
APPENDIX A

■ TRAFFIC ANALYSES

A2 Traffic Analysis

TRAFFIC ANALYSIS

This planning project included an extensive effort to reconcile the various traffic projections and models prepared in recent years for the WisDOT Verona Road project and the nearby Orchard Pointe development. The resulting traffic model was used to evaluate future land use scenarios and predict the function and design needs of intersections in the planning area. These analyses informed the Traffic Recommendations in Chapter 4.

Existing Traffic Data & Synchro Model Procedure

This study was originally scoped with the understanding, based on preliminary discussions with WisDOT staff, that both a traffic model and representative traffic volumes would be available as the basis for projecting traffic in and around the Anton Drive area. The data gathering process revealed that while pieces of the necessary traffic information were available, there was not a complete model and volume set available for analysis. The next section describes our process to establish the baseline condition from which future growth projections are derived for this traffic analysis. This analysis assumes 2020 traffic volumes based on existing land use and development, but further assumes that the WisDOT proposed geometrics are already in place.

Baseline Synchro Traffic Model

The Synchro traffic models provided by WisDOT and their consultant team included multiple models

with different analysis periods for a range of potential improvements along the corridor. In some cases, the models considered an entire corridor, such as McKee Road. Many reviewed individual intersections and alternative geometrics. Once it was determined that no single Synchro model represented the future geometry as a whole, a single Synchro model was created by combining the models with the appropriate future geometry and traffic control conditions. Updates to the model were made to match lane configuration, signal plans, and any restricted accesses based off of the updated WisDOT schematic.

2020 Background Traffic

The traffic volume information available from WisDOT included 2009 and 2010 raw traffic volumes and traffic forecasts for the years 2020, 2030, and 2040 for many of the study area intersections. Additional traffic volumes and projections were also provided via the Orchard Pointe Traffic Impact Analysis Report to assess the additional traffic volumes of the new developments south of McKee Road. No traffic volumes were provided for the internal intersections of Kapec Road & Anton Drive, Anton Drive & King James Way, and Anton Drive & Carriage Street.

Due to the changes in land use and development in Orchard Pointe, it was first necessary to determine which set of volumes best represented 2020 conditions with existing geometry prior to considering





the proposed WisDOT improvements. By reviewing the 2012/2013 raw traffic counts, the 2020 forecasts, and the Orchard Pointe Build year traffic conditions, it was determined that the assumptions for opening of the Orchard Pointe development were similar to the volumes in the 2020 forecast reports provided by WisDOT. Since the forecast reports provided counts at a majority of the study area intersections, these volumes were utilized as the "2020 Background Traffic." Volumes for the missing intersections were generated based on volume balancing between known intersections, adjacent land uses, and greater neighborhood connectivity to the study area.

Once approximated volumes had been generated for all study intersections, the volumes were then redistributed throughout the study area based on the proposed WisDOT improvements. Volumes were redistributed based on assumed logical driver behaviors, area origins and destinations, and access or intersection restrictions and traffic control.

2030 Background Traffic

To analyze the operations in the year 2030 with existing development, the 2020 Base Traffic Volumes were forecasted forward at a 1.5% linear annual growth rate for the AM and PM peak hours. The 2030 Background Traffic volumes were used as a conservative measure to analyze the base conditions in the project area prior to additional development.

Table 1: 2020 capacity outputs for existing development and WisDOT geometrics.

