TRAFFIC IMPACT STUDY FOR:

Wal-Mart SuperCenter Sturgeon Bay

EGG HARBOR ROAD AT PETERSON ROAD

STURGEON BAY, WISCONSIN

DATE SUBMITTED: November 10, 2008

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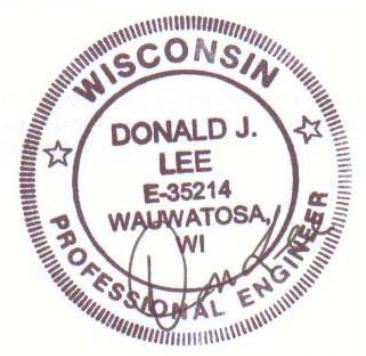
PREPARED FOR:
City of Sturgeon Bay
421 Michigan Street
P.O. Box 47
Sturgeon Bay, WI 54235
Phone: (920) 746-2913
Contact Person: Anthony Depies



PREPARED BY:
Traffic Analysis & Design, Inc.
N36 W7505 Buchanan Street
Cedarburg, WI 53012
Phone: (800) 605-3091
Contact Persons: Don Lee, P.E. (TIA Cert # SE05-804-046)
John Bieberitz, P.E., PTOE (TIA Cert # SE05-804-044)

"I certify that this Traffic Impact Analysis has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering."

_____

Donald J. Lee
Wisconsin Registration #35214-006
Traffic Analysis & Design, Inc.

Traffic Impact Analysis
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LIST OF EXHIBITS

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LIST OF APPENDICES

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CHAPTER I – INTRODUCTION AND EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

A new Wal-Mart SuperCenter development has been proposed to replace the existing Wal-Mart store located on the north side Egg Harbor Road at Alabama Street in Sturgeon Bay, Wisconsin. The new Wal-Mart SuperCenter is proposed to be located immediately north of the existing store. As part of the development, the City of Sturgeon Bay requested a traffic impact analysis be conducted to determine the additional traffic expected to be generated by the development and to identify roadway improvements, if any, attributed to the new development. In addition, the analysis addresses the City of Sturgeon Bay's planned improvements along Egg Harbor Road adjacent to the proposed development site. The Wisconsin Department of Transportation and the City of Sturgeon Bay will review the traffic impact study.

A traffic impact analysis was conducted by Traffic Analysis & Design, Inc. for the proposed development. This report documents the procedures, findings, and conclusions of the traffic impact analysis. This analysis identifies recommended improvements based on existing intersection geometrics and planned geometric improvements, existing traffic volumes and additional traffic expected to be generated by the proposed Wal-Mart SuperCenter development.

PART B – EXECUTIVE SUMMARY

The executive summary includes a description of the study area and site location, description of the development, and conclusions based on the findings of the TIA. All recommendations are based on analysis which follows the methods described in the *2000 Highway Capacity Manual (HCM)*.

Study Area and Site Location

The proposed site is located on the north side Egg Harbor Road at Alabama Street, immediately north of the existing Wal-Mart store.

The study area included in the traffic impact analysis includes the following intersections:

- North 8th Avenue intersection with:
  - Georgia Street (stop sign control - see Transportation Detail);
  - Egg Harbor Road (stop sign control - see Transportation Detail);
- Peterson Road intersection with:
  - Proposed new northern driveway to development (stop sign control – see Site Plan);
  - Existing middle driveway to development (stop sign control- see Transportation Detail);
  - Existing southern driveway to development (stop sign control- see Transportation Detail);
  - Egg Harbor Road (stop sign control - see Transportation Detail).
- North 14th Avenue intersection with:
  - Michigan Street (stop sign control - see Transportation Detail).

- Egg Harbor Road intersection with:
  - Alabama Street/Driveway to development (stop sign control - see Transportation Detail).
- STH 42/57 intersection with:
  - Egg Harbor Road (stop sign control - see Transportation Detail)
  - Alabama Street (stop sign control - see Transportation Detail).

The proposed Wal-Mart SuperCenter development site location and study area are shown in Exhibit 1-1 at the end of this chapter.

On-Site Development Traffic Generation

The *Institute of Transportation Engineers (ITE) Trip Generation Manual, 7th Edition* was utilized to estimate the volume of traffic generated by the Wal-Mart SuperCenter development. The expected land uses for the proposed development are summarized below:

2009 build-out

- Wal-Mart SuperCenter (83,800 square feet (sf) of additional store);
- Outlot: Fast food restaurant with drive-through (3,500-sf).

It should be noted that the land use for the Wal-Mart SuperCenter listed above was calculated based on the new store footprint of 148,800-sf with a deduction of 65,000-sf for the existing store footprint which is planned to be removed as part of the project. The proposed Wal-Mart SuperCenter was assumed to be constructed and occupied in the Year 2009. Two main access points are proposed for the full build out of the SuperCenter development. The first main access point replaces the existing access driveway that aligns to form the north leg of the Egg Harbor Road intersection with Alabama Street. The second access point is a new access located north of the existing grocery store on Peterson Road. Cross access with the existing grocery store is also proposed as part of the development with two additional access points to/from the grocery store off of Peterson Road. Traffic generated from the above land uses was assigned to the study area intersections for 2009 Build, 2019 Build and 2019 Total traffic conditions.

Off-Site Development Traffic Generation

Three off-site developments which could potentially redevelop in the next 10 years have been identified within the limits of the study area by the City of Sturgeon Bay. The three off-site developments include the vacant K-Mart site, a development along Alabama Street between North 18th Avenue and North 15th Place; and a redevelopment along the north side of Egg Harbor Road, east of North 12th Avenue.

For purposes of this study, the proposed developments were expected to be constructed and open by the Year 2019.

PART C - RECOMMENDATIONS

Based on the results of the analysis performed at the study area intersections, the following improvements are recommended. Note that LOS D or better conditions were used to define acceptable peak hour operating conditions at the study area intersections. *Note that all improvements are subject to change based upon the TIA review by the Wisconsin Department of*

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The existing K-Mart warehouse located along Egg Harbor Road at North 18th Avenue has the potential to redevelop into a similar use within the next 10 years. The full build out of this redevelopment was assumed to include the following land uses:¶
<#>Free Standing Discount Store (90,000-sf).¶
For purposes of this study, the proposed redevelopment was expected to be constructed and open by the Year 2019.¶
Alabama Street Recreational Facility¶
The 30 acre farm field located on the southwest corner of Alabama Street and North 18th Avenue has the potential to develop into a large recreational complex within the next 10 years. The full build out of this parcel was assumed to include the following land uses:¶
<#>Sports Fields (8 fields);¶
For purposes of this study, the proposed development was expected to be constructed and open by the Year 2019.¶
Egg Harbor/12th Avenue Redevelopment¶
The parcel of land located along the north side of Egg Harbor Road, immediately east of North 12th Avenue, has the potential to redevelop into a commercial use within the next 10 years. The full build out of this redevelopment was assumed to include the following land uses:¶
<#>Shopping Center (40,000-sf).¶

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Transportation (WisDOT) and the City of Sturgeon Bay. The information summarized below is for preliminary use only.

Year 2009 Background (without development) Traffic Recommended Improvements

The study area intersections were analyzed based on the procedures set forth in the *2000 Highway Capacity Manual* (HCM). For the purpose of this study, LOS D was used to define acceptable peak hour operating conditions for the study area intersections.

The following improvements, as shown in Exhibit 1-2, are recommended at the study area intersections for the Year 2009 background (without development) traffic conditions.

Egg Harbor Road at Alabama Street

- Install four-way stop sign control.
- Construct a dedicated right-turn lane on the northbound approach.

In addition, the following additional improvements can be considered for the Wisconsin Department of Transportation's STH 42/57 corridor improvement project:

STH 42/57 at Alabama Street

- Install traffic signal control (if 4-hour or 8-hour traffic signal warrants are met) or roundabout control.
- Construct a dedicated left-turn lane on the northbound and southbound approaches.

STH 42/57 at Egg Harbor Road

- Install traffic signal control (if 4-hour or 8-hour traffic signal warrants are met) or roundabout control.
- Construct a dedicated left-turn lane on the northbound and southbound approaches.

