

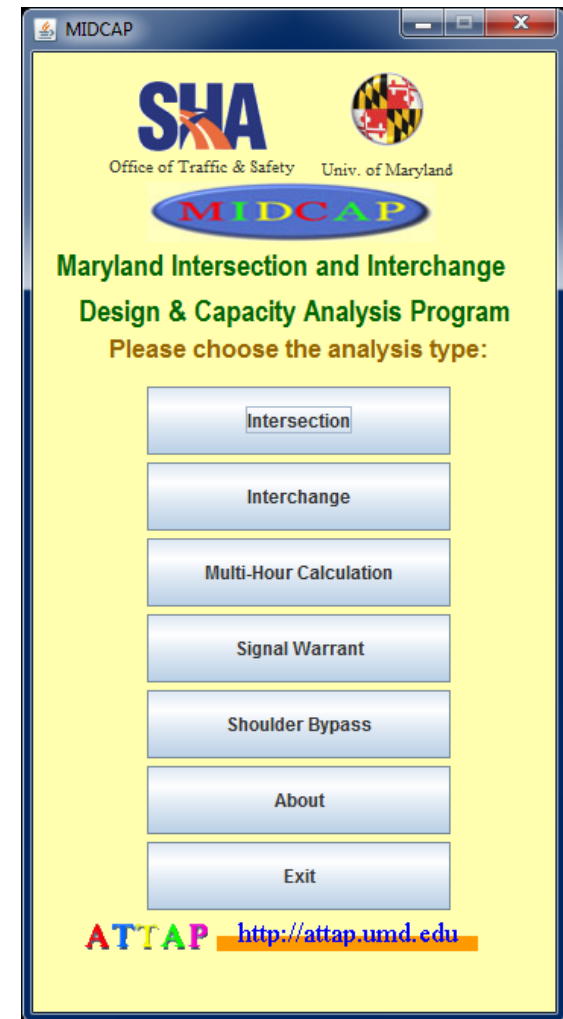


# MIDCAP

Maryland Intersection and Interchange Design & Capacity Analysis Program

# INTRODUCTION

- ❖ **M**aryland **I**ntersection and **D**esign & **C**apacity **A**nalysis **P**rogram (**MIDCAP**)
- ❖ Developed by University of Maryland, College Park and MDSHA
- ❖ A tool to conduct a capacity/queuing analysis for signalized intersections and interchanges, signal warrant and shoulder bypass analysis at the preliminary, planning, or design stage



# MODULES

- ✱ Capacity and queue analysis
  - for signalized Intersections
  - for signalized interchanges
- ✱ Signal Warrant
- ✱ Shoulder Bypass Lanes (SBLs) Warrant

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

- ✱ Uses the CLV method and MDSHA's Queuing analysis procedure
- ✱ Provides the volume-to-capacity ratio and corresponding level of service associated with a particular intersection/interchange design, given hourly turning movement volumes, lane configurations, right turn restrictions, and phase control (split or non-split)
- ✱ Considers different types of intersection/interchange from conventional design (4 leg, 3 leg, diamond intersection) to unconventional design (Continuous Flow Intersection, Single Point Urban Interchange, and Diverging Diamond Interchange)

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ✱ Framework

**INPUT**

- Movement volumes
- Lane configuration
- Intersection type
- Right-turn restriction

Calculate  
CLV for  
each  
approach



Determine  
critical  
movement  
and calculate  
intersection  
CLV



Calculate  
v/c and  
determine  
LOS



Calculate  
Max. queue  
length

- Intersection Critical Lane Volume
- Intersection v/c and LOS
- Maximum Queue Length

**OUTPUT**

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## 🔴 User-friendly interface

- 1 Choose Intersection Type
- 2 Set Lane Configurations
- 3 Input Movement Volumes
- 4 Choose Right Turn Control Type
- 5 Calculate Critical Lane Volume
- 6 Obtain Intersection LOS & V/C

**Project Information:**

- Analyst: FMKIM
- Department: UMD
- Date: 9-22-2014
- Intersection: MD 175/Clark Rd.
- Location: Hanover
- Type: 4 Leg
- Comments: RDI, CFI
- Phase Split: ☐ Split WB, ☐ Split EB and WB

**Intersection Diagram:**

Diagram showing a four-legged intersection with lane configurations and movement volumes. Red numbered circles (1-6) highlight key steps in the workflow.

**AM Results**

Mov.	Vol	Lane Fac	Lane Vol	Oppo Lefts	CLV	*
NB	10	0.55	6	225	231	231
SB	25	1.00	25	65	90	
WB	2525	0.40	1010	159	1169	1169
EB	2045	0.40	818	125	943	
AM Total					1400	AM VIC
					AM LOS	D 0.88

**PM Results**

Mov.	Vol	Lane Fac	Lane Vol	Oppo Lefts	CLV	*
NB	10	0.55	6	220	226	226
SB	30	1.00	30	130	160	
WB	1500	0.40	600	429	1029	1029
EB	2410	0.40	964	65	1029	
PM Total					1255	PM VIC
					PM LOS	C 0.79

**Issues:**

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ❖ Multiple intersections analysis

- Corridor analysis
- Up to 10 intersections

The screenshot shows the MIDCAP software window. At the top, it displays the SHA logo (Shoreline Highway Administration) and the University of Maryland logo, with the text "Office of Traffic & Safety" and "Univ. of Maryland" below them. The MIDCAP logo is prominently displayed in the center. Below the logos, the title "Intersection Setup" is shown. The main form area contains three labels: "Number of Intersections:", "Arterial Numbering Directions:", and "Number of Through Lanes on Arterial:". To the right of these labels is a vertical list of numbers from 3 to 10, with a dropdown arrow at the top. The number 5 is currently selected. At the bottom of the form are two buttons: "OK" and "Back". At the very bottom, the ATTAP logo is displayed next to the URL <http://attap.umd.edu>.

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

- Integration of intersection and interchange designs
  - On the multiple intersection analysis

SHA Office of Traffic & Safety Univ. of Maryland  
ATTAP <http://attap.umd.edu>  
MIDCAP

Click on the blue circle to input for an intersection.

Analyst: Hyeonmi Kim  
Department: TDSD  
Date: 06/12/2013  
Arterial: MD175  
Location:  
Comments:

Distance To Next Intersection (ft)  
West

Intersections

1 2 3 A 3 B 4

Interchange

Intersection Name: Brock B ridge Roa, Sellner Road/Rat, MD 295, Clark R oad/Max B

AM Peak: D 0.89, E 0.89, 3a E 0.84, D 0.88  
LOS V/C:

PM Peak: E 0.89, E 0.89, 3a E 0.84, C 0.78  
LOS V/C:

Type: 3 leg, 4 leg, RDI, 4 leg

Buttons: Back, Print, Open, Save, Save As, Add, Remove, Summary

SHA Office of Traffic & Safety Univ. of Maryland  
ATTAP <http://attap.umd.edu>  
MIDCAP

Click on the arrows to change the lane group configuration.

Analyst: Hyeonmi Kim  
Department: TDSD  
Date: 06/12/2013  
Intersection: 4  
Location: road/Max Blobs Park Road  
Type: 4 Leg  
Comments:

Phase Split:  
☐ Split NB and SB  
☐ Split EB and WB

Buttons: Calculate, Clear, Print, Open, Save, Save As, Back, Queue, Undo, Redo, Factors And Criteria

Diagram showing intersection details and traffic flow.

