TRAFFIC ANALYSIS & DESIGN, INC.

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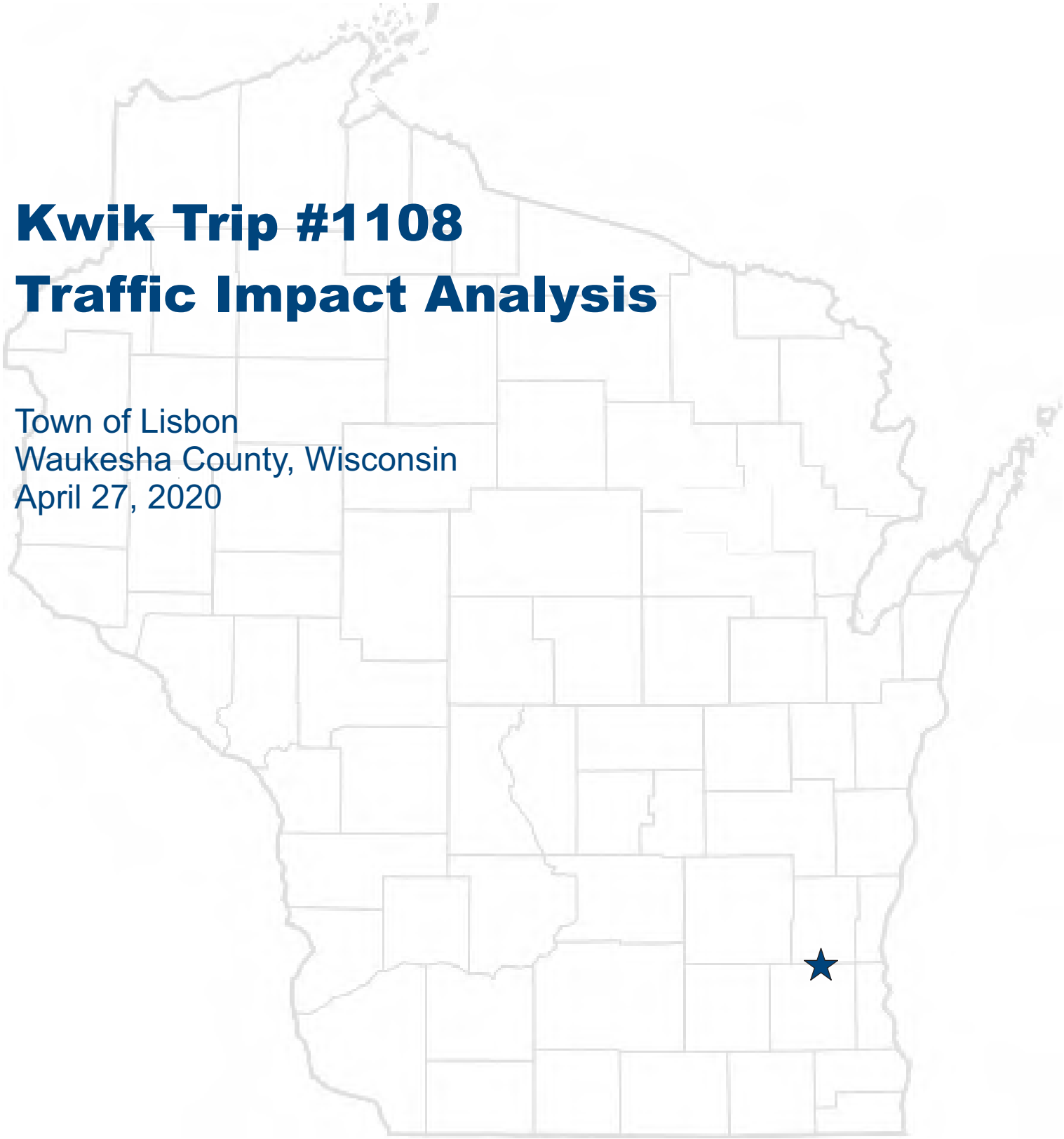
Kwik Trip #1108
Traffic Impact Analysis

Town of Lisbon
Waukesha County, Wisconsin
April 27, 2020



ABBREVIATED TRAFFIC IMPACT ANALYSIS FOR:

KWIK TRIP #1108

LISBON, WISCONSIN

April 27, 2020

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CHAPTER 1 – INTRODUCTION & EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

A Kwik Trip gas station and convenience store is proposed to be constructed in the southwest quadrant of State Trunk Highway (STH) 164 at County Line Road (CTH Q) in the Town of Lisbon, Waukesha County, Wisconsin. Driveway access is proposed at both STH 164 and CTH Q (jurisdiction of Washington County). An Initial Review document was prepared for this site and submitted to WisDOT on March 27, 2020. Based on the review, WisDOT requested that an abbreviated traffic impact analysis (Abbreviated TIA) be prepared for the development site.

This Abbreviated TIA report follows the WisDOT *Statewide TIA Guidelines*. The TIA evaluates the expected weekday AM and PM peak hour operating conditions with base year 2020 background traffic, plus the additional traffic volumes expected from the buildout of the proposed Kwik Trip. Based on the intersection capacity analysis, geometrics and traffic control, modifications were recommended if needed to mitigate unacceptable delays or traffic queues at the study intersections.

PART B – EXECUTIVE SUMMARY

The executive summary includes a description of the study area, description of the development and conclusions based on the findings of the TIA.

B1. Location of Study Site with Respect to Area Roadway Network

The study area includes the following intersections:

- CTH Q & STH 164 (multi-lane roundabout control)
- CTH Q & the Mobil west driveway/proposed Kwik Trip driveway (full access)
- CTH Q & the Mobil east driveway (full access)
- STH 164 & the proposed Kwik Trip driveway (right-in/right-out)

B2. Proposed Development

As shown on the conceptual site plan (Exhibit 1-1), the 22-fueling position Kwik Trip gas station with convenience market is proposed to have one full-access driveway to CTH Q, across from the Mobil gas station's west driveway and one right-in/right-only driveway to STH 164, at the southern edge of the site property. Based on trip generation for the site, the Kwik Trip is expected to generate 5,070 driveway trips on a typical weekday, with 390 driveway trips during the weekday AM peak hour and 325 driveway trips during the weekday PM peak hour. Development of the site is expected in 2021.

B3. Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM) 6th Edition using the Synchro 10 traffic analysis program. 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 or better was used to define desirable peak hour operating conditions.

The improvements listed below and shown on Exhibit 1-2 are recommended to accommodate traffic based on the assumptions outlined in the TIA. Improvements are split into these categories:

- "Background Traffic" – These improvements are recommended to mitigate a background traffic deficiency and are *not* driven by the proposed development. For this study, the background traffic conditions are a combination of the existing traffic volumes collected at the study intersections in November 2017 and March 2020.
- "Build Traffic" – These improvements are recommended in addition to the background traffic recommended improvements to mitigate an impact created by the proposed development.

Improvements are for jurisdictional consideration and are not legally binding. WisDOT, Washington County, and the Town of Lisbon reserves the right to determine alternative solutions.

CTH Q & Mobil W. Driveway/Kwik Trip Driveway

- *Background Traffic:* No modifications
- *Build Traffic:*
  - Provide a two-way left-turn lane (TWLTL) on CTH Q as shown on the Kwik Trip site plan. This median will separate left turns from the through lane for eastbound traffic turning into the Mobil W. driveway and westbound traffic turning into the Kwik Trip driveway.
  - Provide a single exit lane on the Kwik Trip driveway with stop sign control at CTH Q.

CTH Q & Mobil E. Driveway

- *Background Traffic:* No modifications
- *Build Traffic:* The TWLTL recommended on CTH Q will separate left turns from the through lane for eastbound traffic turning into the Mobil E. driveway.

STH 164 & Kwik Trip Driveway

- *Background Traffic:* N/A
- *Build Traffic:*
  - Provide a single-lane exit on the Kwik Trip driveway with stop sign control at STH 164.
  - Position the driveway in the southernmost 50 feet of the site property as shown on the site plan.
  - Close the median on STH 164 with the removal of the existing bank driveway to STH 164.
  - Provide a 10-foot paved shoulder along southbound STH 164 from the end of the curb and gutter for the STH 164/CTH Q roundabout south through the proposed Kwik Trip driveway to STH 164.

PART C – CONCLUSION

With the intersection modifications recommended above, the study intersections are expected to operate acceptably at LOS C or better during the peak hours with the buildout of the proposed Kwik Trip development in the southwest corner of the STH 164/CTH Q intersection. The proposed Kwik Trip is expected to generate higher, but reasonably similar peak hour traffic volumes at the proposed driveway to CTH Q and STH 164. Therefore, the WisDOT site access requirements stated in the December 3, 2014 letter for the October 20, 2014 C-Store Commercial Development TIA submittal are expected to be adequate for the alternate Kwik Trip use on the same site.

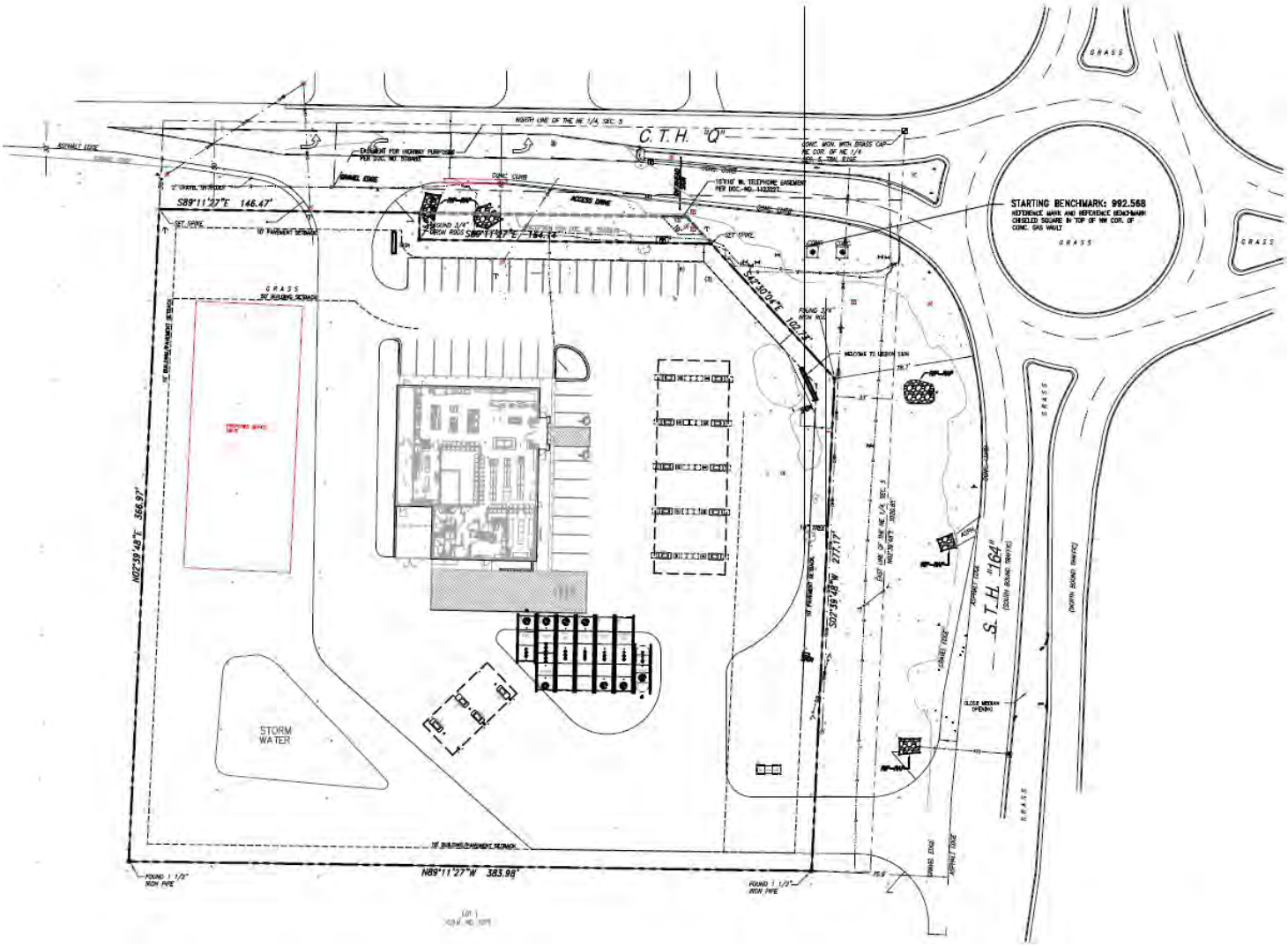

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EXHIBIT 1-1
KWIK TRIP #1108 CONCEPTUAL SITE PLAN

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

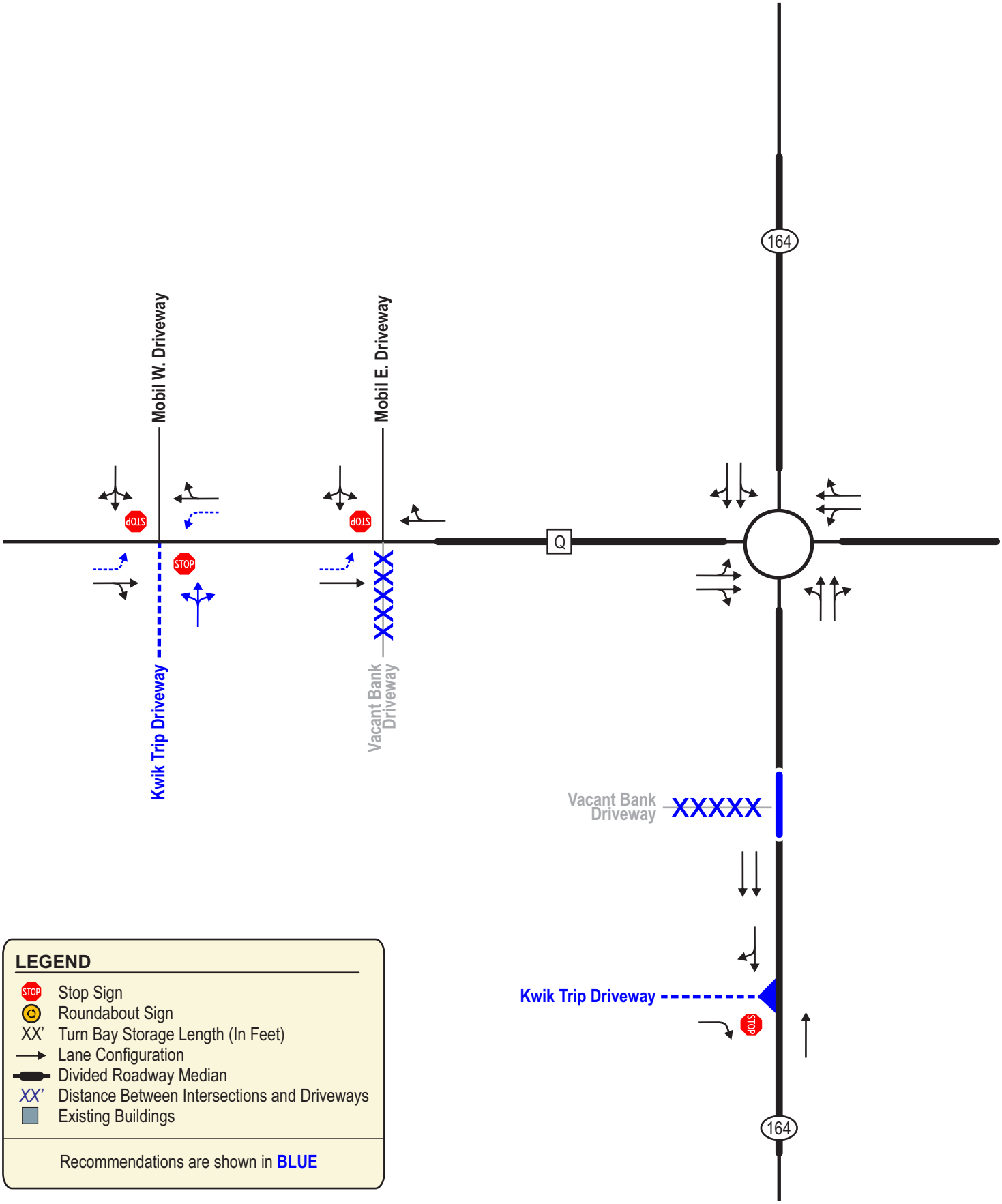

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EXHIBIT 1-2
RECOMMENDATIONS

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

CHAPTER 2 – PROPOSED DEVELOPMENT

PART A – ON-SITE DEVELOPMENT

A street map illustrating the location of the proposed development site with respect to the existing surrounding roadway system is shown on Exhibit 2-1. The site plan for the proposed Kwik Trip is shown on Exhibit 2-2. The development is shown to have a convenience store and 22 total fueling positions. Buildout is expected by the year 2021. Due to the site location and customer base, this Kwik Trip location will not be a 24-hour store. Instead, the hours of operation will be from 5:00 a.m. to 11:00 p.m. daily.

A now-vacant bank is currently located on the approximate 3-acre property. The bank has one full-access driveway to CTH Q, directly across from the Mobil gas station's east driveway, and one full-access driveway to STH 164, near the bottom 1/3 of the property. When redeveloped, it is proposed that the Kwik Trip will have one full-access driveway to CTH Q, directly across from the Mobil gas station's west driveway, and one right-in/right-in only driveway to STH 164, at the southern end of the property.

PART B – STUDY AREA

B1. Influence Area

The project site is located near the Lake Five area, about seven miles west of Menomonee Falls and over eight miles north of the Village of Pewaukee. Development near the study area includes a Mobil gas station, cemetery, retail, and single-family residential housing in the four corners surrounding the STH 164/CTH Q roundabout intersection. Residential neighborhoods are generally located to the east of the site, and vacant fields with sporadic farmhouses and other residences are located to the west. The existing and proposed land uses for the study area are shown on Exhibit 2-4.

B2. Area of Significant Traffic Impact

The study intersections evaluated in this TIA are listed below. The node number corresponds to the intersection to be modeled in the capacity analysis of the TIA. The existing control types are listed after each intersection.

- Node 100: CTH Q & STH 164 (multi-lane roundabout control)
- Node 200: CTH Q & the Mobil east driveway (stop sign control)
- Node 250: CTH Q & the Mobil west driveway/proposed Kwik Trip driveway (stop sign control)
- Node 300: STH 164 & the proposed Kwik Trip right-in/right-out driveway (future)

PART C – OFF-SITE LAND USE AND DEVELOPMENT

No off-site developments were identified for inclusion in this traffic impact study.

PART D – SITE ACCESSIBILITY

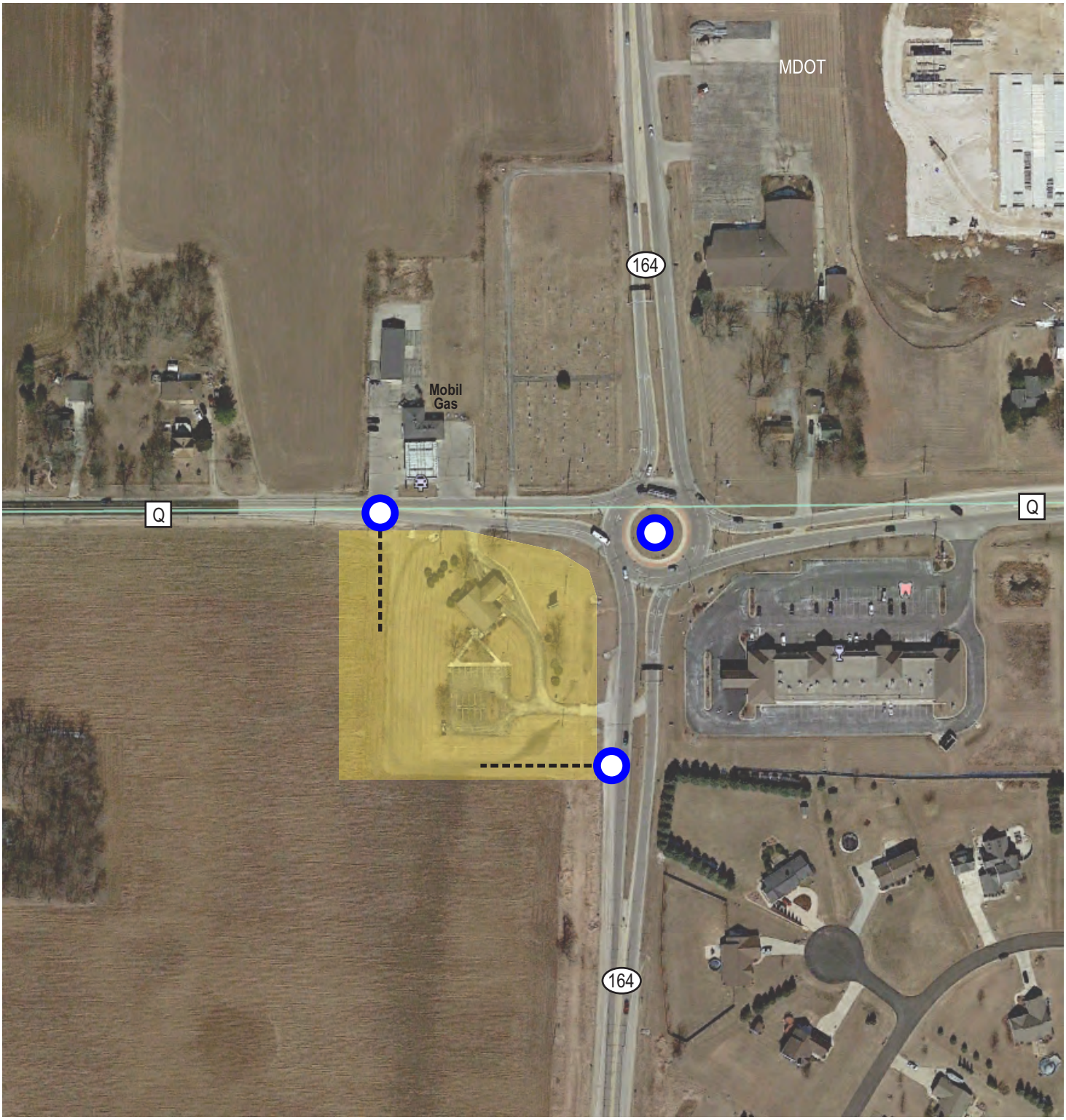
D1. Study Area Roadway

STH 164 is a north/south two-lane undivided Principal Arterial with a posted speed limit of 55 miles per hour (mph). The WisDOT Year 2018 annual average daily traffic (AADT) volume on STH 164 was 13,000 vehicles per day (vpd) north of CTH Q and 18,900-vpd south of CTH Q. No sidewalks currently exist along STH 164 within the limits of the study area.

