IMAGINE MEMORIAL

A planning partnership with Councilwoman Natalyn Archibong,
Atlanta residents, and Georgia Tech's School of City and Regional Planning

DRAFT
2/12/15

Roadway – Speed and Traffic

Suggested topics for comment:

Given the data presented in the study, and subject to radar certification, what are your thoughts on a 35mph speed limit vs. a 25 mph speed limit?

What are your thoughts about reversible lanes in general? What are your thoughts about the reversible lanes specifically on Memorial Drive?

Would support converting the reversible lane into a dedicated turn lane

Do you have any thoughts about traffic on Memorial Drive that were not included in the study?

VI. ROADWAY AND INTERSECTION DESIGN

Scope

The state of Memorial Drive itself is dynamic. Spanning two counties, several communities and ranging in activity from the state Capitol to hundreds of single-family house driveways a few miles down the road, there are many considerations in mobility, safety and community.

To enhance the efficiency of Memorial Drive as a public good, the diverse corridor was reimagined with observation, public comment, and best practices of alternative design methods. The corresponding study is largely organized by key intersections, representing both transitions and access points. Three topics will be considered at each: reversible lanes, the "speed section" and roundabouts.

Reversible Lanes

Users repeatedly expressed safety concerns about reversible-lane configurations where the middle lane runs west during the morning peak and east during the remainder of the day. The corridor also changes between standard lanes and reversible lanes six times. The range of viewpoints at several public meetings showed that residents wanted Memorial Drive to keep its arterial function, yet increase the safety for pedestrians, cyclist and vehicles alike. Several alternative approaches were considered in an effort to satisfy both demands.

Because of Memorial Drive's arterial function, reversible lanes actually serve the corridor well, despite concerns about safety. In effect, they double capacity during peak hours without the need to acquire additional right-of-way (ROW). For this reason, the reversible lane could be an advantage to the surrounding businesses and neighborhoods if safety is addressed. Currently, there are several dangerous transitions from standard lanes to reversible lanes and insufficient signage and markers for drivers. If reversible lanes are made more consistent along the length of the corridor, travel will be more predictable and safer. Advances with in-road lighting and signage are now available. With a more consistent configuration and enhanced indication, driver comprehension will be increased and the functional advantages of reversible lanes can be utilized without constant fear of safety along the route. Specifics of the proposed changes to lane configurations will be detailed later with the intersections and roadway segment proposals. The final proposed configuration along the corridor can be compared with the current configuration along the corridor in Figures 2 and 3.

One possible enhancement of directional indication are supplementary surface level indicators that work in conjunction with the in-place overhead indicators. In-ground indication has had maintenance and functionality concerns in past projects but can be currently obtained with warranties that last up to five years and provide clear communication of variable barriers.

Figure 8: In-road lighting
More reliable hardware for in-road lighting offers improved visibility in reversible lanes and crosswalks.

