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July 11, 2024

Mr. Tim Bryan, P.E.
County Engineer
Madison County Board of Supervisors
3137 S. Liberty Street
Canton, MS 39046

Re: MS Hwy 22 – Livingston Vernon Road/Stokes Road/Cedar Hill Road intersections

Dear Tim:

A *Traffic Analysis* was conducted to evaluate the potential for making improvements to the intersections along MS Hwy 22 at Cedar Hill Road, Livingston Vernon Road, and Stokes Road. Per our scope of services, I evaluated the 3 intersections along Hwy 22, conducted traffic counts, evaluated crash history, looked at some proposed area developments, and developed some geometric improvements and signing/striping alternatives. The location of the study corridor is shown in **Figure 1** – Vicinity Map. Figures referenced in this letter are provided as attachments.

Existing Conditions
Turning movement counts were collected on 5/9/24 for the four intersections including: 1) Livingston Vernon Rd/Stokes Rd, 2) Hwy 22/Livingston Vernon Rd, 3) Hwy 22/Stokes Rd, and 4) Hwy 22/Cedar Hill Rd. Twelve hour counts were conducted on Livingston Vernon Road at Stokes Road and at MS Hwy 22. Four hour counts were conducted on MS Hwy 22 at Stokes Road and Cedar Hill Road. The existing Year 2024 peak hour traffic volumes are shown in **Figure 2**.

MS Hwy 22 is primarily an east/west roadway connecting the cities of Canton and Flora. The posted speed limit is 55 mph through the study area, with curve warning signs with 45 mph advisory speeds. There are centerline and edge line raised pavement markers along MS Hwy 22 within the limits of the study area. The horizontal curves in Hwy 22 make the intersection angles for Cedar Hill Road $\pm$140 degrees and Livingston Vernon Road $\pm$148 degrees. This high angle intersection allows westbound traffic on MS Hwy 22 to basically continue north on Livingston Vernon Road without having to slow down to turn, thus increasing the speeds on Livingston Vernon Road between Hwy 22 and Stokes Road. The Stop line for southbound traffic on Livingston Vernon Road at MS Hwy 22 is basically at a 45 degree angle, instead of perpendicular to southbound traffic. The intersection angles are shown in **Figure 3**.

Above: Looking south at Hwy 22/ Livingston Vernon Road intersection.

Above: Looking north on Livingston Vernon Rd at MS Hwy 22 intersection. Stop line at 45 degree angle to traffic.
Below: Looking west on MS Hwy 22, just west of Livingston Vernon Road. Southern tree line limits sight distance.

Above: Looking southwest on MS Hwy 22 at Livingston Vernon Road intersection. Damascus Church on left.

Stokes Road extends east of the intersection with MS Hwy 22 west of Livingston Vernon Road as a 2-lane roadway with ±17 ft of asphalt. A residential structure exists on the north side of Stokes Road between MS Hwy 22 and Livingston Vernon Road. The horizontal curves in MS Hwy 22 limit the sight distance at the Stokes Road intersection, due to the trees/vegetation along the south side of MS Hwy 22.

Above: Looking west on MS Hwy 22 from Stokes Rd/Anderson Driveway.

Above: Looking east on MS Hwy 22 from Stokes Road
Below: Looking south from Stokes Road across MS Hwy 22 at Anderson driveway.

Above: Looking west on Stokes Road from MS Hwy 22.
Below: Looking north on Stokes Road at residential structure.

The intersection of Stokes Road with Livingston Vernon Road has an R1-1 "Stop" sign on south side of Stokes Road-for eastbound traffic, where the asphalt flares out to 88 ft of width, so the "Stop" sign is not in the direct line of sight.

Above: Looking east on Stokes Road at Livingston Vernon Road/Stop sign on right.
Below: Looking east on Stokes Road from Livingston Vernon Road. Closed gas station on right.

