



DESIGN MEMORANDUM

To: Kevin Schuette, Senior Project Manager (City of Wentzville, MO)
From: David J. Mennenga, P.E., PTOE
Date: April 8, 2019
Subject: Traffic Circulation Report – David Hoekel Parkway (Phase 2D)

As requested, George Butler Associates, Inc. (GBA) has completed the required traffic engineering evaluations to provide this Traffic Circulation Report (TCR) in conjunction with the conceptual designs for Phase 2D of the David Hoekel Parkway construction project. The primary purpose of this TCR was to determine the projected future traffic volumes for this segment of the study corridor between West Meyer Road and Goodfellow Road based upon currently available traffic data, and to confirm the ultimate recommended configuration for this parkway section. Finally, this study provides recommendations for the phased construction of this corridor segment and describes the lane configurations and intersection geometries that should be considered for initial implementation.

DESIGN TRAFFIC VOLUMES

Environmental Assessment Study: The “*Final Environmental Assessment*” (EA) study report previously prepared for the David Hoekel Parkway project determined that the ultimately proposed roadway cross-section would consist of four 12-foot lanes, separated by a grass median allowing left-turn lanes to be provided wherever necessary. The project is planned to be a four-lane parkway with a posted speed of 45 miles per hour (mph) and several signalized intersections along its alignment. David Hoekel Parkway will not be a freeway “bypass” alignment, and the City has already proposed imposing truck restrictions along this roadway through Wentzville in the near-term condition.

The EA study document also provided forecasts of the daily two-way traffic demands for each respective segment of the David Hoekel Parkway corridor for the anticipated Design Year 2040 traffic condition. Based on *Table II-4* provided in the EA document, David Hoekel Parkway was projected to carry approximately 20,000 vehicles per day (vpd) to the south of the West Meyer Road intersection and about 22,000 vpd just north of the proposed I-70 interchange. The proposed David Hoekel Parkway alignment is anticipated to generally change travel patterns within the City of Wentzville itself and provide some

relief at the currently congested I-70 interchange with Wentzville Parkway by shifting some traffic westward to the new I-70 interchange that is proposed with David Hoekel Parkway. The I-70 / Wentzville Parkway interchange is expected to experience the greatest congestion relief benefits from the proposed David Hoekel Parkway project, which will provide an alternate north-south facility providing access to key destinations within western Wentzville.

The EA study generally utilized the regional travel demand model (TDM) developed and maintained by the East-West Gateway Council of Governments (EWGCOG) to develop future year design traffic volumes for Design Year 2040, both with and without the David Hoekel Parkway alignment. The regional TDM was utilized to forecast both daily and A.M. / P.M. peak hour traffic volume forecasts within the study area, as previously reported.

Access Justification Request: In support of the David Hoekel Parkway project, an “*Access Justification Request*” (AJR) study was also prepared by HNTB for the proposed new I-70 interchange. Again, this interchange was demonstrated to be needed to support the anticipated population and employment growth throughout the City of Wentzville. The proposed single-point urban interchange (SPUI) configuration that was ultimately recommended by the AJR study will address many short-term congestion problems along I-70 and at the adjacent Wentzville Parkway interchange, while also allowing MoDOT to integrate future improvements, including Transportation System Management (TSM) techniques, traditional freeway widening, adding dedicated truck lanes on I-70, or even implementing a different interchange alternative.

During this current TCR study, GBA’s traffic engineers reached out to HNTB to obtain background traffic volumes from the previously completed AJR study. The preliminary I-70 / David Hoekel Parkway interchange configuration is depicted on *Figure 2-3* within the AJR study report, including the recommended lane configurations and turn bay storage lengths. At this time, HNTB’s engineers have been unable to produce from their project archives the design traffic volumes that were utilized during the AJR study to make these geometric recommendations for the SPUI interchange, and at the adjacent outer road intersections with Interstate Drive on the south and Goodfellow Road / relocated North Outer Road on the north.

At the Goodfellow Road / relocated North Outer Road intersection (i.e., the southern terminus of this David Hoekel Parkway – Phase 2D project), the AJR study recommended the provision of two north-south travel lanes on David Hoekel Parkway, in addition to exclusive left-turn and right-turn lanes on both approaches to the intersection. Only one east-west through lane was recommended on Goodfellow

Road / relocated North Outer Road, in addition to exclusive left-turn and right-turn lanes on both approaches to the intersection.

