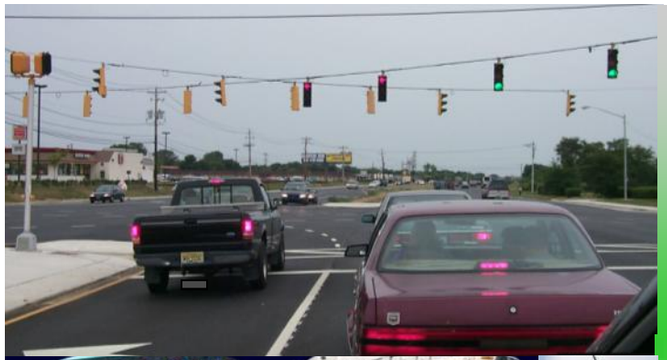

WILMAPCO

New Castle County Intersection Operations Analysis Summary 2014

Final Draft– April 2014

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INTRODUCTION

According to the Federal Highway Administration (FHWA) recently released Moving Ahead for Progress in the 21st Century Act, known as MAP-21 a Congestion Management Process (CMP) is "*Within a metropolitan planning area serving a transportation management area, the transportation planning process under this section shall address congestion management through a process that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under this title and chapter 53 of title 49 through the use of travel demand reduction and operational management strategies.*"

A CMP is required in metropolitan areas with population exceeding 200,000, known as Transportation Management Areas (TMAs). In TMAs designated as ozone or carbon monoxide non-attainment areas (the Wilmington Area is in non-attainment for ozone) the CMP takes on a greater significance. Federal requirements also state that in all TMAs, the CMP shall be developed and implemented as part of the metropolitan planning process.

The 2014 Intersection Operations Analysis is an outgrowth of the CMP process. It focuses upon the arterial roadway network and analyzes the current performance of the signals along all arterial roadways in New Castle County according to the FHWA's functional classification system. The goal of the analysis is to:

- Produce a regional delay/capacity analysis for signalized intersections along the arterial network.
- Identify which intersections have reached a point of limited capacity available to function efficiently.
- Prioritize intersections which need capital improvement, minor adjustments, or can still be addressed through signal timing efforts.
- Monitor the status and timing of any capital improvements scheduled along with the implementation of Traffic Responsive Signalization (TRS) technology to the identified corridors. This document is to serve as a way to update the decision-makers and members of the public on the progress that is being made.

Why the emphasis on signal timings & coordination?

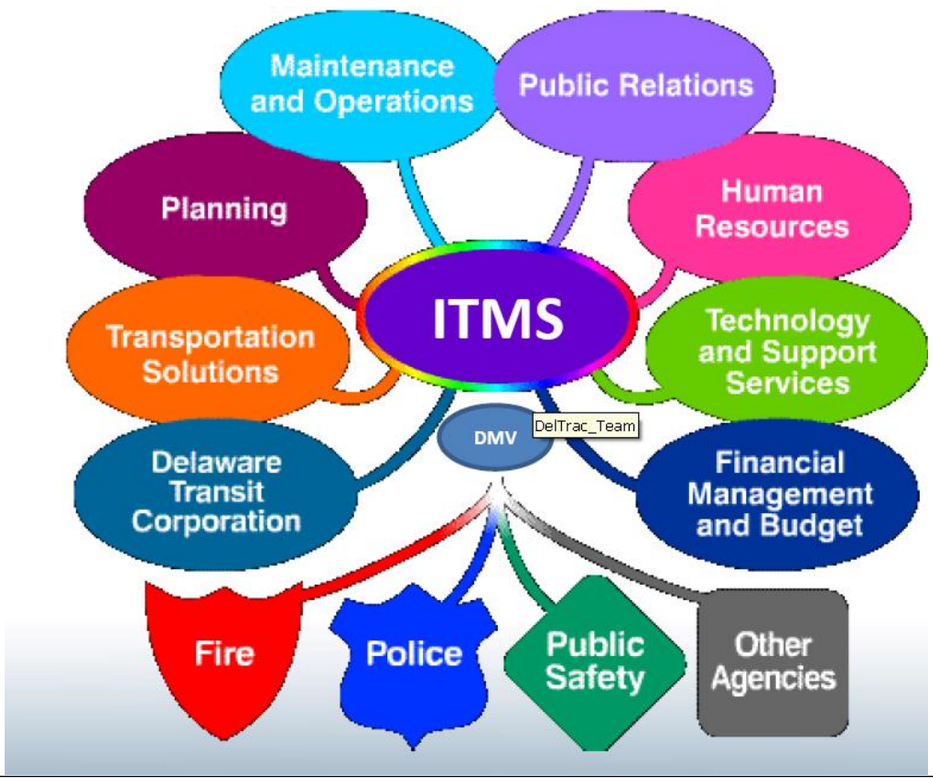
Throughout the arterial network, research has shown that congestion it is not so much caused by lack of roadway capacity (i.e. number of lanes) but rather the ability of the traffic signals to manage peak period traffic efficiently. The DelDOT TMC has developed their Integrated Transportation Management System (ITMS) to help coordinate and implement advanced signal systems, along with various types of traffic management technologies, and the coordinating human resources that make it all work.

These efforts in producing better performing traffic signalization not only benefit automobile users, but cover all modes of transportation. Bus transit, walkers and bikers are also using the same transportation network and thus there can be times where there are competing demands for traffic movement flows.

What are the benefits of signal timings & coordination?

In 2011, the Philadelphia PA-NJ-DE-MD urban area spent 156 million hours and 75 million gallons of fuel sitting in traffic, which resulted in a congestion cost of about $3.4 billion dollars.[1]

- Cost-Effectiveness: With ever shrinking resources for expansive capital improvements, signal timing/coordination has proven to be one of the most effective methods to improve the throughput of traffic without the addition of through lanes or expanding turning bays. Optimal functioning intersections can eliminate or at least delay the need for expensive new roadway construction projects.
- Reduced air pollution emissions: Reductions in CO2 emissions along with other pollutants can be improved with more efficient traffic flow.
- Reduced Driver Delay: With signals coordinated along a corridor, a driver or mass transit vehicle can reduce the number of stops, thus creating better travel times along the corridor.
- Decreased Fuel Consumption: With shorter travel times and less delay, all residents and transit vehicles will use less fuel.



[1]: *2012 Urban Mobility Report, Texas Transportation Institute*

INTERSECTION OPERATIONAL ANALYSIS— Delay Based Level of Service (LOS)

The 2010 Highway Capacity Manual (HCM) defines Level of Service (LOS) for signalized intersections as a function of the average vehicle control delay. LOS may be calculated per movement or per approach for any intersection configuration, but LOS for the intersection as a whole is only defined for signalized and all-way stop configurations. The HCM recommends using delay LOS when determining a systems-based analysis for signalized intersections.

This "delay-LOS" method is used as one of the primary performance measures for identifying areas of congestion within the region. Intersection LOS is collected through a variety of sources. All measures are done for a 2-3 hour period, covering the most common peak period for weekday traffic (6-9am or 7-9am) for the AM period and (3-6pm or 4-7pm) in the PM period.

Figures 1 and 2 show Current AM and PM Level of Service for signalized intersections, identifying intersections which are functioning at LOS E or F in the morning and evening peak periods.

"Delay-Based" Intersection LOS

LOS	Delay Measure
A	under 10 seconds
B	10-20 seconds
C	20-35 seconds
D	35-55 seconds
E	55-80 seconds
F	over 80 seconds

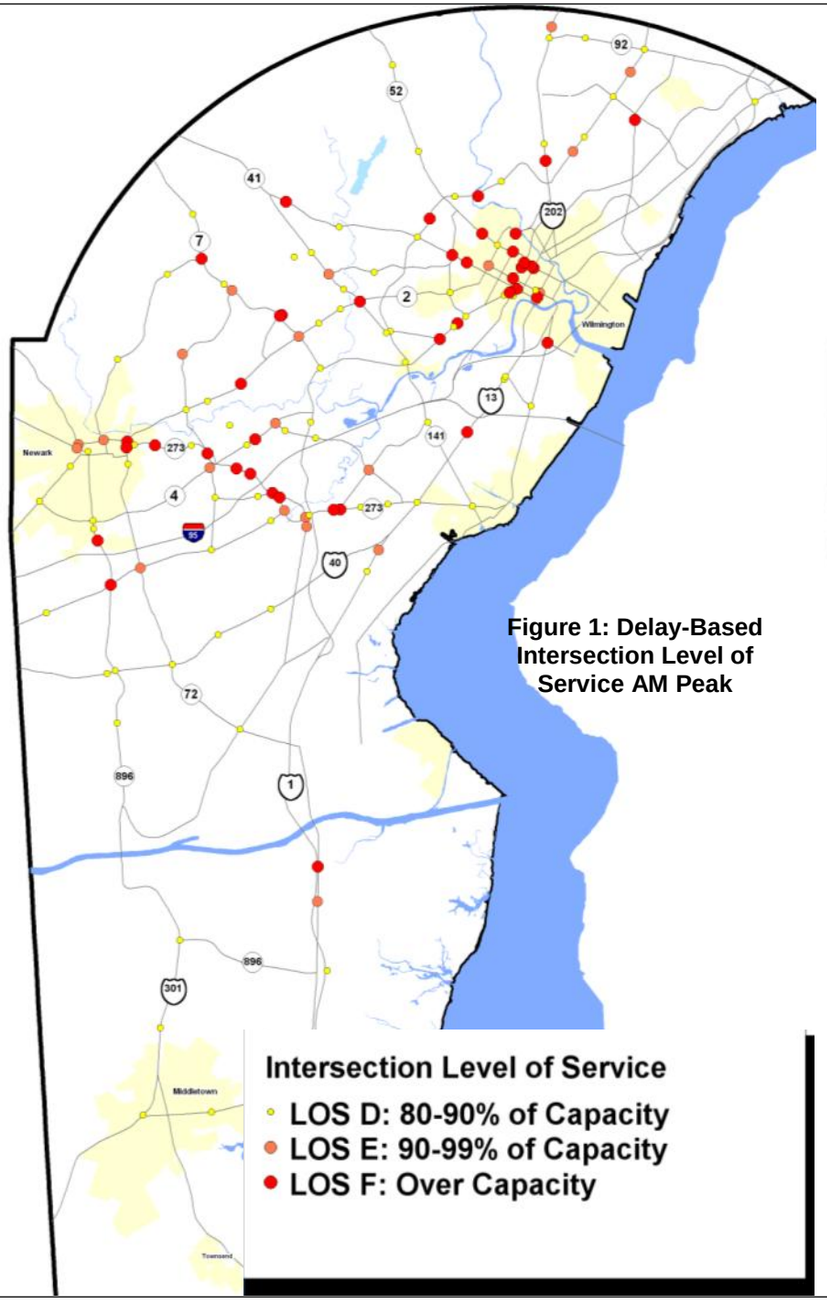


Figure 1: Delay-Based Intersection Level of Service AM Peak

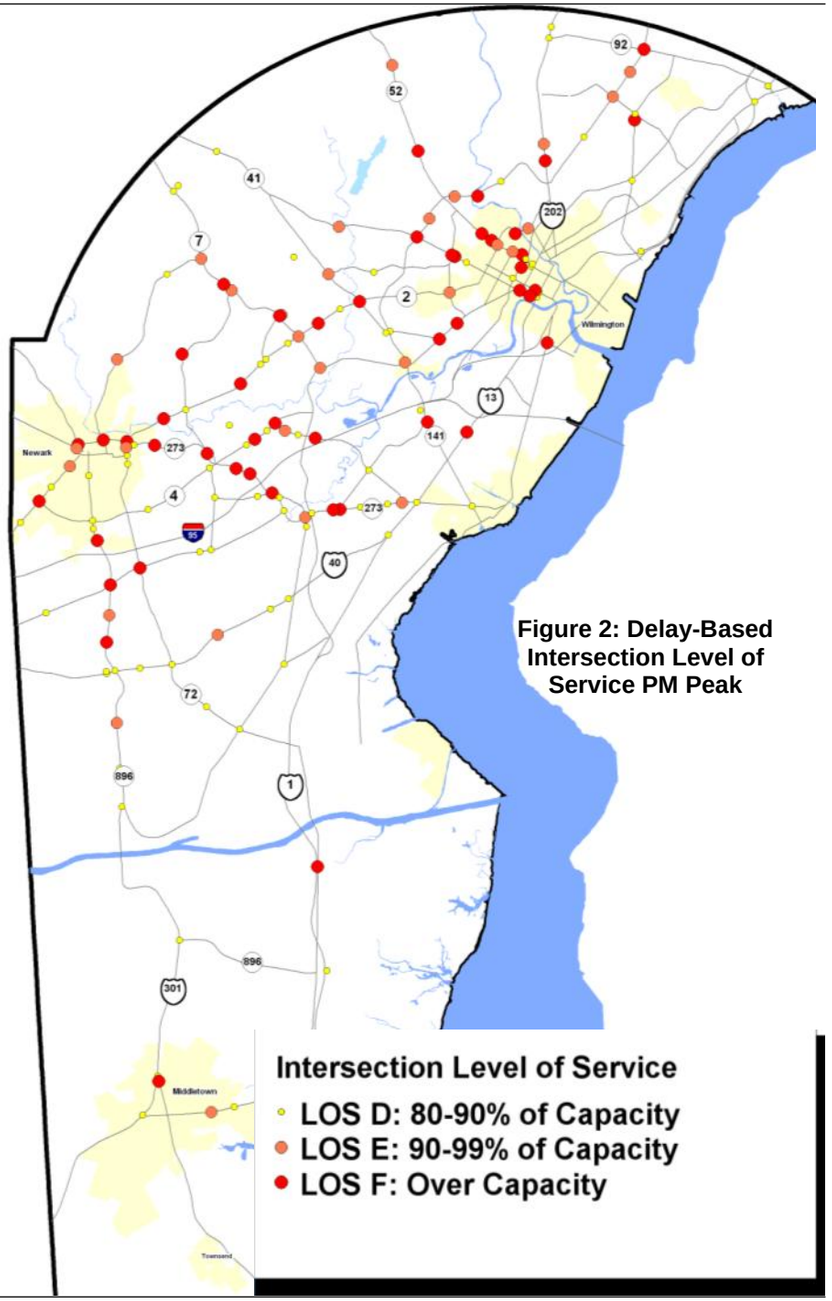


Figure 2: Delay-Based Intersection Level of Service PM Peak

INTERSECTION OPERATIONAL ANALYSIS– Volume Based Level of Service (LOS)

This method focuses on “raw” intersection capacity, that is, the ability for an intersection to process a given traffic demand (volume) with a given lane use configuration and given phase sequence. It is a more simple, hands-on approach to get right to the point of an intersection’s ability to handle traffic demands. The critical movement summation (CMS) method looks at each of the “critical” movements at an intersection. It is a volume-based measure.

At signalized intersections, capacity for a particular movement is defined by two elements: the maximum rate at which vehicles can pass through a given point in an hour under prevailing conditions, and the ratio of time during which vehicles may enter the intersection.

Figures 3 and 4 show all of the intersections where the volume-based level of service is calculated using the Critical Movement Summation analysis tool, which measures the peak hour traffic volume movements though each leg of the intersection. The LOS breakdown is shown below.