CTH Q is an east-west two-lane undivided Principal Arterial with a posted speed limit of 40 mph to the west of STH 164 and 50 mph to the east. The WisDOT Year 2018 AADT volume on CTH Q was 3,900 vpd west of STH 164 and 8,600 vpd to the east. No sidewalks currently exist along CTH Q within the limits of the study area.

D2. Alternative Modes of Transportation

The development site is located in a generally rural area with no sidewalks or multi-use trails along either side of STH 164 or CTH Q. No regularly scheduled public transit service or park-and-ride lots were identified within the study area.



LEGEND

- Kwik Trip Site
- Proposed Access
- Study Intersection

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EXHIBIT 2-1
SITE LOCATION MAP

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

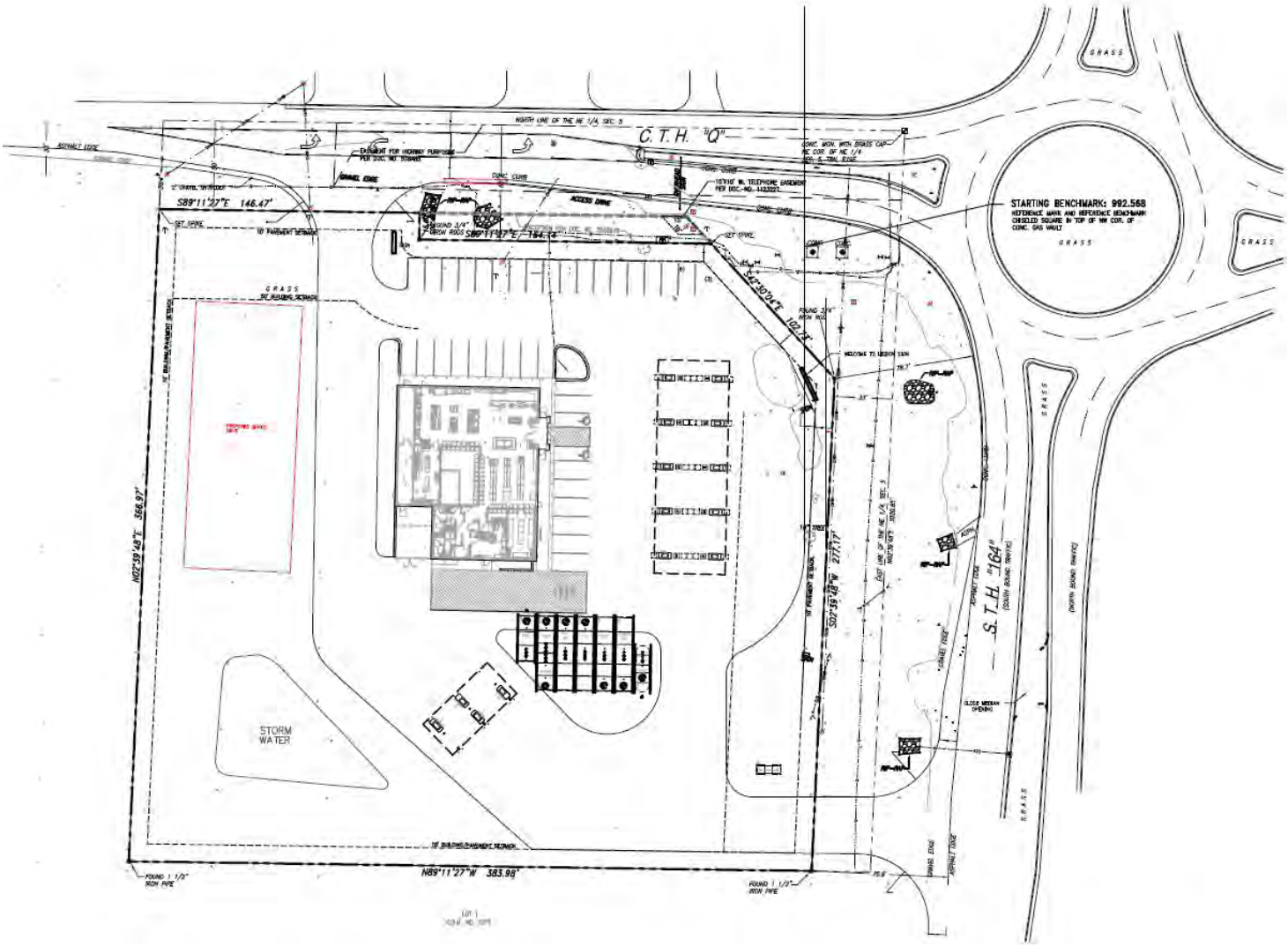

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EXHIBIT 2-2
KWIK TRIP #1108 CONCEPTUAL SITE PLAN

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

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EXHIBIT 2-4
EXISTING AND PROPOSED LAND USES

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

CHAPTER 3 – ANALYSIS OF EXISTING CONDITIONS

PART A – PHYSICAL CHARACTERISTICS

Exhibit 3-1 shows the existing transportation system detail for the roadways within the study area. The exhibit illustrates existing posted speed limits, distances between intersections and driveways, and existing intersection geometrics (travel lanes, intersection turn lanes, traffic control, and turn-lane storage).

PART B – TRAFFIC VOLUMES

B1. Data Collection

TADI collected weekday morning (6:00-9:00 a.m.) and weekday afternoon (3:00-6:00 p.m.) turning movement counts for traffic turning into and out of the Mobil gas station driveways. These counts were collected in the afternoon of Monday, March 9 and in the morning of Friday, March 13 and therefore may have represented volumes lower than normal due to the stay-home measures encouraged at the time for the Covid-19 pandemic (stay-home orders weren't yet required for Wisconsin residents). To better match the 2020 driveway counts to levels evaluated in previous studies, WisDOT directed that each driveway turning movement to be increased by five vehicles in the peak hours.

Due to the impact of the Covid-19 pandemic on traffic volumes at the adjacent STH 164/CTH Q study intersection, WisDOT directed that the November 2017 traffic count collected at that intersection be used for this study. The traffic count data used in this study is located in Appendix A.

B2. Peak Hours

Based on the November 2017 traffic count data collected at the STH 164/CTH Q intersection, the weekday peak hours were determined to occur during the following times:

- Weekday morning (AM) peak hour: 7:00-8:00 a.m.
- Weekday evening (PM) peak hour: 4:30-5:30 p.m.

B3. Existing & Background Traffic Volumes

The traffic count data was compiled for the weekday AM and PM peak hour time periods and are shown on Exhibit 3-2. These existing traffic volumes are also considered the base Year 2021 Background traffic volumes evaluated in this report.

PART C – CAPACITY LEVEL OF SERVICE

The study intersections were analyzed using the Synchro 10 traffic analysis model (outputs based on the Highway Capacity Manual, 6th Edition).

C1. Level of Service Definitions

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. 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 unsignalized intersections, average delays are less than 10 seconds.

LOS B represents stable operation. 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 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. At unsignalized intersections, average delays are 25 to 35 seconds.

LOS E represents the capacity of the intersection. 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 unsignalized intersections, average delays exceed 50 seconds.

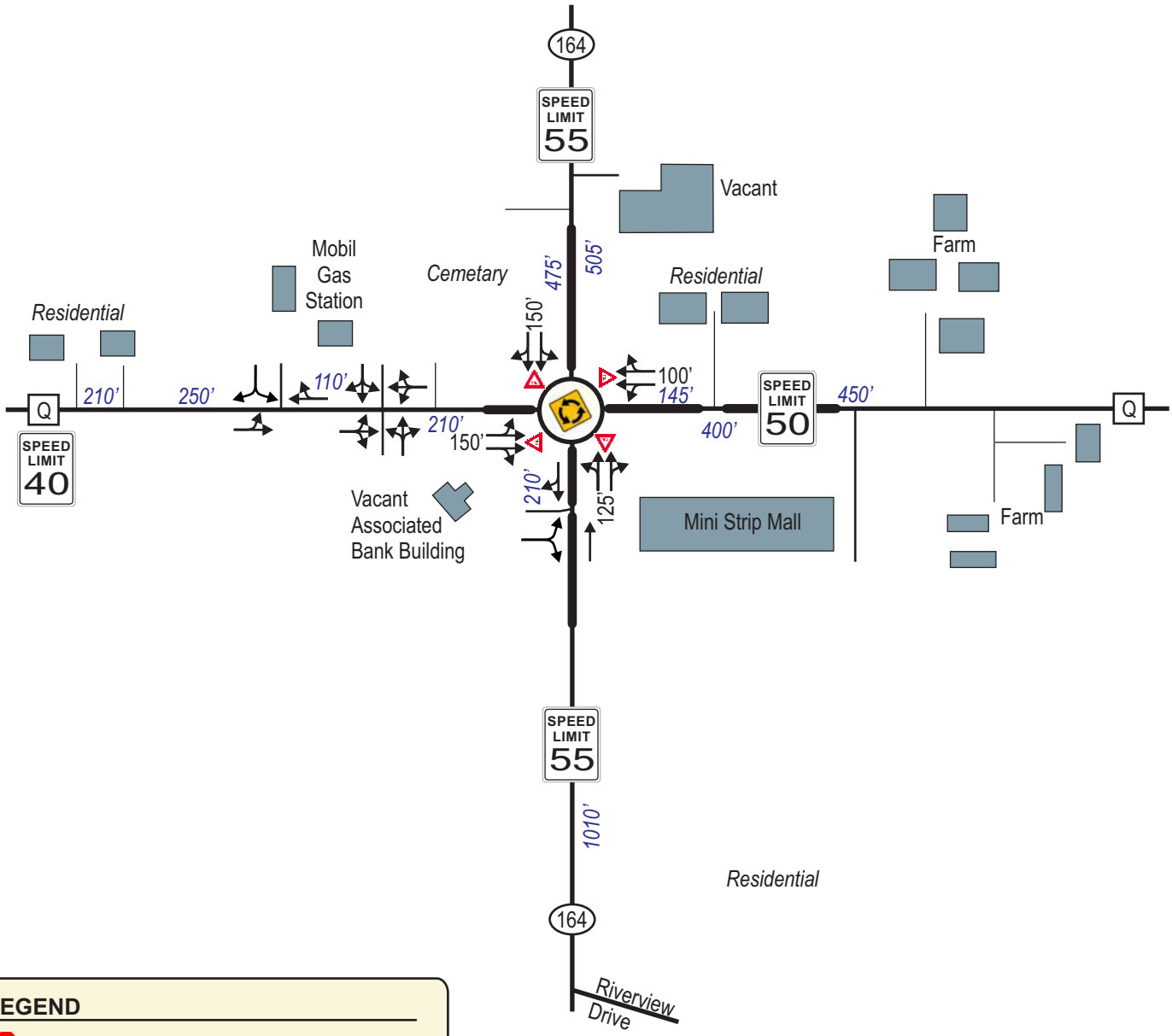
C2. Year 2021 Background Traffic Operating Conditions

The Year 2021 Background traffic capacity analysis was conducted using the existing geometrics and traffic control at the study intersections. As shown on Exhibit 3-3, all turning movements at the study intersections operate acceptably at LOS B or better during the peak hours. The traffic capacity/level of service analysis output sheets are located in Appendix B.

PART D – SOURCES OF DATA

The following sources of data were used for the traffic impact analysis:

- Intersection turning movement counts: TADI & WisDOT
- Historical AADT volumes at the study intersections: WisDOT Coverage Counts and traffic forecast AADT map
- Exiting Field Geometrics: TADI, Google Earth
- Site Access Requirements: TADI October 20, 2014 C-Store Commercial Development Traffic Impact Study and WisDOT requirement letter dated December 3, 2014.



LEGEND

- Stop Sign
- Roundabout Sign
- XX' Turn Bay Storage Length (In Feet)
- Lane Configuration
- Divided Roadway Median
- XX' Distance Between Intersections and Driveways
- Existing Buildings

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EXHIBIT 3-1
EXISTING TRANSPORTATION SYSTEM

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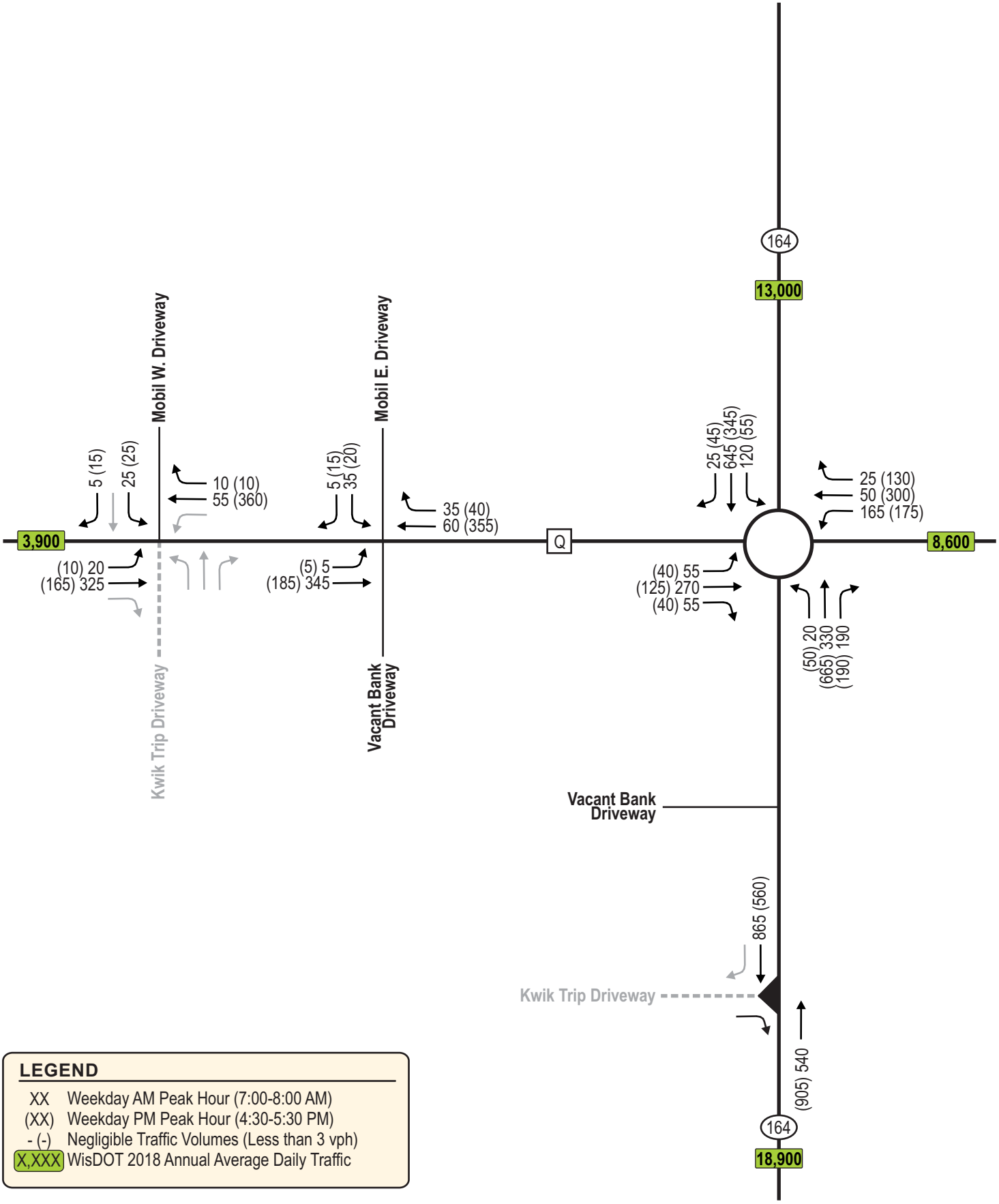

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EXHIBIT 3-2
YEAR 2021 BACKGROUND TRAFFIC VOLUMES

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

Intersection	Peak Hour	MOE[1,2]	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Node 100: CTH Q & STH 164[3] *(Roundabout)*	AM	LOS	B	-	B	A	-	A	A	-	A	A	-	A
		Queue	45	-	50	25	-	10	45	-	50	55	-	65
	PM	LOS	A	-	A	B	-	B	A	-	A	A	-	A
		Queue	15	-	15	55	-	65	60	-	70	30	-	35
Node 200: CTH Q & Mobil Gas E. Driveway *(Stop Sign)*	AM	LOS	A		-	-	A		-			B		
		Queue	0		-	-	0		-			10		
	PM	LOS	A		-	-	A		-			B		
		Queue	0		-	-	0		-			5		
Node 250: CTH Q & Mobil Gas W. Driveway *(Stop Sign)*	AM	LOS	A		-	-	A		-			B		
		Queue	0		-	-	0		-			5		
	PM	LOS	A		-	-	A		-			B		
		Queue	0		-	-	0		-			10		

[1] *(--) indicates a movement that is prohibited, not analyzed, or does not exist; All free-flow movements shown as LOS A.*

[2] *Queue is maximum of the 50th & 95th percentile queue, measured in feet.*

[3] *LT data is for the LT/TH lane group; RT data is for the TH/RT lane group.*

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EXHIBIT 3-3
YEAR 2021 BACKGROUND TRAFFIC CAPACITY/LOS ANALYSIS

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

CHAPTER 4 – PROJECTED TRAFFIC

PART A – BACKGROUND TRAFFIC FORECASTING

The Abbreviated TIA for the proposed development site evaluated base year 2021 traffic conditions. Therefore, no traffic forecasting was prepared for this TIA.

PART B – ON-SITE AND OFF-SITE DEVELOPMENT TRAFFIC FORECASTING

B1. Trip Generation

The expected traffic volumes generated by the proposed development were calculated based on trip rates or equations published in the ITE *Trip Generation Manual, 10th Edition, 2017*. The use of trip rates or equations was determined based on procedures listed in the trip generation manual and in the ITE *Trip Generation Handbook, 3rd Edition*. In the ITE manual, land uses with at least 10 fueling positions and an on-site convenience market of at least 3,000 square feet should be categorized as a "Super Convenience Market/Gas Station" (ITE land use 960).

Based on ITE rates for this land use and using peak hour volume of adjacent street traffic as the independent variable for the AM and PM peak hours, the proposed Kwik Trip would be expected to generate 390 driveway trips during the weekday AM peak hour and 325 driveway trips during the weekday PM peak hour (Exhibit 4-3). The peak hour volume of adjacent street traffic is not available as an independent variable for weekday daily trip generation. Therefore, the weekday daily traffic volumes, based on the number of fueling positions on site, are expected to be about 5,070 trips.

In October 2014, TADI submitted a TIA report to WisDOT, Washington County, and the Town of Lisbon for a proposed C-Store Commercial development on the same development site. The trip generation for that development is about 105 vehicles higher during the weekday AM peak hour, but only 20 vehicles higher during the weekday PM peak hour. Based on the traffic assignment prepared for this study, this results in higher, but reasonably similar traffic assignment for the proposed Kwik Trip driveway to STH 164 as for the C-Store development driveway (30 AM/10 PM higher southbound right-turn volumes and 25 AM/10 PM higher eastbound right-turn volumes).

B2. Mode Split

For this study, the effect of organized carpools, van pools, buses, bicycles, and pedestrians were considered insignificant factors on traffic volumes in the area, and therefore, the effects of these alternative modes of travel were not included in this project.