AM Results

Mov.	Vol	Lane Fac	Lane Vol	Oppo Lefts	CLV	*
NB	10	0.55	6	225	231	
SB	25	1.00	25	65	90	
WB	2525	0.40	1010	159	1169	
EB	2045	0.40	818	125	943	
AM Total					1400	AM VIC
AM LOS					D	0.88

PM Results

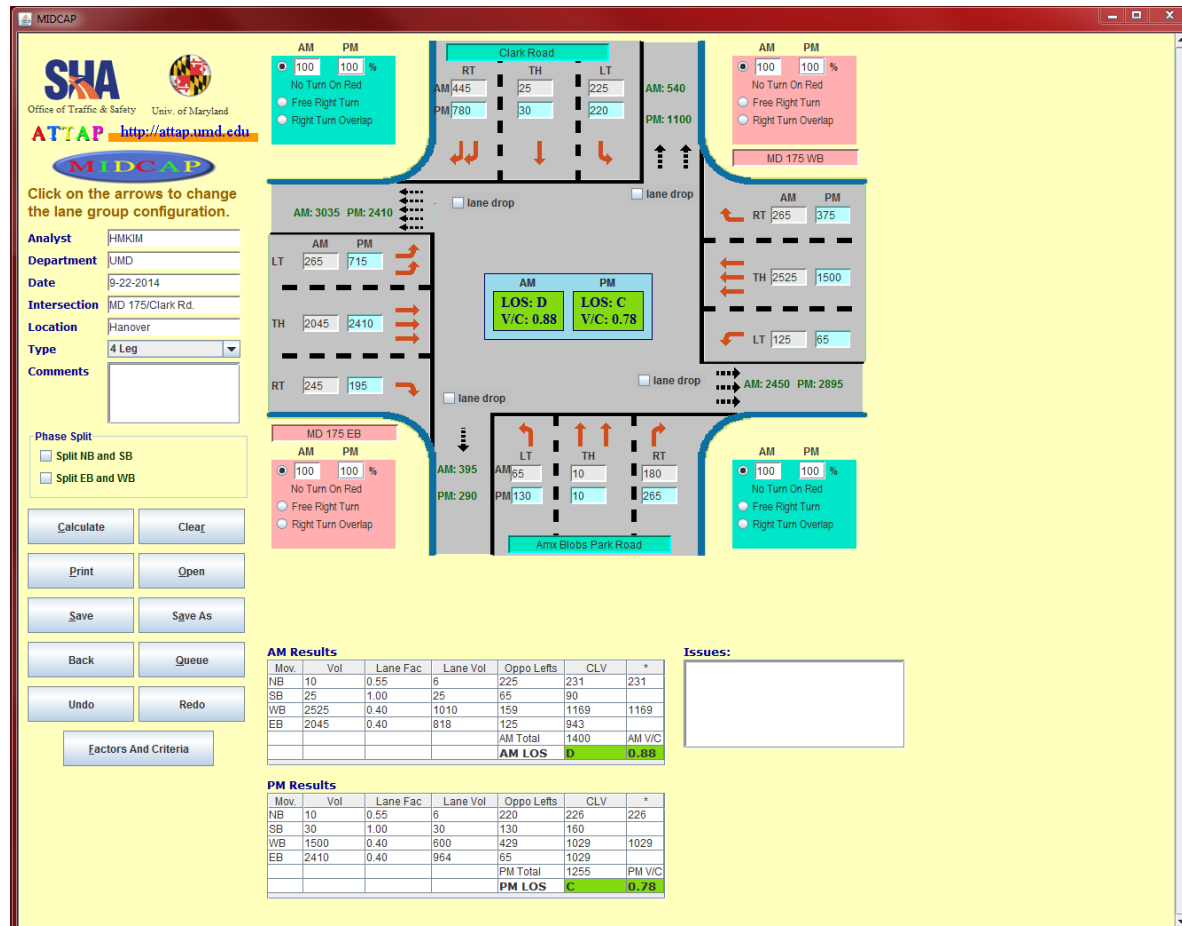
Mov.	Vol	Lane Fac	Lane Vol	Oppo Lefts	CLV	*
NB	10	0.55	6	220	228	

Issues:



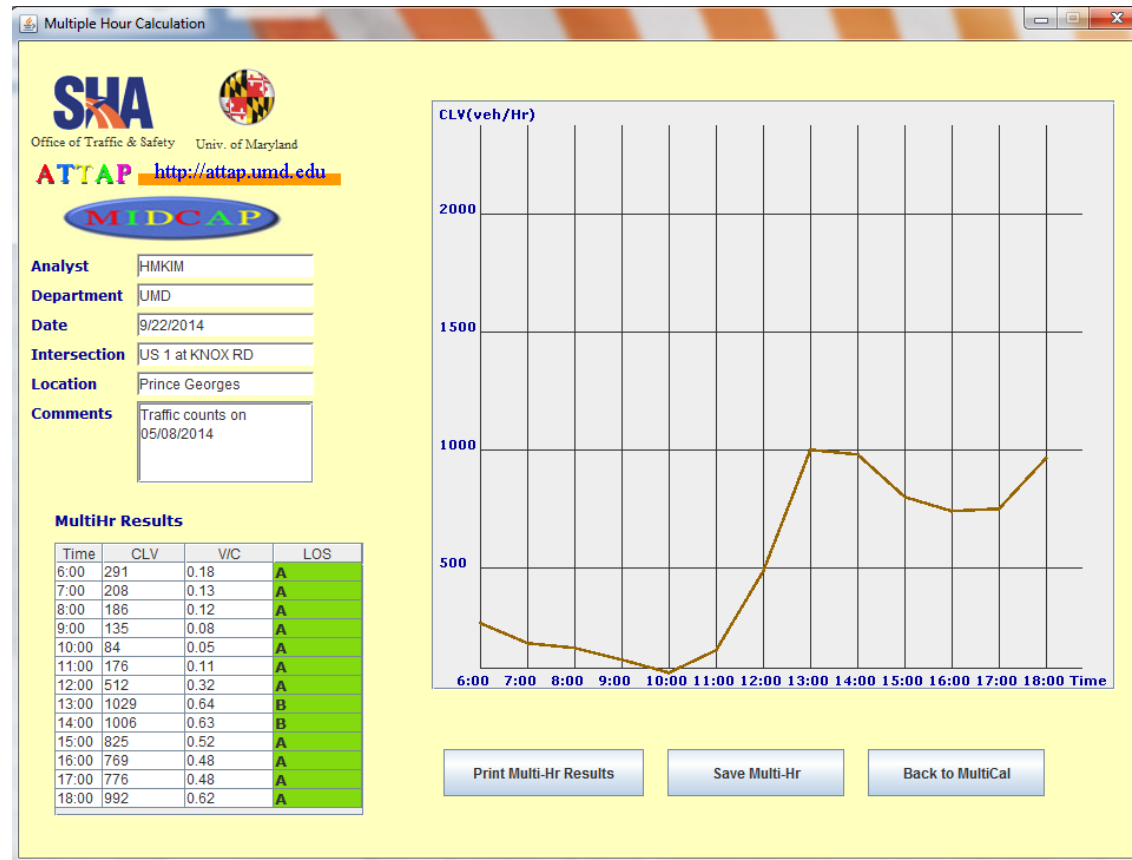
# MODULE 1: CAPACITY AND QUEUE ANALYSIS

✿ Analysis for both AM and PM peak hours at a time



# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ✳ Multi-hour analysis



# MODULE 1: CAPACITY AND QUEUE ANALYSIS

- ✿ Import a report from Internet Traffic Monitoring System (I-TMS) as traffic volume input

The screenshot displays the MIDCAP software interface, which is used for traffic analysis. The interface includes a central diagram of a traffic intersection with various lane configurations and traffic signals. Surrounding the diagram are several input fields and control buttons.

**Left Panel:**

- SHA** (Shoreline Highway Agency) logo and **Office of Traffic & Safety** text.
- ATTAP** logo and **Univ. of Maryland** text.
- MIDCAP** logo.
- Click on the arrows to change the lane group configuration.**
- Analyst:** HMKIM
- Department:** UMD
- Date:** 9/22/2014
- Intersection:** US 1 at KNOX RD
- Location:** Prince George's
- Type:** 4 Leg
- Comments:** (empty text box)
- Phase Split:**
  - ☐ Split NB and SB
  - ☐ Split EB and WB
- Buttons:** Calculate, Clear, Print, Open, Save, Save As, Back, Queue, Undo, Redo, Factors And Criteria.

**Central Diagram:**

- Shows a 4-leg intersection with lanes for Left Turn (LT), Through (TH), and Right Turn (RT).
- Includes traffic signal timing: AM: 381, PM: 0; AM: 820, PM: 0; AM: 136, PM: 0; AM: 723, PM: 0.
- Indicates lane drop locations.
- Shows traffic flow directions with arrows.

**Right Panel:**

- Issues:** (empty text box)

**Bottom Section:**

- Browse the .xls result file:** C:\Users\HMKIM-UMD\Desktop\Report.xls
- Buttons:** Load and Calculate, Mult Hr Result.

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ✱ Factors and Criteria

- Editable Lane Use Factors, LOS criteria, and PCE values
- Can be applied in different intersections and different approaches
- Default values (see tables)

The screenshot shows a software window titled "Factors & Criteria" with three main sections: "Lane Use Factor", "Level of Service", and "PCE". Each section contains a table of default values and a "Default" button at the bottom.

