.2	2.1	29.1	43.4	3.3	2.3	1.7
7:45 AM	21.7	35.0	23.7	1.0	1.9	34.9	31.0	3.3	1.9	2.9
8:00 AM	21.5	33.4	20.4	1.0	1.5	19.4	29.1	4.9	2.0	2.4
8:15 AM	13.1	30.4	16.4	1.2	1.4	16.6	25.4	5.0	3.0	2.3
8:30 AM	13.4	31.0	16.6	0.3	4.5	11.6	15.5	3.3	5.9	6.0
8:45 AM	7.9	28.0	8.8	0.0	3.0	12.4	20.2	4.0	5.1	3.9
9:00 AM	5.8	20.7	6.2	0.0	3.6	8.3	15.2	3.8	3.3	4.9
9:15 AM	5.6	18.3	4.7	0.0	2.1	15.5	10.7	3.2	1.4	1.4
9:30 AM	5.5	22.4	3.9	0.0	1.5	11.0	10.6	2.5	0.9	0.9
9:45 AM	9.2	16.2	6.5	0.0	1.1	12.6	12.8	2.5	2.2	1.3
10:00 AM	5.4	15.8	5.4	0.0	1.0	5.4	11.0	2.1	1.0	2.4
10:15 AM	6.1	12.6	4.9	0.0	0.8	7.9	11.1	2.3	1.2	1.6
10:30 AM	7.1	13.9	5.4	0.0	0.7	9.0	10.7	2.2	1.2	3.2
10:45 AM	6.2	12.5	6.3	0.0	0.2	7.0	13.3	2.5	1.1	1.7
11:00 AM	7.5	16.1	6.6	0.0	1.1	8.8	14.4	2.4	1.7	2.0
11:15 AM	7.6	13.5	14.7	0.0	1.2	13.6	12.9	2.0	2.0	2.6
11:30 AM	14.5	13.8	15.7	0.0	5.2	14.3	18.0	5.0	3.6	4.0
11:45 AM	16.7	15.0	18.7	0.6	4.6	11.9	18.0	5.0	3.8	3.5
12:00 PM	15.9	13.0	11.8	0.7	5.1	11.7	14.2	4.5	3.9	4.0
12:15 PM	17.6	15.0	13.1	0.8	5.8	14.4	16.7	5.0	3.2	4.0
12:30 PM	16.7	13.8	12.6	0.7	4.3	12.6	17.5	5.7	3.6	4.8
12:45 PM	17.3	12.0	13.2	0.6	4.8	14.8	17.8	4.3	3.8	3.9
1:00 PM	15.2	12.6	11.3	0.5	3.7	13.8	16.8	4.3	2.9	6.1
1:15 PM	14.6	12.4	10.4	0.5	3.9	13.0	18.5	4.8	3.9	3.7
1:30 PM	13.4	11.7	9.6	0.3	4.1	10.8	19.0	3.8	4.6	5.5
1:45 PM	14.6	12.9	8.8	0.6	3.2	14.0	14.4	4.2	2.1	4.2
2:00 PM	15.6	12.5	8.7	0.6	4.9	9.8	15.0	4.9	2.1	3.4
2:15 PM	7.1	17.8	15.0	2.8	1.6	23.0	26.3	1.5	2.6	5.7
2:30 PM	5.8	17.4	11.2	0.4	2.7	24.1	22.3	1.7	1.8	4.6
2:45 PM	5.9	15.5	14.2	0.4	2.5	29.0	30.6	1.1	2.4	4.0
3:00 PM	6.0	14.6	19.0	0.0	2.0	34.3	22.8	1.0	2.7	3.3
3:15 PM	6.3	17.3	16.7	0.3	2.6	28.1	11.4	2.0	2.3	3.2
3:30 PM	11.2	24.8	20.7	0.2	2.6	35.7	26.2	2.7	2.3	3.3
3:45 PM	12.5	34.4	35.6	0.3	3.2	35.7	25.3	2.7	1.6	2.5
4:00 PM	14.0	38.9	33.2	0.2	2.5	34.0	28.6	3.8	2.1	2.8
4:15 PM	13.0	28.9	33.2	0.1	3.9	37.4	30.0	3.2	5.0	2.9
4:30 PM	13.0	42.9	33.3	0.3	4.2	34.6	32.2	2.6	2.8	3.3
4:45 PM	15.5	43.6	43.7	0.5	4.3	33.2	32.4	2.2	3.0	5.6
5:00 PM	15.3	32.3	47.3	0.6	4.3	32.6	29.5	3.2	4.3	3.6
5:15 PM	17.3	35.4	45.1	0.3	4.7	39.0	29.3	2.7	3.5	3.6
5:30 PM	13.2	45.0	40.0	0.4	4.7	35.8	29.0	3.0	4.8	3.6
5:45 PM	13.5	24.0	32.8	0.2	4.3	35.5	36.8	1.8	2.8	3.6
6:00 PM	13.6	19.4	19.3	0.3	2.5	35.3	41.8	2.6	3.1	4.2
6:15 PM	6.3	14.8	28.3	1.9	1.8	19.5	37.0	3.0	3.2	4.9
6:30 PM	4.6	14.3	13.4	0.5	1.7	24.8	18.7	1.4	2.3	4.5
6:45 PM	3.5	8.2	8.3	0.5	1.9	21.0	18.5	0.8	3.1	5.4

Figure 10: Congestion map for the eastbound of TH55

(2) Mainline – Westbound

	Revere	Boone	Winnetka	Rhode Isl	Glenwood	Douglas	HW 100	Schaper	Meadow	Wirth
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0
5:30 AM	1.4	0.0	0.0	0.0	0.0	5.0	8.9	0.0	0.3	4.1
5:45 AM	0.8	4.6	2.6	0.0	0.9	7.4	8.4	0.0	0.4	5.9
6:00 AM	3.5	6.0	0.0	0.0	0.4	10.1	13.6	0.0	1.8	4.6
6:15 AM	4.1	7.1	2.6	1.0	2.2	7.9	18.1	0.9	2.1	3.6
6:30 AM	3.9	7.9	3.7	2.8	2.8	6.4	33.6	5.1	2.1	4.1
6:45 AM	7.7	7.3	3.7	2.9	2.8	8.5	33.7	6.7	2.4	2.7
7:00 AM	5.4	17.8	11.8	2.6	0.4	17.4	41.6	4.9	1.2	7.1
7:15 AM	6.9	26.5	15.0	5.3	0.0	17.2	40.4	6.8	1.2	10.4
7:30 AM	8.3	19.1	18.1	4.7	0.3	18.4	78.0	8.2	1.1	9.5
7:45 AM	18.6	21.2	22.9	6.8	0.5	21.5	43.0	11.9	1.1	11.3
8:00 AM	8.3	31.7	18.3	5.4	0.5	18.3	31.6	14.6	1.7	14.6
8:15 AM	10.1	22.8	19.3	7.4	0.3	20.9	53.3	13.5	2.2	8.1
8:30 AM	10.7	24.7	8.2	6.8	5.1	11.8	37.6	6.4	3.8	6.7
8:45 AM	7.7	12.3	8.2	6.2	4.4	9.6	41.4	5.4	2.6	6.7
9:00 AM	8.2	11.7	8.0	5.2	3.9	6.8	30.2	3.4	1.8	6.2
9:15 AM	12.9	11.5	7.5	1.7	0.6	13.7	19.4	3.4	0.0	14.1
9:30 AM	11.2	9.0	5.9	1.6	0.6	13.0	27.1	2.9	0.0	14.8
9:45 AM	6.3	7.1	6.1	1.7	1.2	13.5	23.9	2.9	0.0	13.0
10:00 AM	6.8	8.8	6.2	1.4	1.1	11.6	24.5	2.9	0.4	10.5
10:15 AM	7.7	8.8	6.5	1.8	0.9	14.0	18.1	1.9	0.0	15.5
10:30 AM	8.3	7.1	7.6	1.5	0.8	11.9	27.1	2.3	1.6	14.8
10:45 AM	8.2	9.0	8.7	1.9	0.5	12.7	27.1	3.4	1.8	12.2
11:00 AM	9.3	12.3	8.7	2.2	0.7	12.6	32.7	2.9	2.0	12.9
11:15 AM	10.9	12.3	8.7	3.0	0.8	12.9	27.2	3.2	0.0	13.4
11:30 AM	10.2	12.1	7.9	6.8	1.1	11.6	14.8	3.1	1.3	12.1
11:45 AM	9.8	11.8	9.0	6.5	1.4	12.2	21.0	2.9	3.6	6.6
12:00 PM	9.8	12.9	9.1	6.9	1.6	12.8	17.3	2.5	2.8	11.0
12:15 PM	9.8	11.1	9.8	6.1	0.8	13.5	17.8	3.0	0.0	9.9
12:30 PM	10.3	13.7	8.3	5.7	1.0	13.3	22.5	2.7	3.4	11.0
12:45 PM	11.3	11.9	10.6	5.7	0.8	14.1	14.9	3.3	3.3	7.9
1:00 PM	9.4	12.1	6.9	4.9	0.7	11.8	28.7	1.9	2.3	8.7
1:15 PM	9.1	12.1	6.3	5.2	0.5	13.4	22.1	2.1	3.0	9.5
1:30 PM	9.3	11.6	6.4	4.8	0.9	11.8	16.4	3.0	2.2	5.5
1:45 PM	9.1	10.7	7.7	4.8	0.7	10.7	20.4	1.8	2.0	9.5
2:00 PM	9.9	9.8	7.4	7.1	1.4	13.2	18.4	3.6	1.6	8.3
2:15 PM	10.1	22.8	11.7	3.2	1.3	7.2	35.0	1.7	2.3	14.8
2:30 PM	7.3	8.4	8.8	1.6	0.8	5.7	32.4	1.2	3.0	15.6
2:45 PM	8.7	9.4	8.3	1.1	0.9	4.7	39.9	1.0	3.8	10.1
3:00 PM	10.7	10.4	8.7	1.7	1.3	5.4	35.3	2.6	3.3	14.5
3:15 PM	9.0	8.3	8.5	1.7	0.5	3.2	37.0	1.9	3.4	9.2
3:30 PM	9.3	9.4	14.7	2.0	3.1	6.3	51.4	5.3	0.9	7.6
3:45 PM	8.9	10.7	14.6	1.7	2.0	4.9	49.3	6.4	1.2	13.7
4:00 PM	7.9	15.4	20.9	2.5	2.1	5.2	33.9	8.6	2.1	13.6
4:15 PM	9.2	17.6	15.9	2.2	1.9	7.3	44.3	8.5	1.9	11.9
4:30 PM	20.7	19.6	21.9	2.6	5.3	4.0	54.6	11.3	1.5	12.2
4:45 PM	18.9	19.2	28.5	2.2	1.5	5.1	46.0	10.2	1.8	16.9
5:00 PM	22.9	30.5	32.7	3.8	1.6	4.7	48.8	14.2	3.2	16.8
5:15 PM	22.8	33.2	34.0	4.0	4.3	4.8	56.9	13.5	1.7	15.4
5:30 PM	15.2	12.2	25.7	2.4	4.5	5.6	51.3	11.0	2.9	18.1
5:45 PM	9.4	13.0	17.4	1.9	6.2	4.6	47.4	8.7	2.8	11.4
6:00 PM	12.6	9.4	10.8	1.3	3.4	4.4	37.7	7.3	2.0	12.6
6:15 PM	9.5	18.7	13.0	3.8	3.6	4.5	37.5	1.4	4.3	12.9
6:30 PM	8.8	7.8	5.0	1.4	2.3	3.2	32.9	2.2	2.8	14.9
6:45 PM	9.9	6.7	3.9	0.0	2.2	4.5	36.5	1.4	2.0	16.6

