



Traffic Impact Studies: What are they? What do they do?

Prepared for the WILMAPCO
PAC

Dec 12th 2011

Agenda:

- **What it a TIS/TOA?**
- **Proposed new guidelines/ordiances**
- **Ongoing WILMAPCO Intersection Analysis**
- **Path forward for WILMAPCO Congestion Management Summary 2012**

A Traffic Impact Study (TIS) is:

According to DeIDOT's Standards and Regulations for Subdivision Streets and State Highway Access, a TIS is:

“A study conducted during the development approval process to determine the impacts that traffic generated by the proposed development will have on the surrounding street network and the improvements needed to the transportation system in order to mitigate those impacts.”

What are the applicable regulations?

1. Chapter 2 of DeIDOT 's Standards and Regulations for Subdivision Streets and State Highway Access
2. Chapter 11 of New Castle County's Unified Development Code

What is a TIS?

According to New Castle County:

The transportation capacity for a proposed development shall be based upon the available capacity as determined by a traffic impact study

- **CURRENTLY** for all major plans and rezonings
- **TIS required is project meets the following criteria**
 1. The proposal exceeds the projected average daily traffic warrants from DeIDOT's Rules and Regulations for Subdivision Streets
 2. The proposal is projected to generate more than fifty (50) peak hour trips
 3. The subject property is located near roadways segments and intersections, which are operating below the specified level of service(LOS)
 4. The proposed development causes the total development within the area traffic analysis zone and the adjacent zones to exceed the totals in the WILMAPCO RTP.
 5. The proposed development will impact roadways that are not capable of providing adequate and safe circulation, or adequate stopping sight distances, or that contain other geometric deficiencies that would result in safety problems if the development were built.

(Amended July 13, 2004 by Ordinance 04-059; amended January 1, 2010 by Ord. 09-066; amended January 18, 2011 by Ordinance 10-113)

What is a TIS?

Volume Warrants for Traffic Impact Studies (TIS)

The TIS Applicant shall include complete a LOS analysis for each of the following conditions:

- a. Existing;
- b. Future without project
- c. Future with project and proper entrance
- d. Future with project, proper entrance and off-site improvements

Land Use	TIS Not Warranted (Fewer than 400 vpd and 50 vph)
Single Family Detached Houses	35 units
Apartments	41 units
Townhouses or Condominiums	57 units
Mobile Homes	34 units
Age-Restricted Single Family Detached Houses	70 units
Motel	44 rooms
General Office Building	20,000 square feet
Medical/Dental Office Building	11,100 square feet
Specialty Retail Center (Excludes convenience stores, pharmacies, banks, restaurants and gas stations)	9,000 square feet

What is a TIS?

Turning Movement Count Summary

TOTAL VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Intersection of: SR 41
and: Valley Rd

Location: New Castle Co., DE

Counted by: EH,JL

Date: November 4, 2010
Weather: Rain/Cool

Day: Thursday

Entered by: RB

TIME	TRAFFIC FROM NORTH on: SR 41					TRAFFIC FROM SOUTH on: SR 41					TRAFFIC FROM EAST on: Valley Rd					TRAFFIC FROM WEST on: Valley Rd					TOTAL N + S +
	RIGHT	THRU	LEFT	U-TN	TOTAL	RIGHT	THRU	LEFT	U-TN	TOTAL	RIGHT	THRU	LEFT	U-TN	TOTAL	RIGHT	THRU	LEFT	U-TN	TOTAL	E + W
AM																					
6:00-6:15	0	71	0	0	71	2	41	5	0	48	0	2	1	0	3	14	1	2	0	17	139
6:15-6:30	0	95	1	0	96	0	66	10	0	76	0	5	2	0	7	20	4	3	0	27	206
6:30-6:45	1	141	0	0	142	2	83	12	0	97	1	5	3	0	9	33	2	5	0	40	288
6:45-7:00	3	154	1	0	158	1	57	10	0	68	1	11	2	0	14	49	8	9	0	66	306
7:00-7:15	1	156	3	0	160	5	53	16	1	75	0	11	5	0	16	60	20	8	0	88	339
7:15-7:30	1	146	7	0	154	1	71	17	0	89	3	14	11	0	28	49	41	7	0	97	368
7:30-7:45	0	178	5	0	183	2	70	26	0	98	0	38	12	0	50	58	19	9	0	86	417
7:45-8:00	0	168	7	0	175	2	83	43	0	128	3	29	8	0	40	54	13	8	0	75	418
8:00-8:15	0	154	0	0	154	2	65	25	0	92	2	16	12	0	30	46	7	8	0	61	337
8:15-8:30	0	145	3	0	148	4	61	33	0	98	1	12	16	0	29	44	10	10	0	64	339
8:30-8:45	1	120	2	0	123	1	74	32	0	107	3	9	4	0	16	50	14	5	0	69	315
8:45-9:00	0	136	0	0	136	2	74	30	0	106	2	17	9	0	28	51	15	6	0	72	342
3 Hr Totals	7	1,664	29	0	1,700	24	798	259	1	1,082	16	169	85	0	270	528	154	80	0	762	3,814
PEAK HR																					
7:00-8:00	2	648	22	0	672	10	277	102	1	390	6	92	36	0	134	221	93	32	0	346	1,542

