York County Planning Commission York Area Metropolitan Planning Organization

Report on Congestion 2016

December 2017

YORK COUNTY
YCPC
PLANNING
COMMISSION

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Introduction

The York Area Metropolitan Planning Organization (YAMPO) developed the Congestion Management Process (CMP) to identify and address the most congested elements of the York County transportation system. The CMP establishes a process to gather and analyze data to determine which transportation elements are experiencing congested conditions. The results of the CMP are presented in this Report on Congestion (ROC).

In 2014, the YAMPO appointed a committee to make recommendations for updating the CMP to incorporate the recent improvements in available data collected via mobile technology, introduced in the 2013 ROC. YAMPO approved these recommendations in an update to the CMP in April 2015 and are incorporated in this report. The most significant aspect of the CMP update was the shift in perspective from travel corridors to individual intersections.

The 2016 ROC incorporates the same approach used in the 2014 ROC and includes data from the prior reports. Thus, three full data sets of average travel speed data for York County roads are available for study: 2016, 2014 and 2012.

Data

The Pennsylvania Department of Transportation (PennDOT) purchased the data used for this report from TomTom. The York County Planning Commission (YCPC) purchased prior year TomTom data. TomTom reports the two-year average speed data for each TomTom road segment in both travel directions for three periods of a day: AM peak period of 7AM–9AM, PM peak period of 4PM – 6PM, and a night time period that is undefined by specific hours. This report uses data from prior datasets. The table on the right shows the time periods and the name used to refer to the different datasets.

Dataset Name	Data Years
2016	2015-2016
2014	2013-2014
2012	2011-2012

The road data in this report come from the PennDOT Roadway Management System (RMS) and includes the state-owned roads and locally-owned roads on the federal aid system, excluding the Pennsylvania Turnpike. Map 1 shows these roads in two groups: roads on the National Highway System (NHS) are shown in blue and roads not on the NHS.

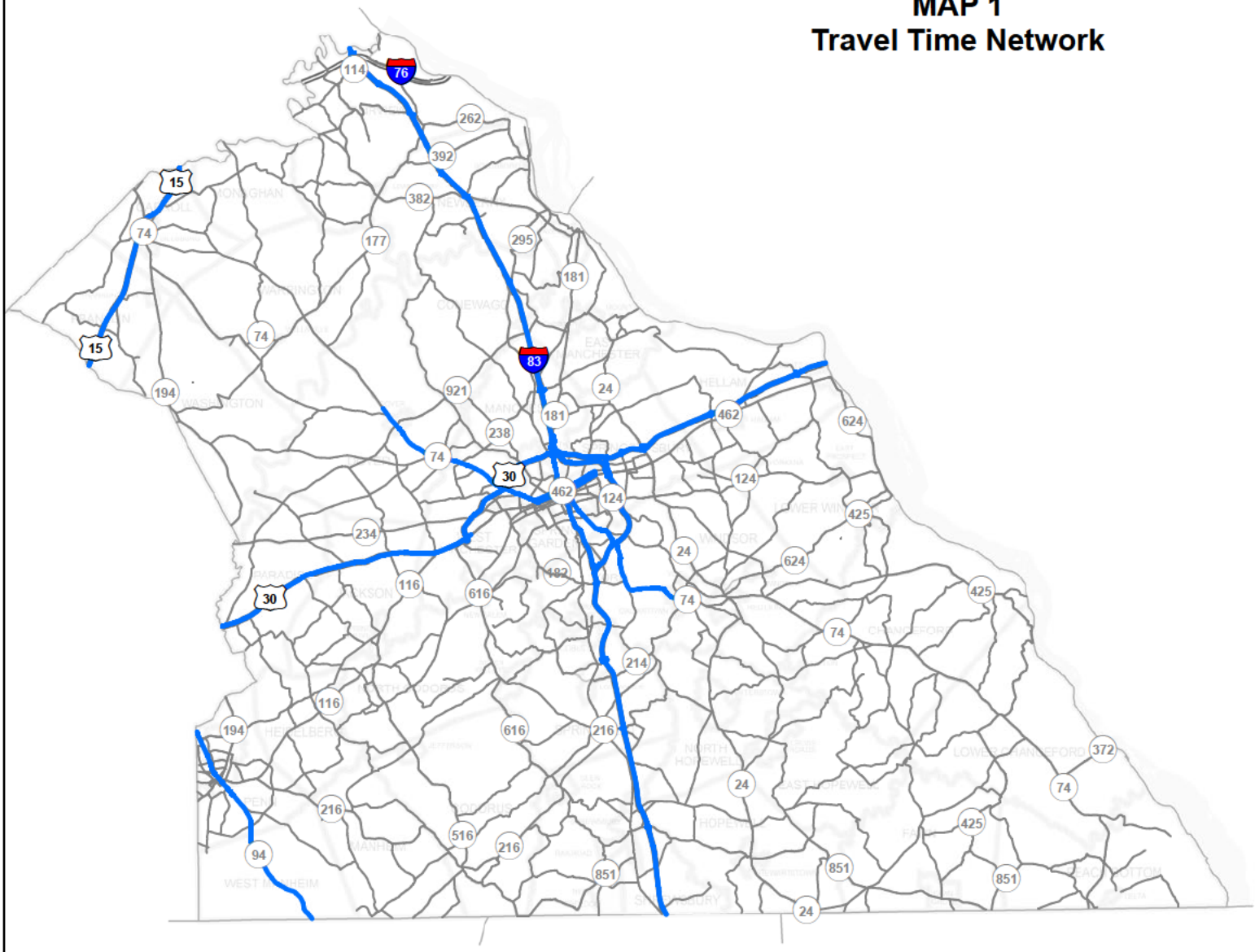
Daily Vehicle Miles Traveled

Vehicle travel is impacted by the number of cars driving on the roads. Daily Vehicle Miles Traveled (DVHT) is calculated by multiplying the amount of daily traffic for each direction on a roadway segment by the length of the segment, then summing all the segments' VMT for all roads, expressed in miles per day. PennDOT publishes annual statistics for DVHT in the Pennsylvania Highway Statistics Highway Data (Pub 600). Figure 1 shows DVHT for All Roads in York County and PennDOT Roads in York County for the years 2016, 2014 and 2012, along with the percent changes in DVHT compared to 2016.

Travel Time

Imagine that you were able to drive your car on every road shown on Map 1, in each direction at posted speeds, never stopping for red lights at traffic signals, stop signs, left turns. This exercise would take 1 day, 9 hours, 58 minutes and 9 seconds. Now imagine driving those same roads in each direction at the speeds you would be able to travel during the morning rush or AM Peak period. According to the

MAP 1
Travel Time Network



Map Created on 12/5/2017 by TLW

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Figure 1: Travel Time Summary

	2016	2014	2012	% Change from 2014 to 2016	% Change from 2012 to 2016
DVMT*					
All Roads (3,836.56 linear miles)	9,249,019	8,899,688	8,895,133	3.9%	4.0%
PennDOT Roads (1,132.77 linear miles)	7,366,022	7,121,322	7,095,771	3.4%	3.8%
NHS Roads (120.4 linear miles)					
Combined Travel Time (1,329.69 segment miles) - Map 1					
Posted Speed Travel	1 day 09:58:09				
AM Peak Period Speeds	2 days 20:13:54	2 days 19:45:35	2 days 19:20:12	0.7%	1.3%
PM Peak Period Speeds	2 days 20:58:40	2 days 20:27:15	2 days 20:38:41	0.8%	0.5%
NHS Only Travel Time (216.4 segment miles) - Map 1					
Posted Speed Travel	04:42:43				
AM Peak Period Speeds	05:41:21				
PM Peak Period Speeds	06:04:51				

* DVMT statistics are from the Pennsylvania Highway Statistics Highway Data (Pub 600) expressed in linear miles

2016 data, it would take 2 days, 20 hours, 13 minutes and 54 seconds. At the evening rush or PM Peak period speeds it would take 2 days, 20 hours, 58 minutes and 40 seconds. Table 1 above shows these travel times and the travel times for the 2014 and 2012 data.

The roads shown in blue on Map 1 are the NHS roads in York County. This network of strategic highways and roadways approved by Congress spans the country and is often monitored independently of other roads. Using the same 2016 data as above, the travel time for the NHS network at posted speeds is 4 hours, 42 minutes and 43 seconds; at AM peak period speeds, 5 hours 41 minutes and 24 seconds; and at PM peak periods speeds, 6 hours 4 minutes and 51 seconds.

In March 2017, the Pennsylvania Department of Transportation and Federal Highway Administration approved a significant change to York County's NHS, decreasing this network by more than 20 miles. With this change to the NHS network, it is not feasible to compare 2016 NHS travel times to prior years.

Congestion

Congestion is the state of being overfilled or overcrowded. The simplest way to measure congestion on a road is volume. Obviously, when fewer vehicles are traveling on a road at the same time, the travel speeds will be higher. Conversely, when more vehicles are traveling on a road at the same time, such as

during the AM or PM peak periods – when a lot of people are trying to get to or from work or school – the travel speeds will be lower. Travel Time Index (TTI) can be used to measure this relationship between travel speeds. For this report, TTI is the relationship between the AM or PM peak period travel speeds and the posted speed.

At what level of traffic volume or at what amount of delay does congestion actually occur? At what level does the overfilling or overcrowding of a roadway become a problem? For this report, the levels of delay and congestion are defined in Figure 1 below. Delay begins when average travel speeds are at 85% of posted speeds or a TTI of 1.2. Congestion begins where average travel speeds are at 70% of the posted speed or a TTI of 1.4, and the Target Threshold for identifying congestion on York County roadways during peak travel times is between 60%-70% of the posted speed or a TTI of 1.5. This threshold of TTI = 1.5 does not pertain to Interstate 83, the Central Business District of York City, or the General Business Zone of Hanover Borough. These exceptions will be discussed in later sections of this report.

Figure 2 – TTI Congestion Threshold

	Delay	Level I Congestion	**Target Threshold**	Level II Congestion
Travel Time Index*	1.2	1.4	**1.5**	1.7
Posted Speed	Travel Speed 85%	Travel Speed 70%	Travel Speed **Stage 1**	Travel Speed 60%
35	30	25	23	21
40	34	28	27	24
45	38	32	30	27
55	47	39	37	33
60	51	42	40	36
65	55	46	43	39

* Travel Time Index (TTI) $= \frac{\text{Free Flow Speed or Posted Speed}}{\text{Congested or Travel Speed}}$

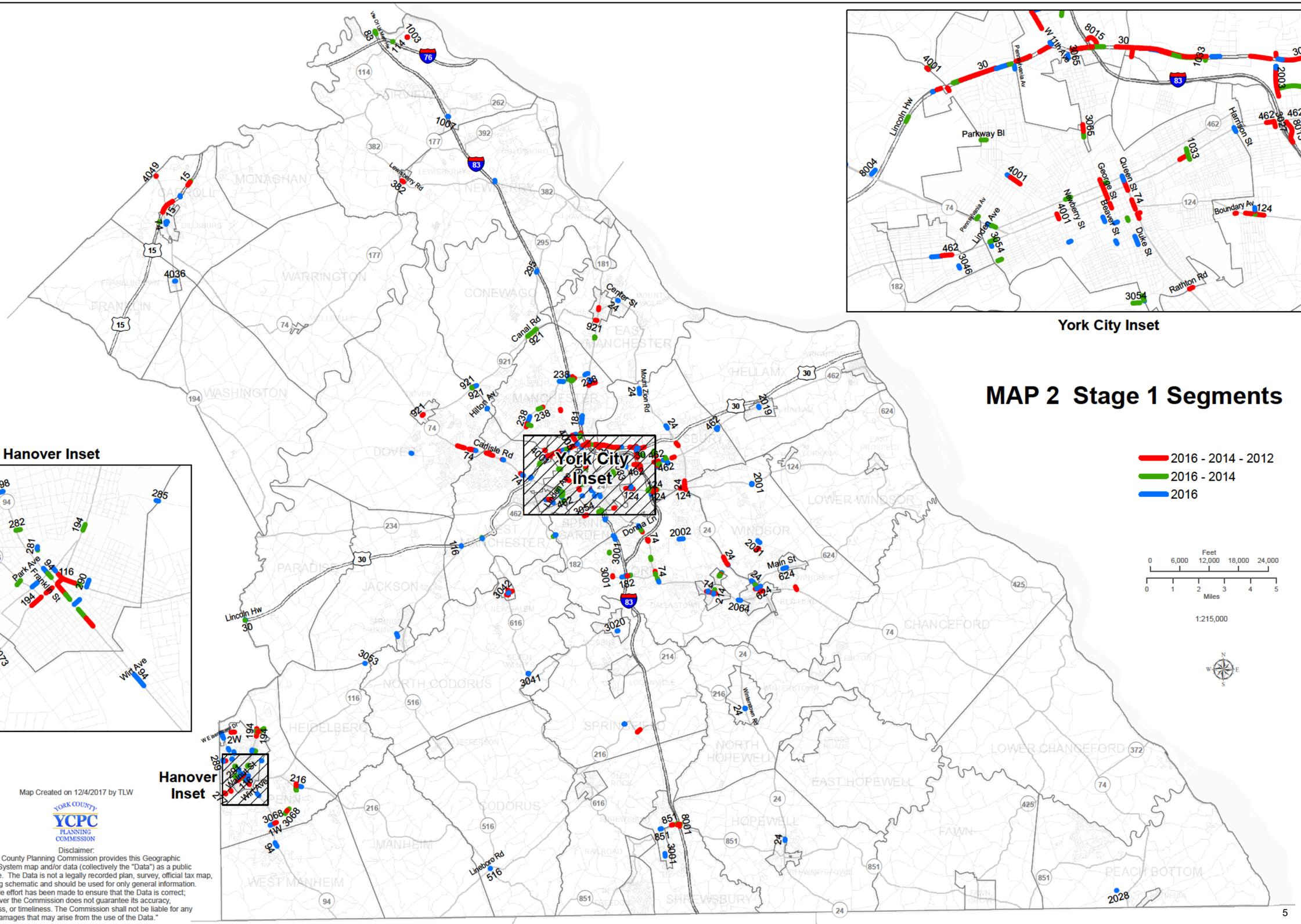
Stage 1

The first stage in the CMP is the initial identification of congested road segments, as defined above. Using Stage 1 CMP performance measure, 431 road segments are identified with a TTI using free flow speed or TTI(FF) of 1.5 or higher in the 2016 dataset.