St. Charles County TDM: The County's TDM using the CUBE software platform was recently updated and provides traffic volume forecasts for a Design Year 2045 condition. GBA's traffic engineers requested from the County transportation staff the "node" turning movement projections for the terminal intersections of this David Hoekel Parkway – Phase 2D project (i.e., West Meyer Road and Goodfellow Road). GBA also provided some peak period traffic counts recently obtained at the intersection of West Meyer Road with North Pointe Prairie to Lochmueller Group, the County's TDM consultant, for their use in validating the model output and providing the future turning movement forecasts.

The attached **Figures 1 and 2** depict the turning movement projections provided by the County for the intersections along this segment of David Hoekel Parkway, as well as at the adjacent West Meyer Road / North Pointe Prairie intersection, during the A.M. and P.M. peak hours under the Design Year 2045 traffic condition, respectively. As shown on these figures, traffic along this segment of David Hoekel Parkway is expected to be predominantly southbound during the morning commuter peak period, and predominantly northbound during the evening commuter peak period.

Based upon the traffic volume projections provided by the County, we would estimate that the daily Average Daily Traffic (ADT) volume along this segment of David Hoekel Parkway in the Design Year 2045 traffic condition will be between 15,000 and 17,000 vpd (i.e., slightly less than the 20,000 vpd indicated in the prior EA study document). This estimation of the daily traffic volume along the study corridor utilizes the assumption that the critical two-way hourly traffic volume on a given roadway segment in most major metropolitan areas typically represents between 8 and 10 percent of its daily traffic volume.

RECOMMENDED CONFIGURATIONS

Cross-Sectional Evaluations: Given the slightly decreased daily traffic volume estimates based upon the County's TDM forecasts, GBA's traffic engineers evaluated the available volume-based capacity criteria to determine the appropriate roadway cross-section for this segment of David Hoekel Parkway between West Meyer Road and Goodfellow Road. In general, these evaluations tried to confirm whether the previously recommended four-lane, median-divided configuration was still valid or if a reduced three-lane cross-section might instead be adequate to serve the anticipated traffic volumes.

Several studies have recently been completed to evaluate the feasibility of implementing a three-lane “road diet” configuration based upon various ADT volume thresholds. The most common “road diet” configurations provide only a single travel lane in each direction along a roadway, with a center turn lane to accommodate left-turning maneuvers where necessary. Different public agencies have recommended a maximum ADT of anywhere between 15,000 to 25,000 vpd for considering the use of this typical three-lane roadway configuration. In its “Road Diet Informational Guide” from November 2014, the Federal Highway Administration (FHWA) recommends that roadways with an ADT of 20,000 vpd or less could be a good candidate for a “road diet” and should be evaluated further. Based on the anticipated traffic projections, this segment of David Hoekel Parkway required additional review.

From a peak hour traffic volume perspective, the Iowa Department of Transportation (Iowa DOT) provides “road diet” guidelines that suggest the following one-way, single travel lane capacities may affect the operational characteristics (assuming a 50/50 directional split along the roadway):

- Probably feasible at 750 vehicles per hour per direction (vphpd) or less.
- Cautiously consider between 750 – 850 vphpd.
- Unlikely feasible above 875 vphpd.

Similarly, the Kansas City, Missouri public works department has recently undertaken a review of all its four-lane, undivided roadways to determine when “road diet” configurations can be expected to function acceptably. During this review, the city staff determined that its three-lane roadways began to experience serious congestion issues and generated complaints from the traveling public whenever a one-way traffic volume of 800 vphpd or higher was present in one lane.

Considering these types of traffic volume threshold criteria, GBA’s traffic engineers would recommend that the City of Wentzville continue to plan for this Phase 2D segment of David Hoekel Parkway to provide a four-lane, median-divided cross-section, as previously recommended by the EA and AJR studies. As depicted on the attached **Figure 2**, a one-way peak hour traffic volume of approximately 935 vphpd is projected by the County TDM in the northbound direction of David Hoekel Parkway just north of the Goodfellow Road / relocated North Outer Road intersection during the Design Year 2045 P.M. peak hour.

Traffic Signal Warrants: The attached **Tables 1 and 2** depict the evaluations completed to determine whether traffic signalization will be warranted at the terminal intersections along this Phase 2D segment of the David Hoekel Parkway corridor. Based upon the turning movement traffic volume projections provided from the County’s TDM and depicted on **Figures 1 and 2**, both intersections of David Hoekel

Parkway with West Meyer Road and Goodfellow Road / relocated North Outer Road will be expected to warrant the addition of traffic signal installations during both the A.M. and P.M. peak hours under the ultimate Design Year 2045 traffic conditions, per the criteria prescribed in the “Manual on Uniform Traffic Control Devices” (MUTCD).