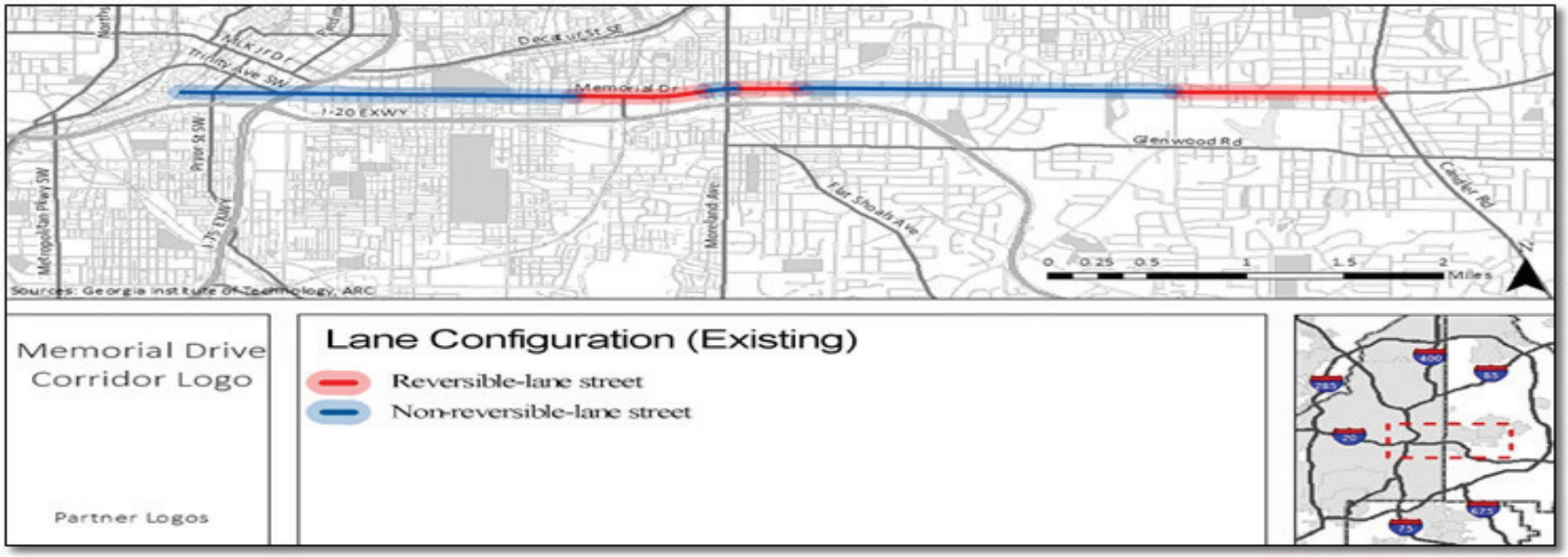

Figure 10: Color-coded map of existing lane configuration
*Some of the most dangerous portions of Memorial Drive are created by multiple, confusing transitions to and from reversible lanes. There are **five** of these transitions in the study area, each with inadequate signage and lines of sight.*