It is noted that the STH 42/57 intersections with Alabama Street and Egg Harbor Road are not expected to operate acceptably from a delay standpoint; however, traffic signals are not expected to be warranted at these intersections under the Year 2009 background traffic conditions. However, the STH 42/57 corridor is being studied by WisDOT and improvements to these intersections, including the implementation of right-turn only access at the STH 42/57 intersection with Alabama Street, are expected as part of that WisDOT project.

All other intersections are expected to operate acceptably under the Year 2009 background (without development) traffic conditions with the existing geometrics and traffic control.

Year 2009 Build (with Wal-Mart SuperCenter development) Traffic Recommended Improvements

The following improvements, as shown in Exhibit 1-3a, are recommended at the study area intersections for the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2009 background recommended improvements.*

Egg Harbor Road at Alabama Street

- Install traffic signal control.
- Construct dedicated left-turn lanes on the northbound and southbound approached.
- Construct dedicated left-turn lanes on the eastbound and westbound approaches.

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- Construct a dedicated right-turn lane on the westbound approach.

Pedestrian Facilities

- Sidewalks and bike accommodations should be provided within the proposed site.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements as described in Chapter 5 of this report. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration.

All other intersections are expected to operate acceptably under the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions with the existing geometrics and traffic control.

Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) Traffic Recommended Improvements

No additional improvements, as shown in Exhibit 1-3b, above and beyond the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions are recommended at the study area intersections for the Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) traffic conditions.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements as described in Chapter 5 of this report. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration.

All other intersections are expected to operate acceptably under the Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) traffic conditions with the existing geometrics and traffic control.

Year 2019 Background (without development) Traffic Recommended Improvements

No additional improvements, as shown in Exhibit 1-4, above and beyond the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions are recommended at the study area intersections for the Year 2019 background (without development) traffic conditions.

It is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 background (without development) traffic

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conditions. In addition, traffic signals may be warranted at this intersection in the future based on a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied.

All other intersections are expected to operate acceptably under the Year 2019 background (without development) traffic conditions with the existing geometrics and traffic control.

Year 2019 Build (with Wal-Mart SuperCenter development) Traffic Recommended Improvements

The following improvements, as shown in Exhibit 1-5, are recommended at the study area intersections for the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2009 Build recommended improvements.*

Egg Harbor Road at Alabama Street

- Provide eastbound left-turn phasing at signalized intersection.

Egg Harbor Road at Peterson Road

- Install traffic signal control or roundabout control.

Pedestrian Facilities

- Sidewalks and bike accommodations should be provided within the proposed site.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Peterson Road, a single lane roundabout would also provide an acceptable level of service for all movements. As stated earlier in the report, at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration. Therefore, if a roundabout is chosen as the preferred traffic control at the intersection of Egg Harbor Road at Peterson Road, it should be noted that a traffic signal at the Alabama Street intersection should operate acceptably being adjacent to the roundabout as the intersections are approximately 900 feet apart and queuing is not expected to be excessive at either intersection. A further discussion on roundabout control is provided in Chapter 5 of this report.

Finally, it is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a preliminary analysis of a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied. All public streets are expected to operate acceptably with the implementation of the above mentioned improvements.

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All other intersections are expected to operate acceptably under the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions with the existing geometrics and traffic control.

Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) Traffic Recommended Improvements

The following improvements, as shown in Exhibit 1-6, are recommended at the study area intersections for the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2019 Build recommended improvements.*

STH 42/57 at Alabama Street

- Provide northbound left-turn phasing at the signalized intersection.

North 8th Avenue at Egg Harbor Road

- Extend the right-turn lane on the southwest-bound lane as shown on the exhibit.
- Extend the left-turn lane on the southbound lane as shown on the exhibit.

North 8th Avenue at Georgia Street

- Extend the right-turn lane on the northbound lane as shown on the exhibit.

Optional Improvements

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North 8th Avenue at Egg Harbor Road

- If the parcel of land on the northeast quadrant of the intersection can be acquired, construct a single-lane roundabout.

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It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Peterson Road, a single lane roundabout would also provide an acceptable level of service for all movements. As stated earlier in the report, at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration. Therefore, if a roundabout is chosen as the preferred traffic control at the intersection of Egg Harbor Road at Peterson Road, it should be noted that a traffic signal at the Alabama Street intersection should operate acceptably being adjacent to the roundabout as the intersections are approximately 900 feet apart and queuing is not expected to be excessive at either intersection. A further discussion on roundabout control is provided in Chapter 5 of this report.

It is also noted that some of the movements at the northbound and southbound approaches at the North 8th Avenue intersection with Egg Harbor Road are not expected to operate acceptably from a delay standpoint during the weekday and weekend peak hours; however, due to right-of-way constraints, reconfiguring this intersection to include additional lanes and or providing roundabout control is not feasible. Therefore, delays and minor queues are expected at this intersection during the weekday and weekend peak hours under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. However, if the parcel of land

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on the northeast quadrant of the intersection can be acquired, a single-lane roundabout would provide acceptable operations at this intersection.

Finally, it is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach and a dedicated through lane with a shared through/right-turn lane on the east approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a preliminary analysis of a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied. All public streets are expected to operate acceptably with the implementation of the above mentioned improvements.

All other intersections are expected to operate acceptably under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions with the existing geometrics and traffic control.

PART D - CONCLUSIONS

Improvements are recommended for the study area intersections to improve the study area intersection operation to acceptable levels. The implementation of the above-recommended geometric improvements is expected to result in safe and efficient traffic operations through the Year 2019 at the public street intersections with the full build-out of the Wal-Mart SuperCenter development.

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CHAPTER II – PROPOSED DEVELOPMENT

PART A – ON-SITE DEVELOPMENT

Development Description and Site Location

A new Wal-Mart SuperCenter development is proposed to replace the existing Wal-Mart store located on the north side Egg Harbor Road at Alabama Street in Sturgeon Bay, Wisconsin. The new Wal-Mart SuperCenter is proposed to be located immediately north of the existing Wal-Mart store. Exhibit 2-1 shows the site location for the proposed development.

Land Use and Intensity

The following land uses were assumed to occupy the development site.

- Wal-Mart SuperCenter (83,800-sf of additional store);
- Outlot: Fast food restaurant with drive-through (3,500-sf).

It should be noted that the land use for the Wal-Mart SuperCenter listed above was calculated based on the new store footprint of 148,800-sf with a deduction of 65,000-sf for the existing store footprint which is planned to be removed as part of the project. The proposed Wal-Mart SuperCenter was assumed to be constructed and occupied in the Year 2009.

Site Plan

The Wal-Mart SuperCenter development is proposed to replace the existing Wal-Mart store located on the north side Egg Harbor Road at Alabama Street. The new Wal-Mart SuperCenter is proposed to be located immediately north of the existing store and northeast of the existing grocery store which will remain. The development is bounded to the south, east and west by commercial developments as well as long term storage facilities. In addition, the proposed development is bounded to the north by farm fields. Two main access points are proposed for the full build out of the SuperCenter development. The first main access point replaces the existing access driveway that aligns to form the north leg of the Egg Harbor Road intersection with Alabama Street. The second access point is a new access located north of the existing grocery store on Peterson Road. Cross access with the existing grocery store is also proposed as part of the development with two additional access points to/from the grocery store off of Peterson Road.

The conceptual site plan for the Wal-Mart SuperCenter development, which shows the locations of the development access points, is shown in Exhibit 2-2.

Development Phasing and Timing

The development is expected to be constructed under two phases with the Wal-Mart SuperCenter being constructed in phase 1 and the outlot being constructed at some point in the future. However, for the purpose of this study, the entire development was assumed to be built-out and operational by the end of 2009. Exhibit 2-3 shows the construction phasing for the Wal-Mart SuperCenter development.

PART B – STUDY AREA

Influence Area

Since STH 42/57 is the main arterial to the Door County area, the Wal-Mart SuperCenter development is expected to draw from both a regional customer base and from the Door County

tourist base. Therefore, the areas of significant influence include the City of Sturgeon Bay, and many of the Door County surrounding cities, villages and towns.