We understand that the intersection of Goodfellow Road / relocated North Outer Road with David Hoekel Parkway is currently planned to operate with only stop sign control in association with Phase 2C of the parkway project. The addition of any “temporary” traffic signal at this location in the near-term (i.e., the post-construction condition) will require significant modifications in the future to accommodate the ultimate intersection configuration, since only the ultimate northbound lanes are being constructed at this time. Likewise, if a traffic signal is desired by the city at the West Meyer Road intersection, it would also need to be considered “temporary” in nature and will require significant future modifications to accommodate the ultimate intersection configuration at that location.

It should be noted that GBA does not have any existing or projected traffic volume data for a Construction Year scenario upon which to make recommendations regarding the necessary traffic controls at the terminal intersections of this Phase 2D project along David Hoekel Parkway. It is highly likely that both intersections can be expected to operate with two-way or all-way stop sign control for several years after they are initially constructed. GBA would recommend that the City of Wentzville periodically monitor the traffic volumes and critical peak hour operations at these locations in order to determine when traffic signalization might be warranted per the appropriate MUTCD criteria.

PHASED CONSTRUCTION

Again, the Phase 2C segment of the David Hoekel Parkway project to the south of the Goodfellow Road / relocated North Outer Road intersection is only constructing the northbound lanes of the recommended ultimate four-lane, median-divided roadway cross-section. At this intersection, a southbound through travel lane, a northbound shared left-turn / through approach lane, and a channelized exclusive right-turn lane are currently proposed for the initial construction of the south leg. In order to match this lane configuration and provide proper lane alignment through the intersection, this Phase 2D project will need to build only the eastern half of the ultimate roadway (i.e., the northbound lanes) on the north leg as well.

Since there is no apparent need for any exclusive southbound turn bays and their provision would also cause misalignment of the proposed curb lines, these ultimate northbound lanes will be used to provide

one southbound approach lane shared for all vehicle movements and one northbound travel lane on the north leg of the intersection. With the already planned configuration on the south leg of the intersection, any “temporary” traffic signal installed later at this location will be required to operate with either split-phased or permitted only left-turn indications for the north-south vehicle movements.

At several intermediate locations along this study segment of David Hoekel Parkway, we would recommend the addition of exclusive left-turn lanes in both the northbound and southbound directions that will require some additional “temporary” pavement areas. GBA believes that it is appropriate to add these exclusive turn bays at the intersections of David Hoekel Parkway with both Bear Creek Drive and Kruger Park Court, since these collector roadways provide critical access into the adjacent residential subdivisions.

To provide these required pavement areas, it will be necessary to widen the roadway westward into the future median strip to accommodate the recommended 150-foot of left-turn storage bay for each respective turning movement and the appropriate 270-foot length for lane-shifting tapers. Even with these additional areas of pavement widening to provide three-lane roadway widths through these intermediate intersection locations, there will still be extended sections of only two-lane roadway on David Hoekel Parkway.

At the northern terminus of this segment of David Hoekel Parkway, it would also be recommended to provide an exclusive northbound left-turn lane since this intersection with West Meyer Road will be in a “T”-configuration for the foreseeable future. With the construction of the ultimate northbound lanes, these lanes can be utilized to provide the recommended northbound left-turn and right-turn lanes at this intersection. Pavement widening to the west will be required in order to provide the southbound travel lane and an appropriate lane-shifting taper. However, it should be noted that this additional pavement within the future median strip will also be able to serve as the future northbound exclusive left-turn lane whenever the ultimate four-lane, median-divided cross-section is constructed in the future.