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	RIGHT	THRU	LEFT	U-TN	TOTAL	RIGHT	THRU	LEFT	U-TN	TOTAL	RIGHT	THRU	LEFT	U-TN	TOTAL	RIGHT	THRU	LEFT	U-TN	TOTAL	E + W
AM																					
6:00-6:15	0	71	0	0	71	2	41	5	0	48	0	2	1	0	3	14	1	2	0	17	139
6:15-6:30	0	95	1	0	96	0	66	10	0	76	0	5	2	0	7	20	4	3	0	27	206
6:30-6:45	1	141	0	0	142	2	83	12	0	97	1	5	3	0	9	33	2	5	0	40	288
6:45-7:00	3	154	1	0	158	1	57	10	0	68	1	11	2	0	14	49	8	9	0	66	306
7:00-7:15	1	156	3	0	160	5	53	16	1	75	0	11	5	0	16	60	20	8	0	88	339
7:15-7:30	1	146	7	0	154	1	71	17	0	89	3	14	11	0	28	49	41	7	0	97	368
7:30-7:45	0	178	5	0	183	2	70	26	0	98	0	38	12	0	50	58	19	9	0	86	417
7:45-8:00	0	168	7	0	175	2	83	43	0	128	3	29	8	0	40	54	13	8	0	75	418
8:00-8:15	0	154	0	0	154	2	65	25	0	92	2	16	12	0	30	46	7	8	0	61	337
8:15-8:30	0	145	3	0	148	4	61	33	0	98	1	12	16	0	29	44	10	10	0	64	339
8:30-8:45	1	120	2	0	123	1	74	32	0	107	3	9	4	0	16	50	14	5	0	69	315
8:45-9:00	0	136	0	0	136	2	74	30	0	106	2	17	9	0	28	51	15	6	0	72	342
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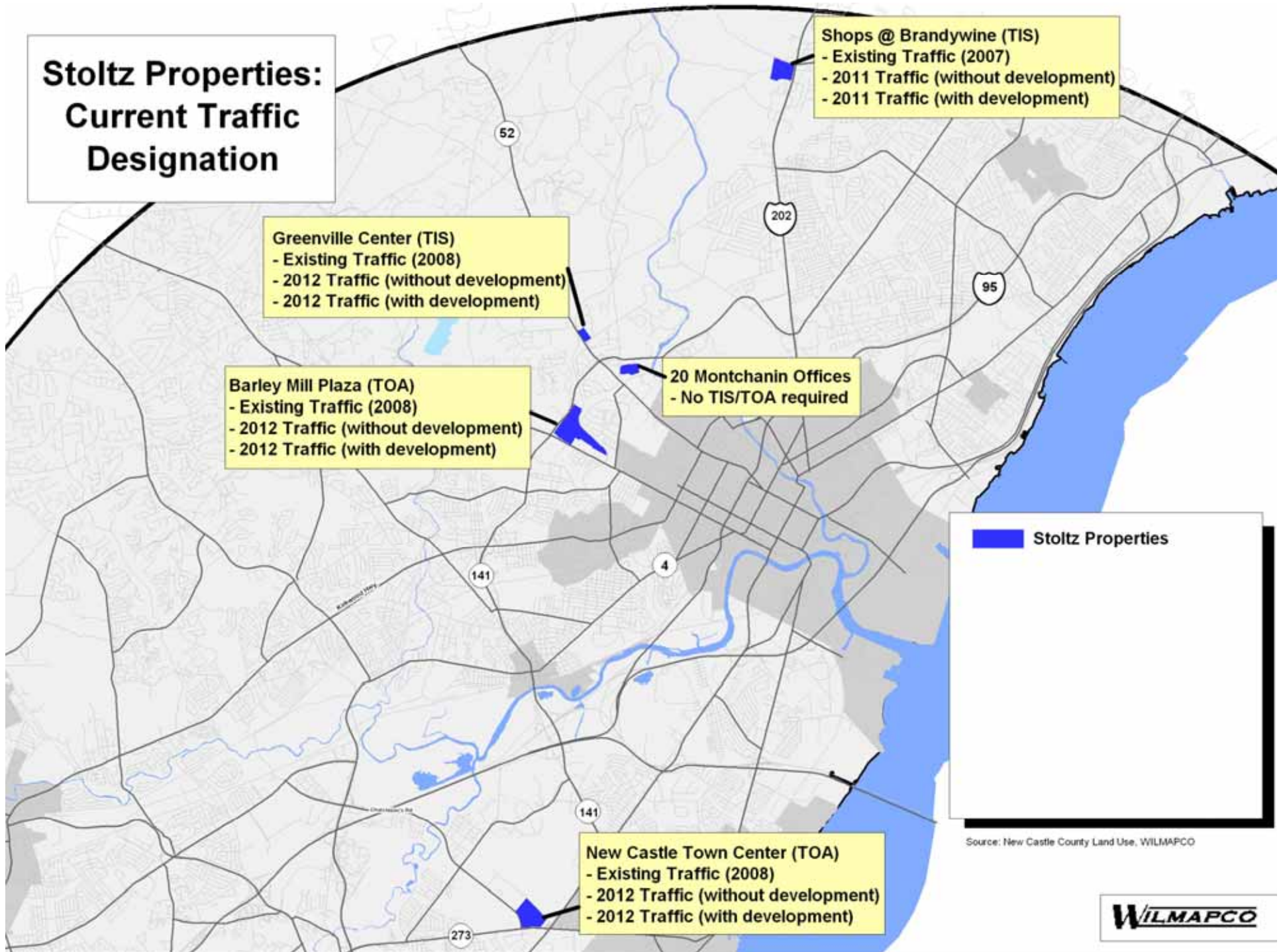
When to use a TIS or a TOA

- DeIDOT and County regulations are specific as to when a TIS may and may not be required and when the requirement can be waived.
- DeIDOT regulations grant the authority to require a TOA as necessary to review a plan.

Examples of when DeIDOT might require a TOA:

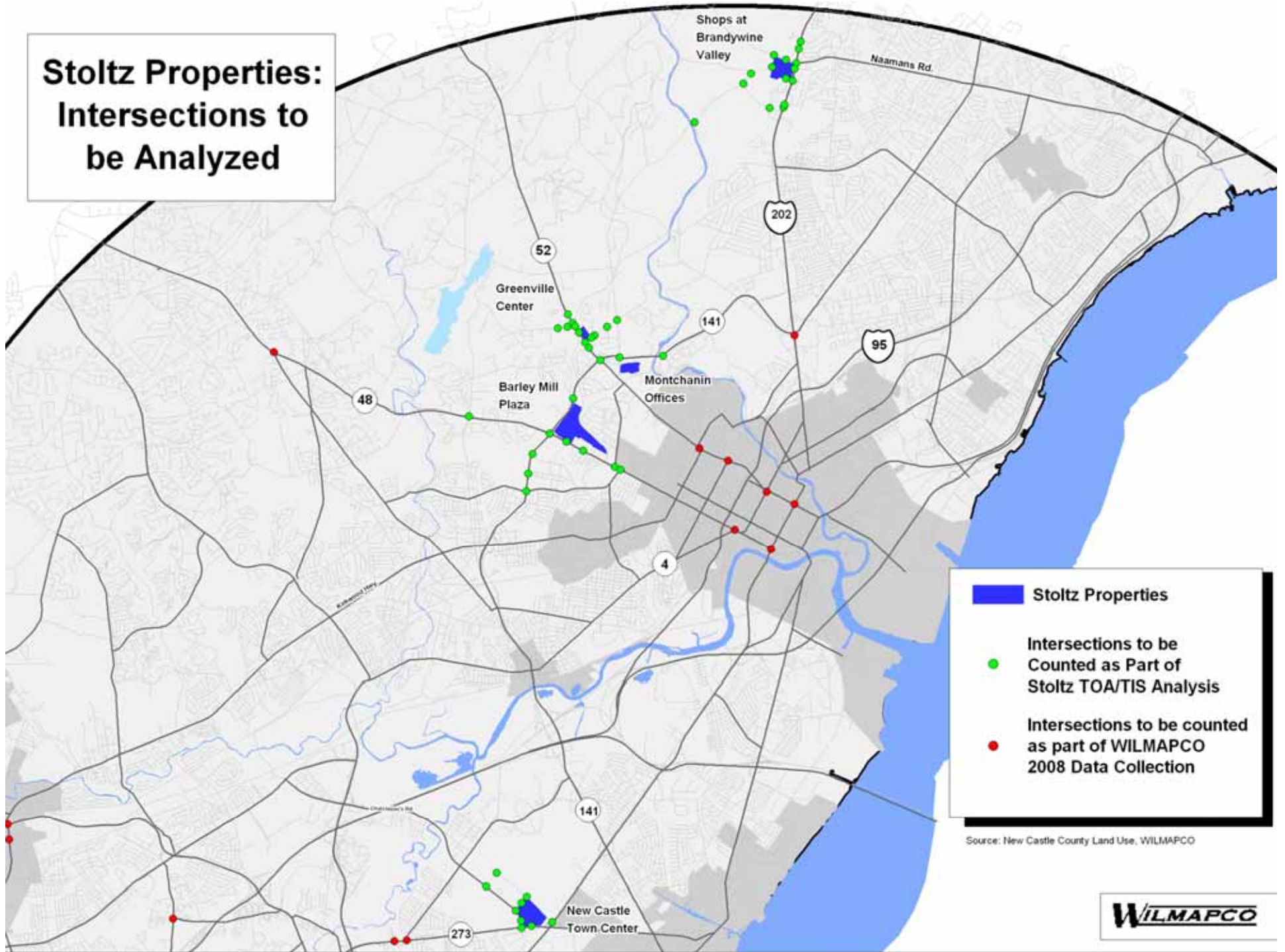
- TIS not warranted
- TIS cannot be required by County Code (e.g. Redevelopment)
- TIS warranted but waived
- TIS left a relevant question unanswered