Intersection	Control	Peak Hour	MOE	Eastbound			Westbound			Northbound			Southbound		
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Fitchrona Road & County Road PD/McKee Road		AM Peak	LOS	A	C	B	C	B	A	C	C	C	C	C	C
			Delay (s)	0	27.1	14.4	30.5	10	0	28.2	29.5	21.8	22.3	23.5	24
			V/C Ratio	0	0.88	0.17	0.28	0.3	0	0.45	0.68	0.07	0.52	0.12	0.18
			Queue (ft)	0	425	25	25	125	0	75	125	25	100	25	25
		PM Peak	LOS	A	C	C	D	B	A	D	C	C	C	C	C
			Delay (s)	0	26.2	21.8	42.1	14.7	0	44.2	24.7	20.4	23.1	27.9	31.9
Signal	V/C Ratio	0	0.71	0.34	0.8	0.58	0	0.86	0.18	0.37	0.38	0.35	0.65		
	Queue (ft)	0	225	25	150	225	0	200	75	75	100	75	25		
Kapec Road & Fitchrona Road		AM Peak	LOS	A			A			B					
			Delay (s)	0			7.7			11.7					
			V/C Ratio	0			0.04			0.37					
			Queue (ft)	0			25			50					
		PM Peak	LOS	A			A			B					
			Delay (s)	0			7.7			12.2					
Stop Control	V/C Ratio	0			0.14			0.48							
	Queue (ft)	0			25			75							
King James Way (N/S) & Fitchrona Road/Anton Drive (E/W)		AM Peak	LOS	B			A			A			B		
			Delay (s)	14.3			9.3			8.8			10.4		
			V/C Ratio	0.58			0.17			0.04			0.35		
			Queue (ft)	100			25			25			25		
		PM Peak	LOS	D			D			B			C		
			Delay (s)	27.9			25.7			10.9			15.3		
All-Way Stop Control	V/C Ratio	0.8			0.78			0.07			0.5				
	Queue (ft)	25			200			200			75				
Williamsburg Way & Anton Drive		AM Peak	LOS	A			A			A			A		
			Delay (s)	6.1			6.4			8.1			4.4		
			V/C Ratio	0.33			0.3			0.39			0.02		
			Queue (ft)	50			50			50			25		
		PM Peak	LOS	B			A			A			A		
			Delay (s)	12.3			9.6			6.3			5.4		
Roundabout	V/C Ratio	0.63			0.53			0.23			0.04				
	Queue (ft)	125			75			25			25				

Intersection Operations

The operational analysis and capacity analysis was completed using Synchro 9 with HCM Outputs, which is based on the procedures, methods and techniques contained in the Highway Capacity Manual, 2010 Edition. Roundabout analysis at the intersection of Williamsburg Way and Anton Drive was completed using SIDRA software with HCM outputs.

This type of analysis provides a Level of Service (LOS) for the subject

intersection, which is a quantitative measure that refers to the overall quality of flow at the intersection ranging from very good (LOS A) to very poor (LOS F). For this analysis, it was requested to identify which intersections drop below LOS D. If this condition existed at any of the subject intersections, a second analysis of the volume/geometric scenarios was completed to determine adequate improvements to reduce the LOS below a LOS D for all movements.





2020 Volumes, Existing Development and WisDOT Geometrics:

The 2020 traffic volumes with existing development and WisDOT geometrics were analyzed to determine the baseline capacity of the improvements to compare future volume and development scenarios against. The results are summarized in Table 1 (above).

The findings of this analysis show that the intersections within the study area operate at acceptable LOS conditions, and that projected

TRAFFIC ANALYSIS

Table 2: 2030 capacity outputs for existing development and WisDOT geometrics.

Intersection	Control	Peak Hour	MOE	Eastbound			Westbound			Northbound			Southbound		
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Fitchrona Road & County Road PD/McKee Road		AM Peak	LOS	A	D	B	D	B	A	D	D	C	C	C	C
			Delay (s)	0	49.2	14.9	41.7	11.5	0	37.2	36.9	26.1	31.1	33	32.2
			V/C Ratio	0	1.0	0.08	0.30	0.34	0	0.46	0.64	0.01	0.51	0.16	0.02
			Queue (ft)	0	650	25	50	150	0	125	200	25	125	50	25
		PM Peak	LOS	A	C	C	D	B	A	D	D	C	D	D	D
			Delay (s)	0	32.1	25.4	54.1	18.7	0	51.1	36.9	31	35.8	44.1	50.3
			V/C Ratio	0	0.73	0.33	0.82	0.65	0	0.86	0.25	0.51	0.48	0.49	0.72
			Queue (ft)	0	425	50	200	450	0	275	125	150	175	125	25
Kapec Road & Fitchrona Road		AM Peak	LOS	A			A			B					
			Delay (s)	0			7.7			11.9					
			V/C Ratio	0			0.03			0.33					
			Queue (ft)	0			25			50					
		PM Peak	LOS	A			A			C					
			Delay (s)	0			7.7			19					
			V/C Ratio	0			0.12			0.59					
			Queue (ft)	0			25			100					
King James Way (N/S) & Fitchrona Road/Anton Drive (E/W)		AM Peak	LOS	B			A			A			A		
			Delay (s)	12.7			9.1			8.6			10		
			V/C Ratio	0.51			0.16			0.05			0.32		
			Queue (ft)	75			25			25			50		
		PM Peak	LOS	C			D			B			C		
			Delay (s)	20			31.4			10.8			15.4		
			V/C Ratio	0.66			0.84			0.08			0.51		
			Queue (ft)	125			225			25			75		
Williamsburg Way & Anton Drive		AM Peak	LOS	A			A			A			A		
			Delay (s)	6.8			7.2			9.1			4.6		
			V/C Ratio	0.39			0.36			0.44			0.02		
			Queue (ft)	50			50			50			25		
		PM Peak	LOS	C			B			A			A		
			Delay (s)	16.1			11			6.9			5.7		
			V/C Ratio	0.74			0.59			0.26			0.04		
			Queue (ft)	175			100			25			25		