Area of Significant Traffic Impact

The study area included in the traffic impact analysis, as shown in Exhibit 2-1, includes the following intersections:

- North 8th Avenue intersection with:
  - Georgia Street (stop sign control - see Transportation Detail);
  - Egg Harbor Road (stop sign control - see Transportation Detail);
- Peterson Road intersection with:
  - Proposed new northern driveway to development (stop sign control – see Site Plan);
  - Existing middle driveway to development (stop sign control- see Transportation Detail);
  - Existing southern driveway to development (stop sign control- see Transportation Detail);
  - Egg Harbor Road (stop sign control - see Transportation Detail).
- North 14th Avenue intersection with:
  - Michigan Street (stop sign control - see Transportation Detail).
- Egg Harbor Road intersection with:
  - Alabama Street/Driveway to development (stop sign control - see Transportation Detail).
- STH 42/57 intersection with:
  - Egg Harbor Road (stop sign control - see Transportation Detail)
  - Alabama Street (stop sign control - see Transportation Detail).

PART C – OFF-SITE LAND USE AND DEVELOPME NT

Three off-site developments which could potentially redevelop in the next 10 years have been identified within the limits of the study area by the City of Sturgeon Bay. The three off-site developments include the vacant K-Mart site, a development along Alabama Street between North 18th Avenue and North 15th Place; and a redevelopment along the north side of Egg Harbor Road, east of North 12th Avenue.

For purposes of this study, the proposed developments were expected to be constructed and open by the Year 2019.

The existing and expected land uses within the study area are shown in Exhibit 2-4.

PART D – SITE ACCESSIBILITY

The study area roadways are discussed below:

STH 42/57 is a two-lane undivided north/south arterial highway with a posted speed limit of 45 miles per hour (mph). The Year 2006 Annual Average Daily Traffic (AADT) collected by

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The existing K-Mart warehouse located along Egg Harbor Road at North 18th Avenue has the potential to redevelop into a similar use within the next 10 years. The full build out of this redevelopment was assumed to include the following land uses:¶
<#>Free Standing Discount Store (90,000-sf).¶
For purposes of this study, the proposed redevelopment was expected to be constructed and open by the Year 2019.¶
Alabama Street Recreational Facility¶
The 30 acre farm field located on the southwest corner of Alabama Street and North 18th Avenue has the potential to develop into a large recreational complex within the next 10 years. The full build out of this parcel was assumed to include the following land uses:¶
<#>Sports Fields (8 fields);¶
For purposes of this study, the proposed development was expected to be constructed and open by the Year 2019.¶
Egg Harbor/12th Avenue Redevelopment¶
The parcel of land located along the north side of Egg Harbor Road, immediately east of North 12th Avenue, has the potential to redevelop into a commercial use within the next 10 years. The full build out of this redevelopment was assumed to include the following land uses:¶
<#>Shopping Center (40,000-sf).¶

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WisDOT on STH 42/57 was 10,000 vpd south of Alabama Street; 6,900 vpd south of Egg Harbor Road and 10,100 vpd north of CTH BB. STH 42/57 is an asphalt roadway with 3' paved shoulders and an additional 9' gravel shoulders through the study area.

Michigan Street (CTH TT) is a two-lane undivided east/west highway with dedicated turn lanes in the vicinity of North 14th Avenue. Michigan Street has an urban cross-section with a posted speed limit of 25 mph. The Year 2006 AADT on Michigan Street was 5,300 vpd west of North 14th Avenue and the Year 2003 AADT was 4,500-vpd east of North 14th Avenue. Sidewalks are provided along the north side of Michigan Street within the limits of the study area.

Alabama Street (CTH T) is a two-lane undivided east/west highway within the limits of the study area. Alabama Street has a rural cross-section with a posted speed limit of 25 mph from Egg Harbor Road to 18th Avenue and a posted speed limit of 35 mph east of 18th Avenue. The Year 2006 AADT on Alabama Street was 1,900 vpd east of Egg Harbor Road and the Year 2003 AADT was 2,500 vpd west of STH 42/57. No sidewalks are provided along Alabama Street within the limits of the study area.

Egg Harbor Road is a two-lane undivided northeast/southwest roadway to the west of STH 42/57. Egg Harbor Road intersects with STH 42/57 to create a "T" intersection. To the west of Peterson Road, Egg Harbor Road is proposed to be constructed to a 3-lane TWLTL cross section in the fall of 2008. Egg Harbor Road has a rural cross-section and a posted speed limit of 25 mph from the south project limits to a point just south of 18th Avenue. The speed limit changes to 35 mph northeast of this point. The Year 2006 AADT on Egg Harbor Road was 9,700 vpd southwest of Peterson Road, 5,000 southwest of 18th Avenue and 3,800 vpd west of STH 42/57. Pedestrian and bicycle lanes are planned along both sides of Egg Harbor Road from North 8th Avenue to Peterson Road.

Peterson Road is a two-lane undivided north/south roadway with an urban cross-section from the northern project limits through the intersection at Egg harbor Road where it becomes North 14th Avenue. At a point south of Egg Harbor Road, the cross section transitions to a rural cross-section and back to an urban cross section at Georgia Street through the southern project limits. The posted speed limit is 25 mph from Michigan Street up to the proposed development driveway where it changes to 35 mph to the north. The Year 2003 AADT on Peterson Road was 4,600 vpd north of Egg Harbor Road and on North 14th Avenue it was 4,000 vpd south of Georgia Street and 3,500-vpd north of Georgia Street. No sidewalks are provided along Peterson Road within the limits of the study area.

North 8th Avenue is a two-lane undivided north/south roadway with an urban cross-section from the northern project limits through Egg harbor Road. North 8th Avenue intersects with Egg Harbor Road to create a "T" intersection from the north. From the south, North 8th Avenue is a four-lane undivided cross-section and changes into Egg Harbor Road from the south at the "T" intersection with Egg Harbor Road. The posted speed limit on North 8th Avenue is 25 mph within the limits of the study area. The Year 2003 AADT on North 8th Avenue was 1,100 vpd north of Egg Harbor Road and 7,800 south of Georgia Street. Sidewalks are provided along both sides of North 8th Avenue south of Georgia Street and along the west side of the street to the north of Egg Harbor Road. In addition, pedestrian and bicycle lanes are planned along both sides of Egg Harbor Road to the north from the intersection of North 8th Avenue and Egg Harbor Road.

Georgia Street is a two-lane undivided east/west roadway that intersects with North 8th Avenue as an offset intersection with the east approach being located approximately 30 feet south of the west approach. Georgia Street has an urban cross-section with parking lanes and a posted speed

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limit of 25 mph within the study area. There is currently no AADT data available on Georgia Street at this time. Sidewalks are provided along both sides of Georgia Street to the west of North 8th Avenue only.

As previously mentioned, the study area for the Wal-Mart SuperCenter development includes the North 8th Avenue intersections with Georgia Street (stop sign control) and Egg Harbor Road (stop sign control). In addition, the Peterson Road intersections with the proposed new northern driveway to development (stop sign control), the two existing driveways to the development (stop sign control); Egg Harbor Road (stop sign control) and Michigan Street (stop sign control) are also included. Finally, the Egg Harbor Road intersection with Alabama Street (stop sign control) and the STH 42/57 intersections with Egg Harbor Road (stop sign control) and Alabama Street (stop sign control) are also included.

Alternative Modes of Transportation

Pedestrian and bicycle lanes are planned to be constructed along both sides of Egg Harbor Road from North 8th Avenue to Peterson Road in the fall of 2008. Based on pedestrian trip rates calculated from other urban Wal-Mart SuperCenter locations in the Milwaukee area, the proposed Wal-Mart SuperCenter development is expected to generate an additional 10 pedestrians during the weekday evening peak period and another 10 pedestrians during the Saturday midday peak period. However, for analysis purposes of this traffic study, all patrons traveling to and from the Wal-Mart SuperCenter development were assumed to do so by motor vehicle.

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CHAPTER III – ANALYSIS OF EXISTING CONDITIONS

PART A – PHYSICAL CHARACTERISTICS

Exhibits 3-1a & b shows the existing and planned configurations of study area intersections and roadways. More specifically, Exhibit 3-1a graphically illustrates existing intersection geometrics, existing traffic control, posted speed limits, approximate distances between intersections, and the number of travel lanes and median types along roadways within the study area. Exhibit 3-1b shows a typical cross-section of the planned improvements to Egg Harbor Road between North 8th Avenue and Peterson Road including the planned pedestrian facilities.