Stoltz Properties: Current Traffic Designation



Source: New Castle County Land Use, WILMAPCO

Stoltz Properties: Intersections to be Analyzed



Stoltz Properties

Intersections to be Counted as Part of Stoltz TOA/TIS Analysis

Intersections to be counted as part of WILMAPCO 2008 Data Collection

Source: New Castle County Land Use, WILMAPCO



**Proposed
Changes to
TIA/TOA
Requirements:**

Proposed changes to the TIS process

Current Changes being proposed

- Ordinance 11-020 (Red/Tackett) to remove “paper” redevelopment through changes to existing recorded plan
- Ordinance 11-026 (Councilman Weiner) requiring redevelopment plans including rezonings to perform a Traffic Impact Study,
- DeIDOT proposing changes TIS/TOA guidelines in Standards and Regulations for Subdivision Streets and State Highway Access manual

DeIDOT Reasons behind changes

- **Areas of influence are too small.**
- **Aof influence are too large.**
- **Do not always focus on the most important road intersections.**
- **Confusion regarding Traffic Impact Studies (TIS) and Traffic Operational Analyses (TOA).**

What is a Traffic Operational Analysis (TOA)?

According to DeIDOT's Standards and Regulations for Subdivision Streets and State Highway Access, an Operational Analysis (TOA) is:

An evaluation or series of evaluations conducted during the TIS and site entrance reviews that is used to determine the ability of a proposed development project to operate safely and with adequate access. Analyses conducted during the heading of "Operational Analysis" may include Queueing Analysis, Highway Capacity Analyses, and Accident Analyses.

DeIDOT Proposed Changes

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An evaluation or series of evaluations conducted during the TIS and site entrance reviews that is used to determine the ability of a proposed development project to operate safely and with adequate access. Analyses conducted during the heading of "Operational Analysis" may include Queueing Analysis, Highway Capacity Analyses, and Accident Analyses.

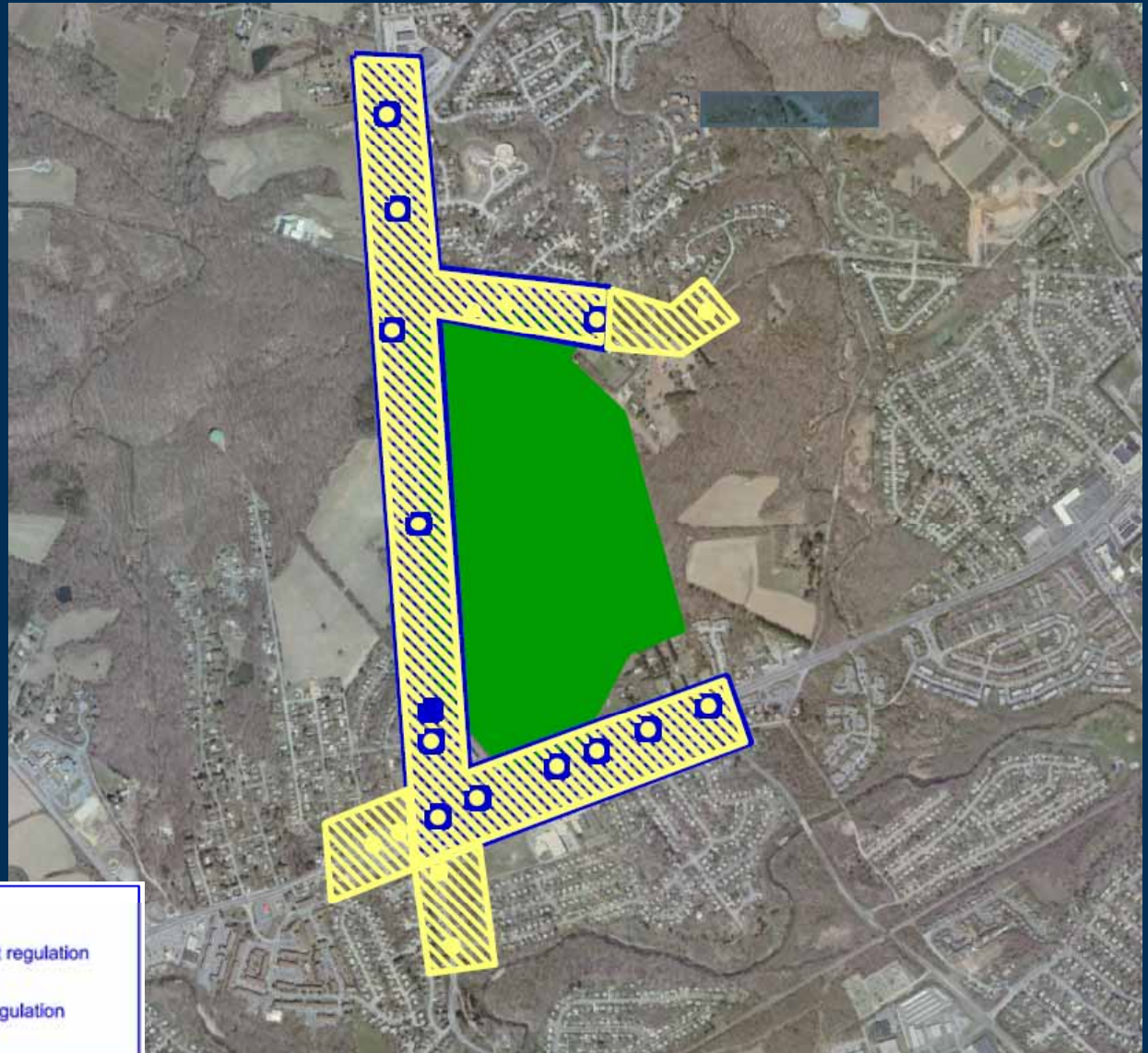
Proposed -Traffic Operational Analysis – An evaluation or series of evaluations conducted during the review of subdivision, land development and entrance plans that is used for purposes that include but are not limited to determination of site entrance location and movements to be allowed at the site entrance.






Generally, Traffic Operational Analyses are conducted only for projects that do not require Traffic Impact Studies and where level of service is not the issue, but one may be required where a Traffic Impact Study did not provide sufficient information to address an issue arising in a subsequent plan review.

