

The Metropolitan Planning Organization for the Baltimore Region

TRAFFIC SIGNAL SUBCOMMITTEE

Thursday, May 19, 2022

MINUTES

1. WELCOME AND INTRODUCTIONS

Mr. Bala Akundi (BMC) welcomed everyone, followed by a round of introductions.

2. REVIEW OF PREVIOUS MEETING NOTES

Mr. Akundi went over the minutes from the previous meeting on August 26, 2021. The minutes were approved without any modifications.

3. SIGNAL TIMING FOR VISION ZERO IN MONTGOMERY COUNTY

Mr. Kamal Hamud, Manager, Transportation Systems Engineering, provided an overview of Vision Zero policies and guidelines related to signal operations. Montgomery County is one of the first county governments in the United States to initiate a Vision Zero plan. The County has put resources in place to eliminate serious and fatal collisions on County roads for vehicle occupants (drivers and passengers), pedestrians, and bicyclists by the end of 2030. Mr. Hamud outlined several high-risk corridors where signal improvement countermeasures such as eliminating E/P left turns, implementing lead pedestrian intervals (LPI), installing backplates and checking clearance intervals were recommended. The county also installed 18 pedestrian hybrid beacons (PHB) and 12 rectangular rapid flashing beacons (RRFB). An additional 10 PHB's are under design.

[PowerPoint: Montgomery County Vision Zero Signal Improvements]

4. SIGNAL TIMING FOR PEDESTRIANS AND BICYCLISTS: HIGHLIGHTS FROM NCHRP REPORT 969

Dr. Burak Cesme, Kittelson & Associates, briefed the committee on new performance measures for pedestrians and cyclists based on the <u>NCHRP Research Report 969</u>. Traffic signal timing is traditionally developed to minimize vehicle delay at signalized intersections. This often results in degraded safety and mobility for pedestrians and bicyclists. This research developed new performance measures for pedestrians and cyclists and a toolbox of treatments at signalized intersections to improve pedestrian and bicyclist experiences by elevating safety considerations, reducing their delay, and enhancing accessibility.

★ 1500 Whetstone Way, Suite 300, Baltimore, MD, 21230 ★ Phone 410-732-0500 ★ www.baltometro.org

Voting: City of Annapolis, Anne Arundel County, Baltimore City, Baltimore County, Carroll County, Harford County, Howard County, Queen Anne's County, MD Department of Transportation and Annapolis Transit. Non-Voting: MD Department of the Environment, MD Department of Planning, and MD Transit Administration.

It describes 2 performance measures and 28 unique treatments to make intersections friendlier for pedestrians and cyclists.

Pedestrian Delay: While pedestrian delay is an easy-to-calculate metric (especially when crossings are not two-stage) and should be one of the primary objectives in intersection design, it is often ignored. Not reporting pedestrian delay, if computed, can lead to situations where average intersection vehicle delay is as low as 20 seconds while average pedestrian delay is as high as 80 seconds (e.g., for actuated pedestrian crosswalks crossing a mainline).

High pedestrian delays also create an environment with increased safety challenges. The Highway Capacity Manual (HCM) 2000 indicates that when average pedestrian delay is larger than 60 seconds, a very high likelihood of non-compliance is anticipated. As a result, NCHRP Research Report 969 advises considering pedestrian delay as part of an intersection analysis along with vehicle delay (and average bicycle delay can be approximated by the pedestrian delay where bicycles follow a pedestrian phase). The simple action of reporting pedestrian delay raises the practitioner's awareness of intersection performance and as a result, can identify opportunities to improve the condition.

Lowest Pedestrian Speed Accommodated: Another metric included in this report is the lowest pedestrian speed accommodated for a given crosswalk. According to the Manual on Uniform Traffic Control Devices (MUTCD), a walking speed of 3.5 feet per second should be used to calculate pedestrian clearance time for pedestrians who begin crossing up to the last moment of the Walk interval. However, research that studied walking speed distribution among different age groups showed that about 8 percent of adults 60 and younger and 26 percent of adults older than 60 years old walk slower than 3.5 feet per second.

