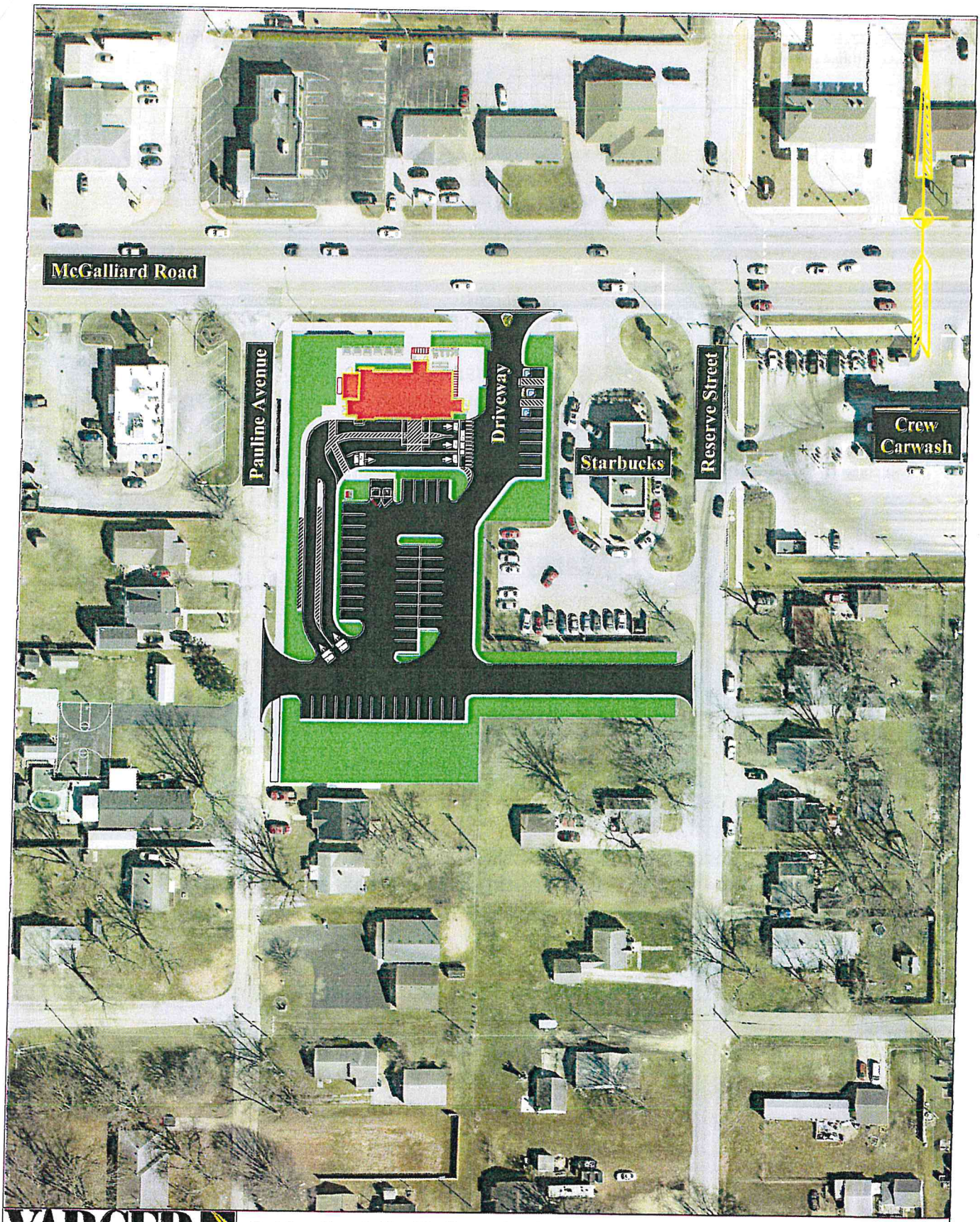

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Raising Cane's Traffic Operational Analysis
711 West McGalliard Road, Muncie, Indiana 47303
Prepared by Yarger Engineering, Inc.© Approximate Scale: 1" = 100'
1401 Alimingo Drive, Indianapolis, IN 46260-4058
317-475-1100, Fax: 317-475-0100 June 2, 2022

Traffic Operational Analysis
Raising Cane's
711 West McGalliard Road
Muncie, Indiana 47303

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

Bradley William Yarger, P.E.
President
Yarger Engineering, Inc.