“Volume-Based” Intersection LOS

Level of Service Critical Movement Summation (CMS)
LOS A Less than 1,000 vehicles/hour
LOS B 1,000 to 1,150 vehicles/hour
LOS C 1,151 to 1,300 vehicles/hour
LOS D 1,301 to 1,450 vehicles/hour
LOS E 1,451 to 1,600 vehicles/hour
LOS F More than 1,600 vehicles/hour

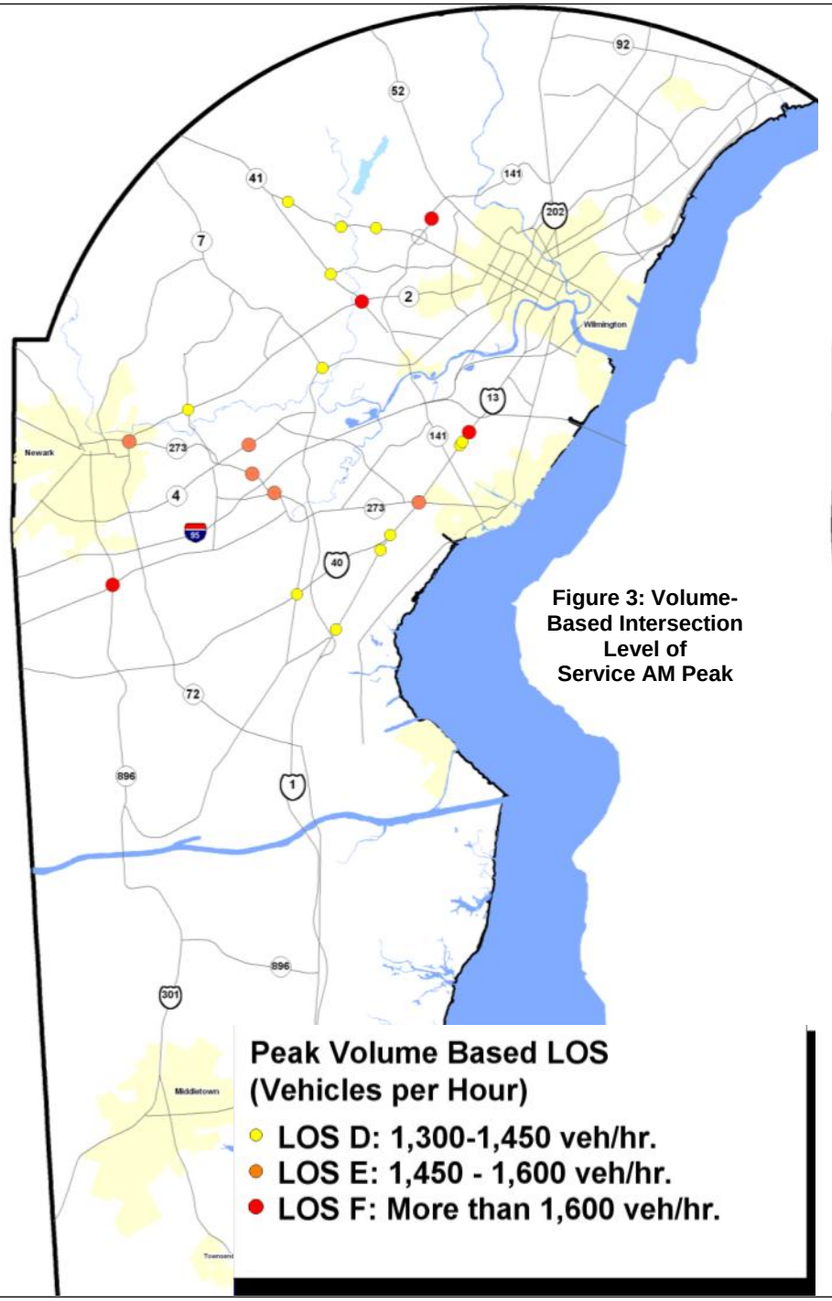


Figure 3: Volume-Based Intersection Level of Service AM Peak

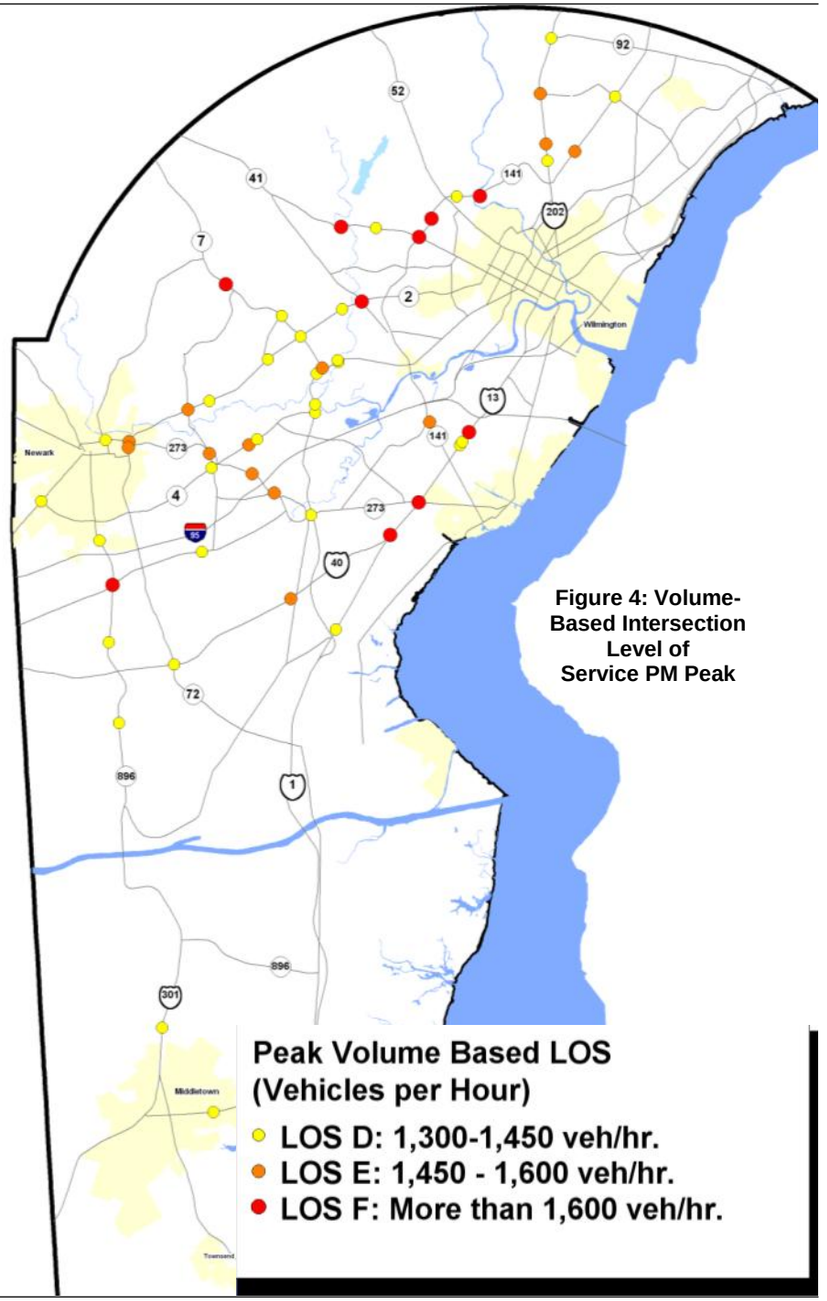


Figure 4: Volume-Based Intersection Level of Service PM Peak

INTERSECTION OPERATIONAL ANALYSIS (cont.)

To take the analysis a little further, each of the intersections determined deficient through the delay-based analysis were additionally studied using the Critical Movement Summation (CMS) methodology. The combination of both methods allows us to quickly see which intersections not only have issues with delay, but have capacity problems as well. The purpose of this is to be able to determine whether a deficient intersection is suffering from a signal timing issue or if it has truly reached a level of volume in which it requires capital improvements. This effort will help determine the extent of demand reduction or capital improvements that are needed to provide an acceptable LOS and provide more efficient traffic flows for commuters and bus transit services.

Results of this effort can be used to provide a performance-based analysis to provide a prioritized list of needed improvements into the statewide Transportation Improvement Program listed each year in the Delaware Capital Transportation Program.

Intersections shown in RED are ones that are showing LOS E of F during the AM or PM peak period. These intersections have issues with capacity and will require strategies that will reduce demand through the intersection or will need capital improvements to improve LOS.

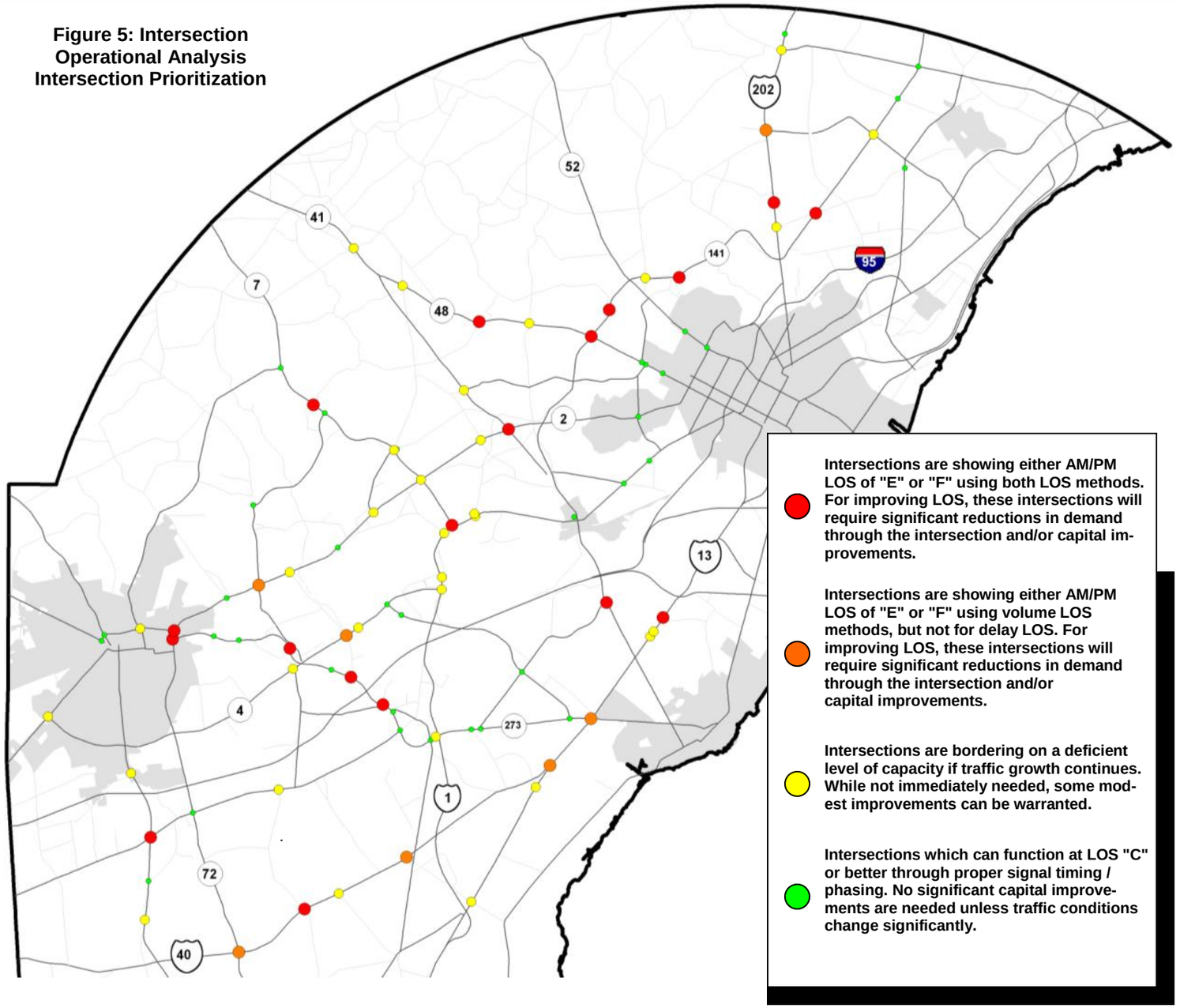
Intersections in ORANGE are unique in that they have acceptable "delay" LOS, but are showing a volume LOS of "E" or "F". Similar to intersections in yellow, these are likely in need of modest improvements unless traffic growth increases, thus needing added improvements.

Intersections in YELLOW are bordering on a deficient level of capacity if traffic demand grows. While not immediately needed, some modest improvements can be made to the intersection.

Intersections in GREEN can function at LOS "C" or better through proper signal timing / phasing. No significant capital improvements are needed unless traffic demand increases.

ID numbers next to each intersection correspond to the charts on pages 6 and 7.

Figure 5: Intersection Operational Analysis Intersection Prioritization



INTERSECTION OPERATIONAL ANALYSIS (cont.)

Table 1 shows the LOS data for each intersection that was identified in the Intersection Operational Analysis. The analysis was conducted in two parts:

- Using delay-based LOS analysis, all intersections that were showing an LOS of “E” or “F” in the AM or PM peak were identified.
- Of those that were identified, a capacity –based LOS analysis was performed to determine the amount of capacity remains at that intersection.

The table reveals which intersections that have reached an LOS of E or F through the capacity analysis, which indicates that it has reached the limit of (or is very close to) its ability to handle any more peak period volume at its current configuration and any additional signal timing adjustments are limited as a way to improve LOS.

“Delay-Based” Intersection LOS

LOS	Delay Measure
A	under 10 seconds
B	10-20 seconds
C	20-35 seconds
D	35-55 seconds
E	55-80 seconds
F	over 80 seconds

“Volume-Based” Intersection LOS

Level of Service Critical Movement Summation (CMS)
LOS A Less than 1,000 vehicles/hour
LOS B 1,000 to 1,150 vehicles/hour
LOS C 1,151 to 1,300 vehicles/hour
LOS D 1,301 to 1,450 vehicles/hour
LOS E 1,451 to 1,600 vehicles/hour
LOS F More than 1,600 vehicles/hour

Table 1: Intersection Operations Analysis: Top Ranking Intersections: LOS E & F

PERMIT	Intersection	Year of LOS	AM Delay LOS	PM Delay LOS	Year of LOS	AM Volume LOS	PM Volume LOS	Status
N303	SR 141 & SR 37 (Commons Blvd.)	2012	D	F	2012	C	E	**Intersections are showing either AM/PM LOS of "E" of "F" using both LOS methods. For improving LOS, these intersections will require significant reductions in demand through the intersection and/or capital improvements.**
N236	Foulk Rd. & Murphy Rd.	2010	E	C	2010	C	E	
N157	SR 48 & Hercules Rd.	2009	D	E	2009	D	F	
N156	SR 48 & SR 141	2010	D	F	2012	-	F	
N422T	SR 2 & Cleveland Ave.	2010	F	F	2012	E	E	
N162	SR 2 & SR 41	2010	F	F	2010	F	F	
N021P	SR 141 & Barley Mill Rd.	2010	F	E	2010	F	F	
N337	SR 273 & Harmony Rd.	2011	F	F	2011	E	E	
N188	SR 896 & Old Baltiomore Pk.	2010	F	F	2010	F	F	
N225	SR 7 (Limestone Rd) & SR 4 (Main St.) Stanton	2011	D	E	2012	D	E	
N261	SR 7 & Skyline Dr.	2010	D	F	2010	C	F	
N393	US 40 & Porter Rd.	2012	D	E	2012	B	E	
N217	US 13 & Bacon Ave/Boulden Blvd.	2011	F	F	2011	F	F	
N367	SR 273 & Chapman Rd (Eagle Run)	2011	F	F	2011	E	E	
N108	US 202 & Fairfax Blvd.	1999	D	E	2012	C	E	
N423T	SR 273 & Main St.	2008	F	E	2012	C	E	
N211	SR 141 & Rising Sun Lane	2000	F	F	2012	C	F	
N590	SR 273 & Old Ogletown Rd./Paradise Ln.	2012	F	F	2012	B	E	
N183	US 13 & SR 273**	2012	**D**	**D**	2012	**E**	**F**	**Intersections are showing either AM/PM LOS of "E" of "F" using volume LOS methods, but not for delay LOS. For improving LOS, these intersections will require significant reductions in demand through the intersection and/or capital**
N184	US 13 & US 40	2012	**B**	**D**	2012	**D**	**F**	
N317	SR 2 & Red Mill/Polly Drummond Rd.**	2011	**D**	**D**	2011	**D**	**E**	
N312	SR 4 & Harmony Rd.**	2011	**D**	**D**	2011	**E**	**E**	
N239	US 40 & SR 72 **	2012	**D**	**D**	2012	**E**	**C**	
N035P	US 40 & Gov. Sq.**	2012	**C**	**D**	2012	**A**	**E**	
N102	US 202 & Silverside Rd.**	2012	**C**	**C**	2012	**A**	**E**	

Intersection Operational Analysis

Table 2 contains intersections which have shown through the capacity-based analysis have an AM and/or PM LOS of "D". While not at the current time showing a pressing need, these intersections are bordering on a deficient level of capacity if traffic growth continues.