PART B – TRAFFIC VOLUMES

Traffic Analysis & Design, Inc. conducted typical weekday evening (4:00 to 6:00 pm), Saturday midday (11:00 am to 1:00 pm) and Sunday midday (11:00 am to 1:00 pm) turning movement counts at the study area intersections. All counts were taken in July of 2008. In addition, turning movement counts taken from a previous study were also conducted at the STH 42/57 intersections during mid-January of 2006. Based on the turning movement counts, the weekday evening, Saturday midday and Sunday midday peak hours were identified as being 4:00 to 5:00 pm, 11:00 am to 12:00 pm and 11:30 am to 12:30 pm, respectively. The traffic counts used to determine peak hour factors and truck percents for each study area intersection have been included in Appendix A following this report.

The traffic counts conducted by Traffic Analysis & Design, Inc. were submitted to WisDOT for their use in providing future year projections. Traffic projections are discussed in greater detail in *Chapter IV—Projected Traffic*. The Year 2009 background traffic volumes are shown in Exhibit 3-2.

PART C – CAPACITY LEVEL OF SERVICE

The study area intersections were analyzed based on the procedures set forth in the *2000 Highway Capacity Manual* (HCM). Intersection operation is defined by "level of service". Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS 'A', to very poor, represented by LOS 'F'. For the purpose of this study, LOS D was used to define acceptable peak hour operating conditions at the study area intersections. Descriptions of the various levels of service are as follows:

LOS A is the highest level of service that can be achieved. Under this condition, intersection approaches appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation. At signalized and unsignalized intersections, average delays are less than 10 seconds.

LOS B represents stable operation. At signalized intersections, average vehicle delays are 10 to 20 seconds. At unsignalized intersections, average delays are 10 to 15 seconds.

LOS C still represents stable operation, but periodic backups of a few vehicles may develop behind turning vehicles. Most drivers begin to feel restricted, but not objectionably so. At signalized intersections, average vehicle delays are 20 to 35 seconds. At unsignalized intersections, average delays are 15 to 25 seconds.

LOS D represents increasing traffic restrictions as the intersection approaches instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but periodic clearance of long lines occurs, thus preventing excessive backups.

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At signalized intersections, average vehicle delays are 35 to 55 seconds. At unsignalized intersections, average delays are 25 to 35 seconds.

LOS E represents the capacity of the intersection. At signalized intersections, average vehicle delays are 55 to 80 seconds. At unsignalized intersections, average delays are 35 to 50 seconds.

LOS F represents jammed conditions where the intersection is over capacity and acceptable gaps for unsignalized intersections in the mainline traffic flow are minimal. At signalized intersections, average vehicle delays exceed 80 seconds. At unsignalized intersections, average delays exceed 50 seconds.

Year 2009 Background Traffic Operating Conditions

Exhibit 3-3 shows the Year 2009 background traffic peak hour operating conditions at the study area intersections. The existing and planned intersection geometrics, shown in Exhibits 3-1a & b, were used in the analysis.

As shown in Exhibit 3-3, all movements at the study area intersections are expected to operate at LOS D or better conditions during the weekday evening, Saturday midday and Sunday midday peak traffic hours except for:

- All movements at the northbound and southbound approaches (LOS E) of the Egg Harbor Road intersection with Alabama Street;
- All movements at the eastbound approach (LOS E) of the Egg Harbor Road intersection with STH 42/57;
- All movements at the westbound approach (LOS F) of the Alabama Street intersection with STH 42/57.

PART D – SOURCES OF DATA

Weekday evening, Saturday midday and Sunday midday peak hour turning movement counts were conducted by Traffic Analysis & Design, Inc. in July of 2008 and mid-January of 2006 as described above.

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CHAPTER IV – PROJECTED TRAFFIC

PART A – NON-SITE TRAFFIC FORECASTING

Turning movement traffic counts conducted by Traffic Analysis & Design, Inc. were submitted to WisDOT for their use in identifying Year 2009 and Year 2019 traffic projections. The WisDOT traffic projections are included in Appendix A of this report. The Year 2019 background traffic volumes are shown in Exhibit 4-1 at the end of this chapter.

PART B – SITE TRAFFIC FORECASTING

To address any potential future traffic impacts along study area roadways and at the intersections adjacent to the development, it is necessary to identify the hourly and daily volume of traffic generated by the proposed development. The expected traffic volumes generated by the development are based on the size and type of the proposed land use, and on trip rates as published in the Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 7th Edition, 2003*.

On-Site Trip Generation

The expected trip generation for the full build out of the proposed Wal-Mart SuperCenter development is shown in Exhibit 4-2a. Note that 20-percent of the development trips are expected to be linked trips, or trips that visit more than one destination in the site without leaving the site (i.e. a SuperCenter customer visits the fast food restaurant without leaving the site). In addition, approximately 10-percent of the remaining driveway trips are expected to be pass-by trips. A pass-by trip occurs when a motorist stops off at a development before continuing on their intended route (i.e. a motorist traveling southbound on Peterson Road stops off at the SuperCenter before continuing southbound on Peterson Road). The pass-by trips were not allowed to exceed 10-percent of the existing traffic volumes along Egg Harbor Road or Peterson Road per WisDOT guidelines.

As shown in Exhibit 4-2a, the Wal-Mart SuperCenter development is expected to generate 445 new trips (220 entering/225 exiting) during a typical weekday evening peak hour. Of the 445 trips, approximately 90 are expected to be linked trips and another 40 are expected to be pass-by trips, resulting in 315 new trips (155 entering/160 exiting) during a typical weekday evening peak hour.

During the Saturday midday peak hour, the proposed development is expected to generate 625 build trips (320 entering/305 exiting) during a typical Sunday midday peak hour. Of the 625 trips, approximately 125 are expected to be linked trips and another 50 are expected to be pass-by trips, resulting in 450 new trips (230 entering/220 exiting) during a typical Saturday midday peak hour.

During the Sunday midday peak hour, the proposed development is expected to generate 615 build trips (305 entering/310 exiting) during a typical Sunday midday peak hour. Of the 615 trips, approximately 125 are expected to be linked trips and another 50 are expected to be pass-by trips, resulting in 440 new trips (215 entering/225 exiting) during a typical Sunday midday peak hour.

On a typical weekday (24-hour period), the Wal-Mart SuperCenter development is expected to generate 5,860 new trips, of which approximately 1,170 are expected to be linked trips and another 470 are expected to be pass-by trips, resulting in 4,220 new trips (2,110 entering/2,110 exiting) upon full build out of the development.

On-Site Trip Generation – Worst Case (Parking Lot Full)

In addition to analyzing the study area intersections based on the traditional industry standard utilizing the ITE Trip Generation rates, the City of Sturgeon Bay has requested that a worst case

analysis be performed utilizing a trip generation based on the number of parking spaces within the proposed site. For this analysis the volume of traffic generated by the new store with a 75-percent turnover during the peak hour was utilized.

The expected trip generation for the full build out of the proposed Wal-Mart SuperCenter development under a full parking lot is shown in Exhibit 4-2b. As shown in Exhibit 4-2b, the Wal-Mart SuperCenter development is expected to generate 745 new trips (375 entering/370 exiting) during the worst case peak hour scenario. Of the 745 trips, approximately 150 are expected to be linked trips and another 70 are expected to be pass-by trips, resulting in 525 new trips (265 entering/260 exiting) during the worst case peak hour scenario.

Off-Site Trip Generation

Three off-site developments which could potentially redevelop in the next 10 years have been identified within the limits of the study area by the City of Sturgeon Bay. The three off-site developments include the vacant K-Mart site, a development along Alabama Street between North 18th Avenue and North 15th Place; and a redevelopment along the north side of Egg Harbor Road, east of North 12th Avenue.

As shown in Exhibit 4-2c, the potential off-site redevelopments are expected to generate approximately 770 new trips (415 entering/355 exiting) during a typical weekday evening peak hour. During the Saturday midday peak hour; approximately 1,110 new trips (560 entering/550 exiting) are expected to be generated. During the Sunday midday peak hour; approximately 1,015 new trips (515 entering/500 exiting) are expected to be generated with the full build out of all of the potential off-site redevelopments. On a typical weekday (24-hour period), the potential off-site redevelopments are expected to generate approximately 7,330 new trips (3,665 entering/3,665 exiting) upon full build out.

Mode Split

Pedestrian and bicycle lanes are planned to be constructed along both sides of Egg Harbor Road from North 8th Avenue to Peterson Road in the fall of 2008. Based on pedestrian trip rates calculated from other urban Wal-Mart SuperCenter locations in the Milwaukee area, the proposed Wal-Mart SuperCenter development is expected to generate an additional 10 pedestrians during the weekday evening peak period and another 10 pedestrians during the Saturday midday peak period. However, for analysis purposes of this traffic study, all patrons traveling to and from the Wal-Mart SuperCenter development were assumed to do so by motor vehicle.