DeIDOT Proposed Changes

Hypothetical
Development
for Urban Area

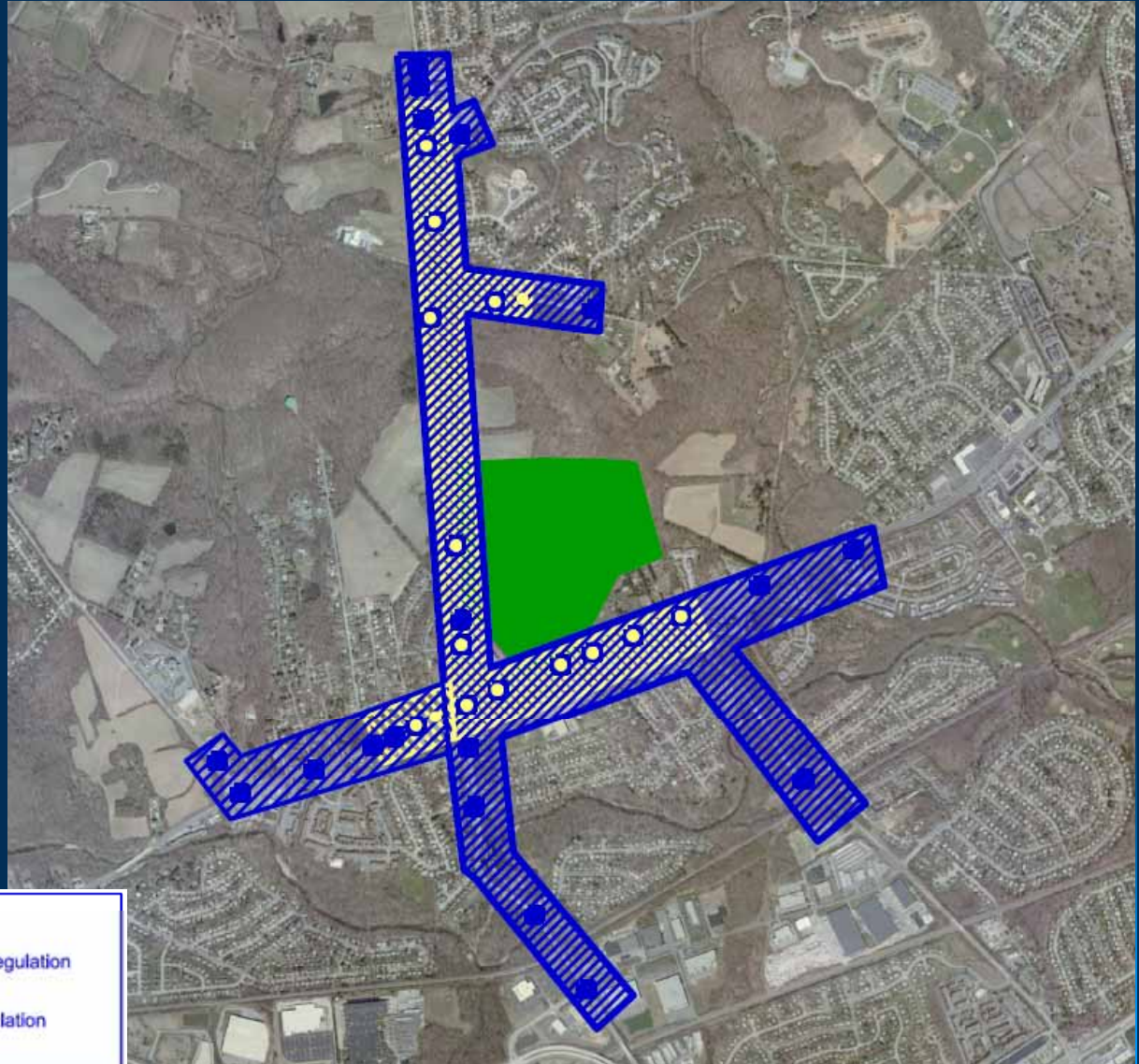
250 single -family
detached houses








Legend	
	Site
	Intersection required by County code / current regulation
	Intersection required by proposed regulation
	Area of Influence per County code / current regulation
	Area of Influence per proposed regulation

DeIDOT Proposed Changes

Hypothetical
Development
for Urban Area
100K Shopping
Center



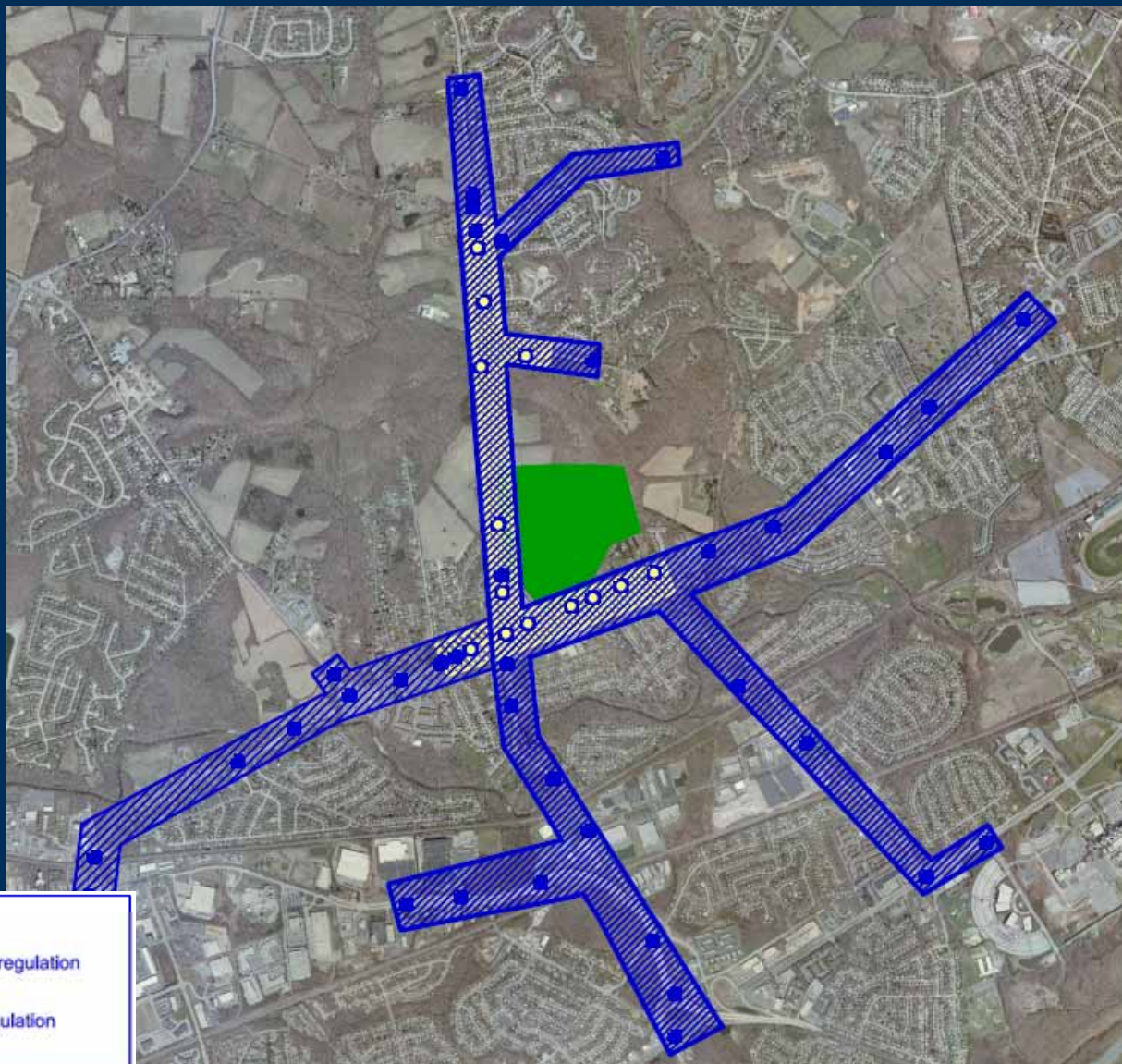
Legend

	Site
	Intersection required by County code / current regulation
	Intersection required by proposed regulation
	Area of Influence per County code / current regulation
	Area of Influence per proposed regulation

