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TECHNICAL MEMORANDUM

Date: May 31, 2018
To: Robert McHaney, AICP; Bryan Schmitz; Jim Webb, AICP
From: Roma Stevens, P.E., PTOE
Subject: Operational Analysis for Ford Road Improvements

Project Description

Montgomery County is proposing roadway improvements for the Ford Road segment between IH 69 Northbound Frontage Road and Mills Branch Drive. The proposed improvements include widening the segment from existing 2-lanes to 4 lanes for the project limits from Mills Branch Drive to IH 69 NB Frontage Road. An evaluation was conducted to assess the operational benefits of proposed improved for this project. This technical memorandum documents the results of this operational evaluation for proposed improvements.
Figure 1 shows the project corridor and study area limits.

Existing Configuration: In the existing condition, Ford road is two-way segment between IH 69 NB Frontage Road and Mills Drive Branch with one lane of travel in each direction and a left turn storage bay at the unsignalized intersection of Ricewood Drive.

Proposed Configuration: In the Build condition, Ford Road cross-section was assumed to be

- Two-way segment between IH 69 NB Frontage Road and Mills Drive Branch with two lanes of travel in each direction and a left turn storage bay at the unsignalized intersection of Ricewood Drive.
- At the intersection of Loop 494 with Ford Road, WB rightmost thru lane was treated as a right-only lane and only one lane was carried forward to IH 69 NB Frontage road which then becomes a right-only lane at the intersection of Ford Road with IH 69 NB frontage road.

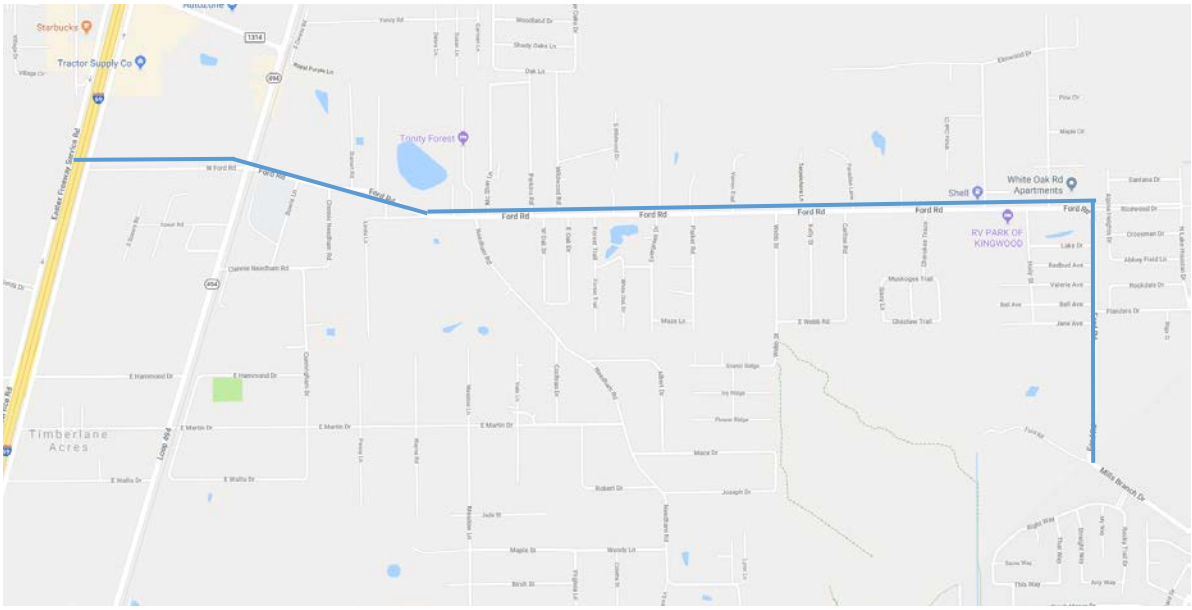

Figure 1. Project Area Showing Limits of Study Segment

Analysis Methodology

To evaluate the operational impacts of proposed geometric configuration, we utilized traffic analysis software Synchro 10.1. Traffic volumes data in the form of turning movement counts for this study area were collected for a typical weekday in mid May 2018.