SUMMARY & CONCLUSIONS

Based upon the completed traffic engineering evaluations, GBA would recommend that the City of Wentzville continue planning for this segment of David Hoekel Parkway to provide a four-lane, median-divided cross-section between the intersections with West Meyer Road and Goodfellow Road /

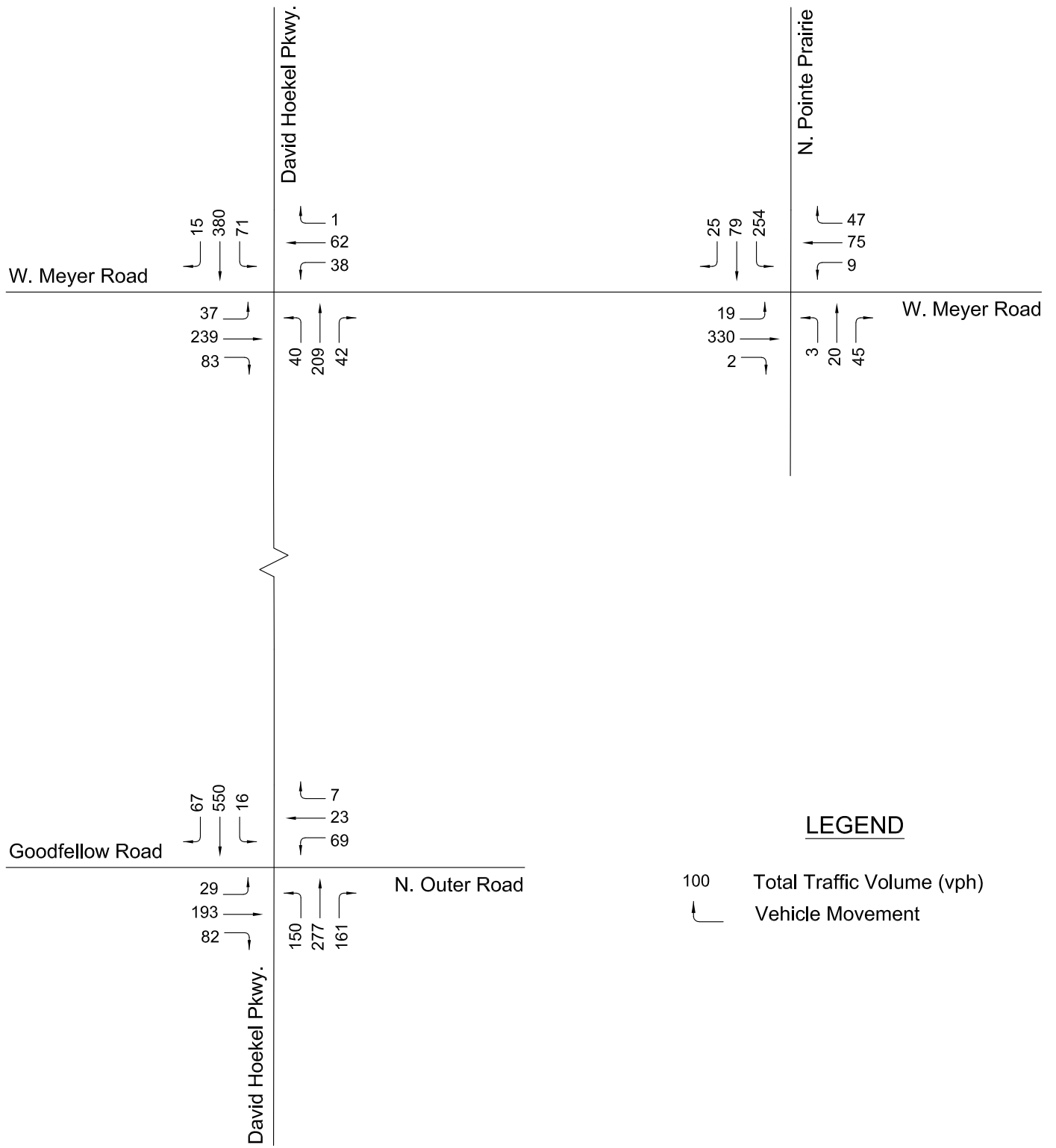
relocated North Outer Road. GBA has confirmed that traffic signalization will ultimately be needed at both these critical arterial intersections to serve the projected future traffic volumes.