Intersection timing should meet the needs of most users by accommodating lower pedestrian speeds, thereby increasing intersection accessibility. To help agencies during signal timing development and incentivize timing plans that can accommodate lower walking speeds, NCHRP Research Report 969 provides methods to calculate lowest pedestrian speed accommodated at a signalized intersection as a way of quantifying accessibility.

[PowerPoint: Traffic Signal Strategies for Pedestrians and Bicyclists – NCHRP Report 969]

5. INRIX 2021 US SIGNALS SCORECARD

The INRIX 2021 U.S. Signals Scorecard expands upon the initial <u>U.S. Signals Scorecard</u>, the first and only systemic nationwide analysis of individual traffic signal performance. Mr. Rick Schuman, Vice President, INRIX, provided an overview, with a specific focus on Maryland and the Baltimore region. The report includes extensive analysis and performance metrics at the state and MPO level. It includes summaries such as the picture below.

				Arrival		Total		
		Est Vehicle	Observed	on	Delay/	Delay/	CO ₂ from	Oil from
	Signals	Crossings/	Crossings/	Green	Vehicle	Signal	Delay	Delay
MPO	Analyzed	Signal	Signal	(%)	(Sec)	(Hours)	(Tonnes)	(Barrels)
SCAG (Los Angeles)	17,226	23,001	617	60.5%	20.0	127.7	7,030	18,311
NYMTC (New York)	15,191	11,513	347	62.3%	23.1	74.0	3,593	9,357
CMAP (Chicago)	7,961	21,529	979	61.6%	18.2	108.7	2,766	7,205
MTC (San Francisco Bay Area)	7,290	14,808	332	59.9%	20.0	82.5	1,922	5,006
NCTCOG (Dallas/Ft. Worth)	5,986	19,962	971	61.4%	19.6	108.7	2,081	5,420
NJTPA (Northern New Jersey)	5,912	17,905	532	60.5%	18.9	93.8	1,773	4,618
DVRPC (Philadelphia)	5,577	17,599	586	59.7%	19.0	92.9	1,656	4,314
HGAC (Houston)	5,339	19,935	962	60.1%	21.3	118.1	2,016	5,250
SEMCOG (Detroit)	5,105	19,284	1,491	67.7%	15.2	81.4	1,329	3,462
NCR TPB (Washington, DC)	4,913	22,090	520	63.9%	19.5	119.6	1,878	4,893
MAG (Phoenix)	4,099	28,465	955	63.2%	18.5	146.0	1,913	4,983
DRCOG (Denver)	3,824	20,484	537	68.0%	15.9	90.5	1,106	2,881
PSRC (Seattle)	3,479	17,410	341	61.1%	19.7	95.1	1,057	2,754
ARC (Atlanta)	3,316	29,554	898	64.0%	21.0	172.6	1,830	4,767
Boston Region MPO	3,200	17,085	405	56.6%	22.2	105.5	1,080	2,812
Miami-Dade MPO	2,876	30,253	1,153	61.3%	24.9	209.2	1,924	5,011
SANDAG (San Diego)	2,755	18,539	450	59.6%	20.0	102.9	906	2,360
OKI RCOG (Cincinnati)	2,716	18,177	743	66.6%	16.0	80.9	702	1,830
Metropolitan Council (Twin Cities)	2,692	13,739	598	66.3%	14.9	56.7	488	1,271
Baltimore RTB	2,687	19,605	586	62.0%	19.9	108.3	931	2,424
EWCGOC (St. Louis)	2,318	21,933	1,005	68.6%	15.3	93.4	692	1,802
SPC (Pittsburgh)	2,242	14,912	708	62.4%	18.5	76.5	548	1,428
NOACA (Cleveland)	2,131	15,594	759	62.8%	16.8	72.6	495	1,288
PACTS (Portland, OR)	2,050	15,362	289	64.1%	17.3	73.7	483	1,257
MARC (Kansas City)	1,992	17,971	626	63.4%	15.5	77.5	493	1,285

Average Daily VOLUME

Coservations / Signal

US Average 701.