Figure 11: Congestion map for the westbound of TH55

(3) Minor Approaches

	Revere	Boone	Winnetka	Rhode Isl	Glenwood	Douglas	HW 100	Schaper	Meadow	Wirth
5:00 AM	60.8	63.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	27.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	52.5	25.1	0.0	0.0	0.0	0.0	14.6	0.0	98.0	0.0
5:45 AM	0.0	51.2	0.0	0.0	0.0	0.0	47.1	0.0	25.4	0.0
6:00 AM	62.9	50.2	34.2	0.0	0.0	0.0	47.1	0.0	0.0	0.0
6:15 AM	0.0	51.3	37.3	0.0	0.0	0.0	47.1	0.0	0.0	0.0
6:30 AM	40.8	55.4	48.1	0.0	30.1	30.1	50.8	0.0	0.0	43.2
6:45 AM	79.4	64.0	54.4	0.0	48.0	48.0	59.0	0.0	0.0	51.2
7:00 AM	72.5	108.3	80.3	104.1	83.4	83.4	86.6	0.0	0.0	62.6
7:15 AM	95.1	93.9	80.6	84.1	83.9	83.9	79.9	0.0	25.6	72.8
7:30 AM	88.1	81.5	81.7	88.4	77.5	77.5	79.9	37.5	28.8	63.7
7:45 AM	88.8	91.5	79.5	89.0	84.1	84.1	79.9	0.0	0.0	71.8
8:00 AM	96.4	94.2	82.7	86.8	79.4	79.4	79.9	30.2	0.0	68.6
8:15 AM	91.0	90.0	74.9	101.9	71.6	71.6	79.2	0.0	44.5	74.3
8:30 AM	61.1	64.5	49.7	51.5	38.8	38.8	56.2	0.0	0.0	48.6
8:45 AM	50.0	63.5	60.2	57.2	45.7	45.7	59.0	0.0	0.0	43.9
9:00 AM	61.1	63.0	50.1	57.2	48.9	48.9	53.7	0.0	15.6	47.6
9:15 AM	48.1	45.1	42.0	0.0	0.0	0.0	47.1	0.0	0.0	30.6
9:30 AM	33.9	46.3	43.0	0.0	25.9	25.9	47.1	0.0	0.0	34.4
9:45 AM	27.0	47.6	40.9	0.0	0.0	0.0	47.1	0.0	0.0	25.0
10:00 AM	38.2	47.8	41.7	0.0	0.0	0.0	47.1	0.0	4.2	26.5
10:15 AM	30.8	47.6	40.1	0.0	0.0	0.0	47.1	0.0	0.0	23.9
10:30 AM	25.7	49.1	42.9	0.0	0.0	0.0	47.1	0.0	20.4	23.0
10:45 AM	38.8	48.1	45.3	0.0	0.0	0.0	47.1	0.0	12.7	15.3
11:00 AM	36.0	47.6	42.0	0.0	0.0	0.0	47.1	0.0	8.4	38.5
11:15 AM	40.0	48.7	45.1	17.6	2.7	2.7	47.1	0.0	14.6	26.6
11:30 AM	48.3	56.1	48.6	58.0	43.9	43.9	56.6	0.0	5.5	24.7
11:45 AM	50.4	59.1	50.7	47.7	37.8	37.8	56.5	21.1	6.0	37.0
12:00 PM	48.1	57.5	48.6	64.2	40.7	40.7	56.5	41.8	14.5	25.3
12:15 PM	48.3	57.6	48.4	53.0	3.2	3.2	56.5	0.0	7.5	37.0
12:30 PM	48.3	57.8	47.1	54.7	41.2	41.2	56.5	0.0	0.0	32.9
12:45 PM	45.1	58.5	48.6	54.1	34.7	34.7	56.6	0.0	10.1	37.0
1:00 PM	48.8	57.6	48.6	63.6	27.1	27.1	56.6	26.7	15.2	29.6
1:15 PM	50.6	58.2	48.1	54.1	28.7	28.7	56.5	0.0	6.7	49.3
1:30 PM	38.1	57.7	48.8	48.2	31.5	31.5	56.6	9.1	16.2	32.9
1:45 PM	41.9	58.7	48.9	52.1	9.2	9.2	56.5	0.0	12.0	33.3
2:00 PM	52.3	57.5	44.7	64.5	41.0	41.0	56.5	34.9	15.2	28.8
2:15 PM	70.5	64.8	67.6	80.7	49.7	49.7	57.2	62.7	6.4	48.6
2:30 PM	54.2	71.6	57.0	75.8	39.3	39.3	66.3	34.0	0.0	48.2
2:45 PM	70.6	73.5	60.3	66.6	46.4	46.4	65.8	54.2	0.0	49.6
3:00 PM	70.5	69.4	57.6	73.9	56.2	56.2	66.6	56.6	37.0	47.5
3:15 PM	71.0	70.9	58.9	65.3	49.3	49.3	68.0	35.9	34.4	55.0
3:30 PM	77.9	79.9	74.6	102.5	77.7	77.7	79.9	56.4	34.1	67.3
3:45 PM	90.8	88.1	79.2	102.4	81.4	81.4	79.9	71.9	49.9	89.2
4:00 PM	88.6	88.4	76.6	100.4	76.8	76.8	79.9	63.2	18.5	66.9
4:15 PM	86.9	87.5	79.7	102.5	76.3	76.3	79.9	80.8	36.8	69.3
4:30 PM	77.3	83.0	79.5	99.0	77.3	77.3	78.9	63.4	45.1	66.6
4:45 PM	80.2	86.6	80.4	100.8	76.3	76.3	79.9	67.2	48.1	79.0
5:00 PM	84.8	86.9	79.1	98.5	78.1	78.1	79.9	67.7	43.7	66.3
5:15 PM	80.7	86.9	79.4	103.2	71.8	71.8	81.7	73.4	42.6	62.9
5:30 PM	90.0	87.0	85.3	93.9	77.8	77.8	76.3	57.9	26.0	68.0
5:45 PM	85.8	77.7	80.1	104.5	82.2	82.2	80.3	90.3	47.3	77.2
6:00 PM	78.5	86.3	81.9	106.0	67.8	67.8	76.1	44.3	49.9	64.3
6:15 PM	65.2	61.6	67.9	62.0	61.7	61.7	66.4	0.0	35.2	58.4
6:30 PM	66.0	71.6	62.5	69.7	38.9	38.9	57.6	0.0	36.0	49.9
6:45 PM	64.6	71.6	59.9	58.9	42.5	42.5	68.0	0.0	20.3	52.2

Figure 12: Congestion map for the minor approaches of TH55

(4) All Approaches

	Revere	Boone	Winnetka	Rhode Isl	Glenwood	Douglas	HW 100	Schaper	Meadow	Wirth
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	1.2	0.7	0.0	0.0	0.0	1.9	11.2	0.0	0.2	0.0
5:45 AM	0.0	6.4	2.2	0.0	0.2	4.5	16.2	0.0	0.4	0.0
6:00 AM	2.1	8.7	1.5	0.0	0.1	2.2	24.6	0.0	0.4	0.0
6:15 AM	3.1	14.1	3.6	0.0	1.1	3.7	31.4	0.3	1.2	1.7
6:30 AM	3.8	25.3	7.5	0.0	2.8	8.2	42.5	1.9	1.9	5.5
6:45 AM	9.5	36.7	7.4	0.5	2.8	9.9	43.1	4.1	1.9	6.2
7:00 AM	5.4	76.7	15.9	2.3	0.7	23.5	77.9	2.3	1.0	22.0
7:15 AM	10.1	70.4	58.2	5.4	0.6	53.8	68.9	4.2	1.5	21.9
7:30 AM	23.3	60.4	44.8	4.3	0.7	41.3	75.6	6.0	1.7	29.7
7:45 AM	32.9	65.3	43.0	6.0	0.9	55.7	75.1	5.9	1.4	44.6
8:00 AM	31.2	75.1	60.8	4.8	0.9	30.8	70.5	12.9	1.7	49.5
8:15 AM	22.9	69.2	47.4	6.9	0.7	25.9	62.2	6.2	3.4	48.2
8:30 AM	16.3	37.8	28.2	2.0	5.0	12.6	42.5	4.2	4.3	26.5
8:45 AM	9.5	32.5	15.5	3.2	3.9	11.3	47.1	4.0	3.9	18.9
9:00 AM	9.1	33.5	21.3	1.5	3.8	9.0	40.4	2.8	3.1	14.1
9:15 AM	10.4	23.8	13.1	0.0	1.2	13.6	31.4	2.6	0.8	7.4
9:30 AM	10.6	24.3	7.9	0.0	1.2	13.2	35.3	2.1	0.0	13.2
9:45 AM	10.0	20.6	12.9	0.0	1.2	12.0	35.3	2.3	1.5	6.0
10:00 AM	8.7	23.1	10.9	0.0	1.0	9.4	33.6	1.9	0.9	7.2
10:15 AM	9.0	18.9	11.6	0.0	0.9	9.9	32.7	1.9	0.0	9.8
10:30 AM	10.0	24.0	12.7	0.0	0.7	8.7	35.3	1.8	1.4	10.8
10:45 AM	10.0	18.4	14.8	0.0	0.5	10.9	37.8	2.2	1.6	5.9
11:00 AM	10.7	23.2	15.6	0.9	0.9	11.2	35.4	2.1	2.0	9.3
11:15 AM	14.5	24.9	28.0	1.4	1.0	12.9	35.3	2.4	2.3	9.8
11:30 AM	18.8	29.9	37.7	3.0	2.1	13.4	38.0	3.4	2.9	7.4
11:45 AM	18.7	30.2	38.9	4.3	2.4	12.7	35.9	4.0	3.6	7.5
12:00 PM	18.8	30.2	37.2	6.2	2.8	13.7	38.2	3.9	4.0	8.9
12:15 PM	20.5	29.6	38.8	5.1	1.6	13.5	38.0	3.7	2.6	13.1
12:30 PM	20.4	34.0	33.6	5.2	2.1	14.2	42.4	3.8	3.4	12.4
12:45 PM	20.8	30.7	32.8	3.3	1.4	14.8	41.1	3.7	3.9	11.2
1:00 PM	20.7	30.3	32.2	4.2	1.5	12.5	38.9	3.5	3.5	10.5
1:15 PM	17.1	30.2	29.2	2.6	1.6	14.0	38.0	3.4	3.7	16.4
1:30 PM	14.8	30.2	20.4	2.1	1.7	12.1	41.0	3.6	4.5	8.9
1:45 PM	16.7	29.8	27.0	3.0	1.5	12.0	40.0	2.7	2.2	12.9
2:00 PM	18.5	29.8	24.2	4.3	2.3	14.1	40.4	4.4	1.9	10.2
2:15 PM	24.8	37.6	49.0	3.4	1.4	17.8	48.5	2.1	2.4	18.0
2:30 PM	11.4	56.4	44.8	1.3	2.0	15.4	48.5	1.7	2.5	21.1
2:45 PM	16.6	38.1	45.7	0.7	2.1	18.6	57.0	1.5	2.6	17.9
3:00 PM	18.3	37.6	41.8	1.2	1.5	16.6	51.0	2.3	3.4	21.1
3:15 PM	14.7	50.8	44.7	0.8	1.6	17.7	54.2	2.2	3.6	31.7
3:30 PM	40.9	52.5	59.0	1.9	2.6	46.6	74.5	4.5	2.6	29.3
3:45 PM	24.6	66.4	67.0	1.6	2.6	39.9	67.7	6.3	2.0	59.4
4:00 PM	37.2	70.6	58.4	1.5	2.2	40.6	71.1	9.2	2.1	49.5
4:15 PM	41.0	57.4	53.1	1.9	3.7	60.9	72.0	7.8	3.9	44.6
4:30 PM	37.0	69.1	64.7	1.8	4.3	35.4	71.1	9.0	3.7	44.6
4:45 PM	36.5	69.9	67.1	2.3	3.8	33.2	65.8	8.6	4.2	52.1
5:00 PM	46.2	69.9	63.7	4.3	3.8	32.4	71.7	14.2	5.0	44.5
5:15 PM	37.3	69.8	69.1	3.9	4.7	35.1	75.2	9.9	3.0	30.2
5:30 PM	25.2	64.5	70.4	2.4	4.7	34.0	69.8	8.6	4.2	51.6
5:45 PM	42.7	57.4	66.4	1.9	5.0	34.0	72.7	6.7	3.2	51.2
6:00 PM	32.8	49.8	69.7	1.1	2.8	31.9	69.9	5.6	3.6	43.1
6:15 PM	17.8	37.4	50.8	3.8	2.7	16.6	52.9	1.7	5.2	27.5
6:30 PM	15.2	37.5	45.7	1.2	1.8	12.7	50.4	1.6	3.1	28.5
6:45 PM	10.1	36.9	35.0	0.6	2.1	16.9	53.9	0.5	3.4	25.3