B3. Determination of Pass-by, Internally-Linked, Multi-Linked and Externally-Linked Trip Traffic

Based on the location of the Kwik Trip site, up to 55% of the driveway trips are expected to be pass-by trips. Pass-by trips occur when a motorist already on the roadway system stops at a development prior to continuing on their intended route (e.g., a motorist on southbound STH 164 makes a stop at the Kwik Trip prior to continuing south on STH 164). Pass-by trips for the Kwik

Trip site were estimated as 2,280 trips during a typical weekday, with 210 pass-by trips during the weekday AM peak hour and 180 pass-by trips during the weekday PM peak hour.

B4. Trip Distribution

The proposed trip distribution for the on-site development is listed below and also shown on Exhibit 4-4. The trip distribution was based upon the existing traffic patterns at the STH 164/CTH Q intersection:

- 30% to/from the north on STH 164
- 40% to/from the south on STH 164
- 20% to/from the east on CTH Q
- 10% to/from the west on CTH Q

B5. Trip Assignment

The Kwik Trip traffic assignments are shown on the following exhibits:

- Exhibit 4-5A: On-Site Development Traffic Assignment – New Trips
- Exhibit 4-5B: On-Site Development Traffic Assignment – Pass-by Trips
- Exhibit 4-5C: On-Site Development Traffic Assignment – Driveway Trips

PART C – BUILD TRAFFIC

The Year 2021 Build traffic volumes (Exhibit 4-11) were developed by adding the on-site development traffic assignment – driveway trips to the Year 2021 Background traffic volumes.

Land Use	ITE Code	Independent Variable	Weekday Daily	AM Peak In	AM Peak Out	AM Peak Total	PM Peak In	PM Peak Out	PM Peak Total
Super Convenience Market/Gas Station	960	22 Fuel Positions	5,070 (230.52)						
Super Convenience Market/ Gas Station	960	1,951 (AM PH Vol) 2,150 (PM PH Vol)		195 (50%)	195 (50%)	390 (0.20)	165 (50%)	160 (50%)	325 (0.15)
Total Driveway Trips			**5,070**	**195**	**195**	**390**	**165**	**160**	**325**
Minus Pass-by Trips	*(960)*	*55%*	*-2,280*	*-105*	*-105*	*-210*	*-90*	*-90*	*-180*
Total New Trips			**2,790**	**90**	**90**	**180**	**75**	**70**	**145**

ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 10th Edition.

TRIP DISTRIBUTION		AADT					
North on STH 164	30%	13000	840	25	25	20	20
South on STH 164	40%	18900	1110	35	35	30	30
East on CTH Q	20%	8600	560	20	20	15	15
West on CTH Q	10%	3900	280	10	10	10	5
	100%	***44400***	***2790***	***90***	***90***	***75***	***70***

PASS-BY REDUCTION	**AM**	**PM**				
Southbound on STH 164	40%	20%	45	45	20	20
Northbound on STH 164	30%	40%	30	30	35	35
Westbound on CTH Q	10%	30%	10	10	25	25
Eastbound on CTH Q	20%	10%	20	20	10	10
			105	***105***	***90***	***90***

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EXHIBIT 4-3
ON-SITE DEVELOPMENT TRIP GENERATION TABLE

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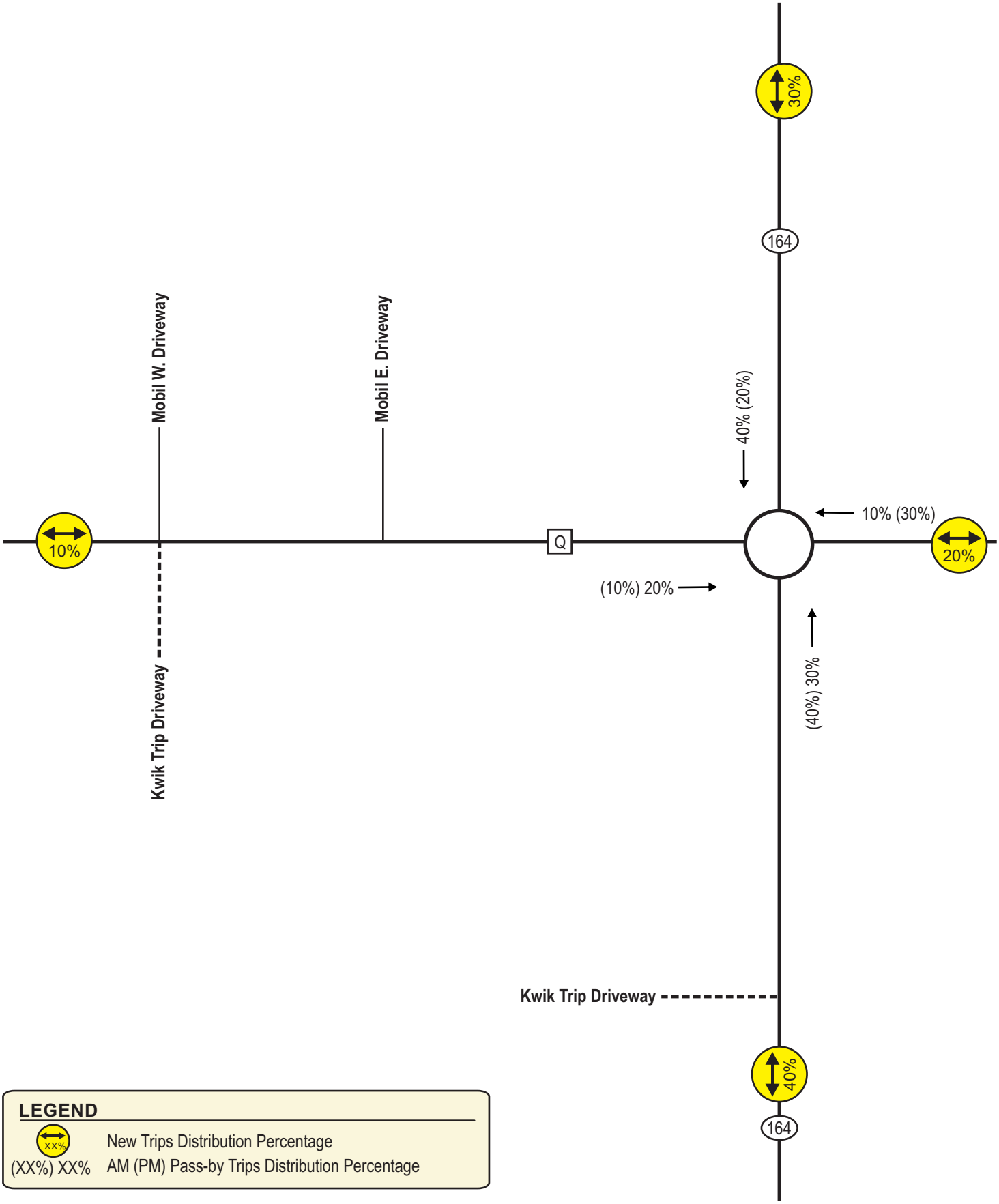

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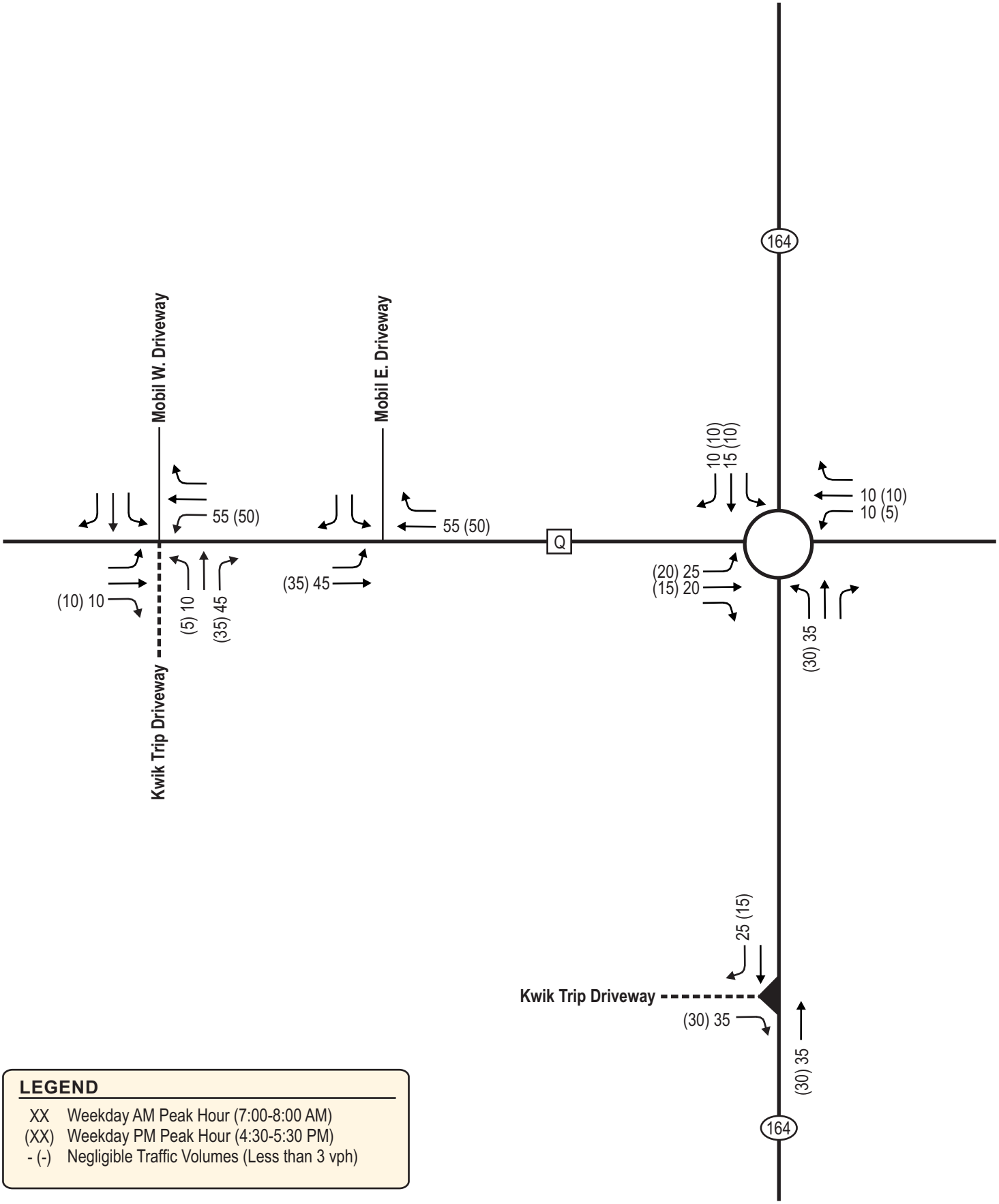
TRAFFIC ANALYSIS & DESIGN, INC.
2509: 04-27-2020

N
NOT TO SCALE

EXHIBIT 4-4
TRIP DISTRIBUTION DIAGRAM

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI



LEGEND

XX	Weekday AM Peak Hour (7:00-8:00 AM)
(XX)	Weekday PM Peak Hour (4:30-5:30 PM)
- (-)	Negligible Traffic Volumes (Less than 3 vph)

TADI
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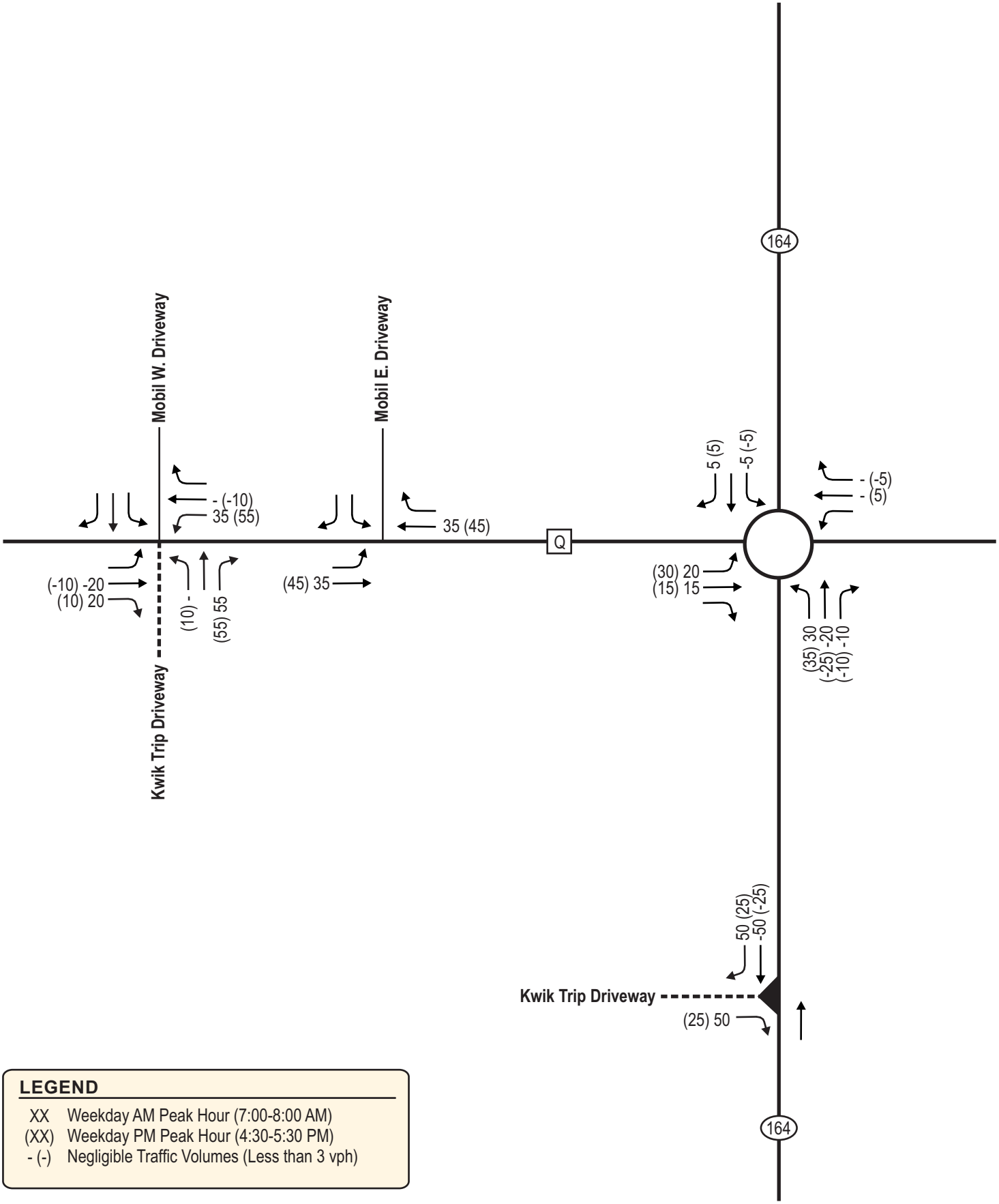
2509: 04-27-2020

N
NOT TO SCALE

EXHIBIT 4-5A
ON-SITE DEVELOPMENT TRAFFIC ASSIGNMENT
NEW TRIPS

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI



LEGEND

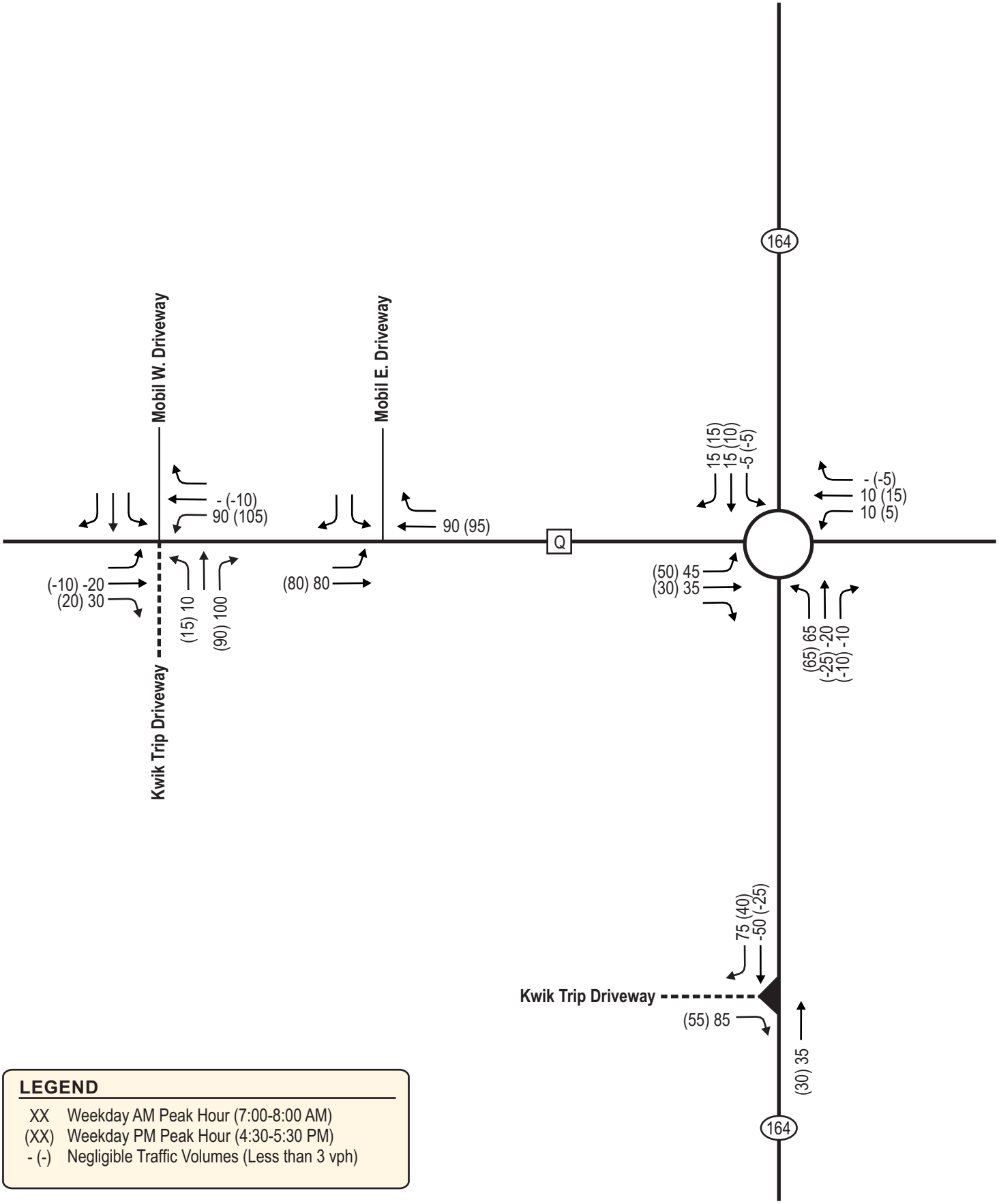
XX	Weekday AM Peak Hour (7:00-8:00 AM)
(XX)	Weekday PM Peak Hour (4:30-5:30 PM)
- (-)	Negligible Traffic Volumes (Less than 3 vph)