Determination of Pass-by and Linked Trip Traffic

As previously mentioned, during the full build out of development, 20-percent of the development trips are expected to be linked trips, or trips that visit more than one destination in the site without leaving the site (i.e. a SuperCenter customer visits the fast food restaurant without leaving the site). In addition, approximately 10-percent of the remaining driveway trips are expected to be pass-by trips. A pass-by trip occurs when a motorist stops off at a development before continuing on their intended route (i.e. a motorist traveling southbound on Peterson Road stops off at the SuperCenter before continuing southbound on Peterson Road). The pass-by trips were not allowed to exceed 10-percent of the existing traffic volumes along Egg Harbor Road or Peterson Road per WisDOT guidelines.

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Trip Distribution

The trip distribution for the proposed Wal-Mart SuperCenter development was based on existing traffic patterns (Analogy Method) and the location of regionally populated areas both inside and outside the City of Sturgeon Bay (Gravity Model Method). The trip distributions used are shown graphically in Exhibit 4-3.

- 15% to and from the north on STH 42/57;
- 15% to and from the south on STH 42/57;
- 25% to and from the south on North 8th Avenue;
- 10% to and from the north on North 8th Avenue;
- 10% to and from the east on Michigan Street;
- 10% to and from the west on Michigan Street;
- 5% to and from the west on Georgia Street;
- 3% to and from the east on Georgia Street;
- 2% to and from the east on Alabama Street;
- 5% to and from the north on 14th Avenue.

Trip Assignment

Traffic generated by the Wal-Mart SuperCenter development was assigned to the adjacent roadway system based on the above directional distribution to determine additional turning movement traffic at the study area intersections.

On-Site Trip Assignment – Year 2009 Build Out

The Wal-Mart SuperCenter new trips (Exhibit 4-4a) were added to the Wal-Mart SuperCenter pass-by trips (Exhibit 4-4b) to identify the Wal-Mart SuperCenter driveway trips shown in Exhibit 4-4c.

On-Site Trip Assignment – Year 2009 Worst Case Build Out

The Wal-Mart SuperCenter (worst case) new trips (Exhibit 4-4d) were added to the Wal-Mart SuperCenter (worst case) pass-by trips (Exhibit 4-4e) to identify the Wal-Mart SuperCenter (worst case) driveway trips shown in Exhibit 4-4f.

On-Site Redistributed Trip Assignment – Year 2009 Build Out

The eastern driveway off of Egg Harbor Road is expected to be eliminated as part of the proposed development. Therefore, the existing trips at this driveway are expected to utilize the proposed driveway located on the north approach at the Alabama Street intersection. The Year 2009 Wal-Mart SuperCenter redistributed trips are shown in Exhibit 4-4g.

Off-Site Trip Assignment – Year 2019 Build Out

The K-Mart redevelopment new trips (Exhibit 4-5a) were added to the Alabama Street development new trips (Exhibit 4-5b) and the Egg Harbor Road/12th Avenue redevelopment new trips (Exhibit 4-5c) to determine the Year 2019 Total off-site new trips which are shown in Exhibit 4-5d.

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On-Site Redistributed Trip Assignment – Year 2019 Build Out

The eastern driveway off of Egg Harbor Road is expected to be eliminated as part of the proposed development. Therefore, the existing trips at this driveway are expected to utilize the proposed driveway located on the north approach at the Alabama Street intersection. The Year 2009 Wal-Mart SuperCenter redistributed trips are shown in Exhibit 4-5e.

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PART C – BUILD TRAFFIC

Year 2019 Background Traffic

The Year 2019 background traffic volumes at the study area intersections, provided by WisDOT are shown in Exhibit 4-1.

Year 2009 Build Traffic

The Year 2009 Build traffic volumes were identified by adding the Wal-Mart SuperCenter development driveway trips (Exhibit 4-4c) to the Year 2009 background traffic volumes (Exhibit 3-3) and the Year 2009 Wal-Mart Redistributed trips (Exhibit 4-4g). The Year 2009 Build traffic volumes are shown in Exhibit 4-6a.

Year 2009 Build (Worst Case – Parking Lot Full) Traffic

The Year 2009 Build (Worst Case) traffic volumes were identified by adding the Wal-Mart SuperCenter development driveway (Worst Case) trips (Exhibit 4-4f) to the Year 2009 background traffic volumes (Exhibit 3-3) and the Year 2009 Wal-Mart Redistributed trips (Exhibit 4-4g). The Year 2009 Build (Worst Case) traffic volumes are shown in Exhibit 4-6b.

Year 2019 Build Traffic

The Year 2019 Build traffic volumes are shown in Exhibit 4-7. The Year 2019 Build traffic volumes were identified by adding the Wal-Mart SuperCenter development driveway trips (Exhibit 4-4c) to the Year 2019 background traffic volumes (Exhibit 4-1) and the Year 2019 Wal-Mart Redistributed trips (Exhibit 4-5e).

Year 2019 Total Traffic

The Year 2019 Total traffic volumes are shown in Exhibit 4-8. The Year 2019 Total traffic volumes were identified by adding the off-site redevelopment new trips (Exhibit 4-5d) to the Year 2019 Build traffic volumes (Exhibit 4-7).

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CHAPTER V – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

The Wal-Mart SuperCenter development is proposed to have two main access points. The first main access point replaces the existing access driveway that aligns to form the north leg of the Egg Harbor Road intersection with Alabama Street. The second access point is a new access located north of the existing grocery store on Peterson Road. Cross access with the existing grocery store is also proposed as part of the development with two additional access points to the grocery store off of Peterson Road.

PART B – CAPACITY / LEVEL OF SERVICE ANALYSIS

Year 2019 Background (without development) Traffic Operating Conditions – No Improvements

The Year 2019 background traffic (no development) peak hour operating conditions are shown in Exhibit 5-1. The existing and planned intersection geometrics, shown in Exhibits 3-1a & b, were used in the analysis.

As shown in Exhibit 5-1, all movements at the study area intersections are expected to operate at LOS D or better conditions during the weekday evening, Saturday midday and Sunday midday peak traffic hours except for:

- All movements at the eastbound approach (LOS F) of the Peterson Road intersection with Michigan Street;
- All movements at the northbound and southbound approaches (LOS E/F) of the Egg Harbor Road intersection with Alabama Street;
- All movements at the eastbound approach (LOS F) of the Egg Harbor Road intersection with STH 42/57;
- All movements at the eastbound and westbound approaches (LOS E/F) of the Alabama Street intersection with STH 42/57.

Improvements to these operational deficiencies are addressed further in this chapter. All other movements at the study area intersections are expected to continue to operate acceptably at LOS D or better conditions under Year 2019 background traffic volumes (no development).

Year 2009 Build (with Wal-Mart SuperCenter development) Traffic – No Improvements

The Year 2009 Build traffic (with Wal-Mart SuperCenter development) peak hour operating conditions are shown in Exhibit 5-2a. The existing and planned intersection geometrics, shown in Exhibits 3-1a & b, were used in the analysis.

As shown in Exhibit 5-2a, all movements at the study area intersections are expected to operate at LOS D or better conditions during the weekday evening, Saturday midday and Sunday midday peak traffic hours except for:

- All movements at the northbound and southbound approaches (LOS F) of the Egg Harbor Road intersection with Alabama Street;
- All movements at the eastbound approach (LOS F) of the Egg Harbor Road intersection with STH 42/57;

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- All movements at the westbound approach (LOS F) of the Alabama Street intersection with STH 42/57.

Improvements to these operational deficiencies are addressed further in this chapter. All other movements at the study area intersections are expected to continue to operate acceptably at LOS D or better conditions under Year 2009 Build traffic volumes (with Wal-Mart SuperCenter development).

Year 2009 Build Worst Case (with Wal-Mart SuperCenter development with full parking lot) Traffic – No Improvements

The Year 2009 Build (Worst Case) traffic (with Wal-Mart SuperCenter development with full parking lot) peak hour operating conditions are shown in Exhibit 5-2b. The existing and planned intersection geometrics, shown in Exhibits 3-1a & b, were used in the analysis.