Figure 13: Congestion map for all the approaches of TH55

4.3 TH 7 Congestion Maps

(1) Mainline – Eastbound

	Hazeltine	Oak	Christmas	Old Mark	Vinehill	CR101	Tonkawo	Williston	Shady Oa	17th Ave	12th Ave	5th Ave	169 W.R.	169 E.R.	Blake	Texas	Louisiana	100 W.R.	100 E.R.	
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	1.3	0.0	4.6	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:30 AM	0.0	2.5	0.7	0.0	0.0	9.2	0.1	2.4	1.3	0.0	0.0	0.0	0.0	0.0	3.9	2.5	0.0	0.8	0.0	0.0
5:45 AM	0.0	3.4	1.1	0.4	0.0	9.2	0.0	2.3	2.3	2.9	0.0	1.3	0.0	2.2	11.1	2.0	0.0	0.0	0.0	1.2
6:00 AM	3.3	2.8	0.8	0.6	0.0	11.2	0.5	1.4	2.6	7.6	0.0	4.9	0.0	0.0	9.5	0.0	0.0	0.0	0.0	11.7
6:15 AM	10.4	4.2	0.9	0.8	0.0	12.1	0.3	2.2	4.1	11.2	0.0	9.2	0.0	0.0	12.2	1.1	0.0	0.0	0.0	9.8
6:30 AM	14.5	6.4	0.8	1.6	0.4	26.6	0.9	5.6	6.1	12.9	0.8	10.1	0.0	0.0	21.8	1.5	0.0	0.0	0.0	10.7
6:45 AM	16.5	6.4	1.3	1.5	2.7	25.8	1.1	4.6	7.4	13.5	0.8	10.3	0.0	0.5	19.0	2.1	0.0	0.0	0.0	13.3
7:00 AM	14.3	6.9	1.1	1.5	2.5	32.0	1.1	5.2	18.6	4.7	2.0	8.3	0.0	0.7	34.4	1.8	0.0	2.9	12.9	12.9
7:15 AM	19.0	8.2	1.3	2.2	4.5	35.6	1.6	5.1	21.9	1.9	2.5	6.9	0.0	0.4	36.6	2.3	0.0	4.8	12.5	12.5
7:30 AM	22.5	8.6	0.8	3.5	7.4	37.2	2.4	15.2	28.8	2.9	2.8	8.7	0.0	0.4	38.5	2.7	0.0	7.4	10.7	10.7
7:45 AM	24.2	9.9	1.1	3.9	10.3	36.4	3.0	13.3	28.8	3.3	2.7	8.2	0.0	0.5	34.6	2.9	0.0	7.1	11.1	11.1
8:00 AM	24.1	7.2	1.1	3.0	6.5	35.2	2.2	3.9	26.5	2.4	2.5	8.4	0.0	0.4	39.4	3.4	0.0	7.0	7.7	7.7
8:15 AM	22.3	9.0	1.4	3.0	8.0	38.4	2.3	5.0	25.5	2.5	3.6	7.9	0.0	0.4	39.9	3.2	0.0	6.8	8.6	8.6
8:30 AM	23.9	6.3	1.9	2.2	1.9	32.4	1.8	9.9	15.3	14.4	2.1	12.1	0.0	0.6	19.9	5.7	0.0	4.7	14.4	14.4
8:45 AM	24.3	8.2	2.1	2.3	4.6	28.7	2.2	8.2	20.1	9.0	1.3	9.1	0.0	0.4	19.8	4.9	0.0	3.4	9.9	9.9
9:00 AM	22.2	5.7	2.5	1.2	3.4	23.6	2.2	7.7	10.6	14.5	0.6	10.3	0.0	0.0	19.8	4.4	0.0	2.5	13.1	13.1
9:15 AM	21.6	7.3	2.1	2.3	1.8	24.9	2.4	7.9	8.9	10.1	1.4	9.6	0.0	0.6	21.8	4.3	0.0	2.7	12.9	12.9
9:30 AM	21.6	7.2	2.2	1.3	1.5	23.6	2.8	7.4	11.7	13.6	1.4	8.3	0.0	1.3	21.3	5.3	0.0	1.7	12.7	12.7
9:45 AM	22.8	7.9	1.8	1.4	0.0	18.8	1.3	12.4	9.6	9.2	1.0	8.3	0.0	0.6	17.7	6.1	0.0	2.9	12.7	12.7
10:00 AM	21.2	5.7	1.6	0.7	3.8	17.9	1.1	9.4	7.1	10.9	1.1	9.6	0.0	0.7	20.9	5.9	0.0	1.8	12.3	12.3
10:15 AM	20.6	5.9	1.8	1.5	1.6	19.3	1.2	8.4	7.3	7.9	1.5	6.8	0.0	0.9	21.8	4.0	0.0	1.5	12.0	12.0
10:30 AM	21.5	6.8	2.1	0.8	0.0	19.4	1.2	10.1	7.6	9.0	1.4	8.7	0.0	0.6	24.0	4.7	0.0	1.7	11.4	11.4
10:45 AM	24.5	6.7	1.5	0.8	2.9	19.5	1.7	10.0	7.7	12.8	0.0	10.2	0.0	0.7	24.8	5.6	0.0	2.9	14.4	14.4
11:00 AM	22.7	7.6	1.8	1.1	0.0	20.9	1.8	11.6	7.0	13.3	0.0	7.2	0.0	0.7	23.5	8.1	0.0	3.1	11.7	11.7
11:15 AM	20.9	8.5	2.2	1.8	2.1	21.3	2.0	19.4	20.0	21.1	1.3	11.9	1.0	0.7	26.8	6.6	1.0	3.6	13.2	13.2
11:30 AM	21.6	5.2	2.6	1.1	2.7	21.8	2.4	13.4	7.4	10.5	1.5	10.1	0.7	0.6	30.5	7.5	0.7	4.7	14.5	14.5
11:45 AM	27.9	7.4	1.3	2.2	1.7	27.3	3.2	20.7	12.2	13.2	2.3	10.8	0.7	0.4	32.2	7.1	0.7	4.5	14.0	14.0
12:00 PM	24.2	5.5	2.5	1.3	3.8	26.6	2.1	13.3	8.9	11.3	2.6	10.4	0.0	0.9	26.3	8.5	0.0	3.8	14.3	14.3
12:15 PM	21.7	5.7	2.6	1.2	0.6	25.3	2.6	14.2	10.0	12.5	3.1	11.3	1.0	0.6	29.9	8.4	1.0	4.4	13.8	13.8
12:30 PM	23.2	5.9	1.7	2.0	1.5	24.2	2.5	13.7	9.8	14.8	1.6	13.8	0.3	1.1	32.6	8.8	0.3	5.4	14.3	14.3
12:45 PM	26.1	7.4	3.1	1.8	2.0	24.2	2.9	15.1	8.7	12.8	4.8	13.6	0.8	0.7	28.9	8.8	0.8	5.4	13.8	13.8
1:00 PM	24.9	7.3	2.6	1.3	1.8	23.0	2.6	13.9	10.0	11.6	2.1	13.1	0.7	0.6	26.2	9.2	0.7	5.2	14.2	14.2
1:15 PM	24.0	5.6	2.8	1.1	0.8	23.0	2.7	12.3	8.3	9.8	1.5	11.1	0.9	0.7	27.3	8.6	0.9	4.8	14.1	14.1
1:30 PM	22.4	7.3	2.3	1.8	1.5	23.6	3.2	12.9	9.5	8.9	1.8	11.7	0.6	0.8	29.6	8.6	0.6	4.7	13.3	13.3
1:45 PM	25.6	6.0	2.9	1.1	4.0	28.3	3.0	13.3	11.0	13.2	1.5	11.8	0.7	0.9	31.3	7.6	0.7	5.1	15.5	15.5
2:00 PM	25.5	7.4	2.6	1.5	1.9	24.2	1.6	11.6	9.6	10.9	1.3	11.6	0.0	0.7	26.8	8.8	0.0	4.0	13.1	13.1
2:15 PM	23.5	7.4	2.6	1.3	1.3	24.6	2.2	12.5	9.2	11.3	0.0	10.2	0.0	0.6	26.9	8.4	0.0	5.2	13.2	13.2
2:30 PM	23.5	6.2	2.2	2.5	4.1	25.9	3.4	15.6	8.1	13.6	1.7	15.5	0.8	1.0	25.2	7.3	0.8	5.5	13.8	13.8
2:45 PM	29.9	5.4	2.6	3.9	4.9	37.6	6.1	13.0	20.9	21.1	1.7	8.4	1.3	0.6	29.4	5.6	1.3	7.3	12.9	12.9
3:00 PM	22.7	5.9	2.6	3.0	4.1	38.6	6.3	11.4	18.4	20.0	1.8	8.8	0.8	1.1	34.4	4.9	0.8	5.8	17.3	17.3
3:15 PM	29.0	6.3	2.3	4.8	4.4	26.6	6.1	11.3	19.9	21.1	2.0	8.3	0.9	0.9	27.8	4.5	0.9	7.2	15.0	15.0
3:30 PM	28.9	5.7	2.4	3.0	5.0	25.4	6.6	14.5	19.4	23.6	1.6	8.6	0.7	0.7	29.7	7.5	0.7	7.7	17.2	17.2
3:45 PM	29.2	6.2	2.4	6.5	2.1	52.2	13.1	8.9	29.5	20.7	2.1	30.1	0.7	3.4	58.3	8.8	0.7	7.4	14.1	14.1
4:00 PM	28.9	6.3	2.8	5.8	2.0	49.8	11.2	7.6	33.3	3.3	2.6	32.2	0.6	3.4	61.0	7.6	0.6	6.5	14.0	14.0
4:15 PM	34.6	12.3	2.8	6.9	2.0	43.4	12.1	5.2	66.2	12.6	5.4	34.5	0.5	3.6	45.6	8.6	0.5	6.7	13.4	13.4
4:30 PM	33.3	5.6	2.9	5.3	2.9	42.7	13.0	6.7	33.8	23.0	5.4	33.9	0.7	4.1	49.5	8.7	0.7	7.8	15.4	15.4
4:45 PM	32.6	7.5	3.2	9.0	2.7	67.6	16.2	7.1	33.7	21.7	6.1	34.1	0.5	4.4	51.0	12.7	0.5	8.2	13.4	13.4
5:00 PM	33.1	6.7	3.1	8.1	4.1	48.4	11.2	6.0	34.5	7.0	5.7	33.9	0.8	5.0	48.6	11.4	0.8	9.6	13.0	13.0
5:15 PM	33.2	7.7	2.8	6.8	3.3	48.9	11.9	5.2	50.5	21.8	7.7	36.4	0.8	4.9	48.7	10.3	0.8	8.3	12.4	12.4
5:30 PM	32.3	6.9	2.6	6.8	2.3	61.7	13.0	5.9	32.9	24.1	4.1	34.2	0.8	5.9	49.5	8.6	0.8	8.7	12.7	12.7
5:45 PM	33.5	6.1	3.6	5.1	3.4	44.4	12.7	8.7	30.1	11.1	5.4	34.7	0.6	3.8	53.0	9.4	0.6	8.7	9.8	9.8
6:00 PM	28.7	6.4	3.7	6.1	1.9	47.6	13.6	6.5	23.2	4.6	3.4	32.3	0.8	3.3	42.4	9.1	0.8	8.3	7.9	7.9
6:15 PM	25.7	5.9	3.0	5.7	2.4	19.8	6.5	14.0	19.6	13.0	3.9	13.9	0.9	2.4	31.1	9.3	0.9	6.8	10.8	10.8
6:30 PM	25.4	5.3	3.7	2.5	0.0	26.5	6.1	9.7	10.8	14.1	2.6	11.1	0.0	0.6	28.3	10.0	0.0	2.7	9.7	9.7
6:45 PM	22.7	5.9	3.7	1.6	0.0	21.1	2.6	13.2	8.9	16.5	2.4	10.8	0.0	0.7	22.7	9.2	0.0	2.2	9.3	9.3