**Lane Use Factor**

Number of Lanes	Factor
1	1.00
2	0.55
3	0.4
4	0.3
5	0.24
Dbl Left	0.6
Tpl Left	0.45

Default

**Level of Service**

Level	CLV
A ≤	1000
B ≤	1150
C ≤	1300
D ≤	1450
E ≤	1600
F >	1600

Default

**PCE**

Opposing Volume	PCE
≤ 199	1.1
≤ 599	2.0
≤ 799	3.0
≤ 999	4.0
≥ 1000	5.0

Default

# MODULE 1: CAPACITY AND QUEUE ANALYSIS

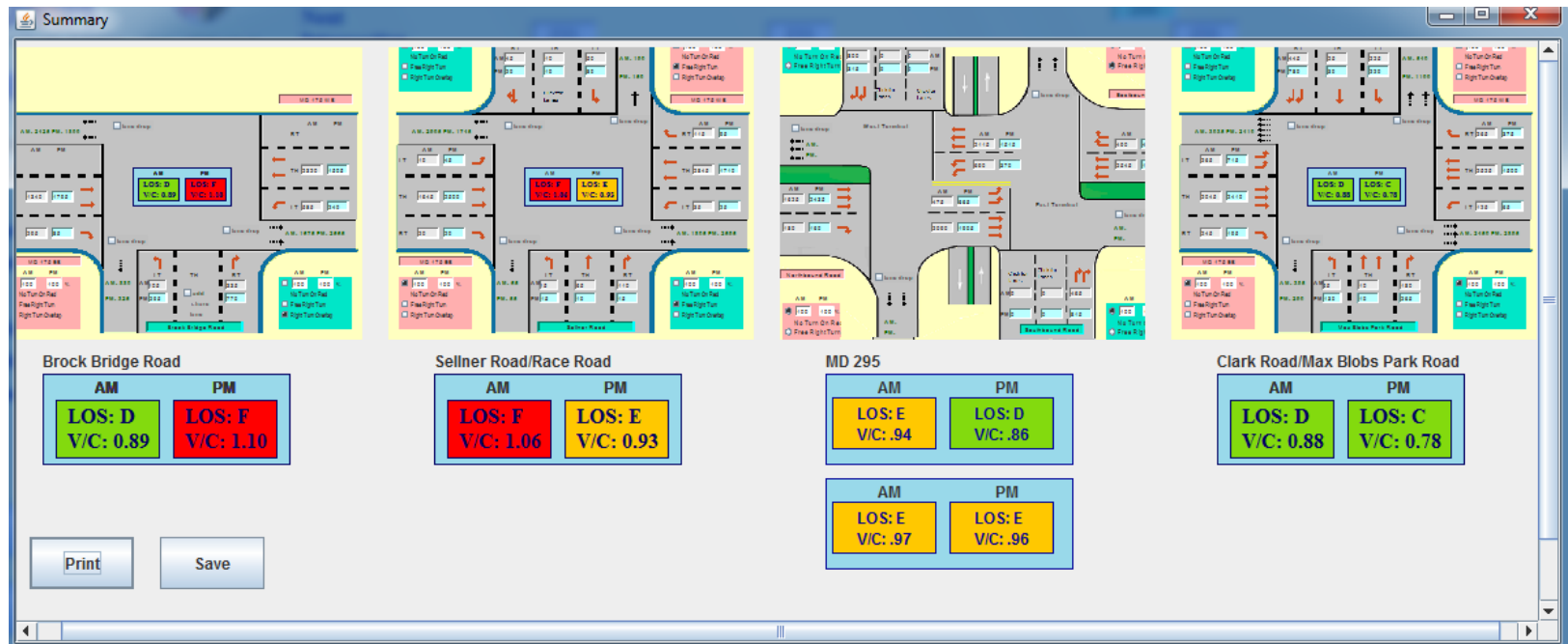
## ⚙️ Right turn restriction

- Percentage of no-turn-on-red traffic
- Free right turn
- Right turn overlap

AM	PM
<input checked="" type="radio"/> 100	<input type="radio"/> 100 %
No Turn On Red	
<input type="radio"/> Free Right Turn	
<input type="radio"/> Right Turn Overlap	

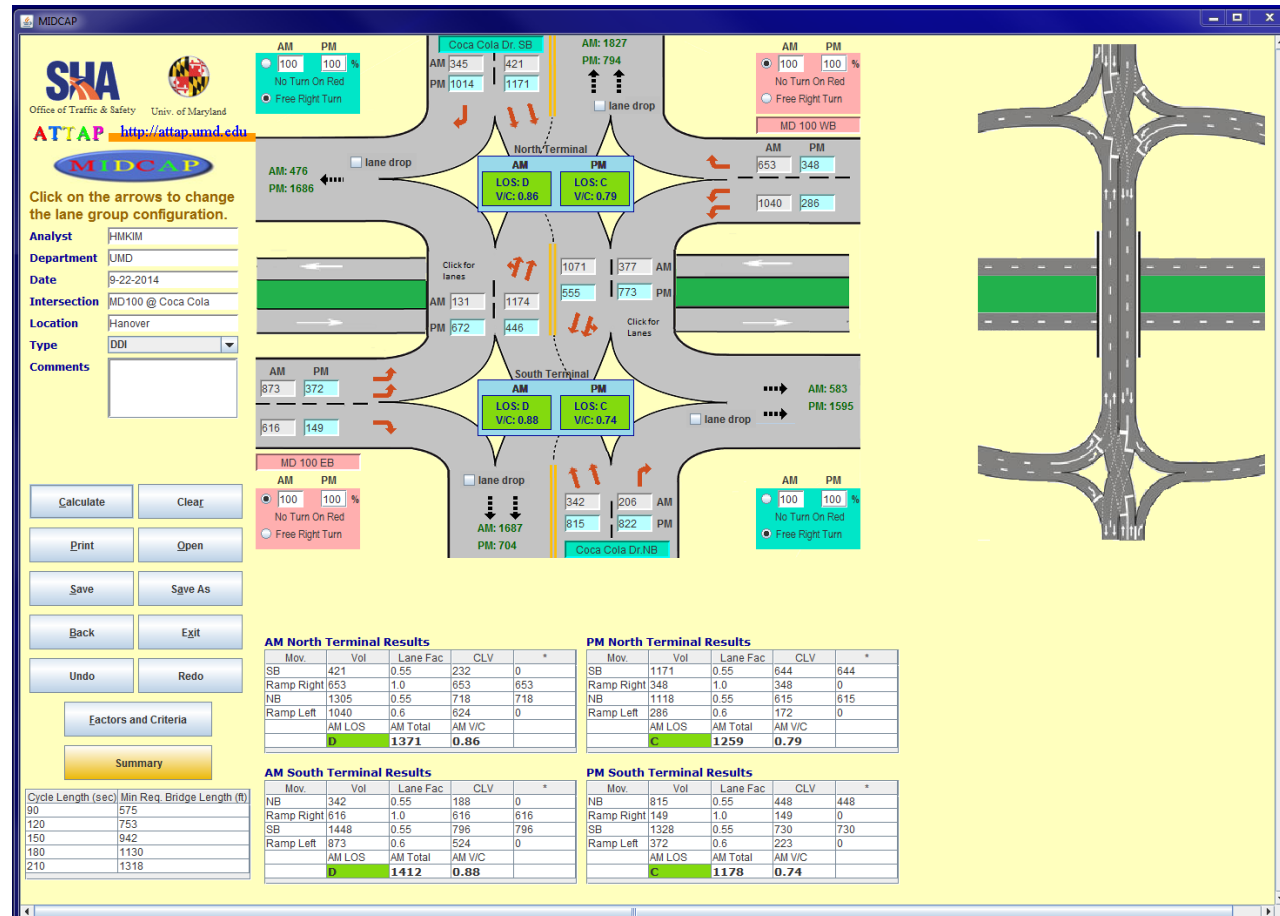
# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ❁ Comparison summary