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2509: 04-27-2020

N
NOT TO SCALE

EXHIBIT 4-5B
ON-SITE DEVELOPMENT TRAFFIC ASSIGNMENT
PASS-BY TRIPS

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI



LEGEND

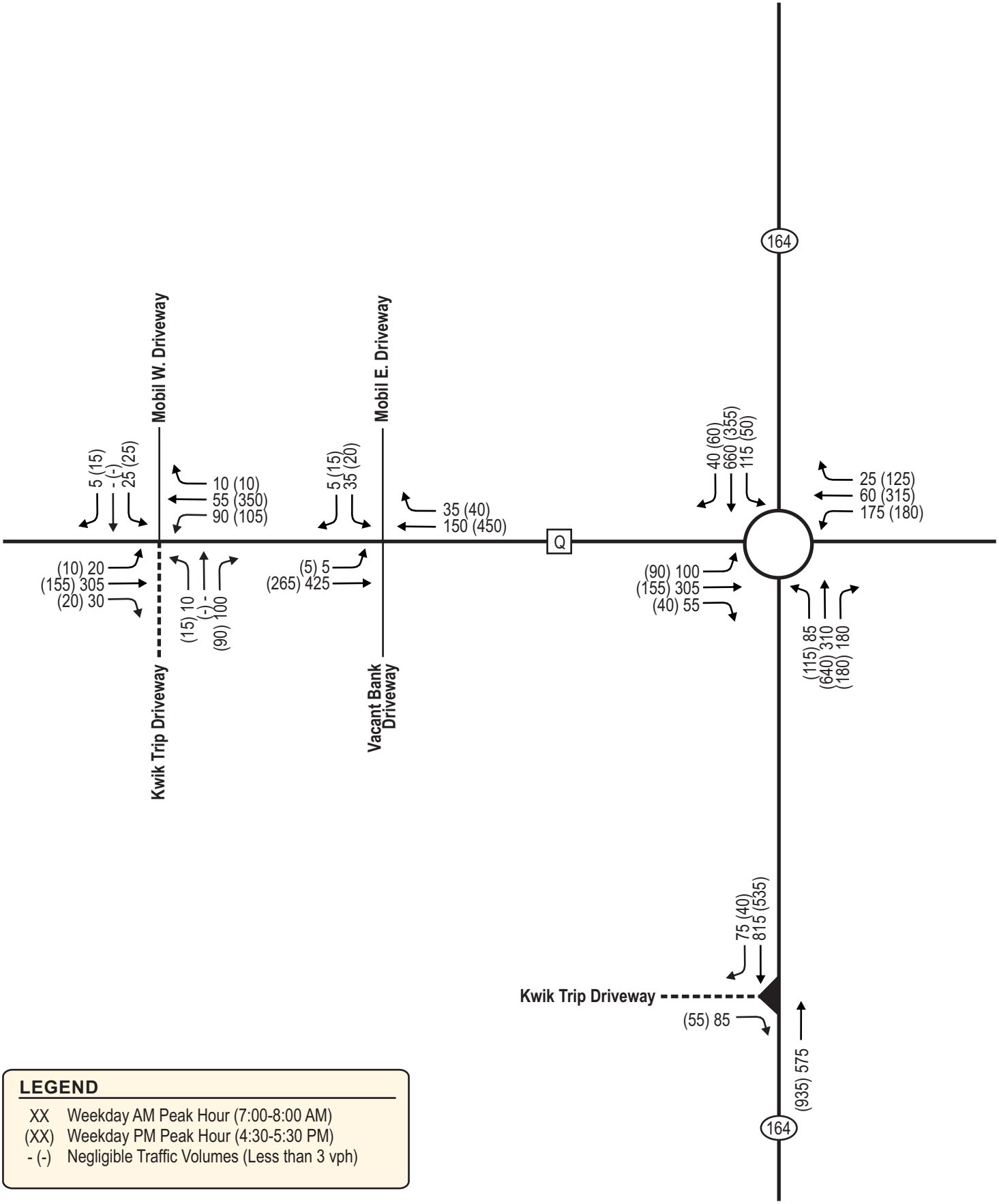
XX	Weekday AM Peak Hour (7:00-8:00 AM)
(XX)	Weekday PM Peak Hour (4:30-5:30 PM)
- (-)	Negligible Traffic Volumes (Less than 3 vph)

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2509: 04-27-2020

N
NOT TO SCALE

EXHIBIT 4-5C
ON-SITE DEVELOPMENT TRAFFIC ASSIGNMENT
DRIVEWAY TRIPS

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI



LEGEND

XX	Weekday AM Peak Hour (7:00-8:00 AM)
(XX)	Weekday PM Peak Hour (4:30-5:30 PM)
- (-)	Negligible Traffic Volumes (Less than 3 vph)

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2509: 04-27-2020

N
NOT TO SCALE

EXHIBIT 4-11
YEAR 2021 BUILD DEVELOPMENT TRAFFIC VOLUMES

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

CHAPTER 5 – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

In the December 3, 2014 requirement letter for the October 20, 2014 C-Store Commercial Development TIA, WisDOT presented the following requirements for site access for the development site:

- Align the driveway to CTH Q across from the Mobil gas station's west driveway and provide a two-way left-turn lane (TWLTL) from the end of the splitter island at the STH 164/CTH Q roundabout through the CTH Q intersection with the Mobil gas station's west driveway.
- Locate the driveway to STH 164 entirely within the southernmost 50 feet of the property and restrict it to right-in and right-out movements only. The median opening for the existing bank driveway to STH 164 shall be closed and a 10-foot paved shoulder shall be constructed along southbound STH 164 from the end of the curb and gutter at the STH 164/CTH Q roundabout south through the proposed driveway.

The site plan for the proposed Kwik Trip includes these access requirements.

PART B – CAPACITY / LEVEL OF SERVICE ANALYSIS

This study evaluates the Year 2021 traffic volumes for the Background and Build traffic conditions.

B1. Year 2021 Build Development Traffic – Existing Transportation System

For the Year 2021 Build analysis, the study intersections were evaluated with the existing geometrics and traffic control, plus the site access requirements stated in the WisDOT December 3, 2014 TIA requirement letter. As shown on Exhibit 5-3, all turning movements at the study intersections are expected to operate acceptably at LOS C or better during the peak hours with the WisDOT site access requirements and the Build traffic volumes. The Synchro output sheets for this scenario are located in Appendix C.

PART C – QUEUEING ANALYSIS

For most studies conducted in Wisconsin, the 95th percentile queue (maximum back of queue based on the 95th percentile traffic volumes) is used for determining the adequacy or design of turn lane storage at an intersection. This provides a more conservative estimate of potential queuing at an intersection than what the user inputs for peak hour traffic flow. The 95th percentile traffic queues are shown in the LOS tables on Exhibit 3-3 for the year 2021 Background traffic volumes and on Exhibit 5-3 for the year 2021 Build traffic volumes.

PART D – MULTI-MODAL CONSIDERATIONS

The proposed development is expected to generate minimal pedestrian trips to or from the site.

PART E – SPEED CONSIDERATION/SIGHT DISTANCE

Note that the sight distance measurements and photographs discussed in this report are based on the proposed intersection placement and on-line aerial and street view photography. The party responsible for designing the intersections is responsible for cross-checking, verifying and designing for all applicable sight distances.

The proposed Kwik Trip driveway to STH 164 should be designed for intersection sight distance (ISD) in accordance with the latest edition of the American Association of State Highway Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* and in accordance with the latest Facilities Development Manual (FDM) design guidelines (Procedure 11-10-5). WisDOT minimum and desirable sight distance calculations for the proposed new road are located in Appendix H.

Sight distance evaluation at the proposed driveway was completed using a design speed of 5 mph above the posted speed limit, or 60 mph on STH 164. Since the driveway is proposed to be restricted to right-in/right-out only, the sight distance was evaluated for traffic movements turning right from the stop-controlled driveway approach.

A WB truck was used as the design vehicle for the sight distance analysis, which has a 1,110-foot desirable sight distance. Although on-line aerials show that this visibility is likely to be met, the controlling sight distance for the proposed driveway is turning movements from the STH 164/CTH Q roundabout. As shown on Exhibit 5-27 (Google Earth street-view photo), all turning movements at the roundabout can be seen from the proposed Kwik Trip driveway. Therefore, intersection sight distance is considered to be met.

PART F – TRAFFIC CONTROL NEEDS

The proposed Kwik Trip driveways to CTH Q and STH 164 are recommended to have stop sign control on the driveway approaches. Based on the capacity analysis, this control is expected to result in acceptable LOS C or better conditions during the peak hours with the year 2021 build traffic volumes.

Build Traffic Operations & Queues

Intersection	Peak Hour	MOE[1,2]	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Node 100: CTH Q & STH 164[3] *(Roundabout)*	AM	LOS	B	-	C	A	-	A	B	-	B	A	-	B
		Queue	60	-	75	30	-	15	50	-	65	65	-	80
	PM	LOS	A	-	A	B	-	B	A	-	B	A	-	A
		Queue	20	-	20	65	-	80	70	-	85	35	-	40
Node 200: CTH Q & Mobil Gas E. Driveway[4] *(Stop Sign)*	AM	LOS	A		-	-	A		-			B		
		Queue	0		-	-	0		-			10		
	PM	LOS	A		-	-	A		-			B		
		Queue	0		-	-	0		-			10		
Node 250: CTH Q & Mobil Gas W. Driveway/Kwik Trip Driveway[4] *(Stop Sign)*	AM	LOS	A	A		A	A		B			C		
		Queue	0	0		10	0		20			10		
	PM	LOS	A	A		A	A		B			C		
		Queue	0	0		10	0		15			15		
Node 300: STH 164 & Kwik Trip Driveway *(Stop Sign)*	AM	LOS	-		C	-			-	A	-	-	A	
		Queue	-		30	-			-	0	-	-	0	
	PM	LOS	-		B	-			-	A	-	-	A	
		Queue	-		10	-			-	0	-	-	0	

[1] *(--) indicates a movement that is prohibited, not analyzed, or does not exist; All free-flow movements shown as LOS A.*

[2] *Queue is maximum of the 50th & 95th percentile queue, measured in feet.*

[3] *LT data is for the LT/TH lane group; RT data is for the TH/RT lane group.*

[4] *The Kwik Trip driveway at CTH Q was modeled with an eastbound LT lane and WB TWLTL on CTH Q.*

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2509: 04-27-2020

EXHIBIT 5-3
BUILD TRAFFIC CAPACITY/LOS ANALYSIS

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

Intersection Sight Distance
Kwik Trip Driveway at STH 164
Right-Turn (Looking Left)

WisDOT Desirable Sight Distance: 1,110' (WB Truck)
Controlling Sight Distance: Turning movements from the STH 164/CTH Q roundabout

Full visibility to all movements at the roundabout ~300' north of the proposed Kwik Trip driveway.

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2509: 04-27-2020

EXHIBIT 5-27
INTERSECTION SIGHT DISTANCE
STH 164 & KWIK TRIP DRIVEWAY

KWIK TRIP #1108 ABBREVIATED TIA - LISBON, WI

CHAPTER 6 – CONCLUSIONS AND RECOMMENDATIONS

PART A – RECOMMENDATIONS

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM) 6th Edition using the Synchro 10 traffic analysis program. 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 or better was used to define desirable peak hour operating conditions.

The improvements listed below are recommended to accommodate traffic based on the assumptions outlined in the TIA. Improvements are split into these categories:

- "Background Traffic" – These improvements are recommended to mitigate a background traffic deficiency and are *not* driven by the proposed development. For this study, the background traffic conditions are a combination of the existing traffic volumes collected at the study intersections in November 2017 and March 2020.
- "Build Traffic" – These improvements are recommended in addition to the background traffic recommended improvements to mitigate an impact created by the proposed development.

Improvements are for jurisdictional consideration and are not legally binding. WisDOT, Washington County, and the Town of Lisbon reserves the right to determine alternative solutions.

<u>*CTH Q & Mobil W. Driveway/Kwik Trip Driveway*</u>

- *Background Traffic:* No modifications
- *Build Traffic:*
  - Provide a two-way left-turn lane (TWLTL) on CTH Q as shown on the Kwik Trip site plan. This median will separate left turns from the through lane for eastbound traffic turning into the Mobil W. driveway and westbound traffic turning into the Kwik Trip driveway.
  - Provide a single exit lane on the Kwik Trip driveway with stop sign control at CTH Q.

<u>*CTH Q & Mobil E. Driveway*</u>

- *Background Traffic:* No modifications
- *Build Traffic:* The TWLTL recommended on CTH Q will separate left turns from the through lane for eastbound traffic turning into the Mobil E. driveway.

<u>*STH 164 & Kwik Trip Driveway*</u>

- *Background Traffic:* N/A
- *Build Traffic:*
  - Provide a single-lane exit on the Kwik Trip driveway with stop sign control at STH 164.

- Position the driveway in the southernmost 50 feet of the site property as shown on the site plan.
- Close the median on STH 164 with the removal of the existing bank driveway to STH 164.
- Provide a 10-foot paved shoulder along southbound STH 164 from the end of the curb and gutter for the STH 164/CTH Q roundabout south through the proposed Kwik Trip driveway to STH 164.

PART B – CONCLUSION

With the intersection modifications recommended above, the study intersections are expected to operate acceptably at LOS C or better during the peak hours with the buildout of the proposed Kwik Trip development in the southwest corner of the STH 164/CTH Q intersection. The proposed Kwik Trip is expected to generate higher, but reasonably similar peak hour traffic volumes at the proposed driveway to CTH Q and STH 164. Therefore, the WisDOT site access requirements stated in the December 3, 2014 letter for the October 20, 2014 C-Store Commercial Development TIA submittal are expected to be adequate for the alternate Kwik Trip use on the same site.

APPENDIX A

Traffic

Summary of PHF & Percent HV
Existing Traffic Counts

Lisbon Kwik Trip TIA - PHF & HV%

Intersection	Traffic Control	Peak Hour	Heavy Vehicle Percentage				PHF
			EB	WB	NB	SB	
#100 CTH Q & STH 164	Round-about	AM	5%	14%	12%	5%	0.89
		PM	8%	1%	6%	7%	0.96
#200 CTH Q & Mobil Gas E. Driveway	Stop Sign	AM	5%	10%		7%	0.86
		PM	8%	2%		0%	0.92
#250 CTH Q & Mobil Gas W. Driveway/Kwik Trip Driveway	Stop Sign	AM	5%	10%	2%	0%	0.86
		PM	8%	2%	2%	7%	0.92
#300 Kwik Trip Driveway/STH 164	Stop Sign	AM	2%		12%	7%	0.94
		PM	2%		6%	6%	0.90

PHF & HV for driveways along CTH Q & STH 164 recalculated from CTH Q/STH 164 traffic count.

CTH Q & STH 164

	SB			WB			NB			EB			Q	164	Q	164
AM	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	WB	SB	E/W	N/S
7:00	8	155	22	2	9	32	32	62	6	16	65	14	23	203	118	303
7:15	5	181	27	7	15	42	43	78	8	18	74	17	28	241	137	370
7:30	8	168	45	8	15	47	63	86	2	10	86	13	25	225	134	376
7:45	3	143	27	8	9	44	50	104	5	13	44	10	17	200	84	359
HV	3	35	4	4	4	25	28	36	2	3	10	4	9	63	0.86	0.94
													10%	7%		

	SB			WB			NB			EB			Q	164	Q	164
PM	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	WB	SB	E/W	N/S
4:30	8	87	17	31	71	22	41	163	13	14	39	15	92	123	160	340
4:45	11	110	18	20	38	52	63	152	19	10	30	8	68	172	116	406
5:00	12	70	14	43	104	51	44	157	7	4	26	8	123	125	161	333
5:15	12	77	7	34	89	52	40	191	9	10	29	9	110	139	158	379
HV	4	23	3	2	2	3	14	34	2	5	7	5	8	31	0.92	0.90
													2%	6%		

Intersection Traffic Volume Report

Count Basics	Version 2013.J4.1		Page 1 of 11
Start Date:	Wednesday, November 08, 2017	Weekday	Schools in Session
Total Number of Hours Counted: 13		Non-Holiday	No Special Events

Base Information, Observed (13) Hour and Estimated (24) Hour Volume Summaries

Intersection of: STH 164 and CTH Q

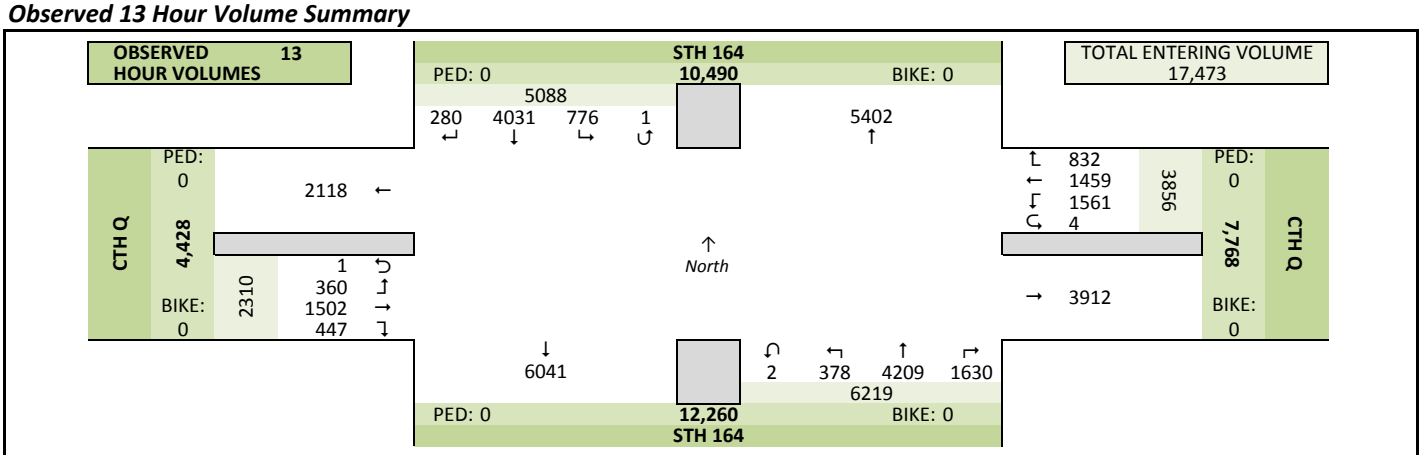
Site Information

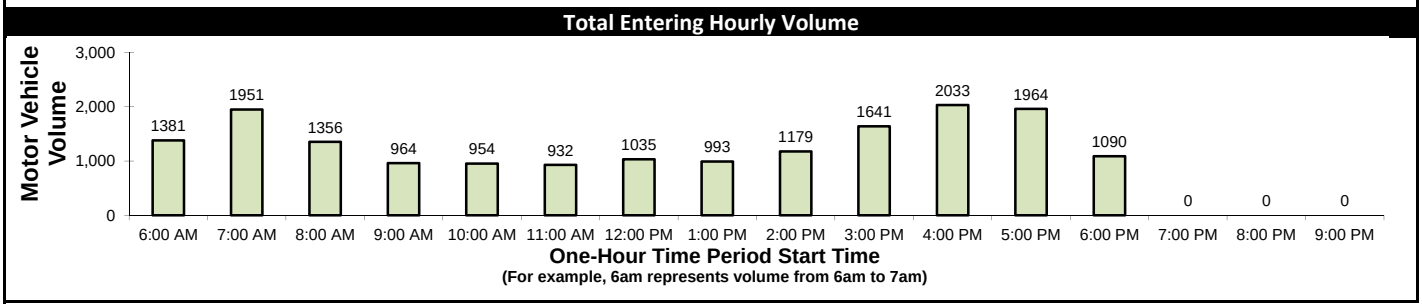
Municipality	Richfield		
County	Washington	WisDOT Region	SE
Traffic Control	Roundabout		
Roadway Names		North Direction	↑
North Leg	STH 164		
East Leg	CTH Q		
South Leg	STH 164		
West Leg	CTH Q		
Special Considerations			
Schools	In Session		
Holidays	None		
Special Events	None		
Special Pedestrians Observed			
Pre-school children		None	
Elementry school age children		None	
Visually impaired (white cane/helper dog)		None	
Elderly/disabled (except wheelchairs)		None	
Wheelchairs/electric scooters		None	
Other (describe)	None	None	

Count Information

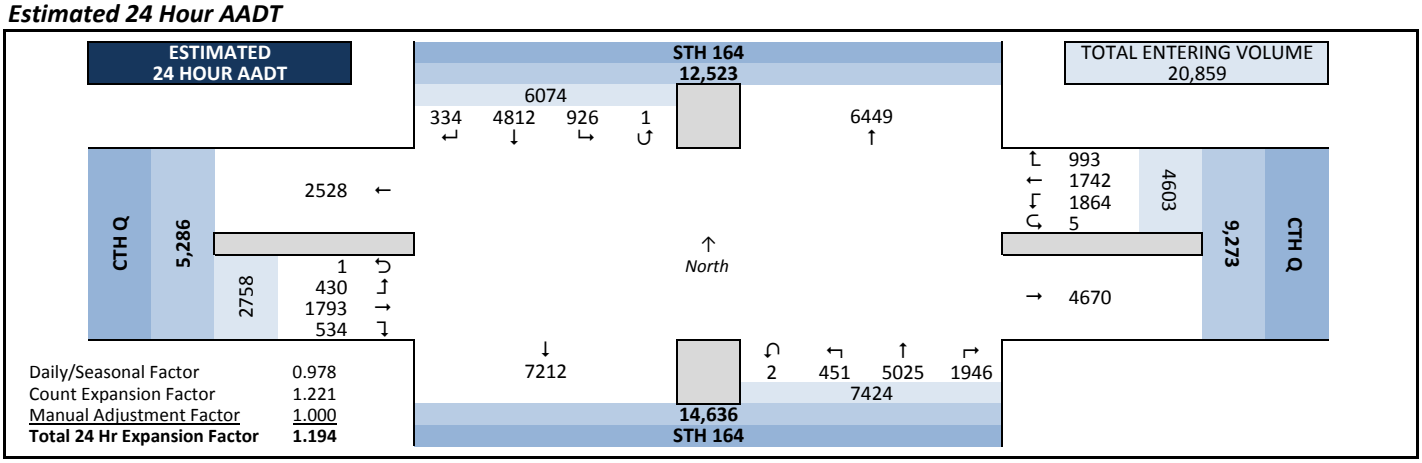
Hrs Counted:	6:00 AM-7:00 PM				
1st Day of Count	Wednesday, November 08, 2017			Weather	
AM Peak Period	Thursday, November 09, 2017			Clear & Dry	
Midday Peak Period	Thursday, November 09, 2017			Clear & Dry	
PM Peak Period	Wednesday, November 08, 2017			Clear & Dry	
Calculated Peak Hours					
AM	7:00-8:00am	MD	11:45-12:45pm	PM	4:30-5:30pm
Peak Hours Selected for Analysis					
AM	7:00-8:00am	MD	11:45-12:45pm	PM	4:30-5:30pm
Daily/Seasonal Adjustment Group	(2) Urban Arterials & Collectors				
Count Expansion Group	(2) Urban Arterials & Collectors				
Daily/Seasonal Adjustment Factor	0.978	Count Expansion Factor	1.221		
Company Name	TADi			Manual Adj.	1.000
Observers	AM Peak Period	Amy Scheuerlein, Jeff Schleif			
	Midday Peak Period	Wendy Picard, Karlyn Bieberitz			
	PM Peak Period	Ted Atwell, Larry Numerich			
Comments	2016 DOT Seasonal Factors				