DeIDOT Proposed Changes

Hypothetical
Development
for Urban Area

800K Office Park



Legend

- Site
- Intersection required by County code / current regulation
- Intersection required by proposed regulation
- Area of Influence per County code / current regulation
- Area of Influence per proposed regulation

DeIDOT Proposed Changes

The screenshot shows a web browser window displaying the Delaware Department of Transportation website. The address bar shows the URL: www.deldot.gov/information/pubs_forms/manuals/subdivisions/TIS_TOA_Workshop/index.shtml. The page features a header with the State of Delaware logo and a navigation menu. The main content area is titled "Publications And Forms" and "Rules and Regulations For Subdivision Streets". It contains a paragraph stating that DeIDOT is considering changes to its regulations regarding Traffic Impact Studies (TIS) and Traffic Operational Analyses (TOA). Below this, a list of presentations and handouts is provided, including a main presentation and four hypothetical development scenarios. The page also includes a sidebar with navigation links and a footer with site information.

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Projects
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Archaeology
Red Light Enforcement

Publications And Forms
Rules and Regulations For Subdivision Streets

DeIDOT is presently considering possible changes to its regulations regarding Traffic Impact Studies (TIS) and Traffic Operational Analyses (TOA). The current regulations are found in DeIDOT's [Standards and Regulations for Subdivision Streets and State Highway Access](#), respectively in Chapter 2 and Section 3.9.

The following PowerPoint and slides were presented at a workshop held on 09/14/2011 to discuss the proposed changes:

- [Presentation \(09/14/11\)](#)
 - [Presentation Handout](#)
 - [Hypothetical Development for Urban Area 250 single-family detached houses](#)
 - [Hypothetical Development for Urban Area 100,000 square foot shopping center](#)
 - [Hypothetical Development for Urban Area 800,000 square foot office park](#)
 - [Hypothetical Development for Rural Area 250 or 600 single-family detached houses](#)

(Intersections and Area of Influence do not change)

Last Updated: Friday, 16-Sep-2011 13:14:19 Eastern Daylight Time

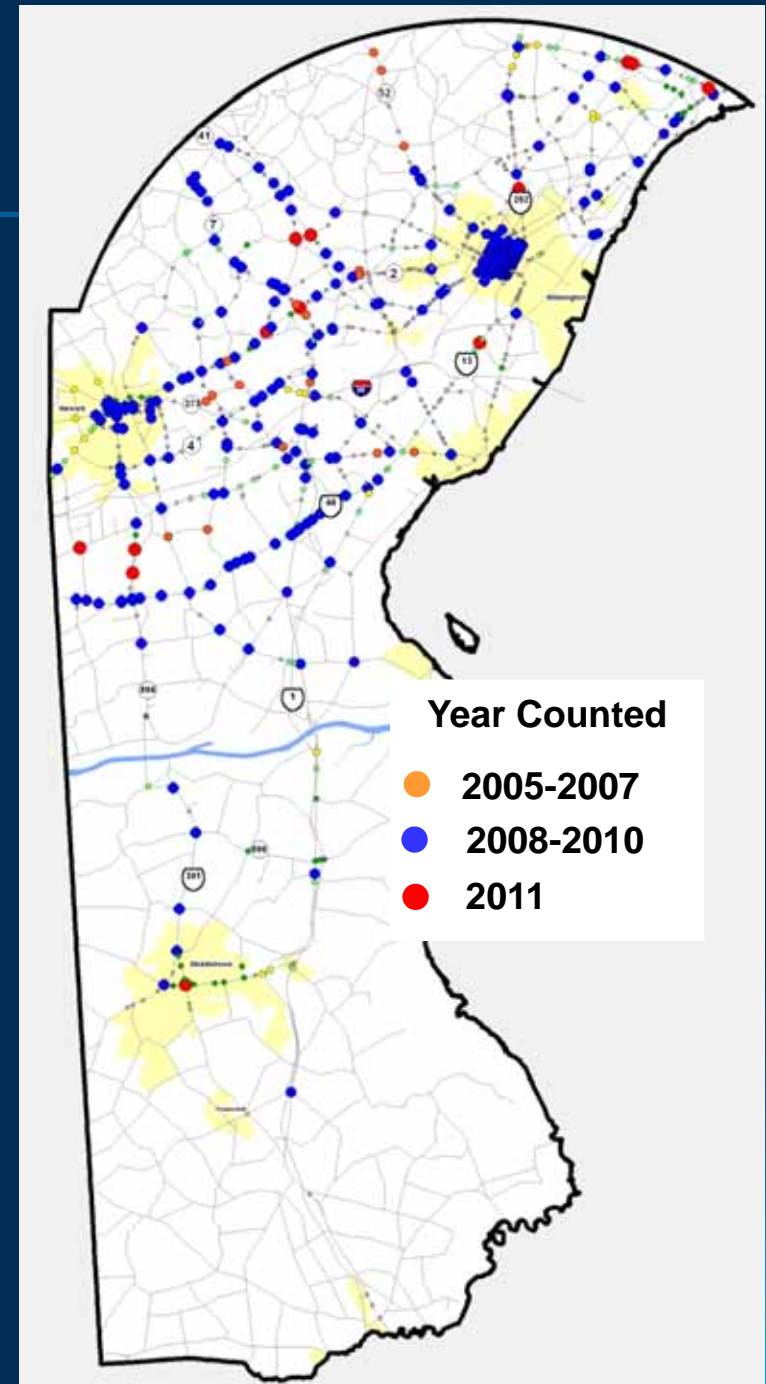
site map | about this site | contact us | translate | delaware.gov

http://www.deldot.gov/information/pubs_forms/manuals/subdivisions/TIS_TOA_Workshop/index.shtml

WILMAPCO Efforts

WILMAPCO Efforts

- Snapshot of current data entered into WILMAPCO LOS database
- Pulled from multiple sources
 - 789 Intersections
 - 457 With LOS Data
 - 311 counted since 2008
 - Multiple Sources:
 - TIS/TOA
 - Corridor Studies
 - WILMAPCO counts
 - TMC/MDSHA
 - Use AM/PM Peak LOS