Stokes Road narrows to ±22 ft of asphalt east of Livingston Vernon Road and provides access to rural residential and agricultural properties over the ±10.3 miles east to Virlilia Road.

Livingston Vernon Road extends north of MS Hwy 22, crossing Stokes Road where the abandoned gas station is located in the southeast quadrant and the residential dwelling in the northwest quadrant. The posted speed limit is 40 mph on Livingston Vernon Road. The cross section includes ±20 ft of asphalt with open ditches for drainage.

Above: Looking north on Livingston Vernon Road north of Stokes Road.
Below: Looking south on Livingston Vernon Road at Stokes Road/abandoned gas station.

The southeast quadrant of the Livingston Vernon Road/Stokes Road intersection has an abandoned gas station. Some recent discussions have included building a new gas station or Dollar General in this area.

Above: Looking southeast at abandoned gas station on Livingston Vernon Road.

Cedar Hill Road has a posted speed limit of 35 mph and has ±21 ft of asphalt with open ditches for drainage. Cedar Hill Road intersects MS Hwy 22 at a high angle and is almost a direct extension of Livingston Vernon Road across MS Hwy 22. Northbound traffic on Cedar Hill Road has to rotate their head +140 degrees to identify traffic approaching from MS Hwy 22 from the east.

Above: Looking north on Cedar Hill Road at MS Hwy 22/Damascus Baptist Church.

Above: Looking east on MS Hwy 22 from Cedar Hill Road.

Livingston Vernon Road provides a direct connection to US Hwy 49, which is the primary route for traffic to bypass Flora and head to destinations to the north. US Hwy 49 also provides the only crossing of the Big Black River in the 40 mile stretch between I-20 in Edwards and MS Hwy 16 north of Canton. MS Hwy 22 also provides access to US Hwy 49 through the town of Flora; however, drivers must navigate through a school zone and the downtown Flora business district.

Crash Data

Historical crash data was obtained from MDOT for a 10 year crash history from 2014-2024. The crash data is summarized in **Tables 1a-e**. The most frequent crash type was with deer (12 crashes/25%), with Angle crashes and Rear end slow or stop crashes the second most frequent (10 crashes/21%). There were 31 people injured in the 48 total crashes, with Angle crashes having the most injuries (16 injured in 10 crashes) and Opposite Direction Sideswipe the second most injuries (8 injured in 5 crashes). The year with the most crashes was 2023 with 9 crashes. Fifty six percent of the crashes occurred in daylight conditions. Only 6% of the crashes involved alcohol.

Traffic Impacts

The intersection delays were evaluated using the information provided in the Highway Capacity Manual to evaluate the levels-of-service (LOS) for the study intersections. The LOS analysis included the existing -Year 2024 traffic. The intersections identified in this analysis include the adjacent intersections of MS Hwy 22/Cedar Hill Road, MS Hwy 22/Livingston Vernon Road, and Livingston Vernon Rd/Stokes Rd. The capacity analysis sheets are provided as an attachment to this letter/report. The capacity analysis results are summarized in **Table 2- Existing Traffic**.

MS Hwy 22/Livingston Vernon Rd-Stokes Rd-Cedar Hill Rd
Crash History - 2014-2024

Table 1a

Roadway	Crash Type										Total
	Angle	Deer	Fell from vehicle	Opposite Direction Sideswipe	Overturn	Rear end slow or stop	Rear end turn	Run off Road - Left	Run off Road - Right	Side swipe	
CEDAR HILL RD		1									1
LIVINGSTON VERNON RD	5										5
MS 22	5	11	1	5	1	10	1	2	5	1	42
Total	10	12	1	5	1	10	1	2	5	1	48
Percent	21%	25%	2%	10%	2%	21%	2%	4%	10%	2%	