Observed 13 Hour Volume Summary





Estimated 24 Hour AADT



Daily/Seasonal Factor	0.978
Count Expansion Factor	1.221
Manual Adjustment Factor	1.000
Total 24 Hr Expansion Factor	**1.194**

Intersection Traffic Volume Report

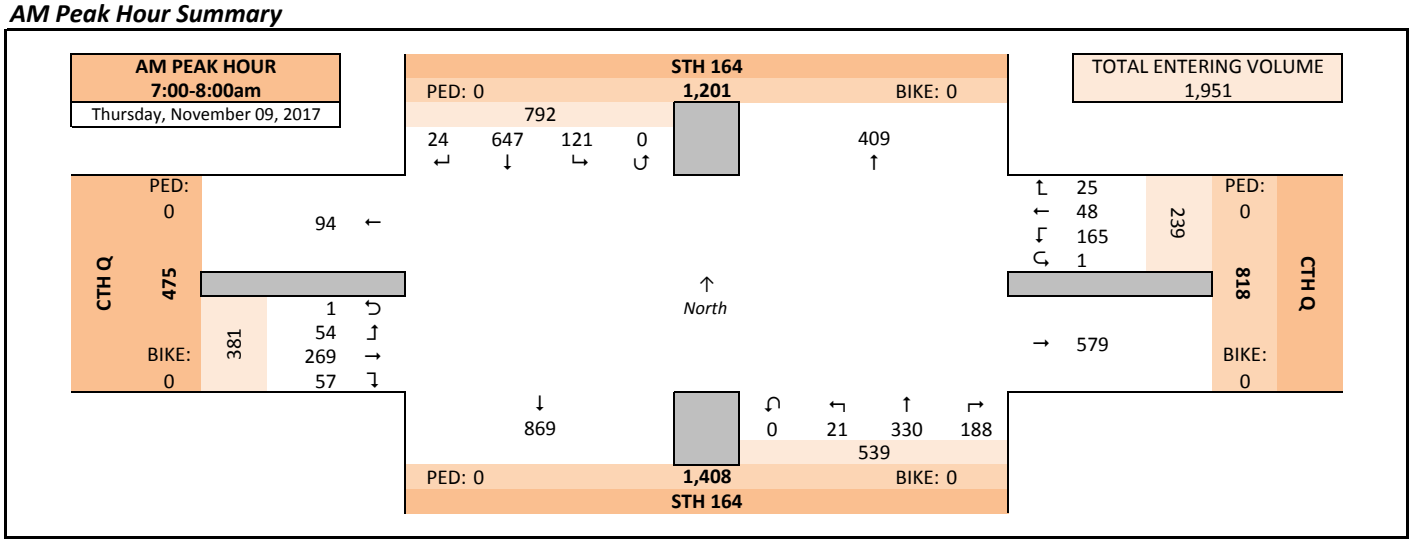
Count Basics			Page 2 of 11
Start Date:	Wednesday, November 08, 2017	Weekday	Schools in Session
Total Number of Hours Counted: 13		Non-Holiday	No Special Events

Peak Hour Volume Graphical Summary

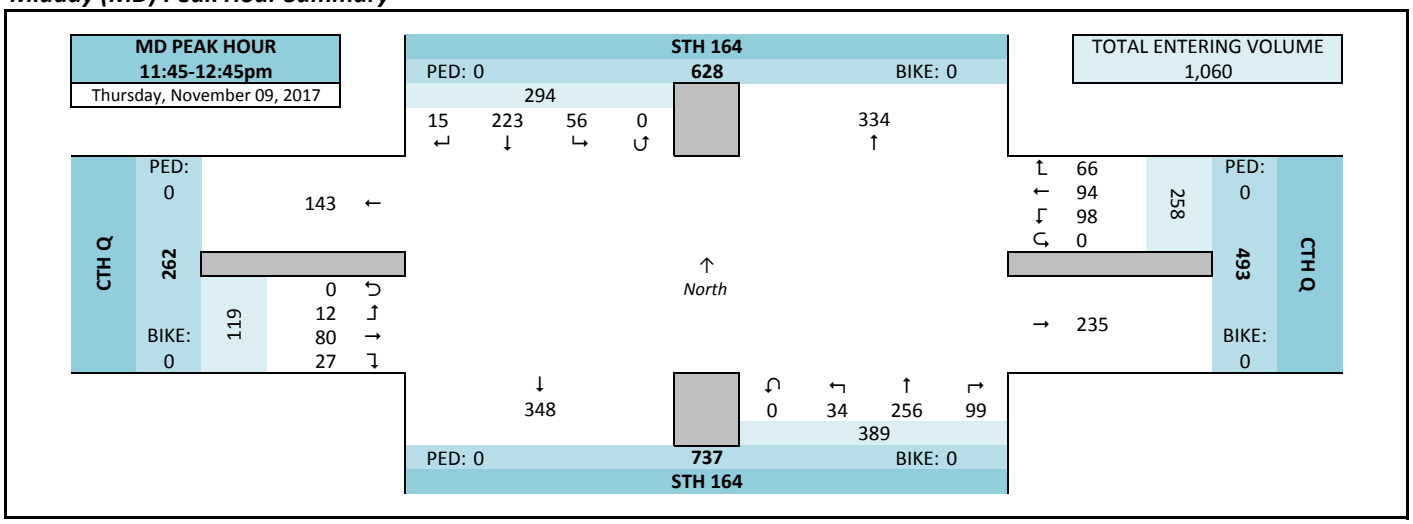
All Motor Vehicles

STH 164 and CTH Q

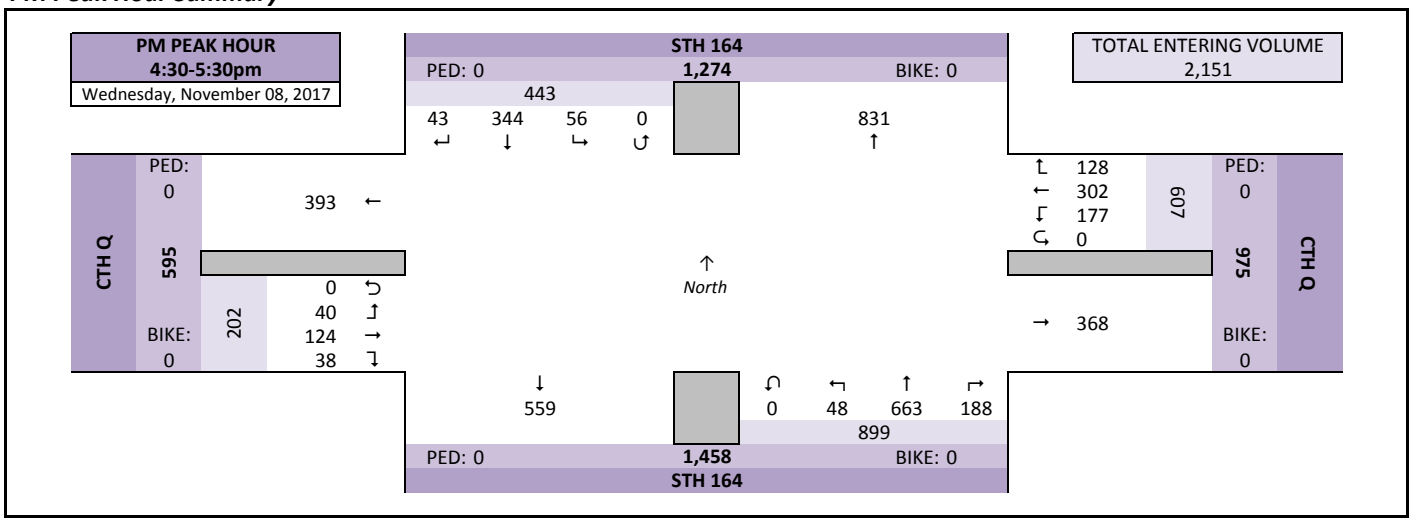
AM Peak Hour Summary



Midday (MD) Peak Hour Summary



PM Peak Hour Summary



Intersection Traffic Volume Report

Count Basics			Page 3 of 11
Start Date:	Wednesday, November 08, 2017	Weekday	Schools in Session
Total Number of Hours Counted: 13		Non-Holiday	No Special Events

Peak Hour Volume Summary

All Motor Vehicles

STH 164 and CTH Q

Peak Hour Volumes, Truck Percentages, and PHFs

Thursday, November 09, 2017		From North					From East					From South					From West					
	AM Peak Hour	STH 164					CTH Q					STH 164					CTH Q					
	Start Time	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Totals
AM Peak Hour	7:00 AM	8	155	22	0	185	2	9	32	1	44	32	62	6	0	100	16	65	14	0	95	424
	7:15 AM	5	181	27	0	213	7	15	42	0	64	43	78	8	0	129	18	74	17	1	110	516
	7:30 AM	8	168	45	0	221	8	15	47	0	70	63	86	2	0	151	10	86	13	0	109	551
	7:45 AM	3	143	27	0	173	8	9	44	0	61	50	104	5	0	159	13	44	10	0	67	460
	Peak Hour Volume	24	647	121	0	792	25	48	165	1	239	188	330	21	0	539	57	269	54	1	381	1951
	Rounded Hourly Volume	25	645	120	0	790	25	50	165	0	240	190	330	20	0	540	55	270	55	0	380	1950
	% Single Unit Trucks	8.3	3.9	3.3	0.0	3.9	16.0	8.3	14.5	0.0	13.4	13.8	8.2	9.5	0.0	10.2	5.3	3.0	7.4	0.0	3.9	6.8
	% Heavy Trucks	4.2	1.5	0.0	0.0	1.4	0.0	0.0	0.6	0.0	0.4	1.1	2.7	0.0	0.0	2.0	0.0	0.7	0.0	0.0	0.5	1.3
	% Trucks (Total)	12.5	5.4	3.3	0.0	5.3	16.0	8.3	15.2	0.0	13.8	14.9	10.9	9.5	0.0	12.2	5.3	3.7	7.4	0.0	4.5	8.1
	Peak Hour Factor (PHF)	0.75	0.89	0.67	0.00	0.90	0.78	0.80	0.88	0.25	0.85	0.75	0.79	0.66	0.00	0.85	0.79	0.78	0.79	0.25	0.87	0.89

Thursday, November 09, 2017		From North					From East					From South					From West					
	MD Peak Hour	STH 164					CTH Q					STH 164					CTH Q					
	Start Time	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Totals
Midday (MD) Peak Hour	11:45 AM	4	52	10	0	66	20	24	28	0	72	29	61	10	0	100	7	21	2	0	30	268
	12:00 PM	4	66	12	0	82	16	25	24	0	65	24	66	11	0	101	11	21	2	0	34	282
	12:15 PM	4	55	18	0	77	17	18	27	0	62	18	62	5	0	85	5	13	5	0	23	247
	12:30 PM	3	50	16	0	69	13	27	19	0	59	28	67	8	0	103	4	25	3	0	32	263
	Peak Hour Volume	15	223	56	0	294	66	94	98	0	258	99	256	34	0	389	27	80	12	0	119	1060
	Rounded Hourly Volume	15	225	55	0	295	65	95	100	0	260	100	255	35	0	390	25	80	10	0	115	1060
	% Single Unit Trucks	6.7	10.3	10.7	0.0	10.2	6.1	9.6	22.4	0.0	13.6	20.2	6.6	8.8	0.0	10.3	18.5	11.2	8.3	0.0	12.6	11.3
	% Heavy Trucks	0.0	1.8	1.8	0.0	1.7	1.5	0.0	2.0	0.0	1.2	4.0	3.5	0.0	0.0	3.3	3.7	1.2	0.0	0.0	1.7	2.2
	% Trucks (Total)	6.7	12.1	12.5	0.0	11.9	7.6	9.6	24.5	0.0	14.7	24.2	10.2	8.8	0.0	13.6	22.2	12.5	8.3	0.0	14.3	13.5
	Peak Hour Factor (PHF)	0.94	0.84	0.78	0.00	0.90	0.82	0.87	0.87	0.00	0.90	0.85	0.96	0.77	0.00	0.94	0.61	0.80	0.60	0.00	0.87	0.94

Wednesday, November 08, 2017		From North					From East					From South					From West					
	PM Peak Hour	STH 164					CTH Q					STH 164					CTH Q					
	Start Time	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Totals
PM Peak Hour	4:30 PM	8	87	17	0	112	31	71	22	0	124	41	163	13	0	217	14	39	15	0	68	521
	4:45 PM	11	110	18	0	139	20	38	52	0	110	63	152	19	0	234	10	30	8	0	48	531
	5:00 PM	12	70	14	0	96	43	104	51	0	198	44	157	7	0	208	4	26	8	0	38	540
	5:15 PM	12	77	7	0	96	34	89	52	0	175	40	191	9	0	240	10	29	9	0	48	559
	Peak Hour Volume	43	344	56	0	443	128	302	177	0	607	188	663	48	0	899	38	124	40	0	202	2151
	Rounded Hourly Volume	45	345	55	0	445	130	300	175	0	605	190	665	50	0	905	40	125	40	0	205	2160
	% Single Unit Trucks	9.3	5.8	5.4	0.0	6.1	1.6	0.7	1.7	0.0	1.2	5.9	4.7	4.2	0.0	4.9	13.2	4.8	12.5	0.0	7.9	4.4
	% Heavy Trucks	0.0	0.9	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	1.6	0.5	0.0	0.0	0.7	0.0	0.8	0.0	0.0	0.5	0.5
	% Trucks (Total)	9.3	6.7	5.4	0.0	6.8	1.6	0.7	1.7	0.0	1.2	7.4	5.1	4.2	0.0	5.6	13.2	5.6	12.5	0.0	8.4	4.8
	Peak Hour Factor (PHF)	0.90	0.78	0.78	0.00	0.80	0.74	0.73	0.85	0.00	0.77	0.75	0.87	0.63	0.00	0.94	0.68	0.79	0.67	0.00	0.74	0.96

Peak Hour Pedestrian and Bicyclist Volumes

Pedestrians and Bicyclists		Crossing North Approach			Crossing East Approach			Crossing South Approach			Crossing West Approach			Total Ped & Bike Volume
		STH 164			CTH Q			STH 164			CTH Q			
	15-Minute Start Time	Pedestrian	Bicyclist	Total	Pedestrian	Bicyclist	Total	Pedestrian	Bicyclist	Total	Pedestrian	Bicyclist	Total	
AM	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0
MD	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Traffic Volume Report

Count Basics			*Page 5 of 11*
Start Date:	Wednesday, November 08, 2017	Weekday	Schools in Session
Total Number of Hours Counted: 13		Non-Holiday	No Special Events

15-Minute Motor Vehicle Data

All Motor Vehicles

STH 164 and CTH Q

15-Minute Motor Vehicle Data

15-Minute Time Period Start Time		From North (STH 164) Right	Thru	Left	U-Tn	Total	From East (CTH Q) Right	Thru	Left	U-Tn	Total	From South (STH 164) Right	Thru	Left	U-Tn	Total	From West (CTH Q) Right	Thru	Left	U-Tn	Total	15-Min Totals	Hourly Sum	PHF
AM Peak Period	6:00 AM	2	65	12	0	79	4	8	16	0	28	23	23	3	0	49	12	42	4	0	58	214	1381	0.73
	6:15 AM	5	93	13	0	111	5	8	17	0	30	35	50	2	0	87	11	42	9	0	62	290	1591	0.85
	6:30 AM	9	159	21	0	189	3	10	38	1	52	40	72	6	0	118	29	73	9	0	111	470	1817	0.88
	6:45 AM	4	140	30	0	174	6	18	31	0	55	45	53	4	1	103	14	50	11	0	75	407	1898	0.86
	7:00 AM	8	155	22	0	185	2	9	32	1	44	32	62	6	0	100	16	65	14	0	95	424	1951	0.89
	7:15 AM	5	181	27	0	213	7	15	42	0	64	43	78	8	0	129	18	74	17	1	110	516	1928	0.87
	7:30 AM	8	168	45	0	221	8	15	47	0	70	63	86	2	0	151	10	86	13	0	109	551	1731	0.79
	7:45 AM	3	143	27	0	173	8	9	44	0	61	50	104	5	0	159	13	44	10	0	67	460	1524	0.83
	8:00 AM	5	110	27	0	142	7	20	28	0	55	47	81	3	0	131	6	61	6	0	73	401	1356	0.85
	8:15 AM	7	97	24	0	128	5	6	31	0	42	29	77	5	0	111	8	27	3	0	38	319	1198	0.87
	8:30 AM	2	95	21	0	118	7	17	41	0	65	39	74	3	1	117	13	28	3	0	44	344	1122	0.82
	8:45 AM	2	81	17	0	100	11	13	35	0	59	33	62	7	0	102	4	19	8	0	31	292	1030	0.88
	9:00 AM	7	59	15	0	81	9	16	28	0	53	22	50	4	0	76	6	21	6	0	33	243	964	0.96
	9:15 AM	1	60	26	0	87	9	18	30	0	57	21	44	6	0	71	6	18	4	0	28	243	962	0.95
	9:30 AM	3	55	20	0	78	16	9	23	0	48	26	63	4	0	93	8	22	3	0	33	252	954	0.95
	9:45 AM	2	65	12	0	79	13	11	25	0	49	17	49	3	0	69	1	22	6	0	29	226	936	0.97
Midday Peak Period	10:00 AM	6	57	12	1	76	12	15	26	0	53	36	38	4	0	78	7	20	7	0	34	241	954	0.98
	10:15 AM	1	45	11	0	57	15	14	24	0	53	26	52	4	0	82	4	29	10	0	43	235	943	0.97
	10:30 AM	4	46	17	0	67	10	14	19	0	43	30	57	2	0	89	6	25	4	0	35	234	942	0.97
	10:45 AM	1	49	16	0	66	17	20	28	0	65	18	57	4	0	79	9	25	0	0	34	244	908	0.93
	11:00 AM	3	50	9	0	62	8	11	24	0	43	28	56	7	0	91	5	26	3	0	34	230	932	0.87
	11:15 AM	7	50	10	0	67	5	20	28	0	53	25	53	4	0	82	3	26	3	0	32	234	984	0.87
	11:30 AM	8	53	12	0	73	6	22	14	0	42	18	39	3	0	60	12	12	1	0	25	200	997	0.88
	11:45 AM	4	52	10	0	66	20	24	28	0	72	29	61	10	0	100	7	21	2	0	30	268	1060	0.94
	12:00 PM	4	66	12	0	82	16	25	24	0	65	24	66	11	0	101	11	21	2	0	34	282	1035	0.92
	12:15 PM	4	55	18	0	77	17	18	27	0	62	18	62	5	0	85	5	13	5	0	23	247	976	0.93
	12:30 PM	3	50	16	0	69	13	27	19	0	59	28	67	8	0	103	4	25	3	0	32	263	975	0.93
	12:45 PM	5	64	7	0	76	11	13	21	1	46	20	62	5	0	87	6	20	8	0	34	243	999	0.87
	1:00 PM	4	39	10	0	53	15	27	20	0	62	20	59	6	0	85	5	14	4	0	23	223	993	0.86
	1:15 PM	6	55	5	0	66	9	23	26	0	58	24	61	6	0	91	8	17	6	0	31	246	988	0.86
	1:30 PM	2	53	14	0	69	10	24	37	1	72	33	65	8	0	106	6	27	7	0	40	287	1040	0.87
	1:45 PM	5	45	7	0	57	13	27	35	0	75	23	52	7	0	82	6	13	4	0	23	237	1084	0.82
PM Peak Period	2:00 PM	0	46	3	0	49	13	24	29	0	66	24	48	7	0	79	5	16	3	0	24	218	1179	0.89
	2:15 PM	4	69	9	0	82	17	28	24	0	69	18	91	4	0	113	7	26	1	0	34	298	1318	0.92
	2:30 PM	9	70	15	0	94	15	37	33	0	85	33	71	3	0	107	11	28	6	0	45	331	1394	0.93
	2:45 PM	6	61	13	0	80	17	44	31	0	92	25	88	14	0	127	4	22	7	0	33	332	1465	0.91
	3:00 PM	10	72	11	0	93	25	37	19	0	81	38	94	13	0	145	9	21	8	0	38	357	1641	0.81
	3:15 PM	4	54	12	0	70	42	47	19	0	108	29	116	8	0	153	10	26	7	0	43	374	1751	0.86
	3:30 PM	12	75	8	0	95	25	45	33	0	103	30	117	7	0	154	13	27	10	0	50	402	1891	0.92
	3:45 PM	9	105	13	0	127	32	58	30	0	120	39	160	18	0	217	5	29	10	0	44	508	2010	0.96
	4:00 PM	6	108	9	0	123	34	48	28	0	110	47	131	9	0	187	11	26	10	0	47	467	2033	0.96
	4:15 PM	12	99	10	0	121	34	66	45	0	145	41	155	11	0	207	9	22	10	0	41	514	2106	0.98
	4:30 PM	8	87	17	0	112	31	71	22	0	124	41	163	13	0	217	14	39	15	0	68	521	2151	0.96
	4:45 PM	11	110	18	0	139	20	38	52	0	110	63	152	19	0	234	10	30	8	0	48	531	2106	0.94
	5:00 PM	12	70	14	0	96	43	104	51	0	198	44	157	7	0	208	4	26	8	0	38	540	1964	0.88
	5:15 PM	12	77	7	0	96	34	89	52	0	175	40	191	9	0	240	10	29	9	0	48	559	1767	0.79
	5:30 PM	0	91	9	0	100	34	70	41	0	145	35	143	12	0	190	8	22	11	0	41	476	1508	0.79
	5:45 PM	4	71	13	0	88	17	31	39	0	87	21	134	19	0	174	8	20	12	0	40	389	1259	0.81
	6:00 PM	10	66	15	0	91	28	28	27	0	83	36	87	11	0	134	7	19	9	0	35	343	1090	0.79
	6:15 PM	5	52	14	0	71	24	17	17	0	58	33	79	13	0	125	11	24	11	0	46	300		
	6:30 PM	3	57	12	0	72	10	28	34	0	72	11	41	10	0	62	5	11	5	0	21	227		
	6:45 PM	3	36	9	0	48	20	23	27	0	70	17	56	6	0	79	7	11	5	0	23	220		
	7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Totals		280	4031	776	1	5088	832	1459	1561	4	3856	1630	4209	378	2	6219	447	1502	360	1	2310	17473		