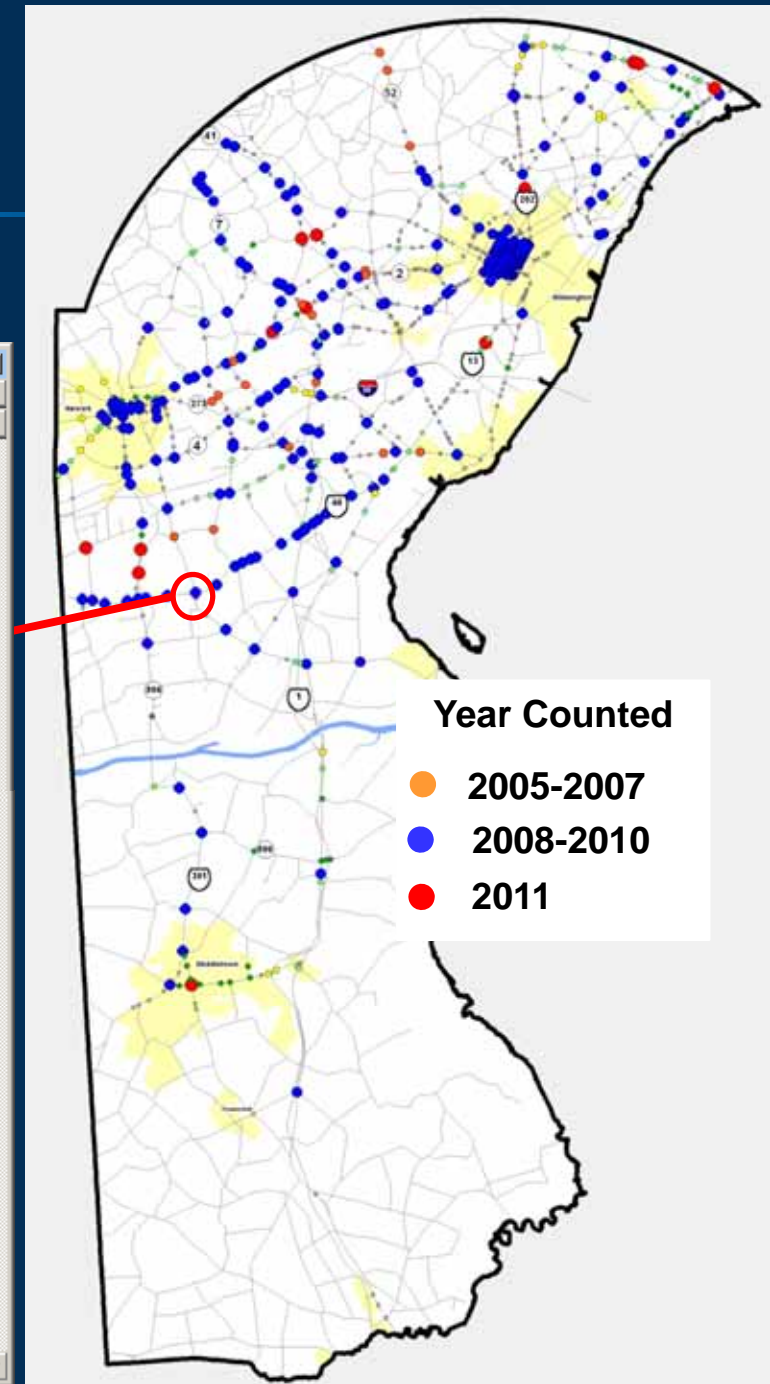
WILMAPCO Efforts

Info Tool

OBJECTID:	1,054
PBID:	609
PERMITNUM:	N239
MAINTID:	000320
MP:	3.77
ROAD_Primary:	US 40
ROAD_Sec:	SR 72 (SUNSET LAKE RD/WRANGLE HILL RD)
Full_name:	US 40 &SR 72 (SUNSET LAKE RD/WRANGLE HILL RD)
LOS_Source:	Route 40 CMC
Year_Count:	2010
AM_LOS:	D
PM_LOS:	D
SAT_LOS:	
AM_PM_LOS:	D/D
AM_Delay:	0.0
PM_Delay:	0.0
LOS_Method:	
ACTRA:	ACTRA
CONTROLLER:	EPAC
COUNTY:	1
SYSNEW:	ACTRA
CMS_07:	Y
Notes:	Last Count: 2009 (D/D)

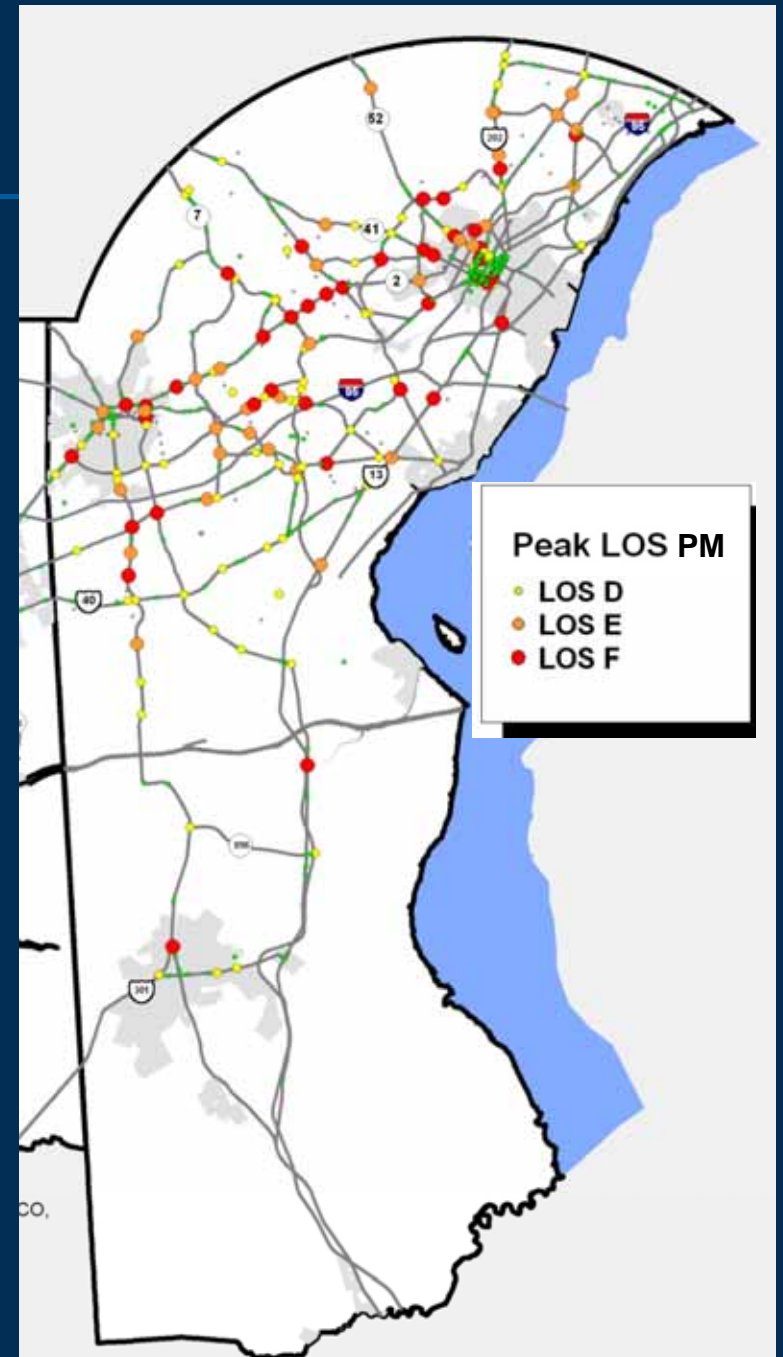
<< >> List

NCC_Intersection_Base



WILMAPCO Efforts

- Snapshot of current data entered into WILMAPCO LOS database
- Pulled from multiple sources



WILMAPCO Efforts

Intersection_LOS_2011.kml - Google Maps - Mozilla Firefox

Delaware Department of Transportation ... WILMAPCO | Congestion Management S... Intersection_LOS_2011.kml - Google Maps

maps.google.com/maps?q=http://www.wilmapco.org/KML_Files/2011_CMS/Intersection_LOS_2011.kml&hl=en&sa=39.793765,-75.634689&spn=0.200483,0.445976&prcc=0&l=h&z=10

Google

http://www.wilmapco.org/KML_Files/2011_CMS/Intersection_LOS_2011.kml

Get directions My places

Displaying content from www.wilmapco.org
The content displayed below and overlaid onto this map is provided by a third party, and Google is not responsible for it. Information you enter below may become available to the third party.