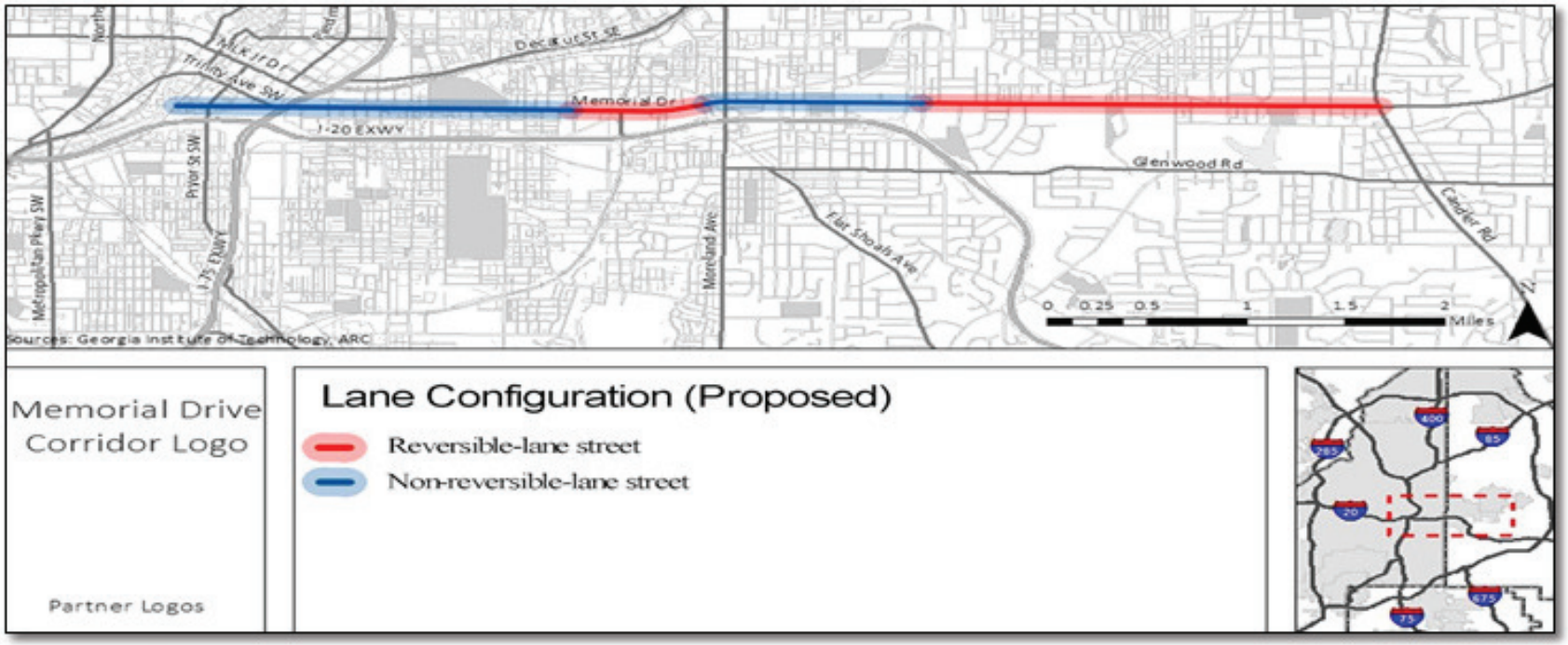

Figure 11: Color-coded map of proposed lane configuration
*There are some compelling reasons for keeping reversible lanes (see p. 37) if the transitions and signage are improved. This plan's proposed configuration would reduce these transitions to **three**.*

The "Speed Section"

One area in which the advantages of the reversible lane could be best used are between the 2nd Ave and Clifton intersections. The authors' observations and surrounding residents confirm that vehicles travel through here much faster than the posted speed limit, creating pedestrian safety concerns for the local YMCA and Drew Charter School. Within a short observation period, fewer than half of the vehicles were seen traveling within the posted speed limit and one-fifth were traveling faster than 50 mph. The cause of this can be attributed to several key factors, including access management, geometric design, and topography.

There are a total of two access points (driveways and entrances) along the south side of Memorial Drive from 2nd Ave westbound to Howard St, a distance of three quarters of a mile, whereas in the same distance east from 2nd Ave there are 26 access points. Although a high number of access points is not desirable on an arterial road, the contrast between this "speed section" and the dynamic along other sections of the corridor indicate a factor of speeding behavior. When drivers reach a segment of Memorial Drive where there are very few conflict points, they can drive fast and straight with little fear of conflict. The design and topography of this section also assist the 'fast and straight' condition as the roadway is horizontally linear with several dramatic changes in topography. With the speed gained on these hills and unimpeded straight direction, vehicles "naturally" speed up past the limit.

Combatting Speed with Policy

There are two proposals for combating this particularly unsafe segment of Memorial Drive. The first is to reduce the posted speed limit to 25 mph. The reduction of speed limits has been recently enacted in several areas throughout the country, most recently New York City, as a means to improve safety for all modes. Studies surrounding such policy changes have observed a higher throughput on congested roads with a lower speed limit. This principle was also cited in the argument for implementing the variable speed limit signs along I-285, reducing the posted limit during peak times to adjust the flow of traffic to a higher-capacity setting.

Two additional benefits of a reduced speed limit are pedestrian and vehicle safety. Studies show that the death rate more than doubles for pedestrians when speed increases from 25 to 35 mph. Figure 3 shows that a pedestrian hit by a car travelling 20 mph only has a 15% death rate, whereas that same collision with a car going 30 mph raises the death rate to 45%, and the number goes up significantly when the speed reaches 40 mph.

Figure 12: Chart of vehicle speeds and likelihood of fatal injury for pedestrians
Lower design speeds carry many benefits, but the most vital is reducing the likelihood that a pedestrian hit by a car will die. Source: UK Dept. of Transportation; NHTSA

