

b. ITS/511

In order to convey information to motorists, numerous ITS devices are strategically positioned throughout the State. These ITS devices combined for CHART and MDTA include:

- 800+ CCTV Cameras which include video feeds from other agencies.
- 300+ Speed Detectors (including those shared through public/private partnerships).
- 200+ Dynamic Message Signs (DMS).
- 60+ Roadway Weather Information Systems (RWIS).
- 50+ Traveler Advisory Radios.
- 15+ Variable Toll Rate Signs



Providing clear and easy to understand information to motorists allows them to make better decisions to reduce congestion and increase mobility. Travel time information is made available based on the analysis of INRIX probe data on more than 200 DMS. The Maryland 511 Travel Information System continues to provide useful, high-quality, timely, and comprehensive travel information. Each year the personnel at CHART evaluate the system and based on funding availability expand the system or introduce new features.

2. SIGNAL OPERATIONS

Arterial corridor operations are greatly influenced by the traffic flow at signalized intersections. One of the most cost effective ways to improve mobility is to reduce delay at those locations by optimizing traffic signals to provide

better progression. These projects provide improved safety and increased person throughput on arterial corridors, by retiming of signals to be more responsive to traffic flows, thereby reducing delay to motorists and decreasing automobile emissions. In addition, signal retiming can be used to provide a more walkable environment. The benefit cost ratio of improving signal timings ranges up to 40:1 on a nationwide basis as a result improving travel time, reducing the number of vehicles stopped, and fuel consumed.

MDOT/SHA operates the majority of traffic signals in Maryland. There are more than 1,556 coordinated signals in 255 signal systems. This is an increase of five signal systems over the last year. The process of upgrading signal timing includes gathering new traffic volume data, performing traffic modeling, developing adjustments to the timing patterns, and conducting travel time analysis to evaluate the before and after results and performing final iterations to the signal timings. A total of 340 signals were reviewed and 260 signals were proposed to be retimed in calendar year 2015. These signals are part of 43 signal systems and new timings were implemented on 31 systems. The 31 systems



MD 45

was the most ever installed in one year. One of the major emphasis areas of the signal system optimization program projects is to increase the rate of traffic signal timing modifications that were installed in the controllers at the intersections after the analysis was completed. New signal timings were implemented in 61% of the controllers. The signal systems that were reviewed are shown on the following map and table.