queuing does not interfere with adjacent controlled intersections. This is true for both the AM and PM peak hours.

2030 Volumes, Existing Development & WisDOT Geometrics: The 2030 traffic volumes with existing development and WisDOT geometrics were also analyzed to estimate the impacts future regional development has on capacity in the study area. Table 2 (above) summarizes the results.

The findings of the 2030 background traffic analysis show that the intersections within the study area operate at acceptable LOS conditions in both AM and PM peak hours. Projected queuing for some movements is anticipated to be longer when compared to 2020 conditions. For example, the eastbound through movement at Fitchrona Road & CTH PD/McKee Road in the AM peak hour may experience a queuing length of 650 feet, and the westbound through movement in the PM peak

hour at the same intersection may experience up to 450 feet of queue lengths. These queue lengths may cause blocking issues for right or left turning vehicles at these intersections, increasing the intersection delay and reducing capacity.

2030 Volumes, Proposed Development & WisDOT Geometrics: Two preliminary development concepts were analyzed to estimate the impact additional traffic volumes will have to the study area. Concept A proposes the majority

of new development to include multi-unit residential buildings, with some regions proposed to include mixed-use/office buildings and one mid-box commercial building. Concept B proposes the majority of new development to include mid-box commercial buildings and mixed-use/office buildings, with some regions developed for multi-unit residential buildings.

The ITE Trip Generation Manual, 9th Edition was used to estimate the amount of new trips expected for each land use. Trip generation was completed for AM and PM peak hour estimates. To begin this analysis, the study area was split up into eight sub-regions, which are displayed in Figure 1 (on the right). To project the new trips generated from the study area, the difference in trip generation between the estimated existing and proposed land uses were calculated. A 10% reduction in trips was applied in regions where linked-trip patterns were expected. For analysis purposes, it was assumed that the calculated differences in trips were the new trips generated from each sub-region. The maps on the next page depicts the estimated new trips for Concepts A and B.