	2016	2014	2012
Segment Miles TTI >= 1.5	24.91	23.93	26.23
% of Ttl Segment Miles (1,132.77)	2.2%	2.1%	2.3%

These 431 road segments comprise 24.91 miles or 2.2% of the 1,132.77 segment miles in the 2016 data. The table above shows the Stage 1 segment miles and percentages for all three datasets. Map 2 shows the 2016 Stage 1 segments historically color-coded: red segments have been identified as Stage 1

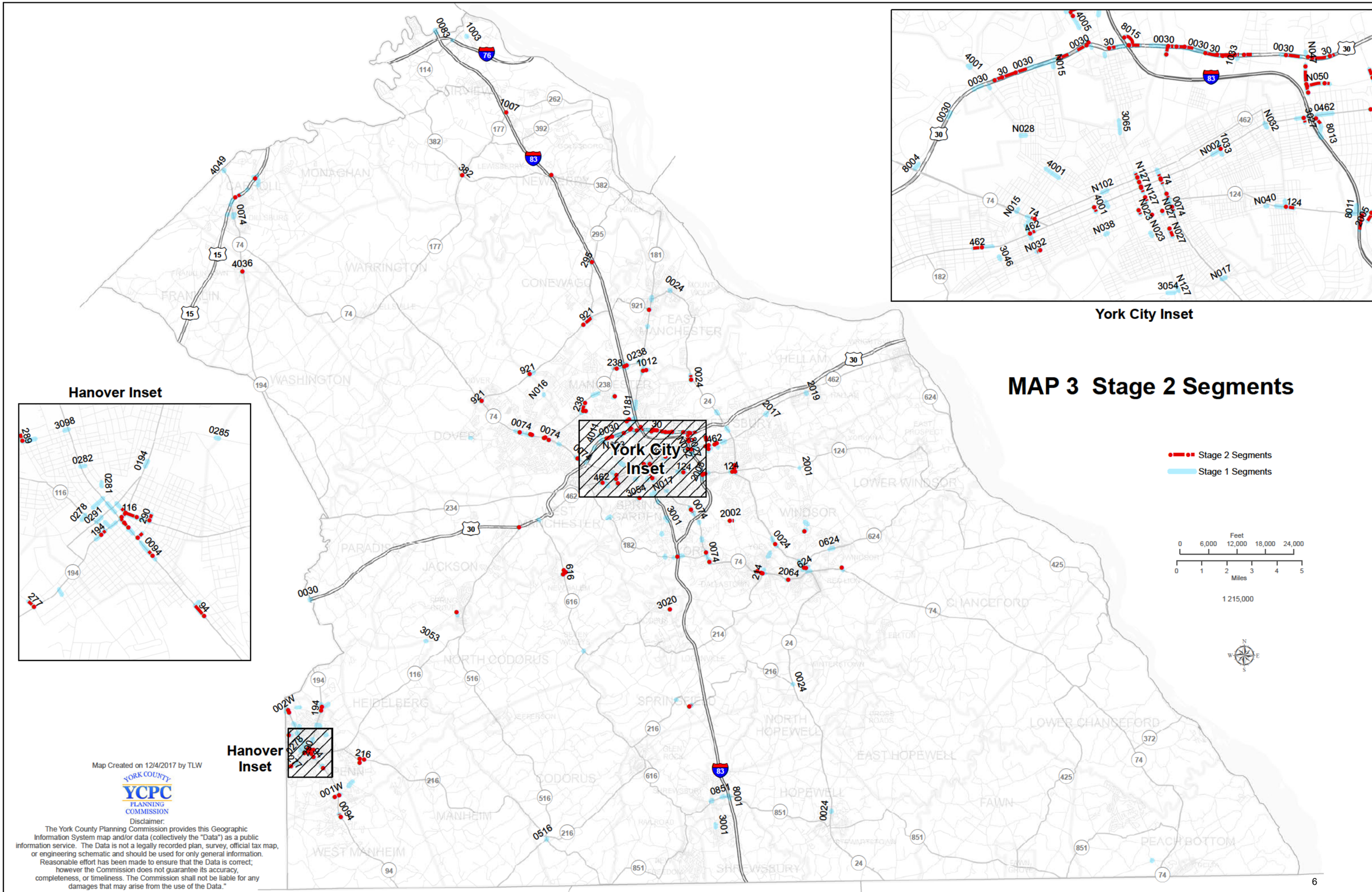
MAP 2 Stage 1 Segments



York City Inset

Hanover Inset

MAP 3 Stage 2 Segments



York City Inset

Hanover Inset

segments in all three datasets – 2016, 2014 and 2012; green segments in both 2016 and 2014 datasets; and blue segments in just the 2016 dataset.

All of the Stage 1 road segments are congested road segments. For land development plans or traffic impact studies that involve any of these road segments, YCPC review comments will include congestion mitigation recommendations. These segments are also used to identify signal timing evaluation studies through the CMP Signal Timing project.

Stage 2

In Stage 2, two performance measures of delay are applied to the segments identified in Stage 1: Delay per vehicle (DVH) and peak hour volume delay (PHVD).

DVH is the amount of delay in time (seconds) experienced by one vehicle on each Stage 1 road segment during the peak period and in the direction with the lower average speed; the delay is the difference in travel time between the posted speed and this average speed, both converted to travel time, experienced during the worse of either peak hour period.

PHVD is calculated by multiplying the DVH values by the regional peak hour percentage for each Stage 1 road segment. Regional peak hour percentage is the traffic volume during the hour of highest traffic volume in a 24-hour day period, expressed as a percentage of the total 24-hour traffic volume. The traffic volume data is collected by YCPC staff and grouped into the seven YCPC planning regions for regional sample sets. The percentages used in this report are a three-year average of 2014, 2015, and 2016 traffic count data and are shown in the Appendix.

After the DVH and PHVD are calculated, the Stage 1 segments are ranked from most to least delay, and the top 100 segments for each measure are identified as the Stage 2 segments. Some of the segments from both delay measures appear in the top 100 of both lists. From the 431 Stage 1 segments in the 2016 dataset, 135 segments were identified as Stage 2 segments. Map 3 shows the blue Stage 1 segments in the background of the red Stage 2 segments.

Stage 3

The segments identified in Stage 2 form an incomplete footprint of congestion in York County. The next step in the CMP is to review each segment geographically and select the additional road segments that make up the intersection to which each of the 135 Stage 2 segments belong. Each intersection includes at least one Stage 2 road segment, plus the corresponding directional road segments and contiguous road segments with a TTI(FF) value equal to or greater than the Level I congestion value shown in Figure 2.

From the 135 Stage 2 segments, 72 Stage 3 congested intersections are identified. These intersections are shown on Map 4 and are listed in Tables 1, 2 and 3. Stage 2 segments that are within the York City Central Business District or the Hanover Borough General Business Zone are not included in the 72 Stage 3 intersections but are included in later sections focusing specifically on these urbanized areas. Any Stage 2 segment on Interstate 83 is also not included in the Stage 3 intersection list as travel speeds on all segments of Interstate 83 are reported in the I-83 Traffic and Conditions Report.

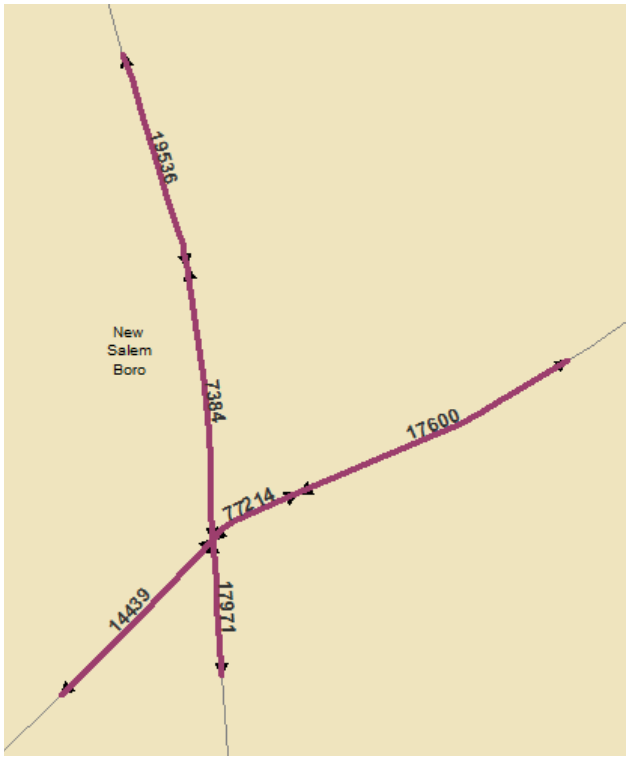
In the next step of Stage 3, adjacent intersections are grouped together. One example of an adjacent intersection group is the Leader Heights and Iron Stone Hill Road intersections on S. Queen Street in York Township. Four or more adjacent intersections are grouped together into corridors, such as Route

74 North through the signalized section of Route 74 in Dover Township or the central signalized section of Route 30 between Roosevelt Avenue and North Hills Road. For proposed projects such as land development plans or traffic impact studies that involve any of these adjacent intersections or corridors, YCPC may require that the off-site intersections be included in impact study area. Congestion performance measures on these adjacent intersections and corridors will be explored in future editions of the ROC.

Stage 4

The previous stages identified the congested intersections in York County. The following stages evaluate the severity of congestion in order to make investment decisions. Just as in Stage 2, Stage 4 uses the two performance measures of DVH and PHVD for each of the 72 congested intersections identified in Stage 3.

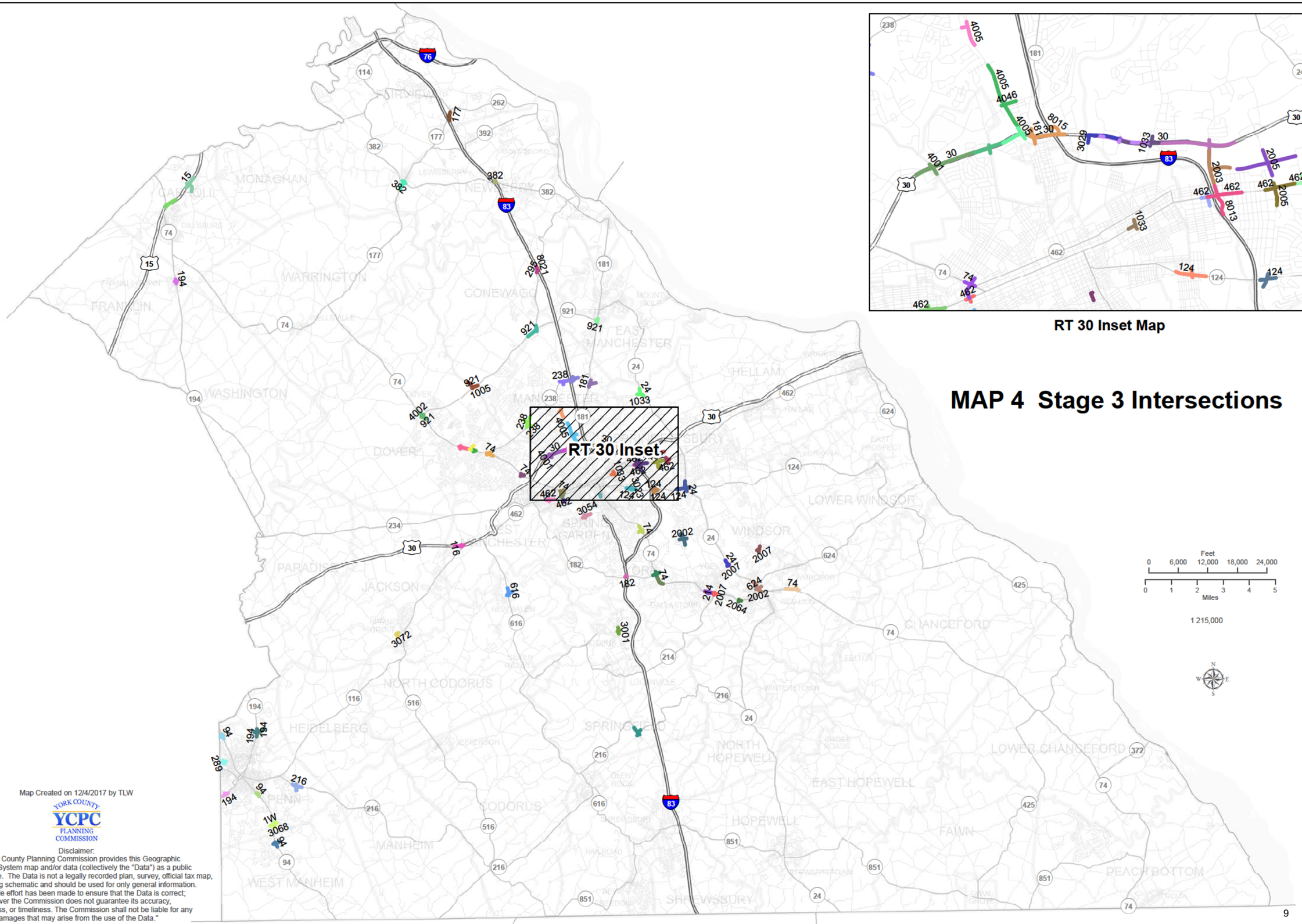
The DVH for a single road segment is a simple concept - the amount of delay (time) that one vehicle experiences traveling on that road segment during a peak period as compared to traveling that same road segment at the posted speed. The DVH for an intersection is the sum of the DVH for all the segments in an intersection.



Using the Main Street/George Street intersection in New Salem as an example, the intersection has six segments shown on the right. With the data in the table below, the delay per vehicle per mile is calculated in the following steps:

- Convert the average speed data to travel time for the each of the road segments identified in the intersection for both the AM peak period and the PM peak period. This is the congested travel time for each segment.
- Convert the posted speed to travel time for the same segments as above. This is the posted speed travel time for each segment.
- Subtract the posted time from the AM peak congested time for each segment. This is the amount of delay for each segment for the AM peak period.
- Subtract the posted time from the PM peak congested time for each segment. This is the amount of delay for each segment for the PM peak period.
- Add the AM peak delay values for all the segments in the intersection. This is the total AM peak period delay per vehicle.
- Add the PM peak delay values for all the segments in the intersection. This is the total PM peak period delay per vehicle.