Figure 14: Congestion map for the eastbound of TH7

(2) Mainline – Westbound

	Hazeltine	Oak	Christmas	Old Mark	Vinehill	CR101	Tonkawoi	Williston	Shady Oa	17th Ave	12th Ave	5th Ave	169 W.R.	169 E.R.	Blake	Texas	Louisiana	100 W.R.	100 E.R.	
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0
5:30 AM	0.0	0.0	0.0	0.0	3.8	4.3	1.1	6.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5:45 AM	0.0	0.0	0.0	0.0	5.1	4.2	1.7	8.8	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	2.2	0.0
6:00 AM	0.0	0.0	0.0	0.0	5.7	6.4	2.2	7.3	3.1	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2
6:15 AM	0.0	0.0	0.0	0.0	9.8	9.9	2.2	10.2	2.2	0.0	0.0	5.3	0.7	0.0	13.0	0.0	0.7	0.0	3.3	0.0
6:30 AM	0.0	3.4	0.0	0.0	11.9	20.3	2.7	8.5	7.4	5.7	4.3	4.7	0.0	3.7	19.4	2.9	0.0	0.0	5.2	0.0
6:45 AM	0.0	6.2	0.0	0.0	17.4	33.9	6.3	13.0	8.1	0.0	4.3	4.8	0.5	3.0	19.4	1.7	0.5	3.5	5.9	0.0
7:00 AM	0.0	8.0	0.0	0.0	17.8	31.3	3.4	12.3	2.8	20.4	11.6	5.9	2.3	4.2	25.0	1.8	2.3	4.3	6.2	0.0
7:15 AM	0.0	8.6	0.0	0.0	21.7	25.6	5.9	11.9	5.0	17.2	14.8	3.9	1.8	5.9	35.3	1.4	1.8	7.6	6.3	0.0
7:30 AM	0.0	8.9	0.0	0.0	23.5	23.3	7.7	12.1	7.6	16.1	12.5	3.2	1.5	6.8	41.9	2.3	1.5	5.5	5.7	0.0
7:45 AM	0.0	10.2	0.0	0.0	22.9	65.0	9.7	14.3	5.8	13.6	16.4	4.5	1.4	5.9	39.0	3.0	1.4	8.1	7.3	0.0
8:00 AM	0.0	8.3	0.0	0.0	23.3	24.5	7.2	10.1	9.4	15.9	15.2	5.0	1.5	5.7	57.4	2.9	1.5	8.1	5.6	0.0
8:15 AM	0.0	11.4	0.0	0.0	22.1	21.0	7.4	12.3	15.9	18.1	14.6	4.6	1.3	6.2	43.7	2.8	1.3	6.1	6.6	0.0
8:30 AM	0.0	14.3	0.0	0.5	10.5	27.3	7.6	14.5	7.9	4.3	6.2	4.7	0.0	3.5	31.8	5.2	0.0	10.3	6.4	0.0
8:45 AM	0.0	14.6	0.0	0.0	7.2	46.5	5.2	14.2	26.5	4.6	10.5	5.3	0.0	4.2	29.2	5.1	0.0	13.8	7.5	0.0
9:00 AM	0.0	15.8	0.0	0.0	10.1	34.5	6.5	16.2	10.8	5.8	7.2	5.2	0.0	4.1	31.2	5.8	0.0	9.6	6.2	0.0
9:15 AM	0.0	12.4	0.0	0.4	9.5	31.2	6.8	12.6	7.7	2.8	6.0	5.5	0.0	3.7	29.2	6.7	0.0	7.6	6.4	0.0
9:30 AM	0.0	13.3	0.0	0.0	9.0	37.1	8.7	11.7	4.5	10.7	2.9	9.5	1.5	3.6	28.3	8.5	1.5	6.0	7.3	0.0
9:45 AM	0.0	8.5	0.0	0.8	18.3	24.7	2.4	23.5	8.8	10.1	2.5	9.4	1.9	3.4	31.3	8.1	1.9	7.8	6.9	0.0
10:00 AM	0.0	7.5	0.0	0.8	16.3	16.5	2.6	19.9	5.9	10.3	2.8	10.4	1.0	2.9	33.8	7.1	1.0	6.2	7.0	0.0
10:15 AM	0.0	7.5	0.0	1.3	14.1	20.3	2.8	20.6	4.6	8.6	4.3	9.4	2.0	4.2	32.9	8.0	2.0	4.8	4.9	0.0
10:30 AM	0.0	7.5	0.0	0.5	14.1	16.4	2.9	24.2	6.7	8.8	4.2	10.5	1.2	3.2	39.7	8.4	1.2	5.1	6.5	0.0
10:45 AM	0.0	9.4	0.0	0.7	15.0	24.5	2.7	22.6	5.1	8.6	1.5	10.9	1.5	2.8	42.1	7.9	1.5	9.9	7.4	0.0
11:00 AM	0.0	8.8	0.0	0.7	11.6	16.4	3.5	23.9	7.5	10.7	2.1	9.5	1.7	3.9	32.9	8.8	1.7	6.1	6.4	0.0
11:15 AM	0.0	17.8	0.0	1.2	13.0	23.8	6.6	18.8	12.1	10.2	4.6	4.6	2.8	5.1	54.4	8.2	2.8	12.3	8.0	0.0
11:30 AM	0.0	12.9	0.0	1.3	11.8	18.3	3.5	20.2	7.7	6.3	8.9	4.1	1.8	5.5	57.0	9.0	1.8	13.3	5.6	0.0
11:45 AM	0.0	11.8	0.0	1.4	10.7	28.6	2.9	24.5	40.5	4.4	6.8	3.9	2.7	6.3	51.5	8.7	2.7	17.9	7.1	0.0
12:00 PM	0.0	12.5	0.0	1.4	12.0	18.9	3.3	18.5	20.2	6.3	8.0	3.8	2.1	5.9	52.5	10.9	2.1	16.8	6.5	0.0
12:15 PM	0.0	12.4	0.0	1.3	12.2	21.5	3.5	20.9	11.5	4.5	4.9	3.6	2.4	5.4	51.4	9.7	2.4	12.7	6.9	0.0
12:30 PM	0.0	12.0	0.0	1.6	11.7	18.9	4.6	17.9	34.4	7.7	6.0	5.4	1.6	6.1	54.8	8.6	1.6	18.2	6.2	0.0
12:45 PM	0.0	13.8	0.0	1.3	13.4	19.2	3.7	19.5	16.6	7.3	11.9	4.8	1.9	5.9	56.4	8.8	1.9	14.6	6.8	0.0
1:00 PM	0.0	10.9	0.0	1.2	11.2	19.2	3.6	18.4	8.8	4.5	7.5	4.2	1.8	6.3	57.2	10.3	1.8	13.6	7.0	0.0
1:15 PM	0.0	13.0	0.0	0.9	10.9	16.9	4.4	18.7	9.0	7.7	6.2	4.1	1.6	5.3	47.8	8.9	1.6	10.1	6.9	0.0
1:30 PM	0.0	12.1	0.0	1.7	11.8	18.9	5.4	15.8	19.4	5.7	7.8	3.5	2.0	5.2	56.7	8.6	2.0	14.6	7.1	0.0
1:45 PM	0.0	11.7	0.0	1.6	12.8	21.0	4.0	21.4	9.7	8.6	6.3	3.8	1.7	5.6	57.2	9.4	1.7	13.0	7.6	0.0
2:00 PM	0.0	12.1	0.0	1.1	10.9	20.0	3.8	14.8	12.9	5.4	7.0	4.2	1.4	5.1	55.8	8.8	1.4	12.4	7.3	0.0
2:15 PM	0.0	12.8	0.0	1.3	11.1	19.1	4.4	17.8	10.4	5.6	6.3	3.2	1.9	5.2	49.0	10.4	1.9	14.8	5.7	0.0
2:30 PM	0.0	15.3	0.6	1.3	12.0	26.8	3.1	22.3	29.9	7.5	5.7	6.9	1.3	4.9	52.7	10.3	1.3	16.2	7.8	0.0
2:45 PM	0.0	4.7	0.0	0.9	12.5	27.6	2.2	26.0	36.3	12.3	2.8	13.3	1.9	2.0	40.7	12.6	1.9	12.5	6.9	0.0
3:00 PM	0.0	5.4	0.8	0.7	7.9	19.6	1.7	24.9	13.4	9.3	2.6	18.2	1.4	2.2	58.8	11.3	1.4	10.5	7.3	0.0
3:15 PM	0.0	6.2	0.9	0.9	9.3	18.2	1.9	29.0	15.7	9.8	2.3	13.6	1.6	2.1	49.7	10.1	1.6	10.6	8.6	0.0
3:30 PM	0.0	5.9	1.0	0.6	11.1	15.5	2.9	28.2	18.1	10.4	3.5	14.4	1.7	1.9	58.5	11.2	1.7	10.6	8.7	0.0
3:45 PM	0.0	5.5	1.6	0.9	12.0	76.1	3.7	28.0	19.9	19.8	5.3	16.1	0.0	3.9	70.3	9.9	0.0	12.8	10.6	0.0
4:00 PM	0.0	8.2	1.0	1.3	13.4	36.0	2.9	31.4	17.9	21.0	6.3	11.7	0.0	3.6	66.3	9.9	0.0	6.2	10.8	0.0
4:15 PM	0.0	9.2	1.5	1.0	9.7	29.8	2.6	33.9	17.1	23.8	4.4	12.1	0.0	4.8	71.5	10.7	0.0	8.4	10.4	0.0
4:30 PM	0.0	7.5	0.9	1.2	10.5	41.0	3.0	31.8	22.3	19.0	6.8	10.3	0.0	4.2	71.9	14.7	0.0	7.2	10.1	0.0
4:45 PM	6.7	8.1	1.1	1.5	13.2	33.3	3.5	38.1	20.3	25.4	9.0	13.7	0.0	5.5	68.2	17.5	0.0	7.1	12.1	0.0
5:00 PM	0.7	8.0	1.2	1.7	26.4	60.1	3.3	32.6	26.3	19.7	7.6	17.1	0.0	5.5	71.4	20.0	0.0	8.1	11.7	0.0
5:15 PM	8.4	9.5	1.4	1.6	10.8	39.5	3.2	32.7	31.5	23.1	7.6	12.8	0.0	4.4	72.3	19.7	0.0	7.8	10.7	0.0
5:30 PM	1.0	9.4	1.0	1.7	10.7	41.5	2.9	32.7	18.3	17.6	8.5	15.5	0.0	5.3	71.4	19.0	0.0	8.3	8.7	0.0
5:45 PM	0.0	7.8	1.6	1.3	10.8	39.3	3.4	32.8	6.7	19.9	6.5	12.4	0.0	4.0	70.2	12.3	0.0	9.4	10.6	0.0
6:00 PM	1.4	7.2	1.7	1.1	10.0	26.4	3.0	30.9	4.9	20.0	5.1	12.1	0.0	4.1	63.0	12.1	0.0	10.1	9.5	0.0
6:15 PM	0.0	8.3	1.3	0.9	11.4	25.0	3.1	27.2	9.7	12.1	7.0	4.8	1.3	6.2	48.9	10.4	1.3	18.0	8.0	0.0
6:30 PM	0.0	5.3	2.3	0.9	9.6	18.7	2.4	26.7	8.0	6.4	5.5	3.8	1.4	5.0	47.6	8.2	1.4	12.2	7.0	0.0
6:45 PM	0.0	13.2	0.0	1.2	9.8	20.3	10.8	21.9	8.8	8.1	4.9	3.5	2.2	5.4	41.9	8.0	2.2	11.7	7.4	0.0