Figure 1: Sub-Region Locations in Project Area

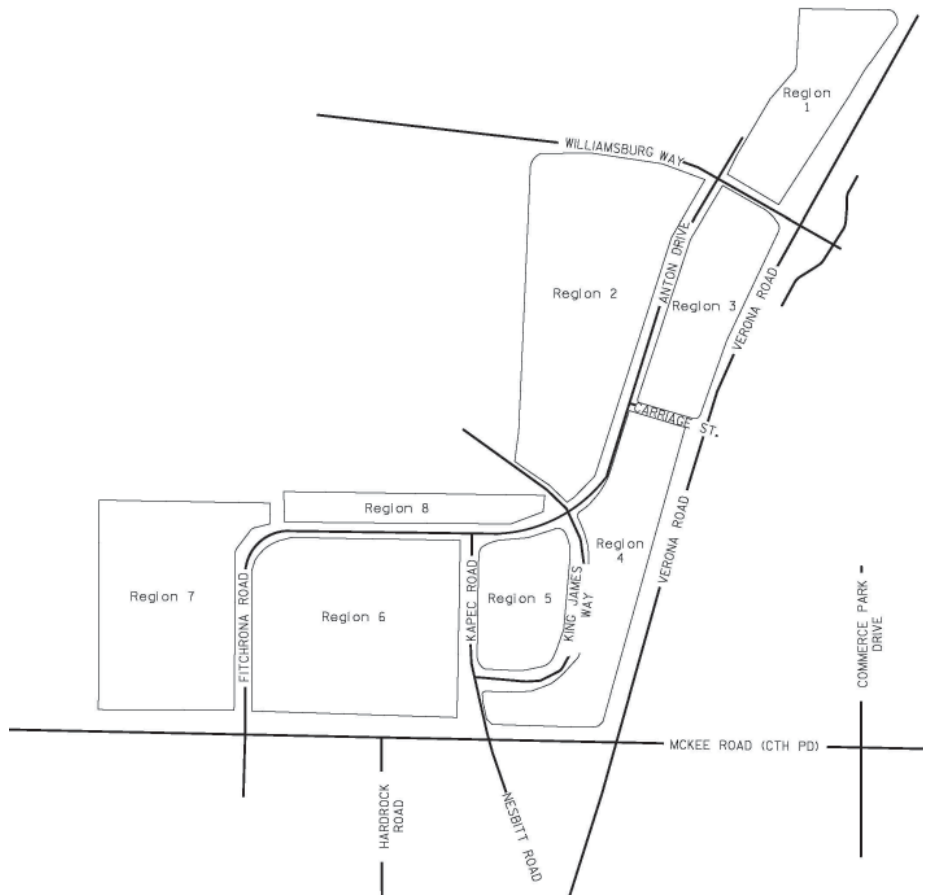