MAP 4 Stage 3 Intersections



Map Created on 12/4/2017 by TLW

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Table 1 - Stage 3 Intersections Summary Table

Row #	Intersection Name	Stage 1 Segment History	Delay per Vehicle - AM	Delay per Vehicle - PM	Peak Period with Most Delay Per Vehicle	Delay per Vehicle Rank	Peak Hr Vol Delay - AM (hr:min:sec)	Peak Hr Vol Delay - PM (hr:min:sec)	Peak Period with Most Pk Hr Vol Delay	Pk Hr Vol Delay Rank
1	Baltimore Pike Brunswick Dr	2016	33.19	61.71	PM	26	01:49:48	04:39:15	PM	47
2	Baltimore St Wirt Ave	2016	14.82	24.42	PM	66	01:07:36	02:57:43	PM	57
3	Cabin Hollow Rd Baltimore St	2016	17.67	11.03	AM	71	00:07:34	00:05:59	AM	72
4	Canal Rd Bull Rd	2016-2014-2012	23.37	87.22	PM	7	01:29:09	06:10:20	PM	36
5	Canal Rd Susquehanna Trl	2016-2014	73.11	33.12	AM	18	04:48:09	02:01:36	AM	45
6	Cape Horn Rd Lombard Rd	2016-2014-2012	29.97	41.56	PM	45	03:42:44	05:38:03	PM	40
7	Carlisle Rd Alta Vista/Fox Run Rd	2016-2014-2012	44.05	60.17	PM	27	03:34:19	07:40:39	PM	30
8	Carlisle Rd Brougher Ln	2016-2014-2012	20.29	28.3	PM	59	02:57:08	05:09:56	PM	42
9	Carlisle Rd Church Rd	2016-2014-2012	28.73	55.6	PM	30	04:20:24	10:13:43	PM	20
10	Carlisle Rd Emig Mill Rd	2016-2014-2012	14.53	22.16	PM	67	01:54:47	03:53:48	PM	53
11	Carlisle Rd Linden Ave	2016-2014	28.25	53.4	PM	33	02:36:15	07:26:28	PM	31
12	Carlisle Rd Poplars Rd	2016-2014-2012	21.95	34.89	PM	53	02:05:15	04:43:32	PM	46
13	Carlisle St Eisenhower Dr	2016	37.36	50.26	PM	35	04:18:59	08:54:49	PM	24
14	Church Rd Board Rd	2016-2014-2012	46.79	95.23	PM	4	05:27:30	12:33:54	PM	15
15	Church Rd Greenbriar Rd	2016-2014-2012	42.13	82.19	PM	10	03:09:12	06:36:54	PM	33
16	Country Club Rd Diaryland Sq	2016	20.73	27.39	PM	61	01:2:40	01:24:42	PM	66
17	Country Club Rd Grantley Rd	2016-2014	31.2	45.47	PM	40	03:14:02	06:17:29	PM	34
18	Delta Rd Windsor Rd	2016-2014-2012	13.63	26.04	PM	64	00:52:56	01:30:53	PM	65
19	E. Market St Belmont St	2016-2014-2012	23.82	47.78	PM	38	02:03:57	05:47:40	PM	39
20	E. Market St Haines Rd/Memory Ln	2016-2014-2012	61.36	96.54	PM	3	11:09:27	19:38:41	PM	8
21	E. Market St North Hills Rd	2016-2014-2012	30.76	73.36	PM	17	07:01:53	18:12:33	PM	11
22	E. Market St Northern Way	2016-2014	32.51	59.77	PM	28	03:08:18	07:40:54	PM	29
23	E. Market St Sherman St	2016-2014-2012	30	44.19	PM	41	02:58:34	05:49:06	PM	38
24	Eisenhouser Dr/ Moulstown Rd Broadway	2016-2014-2012	25.32	91.93	PM	5	02:15:48	10:30:03	PM	19
25	Farmtrail Rd/Church Rd Susquehanna Trl	2016-2014	64	46.1	AM	22	05:51:02	05:07:05	AM	37
26	Frederick St Blettner Ave	2016-2014-2012	12.74	18.51	PM	70	00:46:01	01:09:53	PM	69
27	Grandview Ave Blooming Grove Rd	2016-2014-2012	23.76	54.51	PM	31	02:17:35	06:10:23	PM	35
28	Grandview Rd Baltimore St	2016-2014-2012	32.9	75.01	PM	16	03:09:13	08:40:24	PM	25
29	High St Elm Ave	2016-2014-2012	32.3	48.47	PM	36	01:48:50	03:30:10	PM	55
30	Industrial Hwy North Hills Rd	2016-2014-2012	28.56	72.71	PM	19	04:212:17	11:18:21	PM	16
31	Jackson St Old Hanover Rd/ Hanover St	2016	7.62	16.99	PM	72	00:04:26	00:18:11	PM	71
32	Leader Heights Rd I-83 SB Ramp	2016-2014	37.7	21.65	AM	50	03:54:48	02:20:59	AM	52
33	Lewisberry Rd Rosstown Rd	2016-2014-2012	27.27	40.77	PM	48	01:41:10	02:49:58	PM	59
34	Lombard Rd Freysville Rd	2016-2014-2012	7.52	22.16	PM	68	00:47:53	02:26:19	PM	62
35	Main St Canal St	2016-2014-2012	35.44	47.82	PM	37	03:19:55	05:12:47	PM	41
36	Main St George St NS	2016-2014-2012	48.7	104.22	PM	1	03:54:00	09:45:30	PM	22
37	Main St High St	2016-2014-2012	33.67	75.2	PM	15	02:37:46	08:40:16	PM	26
38	Main St Pleasant Ave/ Lombard St	2016-2014-2012	35.87	41.52	PM	46	02:18:53	04:28:25	PM	48
39	Main St Valley Rd JCBS	2016	30.79	24.15	AM	57	01:10:05	01:21:19	PM	67
40	Main St Walnut St DLLSTWN	2016-2014-2012	26.87	52.75	PM	34	01:10:14	04:08:15	PM	51
41	Memory Ln Industrial Hwy	2016-2014-2012	43.5	82.19	PM	11	05:55:48	12:39:50	PM	14
42	Mount Zion Rd Sherman St	2016	11.7	29.18	PM	58	00:55:48	02:52:53	PM	58
43	Mt Rose Ave Camp Betty Washington Rd	2016-2014-2012	49.75	63.84	PM	23	06:30:28	08:37:25	PM	27
44	Mt Rose/E Prospect Cape Horn/Edgewood	2016-2014-2012	64.37	102.52	PM	2	12:55:04	21:46:47	PM	6
45	Musser St Main St	2016-2014-2012	36.63	26.2	AM	51	02:10:41	02:18:13	PM	63
46	N. George St Emig Rd	2016-2014-2012	38.41	82.31	PM	8	03:55:34	10:05:22	PM	21
47	Old Trail Rd Pines Rd	2016	25.65	26.75	PM	62	01:01:07	01:14:38	PM	68
48	Prospect St/Mount Rose Ave Hill St	2016-2014-2012	45.04	77.78	PM	14	04:43:24	08:37:05	PM	28
49	Rt 15 Spring Ln/ Ore Bank Rd	2016-2014-2012	57.59	82.27	PM	9	08:24:53	16:34:51	PM	12
50	Rt 15 York Rd	2016-2014-2012	15.4	33.31	PM	55	04:00:07	10:47:38	PM	18
51	Rt 30 Eden Rd	2016-2014-2012	20.75	58.1	PM	29	No delay	21:03:37	PM	7
52	Rt 30 Loucks Mill Rd	2016-2014-2012	22.62	53.91	PM	32	05:13:27	24:17:30	PM	5
53	Rt 30 N George-I-83NB Exit	2016-2014-2012	45.87	87.34	PM	6	12:27:20	30:08:41	PM	2
54	Rt 30 North Hills Rd	2016-2014-2012	22.62	63.77	PM	24	04:13:42	24:28:42	PM	3
55	Rt 30 Pennsylvania Ave	2016-2014-2012	18.32	46.19	PM	39	05:34:34	24:28:37	PM	4
56	Rt 30 Roosevelt Ave	2016-2014-2012	39.02	78.43	PM	13	12:35:43	43:40:39	PM	1
57	Rt 30 Salem Church Rd	2016	27.9	36.41	PM	52	04:42:49	07:13:56	PM	32
58	Rt 30 Sherman St	2016-2014	7.54	43.49	PM	44	No delay	18:14:09	PM	10
59	Rt 30 Susquehanna Trl	2016-2014-2012	61.99	49.48	AM	25	12:31:59	19:11:32	PM	9
60	S. Duke St E. Maple St	2016	20.65	7.22	AM	69	00:47:03	00:12:29	AM	70
61	S. Queen St Iron Stone Hill Rd	2016-2014	27.78	33.71	PM	54	02:45:23	03:39:46	PM	54
62	S. Queen St Leader Hgts Rd	2016-2014-2012	29.79	43.92	PM	42	02:10:36	04:55:00	PM	44
63	S. Queen St Tyler Run/Donna Ln	2016-2014-2012	35.53	69.76	PM	21	04:26:07	11:13:40	PM	17
64	Salem Rd Wyndamere Rd	2016	28.15	19.89	AM	60	01:50:42	01:14:29	AM	64
65	Seaks Run Rd Susquehanna Trl	2016-2014-2012	30.16	38.25	PM	49	01:46:52	03:00:00	PM	56
66	Springwood Rd Chestnut Hill Rd	2016	23.53	40.93	PM	47	02:23:56	04:23:21	PM	49
67	Susquehanna Trl I83 Exit 28 SB	2016-2014	16.37	24.49	PM	65	01:34:51	02:44:24	PM	60
68	Susquehanna Trl Lightner Rd Gwen Dr	2016-2014-2012	59.43	81.7	PM	12	07:27:22	13:11:18	PM	13
69	Susquehanna Trl Still Meadow Ln	2016-2014-2012	16.85	26.35	PM	63	02:14:39	04:16:01	PM	50
70	W. Market St Highland Ave	2016-2014-2012	25.53	43.92	PM	43	02:12:01	04:58:52	PM	43
71	W. Market St Richland Ave	2016-2014	35.22	71.42	PM	20	03:33:49	09:38:46	PM	23
72	W. Princess St Richland Ave	2016-2014	16.76	33.18	PM	56	00:42:42	02:36:55	PM	61