Intersection_LOS_2011.kml

- Temporary Places
- NCC_Intersection_LOS.KML

Full name	US 40 & SR 72 (SUNSET LAKE RD/WRANGLE HILL RD)
AM LOS	D
PM LOS	D
Year Count	2010
LOS Source	Route 40 CMC
Notes	Last Count: 2009 (D/O)

Directions Search nearby Save to map more

The image shows a satellite map of a residential area with a road intersection highlighted. A data popup window is overlaid on the map, providing details for the intersection. The popup includes fields for Full name, AM LOS, PM LOS, Year Count, LOS Source, and Notes. The map also shows various landmarks and street names.

Intersection LOS from Churchman's Crossing Monitoring

SR 7 / SR 4 (Stanton Split)

4

		1993 Count	1997 Count	2000 Count	2001 (Feb) Count	2001 (Oct) Count	2002 (Oct) Count	2003 (Oct) Count	2004 (Oct) Count	2005 (Oct) Count	2006 (Oct) Count	2007 (Nov) Count	Notes
NB Mill Road	L	BAD DATA											
	R			8		6	8	2	6	6	4	3	
SB SR 7	L	923?	311	311	340	279	272	295	254	231	218	329	
	R	431?	1028	972	1128	1,002	1,159	1,266	1,426	1,356	1,272	1,370	
EB SR 4/SR 7	L	351?	1261	1226	1274	1,078	1,341	1,213	1,259	1,260	1,101	1,257	
	R	955?	1044	990	1213	1,213	1,266	1,271	1,204	1,173	1,182	1,178	
WB SR 4	L	1316?	1033	1031	1044	1,024	1,254	1,163	1,288	1,299	1,292	1,222	
	R	0?	342	316	384	294	291	306	241	232	198	241	
CLV LOS v/c		N/A	D	D	E	D	F	E	F	F	E	F	
		N/A	0.91	0.89	0.92	0.86	1.03	0.96	1.01	1.00	0.94	1.01	
HCS LOS Delay		N/A	E	E	E	D	F	E	F	F	E	F	
		N/A	76	72	75	50	100	74	95	95	75	87	
Synchro LOS Delay		N/A	D	D	E	D	E	D	E	E	E	D	
		N/A	54	48	58	41	67	51	68	65	58	54	

SR 4 / SR 7 / J.P. MORGAN

5

		1993 Count	1997 Count	2000 Count	2001 (Feb) Count	2001 (Oct) Count	2002 (Oct) Count	2003 (Oct) Count	2004 (Oct) Count	2005 (Oct) Count	2006 (Oct) Count	2007 (Nov) Count	Notes
NB SR 7	L	35	28	57	55	61	65	87	68	93	82	121	Only two lanes per direction open on NB and SB SR 7 during February 2000 count. New EB and NB left turn lanes added prior to 2004 counts.
	R	1693	1581	1360	1501	1,464	1,572	1,660	1,527	1,473	1,361	1,919	
SB SR 7	L	7	11	14	21	18	16	19	11	12	21	7	
	R	3	15	3	5	6	5	3	6	7	6	8	
EB SR 4	L	476	690	500	532	511	542	631	677	716	562	606	
	R	607	655	690	807	828	879	950	903	811	824	773	
WB J.P. Morgan	L	6	11	35	12	17	16	7	22	22	14	16	
	R	47	87	82	241	358	478	554	571	501	461	375	
	L	244	307	147	171	214	177	138	202	214	200	245	
	R	49	88	87	95	108	94	97	126	121	131	143	
CLV LOS v/c		103	244	167	218	174	166	147	162	215	103	242	
		E	D	D	D	E	E	F	F	E	D	D	
		0.92	0.82	0.88	0.88	0.92	0.93	1.03	1.05	0.91	0.83	0.88	
HCS LOS Delay		N/A	D	D	E	E	F	F	F	F	E	F	
		N/A	48	40	59	79	90	127	134	85	63	94	
Synchro LOS Delay		N/A	C	C	D	D	D	E	E	C	C	C	
		N/A	30	31	39	45	48	62	67	32	22	24	

Comparing LOS methods

- Operations looks at volume-based vs. delay based LOS when assessing intersection performance

Critical Movement Summation (CMS)- Measures Volumes through intersections

LOS A	Less than 1,000 veh/hr
LOS B	1,000 to 1,150 veh/hr
LOS C	1,151 to 1,300 veh/hr
LOS D	1,301 to 1,450 veh/hr
LOS E	1,451 to 1,600 veh/hr
LOS F	More than 1,600 veh/hr

Highway Capacity Software (HCS) Measures Delay through intersections

LOS	Signalized Intersection	Unsignalized Intersection
A	≤10 sec	≤10 sec
B	10-20 sec	10-15 sec
C	20-35 sec	15-25 sec
D	35-55 sec	25-35 sec
E	55-80 sec	35-50 sec
F	≥80 sec	≥50 sec