Table 1b

Crash Type	Count of Injured Count							Injured Total
	0	1	2	3	4	5	6	
Angle	4	2	1	1	1	1		16
Deer	12							0
Fell from vehicle	1							0
Opposite Direction Sideswipe	3		1				1	8
Overturn			1					2
Rear end slow or stop	8	2						2
Rear end turn	1							0
Run off Road - Left		2						2
Run off Road - Right	4	1						1
Sideswipe	1							0
Total	34	7	6	3	4	5	6	31

Table 1c

Roadway	Year											Total
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
CEDAR HILL RD		1										1
LIVINGSTON VERNON RD		1		1	1					1	1	5
MS 22	8	3	4	2	2	3	3	3	5	8	1	42
Total	8	5	4	3	3	3	3	3	5	9	2	48

Table 1d

Roadway	Light Condition					Total
	Dark - lighted	Dark-not lighted	Dawn/ dusk	Daylight	Undefined	
CEDAR HILL RD		1				1
LIVINGSTON VERNON RD		1		4		5
MS 22	2	14	2	23	1	42
Total	2	16	2	27	1	48
Percent	4%	33%	4%	56%	2%	

Table 1e

Roadway	Alcohol Involved Crashes			Total
	Undefined	No	Yes	
CEDAR HILL RD		1		1
LIVINGSTON VERNON RD		4	1	5
MS 22	2	38	2	42
Total	2	43	3	48
Percent	4%	90%	6%	

Source: MDOT, Kiser Traffic and Engineering, LLC.

Table 2
Existing Traffic - Capacity Analysis Summary

Unsignalized Intersections	Time Period	Critical Movement Level of Service											
		Eastbound			Westbound			Northbound			Southbound		
		Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt
MS Hwy 22/ Livingston Ver.	AM Peak	A	-	-	-	-	A	-	-	-	B	-	B
	PM Peak	A	-	-	-	-	A	-	-	-	B	-	B
MS Hwy 22/ Cedar Hill Rd	AM Peak	-	-	A	A	-	-	B	-	B	-	-	-
	PM Peak	-	-	A	A	-	-	B	-	B	-	-	-

Source: Kiser Traffic and Engineering, 2024.

The existing traffic volumes are shown to be operating with minimal delays at the study intersections.

Recommendations
Additional signage with flashing caution lights was discussed as an option to geometric changes. The W2-10 "Traffic Entering When Flashing" and W2-11 "Traffic Approaching When Flashing" have liability issues in the event that the flashing lights burn out or malfunction; thus not alerting drivers of potential conflicts. The modified language that could be used for flashing warning signs could be changed to "Watch for Approaching Traffic" and "Watch for Entering Traffic." Discussions on these signs identify that maintenance can be problematic.

Reconstructing/realigning the existing high angle intersections of MS Hwy 22/Cedar Hill Road and MS Hwy 22/ Livingston Vernon Rd is recommended, concurrent with trimming/pruning/removing trees and other vegetation along the right-of-way lines that are restricting sight distance at these intersections. The intersection of MS Hwy 22/Stokes Road is recommended to be modified to cul-de-sac Stokes Road and remove this intersection. The posted speed limit through these reverse curves on MS Hwy 22 is recommended to be reduced to 45 mph. The realignment concepts and pruning areas are shown graphically in **Figure 5**.

If you have additional questions or comments regarding this analysis or these concepts, please let me know.

Sincerely,

Kiser Traffic and Engineering, LLC

Jonathan A. Kiser, P.E., PTOE, PTP
President

Attachments:

Figure 1 – Vicinity Map
Figure 2 – Year 2024 Existing Traffic
Figure 3 – Intersection Angles
Figure 4 – Alternate 1 – Signing Concept
Figure 5 – Alternate 2 – Reconstructing Intersections
Synchro Sheets
Plotted crash locations

MADISON COUNTY

Project Location

N.T.S.