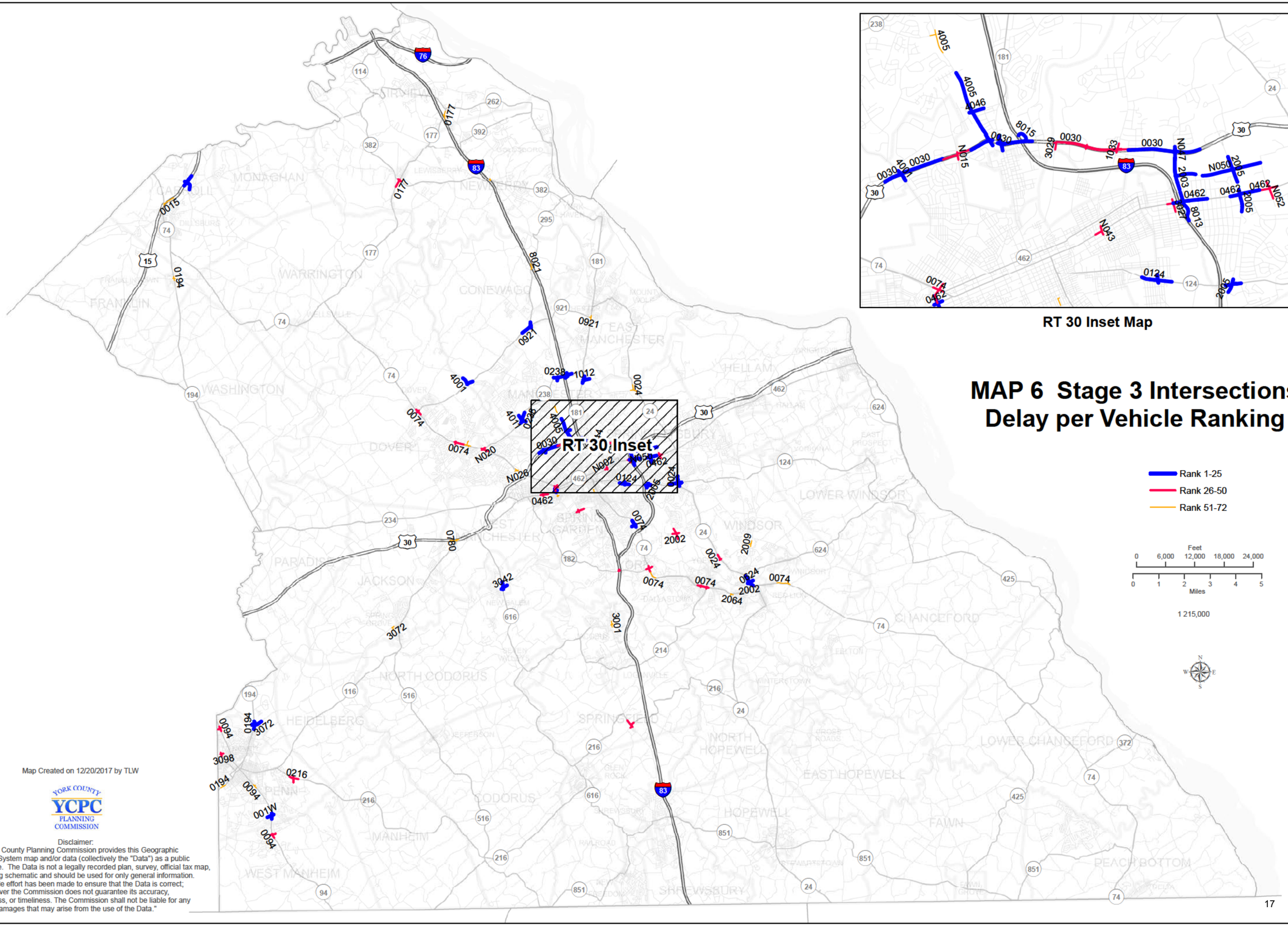
Table 2 - Stage 3 Intersections DVH

Table 1 Row #	Intersection Name	Delay per Vehicle - AM	Delay per Vehicle - PM	Peak Period with Most Delay Per Vehicle	Delay per Vehicle Rank	ADTT > 1,000	On the NHS	On a Transit Route	In a Growth Area	2017-2020 TIP Project	Future VOC > 0.75	ON a Top 25 Crash Corridor (2010-2014 data)
36	Main St George St NS	48.7	104.22	PM	1			Y	Y	Y	Y	
44	Mt Rose/E Prospect Cape Horn/Edgewood	64.37	102.52	PM	2	Y	Y		Y		Y	
20	E. Market St Haines Rd/Memory Ln	61.36	96.54	PM	3			Y	Y			Y
14	Church Rd Board Rd	46.79	95.23	PM	4			Y	Y	Y		Y
24	Eisenhouser Dr/ Moulstown Rd Broadway	25.32	91.93	PM	5	Y	Y		Y	Y	Y	
53	Rt 30 N George-I-83NB Exit	45.87	87.34	PM	6		Y	Y	Y			Y
4	Canal Rd Bull Rd	23.37	87.22	PM	7	Y	Y	Y	Y	Y	Y	
46	N. George St Emig Rd	38.41	82.31	PM	8		Y	Y	Y	Y		
49	Rt 15 Spring Ln/ Ore Bank Rd	57.59	82.27	PM	9			Y	Y			
15	Church Rd Greenbriar Rd	42.13	82.19	PM	10			Y	Y	Y	Y	Y
41	Memory Ln Industrial Hwy	43.5	82.19	PM	11		Y	Y	Y			
68	Susquehanna Trl Lightner Rd Gwen Dr	59.43	81.7	PM	12				Y			
56	Rt 30 Roosevelt Ave	39.02	78.43	PM	13			Y	Y			Y
48	Prospect St/Mount Rose Ave Hill St	45.04	77.78	PM	14				Y		Y	
37	Main St High St	33.67	75.2	PM	15		Y	Y	Y			
28	Grandview Rd Baltimore St	32.9	75.01	PM	16			Y	Y	Y	Y	
21	E. Market St North Hills Rd	30.76	73.36	PM	17		Y	Y	Y	Y		Y
5	Canal Rd Susquehanna Trl	73.11	33.12	AM	18			Y	Y	Y	Y	
30	Industrial Hwy North Hills Rd	28.56	72.71	PM	19		Y	Y	Y			Y
71	W. Market St Richland Ave	35.22	71.42	PM	20				Y			
63	S. Queen St Tyler Run/Donna Ln	35.53	69.76	PM	21			Y	Y		Y	
25	Farmtrail Rd/Church Rd Susquehanna Trl	64	46.1	AM	22	Y	Y	Y	Y			Y
43	Mt Rose Ave Camp Betty Washington Rd	49.75	63.84	PM	23			Y	Y	Y		
54	Rt 30 North Hills Rd	22.62	63.77	PM	24	Y	Y	Y	Y			Y
59	Rt 30 Susquehanna Trl	61.99	49.48	AM	25		Y	Y	Y			Y
1	Baltimore Pike Brunswick Dr	33.19	61.71	PM	26				Y		Y	
7	Carlisle Rd Alta Vista/Fox Run Rd	44.05	60.17	PM	27				Y		Y	
22	E. Market St Northern Way	32.51	59.77	PM	28			Y	Y		Y	
51	Rt 30 Eden Rd	20.75	58.1	PM	29				Y			
9	Carlisle Rd Church Rd	28.73	55.6	PM	30	Y	Y	Y	Y	Y		
27	Grandview Ave Blooming Grove Rd	23.76	54.51	PM	31		Y	Y	Y			Y
52	Rt 30 Loucks Mill Rd	22.62	53.91	PM	32	Y	Y	Y	Y	Y		Y
11	Carlisle Rd Linden Ave	28.25	53.4	PM	33			Y	Y		Y	Y
40	Main St Walnut St DLLSTWN	26.87	52.75	PM	34	Y		Y	Y			Y
13	Carlisle St Eisenhower Dr	37.36	50.26	PM	35	Y	Y	Y	Y			Y
29	High St Elm Ave	32.3	48.47	PM	36	Y	Y		Y		Y	
35	Main St Canal St	35.44	47.82	PM	37		Y	Y	Y	Y		
19	E. Market St Belmont St	23.82	47.78	PM	38	Y	Y		Y		Y	
55	Rt 30 Pennsylvania Ave	18.32	46.19	PM	39	Y	Y	Y	Y	Y		
17	Country Club Rd Grantley Rd	31.2	45.47	PM	40	Y	Y	Y	Y	Y	Y	Y
23	E. Market St Sherman St	30	44.19	PM	41	Y	Y	Y	Y	Y	Y	Y
62	S. Queen St Leader Hgts Rd	29.79	43.92	PM	42		Y		Y		Y	
70	W. Market St Highland Ave	25.53	43.92	PM	43				Y			
58	Rt 30 Sherman St	7.54	43.49	PM	44				Y			
6	Cape Horn Rd Lombard Rd	29.97	41.56	PM	45	Y	Y	Y	Y	Y	Y	Y
38	Main St Pleasant Ave/ Lombard St	35.87	41.52	PM	46		Y	Y	Y	Y	Y	Y
66	Springwood Rd Chestnut Hill Rd	23.53	40.93	PM	47	Y	Y	Y	Y			Y
33	Lewisberry Rd Rosstown Rd	27.27	40.77	PM	48	Y	Y	Y	Y			
65	Seaks Run Rd Susquehanna Trl	30.16	38.25	PM	49	Y	Y	Y	Y		Y	
32	Leader Heights Rd I-83 SB Ramp	37.7	21.65	AM	50	Y	Y		Y		Y	
45	Musser St Main St	36.63	26.2	AM	51				Y			
57	Rt 30 Salem Church Rd	27.9	36.41	PM	52				Y			
12	Carlisle Rd Poplars Rd	21.95	34.89	PM	53	Y		Y	Y			
61	S. Queen St Iron Stone Hill Rd	27.78	33.71	PM	54	Y		Y	Y	Y		
50	Rt 15 York Rd	15.4	33.31	PM	55	Y	Y	Y	Y			
72	W. Princess St Richland Ave	16.76	33.18	PM	56				Y			
39	Main St Valley Rd JCBS	30.79	24.15	AM	57	Y	Y	Y	Y		Y	Y
42	Mount Zion Rd Sherman St	11.7	29.18	PM	58	Y	Y	Y	Y			Y
8	Carlisle Rd Brougher Ln	20.29	28.3	PM	59	Y		Y	Y			
64	Salem Rd Wyndamere Rd	28.15	19.89	AM	60	Y			Y	Y		
16	Country Club Rd Diaryland Sq	20.73	27.39	PM	61	Y	Y	Y	Y			
47	Old Trail Rd Pines Rd	25.65	26.75	PM	62				Y	Y	Y	
69	Susquehanna Trl Still Meadow Ln	16.85	26.35	PM	63			Y	Y			
18	Delta Rd Windsor Rd	13.63	26.04	PM	64				Y		Y	
67	Susquehanna Trl I83 Exit 28 SB	16.37	24.49	PM	65		Y	Y	Y			Y
2	Baltimore St Wirt Ave	14.82	24.42	PM	66	Y		Y	Y	Y		Y
10	Carlisle Rd Emig Mill Rd	14.53	22.16	PM	67				Y		Y	
34	Lombard Rd Freysville Rd	7.52	22.16	PM	68		Y	Y	Y	Y		
60	S. Duke St E. Maple St	20.65	7.22	AM	69		Y		Y			
26	Frederick St Blettner Ave	12.74	18.51	PM	70	Y	Y	Y	Y			
3	Cabin Hollow Rd Baltimore St	17.67	11.03	AM	71			Y	Y	Y	Y	Y
31	Jackson St Old Hanover Rd/ Hanover St	7.62	16.99	PM	72				Y		Y	

Table 3 - Stage 3 Intersections PHVD

Table 1 Row #	Intersection Name	Peak Hr Vol Delay - AM (hr:min:sec)	Peak Hr Vol Delay - PM (hr:min:sec)	Peak Period with Most Pk Hr Vol Delay	Pk Hr Vol Delay Rank	ADTT > 1,000	On the NHS	On a Transit Route	In a Growth Area	2017-2020 TIP Project	Future VOC > 0.75	ON a Top 25 Crash Corridor (2010-2014 data)
56	Rt 30 Roosevelt Ave	12:35:43	43:40:39	PM	1			Y	Y			Y
53	Rt 30 N George-I-83NB Exit	12:27:20	30:08:41	PM	2		Y	Y	Y			Y
54	Rt 30 North Hills Rd	04:13:42	24:28:42	PM	3	Y	Y	Y	Y			Y
55	Rt 30 Pennsylvania Ave	05:34:34	24:28:37	PM	4	Y	Y	Y	Y	Y		
52	Rt 30 Loucks Mill Rd	05:13:27	24:17:30	PM	5	Y	Y	Y	Y	Y		Y
44	Mt Rose/E Prospect Cape Horn/Edgewood	12:55:04	21:46:47	PM	6	Y	Y		Y		Y	
51	Rt 30 Eden Rd	No delay	21:03:37	PM	7				Y			
20	E. Market St Haines Rd/Memory Ln	11:09:27	19:38:41	PM	8			Y	Y			Y
59	Rt 30 Susquehanna Trl	12:31:59	19:11:32	PM	9		Y	Y	Y			Y
58	Rt 30 Sherman St	No delay	18:14:09	PM	10				Y			
21	E. Market St North Hills Rd	07:01:53	18:12:33	PM	11		Y	Y	Y	Y		Y
49	Rt 15 Spring Ln/ Ore Bank Rd	08:24:53	16:34:51	PM	12			Y	Y			
68	Susquehanna Trl Lightner Rd Gwen Dr	07:27:22	13:11:18	PM	13				Y			
41	Memory Ln Industrial Hwy	05:55:48	12:39:50	PM	14		Y	Y	Y			
14	Church Rd Board Rd	05:27:30	12:33:54	PM	15			Y	Y	Y		Y
30	Industrial Hwy North Hills Rd	04:212:17	11:18:21	PM	16		Y	Y	Y			Y
63	S. Queen St Tyler Run/Donna Ln	04:26:07	11:13:40	PM	17			Y	Y		Y	
50	Rt 15 York Rd	04:00:07	10:47:38	PM	18	Y	Y	Y	Y			
24	Eisenhouser Dr/ Moulstown Rd Broadway	02:15:48	10:30:03	PM	19	Y	Y		Y	Y	Y	
9	Carlisle Rd Church Rd	04:20:24	10:13:43	PM	20	Y	Y	Y	Y	Y		
46	N. George St Emig Rd	03:55:34	10:05:22	PM	21		Y	Y	Y	Y		
36	Main St George St NS	03:54:00	09:45:30	PM	22			Y	Y	Y	Y	
71	W. Market St Richland Ave	03:33:49	09:38:46	PM	23				Y			
13	Carlisle St Eisenhower Dr	04:18:59	08:54:49	PM	24	Y	Y	Y	Y			Y
28	Grandview Rd Baltimore St	03:09:13	08:40:24	PM	25			Y	Y	Y	Y	
37	Main St High St	02:37:46	08:40:16	PM	26		Y	Y	Y			
43	Mt Rose Ave Camp Betty Washington Rd	06:30:28	08:37:25	PM	27			Y	Y	Y		
48	Prospect St/Mount Rose Ave Hill St	04:43:24	08:37:05	PM	28				Y		Y	
22	E. Market St Northern Way	03:08:18	07:40:54	PM	29			Y	Y		Y	
7	Carlisle Rd Alta Vista/Fox Run Rd	03:34:19	07:40:39	PM	30				Y		Y	
11	Carlisle Rd Linden Ave	02:36:15	07:26:28	PM	31			Y	Y		Y	Y
57	Rt 30 Salem Church Rd	04:42:49	07:13:56	PM	32				Y			
15	Church Rd Greenbriar Rd	03:09:12	06:36:54	PM	33			Y	Y	Y	Y	Y
17	Country Club Rd Grantley Rd	03:14:02	06:17:29	PM	34	Y	Y	Y	Y	Y	Y	Y
27	Grandview Ave Blooming Grove Rd	02:17:35	06:10:23	PM	35		Y	Y	Y			Y
4	Canal Rd Bull Rd	01:29:09	06:10:20	PM	36	Y	Y	Y	Y	Y	Y	
25	Farmtrail Rd/Church Rd Susquehanna Trl	05:51:02	05:07:05	AM	37	Y	Y	Y	Y			Y
23	E. Market St Sherman St	02:58:34	05:49:06	PM	38	Y	Y	Y	Y	Y	Y	Y
19	E. Market St Belmont St	02:03:57	05:47:40	PM	39	Y	Y		Y		Y	
6	Cape Horn Rd Lombard Rd	03:42:44	05:38:03	PM	40	Y	Y	Y	Y	Y	Y	Y
35	Main St Canal St	03:19:55	05:12:47	PM	41		Y	Y	Y	Y		
8	Carlisle Rd Brougher Ln	02:57:08	05:09:56	PM	42	Y		Y	Y			
70	W. Market St Highland Ave	02:12:01	04:58:52	PM	43				Y			
62	S. Queen St Leader Hgts Rd	02:10:36	04:55:00	PM	44		Y		Y		Y	
5	Canal Rd Susquehanna Trl	04:48:09	02:01:36	AM	45			Y	Y	Y	Y	
12	Carlisle Rd Poplars Rd	02:05:15	04:43:32	PM	46	Y		Y	Y			
1	Baltimore Pike Brunswick Dr	01:49:48	04:39:15	PM	47				Y		Y	
38	Main St Pleasant Ave/ Lombard St	02:18:53	04:28:25	PM	48		Y	Y	Y	Y	Y	Y
66	Springwood Rd Chestnut Hill Rd	02:23:56	04:23:21	PM	49	Y	Y	Y	Y			Y
69	Susquehanna Trl Still Meadow Ln	02:14:39	04:16:01	PM	50			Y	Y			
40	Main St Walnut St DLLSTWN	01:10:14	04:08:15	PM	51	Y		Y	Y			Y
32	Leader Heights Rd I-83 SB Ramp	03:54:48	02:20:59	AM	52	Y	Y		Y		Y	
10	Carlisle Rd Emig Mill Rd	01:54:47	03:53:48	PM	53				Y		Y	
61	S. Queen St Iron Stone Hill Rd	02:45:23	03:39:46	PM	54	Y		Y	Y	Y		
29	High St Elm Ave	01:48:50	03:30:10	PM	55	Y	Y		Y		Y	
65	Seaks Run Rd Susquehanna Trl	01:46:52	03:00:00	PM	56	Y	Y	Y	Y		Y	
2	Baltimore St Wirt Ave	01:07:36	02:57:43	PM	57	Y		Y	Y	Y		Y
42	Mount Zion Rd Sherman St	00:55:48	02:52:53	PM	58	Y	Y	Y	Y			Y
33	Lewisberry Rd Rosstown Rd	01:41:10	02:49:58	PM	59	Y	Y	Y	Y			
67	Susquehanna Trl I83 Exit 28 SB	01:34:51	02:44:24	PM	60		Y	Y	Y			Y
72	W. Princess St Richland Ave	00:42:42	02:36:55	PM	61				Y			
34	Lombard Rd Freysville Rd	00:47:53	02:26:19	PM	62		Y	Y	Y	Y		
45	Musser St Main St	02:10:41	02:18:13	PM	63				Y			
64	Salem Rd Wyndamere Rd	01:50:42	01:14:29	AM	64	Y			Y	Y		
18	Delta Rd Windsor Rd	00:52:56	01:30:53	PM	65				Y		Y	
16	Country Club Rd Diaryland Sq	01:2:40	01:24:42	PM	66	Y	Y	Y	Y			
39	Main St Valley Rd JCBS	01:10:05	01:21:19	PM	67	Y	Y	Y	Y		Y	Y
47	Old Trail Rd Pines Rd	01:01:07	01:14:38	PM	68				Y	Y	Y	
26	Frederick St Blettner Ave	00:46:01	01:09:53	PM	69	Y	Y	Y	Y			
60	S. Duke St E. Maple St	00:47:03	00:12:29	AM	70		Y		Y			
31	Jackson St Old Hanover Rd/ Hanover St	00:04:26	00:18:11	PM	71				Y		Y	
3	Cabin Hollow Rd Baltimore St	00:07:34	00:05:59	AM	72			Y	Y	Y	Y	Y