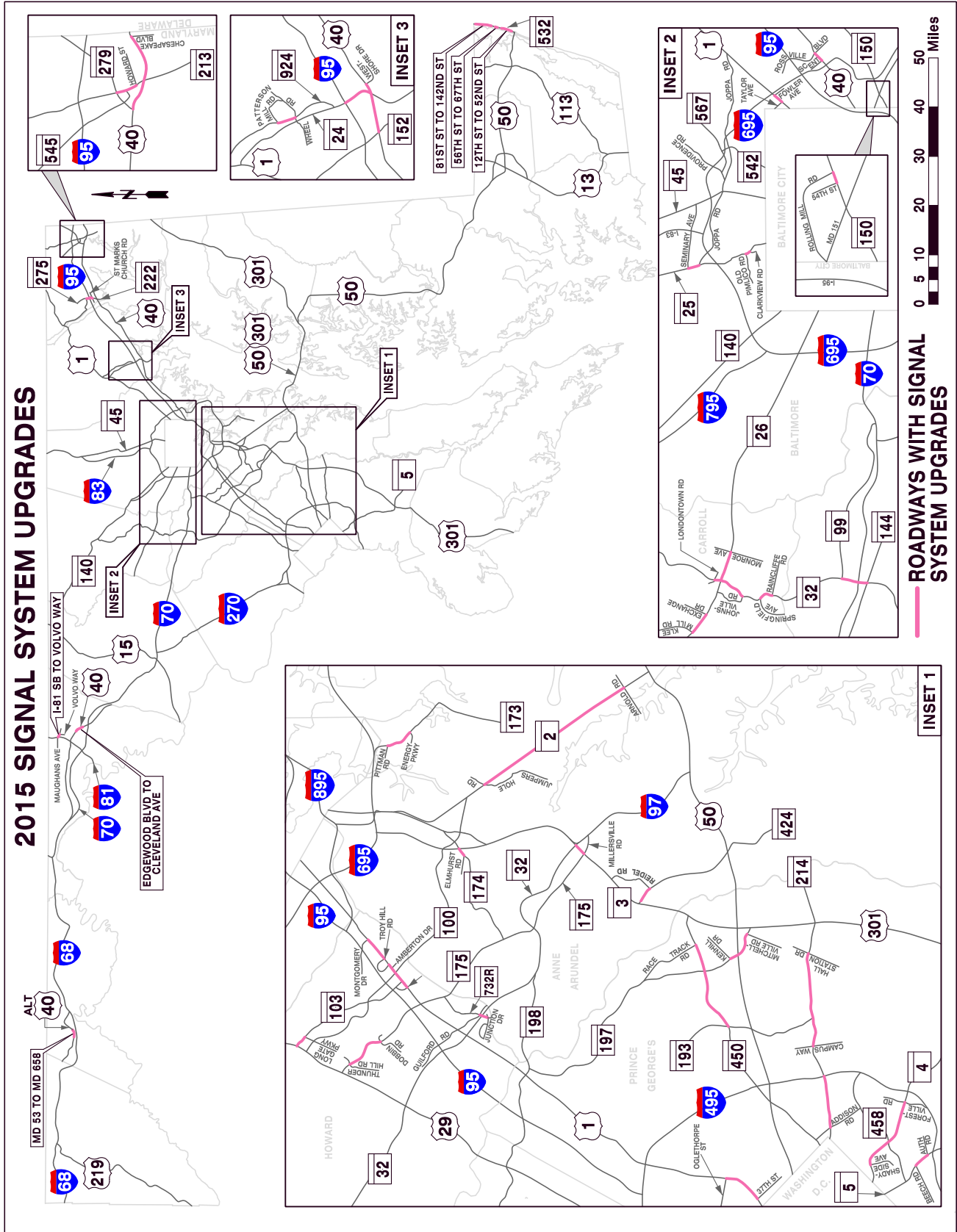
The highest benefits associated with any signal system upgrade from a number of vehicle hours of delay are as follows:

- MD 2 - Arnold Rd to Jumpers Hole Rd
- MD 26 - Johnsville Rd to Monroe Ave and MD 32 Londontown Blvd to Jonesville Rd (one system)
- MD 25 - Joppa Rd to Seminary Ave

All of these locations provide a reduction of more than 50,000 vehicles hours of delay annually. From a percentage standpoint, the following systems provided more than a 20% reduction in delay:

- Maugans Rd - I-81 SB Ramp to Volvo Way
- MD 732 R (Dorsey Run Rd) - Junction Dr to Guilford Rd
- MD 25 - Joppa Rd to Seminary Ave

Overall, signal retiming and optimization modifications provided an estimated reduction of 789,000 hours of delay for motorists and saved nearly 248,000 gallons of gasoline. The fuel, delay and emissions saved resulted in a total annual user cost savings of approximately \$29.3 million.