Turning movement counts for signalized intersections in the study network were collected from 6:30 to 8:30 am and 4:30 to 6:30 pm for a typical weekday.

The analysis was completed for the Existing Condition (2018), No Build Condition (year 2025), Build Condition (Year 2025), No Build Condition (year 2040), and Build Condition (Year 2040) for the AM and PM peak hour. For the Future year 2025 analysis, a growth rate of 1.7% per annum was used to estimate traffic volumes in the study area. Similarly, a growth rate of 3.3% per annum was used for the future year 2040 analysis.

Analysis Results

Analysis results are presented in Table 1 thru 2 for the Intersection Delay and LOS for the AM and PM peak hours. Table 3 shows network delay and emissions results for AM and PM peak hours. Using analysis results for the AM and PM peak hours, daily delay was calculated proportionally using hourly volumes collected in the field along Ford Road in the study area. Daily delay was calculated for hours of 6 am to 9 am, and then from 3 pm to 7 pm, since traffic volumes at other times of the day are not that significant as such delay savings realized from using proposed new connection will not be significant for these hours. The daily values for network delay and emissions results are shown in Table 4.

Table 1 and 2 present delay/vehicle (seconds) at each intersection in the study area for AM and PM peak respectively.

Table 1. Intersection Delay (seconds/vehicle) for AM Peak Hour (7:15 to 8:15 am)

Intersection	No Build (2025)		Build (2025)		No Build (2040)		Build (2040)	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Ford Rd at IH 69 Rd	1.2	A	1.2	A	1.6	A	1.9	A
Ford Rd at Loop 494	22.7	C	16.7	B	61.0	E	49.7	D
Ford Rd at Needham Rd	2.6	A	1.0	A	29.9	D	1.8	A
Ford Rd at Ricewood Dr	1.3	A	0.9	A	12.0	B	1.3	A

Table 2. Intersection Delay (seconds/vehicle) for PM Peak Hour (5:00 to 6:00 pm)

Intersection	No Build (2025)		Build (2025)		No Build (2040)		Build (2040)	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Ford Rd at IH 69 Rd	2.8	A	2.4	A	61.4	F	8.6	A
Ford Rd at Loop 494	43.1	D	31.1	C	75.6	E	64.8	E
Ford Rd at Needham Rd	4.5	A	1.2	A	48.8	E	5.6	A
Ford Rd at Ricewood Dr	1.5	A	1.0	A	14.2	B	1.5	A

Table 3 presents the measures of effectiveness for the entire study network for the AM and PM peak hours while Table 4 presents the estimated daily measures of effectiveness for the entire study network.

Table 3. Network Measures of Effectiveness for AM and PM Peak Hour

MOE	No Build (2025)		Build (2025)		No Build (2040)		Build (2040)	
	AM	PM	AM	PM	AM	PM	AM	PM
Total Delay (Veh-hours)	33.9	96.1	17.6	35.4	340.0	519.5	121.4	176.0
Fuel Used (Gallons)	145.2	202.9	143.9	194.5	277.1	472.9	255.8	375.8
VOC Emissions (Kg)	3.6	5.1	3.6	4.8	6.9	11.8	6.4	9.4
NOx Emissions (Kg)	2.4	3.4	2.4	3.2	4.6	7.9	4.3	6.3
CO Emissions (kg)	32.9	46	32.6	44.1	62.8	107.1	58	85.1

Table 4. Network Measures of Effectiveness for a Typical Weekday*

MOE	No Build (2025)	Build (2025)	No Build (2040)	Build (2040)
Total Delay (Veh-Hours)	403.5	161.4	2573.4	887.4
Fuel Used (Gallons)	1036.2	1005	2261.4	1886.3
VOC Emissions (Kg)	25.8	25	56.4	47
NOx Emissions (Kg)	17.3	16.8	37.8	31.5
CO Emissions (kg)	234.8	227.7	512.3	427.4

*calculated proportionally using AM and PM Peak Hour Analysis Results for Other Hours of the Day.

Results Discussion

The results of the evaluation show significant operational benefits of adding a lane of travel in each direction for both the build year 2025 and future year 2040. The project will benefit even further from improving the intersection of Loop 494 with Ford Road especially SB approach of Loop 494.