MAP 6 Stage 3 Intersections Delay per Vehicle Ranking



Map Created on 12/20/2017 by TLW

YORK COUNTY YCPC PLANNING COMMISSION

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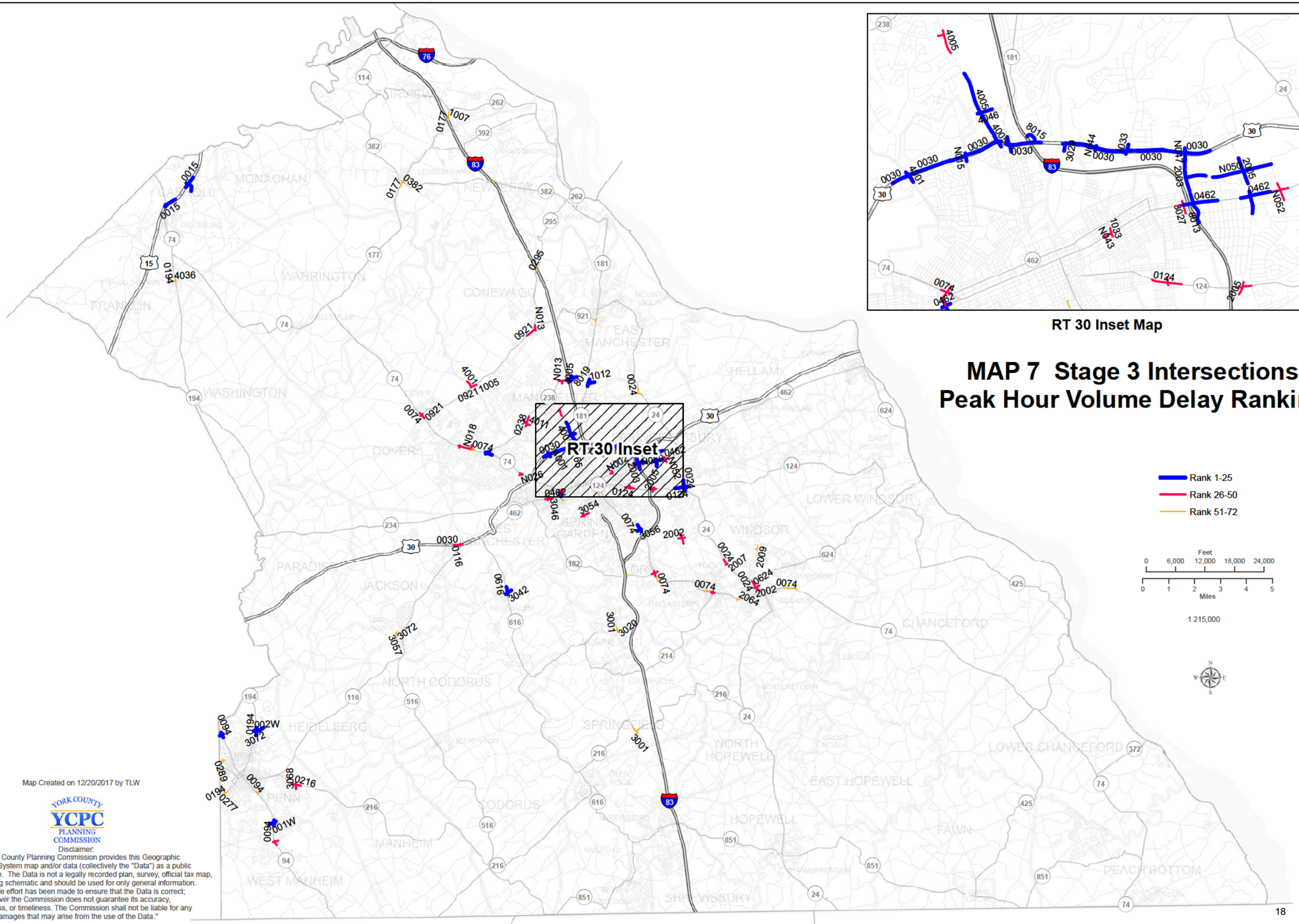
MAP 7 Stage 3 Intersections Peak Hour Volume Delay Ranking



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YORK COUNTY YCPC PLANNING COMMISSION

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Example: Main St George St New Salem (Table 1 Row 36)
Delay per Vehicle per Mile Calculation

Segment ID	Intersection Name	Street Name	Segment Length (ft)	Posted Speed	2016 AM Speed (TomTom)	2016 PM Speed (TomTom)	Posted Time	AM Congested Time	PM Congested Time	AM Delay per Vehicle per mile	PM Delay per Vehicle per Mile
14439	Main St George St NS	GEORGE ST	501.78	25	12.23	6.71	13.68	27.97	50.99	14.29	37.31
17600	Main St George St NS	GEORGE ST	693.81	25	28.50	14.10	18.92	16.60	33.55	-2.32	14.63
77214	Main St George St NS	GEORGE ST	228.54	25	5.59	9.44	6.23	27.88	16.51	21.65	10.28
7384	Main St George St NS	MAIN ST	633.01	35	21.05	10.25	12.33	20.50	42.11	8.17	29.78
17971	Main St George St NS	MAIN ST	315.24	35	15.59	14.10	6.14	13.79	15.24	7.65	9.10
19536	Main St George St NS	MAIN ST	515.27	35	37.76	26.70	10.04	9.30	13.16	-0.74	3.12
									Total Intersection Delay per Vehicle per Mi	48.70	104.22

Similar to the PHVD measurement from Stage 2, the PHVD for an intersection is the DVH value from the previous DVH calculation multiplied by the peak period traffic volume derived from AADT and the regional peak hour percentage for each of the Stage 3 intersections. Again, the concept of multiplying an amount of delay (time) by the number of vehicles that would experience that delay during a peak period is simple; however, the results when adding together the amount of delay on for all the vehicles that pass through all four legs of a high volume intersection can be eye-opening. This illustrates the cumulative cost of congestion for our community.

Continuing with the Main Street/George Street intersection example, in table below, PHVD for an intersection is calculated in the following steps:

- Assign a directional value (N, S, E, W) for the leg of the intersection to which each segment belongs.
- Assume a 50% directional traffic volume split factor for roads with traffic traveling in both directions and no split or 100% directional volume split factor for one-way roads.
- Using the Regional Peak Hour percentage for AM peak period for the planning region where the intersection is located, apply the following formula for each segment:
  Current AADT * Regional AM peak hour % * directional volume split
  This is the AM Peak hour traffic volume for the segment.
- Calculate the average AM Peak hour traffic volume of all the segments for each directional leg of the intersection. This is the AM peak hour traffic volume per intersection leg.
- Multiply the AM peak hour traffic volume for each intersection leg by the sum of the AM delay per vehicle for the segments in that directional leg. This is the AM peak hour delay in seconds for each intersection leg.
- Total the amount of delay for each intersection leg. This is the total AM peak hour volume delay for that intersection.
- Repeat this process using the regional peak hour percentage for the PM peak period to calculate the total PM peak hour volume delay for each intersection.

Example: Main St George St New Salem (Table 1 Row 36)
Peak Hour Volume Delay Calculation

Segment ID	Intersection Name	Street Name	Directional Leg of Intersection	AM Delay per Vehicle per mile	PM Delay per Vehicle per Mile	AM Regional Peak Hr %	PM Regional Peak Hr %	Directional Split Factor	Current AADT	AM Peak Hr Vol Delay (sec)	PM Peak Hr Vol Delay (sec)
14439	Main St George St NS	GEORGE ST	W	14.29	37.31	0.0740	0.0833	0.5000	7035	3719.62	10932.12
17600	Main St George St NS	GEORGE ST	E	-2.32	14.63	0.0740	0.0833	0.5000	6771	-581.22	4125.84
77214	Main St George St NS	GEORGE ST	E	21.65	10.28	0.0740	0.0833	0.5000	6771	5423.91	2899.08
7384	Main St George St NS	MAIN ST	N	8.17	29.78	0.0740	0.0833	0.5000	9817	2967.58	12176.39
17971	Main St George St NS	MAIN ST	S	7.65	9.10	0.0740	0.0833	0.5000	9817	2778.70	3720.79
19536	Main St George St NS	MAIN ST	N	-0.74	3.12	0.0740	0.0833	0.5000	9817	-268.79	1275.70
									Total Intersection Peak Hour Volume Delay (sec)	14039.80	35129.92

Tables 1,2 and 3 contain delay and summary information for the Stage 3 Intersections. Table 1 contains a Stage 1 History field that shows when the Stage 1 road segment in the intersection configuration was identified as congested. Table 1 shows the intersection delay data and rank for both performance measures. Table 2 shows the DVH performance measure values, rank and additional factor information. Table 3 shows the PHVD performance measure values, rank and additional factor information. Map 6 shows the Stage 3 Intersections grouped by highest DVH. Map 7 shows the Stage 3 Intersections grouped by highest PHVD.

Stage 5

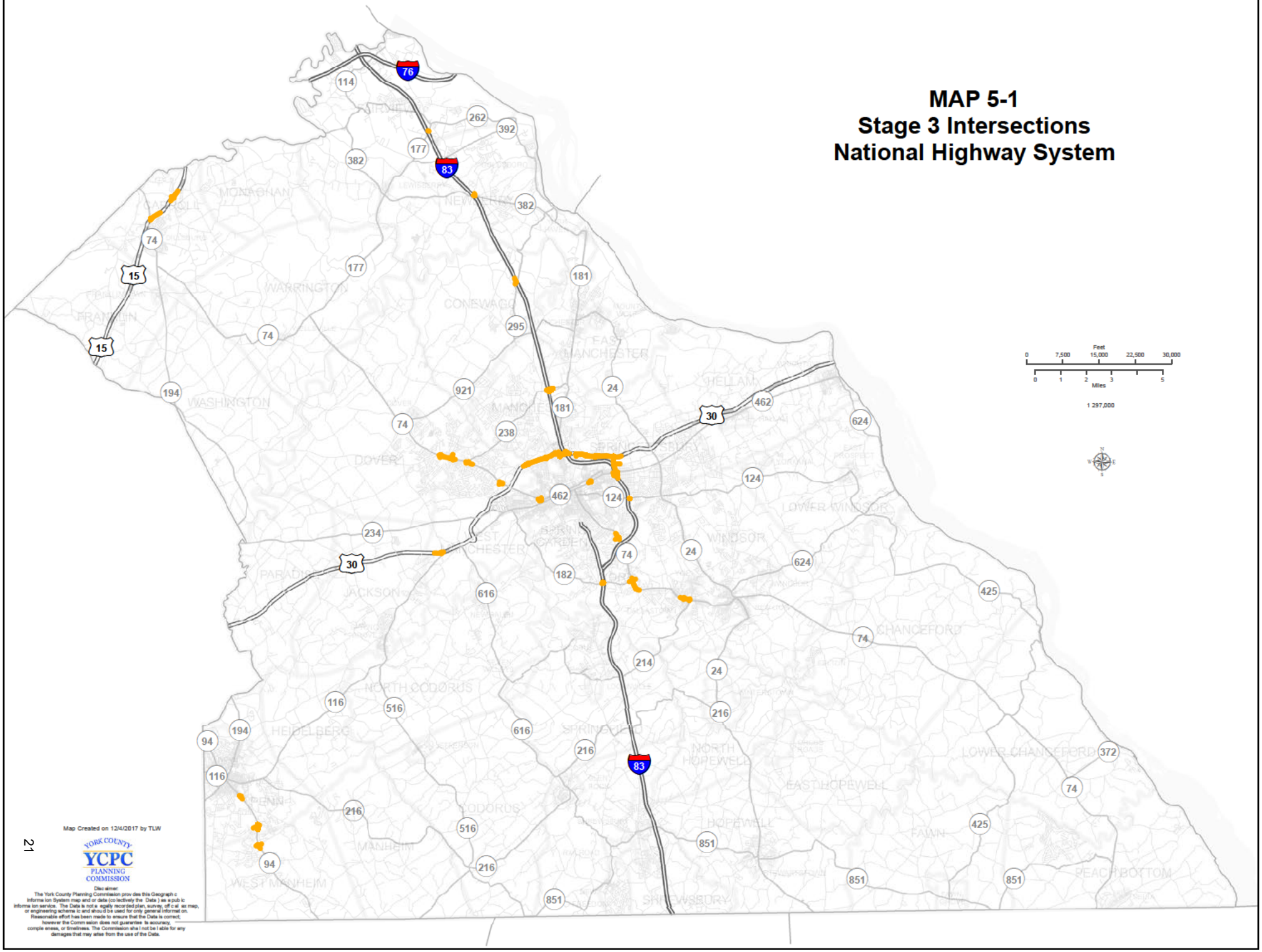
As this is a report on congestion in York County, the previous stages in the CMP have focused solely on identifying and measuring congestion. However, part of the purpose of the CMP and this report is to help guide investment decisions that will result in transportation projects that improve mobility on York County roads. While congestion measurement values are of primary importance, they are not the sole factors that influence investment decisions.