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VICINITY MAP

FIGURE 1

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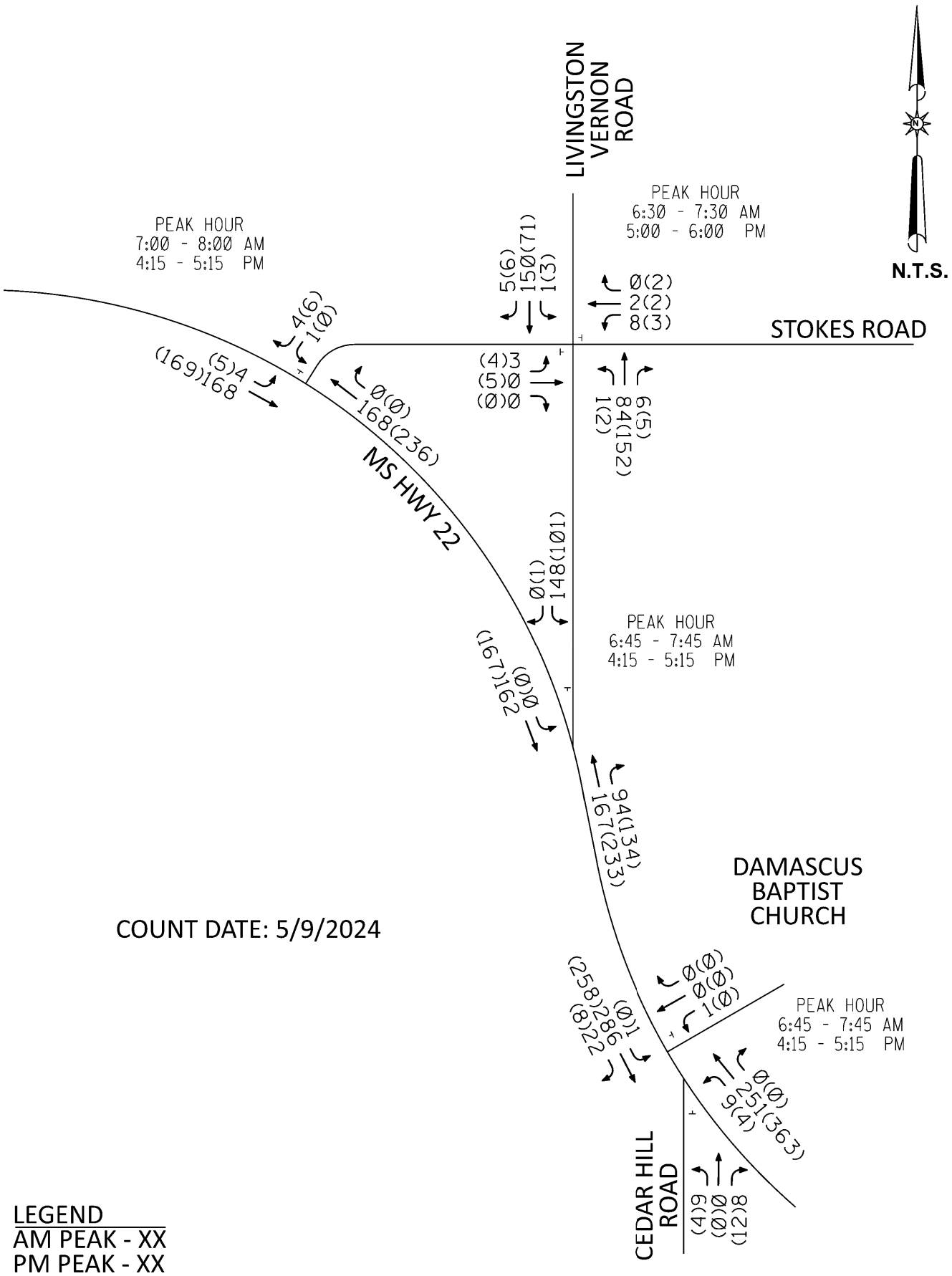