These are being viewed as "intersections to watch" as any traffic volume increases, new land use activity or changes in peak period travel conditions could move the intersection into E/F ranges.

While not immediately needed, some modest improvements can be warranted such as:
- Striping alterations
- Safety improvements
- Signal phasing adjustments
- Perform turning movement counts for updated signal timing sequences

"Delay-Based" Intersection LOS

LOS	Delay Measure
A	under 10 seconds
B	10-20 seconds
C	20-35 seconds
D	35-55 seconds
E	55-80 seconds
F	over 80 seconds

"Volume-Based" Intersection LOS

Level of Service Critical Movement Summation (CMS)
LOS A Less than 1,000 vehicles/hour
LOS B 1,000 to 1,150 vehicles/hour
LOS C 1,151 to 1,300 vehicles/hour
LOS D 1,301 to 1,450 vehicles/hour
LOS E 1,451 to 1,600 vehicles/hour
LOS F More than 1,600 vehicles/hour

Table 2: Intersection Operations Analysis: Top Ranking Intersections (cont.)

Intersection	Year of LOS	AM Delay LOS	PM Delay LOS	Year of LOS	AM Volume LOS	PM Volume LOS	Status
SR 261 (Foulk Rd.) & Silverside Rd.	2010	D	E	2010	B	D	Intersections are bordering on a deficient level of capacity if traffic growth continues. While not immediately needed, some modest improvements can be warranted.
SR 41 & Brackenville Rd.	2009	D	C	2009	D	C	
SR 48 & Loveville Rd.	2012	F	C	2012	D	A	
SR 48 & Centerville Rd.	2010	C	C	2012	D	D	
SR 2 (Kirkwood Hwy) & Harmony Rd.	2011	D	C			D	
SR 2 & Milltown Rd.	2012	C	D	2012	A	D	
SR 2 (Kirkwood Hwy) & SR 7 (Limestone Rd.)	2011	E	E	2011	C	D	
SR 2 & Duncan Rd.	2012	D	D	2012	A	D	
SR 141 & SR 100	2010	D	E	2010	C	D	
Cleveland Ave. & Paper Mill Rd./ N. Chapel St.	2005	E	F	2012	B	D	
SR 4 & SR 7/JP Morgan Ent.	2012	C	C	2012	B	D	
SR 7/ SR 4 & Telegraph Rd.	2012	B	C	2012	C	D	
SR 4 (EB) & Stanton Rd.	2012	B	B	2012	A	D	
SR 4 & Salem Church Rd.	2010	E	D	2010	B	D	
SR 4 & Samoset Dr.	2010	F	F	2010	B	D	
SR 896 (Glasgow Ave.E) & Porter Rd.	2010	D	E	2010	B	D	
SR 896 (S. College Ave.) & Corporate Blvd. (GBC	2011	C	F	2011	B	D	
SR 896 & Welsh Tract Rd.	2012	F	F	2012	B	D	
SR 41 & Faulkland Rd.	2011	E	E	2011	D	B	
SR 299 & Silver Lake Rd.	2012	D	E	2012	C	D	
SR 7 & Milltown Rd.	2010	F	F	2010	C	D	
US 40 & Church Rd.	2012	C	C	2012	B	D	
US 13 & Harrison Ave.	0			2012	D	D	
US 13 & Roosevelt Ave.	0			2012	D	D	
US 13 & Hamburg Rd	2012	C	C	2012	D	D	
US 13 & Llangollen Blvd.	2012	E	C	2012	D	C	
SR 273 & SR 1 SB Ramp	2012	D	C	2012	B	D	
US 202 & Powder Mill/Murphy Rd.	1999	F	F	2012	B	D	
US 202 & SR 92 Naamans Rd.	2010	D	D	2010	B	D	
SR 7 & Stanton-Christiana Rd.	1995	C		2012	A	D	
Old Baltimore Pk. & Salem Church Rd. (West)	2012	B	D	2012	A	D	
US 301 & Armstrong/Marl Pit Rd.	2010	D	C	2010	C	D	
SR 4 (WB) & Stanton Rd.	2008	B	C	2012	A	D	

Intersection Operational Analysis

Table 3 contains intersections which have shown through the capacity-based analysis have an AM and/or PM LOS of “C”. While not at the current time showing a pressing need, these intersections are bordering on a deficient level of capacity if traffic growth continues.

These are being viewed as Intersections which can function at LOS "C" or better through proper signal timing / phasing. No significant capital improvements are needed unless traffic conditions change significantly.

“Delay-Based” Intersection LOS

LOS	Delay Measure
A	under 10 seconds
B	10-20 seconds
C	20-35 seconds
D	35-55 seconds
E	55-80 seconds
F	over 80 seconds

“Volume-Based” Intersection LOS

Level of Service Critical Movement Summation (CMS)
LOS A Less than 1,000 vehicles/hour
LOS B 1,000 to 1,150 vehicles/hour
LOS C 1,151 to 1,300 vehicles/hour
LOS D 1,301 to 1,450 vehicles/hour
LOS E 1,451 to 1,600 vehicles/hour
LOS F More than 1,600 vehicles/hour

Table 3: Intersection Operations Analysis: Top Ranking Intersections (cont.)

PERMIT	Intersection	Year of LOS	AM Delay LOS	PM Delay LOS	Year of LOS	AM Volume LOS	PM Volume LOS	Status
N286	Foulk Rd. & Grubb Rd.	2010	E	E	2010	A	B	
N155	SR 48 & N DuPont Rd.	2010	F	F	2010	A	A	
N166	SR 2 & Possum Park Rd.	2009	C	F	2009	B	C	
N248	SR 2 & Meadowood Dr.	2012	F	F	2012	A	C	
N272	SR 2 & SR 100	2009	D	E	2009	A	A	
N405	Milltown Rd. & McKennans Church Rd.	2010	F	E	2010	A	A	
N439T	SR 896 & Hillside Rd.	2010	E	F	2010	A	B	
N259	LInden Hill Rd. & Polly Drummond Rd.	2010	E	F	2010	C	C	
N347	SR 7 & SR 72	2010	F	E	2010	A	B	
N395	SR 4 (WB) & James St.	2012	D	E	2012	A	A	
N200	SR 4 & Boxwood Rd.	2012	F	F	2012	A	A	
N196	SR 4 & Lorewood Ave.	2012	F	F	2012	A	A	
N146	SR 92 / Naamans Rd. & Foulk Rd.	2010	D	F	2010	A	C	
N406	Churchmans Rd. & Christiana Hosp.	2006	D	E	2012	A	A	
N587	SR 273 & Lowes Entrance	2012	F	F	2012	A	A	
N315	SR 273 & Brownleaf Dr.	2012	F	F	2012	C	C	Intersections which can function at LOS "C" or better through proper signal timing / phasing. No significant capital improvements are needed unless traffic conditions change significantly.
N339	SR 273 & Airport Rd.	2011	F	F	2011	C	C	
N369	SR 4 & Churchman's Rd.	2010	E	F	2010	A	C	
N264	New Castle Ave. & Terminal Ave.	2009	F	F	2009	A	A	
N136	SR 896 & Four Seasons Parkway	2011	C	E	2011	B	C	
N140	SR 3 (Marsh Rd) & Wilson/Veale Rd.	2012	F	F	2012	A	A	
N356	SR 7 & Linden Hill Rd.	2010	E	E	2010	B	B	
N351	SR 273 & Old Balt. Pike	2011	E	D	2011	C	C	
N192	SR 7 & SR 273	2011	E	E	2011	C	C	
N460	SR 273 & Appleby Rd.	2011	F	F	2011	B	B	
N254	SR 273 & Churchmans Rd.	2010	C	E	2012	A	A	
N427T	SR 273 (W. Main St.) & Hillside Rd.	2009	E	E	2010	B	B	
N087P	SR 273 & White Clay Center Dr.	2012	F	F	2012	A	A	
N231	SR 273 & Browns Lane	2012	F	D	2012	C	C	
N665	SR 72 & Old Baltimore Pike	2011	E	F	2011	C	C	
N673	SR 48 & S Dupont Rd.	1999	B	F	2012	B	B	
N674	Lancaster Ave. & Greenhill Ave.	2012	F	D	2012	A	A	
N676	Pennsuylvania Ave. & Greenhill Ave.	2012	F	F	2012	A	A	
N678	Pennsylvania Ave. & Union St.	2008	D	E	2010	A	C	
N682	SR 58 & Airport Rd.	2012	E	D	2012	A	B	
N030P	US 202 & Brandywine Pkwy.	2000	E	D	2012	A	A	

Traffic Responsive Signalization (TRS) Planning Priorities

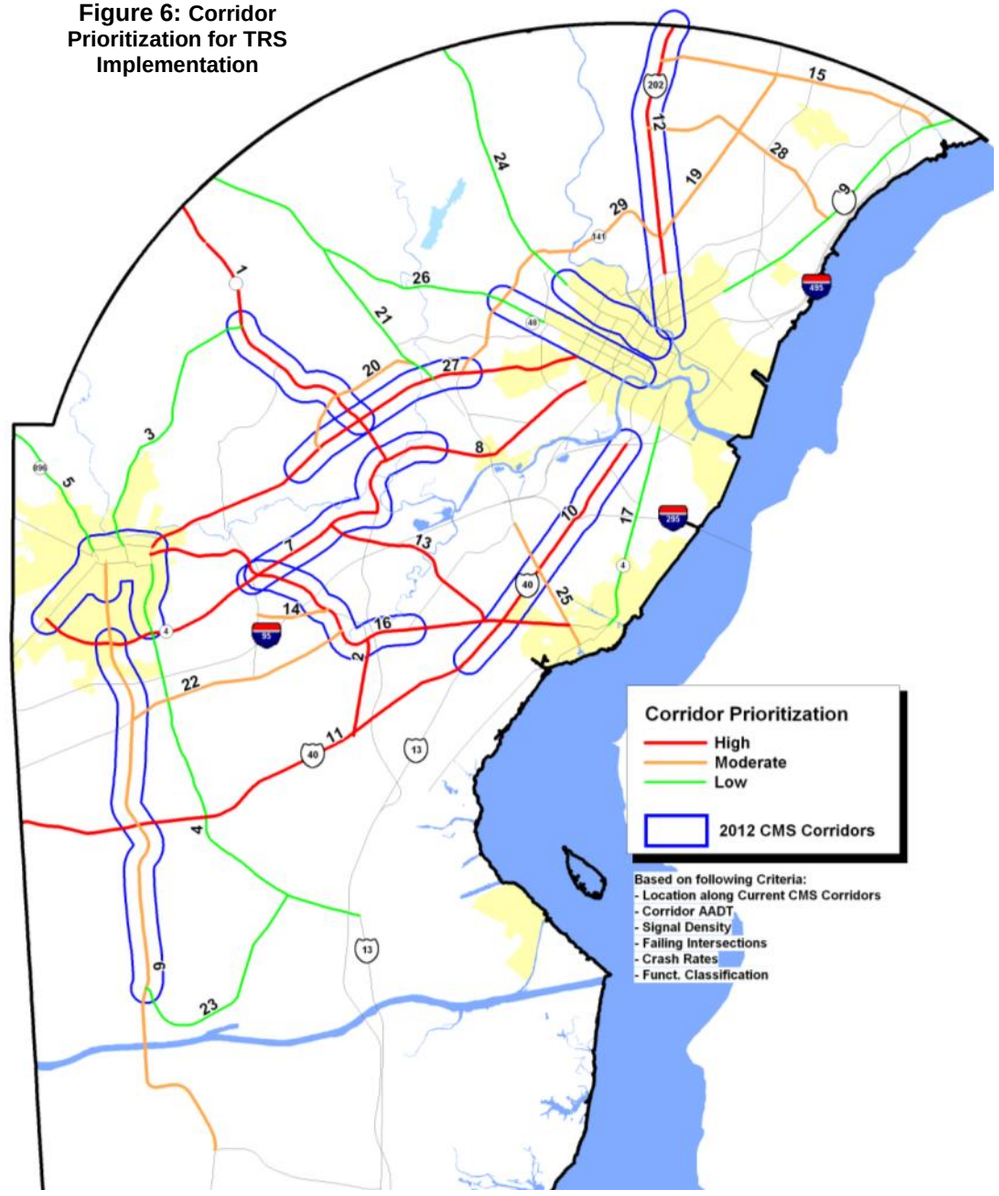
Through a joint effort with the DelDOT Traffic Management Center (TMC) and WILMAPCO, a technical exercise was performed to look at which corridors are priorities for applying Traffic Responsive Signalization technology. The CMS network was analyzed using traffic signal density, average traffic volumes, crashes, and failing signals to create a prioritized list of corridors for the TMC to consider for TRS implementation.

Traffic responsive signalization is a method of signal management that uses advanced technology to adjust timing to meet the needs of current traffic volume. The signals used in this method optimize signal timing according to traffic volume in each direction. Sensors are used to detect vehicular traffic in a certain direction at a particular point and an algorithm is used to predict when and where the traffic will be. The signal controller utilizes these algorithms to adjust the length of green time to allow the maximum amount of vehicles through the intersection. This method can react to fluctuating traffic volume in order to reduce congestion.