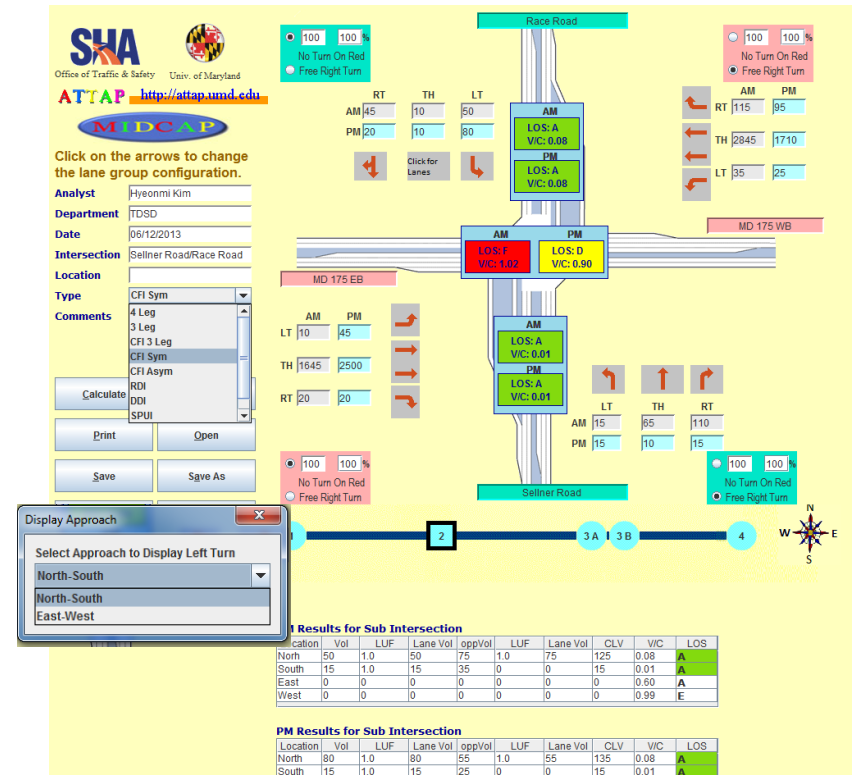
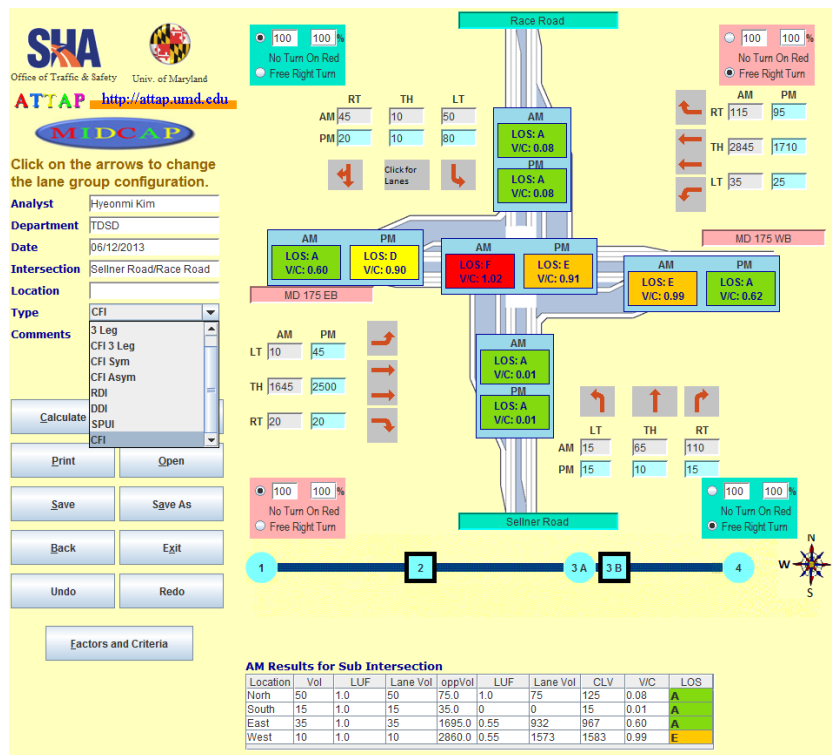
# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ❖ Recommended bridge length for DDI design



# MODULE 1: CAPACITY AND QUEUE ANALYSIS

- ✿ Different intersection and interchange designs
  - Full CFI
  - Symmetric CFI

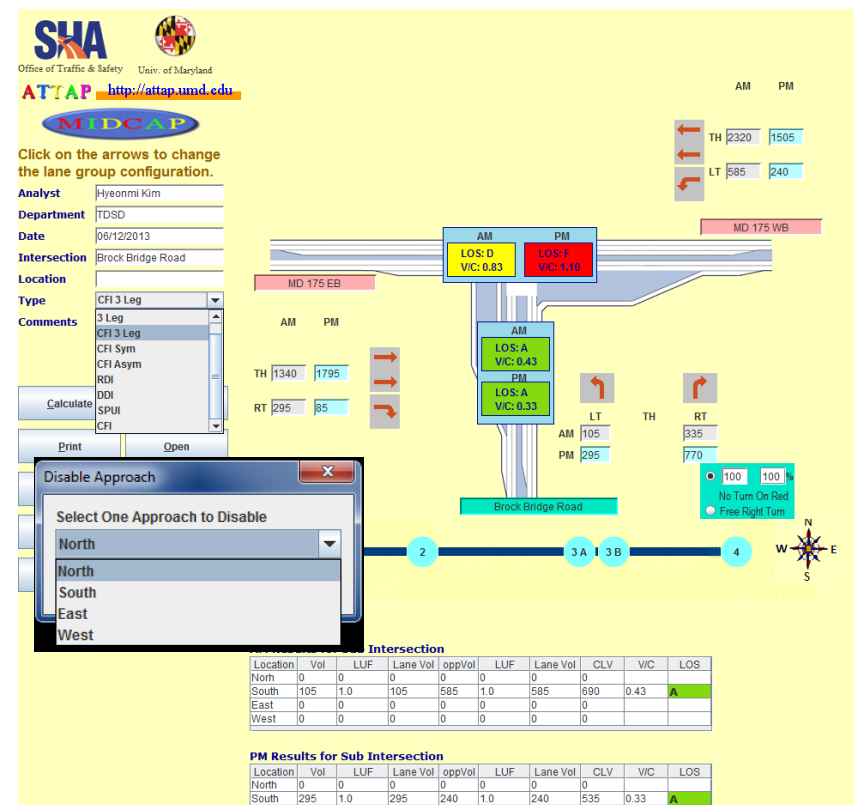
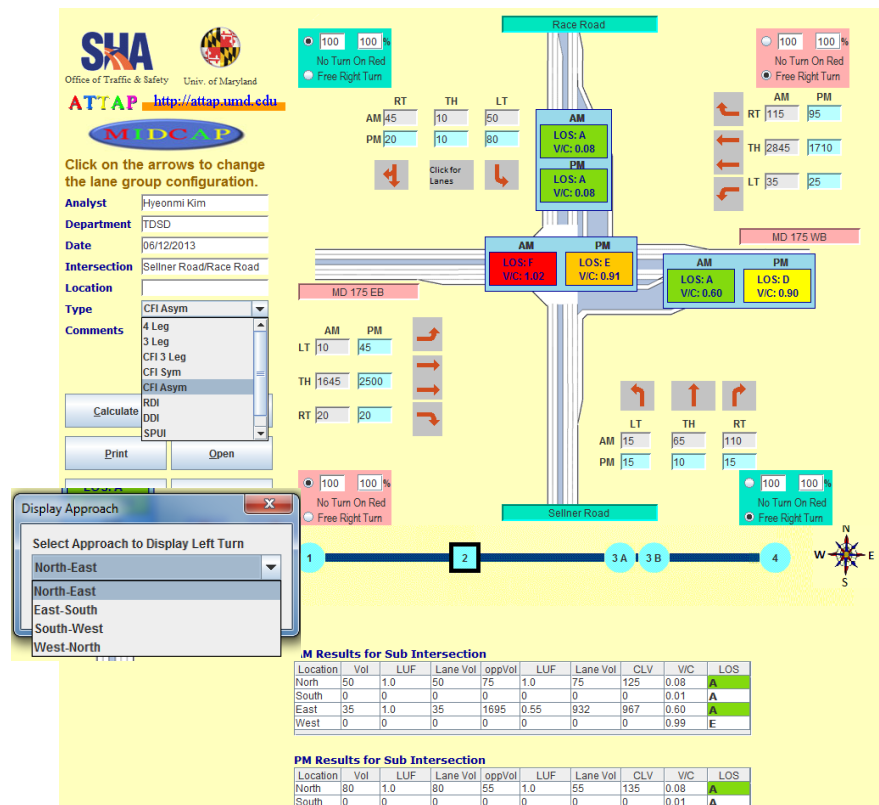




# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ❖ Different intersection and interchange designs

- Asymmetric CFI
- CFI-T

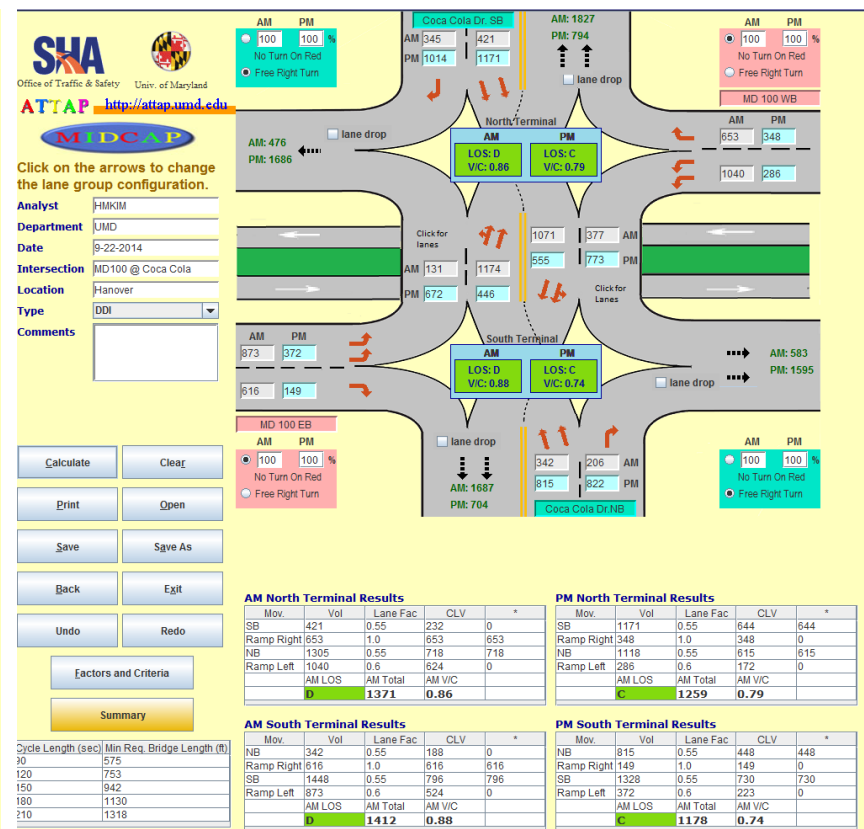
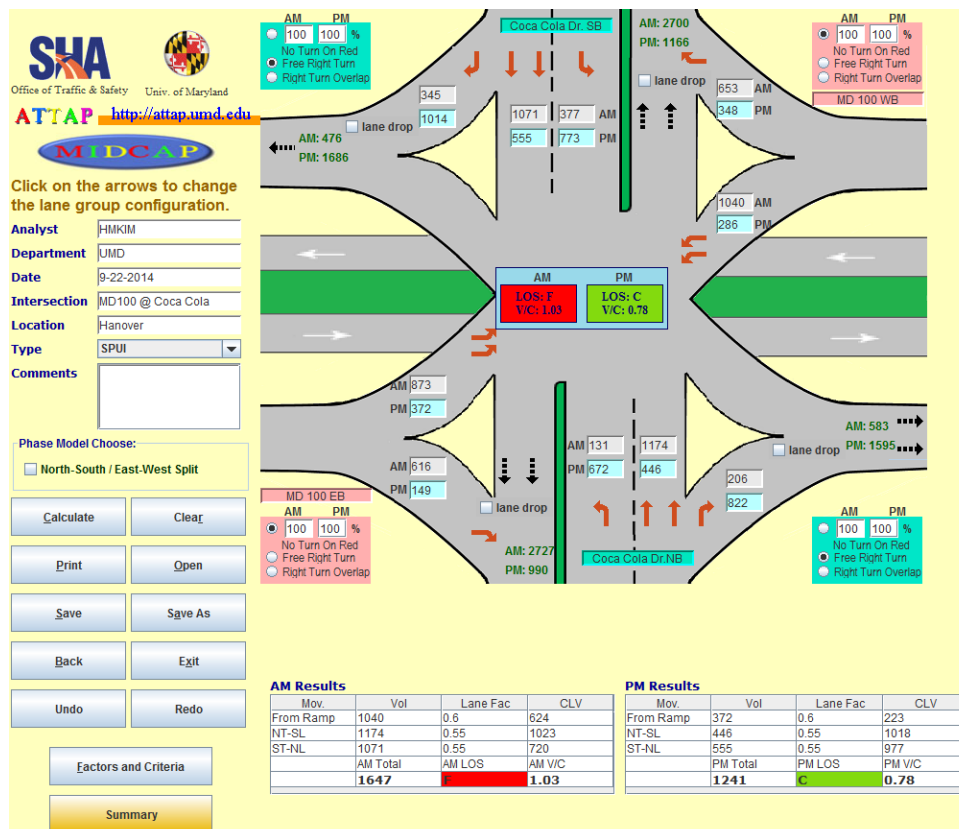


# MODULE 1: CAPACITY AND QUEUE ANALYSIS

## ❖ Different intersection and interchange designs

### ■ SPUI

### ■ DDI



# MODULE 2: SIGNAL WARRANT

- ✱ Uses the Maryland Manual on Uniform Traffic Control Devices (MUTCD) 2011 edition
- ✱ Investigates the need for a traffic control signal by analyzing related factors such as traffic conditions and physical characteristics of the location
- ✱ Provides whether the following traffic signal warrant is satisfied at a particular location or not
  - Warrant 1. Eight-Hour Vehicular Volume
  - Warrant 2. Four-Hour Vehicular Volume
  - Warrant 3. Peak Hour
  - Warrant 9. Intersection Near a Grade Crossing

# MODULE 2: SIGNAL WARRANT

## ✿ User-friendly Interface

- Import a turning movement report from Internet Traffic Monitoring System (I-TMS) as input

1

Load Traffic volume data

2

Set Location-specific Characteristics

3

Click Calculate button

The screenshot displays the MIDCAP software interface. On the left is a form for inputting traffic data, and on the right is a large table showing the resulting volume data.

**Form Fields:**

- Date: 05/19/2011
- Location: MD 355 at Nicholson La
- Major Street: MD 355
- Num. of Approach Lane: 2 or more
- 85th Percentile Speed: above 40 mph
- Direction: North-South
- Minor Street: Nicholson Lane
- Num. of Approach Lane: 1