Peak Hour All Vehicle Volume Summary

Hourly Time Period Start Time		From North (STH 164) Right	Thru	Left	U-Tn	Total	From East (CTH Q) Right	Thru	Left	U-Tn	Total	From South (STH 164) Right	Thru	Left	U-Tn	Total	From West (CTH Q) Right	Thru	Left	U-Tn	Total	Total Hourly Volume	PHF
AM	7:00 AM	24	647	121	0	792	25	48	165	1	239	188	330	21	0	539	57	269	54	1	381	1951	0.89
MD	11:45 AM	15	223	56	0	294	66	94	98	0	258	99	256	34	0	389	27	80	12	0	119	1060	0.94
PM	4:30 PM	43	344	56	0	443	128	302	177	0	607	188	663	48	0	899	38	124	40	0	202	2151	0.96

Intersection Traffic Volume Report

Count Basics			*Page 9 of 11*
Start Date:	Wednesday, November 08, 2017	Weekday	Schools in Session
Total Number of Hours Counted: 13		Non-Holiday	No Special Events

15-Minute Heavy Vehicle Data

Heavy Vehicles (Single-Unit Trucks, Buses & Semi-Trucks)

STH 164 and CTH Q

15-Minute Heavy Vehicle Data

15-Minute Time Period Start Time		From North (STH 164)					From East (CTH Q)					From South (STH 164)					From West (CTH Q)					15-Min Totals	Hourly Sum
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total		
AM Peak Period	6:00 AM	0	4	0	0	4	1	0	1	0	2	3	2	0	0	5	0	2	1	0	3	14	101
	6:15 AM	1	6	0	0	7	0	1	2	0	3	2	4	0	0	6	0	2	0	0	2	18	116
	6:30 AM	0	9	2	0	11	0	3	6	0	9	2	8	0	0	10	2	1	2	0	5	35	127
	6:45 AM	0	10	0	0	10	1	2	3	0	6	4	9	0	0	13	0	4	1	0	5	34	135
	7:00 AM	1	10	0	0	11	1	1	3	0	5	3	6	0	0	9	1	3	0	0	4	29	158
	7:15 AM	0	8	1	0	9	1	1	2	0	4	3	7	0	0	10	2	3	1	0	6	29	168
	7:30 AM	0	5	1	0	6	2	2	11	0	15	9	10	0	0	19	0	3	0	0	3	43	182
	7:45 AM	2	12	2	0	16	0	0	9	0	9	13	13	2	0	28	0	1	3	0	4	57	194
	8:00 AM	1	9	0	0	10	1	1	6	0	8	7	9	1	0	17	0	3	1	0	4	39	171
	8:15 AM	0	6	2	0	8	1	1	3	0	5	6	15	3	0	24	3	2	1	0	6	43	165
	8:30 AM	0	6	2	0	8	2	5	13	0	20	9	15	1	0	25	2	0	0	0	2	55	171
	8:45 AM	0	2	0	0	2	0	1	9	0	10	8	12	0	0	20	0	1	1	0	2	34	151
	9:00 AM	1	4	0	0	5	2	4	9	0	15	5	5	1	0	11	2	0	0	0	2	33	153
	9:15 AM	0	13	4	0	17	4	2	11	0	17	7	4	1	0	12	2	0	1	0	3	49	166
	9:30 AM	0	4	0	0	4	0	2	7	0	9	7	11	1	0	19	2	0	1	0	3	35	147
	9:45 AM	0	9	2	0	11	1	2	6	0	9	7	7	0	0	14	0	1	1	0	2	36	139
Midday Peak Period	10:00 AM	1	13	3	0	17	1	0	7	0	8	10	8	0	0	18	3	0	0	0	3	46	147
	10:15 AM	0	2	1	0	3	8	0	3	0	11	6	10	0	0	16	0	0	0	0	0	30	132
	10:30 AM	0	4	1	0	5	0	2	3	0	5	6	9	0	0	15	0	2	0	0	2	27	130
	10:45 AM	1	5	3	0	9	4	2	15	0	21	4	8	0	0	12	0	2	0	0	2	44	134
	11:00 AM	0	4	1	0	5	0	0	7	0	7	7	9	0	0	16	0	2	1	0	3	31	127
	11:15 AM	2	2	0	0	4	2	3	5	0	10	6	6	0	0	12	0	2	0	0	2	28	129
	11:30 AM	1	6	1	0	8	0	0	6	0	6	7	8	0	0	15	0	2	0	0	2	31	141
	11:45 AM	0	8	1	0	9	0	1	6	0	7	9	8	0	0	17	3	0	1	0	4	37	143
	12:00 PM	0	4	2	0	6	2	4	4	0	10	6	7	0	0	13	1	3	0	0	4	33	142
	12:15 PM	0	11	2	0	13	1	2	9	0	12	3	7	0	0	10	1	4	0	0	5	40	135
	12:30 PM	1	4	2	0	7	2	2	5	0	9	6	4	3	0	13	1	3	0	0	4	33	128
	12:45 PM	2	13	0	0	15	0	3	3	0	6	4	5	0	0	9	0	3	3	0	6	36	144
	1:00 PM	0	3	1	0	4	3	2	6	0	11	3	7	0	0	10	0	0	1	0	1	26	150
	1:15 PM	1	8	0	0	9	0	3	5	0	8	3	11	0	0	14	0	2	0	0	2	33	151
	1:30 PM	0	6	1	0	7	3	5	11	0	19	9	7	1	0	17	0	2	4	0	6	49	148
	1:45 PM	1	9	0	0	10	0	3	10	0	13	10	5	1	0	16	0	3	0	0	3	42	126
PM Peak Period	2:00 PM	0	6	0	0	6	0	4	3	0	7	4	7	0	0	11	0	2	1	0	3	27	115
	2:15 PM	0	7	1	0	8	1	2	5	0	8	1	9	0	0	10	1	2	1	0	4	30	124
	2:30 PM	1	4	1	0	6	0	2	4	0	6	2	10	0	0	12	1	2	0	0	3	27	112
	2:45 PM	0	6	0	0	6	0	3	8	0	11	4	8	0	0	12	1	1	0	0	2	31	109
	3:00 PM	0	12	1	0	13	1	3	3	0	7	4	8	0	0	12	2	2	0	0	4	36	104
	3:15 PM	0	2	1	0	3	0	1	0	0	1	3	6	1	0	10	1	2	1	0	4	18	96
	3:30 PM	1	5	1	0	7	2	0	5	0	7	3	4	0	0	7	0	1	2	0	3	24	106
	3:45 PM	0	6	1	0	7	0	2	4	0	6	2	5	1	0	8	0	3	2	0	5	26	104
	4:00 PM	0	11	0	0	11	1	0	2	0	3	4	9	0	0	13	0	1	0	0	1	28	118
	4:15 PM	1	7	0	0	8	2	2	6	0	10	1	7	0	0	8	0	0	2	0	2	28	119
	4:30 PM	2	3	0	0	5	1	1	2	0	4	1	7	0	0	8	3	1	1	0	5	22	104
	4:45 PM	1	9	3	0	13	1	0	0	0	1	10	8	1	0	19	2	4	1	0	7	40	96
	5:00 PM	0	5	0	0	5	0	1	1	0	2	2	15	0	0	17	0	2	3	0	5	29	67
	5:15 PM	1	6	0	0	7	0	0	0	0	0	1	4	1	0	6	0	0	0	0	0	13	49
	5:30 PM	0	2	0	0	2	0	1	2	0	3	2	4	0	0	6	0	2	1	0	3	14	43
	5:45 PM	0	4	0	0	4	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	11	32
	6:00 PM	0	3	1	0	4	0	0	0	0	0	0	6	0	0	6	0	1	0	0	1	11	29
	6:15 PM	1	2	0	0	3	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	7	
	6:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	3	
	6:45 PM	0	4	0	0	4	0	0	2	0	2	1	0	0	0	1	0	1	0	0	1	8	
	7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals		24	323	45	0	392	52	82	253	0	387	239	383	22	0	644	37	83	39	0	159	1582	

Peak Hour Heavy Vehicle Volume Summary

Hourly Time Period Start Time		From North (STH 164)					From East (CTH Q)					From South (STH 164)					From West (CTH Q)					Total Hourly Volume
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	
AM	7:00 AM	3	35	4	0	42	4	4	25	0	33	28	36	2	0	66	3	10	4	0	17	158
MD	11:45 AM	1	27	7	0	35	5	9	24	0	38	24	26	3	0	53	6	10	1	0	17	143
PM	4:30 PM	4	23	3	0	30	2	2	3	0	7	14	34	2	0	50	5	7	5	0	17	104

Counter buttons – Job # 2509-PL, Lisbon, CTH Q at the 2 Mobil Driveways on CTH Q. Ted Atwell

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East Drive = 3/9/20 – 3:00 PM to 6:00 PM

" " 3/13/20 – 6:00 AM to 9:00 AM

But 2 = OUT = WB But 4 = OUT = EB

But 16 = IN = EB But 6 = IN = WB

West Drive = 3/9/20 – 3:00 PM to 6:00 PM

" " 3/13/20 – 6:00 AM to 9:00 AM

But 12 = OUT = WB But 10 = OUT = EB

But 14 = IN = EB But 8 = IN = WB

Intersection Traffic Volume Report

Count Basics	Version 2013.J4.1		Page 1 of 13
Start Date:	Monday, March 9, 2020	Weekday	Schools in Session
Total Number of Hours Counted: 6		Non-Holiday	No Special Events

Base Information, Observed (6) Hour and Estimated (24) Hour Volume Summaries

Intersection of: See notes for button use and CTH Q and Mobil Driveways

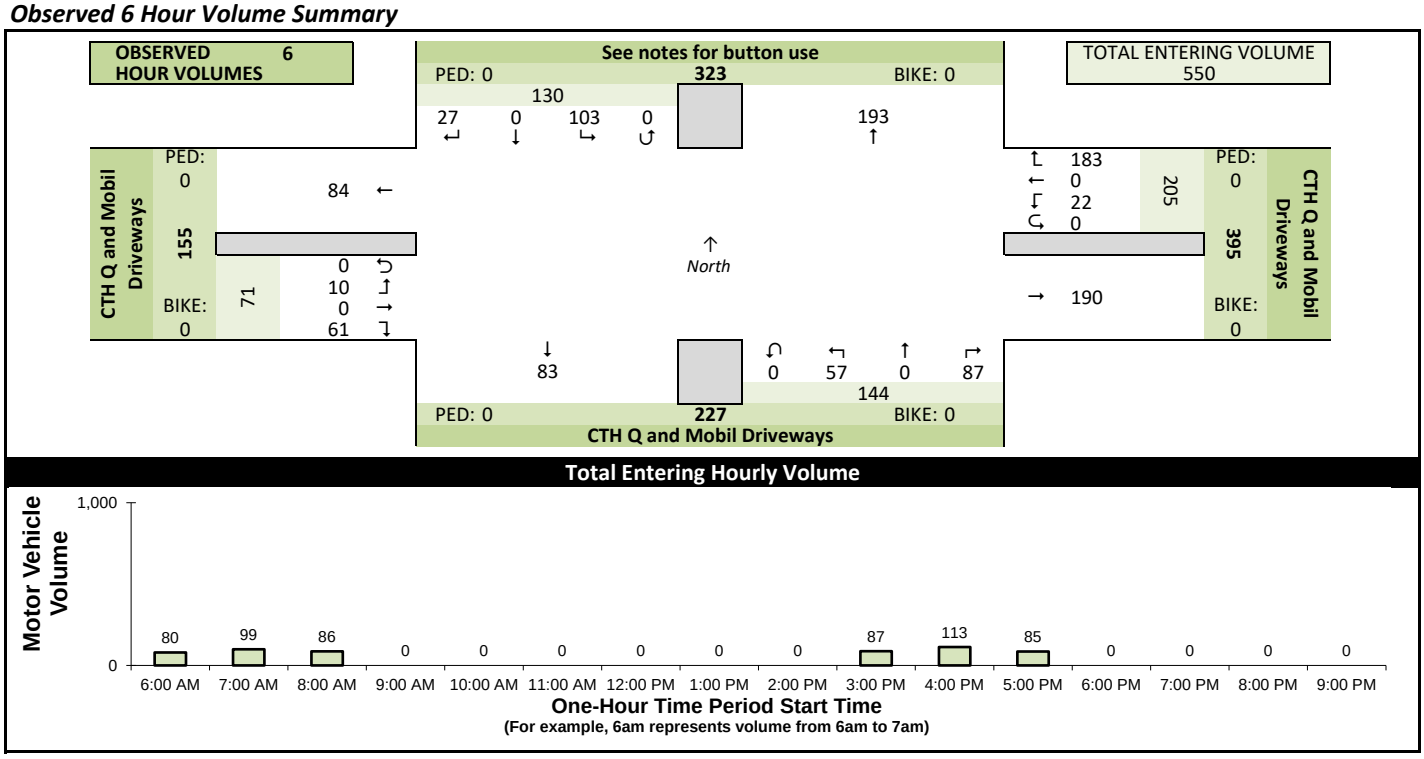
Site Information

Municipality	Town of Lisbon		
County	Waukesha	WisDOT Region	SE
Traffic Control	Uncontrolled		
Roadway Names		North Direction	↑
North Leg	See notes for button use		
East Leg	CTH Q and Mobil Driveways		
South Leg	CTH Q and Mobil Driveways		
West Leg	CTH Q and Mobil Driveways		
Special Considerations			
Schools	In Session		
Holidays	None		
Special Events	None		
Special Pedestrians Observed			
Pre-school children	None		
Elementry school age children	None		
Visually impaired (white cane/helper dog)	None		
Elderly/disabled (except wheelchairs)	None		
Wheelchairs/electric scooters	None		
Other (describe)	None	None	

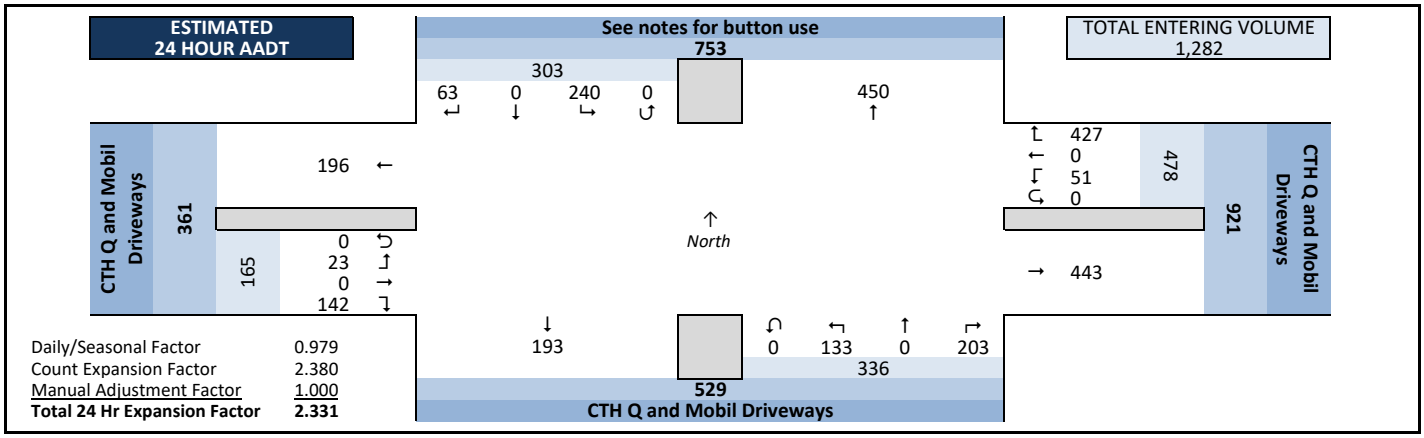
Count Information

Hrs Counted:	6:00 AM-9:00 AM and 3:00 PM-6:00 PM				
1st Day of Count	Monday, March 9, 2020			Weather	
AM Peak Period	Friday, March 13, 2020			Clear & Dry	
Midday Peak Period	Monday, March 9, 2020			Clear & Dry	
PM Peak Period	Monday, March 9, 2020			Clear & Dry	
Calculated Peak Hours					
AM	7:15-8:15am	MD		PM	4:00-5:00pm
Peak Hours Selected for Analysis					
AM	7:00-8:00am	MD		PM	4:30-5:30pm
Daily/Seasonal Adjustment Group	(2) Urban Arterials & Collectors				
Count Expansion Group	(2) Urban Arterials & Collectors				
Daily/Seasonal Adjustment Factor	0.979	Count Expansion Factor	2.380		
Company Name	TADI, Inc.			Manual Adj.	1.000
Observers	AM Peak Period	Ted Atwell			
	Midday Peak Period	None			
	PM Peak Period	Ted Atwell			
Comments	Volumes to/from north are Mobil East Driveway. Volumes to/from the south are Mobile West Driveway.				