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YEAR 2024 EXISTING TRAFFIC

FIGURE 2

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TRAFFIC AND ENGINEERING

INTERSECTION ANGLES

FIGURE 3

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ALTERNATE 1 - SIGNING CONCEPT

FIGURE 4

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STOKES ROAD

LIVINGSTON VERNON ROAD

MS HWY 22

CEDAR HILL ROAD

DAMASCUS BAPTIST CHURCH

SPEED LIMIT 55

SPEED LIMIT 45

580'±

14.5'

610'±

490'±

14.5'

480'±

SPEED LIMIT 45

SPEED LIMIT 55

N.T.S.

NOTES:

1 CUL-DE-SAC STOKES ROAD AND ELIMINATE STOKES ROAD AND MS HWY 22 INTERSECTION.
2 REALIGN LIVINGSTON VERNON ROAD TO INTERSECT MS HWY 22 AT CLOSER TO A 90 DEGREE ANGLE ON THE OUTSIDE OF THE CURVE. REMOVE EXISTING ASPHALT / HIGH ANGLE INTERSECTION. CONSTRUCT WB RIGHT TURN LANE.
3 REALIGN CEDAR HILL ROAD TO INTERSECT MS HWY 22 AT CLOSER TO A 90 DEGREE ANGLE.
4 REDUCE POSTED SPEED LIMIT TO 45 MPH THROUGH THE REVERSE CURVES ON MS HWY 22.

PRUNE / TRIM / REMOVE EXISTING VEGETATION TO IMPROVE SIGHT DISTANCE

PAVEMENT REMOVAL

MAP SOURCE: GOOGLE MAPS

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ALTERNATE 2 - RECONSTRUCTING INTERSECTIONS

FIGURE 5

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	162	167	94	148	0
Future Vol, veh/h	0	162	167	94	148	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	176	182	102	161	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	284	0	-	0	409	233
Stage 1	-	-	-	-	233	-
Stage 2	-	-	-	-	176	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1278	-	-	-	599	806
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1278	-	-	-	599	806
Mov Cap-2 Maneuver	-	-	-	-	599	-
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	855	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1278	-	-	-	599
HCM Lane V/C Ratio	-	-	-	-	0.269
HCM Control Delay (s)	0	-	-	-	13.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	1.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	286	22	9	251	9	8
Future Vol, veh/h	286	22	9	251	9	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	311	24	10	273	10	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	335	0	616	323
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	293	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1224	-	454	718
Stage 1	-	-	-	-	734	-
Stage 2	-	-	-	-	757	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1224	-	449	718
Mov Cap-2 Maneuver	-	-	-	-	449	-
Stage 1	-	-	-	-	734	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	545	-	-	1224	-
HCM Lane V/C Ratio	0.034	-	-	0.008	-
HCM Control Delay (s)	11.8	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	167	233	134	101	0
Future Vol, veh/h	0	167	233	134	101	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	182	253	146	110	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	399	0	-	0	508	326
Stage 1	-	-	-	-	326	-
Stage 2	-	-	-	-	182	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1160	-	-	-	525	715
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1160	-	-	-	525	715
Mov Cap-2 Maneuver	-	-	-	-	525	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	849	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1160	-	-	-	525
HCM Lane V/C Ratio	-	-	-	-	0.209
HCM Control Delay (s)	0	-	-	-	13.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	258	8	4	363	4	12
Future Vol, veh/h	258	8	4	363	4	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	280	9	4	395	4	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	289	0	688	285
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	403	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1273	-	412	754
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	675	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1273	-	410	754
Mov Cap-2 Maneuver	-	-	-	-	410	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	672	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	623	-	-	1273	-
HCM Lane V/C Ratio	0.028	-	-	0.003	-
HCM Control Delay (s)	10.9	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-


Crash Data
2014-2024
Stokes Rd
Stokes Rd
Damascus Baptist Church
Cedar Hill Rd
22
22
22
22