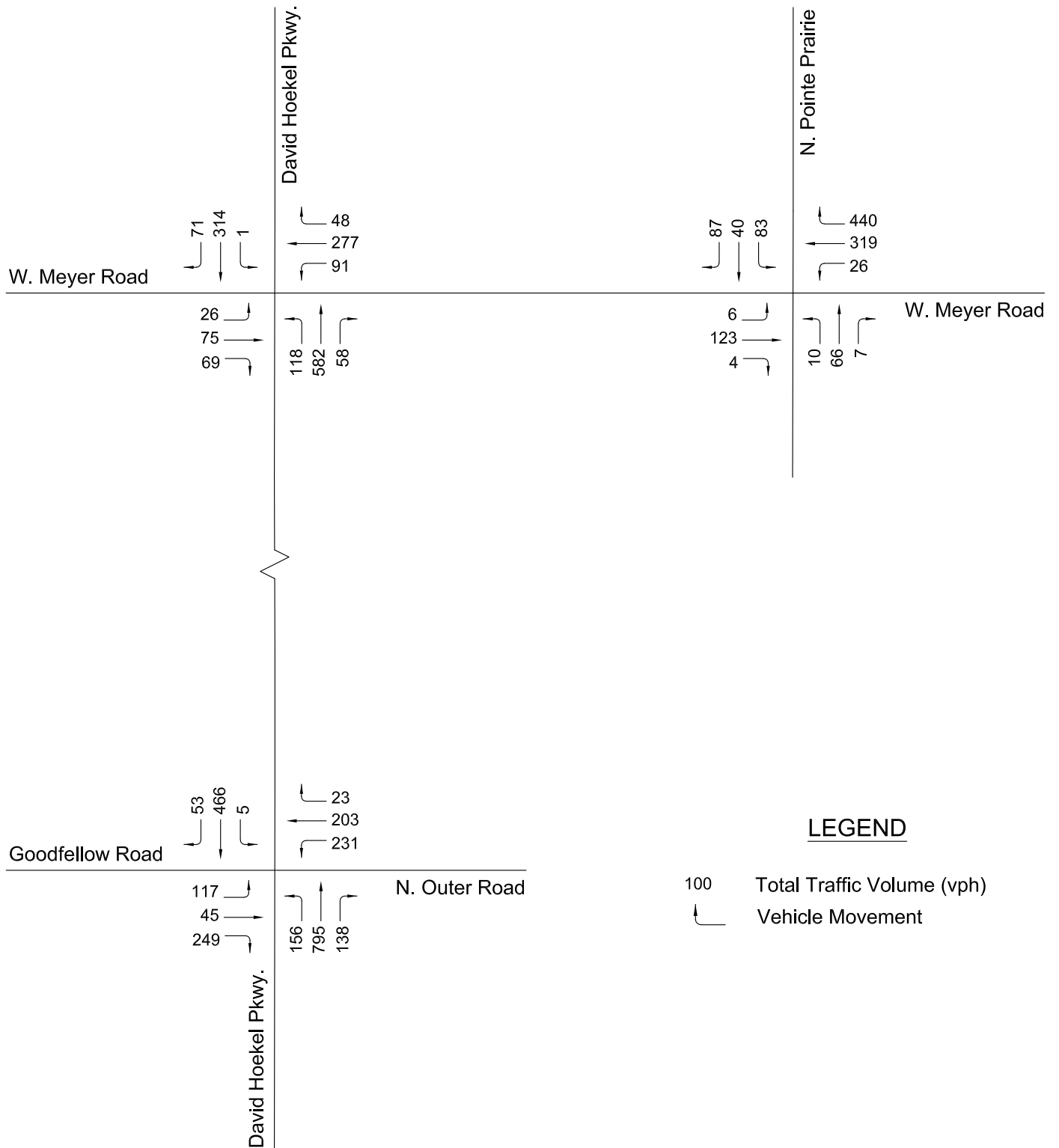
We understand that the Phase 2C project will be using only stop sign control at the Goodfellow Road / relocated North Outer Road intersection during its initial construction. Because only the ultimate northbound travel lanes are being constructed initially, the addition of any “temporary” traffic signal at this location in the near-term condition will require future modifications to accommodate the full intersection layout.

Similarly, a “temporary” traffic signal could also be added at the West Meyer Road intersection as part of this Phase 2D project if the City desires. However, the County TDM projections indicate that turning movement volumes are lower at the northern end of the Phase 2D roadway segment than at the southern end, and this intersection may be expected to operate acceptably with only stop sign control for the northbound vehicles for some time, until traffic signalization is properly warranted per MUTCD volume threshold criteria.