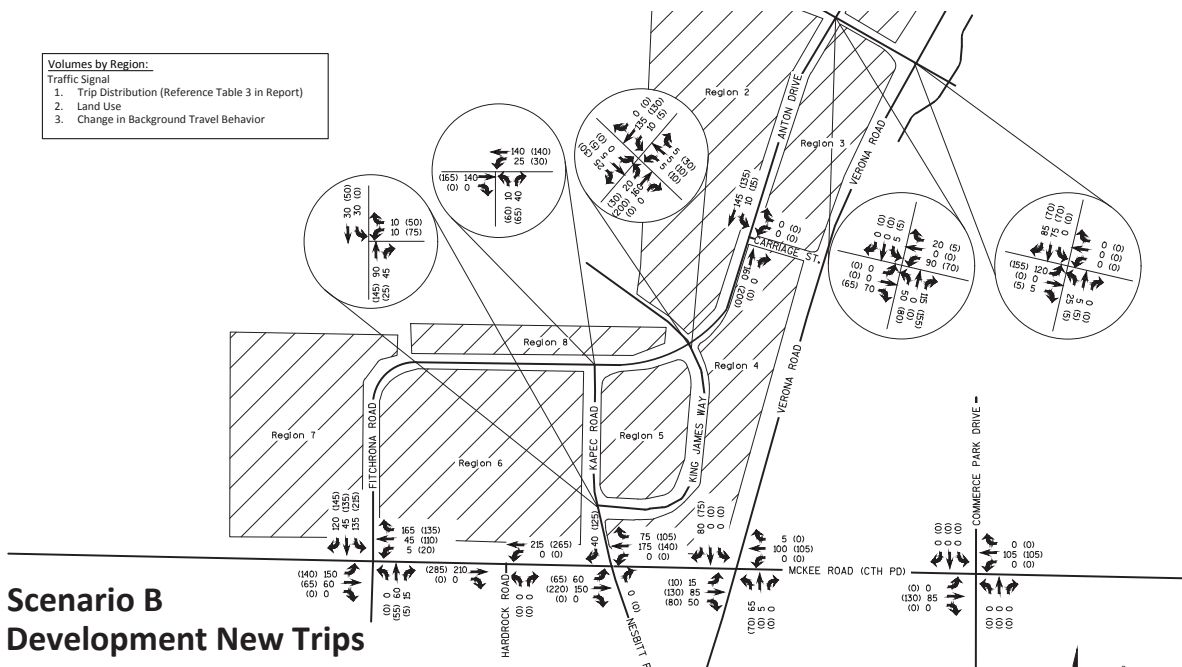
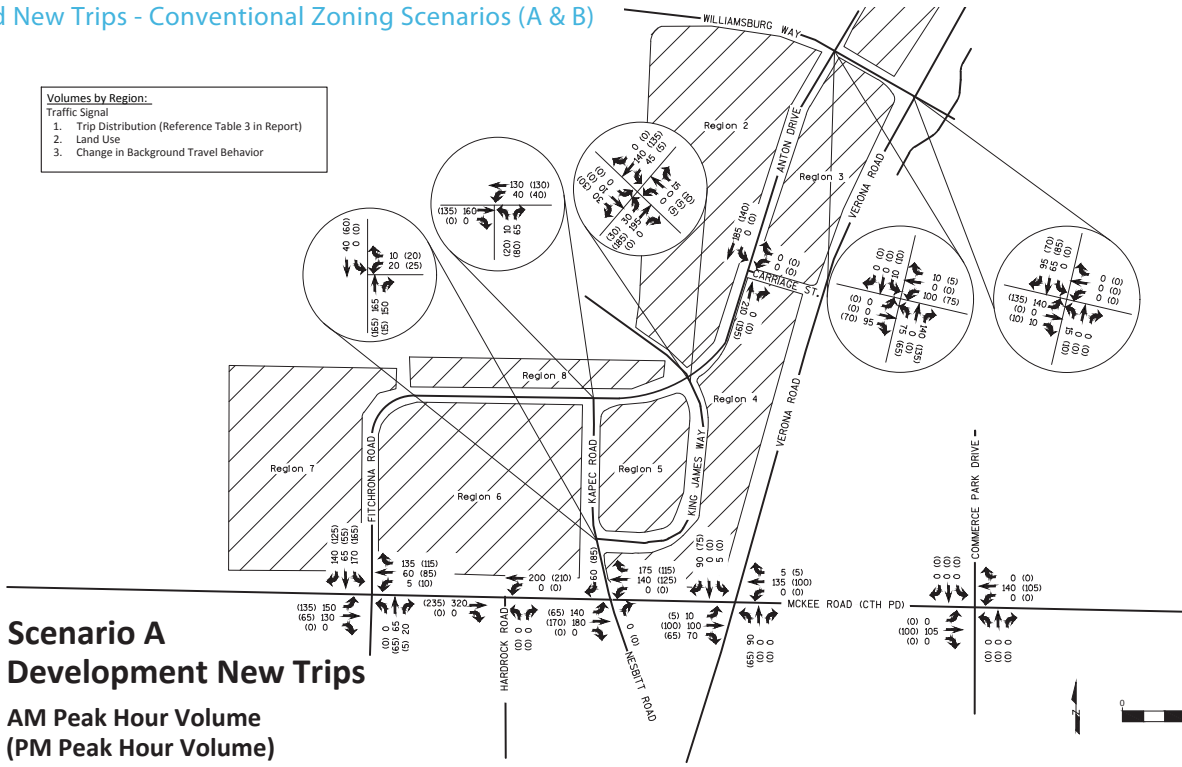