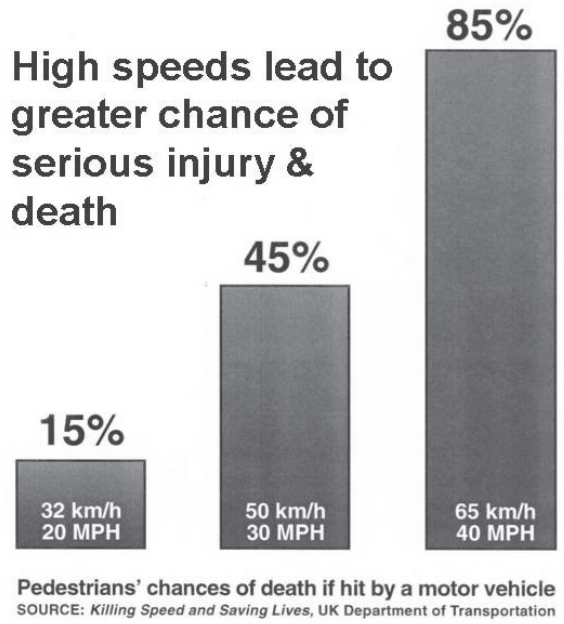

FIGURE 13: Projected changes at Memorial Drive/Boulevard intersection with speed limit change

Throughput

Current Speed Limit (35 mph)				
	Stops (vph)	Fuel Used (gal)	Dilemma Veh.	Delay (sec/veh)
Eastbound	191	4	5	43.5
Westbound	1,142	32	16	75.3
Northbound	1,000	34	24	58.4
Southbound	161	3	9	28.5

Proposed Speed Limit (25 mph)				
	Stops (vph)	Fuel Used (gal)	Dilemma Veh.	Delay (sec/veh)
Eastbound	172	3	0	31.4
Westbound	610	28	0	75.7
Northbound	1,098	35	0	64.8
Southbound	161	3	0	28.5

Projected Change				
	Stops (vph)	Fuel Used (gal)	Dilemma Veh.	Delay (sec/veh)
Eastbound	-19	-1	-5	-12
Westbound	-532	-4	-16	0
Northbound	98	1	-24	6
Southbound	0	0	-9	0
TOTAL CHANGE	**-453**	**-4**	**-54**	**-5**

Emissions (g/hr)

Current Speed Limit (35 mph)			
	CO	NOx	VOC
Eastbound	305	59	71
Westbound	2,231	434	517
Northbound	2,419	471	561
Southbound	253	49	58

Proposed Speed Limit (25 mph)			
	CO	NOx	VOC
Eastbound	219	43	51
Westbound	1,931	375	448
Northbound	2,445	475	567
Southbound	221	42	51

Projected Change			
	CO	NOx	VOC
Eastbound	-86	-16	-20
Westbound	-300	-59	-69
Northbound	26	4	6
Southbound	-32	-7	-7
TOTAL CHANGE	**-392**	**-78**	**-90**

Additionally, as a vehicle approaches an intersection that has just signaled a yellow light, the driver must make the decision to either stop or continue. At higher speeds, there is a space called the "dilemma zone," requiring the driver to make an uncomfortable hard stop or accelerate very quickly in order to obey the traffic signal. The existence of these zones produces a safety risk. The number of vehicles projected to be within the dilemma zone of an intersection is one of the outputs of a Synchro model predicting changes that could be expected with a 25-mph speed limit. Some of the results of this model are included in Table 1. Although this represents only a snapshot, it should be noted that reducing the speed limit also results in reductions in emissions and improves throughput.

Combatting Speed with Design

Another way to reduce unsafe speeds is through design measures. The primary proposal is to extend the reversible lane configuration that ends at 2nd Ave further westbound to the Clifton Street intersection. As mentioned previously, if transitions and visual elements are improved, reversible lanes hold a capacity power that is unique and beneficial. Besides reducing the needed right-of-way, the variable nature of the road encourages drivers to be more cautious. With the acquired space from subtracting a travel lane from the road, several traffic-calming measures can be implemented including those illustrated below:

- Bulb-outs at intersections to shorten crosswalk distances
- Midblock crosswalks and "neckdowns" with pedestrian signaling or signage
- Widened sidewalks
- Adding on-street parking where it can be useful
- Protective measures such as a fence line along the sidewalk for pedestrian safety
- Landscaping
- Enhanced lighting
- Adding horizontal curvature or 'wiggling' the roadwa

One of the design concerns with the present state of this speed section is that it is straight with few conflict points. By adding a slight horizontal curvature to the road, higher speeds become uncomfortable. Reducing the current four-lane road to a three lane reversible configuration will provide twelve feet of space to essentially 'wiggle' the path of the road slightly, as seen in Figure 6 so that only vehicles traveling significantly above the design speed of the road will feel any significant amount of discomfort.