Figure 15: Congestion map for the westbound of TH7

(3) Minor Approaches

	Hazeltine	Oak	Christma	Old Mark	Vinehill	CR101	Tonkawo	Williston	Shady Oa	17th Ave	12th Ave	5th Ave	169 W.R.	169 E.R.	Blake	Texas	Louisiana	100 W.R.	100 E.R.
5:00 AM	0.0	17.9	0.0	0.0	0.0	0.0	0.0	23.8	57.8	0.0	0.0	60.3	17.7	53.1	0.0	0.0	0.0	37.4	94.0
5:15 AM	0.0	13.1	0.0	0.0	0.0	0.0	0.0	19.1	44.1	32.4	6.2	41.2	13.6	28.8	0.0	0.0	0.0	43.5	112.2
5:30 AM	0.0	24.9	0.0	0.0	0.0	0.0	0.0	45.0	27.1	23.4	0.0	39.4	8.1	32.1	0.0	8.2	8.2	26.1	58.6
5:45 AM	0.0	24.9	0.0	0.0	0.0	0.0	0.0	29.9	28.3	28.3	0.0	21.2	8.0	22.3	0.0	0.0	0.0	20.8	54.7
6:00 AM	0.0	24.8	0.0	0.0	16.8	0.0	0.0	34.3	52.4	49.1	67.5	30.0	24.6	25.6	0.0	22.7	22.7	47.0	105.2
6:15 AM	0.0	22.1	0.0	0.0	19.5	0.0	0.0	39.4	50.8	49.8	50.9	25.4	29.2	26.5	0.0	22.9	22.9	51.0	82.1
6:30 AM	10.2	22.6	0.0	79.4	81.6	57.8	56.6	58.8	58.5	59.5	70.2	34.4	32.8	29.9	0.0	17.7	17.7	69.4	107.1
6:45 AM	18.5	23.3	0.0	122.0	93.0	57.9	45.8	58.2	59.6	59.6	66.1	30.7	37.5	29.9	0.0	16.9	16.9	55.9	107.2
7:00 AM	24.9	22.5	0.0	126.2	99.4	86.0	76.7	58.2	77.1	75.2	87.4	54.0	49.7	42.4	0.0	40.3	40.3	92.2	136.4
7:15 AM	38.0	21.5	4.9	118.4	100.6	92.8	82.7	48.4	72.3	80.2	84.1	42.0	50.6	42.4	0.0	34.9	34.9	91.2	133.6
7:30 AM	41.2	23.2	14.4	116.2	95.2	95.4	79.4	57.1	78.4	79.5	86.2	42.9	50.4	42.4	73.1	41.3	41.3	88.2	146.0
7:45 AM	41.9	23.5	5.0	118.2	96.8	88.9	83.8	54.4	65.7	76.5	87.0	43.7	49.2	42.4	68.5	41.5	41.5	94.4	181.7
8:00 AM	37.3	23.6	18.1	118.9	102.6	93.4	105.4	54.4	73.6	80.0	88.4	42.2	49.2	42.3	67.7	41.3	41.3	87.6	183.4
8:15 AM	36.2	21.3	5.0	115.3	95.1	93.1	76.6	59.9	63.1	77.5	85.6	44.2	50.7	42.2	59.5	35.0	35.0	90.1	173.0
8:30 AM	35.3	24.9	5.9	86.1	66.6	58.6	40.0	41.1	50.8	58.2	61.8	41.2	37.5	29.9	39.9	23.1	23.1	61.1	144.9
8:45 AM	35.5	22.7	6.7	81.5	71.5	59.3	62.0	42.7	57.8	58.5	64.0	41.5	32.8	29.9	42.9	25.4	25.4	59.8	125.4
9:00 AM	32.1	21.6	3.3	79.3	64.6	58.9	65.6	38.4	56.6	58.7	64.7	38.8	29.4	29.9	51.9	20.5	20.5	58.3	98.5
9:15 AM	33.8	22.7	6.8	83.3	61.4	57.4	51.6	38.7	51.8	56.4	63.9	42.8	32.8	29.6	42.7	17.7	17.7	67.5	118.8
9:30 AM	33.7	22.4	6.7	79.1	59.8	51.7	30.7	43.1	47.1	48.6	55.3	35.8	22.7	24.5	38.2	21.0	21.0	63.0	121.4
9:45 AM	33.9	22.1	0.0	52.5	38.1	29.1	13.4	28.5	47.9	48.6	53.9	29.6	25.7	24.9	41.5	22.5	22.5	65.4	106.3
10:00 AM	33.5	21.3	0.0	50.4	37.3	26.5	3.8	29.5	47.5	48.6	60.2	25.4	22.7	24.9	40.9	20.4	20.4	65.9	101.8
10:15 AM	33.1	20.9	0.0	57.3	36.5	26.5	18.5	24.7	48.8	47.5	56.7	24.8	23.3	24.9	44.1	20.0	20.0	60.5	109.4
10:30 AM	31.0	20.7	0.0	55.8	36.5	28.1	0.0	25.5	46.2	49.1	54.4	25.5	23.4	24.9	41.9	20.7	20.7	54.0	135.8
10:45 AM	33.7	22.7	0.0	56.4	37.9	33.5	22.7	25.3	50.1	47.9	60.1	25.8	26.2	24.9	44.1	23.0	23.0	64.0	105.7
11:00 AM	34.4	22.7	0.0	53.9	40.0	33.2	10.9	27.8	46.9	44.5	61.2	26.0	26.9	24.9	43.6	22.2	22.2	61.6	103.1
11:15 AM	33.9	32.7	1.6	68.2	52.9	43.2	23.9	34.3	53.5	56.6	71.8	29.9	33.3	29.4	57.6	27.3	27.3	60.5	120.7
11:30 AM	33.1	29.9	0.0	58.2	50.7	42.6	33.7	30.6	50.1	56.5	65.9	30.4	32.0	29.8	54.1	28.8	28.8	66.5	115.9
11:45 AM	33.7	28.1	17.2	66.6	56.6	44.7	26.5	33.1	56.7	56.7	66.0	33.4	32.7	29.8	55.6	29.4	29.4	66.4	126.2
12:00 PM	34.9	29.3	2.2	66.4	54.1	43.5	34.0	31.6	54.1	56.5	63.0	33.2	31.9	29.8	54.5	28.7	28.7	69.3	113.3
12:15 PM	33.0	28.2	0.0	68.3	54.3	38.7	30.3	31.6	49.6	56.5	69.9	36.1	28.9	29.9	54.8	29.9	29.9	65.6	140.0
12:30 PM	35.3	28.2	4.4	66.1	57.5	45.1	41.3	32.4	51.0	51.8	71.8	33.5	30.9	29.2	54.3	28.9	28.9	70.3	120.2
12:45 PM	34.1	28.2	12.2	66.2	55.3	48.0	42.4	31.4	50.0	52.4	60.9	37.9	31.7	29.9	55.2	30.7	30.7	63.4	144.2
1:00 PM	32.6	28.1	5.4	62.9	50.9	41.7	33.0	31.6	50.9	56.6	63.7	33.2	32.1	29.8	54.5	31.5	31.5	63.0	125.7
1:15 PM	35.1	28.2	2.7	66.3	55.5	40.0	17.7	29.5	51.1	54.2	64.2	40.8	34.3	29.9	53.9	27.1	27.1	61.0	122.7
1:30 PM	34.0	28.3	0.0	66.6	55.7	43.0	32.1	29.8	57.3	56.6	71.6	34.3	32.0	29.7	55.2	23.9	23.9	68.6	123.0
1:45 PM	35.3	28.2	2.7	66.3	56.2	40.0	41.8	32.4	51.8	53.9	71.7	41.0	30.9	29.8	58.3	28.9	28.9	72.4	128.2
2:00 PM	34.2	28.2	5.1	65.2	54.7	42.8	44.2	32.1	46.2	56.3	67.1	34.2	30.1	29.5	56.0	28.9	28.9	62.2	129.7
2:15 PM	35.2	29.5	11.9	68.5	55.7	40.5	18.0	33.4	53.3	56.6	74.2	34.3	31.2	29.9	56.7	29.1	29.1	60.3	124.9
2:30 PM	35.2	37.5	3.2	68.1	57.5	50.9	41.0	32.8	52.6	58.5	64.4	38.3	36.7	29.9	63.0	30.0	30.0	71.5	167.6
2:45 PM	37.6	44.3	27.6	81.6	73.8	64.4	75.2	52.1	61.1	69.0	77.0	38.2	43.1	34.7	65.3	34.6	34.6	71.6	191.2
3:00 PM	36.9	49.1	19.4	84.9	74.7	62.6	75.2	45.0	61.8	68.5	70.2	36.0	38.8	34.6	65.7	37.4	37.4	72.7	178.9
3:15 PM	37.7	53.9	15.5	81.3	75.9	64.8	74.3	39.9	56.9	68.5	70.7	38.8	38.8	34.9	66.0	33.3	33.3	72.8	161.4
3:30 PM	39.1	52.7	26.0	83.0	79.1	63.0	77.9	47.0	57.2	66.1	72.4	36.5	43.7	51.0	66.2	38.4	38.4	77.3	149.7
3:45 PM	43.3	58.2	27.8	108.1	90.9	88.3	102.7	64.2	88.8	76.9	89.7	44.1	56.1	58.0	83.1	54.4	54.4	108.2	212.3
4:00 PM	34.9	62.2	33.6	104.5	85.2	88.5	97.7	60.9	65.2	78.2	85.7	45.0	48.4	54.3	80.1	60.4	60.4	92.7	215.5
4:15 PM	41.8	55.3	30.0	101.4	84.7	87.4	100.7	63.2	67.7	78.9	89.2	45.1	48.5	57.0	84.3	60.2	60.2	92.3	217.3
4:30 PM	38.2	59.2	34.0	102.2	89.0	88.6	101.2	63.9	86.2	79.6	85.2	45.1	52.8	62.2	79.0	67.9	67.9	92.2	199.7
4:45 PM	43.6	63.1	31.9	99.9	92.7	89.2	97.6	62.7	73.8	74.6	85.2	48.6	52.8	62.5	79.9	61.3	61.3	91.4	207.6
5:00 PM	41.6	66.6	33.8	96.2	88.0	84.3	100.8	59.9	64.3	76.7	87.7	48.6	48.4	58.0	79.1	56.1	56.1	88.3	222.5
5:15 PM	40.1	61.0	34.4	98.3	85.3	84.9	99.9	63.2	73.4	76.9	77.5	45.3	52.8	61.0	80.2	63.2	63.2	89.4	206.7
5:30 PM	41.6	60.1	26.2	98.3	86.8	88.2	97.6	63.0	67.5	77.8	85.5	44.5	53.8	58.5	80.1	60.4	60.4	89.4	192.8
5:45 PM	42.5	61.3	28.3	101.9	88.5	88.1	97.6	59.6	71.9	76.2	88.2	44.8	48.4	58.5	82.8	61.7	61.7	96.5	195.4
6:00 PM	39.5	60.9	33.3	99.7	79.5	84.1	91.2	55.4	66.9	74.3	89.9	39.8	48.4	44.2	79.0	47.1	47.1	84.1	238.6
6:15 PM	36.3	43.9	26.2	83.9	74.4	60.5	78.6	44.1	48.8	55.8	64.3	36.2	33.4	29.9	52.8	27.1	27.1	57.7	127.5
6:30 PM	32.9	37.6	17.8	85.5	71.0	57.4	75.2	39.8	51.8	55.7	66.5	40.9	29.0	29.9	54.0	28.6	28.6	62.6	132.5
6:45 PM	33.1	28.1	1.8	63.7	54.4	43.2	23.7	32.2	52.6	51.2	72.0	35.9	31.0	29.7	53.8	25.6	25.6	58.3	128.1