Table 4: Corridor Prioritization for TRS Implementation

ID	Route	Segment limits	Segment Length	Road Type (FC)	Avg AADT	# Signals	Signals/ mile	# Failing Intersections (LOS E or F in AM or PM)	Crashes/ Mile	AADT Rank	Signal Rank	Crash Rank	Int. Fail Rank	Overall	Priority
12	US 202	Wilmington Line to PA line	5.1	Principal Arterial	51,261	23	4.5	8	193	2	2	2	2	**0**	**High**
27	SR 2 (Kirkwood Highway)	Newark to Wilmington Line	9.54	Principal Arterial	35,200	32	3.4	12	181	3	7	3	1	**1.5**	**High**
8	SR 4	SR 7 to Wilmington Line	5.79	Principal Arterial	23,239	37	6.4	2	159	11	1	5	14	**5.75**	**High**
2	SR 7	SR 273 to US 40	1.93	Minor Arterial	25,732	7	3.6	2	177	9	4	4	14	**5.75**	**High**
16	SR 273	SR 273(Newark) to SR 141	9.4	Principal Arterial	30,781	25	2.7	5	156	6	15	6	5	**6**	**High**
10	US 13	South of Wilmington, I-495 to US 40 split	5.25	Principal Arterial	65,238	16	3.0	2	222	1	11	1	14	**6.75**	**High**
7	SR 4	Elkton Rd. to SR 7	7.48	Principal Arterial	23,214	20	2.7	3	128	12	15	9	7	**8.75**	**High**
11	US 40	MD line to US 13 split	9.93	Principal Arterial	33,251	23	2.3	3	149	5	21	7	7	**10**	**High**
1	SR 7	SR 4 Split to PA Line	6.65	Principal Arterial	28,670	21	3.2	1	126	8	10	10	20	**10**	**High**
13	Churchmans Rd.	SR 4 to SR 273	3.89	Minor Arterial	15,536	14	3.6	2	123	21	4	12	14	**10.75**	**High**
25	SR 141	SR 37 to SR 9	2.76	Principal Arterial	16,341	10	3.6	1	133	17	4	8	20	**11.25**	**Moderate**
15	SR 92 (Naamans Rd.)	US 202 to US 13	5.7	Principal Arterial	23,395	20	3.5	1	109	10	7	15	20	**13**	**Moderate**
29	SR 141	SR 2 to US 202	6.00	Principal Arterial	28,722	12	2.0	6	63	7	22	24	3	**13**	**Moderate**
22	Old Baltimore Pike	SR 896 to SR 273	4.62	Minor Arterial	16,550	12	2.6	2	118	16	18	13	14	**13.25**	**Moderate**
19	Foulk Rd.	US 202 to Naaman's Road	3.99	Minor Arterial	15,972	11	2.8	3	81	19	14	19	7	**13.75**	**Moderate**
14	Chapman Rd.	Salem Church Rd. to SR 273	1.43	Minor Arterial	11,269	5	3.5	2	112	26	7	14	14	**14.25**	**Moderate**
28	Silverside Rd	US 202 to US 13	4.56	Minor Arterial	16,213	12	2.6	3	76	18	18	22	7	**14.25**	**Moderate**
20	Milltown Rd.	SR 2 to SR 41	2.94	Minor Arterial	34,021	6	2.0	1	124	4	22	11	20	**14.25**	**Moderate**
6	SR 896	South of Newark to Boyd's Corner	12.92	Principal Arterial	22,433	23	1.8	6	78	13	25	21	3	**14.5**	**Moderate**
21	SR 41	PA line to SR 2	6.15	Minor Arterial	15,098	15	2.4	3	79	22	20	20	7	**15.25**	**Low**
4	SR 72	South of Newark to US 13	9.06	Minor Arterial	18,194	17	1.9	3	95	15	24	16	7	**15.5**	**Low**
26	SR 48	SR 41 split to Wilmington border	4.83	Principal Arterial	18,531	8	1.7	4	55	14	27	26	6	**16.25**	**Low**
9	US 13	North of Wilmington to PA line	5.89	Minor Arterial	11,656	22	3.7	0	90	25	3	17	27	**18**	**Low**
18	SR 299	US 301 to US 13	3.71	Minor Arterial	6,969	11	3.0	0	85	28	11	18	27	**19**	**Low**
17	SR 9	Terminal Ave. to Chesnut St.	4.17	Minor Arterial	15,696	12	2.9	1	73	20	13	23	20	**19**	**Low**
3	SR 72	North of Newark	5.61	Minor Arterial	11,719	10	1.8	3	34	24	25	27	7	**20.75**	**Low**
24	SR 52	Wilmington border to PA line	5.51	Principal Arterial	14,968	15	2.7	1	60	23	15	25	20	**20.75**	**Low**
5	SR 896	North of Newark	2.92	Minor Arterial	11,179	3	1.0	1	25	27	28	29	20	**25**	**Low**
23	SR 71	US 13 to SR 896	4.73	Major Collector	2,792	2	0.4	0	32	29	29	28	27	**28.25**	**Low**

Figure 6: Corridor Prioritization for TRS Implementation



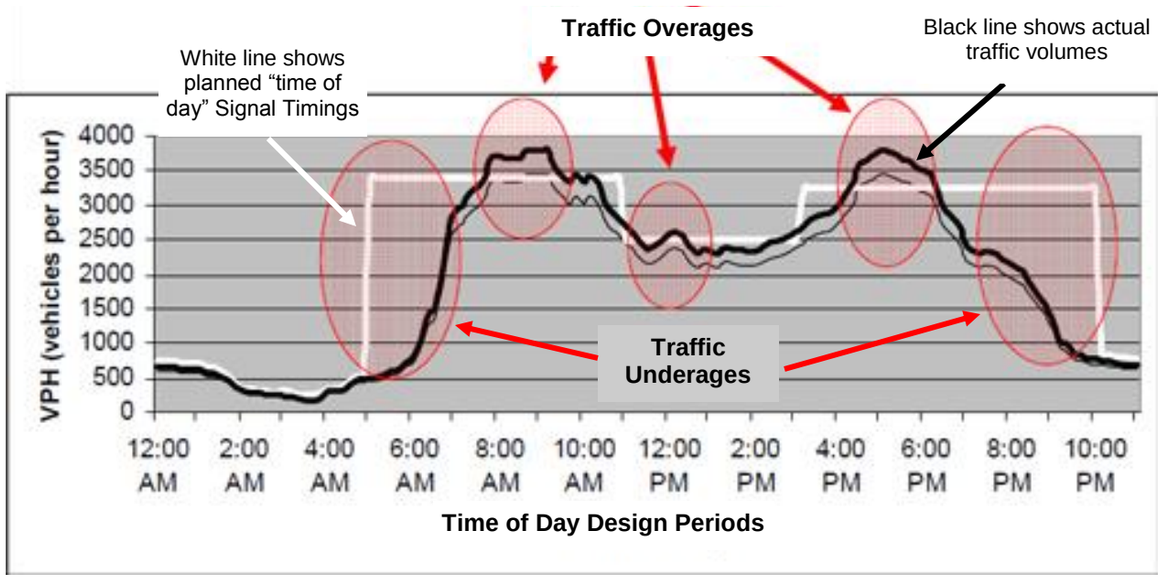
WILMAPCO

Traffic Responsive Signal Controls: Through coordination with the DelDOT TMC and WILMAPCO, an effort was made to use the performance measures developed through the corridor identification process to help the operations community to prioritize their efforts to address the corridors which are in need of installing traffic signal improvements, including retiming and/or installing Traffic Responsive Signalization (TRS). This technology will allow signals to respond to changing traffic conditions as opposed to a pre-determined time of day signal timings. Figure 4 shows which corridors that are under TRS implementation.

Time-of-day plan selection works well when traffic conditions are consistent and predictable – that is, similar traffic patterns generally occur during the same times each day. When incidents, a planned event (e.g., construction, county fair, football game, etc.), extreme weather, or any other unusual occurrence causes a significant change in the normal traffic conditions, the timing plan selected by the time-of-day method may not be the plan best suited to current conditions.

To address this situation, the traffic responsive plan selection method uses data from traffic detectors, rather than time of day, to automatically select the timing plan best suited to current conditions. To implement traffic responsive operations, it may be necessary to update TOD/coordination plans. Along with fine tuned plans, it is critical to confirm that the local controller clocks are in sync to maintain the coordination plans.

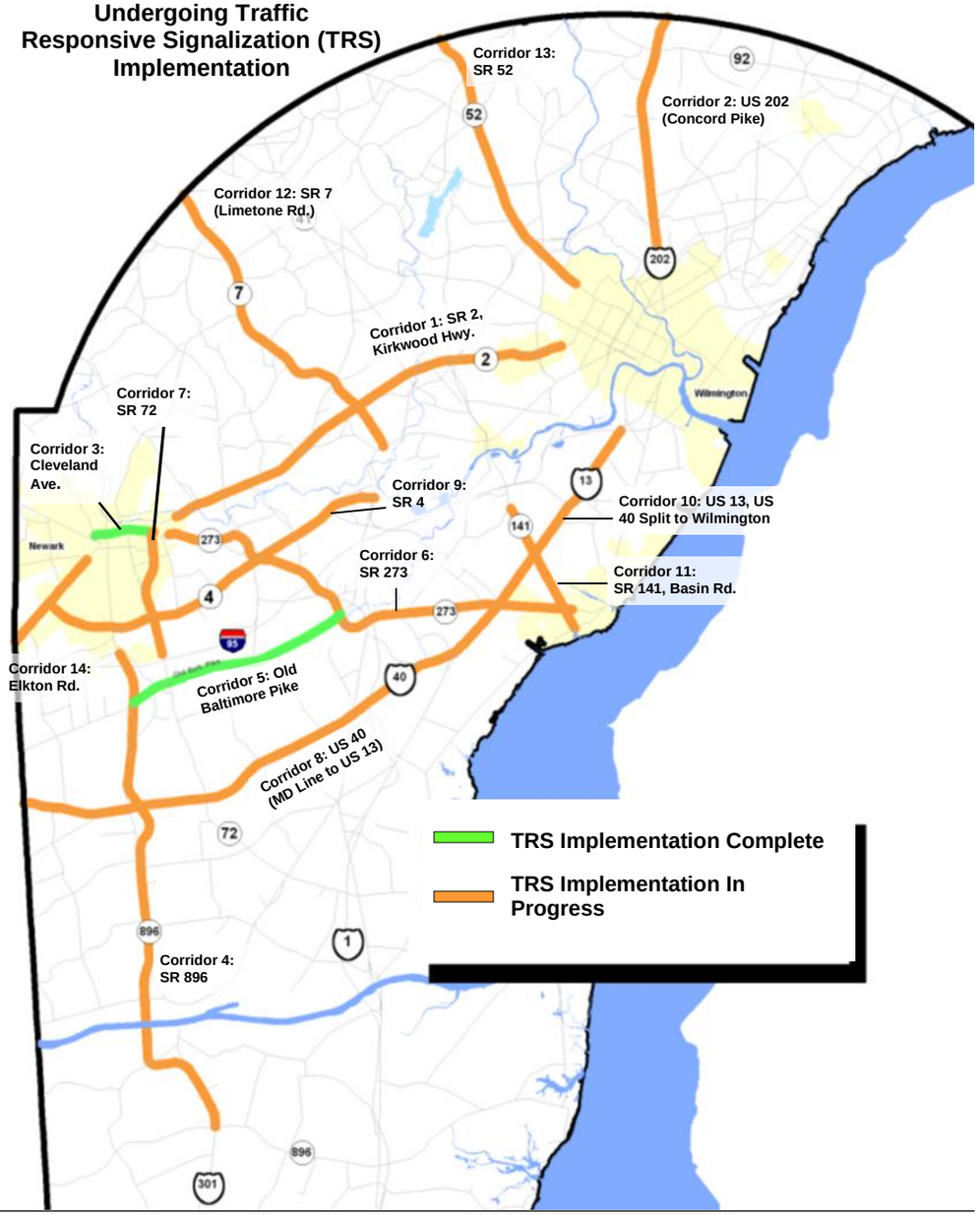
Table 5: Theoretical Signal Timing vs. Actual Traffic Flow



The following pages break down each of the corridors shown in figure 4, showing:

- Corridor limits
- Current intersections (capacity-based) with LOS "C" or worse
- Current status of TRS implementation, which consists of 5 phases
- Any capital intersection projects in the WILMAPCO TIP / DelDOT Capital Transportation Plan

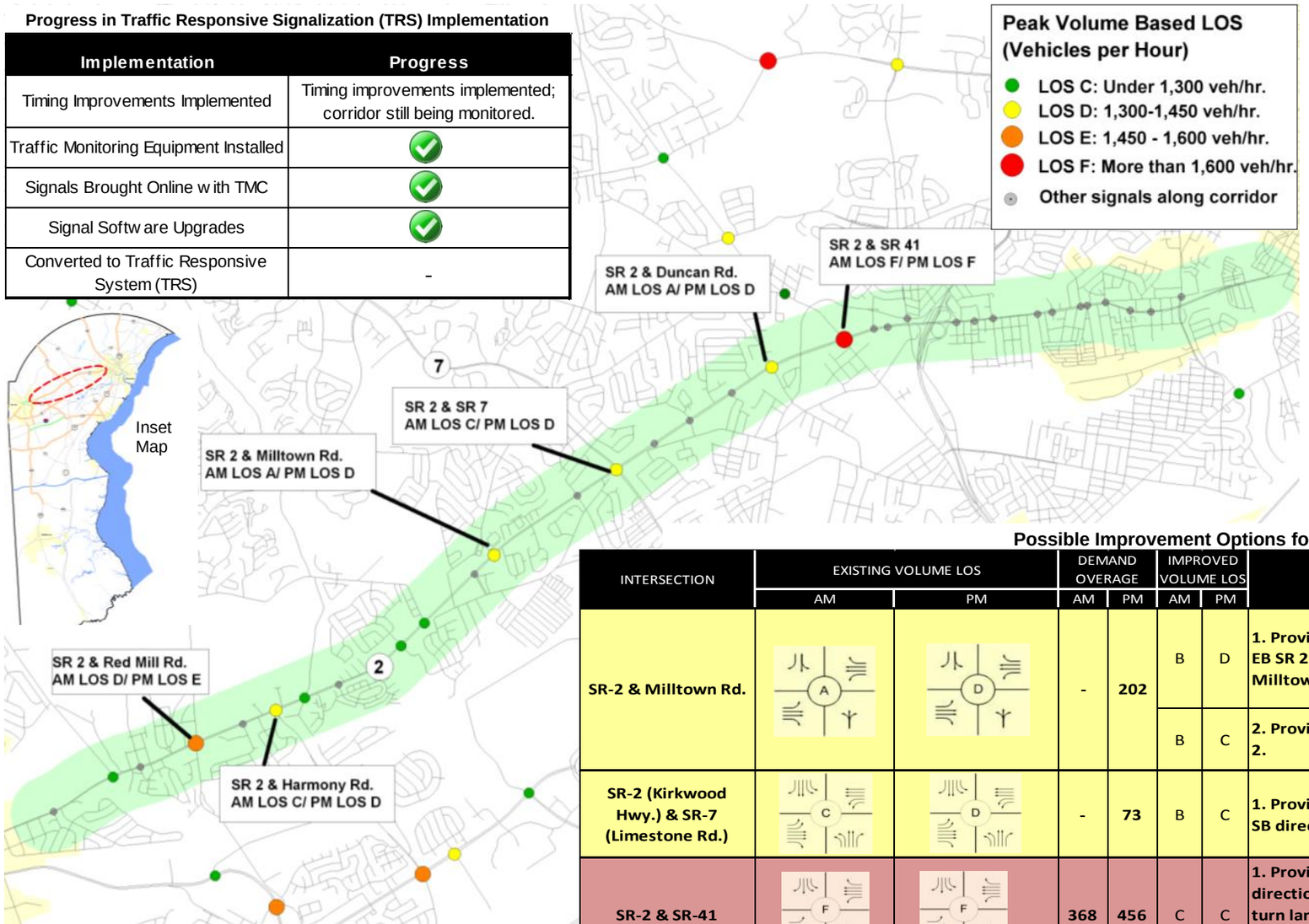
Figure 7: Corridors Undergoing Traffic Responsive Signalization (TRS) Implementation



Corridor 1: Kirkwood Highway: Wilmington to Newark

Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; corridor still being monitored.
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	✓
Converted to Traffic Responsive System (TRS)	-