Table 3: Trip Distribution Assumptions for each region at access locations

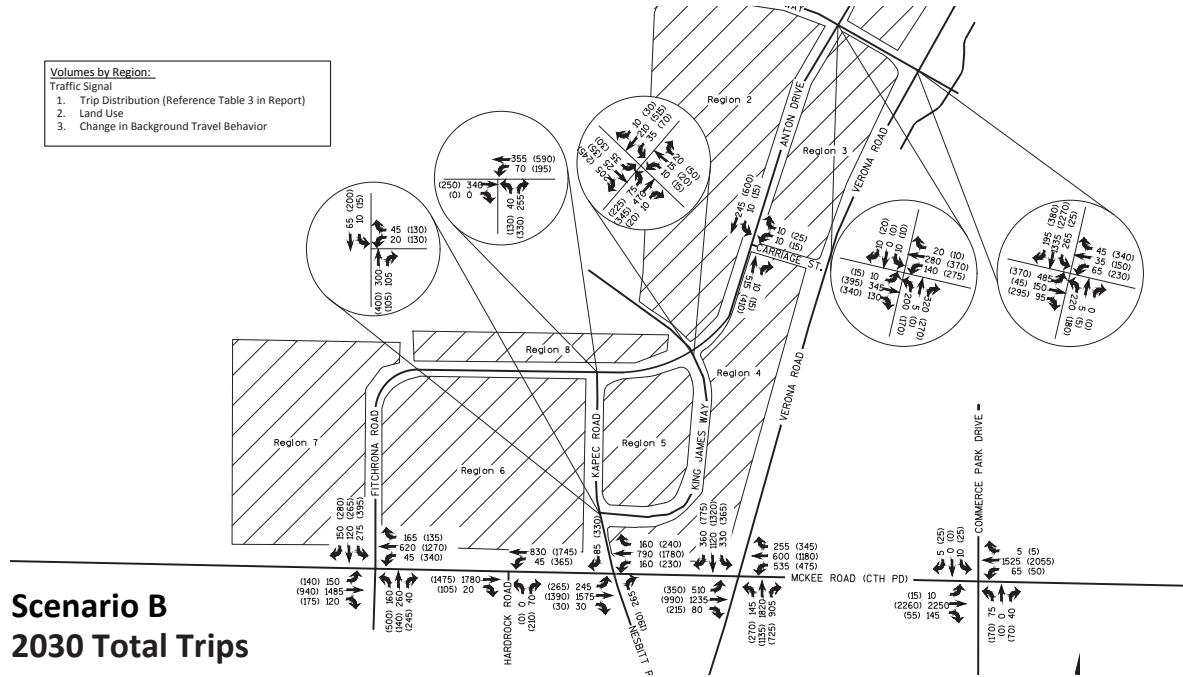
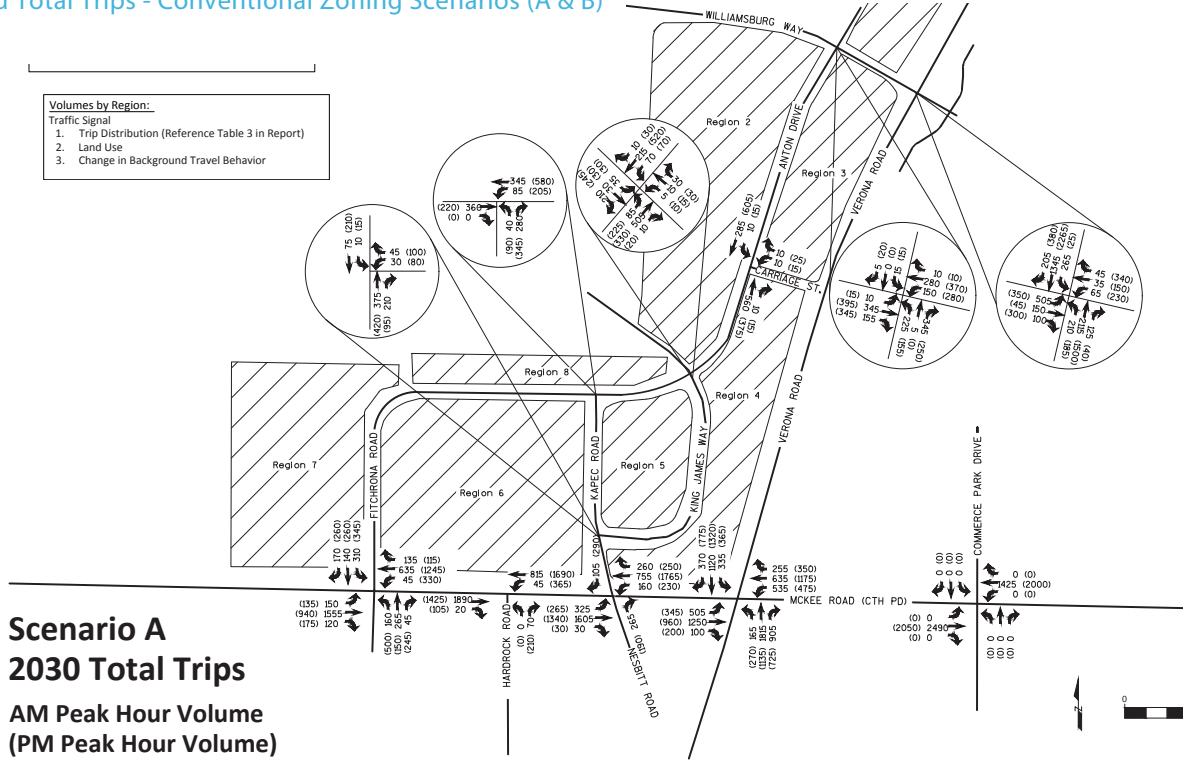
Access Locations	Regions 1-3		Region 4		Region 5		Region 6		Region 7		Region 8	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Fitchrona Rd & McKee Rd	0%	0%	0%	25%	0%	25%	30%	50%	75%	65%	40%	65%
Kapec Rd & McKee Rd	0%	0%	75%	40%	75%	40%	45%	15%	0%	0%	25%	0%
King James Way	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Williamsburg Way & Anton Dr (West)	10%	10%	10%	20%	10%	10%	10%	10%	10%	10%	10%	10%
Williamsburg Way & Anton Dr (East)	85%	85%	10%	10%	10%	20%	10%	20%	10%	20%	20%	20%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