Figure 15:
Illustration of design elements intended to reduce vehicle speed
Introducing new design elements like trees, bulb-outs, pedestrian crossings, and even on-street parking can have the combined effect of reducing how fast drivers can comfortably operate and creating a safer and more attractive environment for other users and adjacent businesses and residents.

Figure 16:
Illustration of proposed intersection design elements
Intersection bulb-outs reduce crosswalk distances for pedestrians, while reducing turning and straight-distance speeds of drivers.

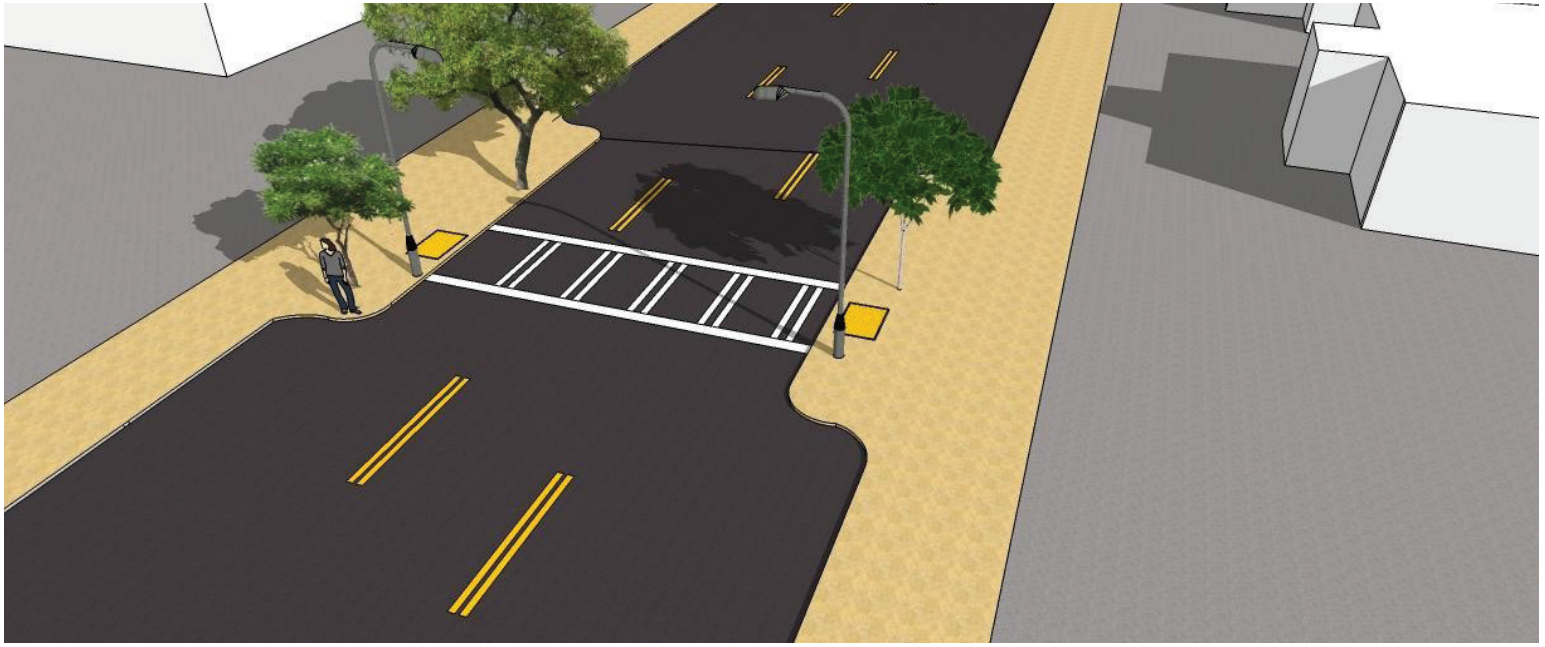

Figure 17:
Illustration of proposed pedestrian crossing between intersections
High-visibility pedestrian crosswalks with bulb-outs could be placed at key segments between intersections to enhance pedestrian connectivity.