As shown in Exhibit 5-2b, all movements at the study area intersections are expected to operate at LOS D or better conditions during the weekday evening, Saturday midday and Sunday midday peak traffic hours except for:

- All movements at the northbound and southbound approaches (LOS F) of the Egg Harbor Road intersection with Alabama Street.

Improvements to these operational deficiencies are addressed further in this chapter. All other movements at the study area intersections are expected to continue to operate acceptably at LOS D or better conditions under Year 2009 Build (Worst Case) traffic volumes (with Wal-Mart SuperCenter development with full parking lot).

Year 2019 Build (with Wal-Mart SuperCenter development) Traffic – No Improvements

The Year 2019 Build traffic (with Wal-Mart SuperCenter development) peak hour operating conditions are shown in Exhibit 5-3. The existing and planned intersection geometrics, shown in Exhibits 3-1a & b, were used in the analysis.

As shown in Exhibit 5-3, all movements at the study area intersections are expected to operate at LOS D or better conditions during the weekday evening, Saturday midday and Sunday midday peak traffic hours except for:

- The left-turn movements at the eastbound and westbound approaches (LOS E/F) of the Peterson Road intersection with Egg Harbor Road;
- All movements at the eastbound approach (LOS F) of the Peterson Road intersection with Michigan Street;
- All movements at the northbound and southbound approaches (LOS F) of the Egg Harbor Road intersection with Alabama Street;
- All movements at the eastbound approach (LOS F) of the Egg Harbor Road intersection with STH 42/57;
- All movements at the eastbound and westbound approaches (LOS F) of the Alabama Street intersection with STH 42/57.

Improvements to these operational deficiencies are addressed further in this chapter. All other movements at the study area intersections are expected to continue to operate acceptably at LOS D or better conditions under Year 2019 Build traffic volumes (with Wal-Mart SuperCenter development).

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Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) Traffic – No Improvements

The Year 2019 Total traffic (with Wal-Mart SuperCenter and Off-site developments) peak hour operating conditions are shown in Exhibit 5-5. The existing and planned intersection geometrics, shown in Exhibits 3-1a & b, were used in the analysis.

As shown in Exhibit 5-5, all movements at the study area intersections are expected to operate at LOS D or better conditions during the weekday evening, Saturday midday and Sunday midday peak traffic hours except for:

- The left-turn movements at the southbound approach (LOS F) of the North 8th Avenue intersection with Egg Harbor Road;
- The left-turn movements at the eastbound and westbound approaches (LOS F) of the Peterson Road intersection with Egg Harbor Road;
- All movements at the eastbound approach (LOS F) of the Peterson Road intersection with Michigan Street;
- All movements at the northbound and southbound approaches (LOS F) of the Egg Harbor Road intersection with Alabama Street;
- All movements at the eastbound approach (LOS F) of the Egg Harbor Road intersection with STH 42/57;
- All movements at the eastbound and westbound approaches (LOS F) of the Alabama Street intersection with STH 42/57.

Improvements to these operational deficiencies are addressed further in this chapter. All other movements at the study area intersections are expected to continue to operate acceptably at LOS D or better conditions under Year 2019 Build traffic volumes (with Wal-Mart SuperCenter development).

Year 2009 Background (without development) Traffic Operating Conditions – *Recommended Improvements*

As shown in Exhibit 5-6, all movements at the study area intersections are expected to operate acceptably under Year 2009 background traffic volumes with the following recommended improvements. *Note that all improvements are subject to change based upon the TIA review by the Wisconsin Department of Transportation (WisDOT) and the City of Sturgeon Bay. The information summarized below is for preliminary use only.*

Egg Harbor Road at Alabama Street

- Install four-way stop sign control.
- Construct a dedicated right-turn lane on the northbound approach.

In addition, the following additional improvements can be considered for the Wisconsin Department of Transportation's STH 42/57 corridor improvement project:

STH 42/57 at Alabama Street

- Install traffic signal control (if 4-hour or 8-hour traffic signal warrants are met) or roundabout control.
- Construct a dedicated left-turn lane on the northbound and southbound approaches.

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STH 42/57 at Egg Harbor Road

- Install traffic signal control (if 4-hour or 8-hour traffic signal warrants are met) or roundabout control.
- Construct a dedicated left-turn lane on the northbound and southbound approaches.

It is noted that the STH 42/57 intersections with Alabama Street and Egg Harbor Road are not expected to operate acceptably from a delay standpoint; however, traffic signals are not expected to be warranted at these intersections under the Year 2009 background traffic conditions. However, the STH 42/57 corridor is being studied by WisDOT and improvements to these intersections, including the implementation of right-turn only access at the STH 42/57 intersection with Alabama Street, are expected as part of that WisDOT project.

All other intersections are expected to operate acceptably under the Year 2009 background (without development) traffic conditions with the existing geometrics and traffic control.

Year 2019 Background (without development) Traffic Operating Conditions – *Recommended Improvements*

As shown in Exhibit 5-7, select movements at the study area intersections are expected to continue to operate at LOS F conditions under Year 2019 background (without development) traffic volumes. However, no additional improvements above and beyond the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions are recommended at the study area intersections for the Year 2019 background (without development) traffic conditions.

It is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 background (without development) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied.

All other intersections are expected to operate acceptably under the Year 2019 background (without development) traffic conditions with the existing geometrics and traffic control.

Year 2009 Build (with Wal-Mart SuperCenter) Traffic – *Recommended Improvements*

As shown in Exhibit 5-8a, all movements at the study area intersections are expected to operate acceptably under the Year 2009 Build (with Wal-Mart SuperCenter) traffic volumes with the following recommended improvements. *These improvements are expected to be recommended in addition to the Year 2009 background recommended improvements.*

Egg Harbor Road at Alabama Street

- Install traffic signal control.
- Construct dedicated left-turn lanes on the northbound and southbound approached.
- Construct dedicated left-turn lanes on the eastbound and westbound approaches.
- Construct a dedicated right-turn lane on the westbound approach.

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Pedestrian Facilities

- Sidewalks and bike accommodations should be provided within the proposed site.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements as described in Chapter 5 of this report. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration.

All other intersections are expected to operate acceptably under the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions with the existing geometrics and traffic control.

Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) Traffic – *Recommended Improvements*

As shown in Exhibit 5-8b, all movements at the study area intersections are expected to operate acceptably under the Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) traffic conditions with no additional improvements above and beyond Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements as described in Chapter 5 of this report. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration.

All other intersections are expected to operate acceptably under the Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) traffic conditions with the existing geometrics and traffic control.

Year 2019 Build (with Wal-Mart SuperCenter development) Traffic – *Recommended Improvements*

As shown in Exhibit 5-9, select movements at the study area intersections are still expected to operate at LOS E/F conditions under Year 2019 Build (with Wal-Mart SuperCenter development) traffic volumes. The following improvements are recommended at the study area intersections for Year 2019 Build (with Wal-Mart SuperCenter) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2009 Build recommended improvements.*

Egg Harbor Road at Alabama Street

- Provide eastbound left-turn phasing at signalized intersection.

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Egg Harbor Road at Peterson Road

- Install traffic signal control or roundabout control.

Pedestrian Facilities

- Sidewalks and bike accommodations should be provided within the proposed site.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Peterson Road, a single lane roundabout would also provide an acceptable level of service for all movements. As stated earlier in the report, at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration. Therefore, if a roundabout is chosen as the preferred traffic control at the intersection of Egg Harbor Road at Peterson Road, it should be noted that a traffic signal at the Alabama Street intersection should operate acceptably being adjacent to the roundabout as the intersections are approximately 900 feet apart and queuing is not expected to be excessive at either intersection. A further discussion on roundabout control is provided in Chapter 5 of this report.

Finally, it is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a preliminary analysis of a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied. All public streets are expected to operate acceptably with the implementation of the above mentioned improvements.

All other intersections are expected to operate acceptably under the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions with the existing geometrics and traffic control.

Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) Traffic – *Recommended Improvements*

As shown in Exhibit 5-11, select movements at the study area intersections are still expected to operate at LOS F conditions under Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic volumes. The following improvements are recommended at the study area intersections for Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2019 Build recommended improvements.*

STH 42/57 at Alabama Street

- Provide northbound left-turn phasing at the signalized intersection.

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North 8th Avenue at Egg Harbor Road

- Extend the right-turn lane on the southwest-bound lane as shown on the exhibit.
- Extend the left-turn lane on the southbound lane as shown on the exhibit.