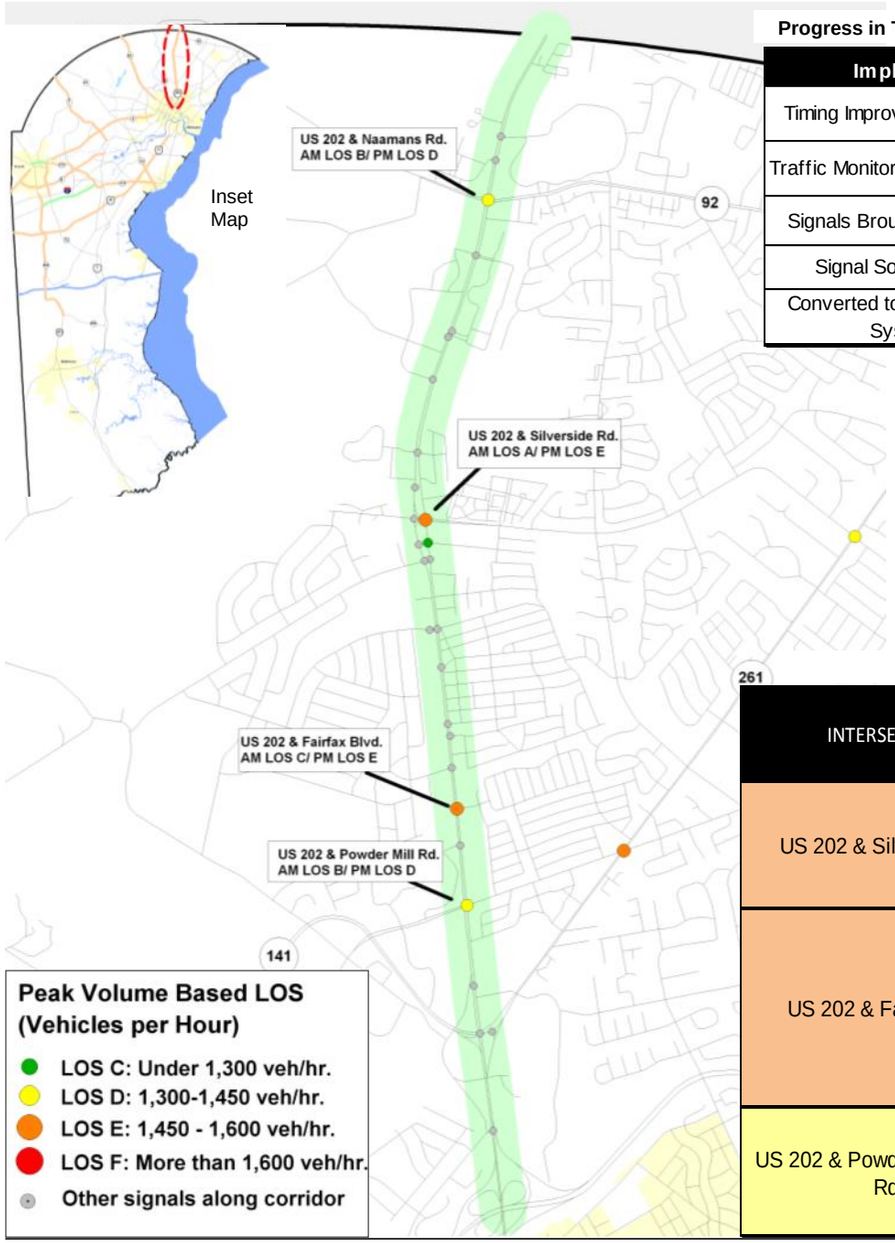
Capital Projects Along Corridor

INTERSECTION	STATUS
SR-2 & Milltown Rd.	No planned/programmed improvements. Possible signal improvement option(s) listed below.
SR-2 (Kirkwood Hwy.) & SR-7 (Limestone Rd.)	Intersection monitored through Churchman's Crossing Area Study. Possible signal improvement option(s) listed below.
SR-2 & SR-41	No planned/programmed improvements. Possible signal improvement option(s) listed below.
SR 2 & Duncan Rd.	Subject to possible developer funded improvement (Wawa Traffic Impact Study).
SR 2 & Harmony Rd.	Has been studied but currently not funded in TIP/CTP. Intersection monitored through Churchman's Crossing Area Study.
SR 2 & Red Mill/Polly Drummond Rd.**	Identified in the Highways Safety Improvement Program (HSIP). $5.9 million, scheduled for construction FY 2019.

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
SR-2 & Milltown Rd.			-	202	B	D	**1. Provide dual left turn lanes for EB SR 2 vehicles turning left on to Milltown Rd.**	**1. Left turn volumes exceed 300 VPH in both peak periods.**
					B	C	**2. Provide 3 thru lanes for WB SR 2.**	**2. Adding a 3rd thru lane in the EB direction provides a modest benefit in the AM (LOS B to LOS A) but no benefit in the PM peak.**
SR-2 (Kirkwood Hwy.) & SR-7 (Limestone Rd.)			-	73	B	C	**1. Provide 3 thru lanes for NB & SB direction.**	**1. Intersection already has dual left turns all the way around and 3 thru lanes on Kirkwood Hwy. (DE 2).**
SR-2 & SR-41			368	456	C	C	**1. Provide 4 thru lanes in EB & WB direction (currently 3 thru), 3 left turn lanes SB, 2 thru lanes SB, 1 thru lane NB (currently shared L/LT).**	**1. Trying to pick and choose the improvements to get to a LOS D did not work because something that helped in the AM did not help in the PM and vice versa. So all improvments are shown in one CMS.**
SR 2 & Duncan Rd.			-	20	A*	C	**1. Provide exclusive EB/WB right turn lanes on SR 2.**	

Corridor 2: US 202



Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; corridor still being monitored.
Traffic Monitoring Equipment Installed	Partially completed; will be completed after construction.
Signals Brought Online with TMC	✓
Signal Software Upgrades	✓
Converted to Traffic Responsive System (TRS)	-

Capital Projects Along Corridor

INTERSECTION	STATUS
US 202 & Fairfax Blvd.	No planned/programmed improvements.
US 202 & Silverside Rd.	No planned/programmed improvements.
US 202 & Powder Mill/Murphy Rd.	No planned/programmed improvements.
US 202 & SR 92 Naamans Rd.	No planned/programmed improvements.

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
US 202 & Silverside Rd.	A	E	-	166	A*	C	1. Provide a 4th NB through lane on US 202.	Note: Pave and Rehab Project (Fall 2013) may yield minor improvement.
US 202 & Fairfax Blvd.	C	E	-	255	C*	C	1. Provide a 4th NB through lane on US 202.	- This option assumes retaining split phasing on side streets. - Note: Pave and Rehab Project (Fall 2013) may yield minor improvement. - Note: Astra Zeneca Downsizing/ Redevelopment will affect volumes.
US 202 & Powder Mill/Murphy Rd.	B	D	-	144	B*	C	1. Provide a 4th NB through lane on US 202.	- Note: Astra Zeneca Downsizing/ Redevelopment will affect volumes.

Corridor 3: Cleveland Ave.

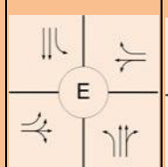
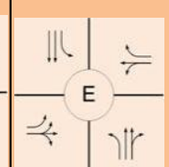
Capital Projects Along Corridor

INTERSECTION	STATUS
Cleveland Ave. & SR 2	Programmed for Preliminary Engineering in FY 2019 ($50,000).
Cleveland Ave. & Paper Mill Rd/ N. Chapel St.	No planned/programmed improvements.

Progress in Traffic Responsive Signalization (TRS) Implementation

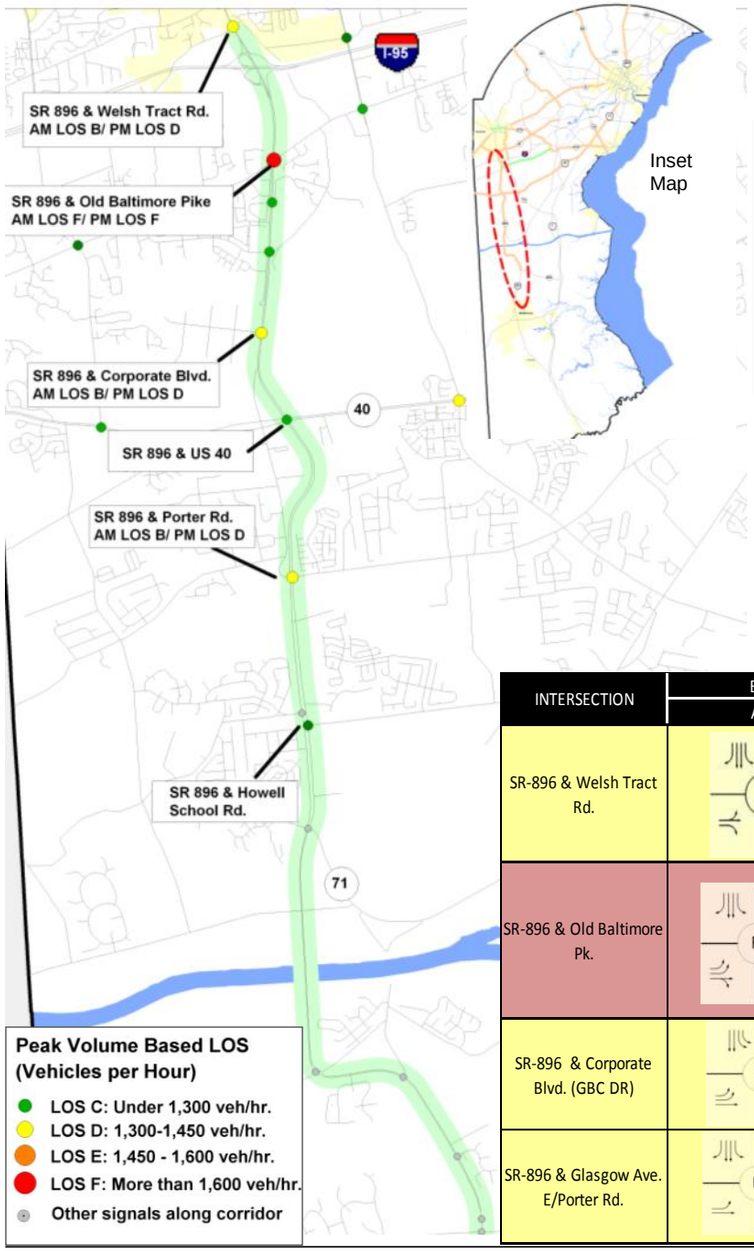
Implementation	Progress
Timing Improvements Implemented	✓
Traffic Monitoring Equipment Installed	-
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
Cleveland Ave. & SR-2			334	315	D	D	1. Provide dual left turn lanes for NB vehicles on SR 2 turning on to Cleveland Avenue.	DSTEP project recommended another option to restripe Cleveland Ave. which would provide LOS E/D (AM/PM).
					D	C	2. Provide a channelized right turn lane for EB vehicles on Cleveland Avenue.	
					C*	B*		* If both improvements are made.
Cleveland Ave. & Paper Mill Rd/N. Chapel St.			-	140	B*	C	1. Provide a 2nd WB through lane on Cleveland Ave.	1. Designer should consider Pomeroy Trail impact on signal timing. Intersection LOS improved from (F/F) to B/D since signal timings were changed.

WILMAPCO

Corridor 4: SR 896, Welsh Tract Rd. to Mt. Pleasant



Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	Initiated. Being studied though Univ. of Delaware DSTEP Program
Traffic Monitoring Equipment Installed	-
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-

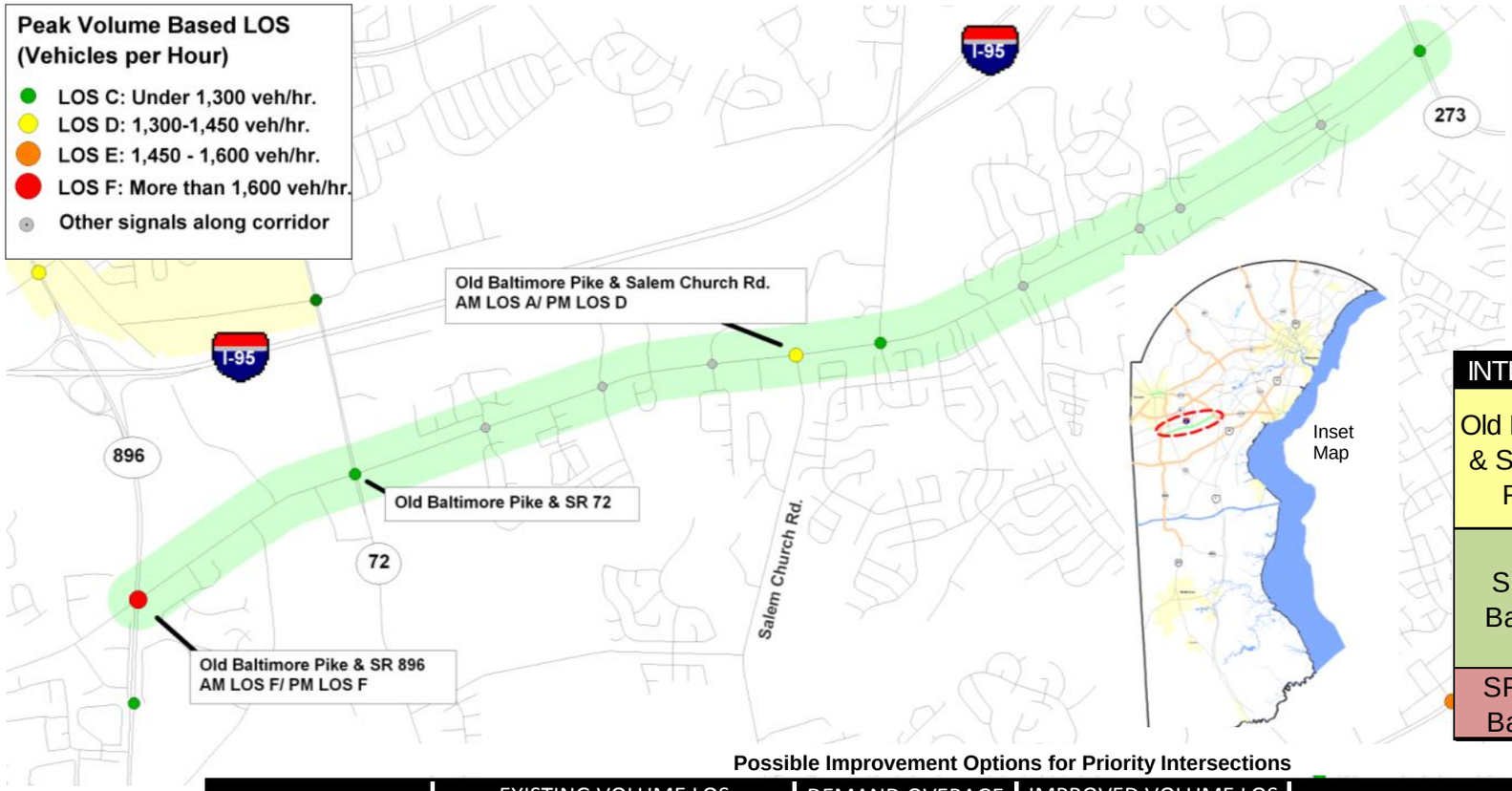
Capital Projects Along Corridor

INTERSECTION	STATUS
SR-896 & Welsh Tract Rd.	No planned/programmed capital improvements.
SR-896 & Old Baltimore Pk.	No planned/programmed capital improvements.
SR-896 & Corporate Blvd.	No planned/programmed capital improvements.
SR 896 & US 40	Programmed for Preliminary Engineering for grade separation (FY 2016-2018).
SR-896 & Glasgow Ave. E/Porter Rd.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2015 ($450,000).
SR 896 & Howell School Rd.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2015 ($10,000,000).