Scaled Cross-restin Unrel 106 Scored Occurrent/Signel 21,200

Weekin PERFORMANCE

Seconds Delay / Venicle: USAWSaje 183 Bink 14

an march Green A35h R5 Rig 62.8h, Early 291 Houseful av/Spin/010 1116/me 131

Salt trow FTS

Curribertand Area MPD

Celvert - Rt Mary's MPC

Netional Capital Region 195 Hagerstoon-Gastelle Familiandia MPO Salisbury-Witcomice MPC

Withington Asta Planning Council

TYPICSI TRIP

11 Time Stopped at Signals 10S Average 8.4% Travit: 7

Testal Trace Trem 38.4 mins [45: Aug 17.0; modd 5] Signals/Treasted &2105 mg 427, ratio 61

Terral Signin Doney: E.97 mins (US Avg 1,47c rank: 4)

1600 2006

394

336,799

258,625

13,316

10,455

7.045

2710

5.74

104.019

\$50,550

21556

27,541 18,240

7,069

15,465

Counties Listed by Signal Count												
-	10-1005	A.C.	al.	000	000	4-10	Here !!					
the second		1000	126	0.00	119	125 817	228.926					
Nontapolery	-	25.0	12%	100	10%	111 214	111.124					
azzinole	100	18.7	tth	123	2276	88.951	241.000					
PEACE BROUGH'S	- 847	18.5	-	148	20%	15,251	DALDET					
Arrig Arundal	367	19.0	28	123	1170	55.142	151,456					
rowert	228	17.6	LOW	105	34%	27,371	71.19					
An danck	156	20.5	128	102	75	12012	51.629					
Harford	1875	180	48	1.55	-011	15,004	67,729					
Washington -	155	18.7	12%	84	10	12.116	51,356					
Widtheaster:	127	81	-158	-51	-48%	7.401	19.355					

MPOs Listed by Signal Count

2.687 19.9

1,585

-

22

94 142

4

214 104

-264

194 7% 167 126

197

40

40 -374

171 3% 31 8% 174 -19 100 -129

18.5 179 111 .79

The methodologi lised to generate results show his iterated in Appendix A of the Scorecard
Results based on patient system of December 13-18, 2021
The gradinal expension of December 14, 2021
The gradinalexpension of December 14, 2021
The gradinal expension of Dece

© 2022 INRIX, Inc.

Notes:

INRIX U.S. Signals Scorecard - April 2022 Update



[PDF: INRIX Signal Scorecard April update]

Traffic Signal Subcommittee May 19, 2022 Page 4 of 4

Mr. Ben Myrick, MDOT-SHA, provided a state/regional perspective on the report card. For the most part, the Maryland signal metrics track closely to the national numbers – 19,900 to 21,277 vehicles per intersection, 63.6% average arrival on green to 62.8%, 17.6 sec delay per vehicle to 19.0, etc. Mr. Myrick compared Maryland signal performance to Massachusetts (similar population, geographic area) and they too are fairly close (5001 signals in MD to 4,884 in MA, 63.5% arrival on green in MD to 57.4% in MA etc.). In other metrics, delay per vehicle increased from 2020 – from 17.6 seconds to 19.0 (US 16.9 sec to 18.3 secs). Midday has as much volume and delay as AM peak. The analysis also showed Saturdays as being very busy and the need to do more with signal timing on weekends.

Mr. Myrick made some general observations in conclusion – Baltimore City has the highest delay but performance is not bad compared to other cities. Harford and Frederick counties also seem to be having some performance issues. He suggested doing more timing reviews – especially with post-COVID changes and more focus on mid-day and Saturday.

[PowerPoint: BMC Maryland Signal Report]

ATTENDANCE:

Amy Lopez, INRIX Andrew Burke, MWCOG Bala Akundi, Baltimore Metropolitan Council (BMC) Bailey Lozner, Kittelson & Associates Ben Myrick, MDOT SHA Bo Zhou, Anne Arundel County DPW **Breck Jeffers, FHWA** Edward Myers, Kittelson & Associates Eileen Singleton, BMC Hiwot Habtemariam, MDOT SHA Kamal Hamud, Montgomery County DOT Keith Riniker, Mead & Hunt Kristen Haas, STV Kristoffer Nebre, Baltimore County DPW&T Mike Massaro, INRIX Minseok Kim, MDOT SHA **Rick Schuman, INRIX** Robert Evans, Wallace, Montgomery & Associates Roger Hale, TST Seth Young, STV Tina Fink, Toole Design Vivek Hariharan, RS&H