**Buttons:** Calculate, Switch, Save, Load, Redo, Undo, Back, Exit, Clear, Print.

**Table Data:**

Volume	MD 355																Nicholson Lane															
	From North								From South								From East								From West							
Start	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	ALL											
5:00																																
5:15																																
5:30																																
5:45																																
6:00	16	216	12	244	4	133	38	175	49	49	15	113	5	22	11	38	570															
6:15	15	216	9	240	4	130	36	170	48	46	14	108	5	19	10	34	552															
6:30	15	216	9	240	4	130	36	170	48	46	14	108	5	19	10	34	552															
6:45	15	216	9	240	4	130	36	170	48	46	14	108	5	19	10	34	552															
7:00	32	334	30	396	15	231	90	336	104	123	22	249	11	123	20	154	1135															
7:15	30	331	29	390	14	229	90	333	104	120	20	244	9	123	17	149	1116															
7:30	30	331	29	390	14	229	90	333	104	120	20	244	9	123	17	149	1116															
7:45	30	331	29	390	14	229	90	333	104	120	20	244	9	123	17	149	1116															
8:00	35	416	24	475	15	253	69	337	131	151	21	303	20	67	23	110	1225															
8:15	32	416	22	470	15	253	67	335	128	150	18	296	20	66	20	106	1207															
8:30	32	416	22	470	15	253	67	335	128	150	18	296	20	66	20	106	1207															
8:45	32	416	22	470	15	253	67	335	128	150	18	296	20	66	20	106	1207															
9:00	61	385	41	487	15	294	73	382	107	100	30	237	25	96	28	149	1255															
9:15	58	383	40	481	15	294	72	381	104	99	27	230	25	93	28	146	1238															
9:30	58	383	40	481	15	294	72	381	104	99	27	230	25	93	28	146	1238															
9:45	58	383	40	481	15	294	72	381	104	99	27	230	25	93	28	146	1238															
10:00	67	302	31	400	19	292	102	413	88	82	41	211	26	121	27	174	1198															
10:15	64	301	30	395	16	290	99	405	86	81	40	207	26	120	26	172	1179															
10:30	64	301	30	395	16	290	99	405	86	81	40	207	26	120	26	172	1179															
10:45	64	301	30	395	16	290	99	405	86	81	40	207	26	120	26	172	1179															
11:00	67	333	27	427	17	277	113	407	79	85	42	206	34	96	33	163	1203															
11:15	67	331	26	424	16	276	113	405	77	85	41	203	34	95	30	159	1191															
11:30	67	331	26	424	16	276	113	405	77	85	41	203	34	95	30	159	1191															
11:45	67	331	26	424	16	276	113	405	77	85	41	203	34	95	30	159	1191															
12:00	103	371	26	500	19	347	97	463	104	90	64	258	24	104	25	163	1374															
12:15	100	370	25	495	18	347	97	462	104	90	61	255	24	104	24	162	1364															
12:30	100	370	25	495	18	347	97	462	104	90	61	255	24	104	24	162	1364															
12:45	100	370	25	495	18	347	97	462	104	90	61	255	24	104	24	162	1364															
13:00	109	392	51	552	14	326	128	468	110	90	67	267	33	107	31	171	1458															
13:15	106	390	48	544	13	323	127	463	109	87	65	261	32	104	31	167	1435															
13:30	106	390	48	544	13	323	127	463	109	87	65	261	32	104	31	167	1435															
13:45	106	390	48	544	13	323	127	463	109	87	65	261	32	104	31	167	1435															
14:00	64	290	36	390	18	314	75	407	96	114	61	271	23	59	17	99	1167															
14:15	63	290	34	387	15	311	73	399	94	112	60	266	21	59	15	95	1147															
14:30	63	290	34	387	15	311	73	399	94	112	60	266	21	59	15	95	1147															
14:45	63	290	34	387	15	311	73	399	94	112	60	266	21	59	15	95	1147															
15:00	61	434	41	556	18	354	122	494	116	95	54	265	32	123	37	192	1507															

# MODULE 2: SIGNAL WARRANT

## User-friendly Interface

### ■ Evaluation results for Warrant 1

Volume	Bus & Truck	Evaluation	W1A	W1B	W2	W3	W9A	W9B
--------	-------------	------------	-----	-----	----	----	-----	-----

**MUTCD SIGNAL WARRANT 1: EIGHT-HOUR VEHICULAR VOLUME**

**Table 4c-1. Warrant, Eight-Hour Vehicular Volume**

Number of lanes for moving traffic on each approach      Vehicles per hour on major street      Vehicles per hour on higher-volume minor-street approach (one-direction)

**Condition A - Minimum Vehicular Volume**

Major Street	Minor Street	100%	80%	70%	56%
1	1	500	400	350	280
2 or more	1	600	480	<b>420</b>	<b>336</b>
2 or more	2 or more	600	480	420	336
1	2 or more	500	400	350	280

**Condition B - Interruption of Continuous Traffic**

Major Street	Minor Street	100%	80%	70%	56%
1	1	750	600	525	420
2 or more	1	900	720	630	504
2 or more	2 or more	900	720	630	504
1	2 or more	750	600	525	420

**Evaluation for Condition A**

Evaluation of Condition A with the 70% columns (420, 105)      Evaluation of Condition A with the 56% columns (336, 84)

Hour	End	Major Volume	Minor Volume	Warrant
5:00	6:00			
6:00	7:00	1649	437	yes
7:00	8:00	2901	981	yes
8:00	9:00	3227	1191	yes
9:00	10:00	3455	927	yes
10:00	11:00	3213	832	yes
11:00	12:00	3321	815	yes
12:00	13:00	3834	1023	yes
13:00	14:00	4041	1050	yes
14:00	15:00	3155	1069	yes
15:00	16:00	4173	1048	yes
16:00	17:00	5204	1432	yes
17:00	18:00	4098	1234	yes
18:00	19:00	3499	2101	yes
19:00	20:00	44	0	no

Condition A is met

Volume	Bus & Truck	Evaluation	W1A	W1B	W2	W3	W9A	W9B
--------	-------------	------------	-----	-----	----	----	-----	-----

**MUTCD SIGNAL WARRANT 1: EIGHT-HOUR VEHICULAR VOLUME**

**Table 4c-1. Warrant, Eight-Hour Vehicular Volume**

Number of lanes for moving traffic on each approach      Vehicles per hour on major street      Vehicles per hour on higher-volume minor-street approach (one direction)

**Condition A - Minimum Vehicular Volume**

Major Street	Minor Street	100%	80%	70%	56%
1	1	500	400	350	280
2 or more	1	600	480	420	336
2 or more	2 or more	600	480	420	336
1	2 or more	500	400	350	280

**Condition B - Interruption of Continuous Traffic**

Major Street	Minor Street	100%	80%	70%	56%
1	1	750	600	525	420
2 or more	1	900	720	<b>630</b>	<b>504</b>
2 or more	2 or more	900	720	630	504
1	2 or more	750	600	525	420

**Evaluation for Condition B**

Evaluation of Condition B with the 70% columns (630, 53)      Evaluation of Condition B with the 55% columns (504, 42)

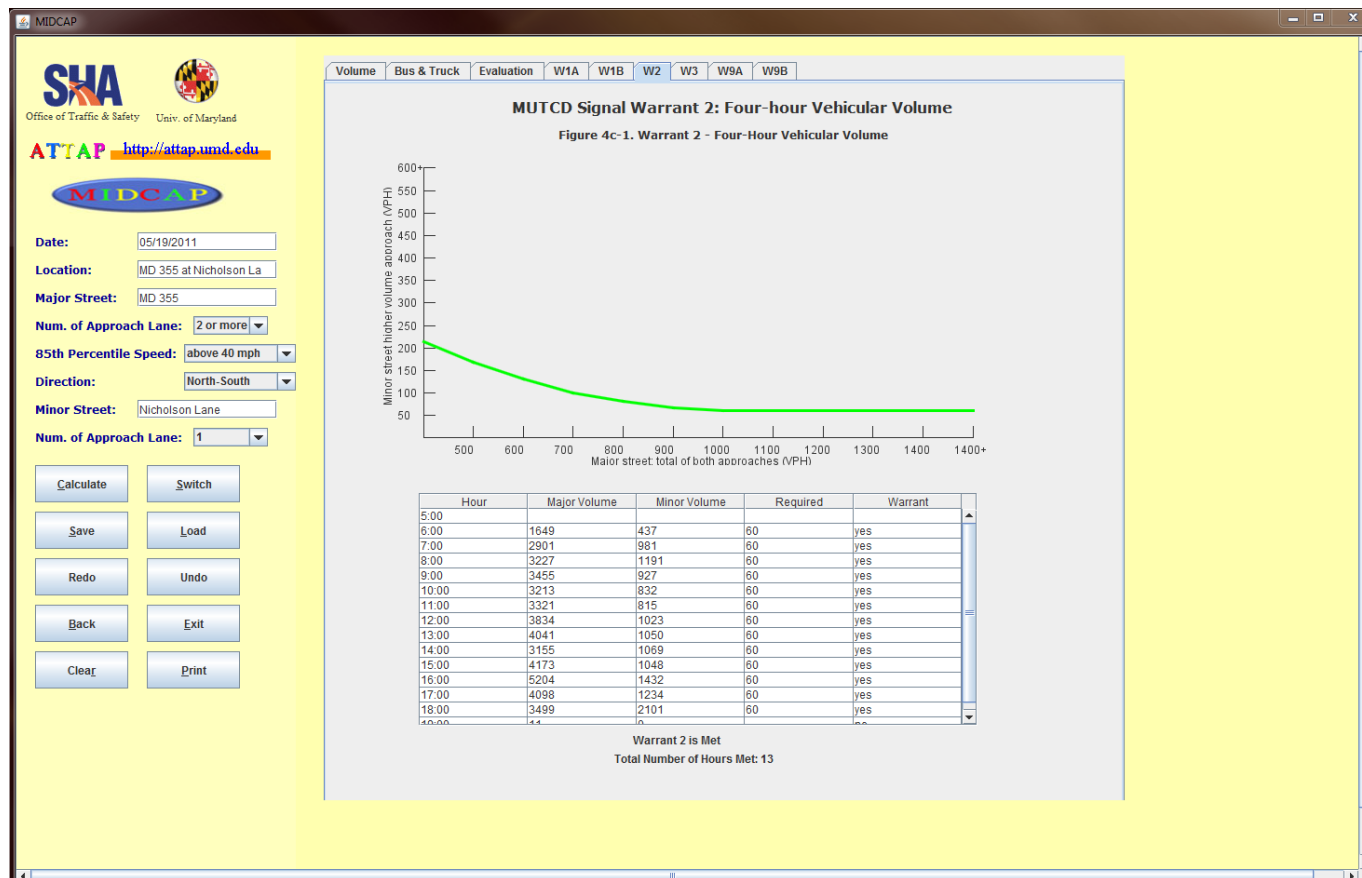
Hour	End	Major Volume	Minor Volume	Warrant
5:00	6:00			
6:00	7:00	1649	437	yes
7:00	8:00	2901	981	yes
8:00	9:00	3227	1191	yes
9:00	10:00	3455	927	yes
10:00	11:00	3213	832	yes
11:00	12:00	3321	815	yes
12:00	13:00	3834	1023	yes
13:00	14:00	4041	1050	yes
14:00	15:00	3155	1069	yes
15:00	16:00	4173	1048	yes
16:00	17:00	5204	1432	yes
17:00	18:00	4098	1234	yes
18:00	19:00	3499	2101	yes
19:00	20:00	44	0	no