Figure 16: Congestion map for the minor approaches of TH7

(4) All Approaches

	Hazeltine	Oak	Christma	Old Mark	Vinehill	CR101	Tonkawoi	Williston	Shady Oa	17th Ave	12th Ave	5th Ave	169 W.R.	169 E.R.	Blake	Texas	Louisiana	100 W.R.	100 E.R.	
5:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0
5:15 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	0.0
5:30 AM	0.0	4.5	0.0	0.0	0.0	0.0	0.0	7.4	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.9
5:45 AM	0.0	3.7	0.0	0.0	1.0	0.0	0.0	11.0	5.2	4.9	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	5.9	5.8
6:00 AM	0.0	3.3	0.0	0.0	1.9	5.3	0.0	8.2	34.6	11.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5
6:15 AM	0.0	4.4	0.0	0.4	3.8	5.6	0.4	11.7	27.4	20.0	0.0	11.1	1.4	0.7	8.7	1.6	1.6	0.0	0.0	11.6
6:30 AM	0.0	7.9	0.5	0.3	7.0	39.6	3.2	33.1	40.5	29.8	3.4	9.9	0.0	3.8	14.0	2.6	2.6	1.0	13.6	13.6
6:45 AM	3.5	8.2	0.6	0.7	18.5	50.1	3.7	26.9	43.3	26.0	3.8	13.6	0.7	3.6	10.2	2.4	2.4	1.3	13.6	13.6
7:00 AM	3.1	9.8	0.8	0.6	20.4	54.3	3.4	42.7	51.0	55.9	10.1	14.5	1.8	4.6	24.5	4.1	4.1	6.4	13.2	13.2
7:15 AM	14.2	11.0	1.2	1.4	41.9	68.8	5.6	28.5	52.0	59.7	12.7	9.8	1.3	6.6	34.5	2.9	2.9	7.7	13.0	13.0
7:30 AM	13.2	11.3	0.8	0.9	58.1	77.2	7.2	26.2	52.9	58.7	10.3	13.0	1.1	6.6	48.8	4.1	4.1	7.9	13.0	13.0
7:45 AM	17.3	14.1	0.8	3.7	64.1	77.5	9.7	28.7	48.0	56.0	15.2	17.1	0.9	6.9	46.3	5.7	5.7	9.4	12.8	12.8
8:00 AM	16.9	9.9	1.0	0.8	66.2	77.2	9.2	25.4	54.1	59.6	11.8	17.7	1.0	6.0	50.7	4.9	4.9	8.4	10.1	10.1
8:15 AM	15.6	14.1	1.3	1.9	46.1	74.0	7.8	33.6	49.4	51.6	11.1	13.9	1.0	5.8	47.4	4.5	4.5	7.9	10.3	10.3
8:30 AM	17.3	13.8	0.9	1.0	12.2	39.5	6.3	28.7	37.0	40.0	7.4	17.6	0.5	3.9	29.2	7.9	7.9	8.8	15.6	15.6
8:45 AM	18.9	14.2	1.1	0.8	40.9	50.4	5.1	26.5	43.5	38.6	8.8	14.0	0.7	4.2	29.2	6.9	6.9	9.9	11.4	11.4
9:00 AM	16.3	14.3	1.2	0.6	17.5	45.3	4.3	26.6	43.4	41.6	6.3	13.2	0.6	4.0	31.9	6.0	6.0	7.0	13.4	13.4
9:15 AM	16.1	13.2	1.1	1.1	17.1	40.4	4.7	21.2	38.5	31.6	5.4	15.0	0.7	4.0	29.2	6.7	6.7	6.5	13.0	13.0
9:30 AM	16.4	14.1	1.6	0.7	11.4	44.7	5.5	25.7	33.6	32.5	3.6	14.9	1.3	4.2	27.8	9.2	9.2	5.5	14.1	14.1
9:45 AM	19.5	12.8	0.6	1.1	16.0	24.9	2.3	24.6	32.5	29.1	3.1	15.7	1.5	3.8	27.4	9.3	9.3	6.8	13.9	13.9
10:00 AM	17.4	9.1	0.0	0.8	14.7	24.4	1.9	22.6	32.3	34.6	2.9	15.6	1.3	2.7	30.3	8.2	8.2	5.5	13.1	13.1
10:15 AM	16.5	8.5	0.0	1.6	11.7	24.4	2.3	19.6	35.2	30.8	4.0	12.4	1.6	4.2	33.5	8.1	8.1	4.3	12.5	12.5
10:30 AM	16.4	8.9	0.0	0.7	11.2	24.5	1.8	24.1	28.9	30.5	3.7	13.3	1.2	3.2	33.3	9.3	9.3	4.2	12.0	12.0
10:45 AM	18.7	11.3	0.5	0.8	14.3	24.7	2.7	23.5	35.0	31.0	2.5	14.7	1.3	2.6	37.6	9.0	9.0	8.9	14.1	14.1
11:00 AM	15.6	12.1	1.0	1.1	10.9	24.5	2.9	23.8	36.5	29.1	2.3	13.6	1.7	3.9	36.1	11.3	11.3	6.6	11.7	11.7
11:15 AM	18.1	20.3	1.4	1.7	14.7	28.7	4.3	27.2	40.8	40.0	5.2	18.3	2.2	5.1	48.5	9.5	9.5	9.0	16.4	16.4
11:30 AM	19.8	13.6	1.0	1.2	13.8	29.5	4.3	25.6	39.4	33.4	7.8	15.0	1.4	5.4	48.4	11.2	11.2	9.7	16.9	16.9
11:45 AM	21.2	12.8	1.0	2.2	15.1	35.7	3.7	29.5	44.0	35.7	6.8	22.9	2.5	6.0	48.2	9.7	9.7	10.6	15.4	15.4
12:00 PM	21.3	12.5	1.6	1.8	18.0	30.7	3.3	24.3	36.2	33.9	8.0	22.8	1.5	6.3	47.8	12.6	12.6	10.6	18.6	18.6
12:15 PM	19.1	12.9	1.2	1.3	12.5	29.7	4.6	26.5	37.6	37.7	5.8	15.3	1.9	5.4	48.5	12.1	12.1	9.8	15.0	15.0
12:30 PM	22.1	12.5	1.4	2.0	14.5	30.5	4.5	25.6	39.7	35.3	5.8	20.4	1.5	6.1	48.4	11.4	11.4	11.6	15.7	15.7
12:45 PM	22.4	14.4	2.3	1.8	14.5	32.3	4.1	28.4	38.9	37.8	12.2	20.0	1.8	5.8	50.5	12.4	12.4	10.6	14.0	14.0
1:00 PM	19.2	12.0	1.5	1.4	13.5	29.0	3.8	24.8	40.1	35.7	7.3	19.9	1.7	6.2	50.5	13.4	13.4	11.3	14.8	14.8
1:15 PM	19.2	13.4	1.3	1.2	11.6	28.9	3.8	25.3	35.3	37.8	6.2	16.4	1.6	5.8	48.4	12.1	12.1	8.7	15.5	15.5
1:30 PM	18.7	12.6	1.5	2.2	12.9	28.9	5.0	25.3	40.6	37.7	7.3	17.5	1.7	5.4	48.4	9.5	9.5	11.1	15.1	15.1
1:45 PM	20.6	12.5	1.8	1.5	19.9	29.8	4.8	24.1	37.0	35.7	5.4	16.2	1.6	5.5	51.7	11.2	11.2	11.0	19.6	19.6
2:00 PM	20.9	13.1	1.9	1.6	12.7	29.3	4.1	24.7	35.4	38.5	6.7	15.7	1.3	5.0	50.2	12.3	12.3	9.8	13.9	13.9
2:15 PM	19.3	13.0	2.1	1.6	12.5	28.9	3.6	22.1	38.8	34.1	5.7	15.1	1.4	5.2	48.7	12.6	12.6	10.7	14.0	14.0
2:30 PM	19.1	14.6	1.8	2.2	17.0	34.1	4.6	27.2	41.2	41.6	6.0	23.9	1.4	5.1	52.7	13.0	13.0	11.2	14.4	14.4
2:45 PM	22.5	7.2	2.3	2.6	29.5	59.5	7.8	35.1	46.7	50.6	3.0	17.2	2.1	2.2	54.4	14.2	14.2	10.9	13.5	13.5
3:00 PM	18.6	6.4	2.7	2.3	10.7	58.4	6.4	30.8	47.0	52.8	3.2	22.9	1.5	2.3	56.8	14.9	14.9	9.5	19.1	19.1
3:15 PM	21.6	8.0	2.3	3.5	26.8	59.3	6.2	36.2	47.1	52.8	3.7	20.8	1.8	2.2	54.4	11.6	11.6	10.3	16.6	16.6
3:30 PM	23.0	8.3	2.5	1.7	47.5	51.4	7.0	32.9	50.4	51.4	4.0	20.3	1.7	2.1	56.8	17.5	17.5	10.9	17.9	17.9
3:45 PM	24.7	8.4	2.5	5.9	66.2	83.1	22.2	47.6	59.6	62.0	5.6	32.6	0.7	4.4	73.4	30.5	30.5	11.4	15.3	15.3
4:00 PM	21.8	9.7	2.7	5.9	56.5	83.2	22.2	44.4	56.8	56.2	7.6	33.8	0.5	4.0	72.9	23.5	23.5	8.2	17.0	17.0
4:15 PM	26.6	14.8	2.9	7.0	44.4	81.2	28.1	43.0	60.5	63.7	7.4	36.0	0.4	5.0	73.5	19.0	19.0	8.5	17.6	17.6
4:30 PM	25.1	8.7	2.5	4.9	50.5	82.4	24.4	48.7	64.6	62.0	8.7	36.2	0.5	5.0	72.8	24.8	24.8	9.4	17.6	17.6
4:45 PM	28.8	10.5	3.1	8.9	63.4	81.2	24.3	44.6	59.9	60.0	15.1	36.5	0.4	6.1	72.9	29.0	29.0	10.0	16.4	16.4
5:00 PM	28.1	8.9	2.9	6.8	55.4	81.6	21.4	41.9	60.6	64.3	10.5	35.8	0.5	6.4	71.4	26.6	26.6	10.1	15.2	15.2
5:15 PM	29.1	10.4	2.7	6.5	61.6	81.8	21.5	43.1	61.1	65.0	9.9	37.6	0.4	5.4	72.4	26.5	26.5	9.8	15.9	15.9
5:30 PM	29.1	10.0	2.5	6.8	61.2	83.0	20.1	46.0	59.1	59.9	9.5	34.1	0.5	6.4	72.4	26.3	26.3	10.4	15.7	15.7
5:45 PM	25.8	9.4	3.2	4.6	61.5	81.4	28.8	44.5	58.3	54.1	7.7	35.5	0.5	4.7	72.8	22.9	22.9	10.2	12.8	12.8
6:00 PM	24.9	8.4	3.7	5.6	49.1	79.4	26.8	37.8	56.6	62.6	6.6	31.5	0.6	4.9	67.3	17.8	17.8	10.1	10.2	10.2
6:15 PM	23.5	10.0	2.9	3.0	31.3	54.8	8.5	33.9	32.0	40.2	7.4	16.6	1.6	6.2	47.5	12.6	12.6	13.1	12.7	12.7
6:30 PM	20.0	7.4	3.4	2.2	11.8	39.1	6.6	31.8	35.8	34.6	5.2	17.8	1.2	5.1	47.7	11.6	11.6	9.2	13.0	13.0
6:45 PM	18.4	14.6	2.1	1.7	10.8	28.9	5.8	25.3	39.3	35.4	5.3	16.5	1.5	5.3	45.9	10.2	10.2	9.1	11.4	11.4