Observed 6 Hour Volume Summary



Estimated 24 Hour AADT



Intersection Traffic Volume Report

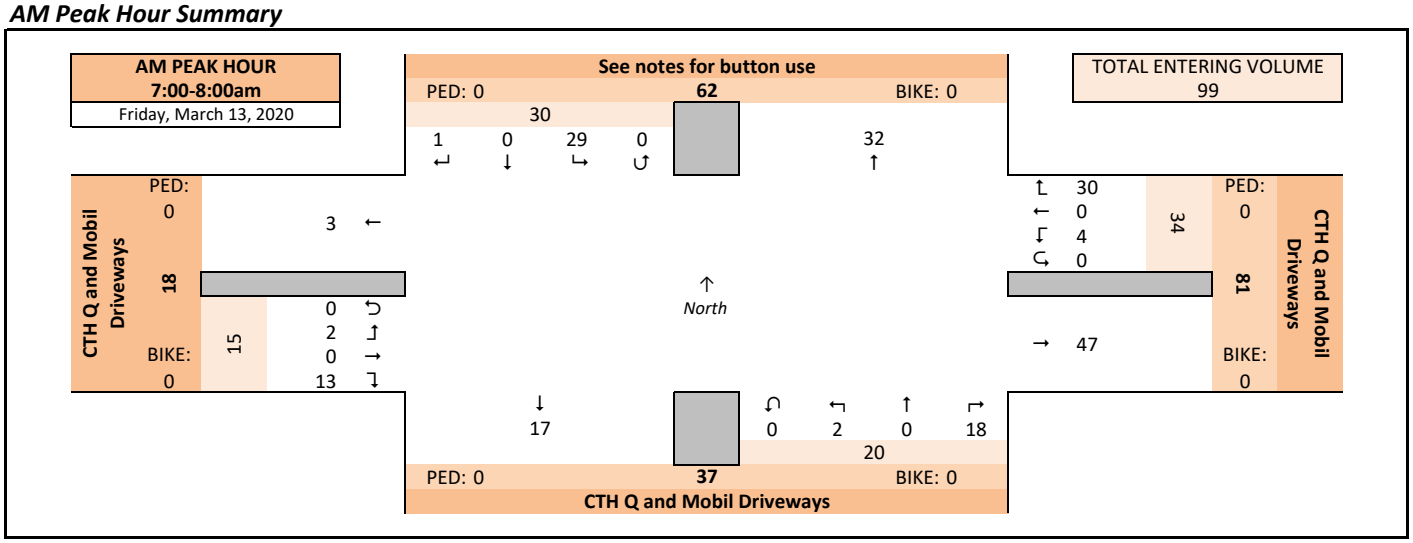
Count Basics			Page 2 of 13
Start Date:	Monday, March 9, 2020	Weekday	Schools in Session
Total Number of Hours Counted: 6		Non-Holiday	No Special Events

Peak Hour Volume Graphical Summary

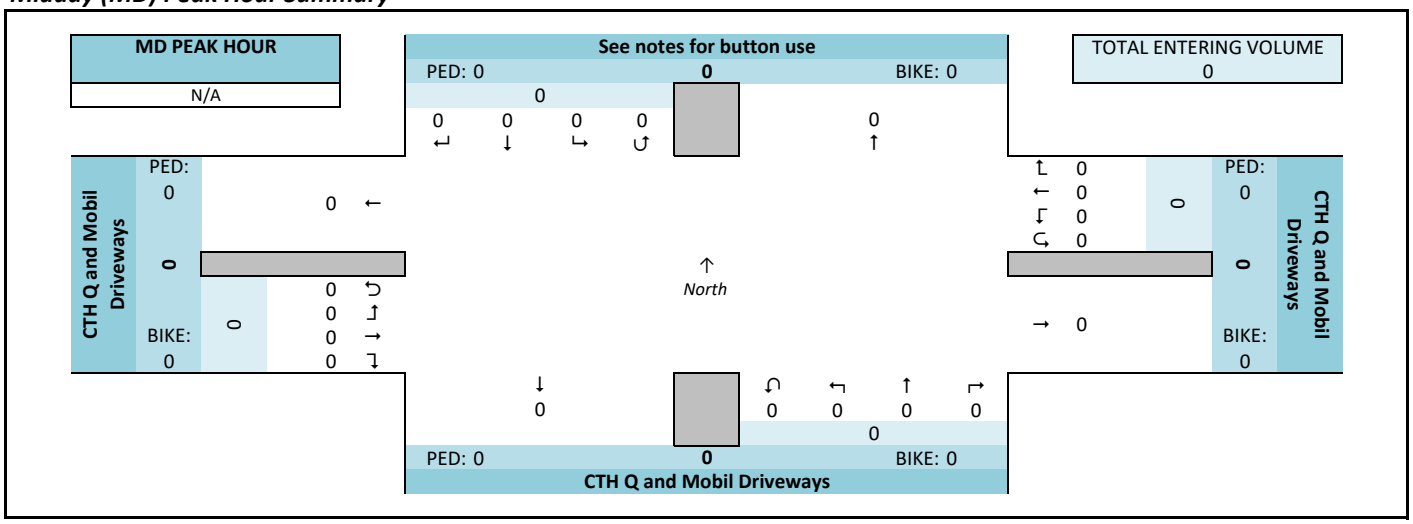
See notes for button use and CTH Q and Mobil Driveways

All Motor Vehicles

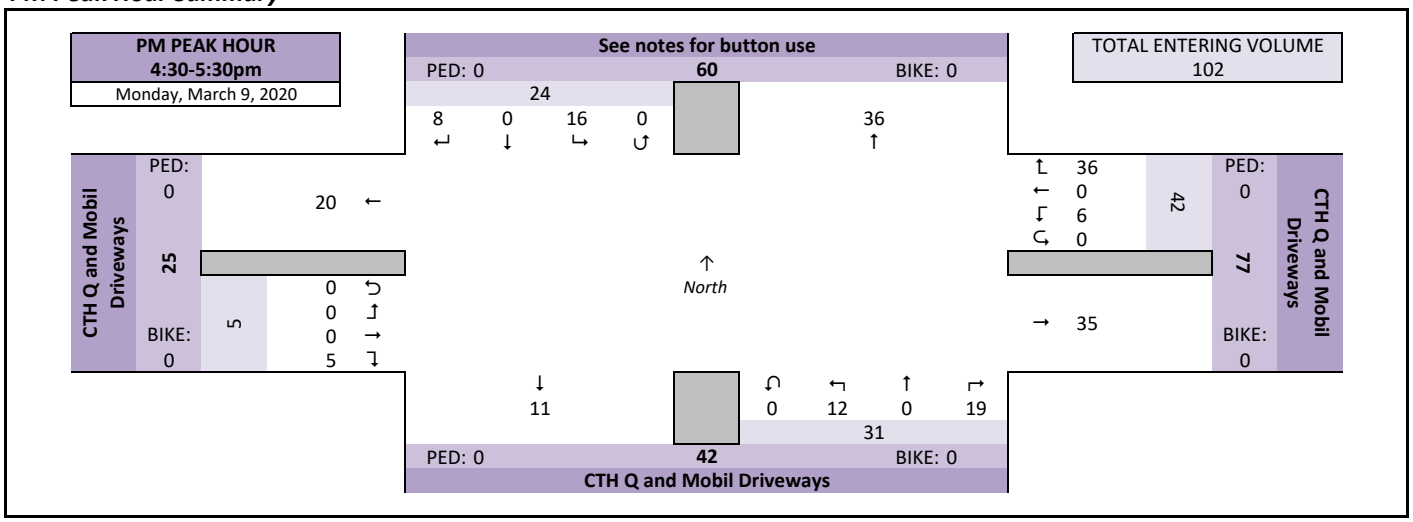
AM Peak Hour Summary



Midday (MD) Peak Hour Summary



PM Peak Hour Summary



Intersection Traffic Volume Report

Count Basics			Page 3 of 13
Start Date:	Monday, March 9, 2020	Weekday	Schools in Session
Total Number of Hours Counted: 6		Non-Holiday	No Special Events

Peak Hour Volume Summary

See notes for button use and CTH Q and Mobil Driveways

All Motor Vehicles

Peak Hour Volumes, Truck Percentages, and PHFs

Friday, March 13, 2020		From North					From East					From South					From West					
	AM Peak Hour	See notes for button use					CTH Q and Mobil Driveways					CTH Q and Mobil Driveways					CTH Q and Mobil Driveways					
	Start Time	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Totals
AM Peak Hour	7:00 AM	0	0	7	0	7	6	0	1	0	7	1	0	1	0	2	3	0	1	0	4	20
	7:15 AM	0	0	6	0	6	4	0	1	0	5	7	0	0	0	7	2	0	1	0	3	21
	7:30 AM	0	0	11	0	11	11	0	1	0	12	5	0	0	0	5	6	0	0	0	6	34
	7:45 AM	1	0	5	0	6	9	0	1	0	10	5	0	1	0	6	2	0	0	0	2	24
	Peak Hour Volume	1	0	29	0	30	30	0	4	0	34	18	0	2	0	20	13	0	2	0	15	99
	Rounded Hourly Volume	0	0	30	0	30	30	0	5	0	35	20	0	0	0	20	15	0	0	0	15	100
	% Single Unit Trucks	0.0	0.0	6.9	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.0	0.0	0.0	13.3	4.0
	% Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Trucks (Total)	0.0	0.0	6.9	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	0.0	0.0	0.0	13.3	4.0
	Peak Hour Factor (PHF)	0.25	0.00	0.66	0.00	0.68	0.68	0.00	1.00	0.00	0.71	0.64	0.00	0.50	0.00	0.71	0.54	0.00	0.50	0.00	0.62	0.73

N/A		From North					From East					From South					From West					
	MD Peak Hour	See notes for button use					CTH Q and Mobil Driveways					CTH Q and Mobil Driveways					CTH Q and Mobil Driveways					
	Start Time	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Totals
Midday (MD) Peak Hour	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Peak Hour Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rounded Hourly Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% Single Unit Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Trucks (Total)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Peak Hour Factor (PHF)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Monday, March 9, 2020		From North					From East					From South					From West					
	PM Peak Hour	See notes for button use					CTH Q and Mobil Driveways					CTH Q and Mobil Driveways					CTH Q and Mobil Driveways					
	Start Time	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Totals
PM Peak Hour	4:30 PM	2	0	6	0	8	6	0	1	0	7	4	0	3	0	7	0	0	0	0	0	22
	4:45 PM	2	0	2	0	4	12	0	2	0	14	5	0	6	0	11	1	0	0	0	1	30
	5:00 PM	3	0	3	0	6	11	0	0	0	11	3	0	2	0	5	3	0	0	0	3	25
	5:15 PM	1	0	5	0	6	7	0	3	0	10	7	0	1	0	8	1	0	0	0	1	25
	Peak Hour Volume	8	0	16	0	24	36	0	6	0	42	19	0	12	0	31	5	0	0	0	5	102
	Rounded Hourly Volume	10	0	15	0	25	35	0	5	0	40	20	0	10	0	30	5	0	0	0	5	100
	% Single Unit Trucks	0.0	0.0	0.0	0.0	0.0	2.8	0.0	16.7	0.0	4.8	5.3	0.0	8.3	0.0	6.5	0.0	0.0	0.0	0.0	0.0	3.9
	% Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Trucks (Total)	0.0	0.0	0.0	0.0	0.0	2.8	0.0	16.7	0.0	4.8	5.3	0.0	8.3	0.0	6.5	0.0	0.0	0.0	0.0	0.0	3.9
	Peak Hour Factor (PHF)	0.67	0.00	0.67	0.00	0.75	0.75	0.00	0.50	0.00	0.75	0.68	0.00	0.50	0.00	0.70	0.42	0.00	0.00	0.00	0.42	0.85

Peak Hour Pedestrian and Bicyclist Volumes

Pedestrians and Bicyclists		Crossing North Approach			Crossing East Approach			Crossing South Approach			Crossing West Approach			Total Ped & Bike Volume
		See notes for button use			CTH Q and Mobil Driveways			CTH Q and Mobil Driveways			CTH Q and Mobil Driveways			
	15-Minute Start Time	Pedestrian	Bicyclist	Total	Pedestrian	Bicyclist	Total	Pedestrian	Bicyclist	Total	Pedestrian	Bicyclist	Total	
AM	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0
MD	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Traffic Volume Report

Count Basics		*Page 5 of 13*
Start Date: Monday, March 9, 2020	Weekday	Schools in Session
Total Number of Hours Counted: 6	Non-Holiday	No Special Events

15-Minute Motor Vehicle Data

All Motor Vehicles

See notes for button use and CTH Q and Mobil Driveways

15-Minute Motor Vehicle Data

15-Minute Time Period Start Time		From North (See notes for button use)					From East (CTH Q and Mobil Driveways)					From South (CTH Q and Mobil Driveways)					From West (CTH Q and Mobil Driveways)					15-Min Totals	Hourly Sum	PHF
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total			
AM Peak Period	6:00 AM	0	0	6	0	6	5	0	1	0	6	1	0	2	0	3	2	0	1	0	3	18	80	0.87
	6:15 AM	0	0	5	0	5	6	0	2	0	8	5	0	0	0	5	3	0	2	0	5	23	82	0.89
	6:30 AM	2	0	5	0	7	1	0	0	0	1	2	0	0	0	2	6	0	1	0	7	17	80	0.91
	6:45 AM	0	0	5	0	5	8	0	0	0	8	3	0	2	0	5	2	0	2	0	4	22	97	0.71
	7:00 AM	0	0	7	0	7	6	0	1	0	7	1	0	1	0	2	3	0	1	0	4	20	99	0.73
	7:15 AM	0	0	6	0	6	4	0	1	0	5	7	0	0	0	7	2	0	1	0	3	21	100	0.74
	7:30 AM	0	0	11	0	11	11	0	1	0	12	5	0	0	0	5	6	0	0	0	6	34	98	0.72
	7:45 AM	1	0	5	0	6	9	0	1	0	10	5	0	1	0	6	2	0	0	0	2	24	88	0.92
	8:00 AM	2	0	6	0	8	3	0	0	0	3	1	0	2	0	3	7	0	0	0	7	21	86	0.90
	8:15 AM	1	0	3	0	4	6	0	1	0	7	3	0	1	0	4	4	0	0	0	4	19		
	8:30 AM	1	0	3	0	4	8	0	1	0	9	5	0	1	0	6	5	0	0	0	5	24		
	8:45 AM	0	0	4	0	4	6	0	2	0	8	4	0	3	0	7	1	0	2	0	3	22		
	9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Midday Peak Period	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PM Peak Period	2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	3:00 PM	2	0	3	0	5	9	0	0	0	9	2	0	4	0	6	3	0	0	0	3	23	87	0.87
	3:15 PM	4	0	4	0	8	10	0	0	0	10	1	0	4	0	5	2	0	0	0	2	25	93	0.80
	3:30 PM	1	0	3	0	4	8	0	1	0	9	5	0	1	0	6	0	0	0	0	0	19	100	0.78
	3:45 PM	1	0	4	0	5	9	0	0	0	9	2	0	3	0	5	1	0	0	0	1	20	103	0.80
	4:00 PM	0	0	2	0	2	12	0	1	0	13	5	0	6	0	11	3	0	0	0	3	29	113	0.88
	4:15 PM	3	0	1	0	4	12	0	1	0	13	4	0	8	0	12	3	0	0	0	3	32	109	0.85
	4:30 PM	2	0	6	0	8	6	0	1	0	7	4	0	3	0	7	0	0	0	0	0	22	102	0.85
	4:45 PM	2	0	2	0	4	12	0	2	0	14	5	0	6	0	11	1	0	0	0	1	30	95	0.79
	5:00 PM	3	0	3	0	6	11	0	0	0	11	3	0	2	0	5	3	0	0	0	3	25	85	0.85
	5:15 PM	1	0	5	0	6	7	0	3	0	10	7	0	1	0	8	1	0	0	0	1	25		
	5:30 PM	1	0	0	0	1	7	0	0	0	7	3	0	4	0	7	0	0	0	0	0	15		
	5:45 PM	0	0	4	0	4	7	0	2	0	9	4	0	2	0	6	1	0	0	0	1	20		
	6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Totals		27	0	103	0	130	183	0	22	0	205	87	0	57	0	144	61	0	10	0	71	550		

Peak Hour All Vehicle Volume Summary

Hourly Time Period Start Time		From North (See notes for button use)					From East (CTH Q and Mobil Driveways)					From South (CTH Q and Mobil Driveways)					From West (CTH Q and Mobil Driveways)					Total Hourly Volume	PHF
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total		
AM	7:00 AM	1	0	29	0	30	30	0	4	0	34	18	0	2	0	20	13	0	2	0	15	99	0.73
MD	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PM	4:30 PM	8	0	16	0	24	36	0	6	0	42	19	0	12	0	31	5	0	0	0	5	102	0.85

Intersection Traffic Volume Report

Count Basics			*Page 9 of 13*
Start Date:	Monday, March 9, 2020	Weekday	Schools in Session
Total Number of Hours Counted: 6		Non-Holiday	No Special Events

15-Minute Heavy Vehicle Data

Heavy Vehicles (Single-Unit Trucks, Buses & Semi-Trucks)

See notes for button use and CTH Q and Mobil Driveways

15-Minute Heavy Vehicle Data

15-Minute Time Period Start Time		From North (See notes for button use)					From East (CTH Q and Mobil Driveways)					From South (CTH Q and Mobil Driveways)					From West (CTH Q and Mobil Driveways)					15-Min Totals	Hourly Sum
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total		
AM Peak Period	6:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	2	4
	6:15 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3
	6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	4
	7:15 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	3
	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
	8:15 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
	8:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	1	0	0	0	1	3	
	8:45 AM	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2	
	9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Midday Peak Period	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PM Peak Period	2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	3:30 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	2
	3:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	4:30 PM	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	2	4
	4:45 PM	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	2	2
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals		0	0	4	0	4	3	0	4	0	7	3	0	2	0	5	3	0	1	0	4	20	

Peak Hour Heavy Vehicle Volume Summary

Hourly Time Period Start Time		From North (See notes for button use)					From East (CTH Q and Mobil Driveways)					From South (CTH Q and Mobil Driveways)					From West (CTH Q and Mobil Driveways)					Total Hourly Volume
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	
AM	7:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4
MD	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:30 PM	0	0	0	0	0	1	0	1	0	2	1	0	1	0	2	0	0	0	0	0	4

APPENDIX B

Year 2021 Background Traffic Operational Analysis

HCS7 Roundabouts Report

General Information

Analyst	TSC
Agency or Co.	TADI
Date Performed	4/20/2020
Analysis Year	2017
Time Analyzed	AM Peak Hour - Existing
Project Description	2509 Lisbon Kwik Trip STH 164/CTH Q TIA

Site Information

Intersection	STH 164 & CTH Q
E/W Street Name	CTH Q
N/S Street Name	STH 164
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.89
Jurisdiction	WisDOT Abb TIA

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0
Lane Assignment	LT		TR		LT		TR		LT		TR		LT		TR	
Volume (V), veh/h	0	55	270	55	0	165	50	25	0	20	330	190	0	120	645	25
Percent Heavy Vehicles, %	5	5	5	5	14	14	14	14	12	12	12	12	5	5	5	5
Flow Rate (v_{PCE}), pc/h	0	65	319	65	0	211	64	32	0	25	415	239	0	142	761	29
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.0000	4.0000		4.0000	4.0000		4.0000	4.0000		4.0000	4.0000	
Follow-Up Headway (s)	2.8000	2.8000		2.8000	2.8000		2.8000	2.8000		2.8000	2.8000	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	211.03	237.97		211.00	96.00		319.13	359.87		438.04	493.96	
Entry Volume veh/h	200.98	226.64		185.09	84.21		284.94	321.31		417.18	470.44	
Circulating Flow (v_c), pc/h	1114			505			526			300		
Exiting Flow (v_{ex}), pc/h	700			118			512			1037		
Capacity (c_{pce}), pc/h	575.08	575.08		892.79	892.79		879.35	879.35		1035.25	1035.25	
Capacity (c), veh/h	547.70	547.70		783.15	783.15		785.13	785.13		985.96	985.96	
v/c Ratio (x)	0.37	0.41		0.24	0.11		0.36	0.41		0.42	0.48	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	12.2	13.2		7.2	5.7		9.0	9.8		8.4	9.3	
Lane LOS	B	B		A	A		A	A		A	A	
95% Queue, veh	1.7	2.0		0.9	0.4		1.7	2.0		2.1	2.6	
Approach Delay, s/veh	12.7			6.7			9.4			8.9		
Approach LOS	B			A			A			A		
Intersection Delay, s/veh | LOS	9.5						A					

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	345	60	35	35	5
Future Volume (vph)	5	345	60	35	35	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		50	50		30	
Link Distance (ft)		120	311		208	
Travel Time (s)		1.6	4.2		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	10%	10%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	345	60	35	35	5
Future Vol, veh/h	5	345	60	35	35	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	5	5	10	10	7	7
Mvmt Flow	6	401	70	41	41	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	111	0	-	0	504	91
Stage 1	-	-	-	-	91	-
Stage 2	-	-	-	-	413	-
Critical Hdwy	4.15	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.245	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	1460	-	-	-	519	953
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	657	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1460	-	-	-	516	953
Mov Cap-2 Maneuver	-	-	-	-	516	-
Stage 1	-	-	-	-	915	-
Stage 2	-	-	-	-	657	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1460	-	-	-	547
HCM Lane V/C Ratio	0.004	-	-	-	0.085
HCM Control Delay (s)	7.5	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	325	55	10	25	5
Future Volume (vph)	20	325	55	10	25	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		50	50		25	
Link Distance (ft)		259	120		211	
Travel Time (s)		3.5	1.6		5.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	10%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	325	55	10	25	5
Future Vol, veh/h	20	325	55	10	25	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	5	5	10	10	1	1
Mvmt Flow	23	378	64	12	29	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	76	0	-	0	494	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	424	-
Critical Hdwy	4.15	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.245	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1504	-	-	-	536	996
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	662	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1504	-	-	-	526	996
Mov Cap-2 Maneuver	-	-	-	-	526	-
Stage 1	-	-	-	-	937	-
Stage 2	-	-	-	-	662	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1504	-	-	-	571
HCM Lane V/C Ratio	0.015	-	-	-	0.061
HCM Control Delay (s)	7.4	0	-	-	11.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCS7 Roundabouts Report

General Information

Analyst	TSC
Agency or Co.	TADI
Date Performed	4/20/2020
Analysis Year	2017
Time Analyzed	PM Peak Hour - Existing
Project Description	2509 Lisbon Kwik Trip STH 164/CTH Q TIA

Site Information

Intersection	STH 164 & CTH Q
E/W Street Name	CTH Q
N/S Street Name	STH 164
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.96
Jurisdiction	WisDOT Abb TIA