TRAFFIC ANALYSIS

Estimated New Trips - Conventional Zoning Scenarios (A & B)



Estimated Total Trips - Conventional Zoning Scenarios (A & B)



TRAFFIC ANALYSIS

In order to apply the new trips to the appropriate intersections and existing volumes, the trip generation was distributed and assigned to the study area roadway network based on existing and anticipated traffic flow patterns. Table 3 (below) shows the distribution percentages from proposed sub-regions to each access. The new traffic was added to the 2030 Background Traffic Volumes to estimate the 2030 Total Traffic Volumes. The maps on the previous page depicts the total traffic volumes estimated for Development Concepts A and B.





Since the PM peak hour in Concept B provides the higher amount of total trips, it was used as a conservative scenario for analysis purposes. A summary of the Synchro outputs are provided in Table 4 (shown below).

This analysis included the redevelopment of the Wingra concrete plant area. Without adding the redevelopment of the concrete plant area, operations at Fitchrona Road and McKee Road remain at acceptable levels as other development projects are completed. However, with the inclusion of new traffic due to redevelopment of the Wingra concrete plant area, the intersection of Fitchrona Road and McKee Road may experience unacceptable LOS, delay, and significant reduction in capacity. The proposed WisDOT geometry includes one left turn lane for the southbound movement. The analysis shows that one left-turn lane may not provide adequate capacity for the expected volume since the volume/capacity ratio is greater than 1.0. At the same intersection, similar capacity concerns

exist for the eastbound and westbound through movements.

Additionally, at the proposed STOP controlled intersection of Kapec Road and Fitchrona Road, the northbound movement may see undesirable operational issues. It should be stressed that this operational analysis is based on a series of assumptions about traffic patterns and volumes. As development occurs, observations and traffic data should be collected to make the required adjustments to signal timings or geometry to provide more desirable operations.

Table 4: 2030 capacity outputs for Scenario B Total Traffic PM Peak Hour

Intersection	Control	Peak Hour	MOE	Eastbound			Westbound			Northbound			Southbound		
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Fitchrona Road & County Road PD/McKee Road	 Signal	PM Peak	LOS	D	D	A	D	F	B	D	D	E	F	D	C
			Delay (s)	48.2	53.4	9.3	53.8	64.3	12.8	41.7	41.7	60.3	207	47	33.3
			V/C Ratio	0.78	0.94	0.39	0.83	1.02	0.16	0.66	0.42	0.87	1.31	0.58	0.9
			Queue (ft)	175	600	75	175	700	25	250	175	75	600	150	125
Kapec Road & Fitchrona Road	 Stop Control	PM Peak	LOS				A			F					
			Delay (s)					8.3			256.4				
			V/C Ratio					0.16			1.47				
			Queue (ft)					25			675				
King James Way (N/S) & Fitchrona Road/Anton Drive (E/W)	 All-Way Stop Control	PM Peak	LOS		B		B			A			B		
			Delay (s)		17.5			10.1			9.1			11.6	
			V/C Ratio		0.84			0.71			0.15			0.54	
			Queue (ft)		375			325			25			75	
Williamsburg Way & Anton Drive	 Roundabout	PM Peak	LOS		D		C			B			A		
			Delay (s)		27.2			15.7			12.3			6.7	
			V/C Ratio		0.87			0.72			0.57			0.06	
			Queue (ft)		300			150			100			25	