North 8th Avenue at Georgia Street

- Extend the right-turn lane on the northbound lane as shown on the exhibit.

Optional Improvements

North 8th Avenue at Egg Harbor Road

- If the parcel of land on the northeast quadrant of the intersection can be acquired, construct a single-lane roundabout.

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It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Peterson Road, a single lane roundabout would also provide an acceptable level of service for all movements. As stated earlier in the report, at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration. Therefore, if a roundabout is chosen as the preferred traffic control at the intersection of Egg Harbor Road at Peterson Road, it should be noted that a traffic signal at the Alabama Street intersection should operate acceptably being adjacent to the roundabout as the intersections are approximately 900 feet apart and queuing is not expected to be excessive at either intersection. A further discussion on roundabout control is provided in Chapter 5 of this report.

It is also noted that some of the movements at the northbound and southbound approaches at the North 8th Avenue intersection with Egg Harbor Road are not expected to operate acceptably from a delay standpoint during the weekday and weekend peak hours; however, due to right-of-way constraints, reconfiguring this intersection to include additional lanes and or providing roundabout control is not feasible. Therefore, delays and minor queues are expected at this intersection during the weekday and weekend peak hours under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. However, if the parcel of land on the northeast quadrant of the intersection can be acquired, a single-lane roundabout would provide acceptable operations at this intersection.

Finally, it is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach and a dedicated through lane with a shared through/right-turn lane on the east approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a preliminary analysis of a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when

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MUTCD warrants are satisfied. All public streets are expected to operate acceptably with the implementation of the above mentioned improvements.

All other intersections are expected to operate acceptably under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions with the existing geometrics and traffic control.

PART C – QUEUEING ANALYSIS

To estimate storage length requirements for turn bays at the study area intersections, a queuing analysis has been conducted. Note that a 95% probable queue length was used for the design of turn bays at traffic signal controlled and stop sign controlled intersections. The computer model Synchro 7 was used to determine the 95% probable queue length at the study area intersections. The following is a list of where the results of the queuing analysis can be found.

- Year 2009 Background Traffic – Exhibit 5-12;
- Year 2009 Build Traffic - Exhibit 5-13a;
- Year 2009 Build (Worst Case) Traffic - Exhibit 5-13b;
- Year 2019 Background Traffic – Exhibit 5-14;
- Year 2019 Build Traffic – Exhibit 5-15;
- Year 2019 Total Traffic – Exhibit 5-16.

PART D – PEDESTRIAN, BICYCLE AND MULTI-USE TRAIL CONSIDERATIONS

Pedestrian and bicycle lanes are planned to be constructed along both sides of Egg Harbor Road from North 8th Avenue to Peterson Road in the fall of 2008. Based on pedestrian trip rates calculated from other urban Wal-Mart SuperCenter locations in the Milwaukee area, the proposed Wal-Mart SuperCenter development is expected to generate an additional 10 pedestrians during the weekday evening peak period and another 10 pedestrians during the Saturday midday peak period. However, for analysis purposes of this traffic study, all patrons traveling to and from the Wal-Mart SuperCenter development were assumed to do so by motor vehicle.

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PART E – TRAFFIC CONTROL NEEDS/WARRANT ANALYSIS

A roundabout analysis was performed using Rodel software to determine the recommended geometry that would be recommended if the roundabout alternative was selected as the preferred alternative at several of the study area intersections. Based on the traffic volumes expected at these intersections, the following geometrics would be required for each of the traffic volume scenarios:

Egg Harbor Road @ Peterson Road:
Year 2009 Build Traffic – Single lane roundabout;
Year 2019 Build Traffic – Same as 2009 Build Traffic;
Year 2019 Total Traffic – Same as 2019 Build Traffic.

Egg Harbor Road @ Alabama Street/Wal-Mart Driveway:
Year 2009 Build Traffic – Single lane roundabout;
Year 2019 Build Traffic – Same as 2009 Build Traffic;
Year 2019 Total Traffic – Same as 2019 Build Traffic.

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Egg Harbor Road @ 8th Avenue:
Year 2019 Total Traffic – Single lane roundabout.

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STH 42/57 @ Egg Harbor Road:
Year 2009 Build Traffic – Single lane roundabout;
Year 2019 Build Traffic – Same as 2009 Build Traffic;
Year 2019 Total Traffic – Same as 2019 Build Traffic.

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STH 42/57 @ Alabama Street:
Year 2009 Build Traffic – Single lane roundabout;
Year 2019 Build Traffic – Same as 2009 Build Traffic;
Year 2019 Total Traffic – Same as 2019 Build Traffic.

The decision to choose a specific traffic control improvement (traffic signal or roundabout) for the study area intersections is best left to the City of Sturgeon Bay and WisDOT. To aid these jurisdictions with their decision making processes, Traffic Analysis & Design, Inc. has completed an alternative traffic control analysis and conceptual roundabout schematics to objectively compare roundabouts to signal control or stop sign control at these intersections.

The following is a list of where the alternative traffic control analysis for each intersection under the Year 2019 Total traffic conditions is located:

- Egg Harbor & Peterson Road – Exhibit 5-17;
- Egg Harbor & Alabama/Wal-Mart Driveway – Exhibit 5-18.

PART F – TRAFFIC SIGNAL WARRANT ANALYSIS

To provide safe and efficient traffic operations along the STH 42/57 corridor, it is recommended to install traffic signals at several of the intersections.

The need for traffic signals was investigated by Traffic Analysis & Design, Inc. at the Egg Harbor intersections with Alabama Street and Peterson Road under the Year 2009 Build (with Wal-Mart SuperCenter development) traffic volume conditions. Eight hour traffic count data was conducted at these intersections for this study. In addition, the need for traffic signals was also investigated at the Peterson Road intersection with Michigan Street; however, eight hour traffic count data wasn't conducted for this intersection. Therefore, a full traffic signal warrant analysis was not performed at this study area intersection. Instead, peak hour turning movement counts were collected which allowed for a preliminary Peak Hour traffic signal warrant study to be completed.

For the Egg Harbor intersection with Peterson Road, the warrant analysis assumes Egg Harbor as a highway with two or more approach lanes and the minor street movements as a 2-lane minor street approach. For the Egg Harbor intersection with Alabama Street, the warrant analysis assumes Egg Harbor as a highway with one approach lane and the minor street movements as a 1-lane minor street approach. For the North 14th Avenue intersection with Michigan Street the warrant analysis assumes Michigan Street as a highway with two or more approach lanes and the minor street movements as a 2-lane minor street approach. Based on the WisDOT Traffic Signal Design Manual (TSDM), the minor street right-turn volume should not be included in the warrant analysis. Therefore, the right-turn volumes at these intersections were not included in the analysis, per WisDOT guidelines.

Chapter 4C of the 2003 *Manual on Uniform Traffic Control Devices* (MUTCD) outlines the standards for determining the need for traffic signals at a particular location. For a traffic signal

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to be installed, at least one of the following warrants must be satisfied. The eight signal warrants are listed below:

- Warrant 1, Eight-Hour Vehicular Volume.
- Warrant 2, Four-Hour Vehicular Volume.
- Warrant 3, Peak Hour.
- Warrant 4, Pedestrian Hour.
- Warrant 5, School Crossing.
- Warrant 6, Coordinated Signal Systems.
- Warrant 7, Crash Experience.
- Warrant 8, Roadway Network.

Warrants 1, 2, 3 and the left-turn conflict analysis has been evaluated for the Egg Harbor Road locations and only Warrant 3 has been evaluated for the North 14th Avenue intersection with Michigan Street.

It is noted that the MUTCD has different criteria based on rural communities less than 10,000. Per the MUTCD, since the population of Sturgeon Bay is less than 10,000 people, the 70-percent rural traffic signal warrant analysis volume thresholds were used in this analysis.

As shown in the Appendix F of this report, traffic signals are expected to be warranted at the Egg Harbor Road intersections with Peterson Road and Alabama Avenue under the 2019 Build (with Wal-Mart SuperCenter) traffic conditions. In addition, based on the Peak Hour warrant, traffic signal warrants have the potential for being met in the future at the North 14th Avenue intersection with Michigan Street.

A summary of the warrant analysis and the calculations/thresholds for the warrant analysis are shown in Appendix F.