Stage 5 of the CMP provides additional information on the characteristics and uses - or factors - of the roads of the Stage 3 intersections. The additional factors answer the following question for one or more legs of the congested intersections:

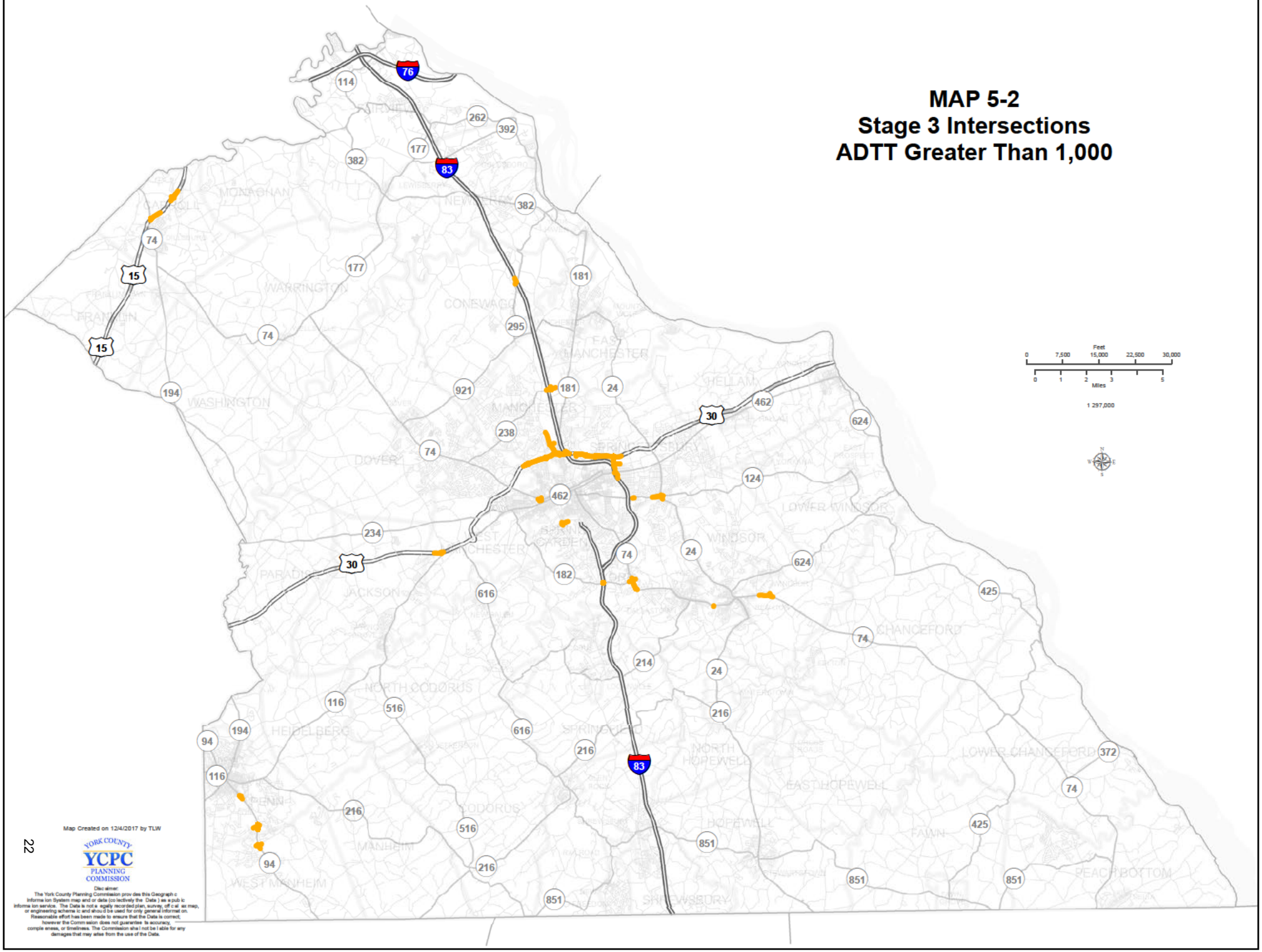
- Is the intersection on a road that is part of the National Highway System (NHS)?
- Does the intersection carry an Average Daily Truck Traffic (ADTT) of 1,000 truck trips or more?
- Is the intersection on a transit route?
- Does the intersection have a VOC value of 0.75 or greater in a future year of the York County Travel Demand Model?
- Is the intersection within a Growth Area designated by the York County Comprehensive Plan?
- Is the intersection part of a transportation improvement project funded in the 2015-2018 TIP?
- Is the intersection on a top 25 crash corridor?

The maps on the following pages – Map 5-1 through Map 5-7 – illustrate the locations where each of the factors overlaps the Stage 3 intersections. These results are reported in Tables 2 and 3.

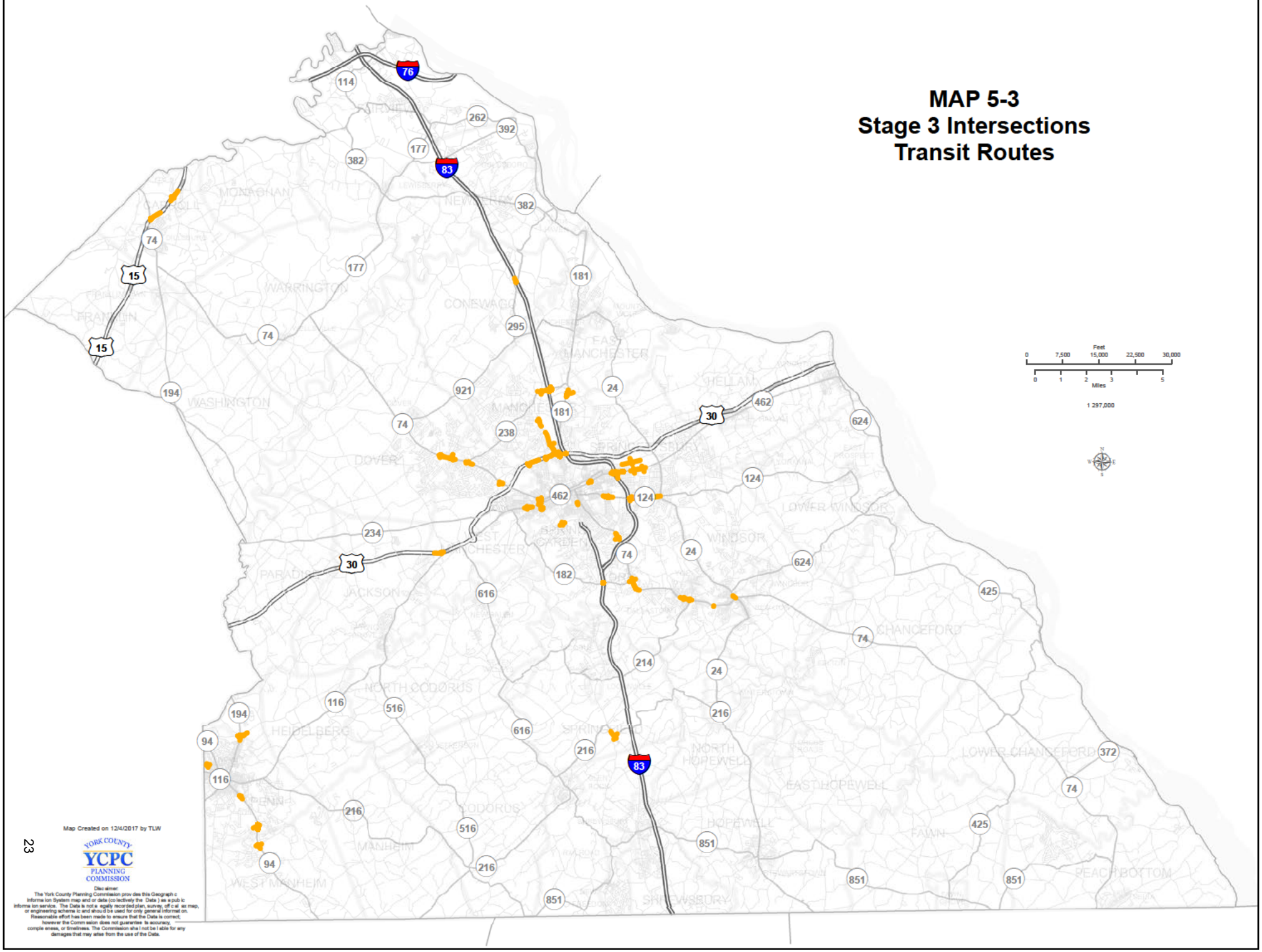
MAP 5-1
Stage 3 Intersections
National Highway System



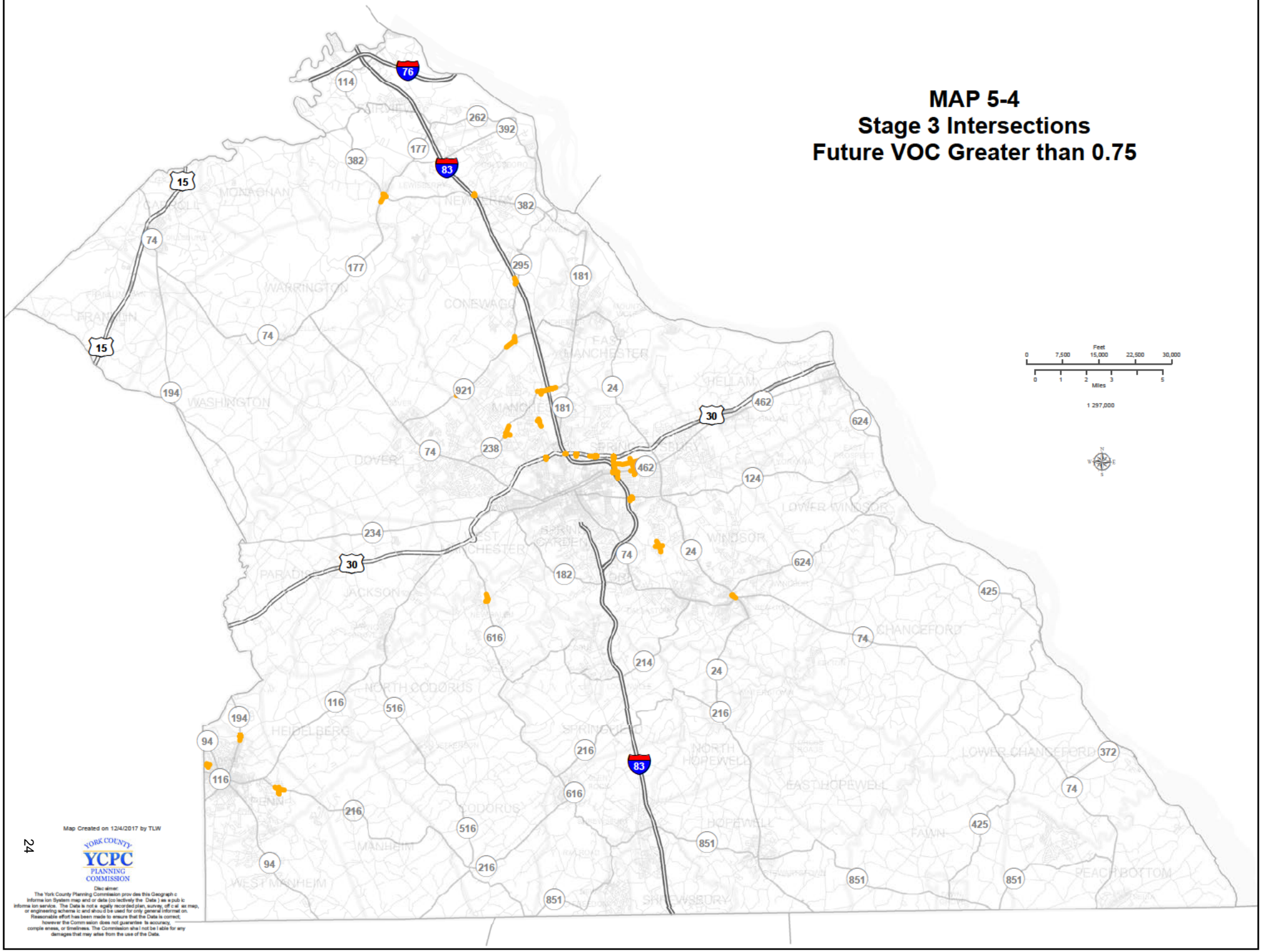
MAP 5-2
Stage 3 Intersections
ADTT Greater Than 1,000



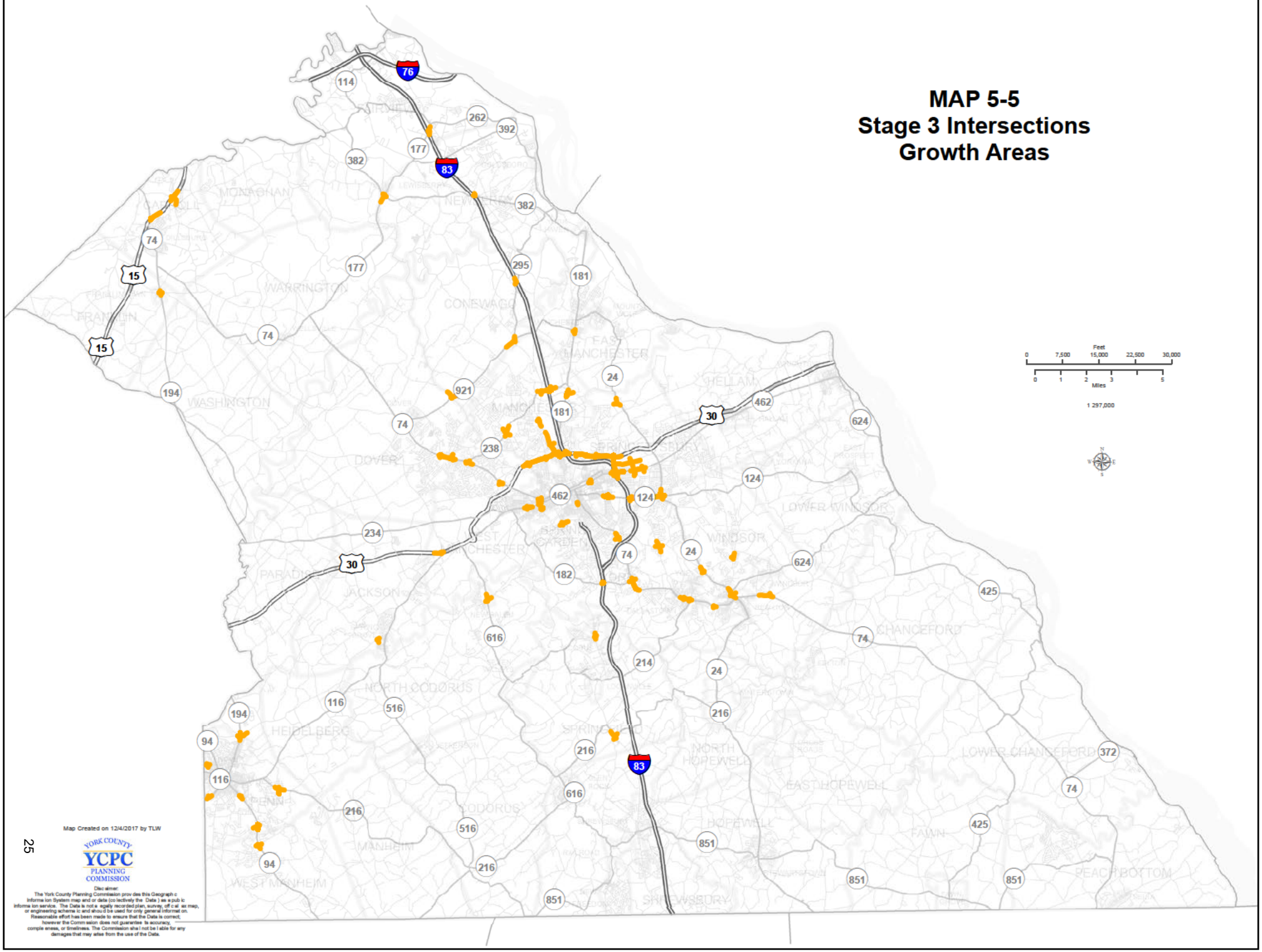
MAP 5-3
Stage 3 Intersections
Transit Routes