Condition B is met

# MODULE 2: SIGNAL WARRANT

## ✿ User-friendly Interface

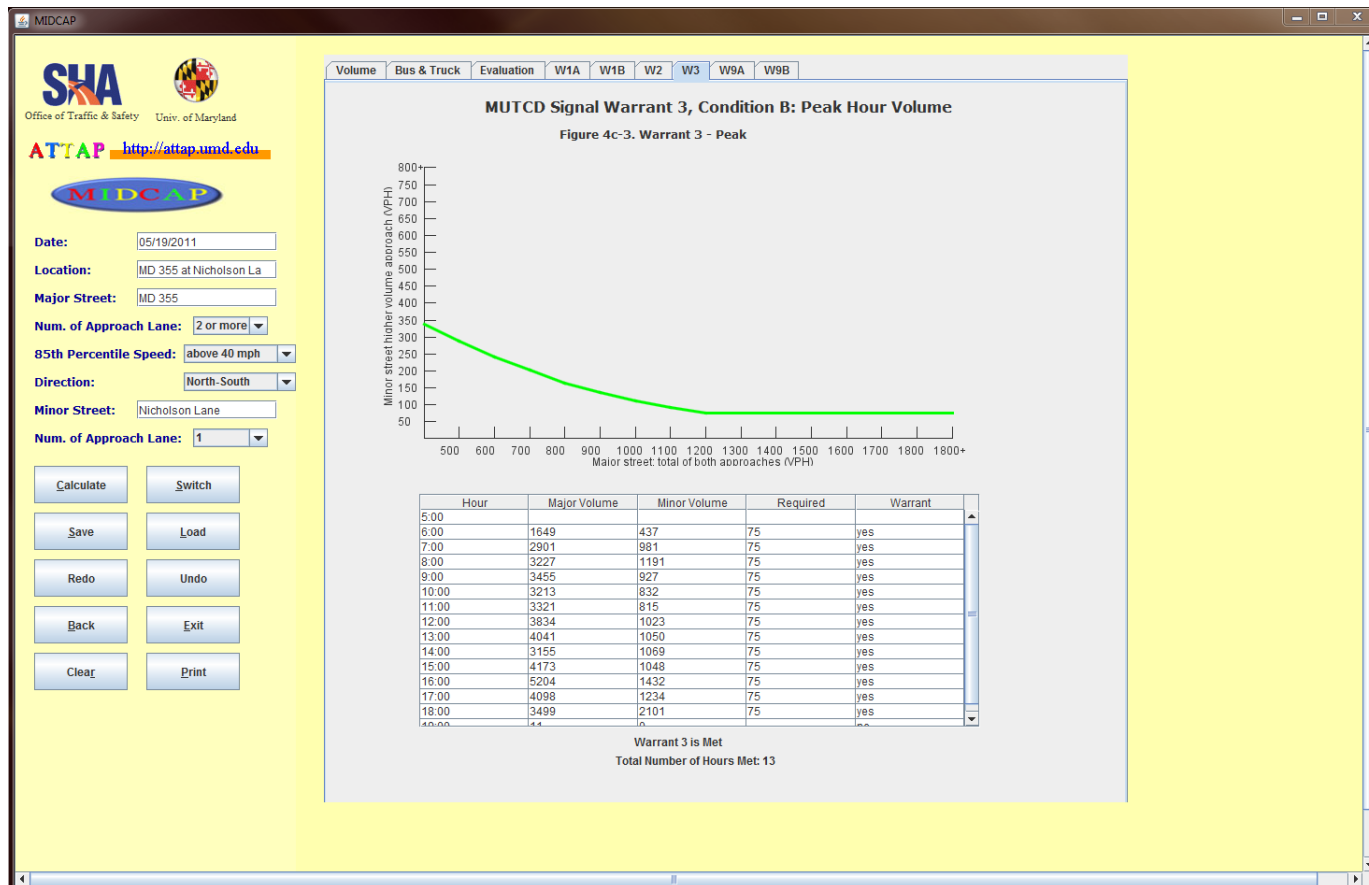
### ■ Evaluation results for Warrant 2



# MODULE 2: SIGNAL WARRANT

## ✿ User-friendly Interface

### ■ Evaluation results for Warrant 3



# MODULE 2: SIGNAL WARRANT

## ❖ User-friendly Interface

### ■ Evaluation results for Warrant 9

Volume Bus & Truck Evaluation W1A W1B W2 W3 W9A W9B

### Warrant 9, Intersection Near a Grade Crossing

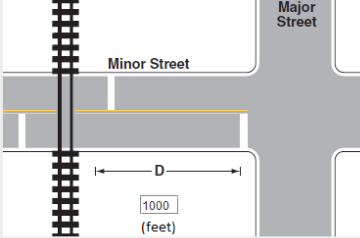


Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

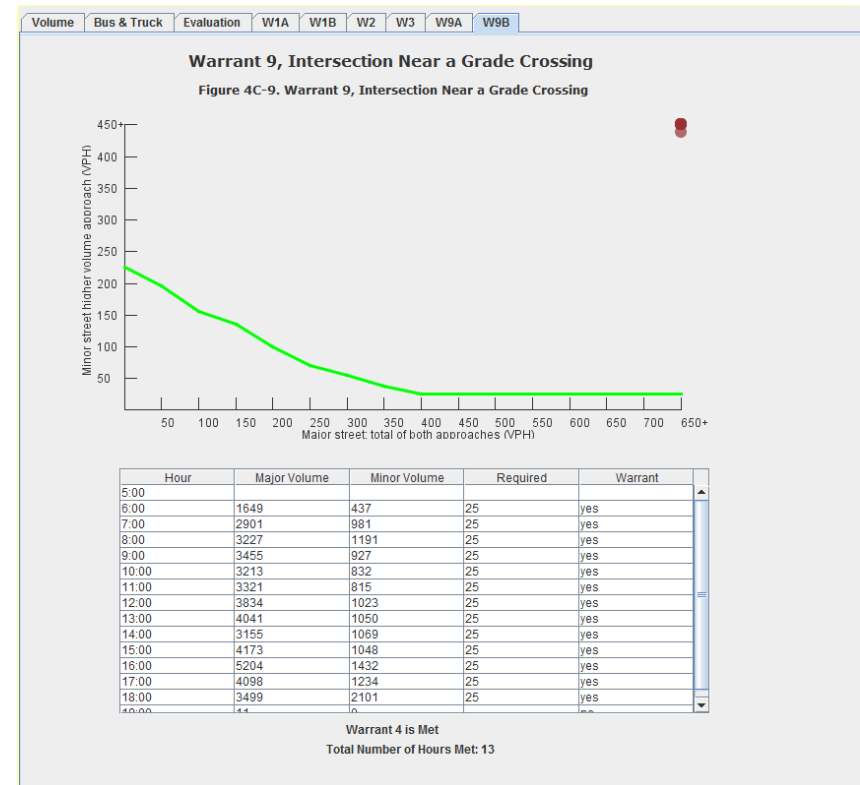
Rail Traffic/Day	Adjustment Factor	Selected
1	0.67	<input type="checkbox"/>
2	0.91	<input type="checkbox"/>
3 to 5	1.00	<input checked="" type="checkbox"/>
6 to 8	1.18	<input type="checkbox"/>
9 to 11	1.25	<input type="checkbox"/>
12 or more	1.33	<input type="checkbox"/>