In general, GBA recommends that the eastern half of the ultimate roadway cross-section (i.e., the northbound lanes) be constructed initially. The additions of exclusive northbound and southbound left-turn lanes at both the Bear Creek Drive and Kruger Park Court intersections with David Hoekel Parkway are also recommended. Finally, additional pavement should also be provided within the median area on the south leg of the West Meyer Road intersection in order to accommodate exclusive northbound left-turn and right-turn lanes on David Hoekel Parkway while this intersection is expected to remain in a “T”-configuration prior to the northward extension of the parkway.

cc: MCE, JAH, RSK, file





MUTCD 2009
TRAFFIC SIGNAL WARRANT PROGRAM



Location : W. Meyer Road & David Hoekel Parkway
 Scenario : Design Year 2045 Traffic Projections

Count Date : N/A
 Day of Week : N/A
 By : County TDM

Street Information		# Lanes	85% Speed
Major Street	David Hoekel Pkwy	2	45
Minor Street	W. Meyer Road	2	35
(N-S) Street	David Hoekel Pkwy		

Pop. > 10,000?	Yes
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Crash Experience (In Past 12 Months)	
Right Angle & Left Turn Crashes	0

End of Hour	Entering Traffic Volumes				Total Entering Traffic	Major Street Total	Minor Street Approach
	David Hoekel Pkwy		W. Meyer Road				
	NB	SB	EB	WB			
0100	0	0	0	0	0	0	0
0200	0	0	0	0	0	0	0
0300	0	0	0	0	0	0	0
0400	0	0	0	0	0	0	0
0500	0	0	0	0	0	0	0
0600	0	0	0	0	0	0	0
0700	0	0	0	0	0	0	0
0800	291	466	359	101	1217	757	359
0900	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0
1500	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0
1700	0	0	0	0	0	0	0
1800	758	386	170	416	1730	1144	416
1900	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0
2100	0	0	0	0	0	0	0
2200	0	0	0	0	0	0	0
2300	0	0	0	0	0	0	0
2400	0	0	0	0	0	0	0

24 HOUR SUM:	1049	852	529	517	2947	1901	775
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PEAK HOUR:	1800	758	386	170	416	1730	1144	416
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Volume Warrants						
Warrant Number	Required Hourly Volumes		Hours Req'd	Hours Met	Warrant Met	Warrant Not Met
	Major St	Minor St				
1A	420	140	8	2		X
1B	630	70	8	2		X
2	CURVE		4	2		X
3	CURVE		1	2	X	

Combination of Warrants 1A & 1B						
1A (80%)	480	160	8	2		X
1B (80%)	720	80	8	2		X
Combination of Warrants 1A & 1B Met?					No	

Crash Experience Warrant		
7	> 5 Crashes and either 1A(80%) or 1B(80%) met?	No

MUTCD 2009
TRAFFIC SIGNAL WARRANT PROGRAM



Location : Goodfellow Road & David Hoekel Parkway
 Scenario : Design Year 2045 Traffic Projections

Count Date : N/A
 Day of Week : N/A
 By : County TDM

Street Information		# Lanes	85% Speed
Major Street	David Hoekel Pkwy	2	45
Minor Street	Goodfellow Road	2	35
(N-S) Street	David Hoekel Pkwy		

Pop. > 10,000?	Yes
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Crash Experience (In Past 12 Months)	
Right Angle & Left Turn Crashes	0

End of Hour	Entering Traffic Volumes				Total Entering Traffic	Major Street Total	Minor Street Approach
	David Hoekel Pkwy		Goodfellow Road				
	NB	SB	EB	WB			
0100	0	0	0	0	0	0	0
0200	0	0	0	0	0	0	0
0300	0	0	0	0	0	0	0
0400	0	0	0	0	0	0	0
0500	0	0	0	0	0	0	0
0600	0	0	0	0	0	0	0
0700	0	0	0	0	0	0	0
0800	588	633	304	99	1624	1221	304
0900	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0
1500	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0
1700	0	0	0	0	0	0	0
1800	1089	524	411	457	2481	1613	457
1900	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0
2100	0	0	0	0	0	0	0
2200	0	0	0	0	0	0	0
2300	0	0	0	0	0	0	0
2400	0	0	0	0	0	0	0

24 HOUR SUM:	1677	1157	715	556	4105	2834	761
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PEAK HOUR:	1800	1089	524	411	457	2481	1613	457
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Volume Warrants						
Warrant Number	Required Hourly Volumes		Hours Req'd	Hours Met	Warrant Met	Warrant Not Met
	Major St	Minor St				
1A	420	140	8	2		X
1B	630	70	8	2		X
2	CURVE		4	2		X
3	CURVE		1	2	X	

Combination of Warrants 1A & 1B						
1A (80%)	480	160	8	2		X
1B (80%)	720	80	8	2		X
Combination of Warrants 1A & 1B Met?					No	

Crash Experience Warrant		
7	> 5 Crashes and either 1A(80%) or 1B(80%) met?	No