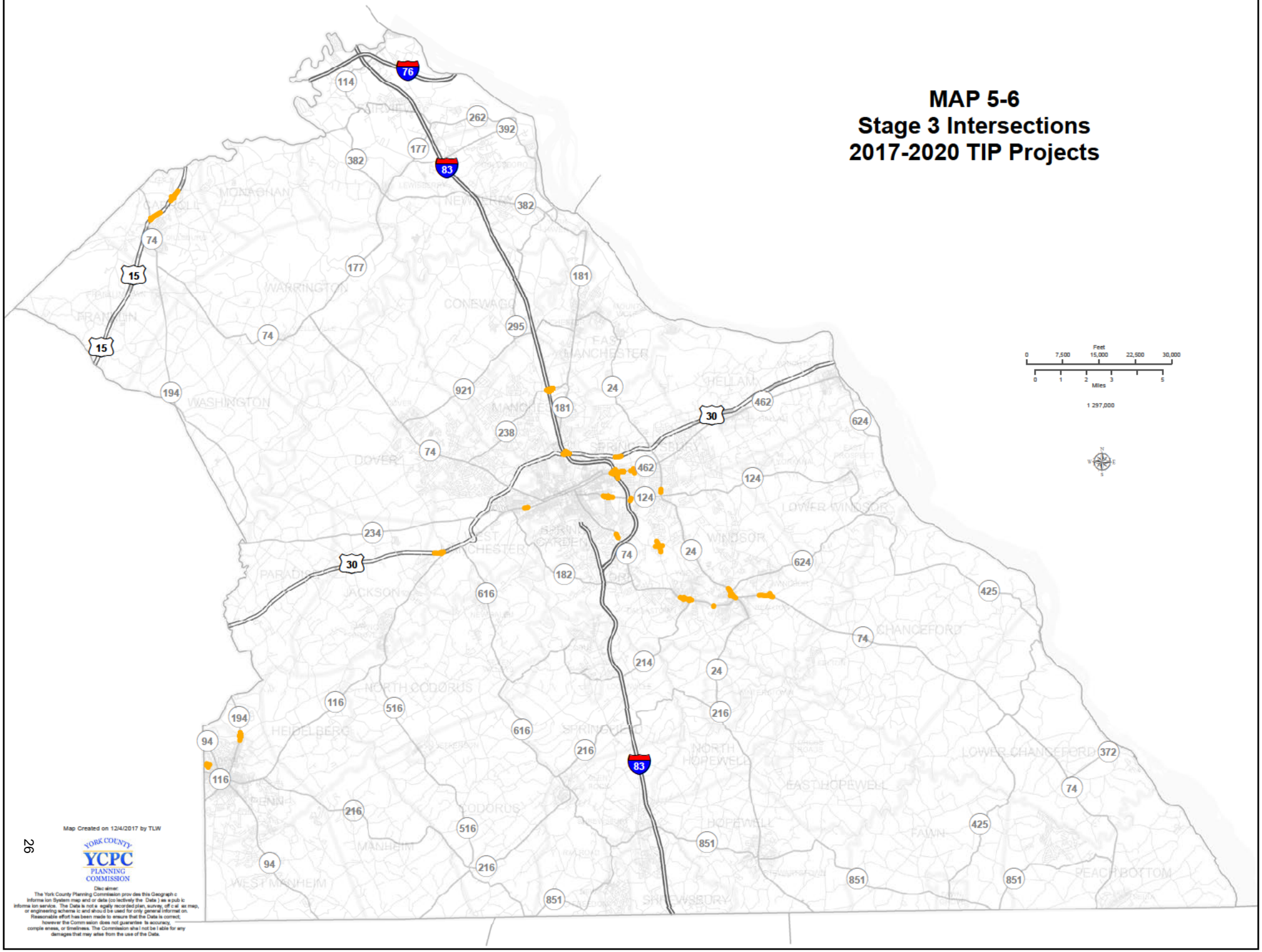
MAP 5-4
Stage 3 Intersections
Future VOC Greater than 0.75



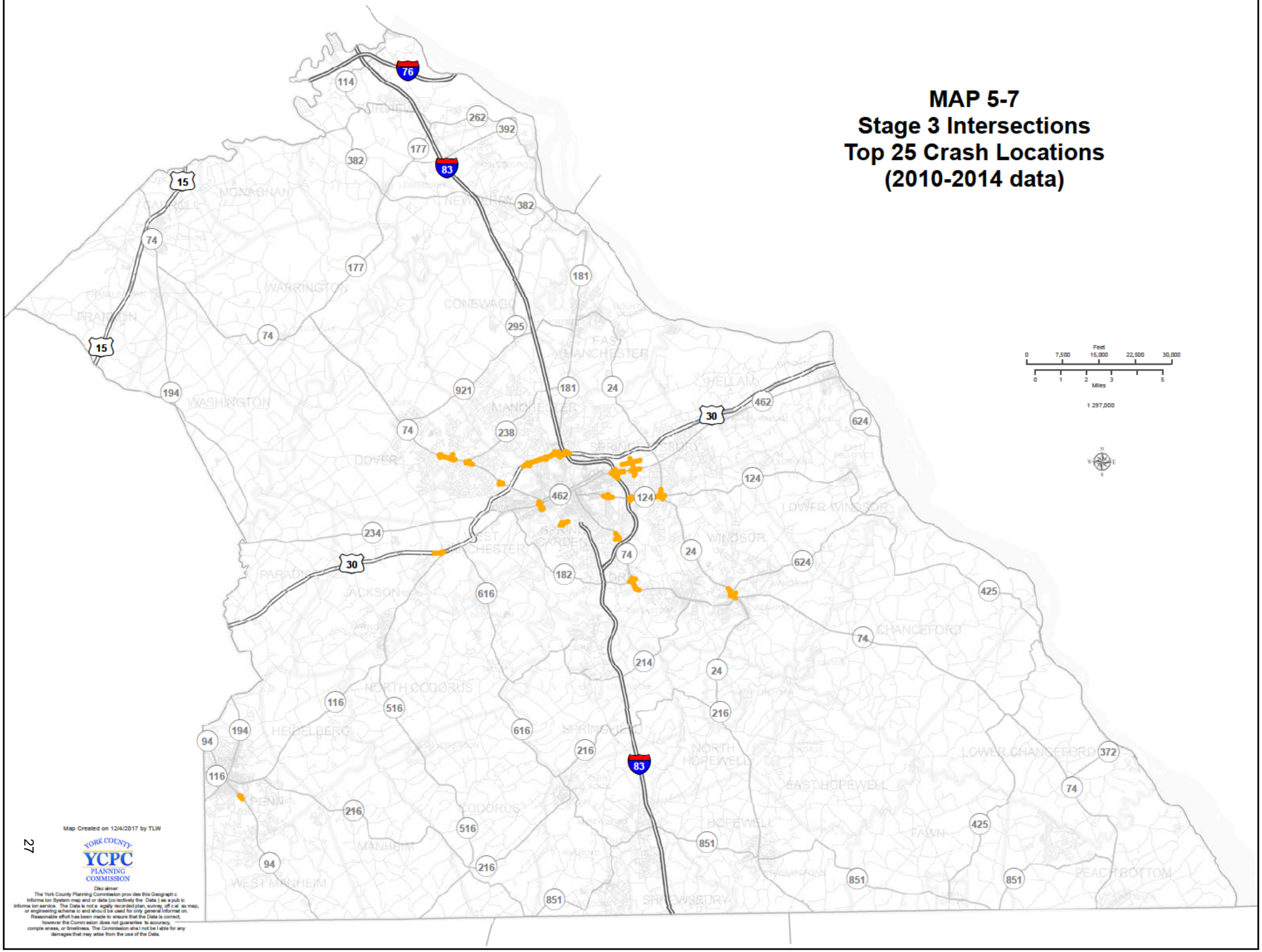
MAP 5-5
Stage 3 Intersections Growth Areas



MAP 5-6
Stage 3 Intersections
2017-2020 TIP Projects



MAP 5-7
Stage 3 Intersections
Top 25 Crash Locations
(2010-2014 data)



Urban Areas

Urban areas provide unique challenges when measuring congestion. For both individual intersections and signalized corridors, the main priorities for setting traffic signal timing are optimizing the intersection efficiency to achieve maximum capacity while minimizing safety risks for vehicle traffic traveling through the intersection. In urban areas, other factors such as economic development, pedestrian and bicycle movements, and directional traffic flow movements are often higher priorities than maximizing capacity for through traffic. Thus, standard congestion measures, such as TTI = 1.5, may not pertain to these areas and typically identified congestion may not be considered a problem.

York County has two major urban areas: York City and Hanover Borough. For this report, these two areas are considered separately from the rest of the County. Road segments were selected to form a street footprint for each area. These footprints are shown in Map 8 for York City and Map 9 for Hanover Borough. Travel time and delay are calculated by direction using all three datasets for both AM and PM peak periods.

York City

The Central Business District street footprint for the City of York starts at Penn Street in the west to Queen Street in the east and from North Street in the north to College Avenue in the south, as shown on Map 8. Some road segments extend past these boundary streets in order to include directional intersection movements and/or contiguous congested road segments, such as the segments of Duke and Queen Streets south of Princess Street and College Avenue east of George Street.

Table 4 shows the calculation details by direction: northbound travel, southbound travel, eastbound travel and westbound travel by individual street. The 2016 posted speed travel time is shown in seconds, along with both the AM and PM peak period travel times for the distance shown. The amount of delay is calculated from the posted speed and peak period travel times for 2016, 2014 and 2012.

Cumulative travel time and delay for the entire footprint area are shown at the bottom of Table 4. These cumulative values indicate that travel time and delay is staying relatively steady through the three data periods.

As this report is being written, York City has proposed a road diet project for George Street that could seriously impact travel times for the northbound and southbound directions. This project will address other issues on the corridor, including pedestrian and bicycle safety and economic development, and it fulfills York City's complete streets policy.

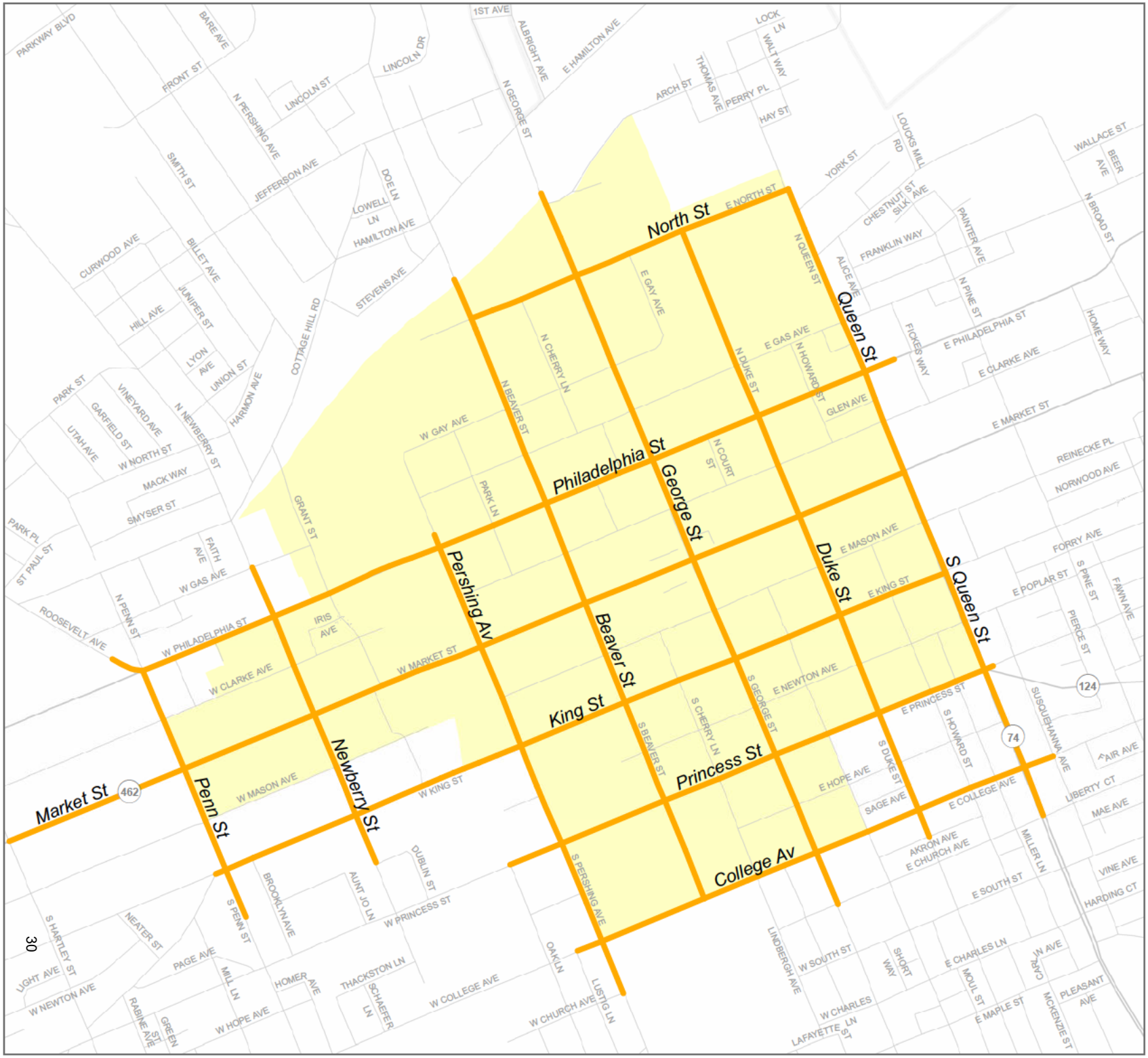
Hanover Borough

The General Business Zone street footprint for Hanover Borough starts at High Street in the west to Railroad Street/York Street in the east and from Park Avenue in the north to Middle Street in the south, as shown on Map 9. Some road segments extend past these boundary streets in order to include directional intersection movements and/or contiguous congested road segments, such as the segments of Baltimore Street south of Middle Street and portions of Chestnut Street, Broadway, and Walnut Street east of Railroad Street/York Street.

Table 5 shows the calculation details by direction: northbound travel, southbound travel, eastbound travel and westbound travel by individual street. The 2016 posted speed travel time is shown in seconds, along with both the AM and PM peak period travel times for the distance shown. The amount of delay is calculated from the posted speed and peak period travel times for 2016, 2014 and 2012.

Cumulative travel time and delay for the entire footprint area are shown at the bottom of Table 5. These cumulative values indicate that travel time and delay is staying relatively steady through the three data periods.

Hanover Borough was chosen through PennDOT's Highway Safety Improvement Program Set-Aside for a comprehensive evaluation of its traffic signal system which will result in Borough-wide signal retiming and/or adaptive traffic signal system. This project is currently slated for 2018 and will undoubtedly have very large impact on the travel time throughout the Borough that will be reflected in future datasets.