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
SR-896 & Welsh Tract Rd.	B	D	-	155	C	D	1. Provide dual left turn lanes for NB SR 896 vehicles turning left on to Welsh Tract Rd.	1. There are two receiving lanes which quickly taper to a single lane which immediately crosses a bridge.
					B	C	2. Provide 3 thru lanes for SB SR 896.	2. This section of SR 896 has an AADT greater than 30,001. With close proximity to I-95, SB is critical movment in both peak periods.
SR-896 & Old Baltimore Pk.	F	F	406	403	D	D	1. Provide 3 thru lanes in NB & SB direction and 1 thru lane in the WB direction (currently L/LT).	1. Providing 3 thru lanes in NB & SB direction by itself was not enough to reduce LOS to a D in either AM or PM peak periods.
					F	E	2. Analyzed as 8 - phase operation.	2. Did not improve either peak to a LOS D.
					E	F	3. Change lane assignment to triple left turn for Old Baltimore Pk. EB.	3. Did not improve either peak to a LOS D.
SR-896 & Corporate Blvd. (GBC DR)	B	D	-	95	A	B	1. Provide 3 thru lanes in NB & SB direction.	
SR-896 & Glasgow Ave. E/Porter Rd.	B	D	-	6	A	C	1. Change WB lane assignment to L/T.	1. Current lane assignment for WB movement is L-LT. The thru movement is higher than the left turns in both peak periods.

Corridor 5: Old Baltimore Pike



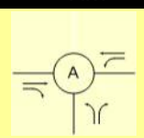
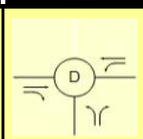
Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	✓
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	✓
Converted to Traffic Responsive System (TRS)	✓

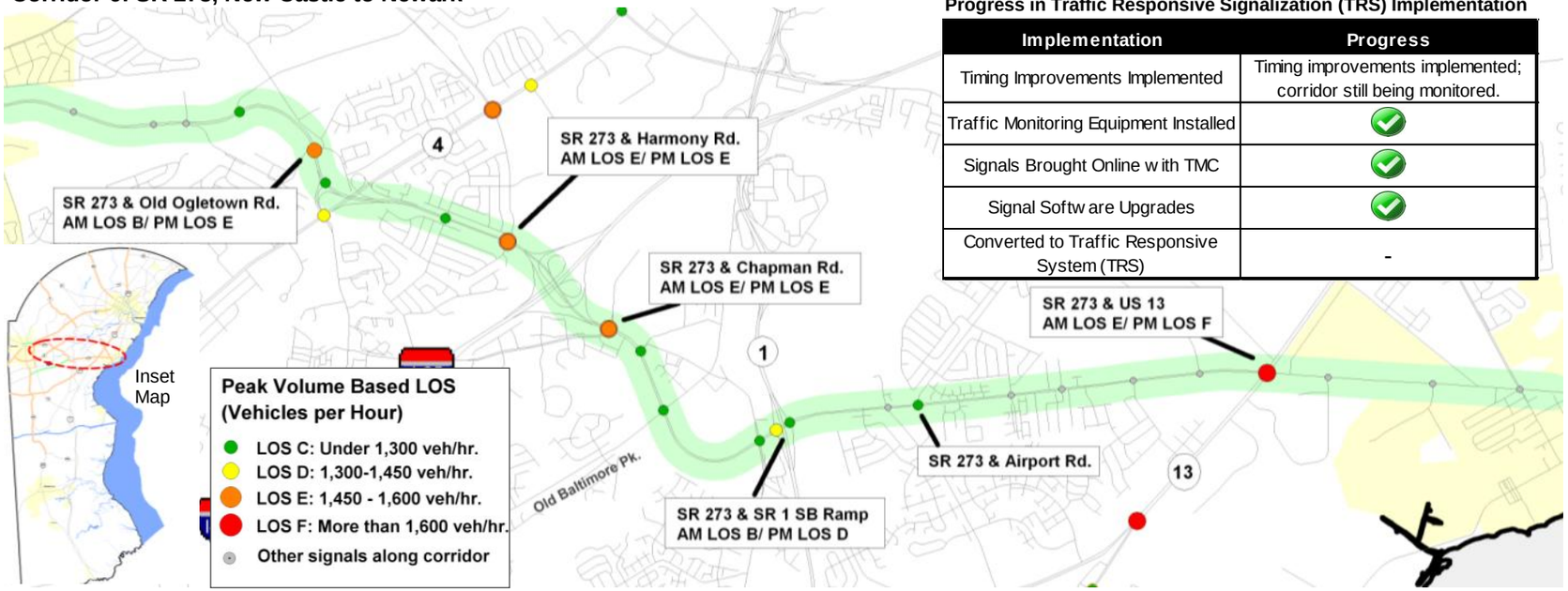
Capital Projects Along Corridor

INTERSECTION	STATUS
Old Baltimore Pk. & Salem Church Rd. (West)	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2017 ($1,000,000).
SR 72 & Old Baltimore Pk.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2017 ($800,000).
SR-896 & Old Baltimore Pk.	No planned/programmed improvements.

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS
	AM	PM	AM	PM	AM	PM	
Old Baltimore Pk. & Salem Church Rd. (West)			-	149	A*	C	1. Provide a 2nd WB left turn lane on OBP.
SR-896 & Old Baltimore Pk.			406	403	D	D	1. Provide 3 thru lanes in NB & SB direction and 1 thru lane in the WB direction (currently L/LT)
					F	E	2. Analyzed as 8 - phase operation.
					E	F	3. Change lane assignment to triple left turn for Old Baltimore Pk. EB.

Corridor 6: SR 273, New Castle to Newark



Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; corridor still being monitored.
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	✓
Converted to Traffic Responsive System (TRS)	-

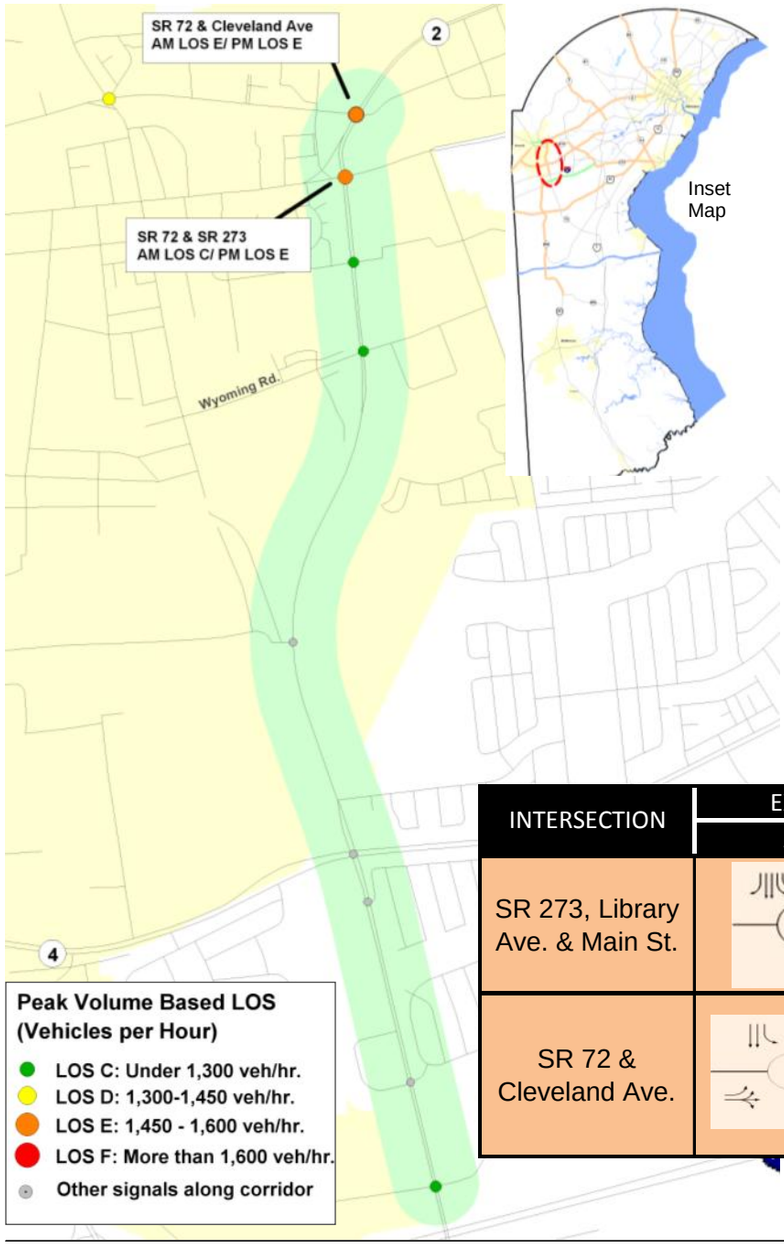
Capital Projects Along Corridor

INTERSECTION	STATUS
SR-273 & Harmony Rd.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2018 ($3,000,000).
SR-273 & Chapman Rd. (Eagle Run)	Has been studied but currently not funded in TIP/CTP.
SR 273 & Old Ogletown Rd.	No planned/programmed improvements.
SR 273 & SR 1	Will be reconfigured as part of the SR 1 widening project. Scheduled for completion in FY 2018.
SR 273 & Airport Rd.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2018 ($2,970,000).
US 13 & SR 273	No planned/programmed improvements.

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
SR-273 & Harmony Rd.	E	E	121	155	B	C	1. Provide 3 thru lanes in each direction for SR 273.	1. This section of SR 273 has an AADT approaching 50,000. Immediately adjacent to I-95, adding a lane in only one direction would not provide a benefit since the critical movement would always be the direction that hadn't been widened.
SR-273 & Chapman Rd. (Eagle Run)	E	E	160	242	C	C	1. Provide 3 thru lanes in each direction for SR 273.	1. This section of SR 273 has an AADT approaching 50,000. Immediately adjacent to I-95, adding a lane in only one direction would not provide a benefit since the critical movement would always be the direction that hadn't been widened.
					D	E	2. Change lane assignment to triple left turn for Chapman Rd.	
SR 273 & Old Ogletown Rd./Paradise Ln.	B	E	-	151	B*	C	1. Provide a 3rd EB through lane on Rt. 273.	
US 13 & SR 273	E	F	235	326	C	C	1. Widening on all approaches required: 3rd NB and SB left turn lanes, 3rd WB left turn lane, 3rd and 4th EB left turn lanes, and 3rd EB and WB through lane.	- Note: Consider grade separation. - Note: 5 through lanes on US 13 would go beyond standard CMS methodology.

Corridor 7: SR 72



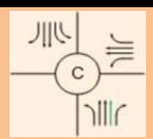
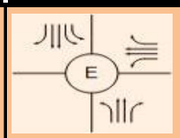
Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	✓
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-

Capital Projects Along Corridor

INTERSECTION	STATUS
SR 72 & Cleveland Ave.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for preliminary engineering in FY 2019 ($50,000).
SR 273, Library Ave. & Main St.	No planned/programmed improvements.

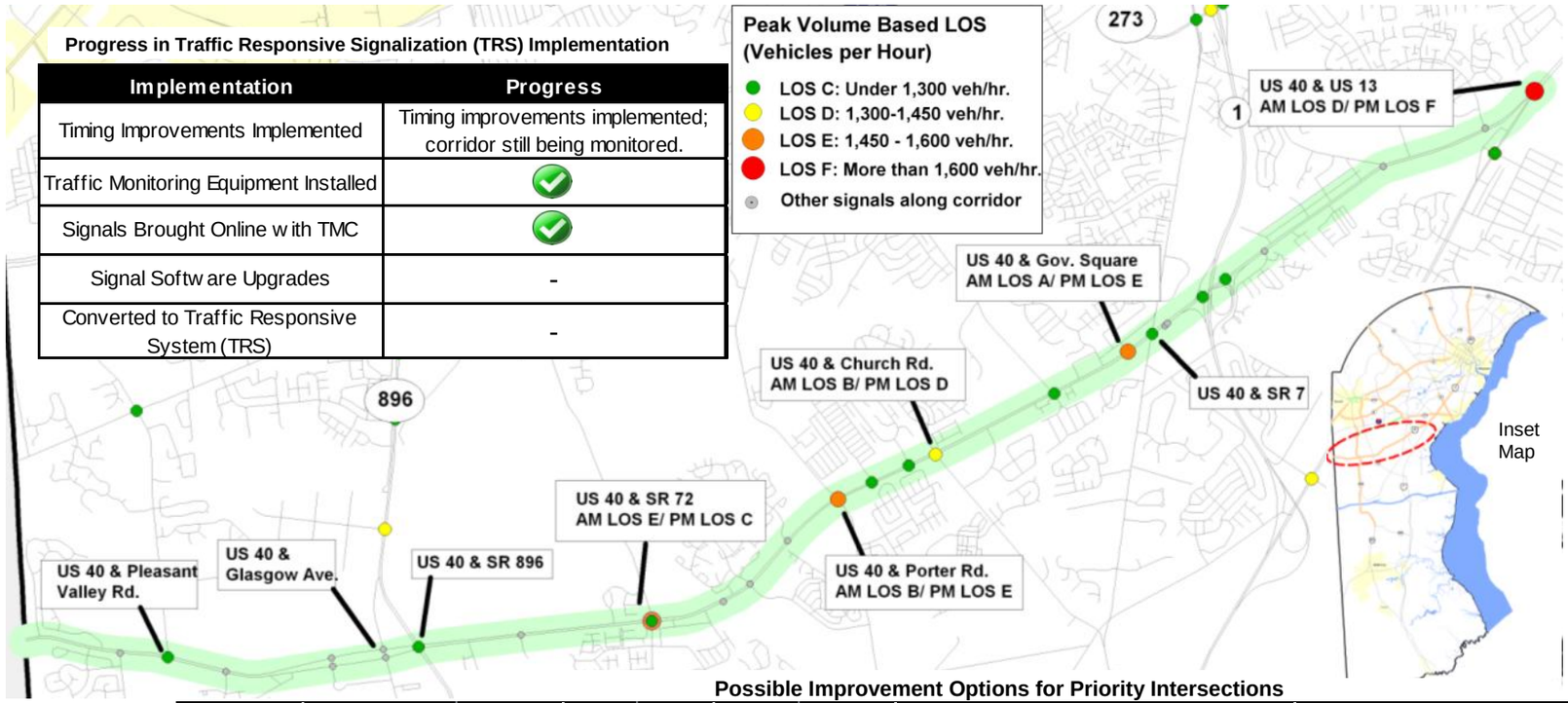
Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
SR 273, Library Ave. & Main St.			10	226	B	C	1. Provide a 3rd NB through lane on Library Ave.	1. Will require modification of receiving lanes.
SR 72 & Cleveland Ave.			195	185	C	C	1. Provide a 2nd NB left turn lane from SR 72 onto Cleveland Ave.	1. Will require modification of receiving lanes. Also, railroad bridge is a major issue (for roadway widening underneath).

Corridor 8: US 40, from US 13 split to MD Line

Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; corridor still being monitored.
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-



Capital Projects Along Corridor

INTERSECTION	STATUS
US 40 & Pleasant Valley Rd.	Recently converted to 4-way intersection.
US 40 & Glasgow Ave.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2015 ($250,000).
SR 896 & US 40	Programmed for Preliminary Engineering for grade separation (FY 2016-2018).
US 40 & Church Rd.	No planned/programmed improvements.
US 40 & Porter Rd.	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2014.
US 40 & SR 72	Currenty programmed in TIP/CTP . Scheduled for construction in FY 2018 ($11,500,000).
US 40 & SR 7	Identified in the Highways Safety Improvement Program (HSIP). Scheduled for construction in FY 2016 ($750,000).
US 40 & Governor's Sq.	No planned/programmed improvements.
US 13 & US 40	No planned/programmed improvements.