2015 NETWORK DELAY SAVINGS FOR SIGNAL SYSTEM UPGRADES

LOCATION	NO. OF SIGNALS	NETWORK DELAY SAVINGS (VEH- HRS)
MD 2 - Arnold Rd. to Jumpers Hole Rd.	14	121,000
MD 26 and MD 32 -Eldersburg (2 systems)	11	81,000
MD 25 - Joppa Rd. to Seminary Ave.	3	54,000
MD 214 - Campus Way to Hall Station Dr.	7	50,000
MD 732R Dorsey Run - Junction Dr to Guilford Rd	4	48,000
MD 214 - Addison Rd. to I-95 Ramp	9	46,000
MD 4 and MD 458(2 systems)	16	45,000
Maugans Rd - I-81 SB Ramp to Volvo Way	4	42,000
MD 24 - US 40 to I-95 Ramp	4	36,000
US 1 - Business Pkwy to Montgomery Rd (2 systems)	10	35,000
MD 424 - Martha Greenleaf Dr. to Reidel Rd.	3	30,000
MD 3/MD 175 Millersville	2	27,000
US 40 - Edgewood Dr. to Cleveland Ave.	5	26,000
MD 175 - Thunder Hill Rd. to Dobbin Rd.	3	25,000
MD 103 - US 29 Ramp to Long Gate Pkwy	4	21,000
US 40 - MD 279 to Chesapeake SC	9	21,000
MD 5 - Auth Rd. to Metro Entrance(2 systems)	17	14,000
US 1- Oglethorpe St. to 37th St.	11	14,000
MD 150 - 54th St. to Rolling Mill Rd.	2	9,000
MD 32 - MD 144 to MD 99	4	9,000
US 40 - Mall Ent. to Ebenezer Rd. (2 systems)	6	8,000
MD 197 - Kenhill Dr. to Mitchellville Rd.	6	7,000
MD 174 - I-97 to Elmhurst Rd.	5	7,000
MD 32 - Raincliffe Rd. to Springfield Ave.	2	7,000
US 40 - MD 152 to West Shore	7	4,000
US 40Alt - Lavale MD 53, MD 658	11	4,000
MD 26 - Klee Mill Rd.	3	3,000
MD 222 - St Marks Church Rd. to MD 275	5	3,000
MD 213 - Howard St. to MD 545	5	2,000
MD 25 - Old Pimlico Rd. to Clarkview Rd.	2	1,000
MD 924 - Patterson Mill Rd. to Wheel Rd.	4	1,000
MD 173 - Pitman Rd. to Energy Pkwy.	4	1,000
US 1 - Taylor Ave. to Fowler Ave.	4	0
Ocean City (3 systems)	42	-12,000
MD 567 - MD 542 to Cowpens Ave.	2	N/A
MD 450 - MD 193 to Race Track Rd.	17	N/A
TOTAL	267	790,000

A major effort in calendar year 2015 related to beginning the implementation of Centrac and adaptive signal system operations that allows for timings to be adjusted to conditions. The first corridor selected was along US 1 in Howard County which was implemented in October. The next corridor for implementation will be at 13 intersections on MD 24 in Harford County in 2016.

Another program is a joint state/county effort to implement transit signal priority. The first project is in Montgomery County on MD 355. A joint state/county policy and criteria for location identification has been developed, and corridors have been screened to determine the most beneficial locations for potential implementation. Future deployment remains unfunded at this time. Initial deployment will be focused on MD 355 between Lakeforest Mall and the Medical Center Metro Station as part of a new limited stop “Ride On Plus” transit service to be launched in Fall of 2017.

3. MULTI-MODAL

a. Park and Ride

The MDOT has created and maintains a system of park and ride lots throughout the State. These lots reduce single occupant vehicles and encourage transit use and ride-sharing. SHA partners with the Maryland Transit Administration and local transit agencies to encourage transit connections to the lots. The mutually beneficial relationship increases transit trips and reduces congestion. The lots operated by SHA and MDTA include 104 locations in 20 counties providing a total of 13,342 spaces. The number of spaces at the park and ride lots range from less than 15 spaces to more than 800 spaces. The two largest lots are MD 5 in the Waldorf area of Charles County and MD 665 at Riva Road in the Annapolis area of Anne Arundel County. The success of the program has justified funds to be allocated to expand



the opportunities to utilize the lots. In 2015, 213 new spaces were constructed at the US 50/301 at MD 424 lot in Anne Arundel County and the number of spaces doubled at the I-70/MD 75 lot from 50 to 100. Also, a new lot opened last year at I-81/MD 68 in Williamsport of Washington County with nearly 50 spaces. It is estimated SHA and MDTA park and ride lot facilities result in a 107 million VMT reduction annually, a savings of approximately \$58 million in annual user costs. Other minor adjustments occurred in the number of spaces in the network.

The following map shows the location of all the Park and Ride lots operated by SHA and MDTA in Maryland.