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CHAPTER VI – RECOMMENDATIONS AND CONCLUSION

PART A – RECOMMENDATIONS

Based on the results of the analysis performed at the study area intersections, the following improvements are recommended. Note that LOS D or better conditions were used to define acceptable peak hour operating conditions at the study area intersections. *Note that all improvements are subject to change based upon the TIA review by the Wisconsin Department of Transportation (WisDOT) and the City of Sturgeon Bay. The information summarized below is for preliminary use only.*

Year 2009 Background (without development) Traffic Recommended Improvements

The study area intersections were analyzed based on the procedures set forth in the *2000 Highway Capacity Manual* (HCM). For the purpose of this study, LOS D was used to define acceptable peak hour operating conditions for the study area intersections.

The following improvements are recommended at the study area intersections for the Year 2009 background (without development) traffic conditions.

Egg Harbor Road at Alabama Street

- Install four-way stop sign control.
- Construct a dedicated right-turn lane on the northbound approach.

In addition, the following additional improvements can be considered for the Wisconsin Department of Transportation's STH 42/57 corridor improvement project:

STH 42/57 at Alabama Street

- Install traffic signal control (if 4-hour or 8-hour traffic signal warrants are met) or roundabout control.
- Construct a dedicated left-turn lane on the northbound and southbound approaches.

STH 42/57 at Egg Harbor Road

- Install traffic signal control (if 4-hour or 8-hour traffic signal warrants are met) or roundabout control.
- Construct a dedicated left-turn lane on the northbound and southbound approaches.

It is noted that the STH 42/57 intersections with Alabama Street and Egg Harbor Road are not expected to operate acceptably from a delay standpoint; however, traffic signals are not expected to be warranted at these intersections under the Year 2009 background traffic conditions. However, the STH 42/57 corridor is being studied by WisDOT and improvements to these intersections, including the implementation of right-turn only access at the STH 42/57 intersection with Alabama Street, are expected as part of that WisDOT project.

All other intersections are expected to operate acceptably under the Year 2009 background (without development) traffic conditions with the existing geometrics and traffic control.

Year 2009 Build (with Wal-Mart SuperCenter development) Traffic Recommended Improvements

The following improvements are recommended at the study area intersections for the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions. *These improvements are*

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expected to be recommended in addition to the Year 2009 background recommended improvements.

Egg Harbor Road at Alabama Street

- Install traffic signal control.
- Construct dedicated left-turn lanes on the northbound and southbound approached.
- Construct dedicated left-turn lanes on the eastbound and westbound approaches.
- Construct a dedicated right-turn lane on the westbound approach.

Pedestrian Facilities

- Sidewalks and bike accommodations should be provided within the proposed site.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements as described in Chapter 5 of this report. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration.

All other intersections are expected to operate acceptably under the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions with the existing geometrics and traffic control.

Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) Traffic Recommended Improvements

No additional improvements above and beyond the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions are recommended at the study area intersections for the Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) traffic conditions.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements as described in Chapter 5 of this report. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration.

All other intersections are expected to operate acceptably under the Year 2009 Build Worst Case (with Wal-Mart SuperCenter development parking lot full) traffic conditions with the existing geometrics and traffic control.

Year 2019 Background (without development) Traffic Recommended Improvements

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No additional improvements above and beyond the Year 2009 Build (with Wal-Mart SuperCenter development) traffic conditions are recommended at the study area intersections for the Year 2019 background (without development) traffic conditions.

It is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 background (without development) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied.

All other intersections are expected to operate acceptably under the Year 2019 background (without development) traffic conditions with the existing geometrics and traffic control.

Year 2019 Build (with Wal-Mart SuperCenter development) Traffic Recommended Improvements

The following improvements are recommended at the study area intersections for the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2009 Build recommended improvements.*

Egg Harbor Road at Alabama Street

- Provide eastbound left-turn phasing at signalized intersection.

Egg Harbor Road at Peterson Road

- Install traffic signal control or roundabout control.

Pedestrian Facilities

- Sidewalks and bike accommodations should be provided within the proposed site.

It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Peterson Road, a single lane roundabout would also provide an acceptable level of service for all movements. As stated earlier in the report, at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration. Therefore, if a roundabout is chosen as the preferred traffic control at the intersection of Egg Harbor Road at Peterson Road, it should be noted that a traffic signal at the Alabama Street intersection should operate acceptably being adjacent to the roundabout as the intersections are approximately 900 feet apart and queuing is not expected to be excessive at either intersection. A further discussion on roundabout control is provided in Chapter 5 of this report.

Finally, it is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the

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west approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a preliminary analysis of a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied. All public streets are expected to operate acceptably with the implementation of the above mentioned improvements.

All other intersections are expected to operate acceptably under the Year 2019 Build (with Wal-Mart SuperCenter development) traffic conditions with the existing geometrics and traffic control.

Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) Traffic Recommended Improvements

The following improvements are recommended at the study area intersections for the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. *These improvements are expected to be recommended in addition to the Year 2019 Build recommended improvements.*

STH 42/57 at Alabama Street

- Provide northbound left-turn phasing at the signalized intersection.

North 8th Avenue at Egg Harbor Road

- Extend the right-turn lane on the southwest-bound lane as shown on the exhibit.
- Extend the left-turn lane on the southbound lane as shown on the exhibit.

North 8th Avenue at Georgia Street

- Extend the right-turn lane on the northbound lane as shown on the exhibit.

Optional Improvements

North 8th Avenue at Egg Harbor Road

- If the parcel of land on the northeast quadrant of the intersection can be acquired, construct a single-lane roundabout.

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It is noted that the City of Sturgeon Bay plans to construct pedestrian/bicycle lanes on the north and south sides of Egg Harbor Road within the street typical section from the west side of Peterson Road through North 8th Avenue. Sidewalks and cross walks should be incorporated into the site plan to allow for a connection into these planned facilities.

It is further noted that even though traffic signals are recommended at the Egg Harbor Road intersection with Peterson Road, a single lane roundabout would also provide an acceptable level of service for all movements. As stated earlier in the report, at the Egg Harbor Road intersection with Alabama Street, a single lane roundabout would also provide an acceptable level of service for all movements. However, due to the skew at which Alabama Street intersects Egg Harbor Road, right-of-way constraints are expected to eliminate a roundabout from consideration. Therefore, if a roundabout is chosen as the preferred traffic control at the intersection of Egg Harbor Road at Peterson Road, it should be noted that a traffic signal at the Alabama Street intersection should operate acceptably being adjacent to the roundabout as the intersections are

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approximately 900 feet apart and queuing is not expected to be excessive at either intersection. A further discussion on roundabout control is provided in Chapter 5 of this report.

It is also noted that some of the movements at the northbound and southbound approaches at the North 8th Avenue intersection with Egg Harbor Road are not expected to operate acceptably from a delay standpoint during the weekday and weekend peak hours; however, due to right-of-way constraints, reconfiguring this intersection to include additional lanes and or providing roundabout control is not feasible. Therefore, delays and minor queues are expected at this intersection during the weekday and weekend peak hours under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. However, if the parcel of land on the northeast quadrant of the intersection can be acquired, a single-lane roundabout would provide acceptable operations at this intersection.

Finally, it is noted that the west approach at the North 14th Avenue intersection with Michigan Street is not expected to operate acceptably from a delay standpoint; however, by reconfiguring the intersection to include a dedicated through lane with a shared through/left-turn lane on the west approach and a dedicated through lane with a shared through/right-turn lane on the east approach, the intersection could operate acceptably. Due to safety concerns with the close proximity of the school located adjacent to this intersection, this improvement is not recommended. Therefore, delays and minor queues are expected at this intersection during the weekday evening peak hour under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions. In addition, traffic signals may be warranted at this intersection in the future based on a preliminary analysis of a peak hour warrant. This intersection should be monitored for operation and a traffic signal installed at such time when MUTCD warrants are satisfied. All public streets are expected to operate acceptably with the implementation of the above mentioned improvements.

All other intersections are expected to operate acceptably under the Year 2019 Total (with Wal-Mart SuperCenter and Off-site developments) traffic conditions with the existing geometrics and traffic control.

PART B - CONCLUSIONS

Improvements are recommended for the study area intersections to improve the study area intersection operation to acceptable levels. The implementation of the above-recommended geometric improvements is expected to result in safe and efficient traffic operations through the Year 2019 at the public street intersections with the full build-out of the Wal-Mart SuperCenter development.