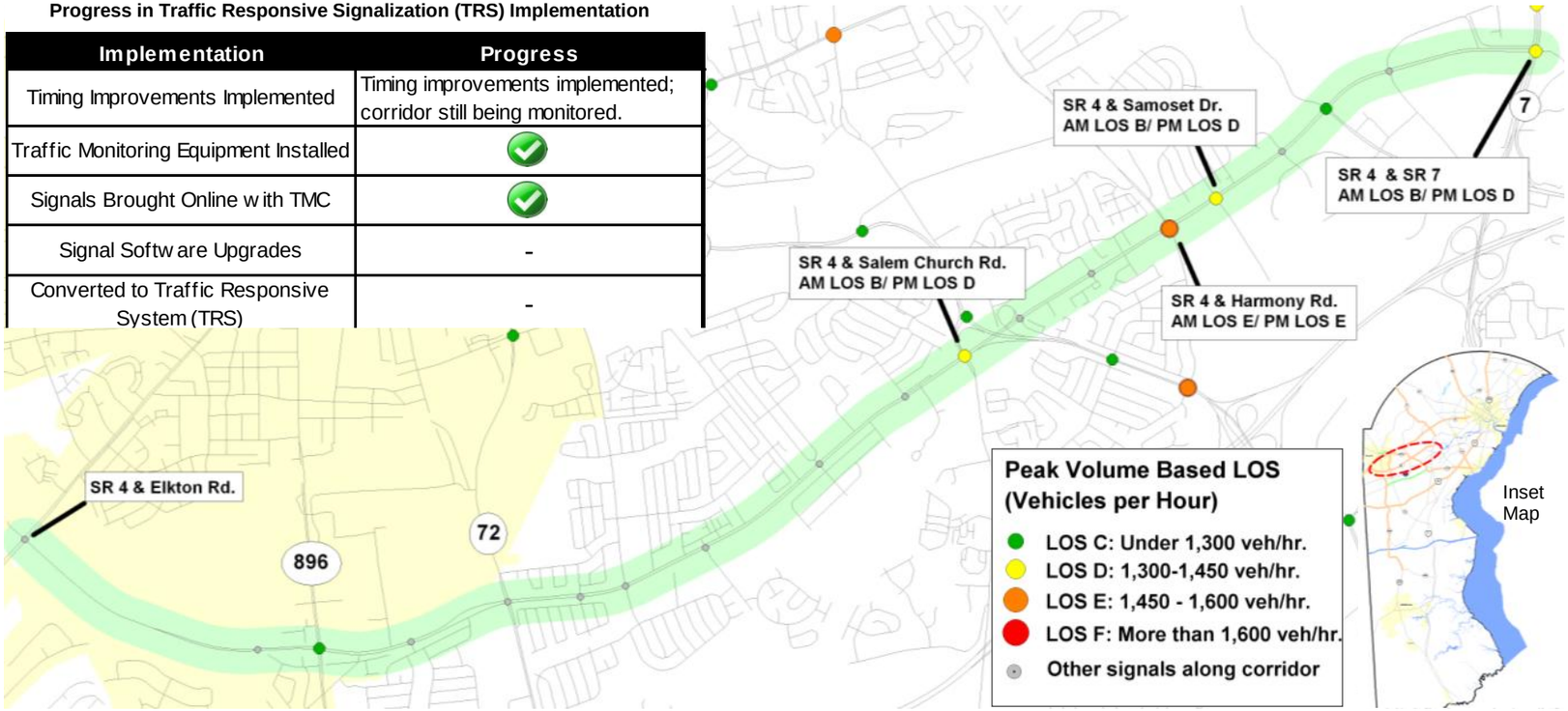
Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
US 40 & Governor's Sq.	A	E	-	229	A*	C	1. Replace split phasing with 8 Phase timing plan. Provide a 4th WB through lane on Rt. 40.	1. Phasing change will require pavement marking updates and signal head changes for the side street approaches. Phasing change alone will not reduce LOS to C or better.
					A*	D	2. Retain split phasing. Provide a 4th WB through lane on Rt. 40.	
US 40 & Church Rd.	B	D	-	66	B*	C	1. Provide a 3rd WB through lane.	
US 40 & Porter Rd.	B	E	-	218	B*	C	1. Provide a 3rd WB and EB through lane on Rt. 40. Provide a 2nd SB through lane on Porter Rd.	1. With added WB and EB through lanes on Rt. 40 but without the added SB through lane on Porter Rd. the PM LOS is a D -1306 vph.
					B*	D	2. Provide a 3rd WB and EB through lane on Rt. 40.	
US 40 & SR 72	E	C	213	-	Currenty programmed in TIP/CTP to add northbound/southbound through lanes and eastbound/westbound left-turn lanes which will provide double left-turn lanes at all legs of the intersection to address operational problems at the intersection. This project will also include improvements to the SR 72, Wrangle Hill Road/Del Laws Road Intersection. Scheduled for construction in FY 2018 ($11,500,000).	
US 13 & US 40	D	F	61	440	A	B	1. Provide a 3rd SB through lane, and provide a 3rd EB through lane.	
					C	D	2. Provide 3rd SB through lane only.	

Corridor 9: SR 4

Progress in Traffic Responsive Signalization (TRS) Implementation

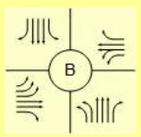
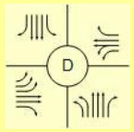
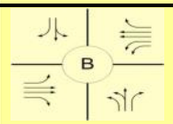
Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; corridor still being monitored.
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-



Capital Projects Along Corridor

INTERSECTION	STATUS
SR 4 & Elkton Rd.	Intersection to be improved as part of SR2, Elkton Road reconstruction. Construction slated for FY 2020 ($20,000,000).
SR-4 & Salem Church Rd.	Intersection monitored through Churchman's Crossing Area Study.
SR 4 & Harmony Rd.	Intersection monitored through Churchman's Crossing Area Study.
SR-4 & Samoset Dr.	Intersection monitored through Churchman's Crossing Area Study. Possible signal improvement option(s) listed below.
SR 4/7 & JP Morgan Ent.	Has been studied but currently not funded in TIP/CTP.

Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
SR 4/7 & JP Morgan Ent.			-	50	B*	C	1. Provide a 4th WB through lane to accommodate 2 through lanes and 2 left turn lanes (JP Morgan).	1. Appropriate number of receiving lanes exist.
					B*	C	2. Same as Option 1, plus convert from split phasing to standard 8-phase timing.	
SR-4 & Samoset Dr.			-	95	A	B	1. Provide 3 thru lanes in EB & WB direction.	1. No improvement on any minor approaches was substantial enough to reduce the LOS to below a D.

Corridor 10: US 13, from US 40 to Wilmington

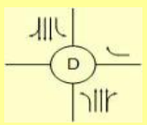
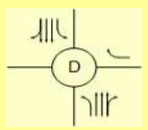
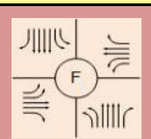
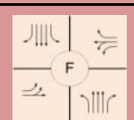
Progress in Traffic Responsive Signalization (TRS) Implementation

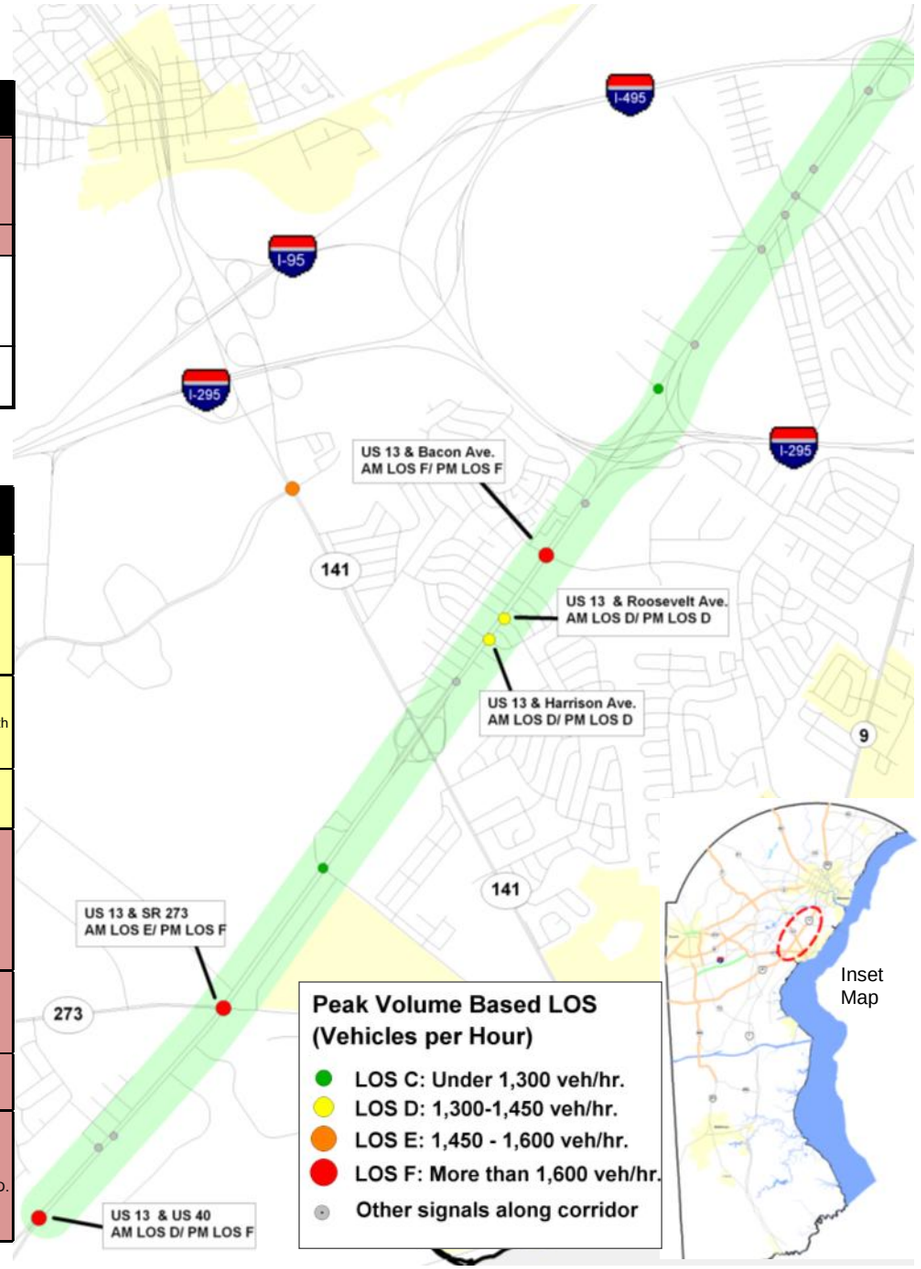
Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; corridor still being monitored.
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-

Capital Projects Along Corridor

INTERSECTION/ SEGMENT	STATUS
US 13 & US 40	No planned/programmed improvements. Intersection monitored through US 40 20-year study.
US 13 & SR 273	No planned/programmed improvements.
US 13, Tybouts Corner to Wilmington	Addition of one lane in each direction. Project is unfunded and is on the "Aspirations List" in the WILMAPCO RTP.
US 13, Memorial Dr. to US 40	Pedestrian Safety Improvements. Currently unfunded in FY 2015-2018 TIP/CTP.

Possible Improvement Options for Priority Intersections

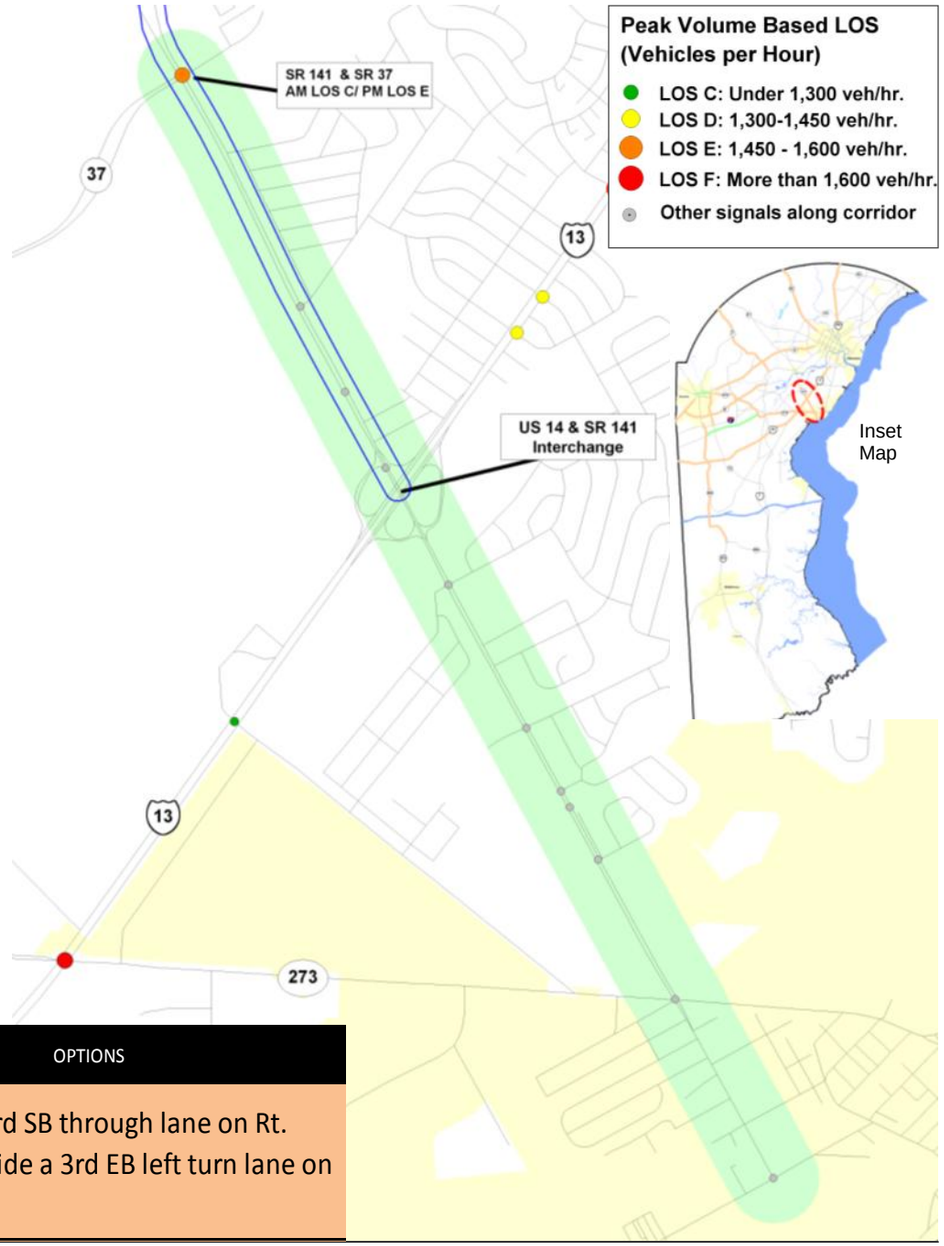
INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
US 13 & Roosevelt Ave.			28	16	B	C	1. Provide a 4th NB through lane on US 13, and provide a 2nd WB left turn lane.	1. Need for 4th NB through lane on US 13 is generated by AM peak only,whereas need for 2nd WB left turn lane is generated by PM peak only.
US 13 & Harrison Ave.			41	76	C	B	1. Provide a 2nd NB left turn lane from US 13 to Harrison Ave. and provide a 4th SB through Lane on US 13.	1. Need for 2nd NB left turn lane on US 13 is generated by AM peak only,whereas need for 4th SB through lane is generated by PM peak only.
					D	B	2. Provide a 4th SB through lane on US 13.	
US 13 & SR 273			235	326	C	C	1. Widening on all approaches required: 3rd NB and SB left turn lanes, 3rd WB left turn lane, 3rd and 4th EB left turn lanes, and 3rd EB and WB through lane.	- Note: Consider grade separation. - Note: 5 through lanes on US 13 would go beyond standard CMS methodology.
US 13 & US 40			61	440	A	B	1. Provide a 3rd SB through lane, and provide a 3rd EB through lane.	
					C	D	2. Provide 3rd SB through lane only.	
US-13 & Bacon Ave./Boulden Blvd.			391	370	D	D	1. Provide 4 thru lanes in NB & SB direction.	1. No improvement on any minor approaches was substantial enough to reduce the LOS to a D.