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0
Lane Assignment	LT		TR		LT		TR		LT		TR		LT		TR	
Volume (V), veh/h	0	40	125	40	0	175	300	130	0	50	665	190	0	55	345	45
Percent Heavy Vehicles, %	8	8	8	8	1	1	1	1	6	6	6	6	7	7	7	7
Flow Rate (v_{PCE}), pc/h	0	45	141	45	0	184	316	137	0	55	734	210	0	61	385	50
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.0000	4.0000		4.0000	4.0000		4.0000	4.0000		4.0000	4.0000	
Follow-Up Headway (s)	2.8000	2.8000		2.8000	2.8000		2.8000	2.8000		2.8000	2.8000	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	108.57	122.43		299.39	337.61		469.53	529.47		233.12	262.88	
Entry Volume veh/h	100.53	113.36		296.43	334.27		442.95	499.50		217.87	245.68	
Circulating Flow (v_c), pc/h	630			834			247			555		
Exiting Flow (v_{ex}), pc/h	412			421			916			614		
Capacity (c_{pce}), pc/h	815.72	815.72		703.97	703.97		1075.65	1075.65		861.12	861.12	
Capacity (c), veh/h	755.30	755.30		697.00	697.00		1014.76	1014.76		804.79	804.79	
v/c Ratio (x)	0.13	0.15		0.43	0.48		0.44	0.49		0.27	0.31	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	6.2	6.4		11.1	12.2		8.4	9.4		7.5	8.0	
Lane LOS	A	A		B	B		A	A		A	A	
95% Queue, veh	0.5	0.5		2.1	2.6		2.3	2.8		1.1	1.3	
Approach Delay, s/veh	6.3			11.7			9.0			7.7		
Approach LOS	A			B			A			A		
Intersection Delay, s/veh | LOS	9.2						A					

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	185	355	40	20	15
Future Volume (vph)	5	185	355	40	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		50	50		30	
Link Distance (ft)		120	311		208	
Travel Time (s)		1.6	4.2		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	8%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	185	355	40	20	15
Future Vol, veh/h	5	185	355	40	20	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	2	2	1	1
Mvmt Flow	5	201	386	43	22	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	429	0	-	0	619	408
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	211	-
Critical Hdwy	4.18	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.272	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1099	-	-	-	454	645
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	827	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1099	-	-	-	452	645
Mov Cap-2 Maneuver	-	-	-	-	452	-
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	827	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1099	-	-	-	518
HCM Lane V/C Ratio	0.005	-	-	-	0.073
HCM Control Delay (s)	8.3	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	165	360	10	25	15
Future Volume (vph)	10	165	360	10	25	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		50	50		25	
Link Distance (ft)		259	120		211	
Travel Time (s)		3.5	1.6		5.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	8%	2%	2%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	165	360	10	25	15
Future Vol, veh/h	10	165	360	10	25	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	2	2	7	7
Mvmt Flow	11	179	391	11	27	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	402	0	-	0	598	397
Stage 1	-	-	-	-	397	-
Stage 2	-	-	-	-	201	-
Critical Hdwy	4.18	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.272	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	1125	-	-	-	457	642
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	821	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1125	-	-	-	452	642
Mov Cap-2 Maneuver	-	-	-	-	452	-
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	821	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1125	-	-	-	508
HCM Lane V/C Ratio	0.01	-	-	-	0.086
HCM Control Delay (s)	8.2	0	-	-	12.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

APPENDIX C

Year 2021 Build Traffic Operational Analysis

HCS7 Roundabouts Report

General Information

Analyst	TSC
Agency or Co.	TADI
Date Performed	4/20/2020
Analysis Year	2017
Time Analyzed	AM Peak Hour - Build
Project Description	2509 Lisbon Kwik Trip STH 164/CTH Q TIA

Site Information

Intersection	STH 164 & CTH Q
E/W Street Name	CTH Q
N/S Street Name	STH 164
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.89
Jurisdiction	WisDOT Abb TIA

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0
Lane Assignment	LT		TR		LT		TR		LT		TR		LT		TR	
Volume (V), veh/h	0	100	305	55	0	175	60	25	0	85	310	180	0	115	660	40
Percent Heavy Vehicles, %	5	5	5	5	14	14	14	14	12	12	12	12	5	5	5	5
Flow Rate (v_{PCE}), pc/h	0	118	360	65	0	224	77	32	0	107	390	227	0	136	779	47
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.0000	4.0000		4.0000	4.0000		4.0000	4.0000		4.0000	4.0000	
Follow-Up Headway (s)	2.8000	2.8000		2.8000	2.8000		2.8000	2.8000		2.8000	2.8000	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	255.21	287.79		224.00	109.00		340.28	383.72		452.14	509.86	
Entry Volume veh/h	243.06	274.09		196.49	95.61		303.82	342.61		430.61	485.58	
Circulating Flow (v_c), pc/h	1139			615			614			408		
Exiting Flow (v_{ex}), pc/h	723			231			540			1068		
Capacity (c_{pce}), pc/h	564.79	564.79		824.60	824.60		825.20	825.20		957.57	957.57	
Capacity (c), veh/h	537.90	537.90		723.34	723.34		736.79	736.79		911.98	911.98	
v/c Ratio (x)	0.45	0.51		0.27	0.13		0.41	0.47		0.47	0.53	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	14.4	16.0		8.2	6.4		10.3	11.4		9.8	11.0	
Lane LOS	B	C		A	A		B	B		A	B	
95% Queue, veh	2.3	2.9		1.1	0.5		2.0	2.5		2.6	3.2	
Approach Delay, s/veh	15.2			7.6			10.9			10.4		
Approach LOS	C			A			B			B		
Intersection Delay, s/veh | LOS	11.3						B					

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	425	150	35	35	5
Future Volume (vph)	5	425	150	35	35	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	50			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		50	50		30	
Link Distance (ft)		120	311		208	
Travel Time (s)		1.6	4.2		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	10%	10%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	425	150	35	35	5
Future Vol, veh/h	5	425	150	35	35	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	5	5	10	10	7	7
Mvmt Flow	6	494	174	41	41	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	215	0	-	0	701	195
Stage 1	-	-	-	-	195	-
Stage 2	-	-	-	-	506	-
Critical Hdwy	4.15	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.245	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	1337	-	-	-	397	834
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	595	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1337	-	-	-	395	834
Mov Cap-2 Maneuver	-	-	-	-	395	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	595	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	14.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1337	-	-	-	423
HCM Lane V/C Ratio	0.004	-	-	-	0.11
HCM Control Delay (s)	7.7	-	-	-	14.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	305	30	90	55	10	10	1	100	25	1	5
Future Volume (vph)	20	305	30	90	55	10	10	1	100	25	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		50			50			30			25	
Link Distance (ft)		259			120			261			211	
Travel Time (s)		3.5			1.6			5.9			5.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	10%	10%	10%	2%	2%	2%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												

Intersection Summary

Area Type: Other

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	305	30	90	55	10	10	1	100	25	1	5
Future Vol, veh/h	20	305	30	90	55	10	10	1	100	25	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	5	5	5	10	10	10	2	2	2	1	1	1
Mvmt Flow	23	355	35	105	64	12	12	1	116	29	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	76	0	0	390	0	0	703	705	373	757	716	70
Stage 1	-	-	-	-	-	-	419	419	-	280	280	-
Stage 2	-	-	-	-	-	-	284	286	-	477	436	-
Critical Hdwy	4.15	-	-	4.2	-	-	7.12	6.52	6.22	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Follow-up Hdwy	2.245	-	-	2.29	-	-	3.518	4.018	3.318	3.509	4.009	3.309
Pot Cap-1 Maneuver	1504	-	-	1126	-	-	352	361	673	325	357	996
Stage 1	-	-	-	-	-	-	612	590	-	729	681	-
Stage 2	-	-	-	-	-	-	723	675	-	571	582	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1504	-	-	1126	-	-	320	322	673	246	319	996
Mov Cap-2 Maneuver	-	-	-	-	-	-	320	322	-	246	319	-
Stage 1	-	-	-	-	-	-	603	581	-	718	618	-
Stage 2	-	-	-	-	-	-	651	612	-	464	573	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	4.9	12.5	19.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	607	1504	-	-	1126	-	-	282
HCM Lane V/C Ratio	0.213	0.015	-	-	0.093	-	-	0.128
HCM Control Delay (s)	12.5	7.4	-	-	8.5	-	-	19.6
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.3	-	-	0.4

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	85	0	575	815	75
Future Volume (vph)	0	85	0	575	815	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	0	1	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	30			55	55	
Link Distance (ft)	335			282	91	
Travel Time (s)	7.6			3.5	1.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	12%	12%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑	↑↳	
Traffic Vol, veh/h	0	85	0	575	815	75
Future Vol, veh/h	0	85	0	575	815	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	12	12	7	7
Mvmt Flow	0	90	0	612	867	80

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	907	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	334	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	334	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	334	-	-
HCM Lane V/C Ratio	-	0.271	-	-
HCM Control Delay (s)	-	19.7	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	1.1	-	-

HCS7 Roundabouts Report

General Information

Analyst	TSC
Agency or Co.	TADI
Date Performed	4/20/2020
Analysis Year	2017
Time Analyzed	PM Peak Hour - Build
Project Description	2509 Lisbon Kwik Trip STH 164/CTH Q TIA

Site Information

Intersection	STH 164 & CTH Q
E/W Street Name	CTH Q
N/S Street Name	STH 164
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.96
Jurisdiction	WisDOT Abb TIA

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	2	0	0	0	2	0
Lane Assignment	LT		TR		LT		TR		LT		TR		LT		TR	
Volume (V), veh/h	0	90	155	40	0	180	315	125	0	115	640	180	0	50	355	60
Percent Heavy Vehicles, %	8	8	8	8	1	1	1	1	6	6	6	6	7	7	7	7
Flow Rate (v_{PCE}), pc/h	0	101	174	45	0	189	331	132	0	127	707	199	0	56	396	67
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)	4.0000	4.0000		4.0000	4.0000		4.0000	4.0000		4.0000	4.0000	
Follow-Up Headway (s)	2.8000	2.8000		2.8000	2.8000		2.8000	2.8000		2.8000	2.8000	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	150.40	169.60		306.44	345.56		485.51	547.49		243.93	275.07	
Entry Volume veh/h	139.26	157.04		303.41	342.14		458.03	516.50		227.97	257.07	
Circulating Flow (v_c), pc/h	641			935			331			647		
Exiting Flow (v_{ex}), pc/h	429			525			940			630		
Capacity (c_{pce}), pc/h	809.26	809.26		654.45	654.45		1012.33	1012.33		805.76	805.76	
Capacity (c), veh/h	749.32	749.32		647.97	647.97		955.03	955.03		753.05	753.05	
v/c Ratio (x)	0.19	0.21		0.47	0.53		0.48	0.54		0.30	0.34	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	6.8	7.1		12.7	14.2		9.6	10.8		8.4	8.9	
Lane LOS	A	A		B	B		A	B		A	A	
95% Queue, veh	0.7	0.8		2.5	3.1		2.7	3.3		1.3	1.5	
Approach Delay, s/veh	7.0			13.5			10.2			8.7		
Approach LOS	A			B			B			A		
Intersection Delay, s/veh | LOS	10.4						B					

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	265	450	40	20	15
Future Volume (vph)	5	265	450	40	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	50			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		50	50		30	
Link Distance (ft)		120	311		208	
Travel Time (s)		1.6	4.2		4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	8%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	265	450	40	20	15
Future Vol, veh/h	5	265	450	40	20	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	2	2	1	1
Mvmt Flow	5	288	489	43	22	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	532	0	-	0	809	511
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	298	-
Critical Hdwy	4.18	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.272	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1006	-	-	-	351	565
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	755	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1006	-	-	-	349	565
Mov Cap-2 Maneuver	-	-	-	-	349	-
Stage 1	-	-	-	-	601	-
Stage 2	-	-	-	-	755	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1006	-	-	-	417
HCM Lane V/C Ratio	0.005	-	-	-	0.091
HCM Control Delay (s)	8.6	-	-	-	14.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	155	20	105	350	10	15	1	90	25	1	15
Future Volume (vph)	10	155	20	105	350	10	15	1	90	25	1	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		50			50			25			25	
Link Distance (ft)		259			120			261			211	
Travel Time (s)		3.5			1.6			7.1			5.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	2%	2%	2%	7%	7%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	155	20	105	350	10	15	1	90	25	1	15
Future Vol, veh/h	10	155	20	105	350	10	15	1	90	25	1	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	2	2	2	2	2	2	7	7	7
Mvmt Flow	11	168	22	114	380	11	16	1	98	27	1	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	391	0	0	190	0	0	823	820	179	865	826	386
Stage 1	-	-	-	-	-	-	201	201	-	614	614	-
Stage 2	-	-	-	-	-	-	622	619	-	251	212	-
Critical Hdwy	4.18	-	-	4.12	-	-	7.12	6.52	6.22	7.17	6.57	6.27
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.17	5.57	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.17	5.57	-
Follow-up Hdwy	2.272	-	-	2.218	-	-	3.518	4.018	3.318	3.563	4.063	3.363
Pot Cap-1 Maneuver	1136	-	-	1384	-	-	292	310	864	269	302	651
Stage 1	-	-	-	-	-	-	801	735	-	471	475	-
Stage 2	-	-	-	-	-	-	474	480	-	742	718	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1136	-	-	1384	-	-	264	282	864	221	275	651
Mov Cap-2 Maneuver	-	-	-	-	-	-	264	282	-	221	275	-
Stage 1	-	-	-	-	-	-	793	728	-	466	436	-
Stage 2	-	-	-	-	-	-	423	441	-	651	711	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	1.8	11.8	19.5
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	644	1136	-	-	1384	-	-	293
HCM Lane V/C Ratio	0.179	0.01	-	-	0.082	-	-	0.152
HCM Control Delay (s)	11.8	8.2	-	-	7.8	-	-	19.5
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0.3	-	-	0.5

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	55	0	935	535	40
Future Volume (vph)	0	55	0	935	535	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	0	1	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	30			55	55	
Link Distance (ft)	335			282	91	
Travel Time (s)	7.6			3.5	1.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	6%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑	↑↳	
Traffic Vol, veh/h	0	55	0	935	535	40
Future Vol, veh/h	0	55	0	935	535	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	6	6	6	6
Mvmt Flow	0	61	0	1039	594	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	616	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	491	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	491	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	491	-	-
HCM Lane V/C Ratio	-	0.124	-	-
HCM Control Delay (s)	-	13.4	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

APPENDIX H

Intersection Sight Distance Calculations

ISD CALCULATIONS

Performed by: TADI-TSC Date: 4/21/2020
Location: STH 164 @ Proposed D/W

Mainline Name: STH 164
Sidestreet Name: Proposed D/W

T-Intersection (1=yes, 0=no):	1			
Design Speed from Left:	55	mph	80.67	fps
Design Speed from Right:	55	mph	80.67	fps
Median Width:	25	feet	2.08	equivalent lanes
Near Side Right:	1	lane or taper		
Near Side Thru:	2	lane(s)		
Far Side Thru:	1	lane(s)		
Far Side Right:	0	lane or taper		

	P	SU	WB	
Design Vehicles:	x	x	x	(place an "X")

CASE B1: Left Turn from Minor Street or Median (driver looking right)

	MINIMUM ISD			*DESIRABLE ISD*		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	7.5	9.5	11.5	10.0	12.0	13.0
Additional Time Gap, sec:	0.0	2.9	2.9	0.0	2.9	2.9
Total Time Gap, sec:	7.5	12.4	14.4	10.0	14.9	15.9
Case B1 ISD, feet:	605.0	1000.3	1161.6	806.7	1201.9	1282.6
Rounded Case B1 ISD, feet:	610	1005	1165	810	1205	1285

CASE B2: Right Turn from Minor Street (driver looking left)

	MINIMUM ISD			*DESIRABLE ISD*		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.5	8.5	10.5	8.0	10.0	12.0
Additional Time Gap, sec:	0.5	0.7	0.7	0.5	0.7	0.7
Total Time Gap, sec:	7.0	9.2	11.2	8.5	10.7	12.7
Case B2 ISD, feet:	564.7	742.1	903.5	685.7	863.1	1024.5
Rounded Case B2 ISD, feet:	565	745	905	690	865	1025

CASE B3: Crossing from Minor Street (driver looking left)

	MINIMUM ISD			*DESIRABLE ISD*		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.5	8.5	10.5	7.0	10.0	13.0
Additional Time Gap, sec:	0.5	0.7	0.7	0.5	0.7	0.7
Total Time Gap, sec:	7.0	9.2	11.2	7.5	10.7	13.7
Case B3 ISD, feet:	564.7	742.1	903.5	605.0	863.1	1105.1
Rounded Case B3 ISD, feet:	565	745	905	610	865	1110

CASE B3: Crossing from Minor Street or Median (driver looking right)

	MINIMUM ISD			*DESIRABLE ISD*		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.5	8.5	10.5	7.0	10.0	13.0
Additional Time Gap, sec:	-6.5	-8.5	-10.5	-7.0	-10.0	-13.0
Total Time Gap, sec:	0.0	0.0	0.0	0.0	0.0	0.0
Case B3 ISD, feet:	0.0	0.0	0.0	0.0	0.0	0.0
Rounded Case B3 ISD, feet:	0	0	0	0	0	0

CASE F: Left from Major to Minor (driver looking to left of access)

	MINIMUM ISD			*DESIRABLE ISD*		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	5.5	6.5	7.5	8.0	8.0	8.0
Additional Time Gap, sec:	1.0	1.4	1.4	1.0	1.4	1.4
Total Time Gap, sec:	6.5	7.9	8.9	9.0	9.4	9.4
Case F ISD, feet:	524.3	637.3	717.9	726.0	758.3	758.3
Rounded Case F ISD, feet:	525	640	720	730	760	760

CONTROLLING DISTANCES:

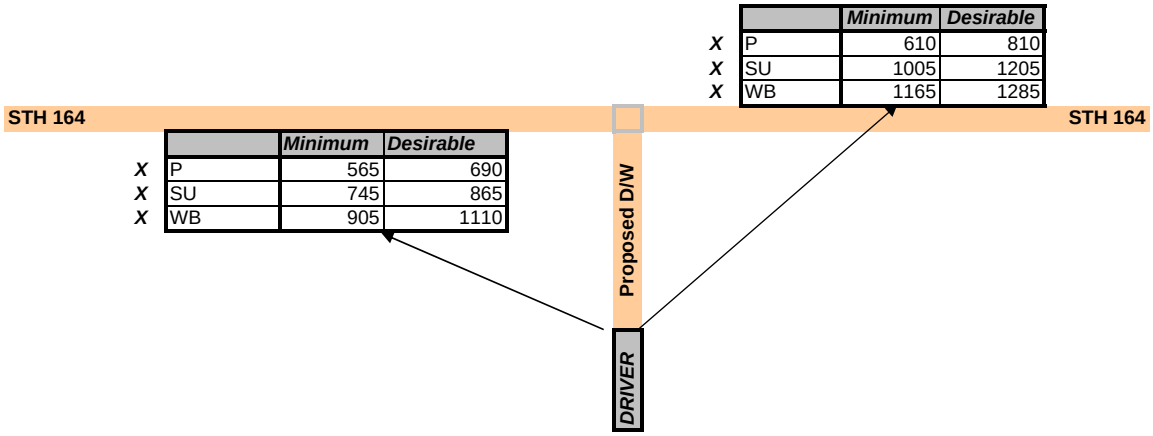
	MINIMUM ISD			***DESIRABLE ISD***		
	P	**SU**	**WB**	**P**	**SU**	**WB**
To Left of Access:	**565**	**745**	**905**	**690**	**865**	**1110**
To Right of Access:	**610**	**1005**	**1165**	**810**	**1205**	**1285**
Left-Turn from Mainline:	**525**	**640**	**720**	**730**	**760**	**760**

NOTES: A median width of 25' or more necessary for two-stage of 19' P-Vehicle
A median width of 36' or more necessary for two-stage of 30' SU-Vehicle
A median width of 71' or more necessary for two-stage of 65' WB-Vehicle

ISD CALCULATIONS

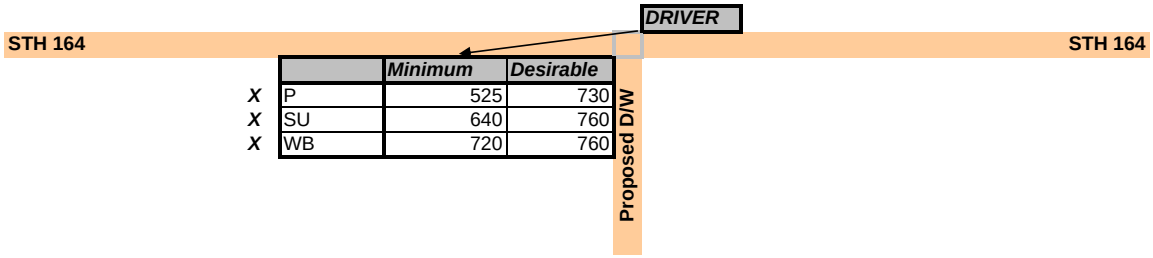
Performed by: TADI-TSC Date: 4/21/2020
Location: STH 164 @ Proposed D/W
0

SPECIAL INSTRUCTIONS:



		Minimum	Desirable
X	P	610	810
X	SU	1005	1205
X	WB	1165	1285

		Minimum	Desirable
X	P	565	690
X	SU	745	865
X	WB	905	1110



		Minimum	Desirable
X	P	525	730
X	SU	640	760
X	WB	720	760