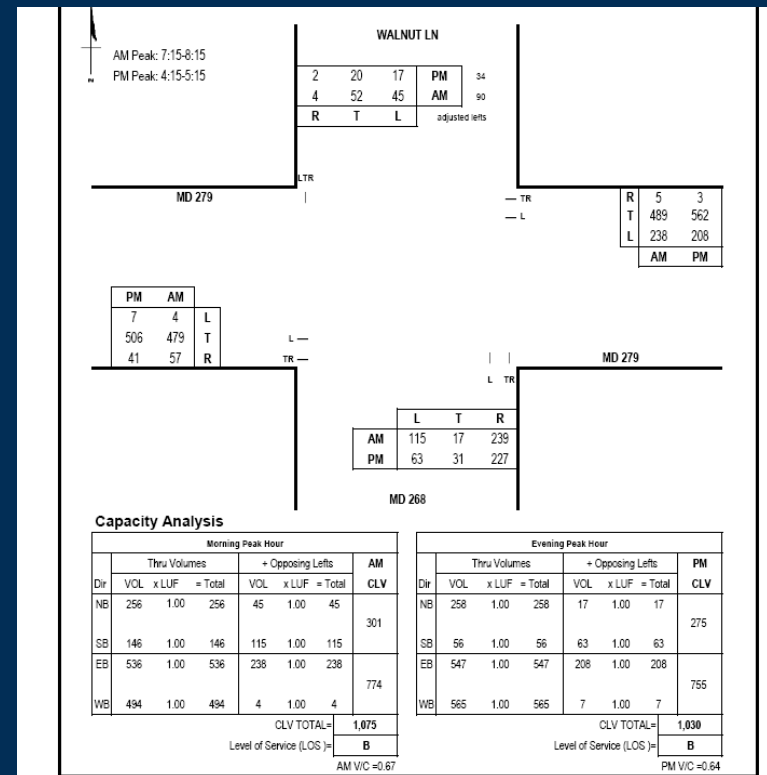
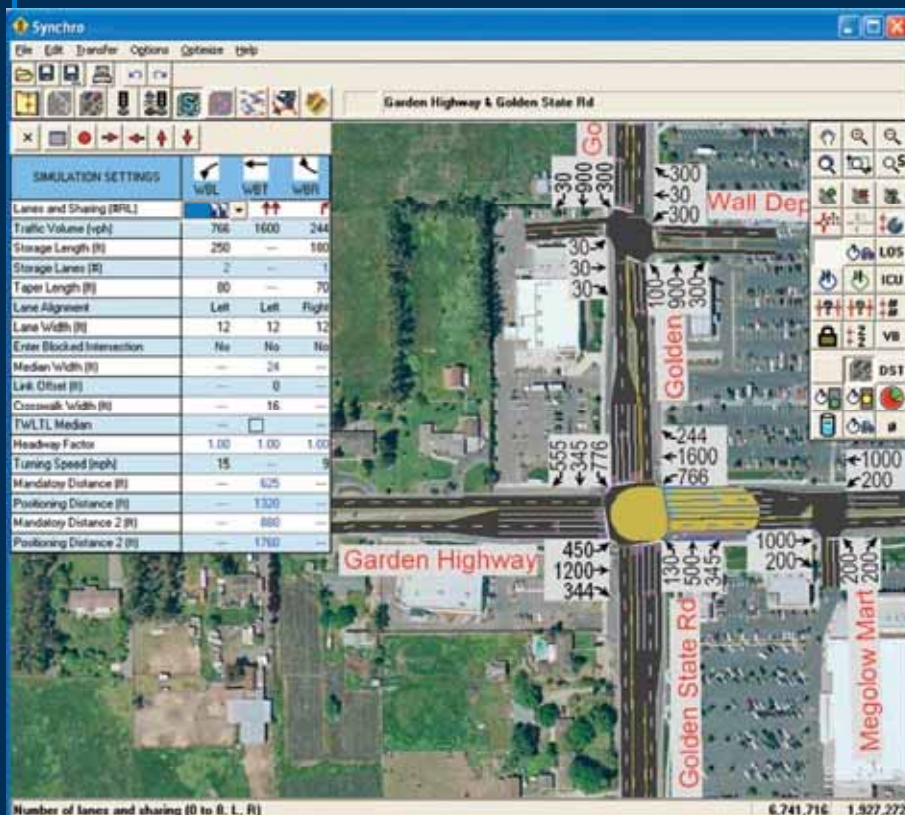
Comparing LOS methods

Highway Capacity Software (HCS)

- Requires complex model software
- Lots of variables in “black box”
- Significant time to perform analysis

Critical Movement Summation (CMS)

- Spreadsheet model
- Few variables to manipulate
- Gives best method to optimize signal timings



Proposed Solutions:

Addition:

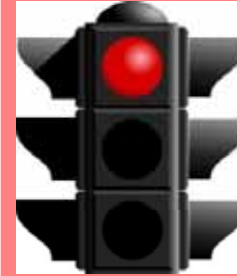
- As part of Congestion Mitigation Strategy section, Insert “Intersection Operations” section
- Compare Delay LOS with Capacity-Based LOS to determine if it can be:
 - retimed
 - needs minor upgrades (restriping)
 - capacity improvements

Project	Proposed Action	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7	Category 8	Category 9	Category 10	Category 11	Category 12
		Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7	Category 8	Category 9	Category 10	Category 11	Category 12
10	...												
11	...	X	X	X									
12	...	X	X	X	X	X	X	X	X	X	X	X	X
13	...	X	X	X	X	X	X	X	X	X	X	X	X
14	...	X	X	X	X	X	X	X	X	X	X	X	X
15	...	X	X	X	X	X	X	X	X	X	X	X	X
16	...	X	X	X	X	X	X	X	X	X	X	X	X
17	...	X	X	X	X	X	X	X	X	X	X	X	X
18	...	X	X	X	X	X	X	X	X	X	X	X	X
19	...	X	X	X	X	X	X	X	X	X	X	X	X
20	...	X	X	X	X	X	X	X	X	X	X	X	X
21	...	X	X	X	X	X	X	X	X	X	X	X	X
22	...	X	X	X	X	X	X	X	X	X	X	X	X
23	...	X	X	X	X	X	X	X	X	X	X	X	X
24	...	X	X	X	X	X	X	X	X	X	X	X	X
25	...	X	X	X	X	X	X	X	X	X	X	X	X
26	...	X	X	X	X	X	X	X	X	X	X	X	X
27	...	X	X	X	X	X	X	X	X	X	X	X	X
28	...	X	X	X	X	X	X	X	X	X	X	X	X
29	...	X	X	X	X	X	X	X	X	X	X	X	X
30	...	X	X	X	X	X	X	X	X	X	X	X	X
31	...	X	X	X	X	X	X	X	X	X	X	X	X
32	...	X	X	X	X	X	X	X	X	X	X	X	X
33	...	X	X	X	X	X	X	X	X	X	X	X	X
34	...	X	X	X	X	X	X	X	X	X	X	X	X
35	...	X	X	X	X	X	X	X	X	X	X	X	X
36	...	X	X	X	X	X	X	X	X	X	X	X	X
37	...	X	X	X	X	X	X	X	X	X	X	X	X
38	...	X	X	X	X	X	X	X	X	X	X	X	X
39	...	X	X	X	X	X	X	X	X	X	X	X	X
40	...	X	X	X	X	X	X	X	X	X	X	X	X
41	...	X	X	X	X	X	X	X	X	X	X	X	X
42	...	X	X	X	X	X	X	X	X	X	X	X	X
43	...	X	X	X	X	X	X	X	X	X	X	X	X
44	...	X	X	X	X	X	X	X	X	X	X	X	X
45	...	X	X	X	X	X	X	X	X	X	X	X	X
46	...	X	X	X	X	X	X	X	X	X	X	X	X
47	...	X	X	X	X	X	X	X	X	X	X	X	X
48	...	X	X	X	X	X	X	X	X	X	X	X	X
49	...	X	X	X	X	X	X	X	X	X	X	X	X
50	...	X	X	X	X	X	X	X	X	X	X	X	X

Proposed Solutions:

“Intersection Operations” Sample for solution matrix

CMS LOS shows unacceptable Intersection Capacity (AM/PM LOS “E” and “F”)



“Re-build”

CMS LOS shows Borderline Intersection Capacity issues (AM/PM “D” or “D” in any peak period)



“Re-stripe”

CMS LOS shows Acceptable Intersection Capacity (AM/PM LOS “C” or better in both peaks)



“Re-time”

Proposed Solutions:

Addition:

- As part of Congestion Mitigation Strategy section, Insert “Intersection Operations” section
- Compare Delay LOS with Capacity-Based LOS to determine if it can be:
 - retimed
 - needs minor upgrades (restriping)
 - capacity improvements

Sample

Intersection	Delay LOS (AM/PM)	Volume-Based LOS (AM/PM)	Result
Foulk Rd. & Grubb Rd.	D/E	D/F	"Re-Build"
SR 2 (Elkton Rd.) & Amstel Ave.	F/F	D/D	"Re-Stripe"
SR 2 (Del. Ave.) & Orchard Rd.	C/F	C/B	"Re-Time"
SR 2 (Del. Ave.) & Academy St.	D/E	D/E	"Re-Stripe"
SR 2 & Delaware Park Ent.	E/E	C/E	"Re-Stripe"
SR 896 & SUMMIT BRIDGE RD	D/E	E/F	"Re-Build"

Questions?