Corridor 11: SR 141, Basin Road

Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	-
Traffic Monitoring Equipment Installed	-
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-



Capital Projects Along Corridor

INTERSECTION/ SEGMENT	STATUS
SR 141 & SR 37 (Commons Blvd.)	Currenty programmed in TIP/CTP . Scheduled for construction in FY2018 ($9,000,000).
SR 141 & US 13 Interchange	Replacment of bridge deck and safety improvements for on ramps. Currenty programmed in TIP/CTP . Scheduled for construction in FY 2020 ($12,000,000).
SR 141, US 13 to Burnside Blvd.	Capacity improvements along road segment. Currenty NOT programmed in TIP/CTP. Shown in BLUE on map.

Possible Improvement Options for Priority Intersections

Map ID #	PERMIT #	INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS
			AM	PM	AM	PM	AM	PM	
14	N303	SR 141 & SR 37 (Commons Blvd.)	C	E	-	242	C*	C	1. Provide a 3rd SB through lane on Rt. 141, and provide a 3rd EB left turn lane on EB Rt. 37.

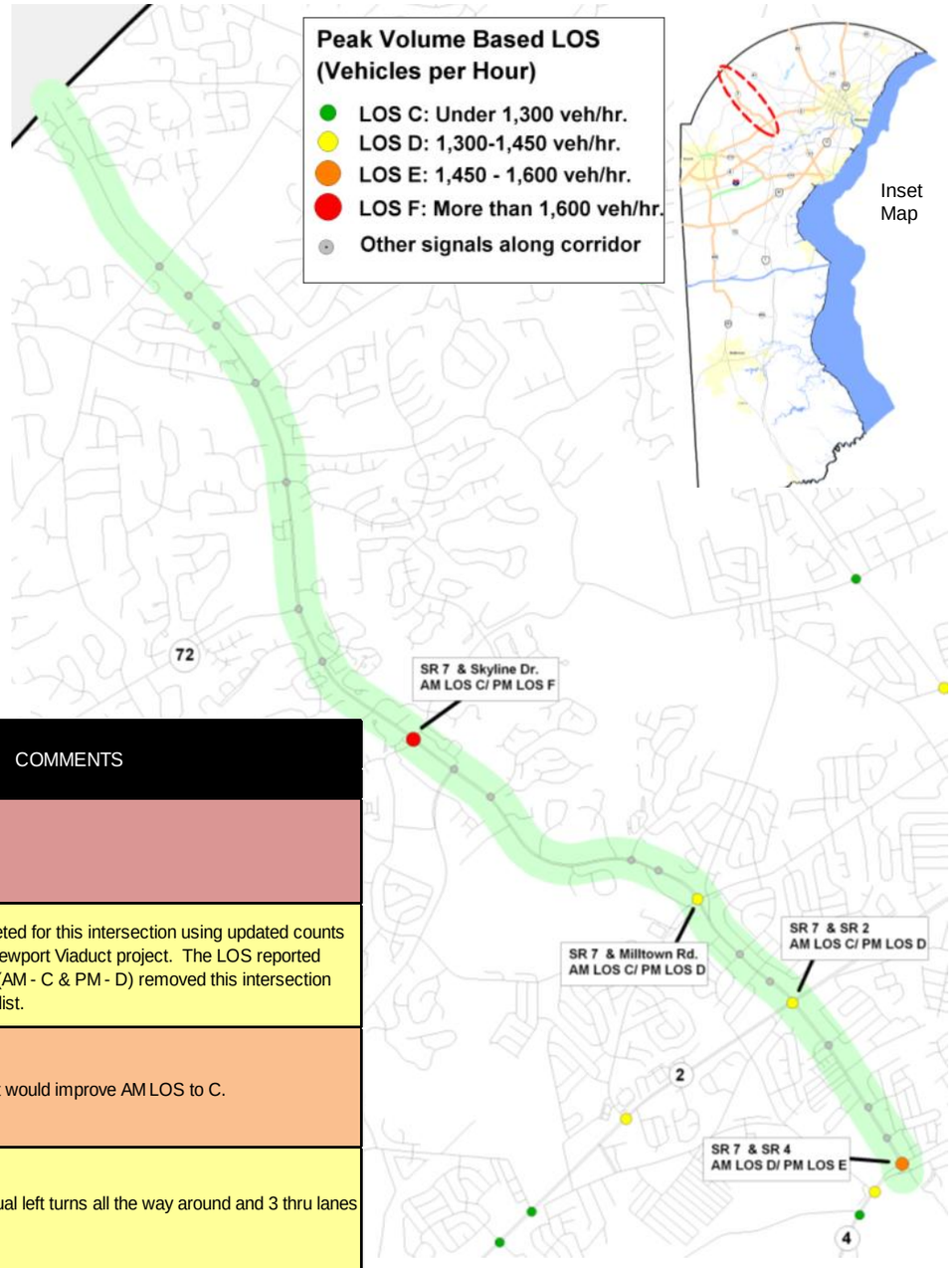
Corridor 12: SR 7, Limestone Rd. from PA line to SR 4

Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	In design.
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-

Capital Projects Along Corridor

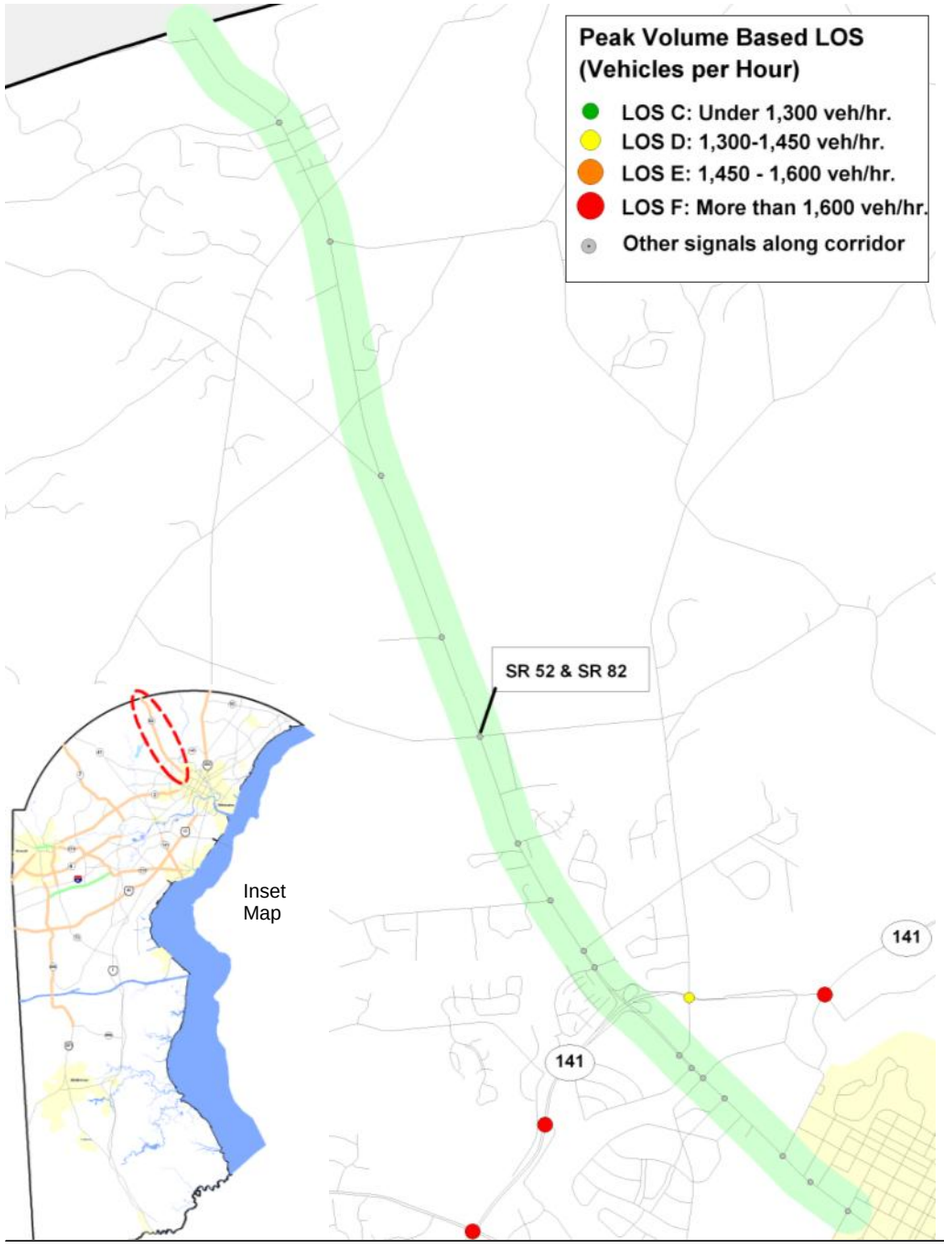
INTERSECTION	STATUS
No programmed projects along corridor.	



Possible Improvement Options for Priority Intersections

INTERSECTION	EXISTING VOLUME LOS		DEMAND OVERAGE		IMPROVED VOLUME LOS		OPTIONS	COMMENTS
	AM	PM	AM	PM	AM	PM		
SR-7 & Skyline Dr.	C	F	-	337	B	C	1. Provide 1 thru lane in EB & WB direction (both approaches currently have L/LT lane assignment).	
SR-7 & Milltown Rd.	C*	D*	-	30	-	-		*AM & PM CMS were completed for this intersection using updated counts (10/28/2010) as part of the Newport Viaduct project. The LOS reported using these updated counts (AM - C & PM - D) removed this intersection from the Major Modifications list.
SR 7 (Limestone) & SR 4 (Main St. Stanton)	E	E	196	400	C	C	1. Add a 3rd WB through lane, and add a 3rd EB left turn lane.	1. Signal phasing adjustment would improve AM LOS to C.
SR-2 (Kirkwood Hwy.) & SR-7 (Limestone Rd.)	C	D	-	73	B	C	1. Provide 3 thru lanes for NB & SB direction.	1. Intersection already has dual left turns all the way around and 3 thru lanes on Kirkwood Hwy. (DE 2).

Corridor 13: SR 52



Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress
Timing Improvements Implemented	Timing improvements implemented; will be again after construction.
Traffic Monitoring Equipment Installed	-
Signals Brought Online with TMC	In design.
Signal Software Upgrades	✓
Converted to Traffic Responsive System (TRS)	-

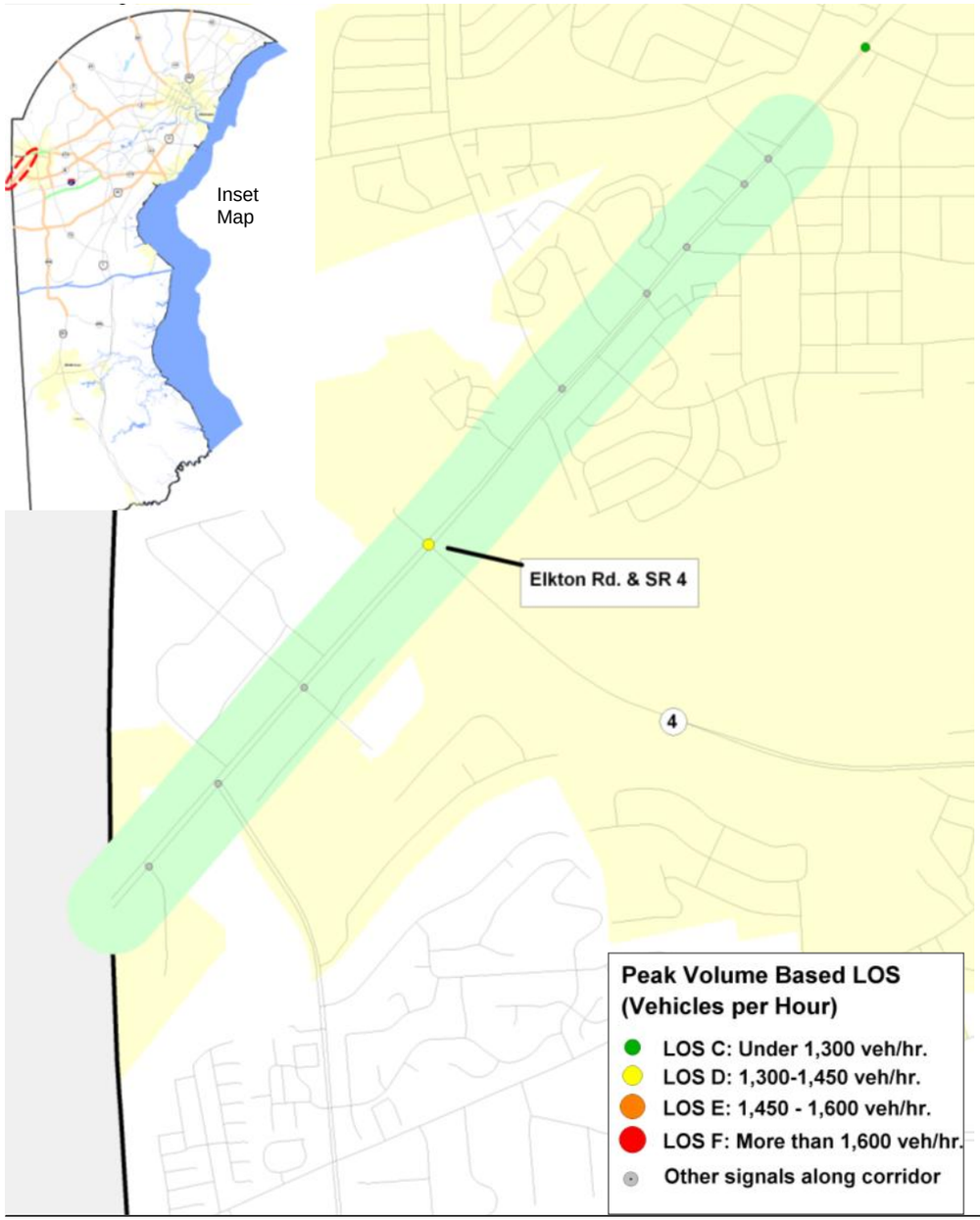
Capital Projects Along Corridor

INTERSECTION	STATUS
SR 52 & SR 82	Currenty programmed in TIP/CTP as an HSIP project . Scheduled for construction in FY 2014 ($1,800,000).

Possible Improvement Options for Priority Intersections

No Intersections along corridor have significant congestion deficiencies

Corridor 14: Elkton Rd.



Capital Projects Along Corridor

INTERSECTION	STATUS
SR 4 & Elkton Rd.	Intersection to be improved as part of SR2, Elkton Road reconstruction. Construction slated for FY 2020 ($20,000,000).

Progress in Traffic Responsive Signalization (TRS) Implementation

Implementation	Progress (as of Nov. 2013)
Timing Improvements Implemented	✓
Traffic Monitoring Equipment Installed	✓
Signals Brought Online with TMC	✓
Signal Software Upgrades	-
Converted to Traffic Responsive System (TRS)	-

Possible Improvement Options for Priority Intersections

No analysis has been performed on any intersections along this corridor.