Figure 17: Congestion map for all the approaches of TH7

4.4 TH 10 Congestion Maps

(1) Mainline – Eastbound

	Armstrong	Ramsey	Sunfish	Thurston	Fairoak
5:00 AM	5.1	3.5	1.5	2.9	2.3
5:15 AM	8.5	6.4	1.8	4.4	1.8
5:30 AM	7.9	7.4	2.2	5.0	2.1
5:45 AM	10.8	5.9	2.8	5.0	2.6
6:00 AM	10.6	7.5	4.4	6.0	3.6
6:15 AM	14.5	3.8	13.8	22.7	6.2
6:30 AM	11.3	6.0	28.4	24.6	8.0
6:45 AM	15.7	13.6	36.0	23.3	7.1
7:00 AM	13.7	6.2	31.7	21.1	5.0
7:15 AM	11.9	8.0	31.7	25.5	7.8
7:30 AM	17.5	6.3	30.8	25.3	5.8
7:45 AM	17.1	10.6	27.5	20.4	6.2
8:00 AM	17.9	8.8	10.2	20.6	5.3
8:15 AM	13.9	7.0	4.2	12.1	4.3
8:30 AM	15.0	6.6	5.1	10.3	4.9
8:45 AM	13.5	4.1	5.2	11.6	5.9
9:00 AM	14.0	6.4	6.6	9.0	5.6
9:15 AM	13.3	3.6	4.7	9.2	5.6
9:30 AM	15.1	6.7	5.0	10.2	6.1
9:45 AM	14.2	4.6	5.3	9.6	5.0
10:00 AM	11.7	8.2	5.5	10.1	11.1
10:15 AM	11.9	4.2	4.7	7.7	9.2
10:30 AM	11.2	6.7	5.9	8.7	9.4
10:45 AM	13.6	4.4	4.5	12.5	14.8
11:00 AM	13.0	4.8	6.1	11.9	13.0
11:15 AM	14.0	4.2	6.2	11.4	12.5
11:30 AM	16.8	8.4	7.5	16.0	13.8
11:45 AM	16.6	7.6	6.5	18.2	22.7
12:00 PM	13.5	7.5	6.7	14.1	13.8
12:15 PM	12.8	7.5	6.1	12.1	11.0
12:30 PM	14.3	7.4	5.6	12.9	11.1
12:45 PM	14.7	4.2	6.2	10.0	9.2
1:00 PM	14.7	3.1	25.9	12.0	4.5
1:15 PM	15.6	6.4	29.2	11.0	5.4
1:30 PM	13.7	9.0	27.5	10.7	4.8
1:45 PM	14.4	6.2	27.7	12.6	4.6
2:00 PM	12.4	5.7	31.7	14.5	7.7
2:15 PM	14.5	10.3	24.9	25.5	7.8
2:30 PM	12.9	17.4	24.0	21.9	7.1
2:45 PM	13.1	28.3	24.7	23.6	8.1
3:00 PM	13.0	18.0	22.4	21.7	7.4
3:15 PM	14.8	14.7	26.3	18.4	7.5
3:30 PM	13.0	15.8	29.6	24.6	8.4
3:45 PM	13.6	22.7	26.6	21.7	12.1
4:00 PM	13.4	28.1	26.9	23.6	9.8
4:15 PM	13.3	16.9	25.4	23.8	8.1
4:30 PM	14.9	16.1	27.5	21.9	12.5
4:45 PM	14.7	18.5	28.8	22.6	31.0
5:00 PM	13.1	20.3	28.0	25.5	28.2
5:15 PM	16.9	25.2	24.5	23.6	15.3
5:30 PM	14.4	19.8	23.5	24.8	10.3
5:45 PM	11.8	14.2	25.6	19.0	6.2
6:00 PM	12.3	15.3	19.4	19.7	7.1
6:15 PM	10.7	19.9	18.4	17.3	6.3
6:30 PM	8.6	13.5	12.9	16.7	5.7
6:45 PM	9.8	12.6	9.2	14.7	5.9

Figure 18: Congestion map for the eastbound of TH10

(2) Mainline – Westbound

	Armstrong	Ramsey	Sunfish	Thurston	Fairoak
5:00 AM	3.9	3.3	6.2	2.3	4.9
5:15 AM	5.3	3.4	11.2	3.3	8.5
5:30 AM	5.6	5.3	12.6	3.2	10.6
5:45 AM	6.2	4.1	15.8	4.0	9.4
6:00 AM	4.9	4.4	18.9	3.5	5.2
6:15 AM	7.0	5.1	20.0	3.9	11.9
6:30 AM	12.6	13.9	34.5	4.1	11.4
6:45 AM	14.0	10.8	26.4	5.3	15.1
7:00 AM	14.1	6.7	30.8	4.2	12.1
7:15 AM	18.6	19.1	40.4	5.2	13.6
7:30 AM	20.2	13.1	42.9	6.6	14.9
7:45 AM	19.5	15.2	41.7	11.0	16.1
8:00 AM	14.2	9.9	29.0	5.1	9.6
8:15 AM	13.5	7.6	18.2	4.5	16.9
8:30 AM	29.3	18.0	3.0	7.4	12.4
8:45 AM	25.0	10.7	5.0	9.0	9.9
9:00 AM	25.7	10.9	3.0	7.7	10.5
9:15 AM	25.8	14.5	2.5	9.0	2.3
9:30 AM	24.8	9.6	1.6	9.9	7.0
9:45 AM	28.1	13.9	2.2	7.9	10.4
10:00 AM	5.2	4.4	4.3	10.6	17.3
10:15 AM	6.8	3.2	5.2	11.3	6.5
10:30 AM	4.5	3.6	4.7	11.2	11.5
10:45 AM	7.4	2.9	4.6	13.1	12.1
11:00 AM	6.9	4.1	5.3	13.0	17.4
11:15 AM	6.4	4.7	4.7	11.6	15.1
11:30 AM	4.7	5.4	6.9	13.7	16.6
11:45 AM	5.9	5.5	6.5	15.0	13.4
12:00 PM	5.4	7.5	6.1	14.4	19.4
12:15 PM	4.8	7.6	5.9	12.9	14.8
12:30 PM	5.5	4.4	6.4	13.7	14.3
12:45 PM	5.5	4.1	6.9	14.4	19.9
1:00 PM	8.6	2.6	3.6	7.6	22.1
1:15 PM	7.6	3.8	2.5	6.6	20.6
1:30 PM	4.7	3.2	2.9	6.7	20.1
1:45 PM	7.1	1.4	3.1	6.5	19.7
2:00 PM	5.6	2.6	4.8	8.7	23.3
2:15 PM	5.4	4.2	4.7	3.1	34.9
2:30 PM	8.9	3.5	4.7	3.7	37.2
2:45 PM	4.7	3.6	6.0	4.0	40.7
3:00 PM	5.6	3.8	6.8	4.4	45.0
3:15 PM	10.1	4.7	5.8	4.7	47.4
3:30 PM	7.1	2.6	10.6	5.7	23.1
3:45 PM	6.0	2.5	7.7	6.2	48.0
4:00 PM	11.4	5.7	17.7	6.9	42.2
4:15 PM	6.0	6.2	8.2	7.6	48.4
4:30 PM	15.0	4.8	9.7	7.0	46.6
4:45 PM	6.1	3.2	6.4	7.8	46.9
5:00 PM	12.6	3.6	8.9	6.3	41.3
5:15 PM	11.7	3.7	6.3	5.7	41.5
5:30 PM	9.8	3.0	4.4	6.0	32.5
5:45 PM	8.9	2.7	4.6	4.8	44.9
6:00 PM	6.8	1.5	4.9	3.5	35.0
6:15 PM	5.0	0.8	3.2	3.3	28.8
6:30 PM	5.4	0.6	2.9	2.1	26.2
6:45 PM	8.4	1.2	2.4	1.7	35.7

Figure 19: Congestion map for the westbound of TH10

(3) Minor Approaches

	Armstrong	Ramsey	Sunfish	Thurston	Fairoak
5:00 AM	64.4	0.0	67.1	0.0	53.3
5:15 AM	65.9	0.0	72.3	0.0	53.2
5:30 AM	76.3	68.5	75.1	0.0	53.3
5:45 AM	73.6	73.9	71.1	0.0	49.2
6:00 AM	70.8	0.0	65.0	27.6	50.0
6:15 AM	62.1	0.0	70.4	44.9	55.3
6:30 AM	77.8	0.0	61.3	63.8	67.7
6:45 AM	74.4	0.0	67.5	62.3	75.3
7:00 AM	64.2	61.6	67.2	62.6	72.3
7:15 AM	71.9	71.5	66.6	60.0	80.0
7:30 AM	72.8	67.8	65.6	62.5	77.8
7:45 AM	75.7	57.5	71.1	59.1	72.6
8:00 AM	72.4	0.0	66.6	57.8	78.1
8:15 AM	80.4	0.0	68.8	50.1	75.2
8:30 AM	66.1	0.0	55.0	44.3	54.8
8:45 AM	63.3	0.0	53.1	40.6	57.9
9:00 AM	63.6	0.0	55.8	45.6	60.6
9:15 AM	64.5	0.0	53.9	0.0	63.3
9:30 AM	63.3	0.0	58.7	0.0	54.5
9:45 AM	64.7	0.0	53.8	43.8	63.3
10:00 AM	56.1	0.0	44.6	0.0	51.8
10:15 AM	55.9	0.0	33.5	0.0	51.8
10:30 AM	57.1	0.0	48.1	0.0	44.2
10:45 AM	55.5	0.0	49.8	6.9	47.1
11:00 AM	55.3	0.0	38.8	40.5	45.0
11:15 AM	55.3	0.0	41.4	37.7	50.0
11:30 AM	55.3	0.0	44.5	44.4	44.6
11:45 AM	56.6	0.0	45.1	48.7	47.1
12:00 PM	55.3	28.4	48.1	46.4	42.9
12:15 PM	55.3	0.0	44.7	43.7	49.5
12:30 PM	55.3	0.0	49.5	43.5	44.0
12:45 PM	55.3	0.0	44.4	40.8	45.7
1:00 PM	66.0	0.0	55.5	46.7	51.0
1:15 PM	65.3	52.7	53.6	49.3	47.4
1:30 PM	65.3	0.0	55.3	41.0	50.8
1:45 PM	65.3	0.0	51.3	47.0	57.6
2:00 PM	65.3	0.0	52.1	49.6	56.2
2:15 PM	77.9	0.0	70.2	65.5	52.2
2:30 PM	76.9	0.0	73.0	64.4	48.7
2:45 PM	73.7	0.0	73.4	67.1	48.7
3:00 PM	81.3	66.6	66.1	62.7	48.7
3:15 PM	79.2	62.1	66.8	62.5	48.5
3:30 PM	78.9	71.0	63.5	65.4	46.4
3:45 PM	79.2	0.0	71.5	65.8	42.5
4:00 PM	78.3	71.3	68.8	66.4	43.7
4:15 PM	79.1	80.3	73.7	64.8	44.2
4:30 PM	76.3	69.1	64.3	65.3	45.0
4:45 PM	81.1	0.0	73.2	65.4	45.1
5:00 PM	75.4	71.8	65.8	66.2	42.2
5:15 PM	73.2	70.5	72.1	64.6	42.9
5:30 PM	79.2	83.1	72.5	68.3	48.6
5:45 PM	79.2	61.9	76.9	69.1	46.1
6:00 PM	79.2	0.0	74.5	67.4	52.1
6:15 PM	80.1	0.0	69.9	64.9	52.3
6:30 PM	82.1	0.0	68.9	69.0	52.1
6:45 PM	75.4	50.2	72.2	60.5	49.7