MAP 8
York City Central Business District

Signals

York City Central Business District

Feet
0 200 400 600 800
0 0.04 0.08 0.12 0.16
Miles

1 8,000

Map Created on 12/4/2017 by TLW

YORK COUNTY YCPC PLANNING COMMISSION

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Table 4 - York City Central Business District Travel Time and Delay

Northbound Travel (West to East)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
Penn St/ Roosevelt	0.29	King St	Philadelphia St	42	80	**38**	82	**40**	85	**43**	89	**47**	86	**44**	103	**61**
Newberry St	0.31	King St	Philadelphia St	45	96	**51**	91	**47**	96	**51**	111	**66**	109	**65**	123	**78**
Pershing Ave	0.48	College Ave	Philadelphia St	69	139	**69**	140	**71**	145	**75**	143	**74**	138	**69**	150	**81**
Beaver St	0.65	College Ave	North St	93	170	**76**	155	**62**	157	**64**	173	**80**	166	**72**	165	**72**
George St	0.75	College Ave	North St	108	178	**70**	184	**76**	173	**66**	237	**129**	235	**127**	249	**141**
Duke St	0.64	College Ave	North St	92	166	**75**	175	**84**	158	**66**	166	**74**	161	**70**	177	**86**
Queen St	0.66	College Ave	North St	80	133	**53**	140	**60**	135	**55**	182	**102**	173	**93**	175	**95**
	3.78		**Northbound**	528	961	**433**	968	**440**	949	**420**	1101	**573**	1068	**540**	1143	**615**

Southbound Travel (West to East)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
Penn St/ Roosevelt	0.29	Philadelphia St	King St	42	79	**37**	91	**49**	83	**41**	80	**38**	80.3	**38.43**	90	**48.3**
Newberry St	0.31	Philadelphia St	King St	45	94	**49**	101	**56**	93	**48**	104	**59**	104.1	**59.37**	109	**64.1**
Pershing Ave	0.48	Philadelphia St	College Ave	69	138	**69**	135	**66**	142	**73**	147	**77**	143.0	**73.68**	148	**78.8**
Beaver St	0.65	North St	College Ave	93	173	**80**	164	**71**	154	**61**	175	**81**	171.9	**78.65**	165	**72.1**
George St	0.75	North St	College Ave	108	166	**58**	164	**56**	161	**53**	199	**92**	190.3	**82.64**	192	**84.3**
Duke St		One Way Northbound		-	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**
Queen St	0.66	North St	College Ave	80	143	**63**	145	**66**	142	**63**	170	**90**	174.8	**95.06**	180	**100.2**
	3.14		**Southbound**	437	793	**357**	801	**364**	775	**339**	874	**437**	864	**428**	884	**448**

Eastbound Travel (North to South)

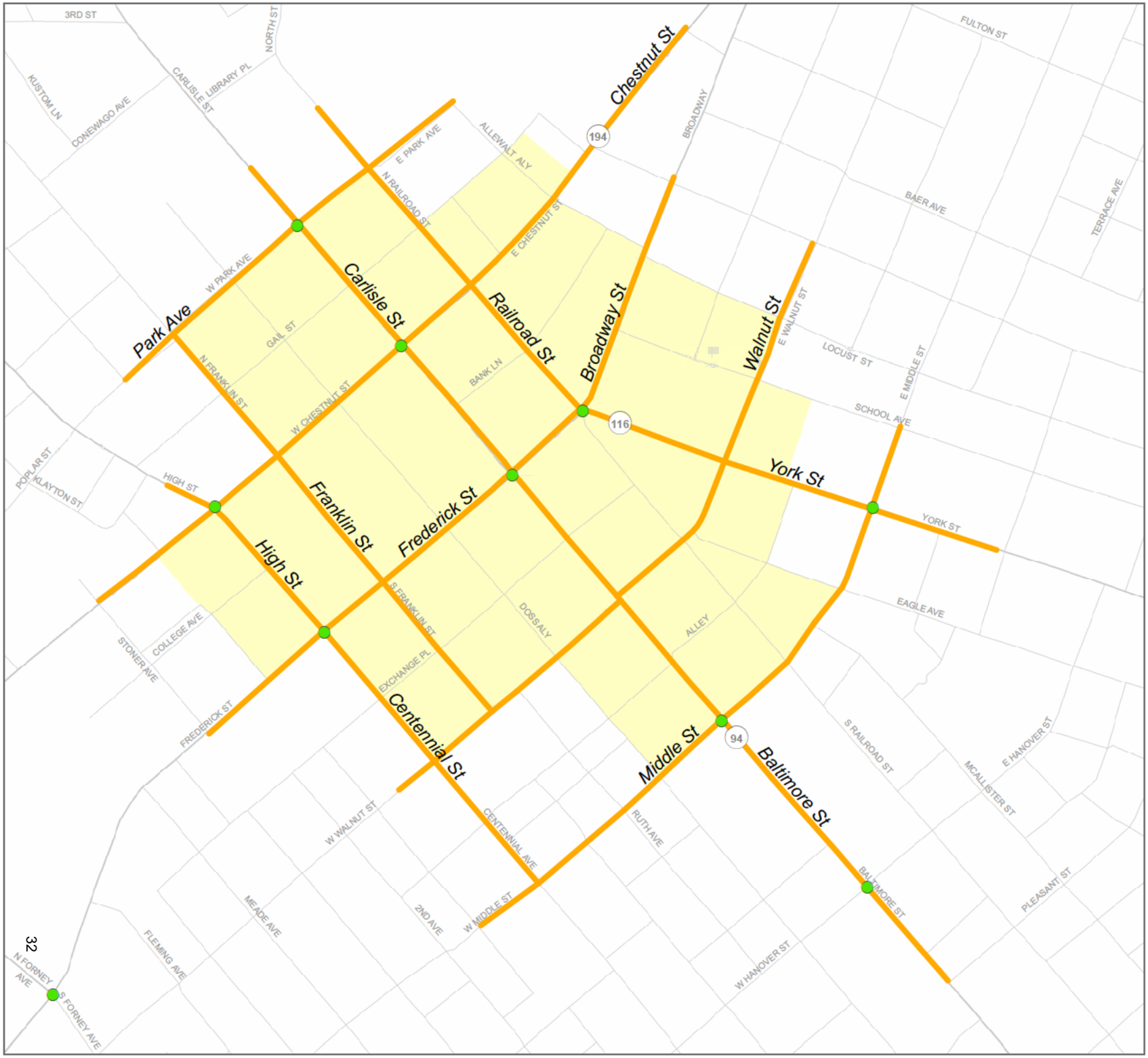
					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
North St	0.33	Beaver St	Queen St	48	84	**36**	81	**34**	84	**36**	85	**37**	83	**35**	83	**35**
Philadelphia St		One Way Westbound		-	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**
Market St	0.94	S. Penn St	Queen St	135	195	**60**	192	**58**	204	**70**	225	**90**	222	**87**	220	**85**
King St	0.77	S. Penn St	Queen St	110	166	**56**	154	**43**	154	**44**	176	**65**	167	**57**	167	**57**
Princess St	0.51	Pershing Ave	Queen St	73	112	**39**	115	**42**	111	**38**	120	**47**	119	**46**	120	**47**
College Ave	0.50	Pershing Ave	Queen St	72	111	**39**	127	**55**	112	**40**	127	**55**	125	**54**	134	**62**
	3.05		**Eastbound**	438	669	**231**	670	**232**	665	**228**	733	**295**	716	**278**	724	**286**

Westbound Travel (North to South)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
North St	0.33	Queen St	Beaver St	48	71	**23**	74	**26**	75	**28**	80	**32**	82	**34**	83	**35**
Philadelphia St	0.79	Queen St	S. Penn St	113	136	**23**	132	**19**	132	**19**	160	**47**	159	**46**	156	**43**
Market St	0.49	Penn St	Pershing Ave	71	87	**16**	87	**17**	94	**23**	97	**26**	93	**22**	99	**28**
King St		One Way Eastbound		-	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**
Princess St	0.51	Queen St	Pershing Ave	73	113	**40**	114	**41**	114	**41**	124	**51**	120	**47**	123	**50**
College Ave	0.50	Queen St	Pershing Ave	72	118	**47**	114	**42**	115	**44**	123	**51**	131	**59**	126	**54**
	2.62		**Westbound**	377	526	**149**	520	**143**	531	**154**	584	**208**	584	**208**	586	**210**
	5.24															

	AM						PM					
	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
NB-SB	1754.64	**790.04**	1768.25	**803.65**	1724.00	**759.40**	1974.70	**1010.10**	1932.77	**968.17**	2026.97	**1062.37**
EB-WB	1194.42	**380.01**	1189.58	**375.17**	1196.18	**381.77**	1317.13	**502.72**	1299.69	**485.28**	1310.19	**495.78**

	AM						PM					
	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
All Directions Together	2,949	**1,170**	2,958	**1,179**	2,920	**1,141**	3,292	**1,513**	3,232	**1,453**	3,337	**1,558**



MAP 9
Hanover Borough General Business Zone

Signals

Hanover Borough General Business Zone

Feet: 0, 125, 250, 375, 500

Miles: 0, 0.025, 0.05, 0.075, 0.1

1 5,000

Map Created on 12/4/2017 by TLW

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Table 5 - Hanover Borough General Business Zone Travel Time and Delay

Northbound Travel (West to East)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	2016 Delay (sec)	2014 Travel Time (sec)	2014 Delay (sec)	2012 Travel Time (sec)	2012 Delay (sec)
Centennial Ave/ High St	0.33	Middle St	Chestnut St	38	60	**22**	64	**26**	67	**29**	74	**35**	76	**38**	77	**39**
Franklin St	0.30	Walnut St	Park Ave	43	85	**42**	64	**21**	60	**16**	64	**21**	63	**20**	60	**17**
Baltimore St/ Carlisle St	0.65	Pleasant	Park Ave	77	117	**40**	159	**82**	155	**78**	212	**135**	217	**140**	202	**125**
York St/ N. Railroad St	0.51	Middle St	Park Ave	62	111	**49**	91	**29**	93	**30**	121	**59**	122	**60**	121	**59**
	1.79		**Northbound**	221	373	**152**	378	**158**	374	**153**	471	**250**	478	**258**	460	**240**

Southbound Travel (West to East)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
Centennial Ave/ High St	0.33	Chestnut St	Middle St	38	71	**33**	75	**36**	74	**36**	82	**43**	84	**45**	84	**45**
Franklin St	0.30	Park Ave	Walnut St	43	68	**25**	61	**18**	61	**18**	65	**22**	61	**18**	61	**18**
Baltimore St/ Carlisle St	0.65	Park Ave	Pleasant	77	117	**40**	158	**81**	147	**70**	184	**107**	185	**108**	180	**104**
York St/ N. Railroad St	0.51	Park Ave	Middle St	62	109	**47**	112	**50**	96	**33**	111	**48**	124	**62**	120	**58**
	1.79		**Southbound**	221	365	**145**	406	**185**	378	**157**	442	**221**	454	**233**	445	**225**

Eastbound Travel (North to South)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
Park Ave	0.26	Franklin St	N. Railroad St	38	95	**58**	94	**56**	92	**54**	97	**59**	95	**57**	92	**54**
Chestnut St		One Way Westbound		-	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**
Frederick St/ Broadway	0.45	Stoner	Locust St	53	89	**36**	87	**34**	82	**30**	110	**58**	109	**56**	103	**51**
Walnut St	0.43	Centennial Ave	Locust St	61	100	**38**	105	**43**	100	**38**	106	**44**	105	**43**	100	**38**
Middle St	0.41	Centennial Ave	York St	58	108	**50**	110	**51**	107	**49**	107	**49**	115	**56**	113	**54**
	1.55		**Eastbound**	210	296	**182**	395	**185**	381	**171**	420	**210**	423	**213**	408	**197**

Westbound Travel (North to South)

					AM						PM					
Street Name	Distance (mi)	From Intersection	To Intersection	Posted Speed Time (sec)	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
Park Ave	0.21	Franklin St	N. Railroad St	30	51	**21**	48	**18**	50	**20**	51	**21**	48	**18**	50	**20**
Chestnut St	0.50	Stoner	North	72	102	**30**	107	**35**	99	**27**	116	**44**	111	**39**	118	**46**
Frederick St	0.30	Centennial Ave	York St	31	68	**37**	72	**41**	67	**37**	84	**53**	94	**63**	88	**57**
Walnut St	0.43	Centennial Ave	Locust St	61	99	**38**	97	**35**	91	**30**	100	**39**	97	**35**	93	**31**
Middle St	0.41	Centennial Ave	School	58	109	**51**	105	**46**	104	**46**	118	**60**	118	**60**	124	**65**
	1.85		**Westbound**	252	428	**176**	429	**176**	412	**159**	468	**216**	468	**215**	471	**219**

*Broadway is one way eastbound

	AM						PM					
	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**	2016 Travel Time (sec)	**2016 Delay (sec)**	2014 Travel Time (sec)	**2014 Delay (sec)**	2012 Travel Time (sec)	**2012 Delay (sec)**
NB-SB	738.53	**297.13**	784.15	**342.75**	751.82	**310.42**	912.65	**471.25**	932.11	**490.71**	905.82	**464.42**
EB-WB	724.46	**357.40**	823.52	**361.03**	792.89	**330.40**	888.43	**425.94**	891.22	**428.73**	878.86	**416.37**

Appendix

Appendix - Regional Peak Hour Percentage

South Central	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	61980	4142	6.68%	5575	8.99%
	2015	33096	2307	6.97%	2964	8.96%
	2016	43345	3114	7.18%	3900	9.00%
3-yr Average		**138421**	**9563**	**6.91%**	**12439**	**8.99%**

GY- East	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	116751	10620	9.10%	9004	7.71%
	2015	199517	15288	7.66%	17025	8.53%
	2016	145209	10701	7.37%	12776	8.80%
3-yr Average		**461477**	**36609**	**7.93%**	**38805**	**8.41%**

GY- West	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	72718	6382	8.78%	5452	7.50%
	2015	148938	10029	6.73%	12880	8.65%
	2016	46894	3458	7.37%	4035	8.60%
3-yr Average		**268550**	**19869**	**7.40%**	**22367**	**8.33%**

Northern	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	89273	6577	7.37%	8713	9.76%
	2015	46019	3371	7.33%	4513	9.81%
	2016	116146	10743	9.25%	9829	8.46%
3-yr Average		**251438**	**20691**	**8.23%**	**23055**	**9.17%**

South West	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	38386	3393	8.84%	3313	8.63%
	2015	64559	4386	6.79%	5377	8.33%
	2016	119623	8268	6.91%	10291	8.60%
3-yr Average		**222568**	**16047**	**7.21%**	**18981**	**8.53%**

York City	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	14186	1030	7.26%	1310	9.23%
	2015	31020	1942	6.26%	2912	9.39%
	2016	74132	5186	7.00%	6420	8.66%
3-yr Average		**119338**	**8158**	**6.84%**	**10642**	**8.92%**

South East	Year	Total Volume	AM Peak Hr Volume	AM %	PM Peak Hr Volume	PM %
	2014	34403	2721	7.91%	3228	9.38%
	2015	21200	1450	6.84%	1856	8.75%
	2016	14785	1180	7.98%	1509	10.21%
3-yr Average		**70388**	**5351**	**7.60%**	**6593**	**9.37%**