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of high occupancy buses on Minor-Street	Adjustment Factor	Selected
0%	1.00	<input checked="" type="checkbox"/>
2%	1.09	<input type="checkbox"/>
4%	1.19	<input type="checkbox"/>
6% or more	1.32	<input type="checkbox"/>

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer T.	D less than 70 feet	D of 70 feet or more	Selected
0% to 2.5%	0.05	0.05	<input type="checkbox"/>
2.6% to 7.5%	0.75	0.75	<input type="checkbox"/>
7.6% to 12.5%	1.00	1.00	<input checked="" type="checkbox"/>
12.6% to 17.5%	2.30	1.15	<input type="checkbox"/>
17.6% to 22.5%	2.70	1.35	<input type="checkbox"/>
22.6% to 27.5%	3.28	1.64	<input type="checkbox"/>
More than 27.5%	4.18	2.09	<input type="checkbox"/>





# MODULE 3: SHOULDER BYPASS LANES(SBLs)

- ✱ Using the MDSHA's application and design guidelines for shoulder bypass lanes (SBLs)
- ✱ Investigates the need for shoulder bypass lanes and left-turn lanes by analyzing related factors such as traffic conditions and physical characteristics of the location
- ✱ Provides whether the following shoulder bypass lane warrant is satisfied at a particular location or not
  - Warrant 1. Vehicular Volumes
  - Warrant 2. Stopping Sight Distance
  - Warrant 3. Accident History

# MODULE 3: SHOULDER BYPASS LANES(SBLs)

## ✳ User-friendly Interface

1

Input Traffic volume data

2

Set Location-specific Characteristics

3

Click Calculate button

**SHA**  
Office of Traffic & Safety Univ. of Maryland  
**ATTAP** <http://attap.umd.edu>  
**MIDCAP**

Analyst:   
Department:   
Date:   
Intersection:   
Location:   
Major Street:   
Minor Street:   
Comments:

**Shoulder Bypass Lane**

**Hourly Lane Volume**

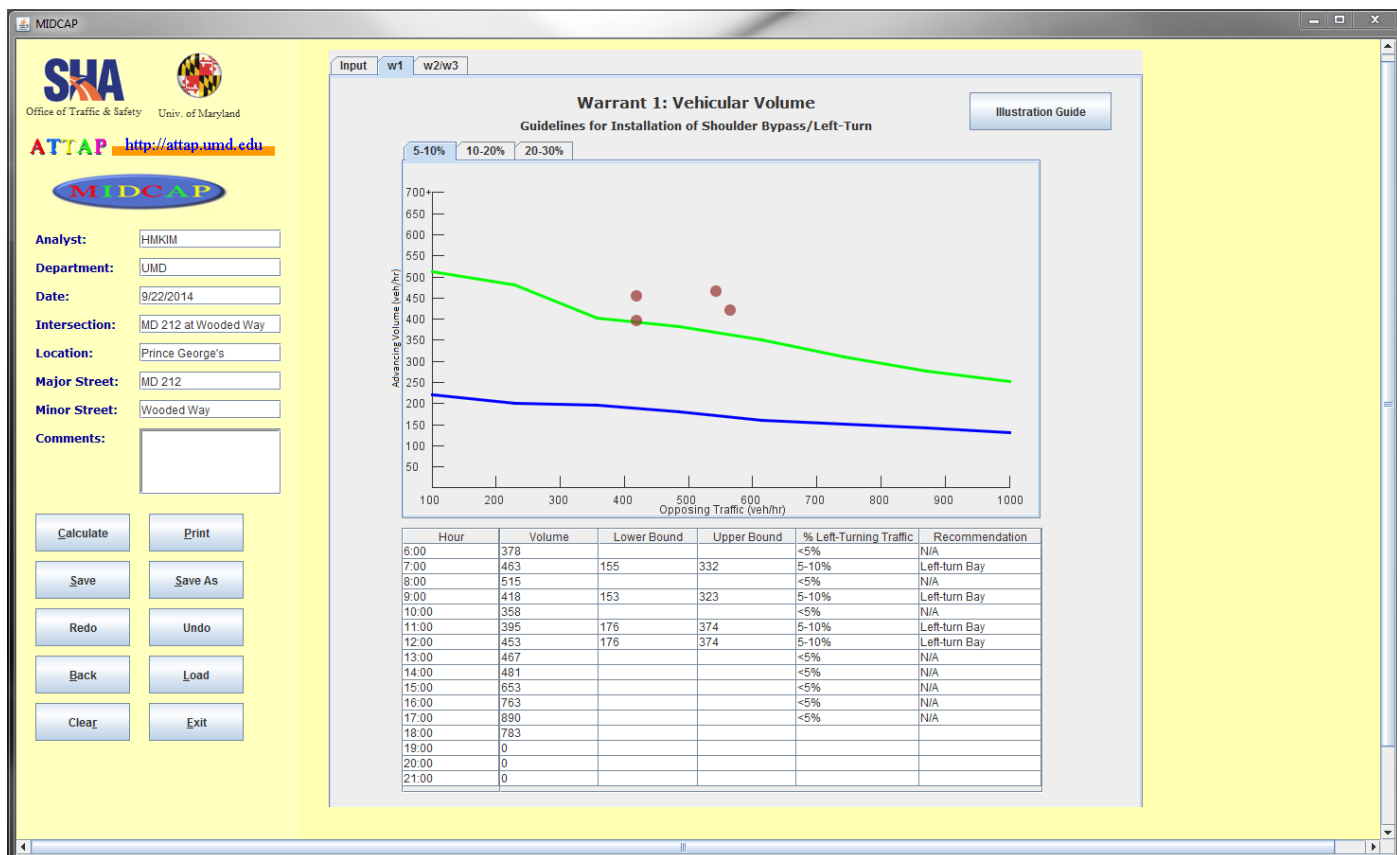
Hour	Left	Through	Opposing
6:00	13	365	404
7:00	26	437	544
8:00	22	493	633
9:00	24	394	566
10:00	15	343	418
11:00	25	370	420
12:00	28	425	419
13:00	22	445	428
14:00	17	464	499
15:00	10	643	534
16:00	24	739	709
17:00	31	859	950
18:00	29	754	868
19:00			
20:00			
21:00			

Speed Limit:  mph  
Through Movement Sight Distance:  ft  
Accident History:  in 12 months  
(Rear-end & Left Turn Accidents):  in 24 months

# MODULE 3: SHOULDER BYPASS LANES(SBLs)

## ✿ User-friendly Interface

### ■ Evaluation results for Warrant 1



# MODULE 3: SHOULDER BYPASS LANES(SBLs)

## ✿ User-friendly Interface

- Evaluation results for Warrant 2 and Warrant 3

The screenshot displays the MIDCAP software interface, which is used for evaluating traffic warrants. The interface is divided into a left sidebar for input and a main area for results.

**Left Sidebar (Input):**

- Logos: SHA (Office of Traffic & Safety, Univ. of Maryland), ATTAP (<http://attap.umd.edu>), and MIDCAP.
- Fields:
  - Analyst: HMKIM
  - Department: UMD
  - Date: 9/22/2014
  - Intersection: MD 212 at Wooded Way
  - Location: Prince George's
  - Major Street: MD 212
  - Minor Street: Wooded Way
  - Comments: (empty text box)
- Buttons: Calculate, Print, Save, Save As, Redo, Undo, Back, Load, Clear, Exit.

**Main Area (Results):**

- Warrant 2: Stopping Sight Distance
  - 3-1 AASHTO Guideline

Speed (mph)	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Required Sight Distance (ft)	80	115	155	200	250	305	360	425	495	570	645	730	820	910

  - Speed: 35 mph   Required Sight Distance: 250 ft   Sight Distance: 200 ft   Warrant: Yes
- Warrant 3: Accident History
  - ☐ accidents in the last 12 months >= 4
  - ☐ accidents in the last 24 months >= 6
  - Warrant: No
- Summary
  - Warrant 1: No
  - Warrant 2: Yes
  - Warrant 3: No
- Design Guideline (button)