Figure 20: Congestion map for the minor approaches of TH10

(4) All Approaches

	Armstrong	Ramsey	Sunfish	Thurston	Fairoak
5:00 AM	5.2	2.4	3.0	0.0	1.2
5:15 AM	8.7	3.5	6.1	1.5	2.0
5:30 AM	9.8	6.5	10.3	2.9	2.4
5:45 AM	10.8	5.9	13.6	4.0	2.5
6:00 AM	11.5	4.5	17.5	4.9	4.0
6:15 AM	12.9	3.9	24.4	9.9	7.1
6:30 AM	16.5	8.2	37.5	20.9	11.2
6:45 AM	21.7	10.2	43.0	23.3	15.0
7:00 AM	23.7	7.5	41.9	22.5	14.0
7:15 AM	25.0	19.1	45.1	27.0	19.7
7:30 AM	32.5	11.7	45.2	31.3	16.0
7:45 AM	32.8	15.0	44.1	24.8	13.0
8:00 AM	25.4	7.9	33.9	18.0	11.6
8:15 AM	24.8	6.9	18.1	7.7	13.6
8:30 AM	32.3	7.9	5.9	9.3	9.0
8:45 AM	28.6	5.3	6.1	10.4	12.9
9:00 AM	29.0	9.7	6.7	9.0	15.5
9:15 AM	28.0	8.5	4.5	8.6	11.3
9:30 AM	26.1	7.1	4.6	10.0	12.1
9:45 AM	30.0	7.3	4.4	8.8	11.8
10:00 AM	13.9	3.8	5.4	9.4	19.6
10:15 AM	16.3	2.2	5.2	8.5	11.6
10:30 AM	15.4	3.1	6.0	9.1	13.4
10:45 AM	14.5	2.8	5.3	12.8	17.2
11:00 AM	16.7	4.1	6.1	15.0	19.2
11:15 AM	16.2	4.1	6.3	13.1	18.6
11:30 AM	20.1	6.6	9.1	17.9	23.3
11:45 AM	18.9	5.6	7.4	22.7	24.5
12:00 PM	15.6	7.7	7.9	18.5	22.3
12:15 PM	14.9	7.3	7.0	14.9	24.4
12:30 PM	15.7	6.2	7.4	15.6	17.5
12:45 PM	16.3	3.6	7.3	14.1	15.8
1:00 PM	21.1	2.8	19.7	11.2	20.0
1:15 PM	19.2	5.9	19.4	10.5	20.3
1:30 PM	18.0	4.1	15.9	9.5	19.9
1:45 PM	21.3	4.2	15.5	10.7	19.8
2:00 PM	16.2	3.3	28.2	14.8	30.2
2:15 PM	22.9	6.2	20.4	23.3	27.5
2:30 PM	23.2	7.1	23.2	21.2	29.9
2:45 PM	19.7	14.7	24.7	24.3	28.7
3:00 PM	20.9	12.0	22.4	20.6	29.2
3:15 PM	25.8	10.2	24.0	16.3	29.2
3:30 PM	18.0	9.7	36.2	28.0	29.7
3:45 PM	19.7	10.0	27.3	22.7	29.8
4:00 PM	20.5	27.4	31.0	27.3	29.3
4:15 PM	21.4	16.5	29.8	27.6	30.3
4:30 PM	29.5	12.8	33.0	30.9	32.1
4:45 PM	22.7	6.5	29.6	26.2	32.1
5:00 PM	22.6	12.4	30.7	30.7	33.2
5:15 PM	29.2	17.8	26.9	24.2	31.1
5:30 PM	22.1	11.7	24.7	28.8	32.0
5:45 PM	26.1	6.7	25.2	21.7	26.7
6:00 PM	23.5	6.7	21.4	19.6	29.2
6:15 PM	15.7	7.0	14.6	16.1	29.2
6:30 PM	16.5	2.5	10.2	11.9	27.5
6:45 PM	16.1	5.7	7.4	8.2	26.7

Figure 21: Congestion map for all the approaches of TH10

5. Congestion summary

The congestion summary of the 4 signalized corridors is presented in this section based on the congestion maps generated in Section 4. Table 3 summarizes the number of congested main approaches for both AM and PM peak period. One can see from both the congestion maps and summarized statistics in Table 3 that the four signalized corridors operate very efficiently during AM and PM peaks in general. Congestion only happens at some specific locations. In total, 13.5% of the main approaches are congested on the four corridors.

Table 3: AM Plus PM Approaches of Directional Congestion

	Number of Congested Approaches	Percentage* of Congested Approaches
Severe (> 2 Hrs.)	5	2.70%
Moderate (1-2 Hrs.)	8	4.30%
Low (< 1 Hr.)	12	6.50%
Total	25	13.50%

*Percentage is calculated by dividing the number of congested approaches by (92 main approaches*2). As can be seen in Table 1, there are 46 intersections and 92 main approaches in total.

(1) AM Peak period (5:00 ~ 10:00 AM)

Table 4: Number of congested approaches and duration during AM peak

	< 1 Hr. Congestion	1 ~ 2 Hrs. Congestion	2 ~ 3 Hrs. Congestion	>3 Hrs. Congestion
TH13_EB				
TH13_WB		1		
TH55_EB	2			
TH55_WB		1		
TH7_EB	1	1		
TH7_WB	1	1		
TH10_EB	1			
TH10_WB	1			
Total	6	4	0	0

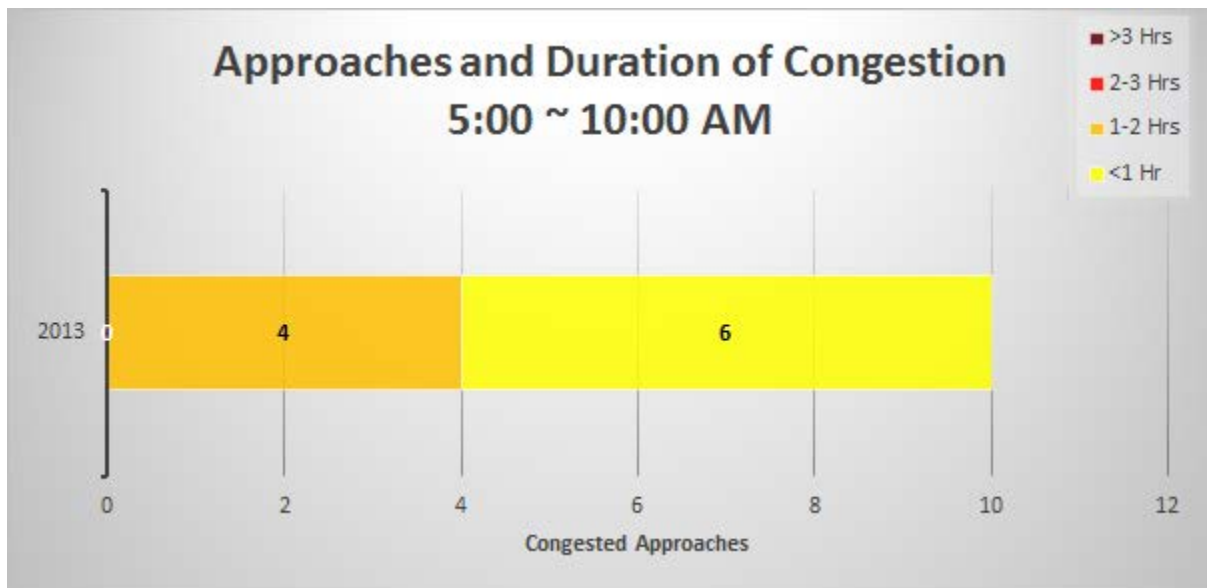


Figure 22: Number of congested approaches and duration during AM peak

(2) PM Peak Period (2:00 ~ 7:00 PM)

Table 5: Number of congested approaches and duration during PM peak

	< 1 Hr. Congestion	1 ~ 2 Hrs. Congestion	2 ~ 3 Hrs. Congestion	>3 Hrs. Congestion
TH13_EB	1			
TH13_WB				
TH55_EB	1	3		
TH55_WB				1
TH7_EB	2		1	1
TH7_WB	2	1		1
TH10_EB				
TH10_WB				1
Total	6	4	1	4

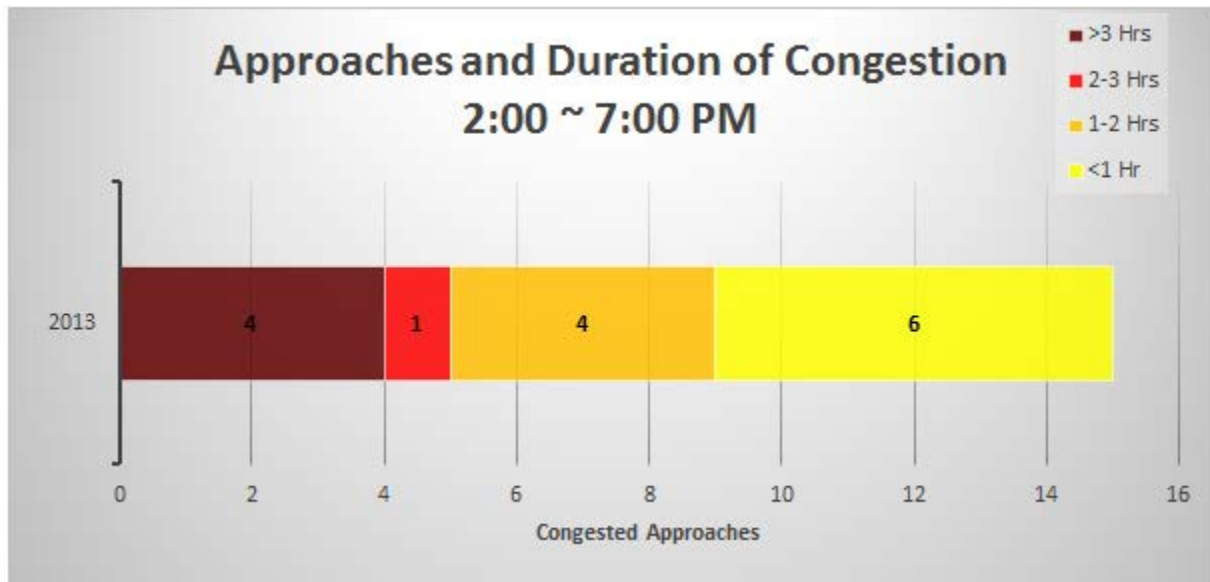


Figure 23: Number of congested approaches and duration during PM peak

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