Thursday, June 2, 2022

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EXECUTIVE SUMMARY

I. Site Location and Study Area

Raising Cane's Chicken Fingers Restaurant is proposed for 711 West McGalliard Road at the site of an existing church.

Study intersections:

1. McGalliard Road at Pauline Avenue
2. McGalliard Road at Driveway
3. McGalliard Road at Reserve Street

See Figure 1 on page 4 and Figure 2 on page 5.

II. Development Description

A. Land Use

The site is proposed as a 3,062 sft fast-food restaurant with a drive-thru, so it fits in the ITE Trip Generation Manual, 11 Edition's fast-food with drive-thru classification, code number 934.

B. Site Plan

The site plan is shown in Figure 6 on page 13.

C. Zoning

The site is zoned variety business and residential R4. The R4 portion will be rezoned to variety business.

D. Phasing and Timing

This study has assumed an opening day of 2023. There will be only a single phase to development.

This study focuses on the weekday and Saturday morning and afternoon street and generator peaks.

No off-site developments have been assumed for this study.

III. Planned / Programmed Public Transportation Improvements

No road improvements are planned for the study period.

IV. Methodology

This study uses forecasts using the traditional build-up method. The build-up forecast follows the typical trip generation, distribution, assignment, and analysis methodology recommended by INDOT and the Institute of Transportation Engineers (ITE).

INDOT turn lane guidelines from the Indiana Design Manual were utilized. The 2010 Edition of the Highway Capacity Manual and Synchro Software, Version 8, were used to determine levels of service and queue lengths.

V. Findings

A. Existing

The northbound approach on Pauline Avenue has a level of service of E during the weekday noon hour, and the southbound approach on Pauline Avenue has a level of service F during the Saturday noon hour. All other approaches were level of service D or better. See Table 6 on page 31 for more information.

B. Opening Day without Development

The northbound approach on Pauline Avenue has a level of service of E during the weekday noon hour, and the southbound approach on Pauline Avenue has a level of service F during the Saturday noon hour. All other approaches were level of service D or better. See Table 7 on page 32 for more information.

C. Opening Day with Development

The driveway at McGalliard Road needs one lane in and one lane out.

The northbound approach on Pauline Avenue has a level of service of F during the weekday and Saturday generator peaks and afternoon street peak, and the southbound approach on Pauline Avenue has a level of service F during the Saturday noon hour. All other approaches were level of service D or better. See Table 8 on pages 33 for more information.

VI. Recommendations

A. Existing

No changes are recommended.

B. Opening Day without Development

No changes are recommended.

C. Opening Day with Development

Raising Cane's Driveway at McGalliard Road should have a single lane right-in/right-out entrance and be stop sign controlled. No changes are recommended for Pauline Avenue or Reserve Street at McGalliard Road.

VII. Conclusions

Traffic in the study area should not be unreasonably delayed due to the construction of Raising Cane's with the recommended road improvements. The only recommended improvement is the construction of a right-in/right-out driveway on McGalliard Road.

The existing traffic on McGalliard Road is already there and adding the traffic from Raising Cane's restaurant won't increase that much. About half of Raising Cane's traffic will come from the existing traffic.

Most approaches show little change in levels of service and queue lengths. The primary impact will be to northbound traffic on Pauline Avenue, which will mostly be Raising Cane's customers. There were less than 50 vehicles on the Pauline Avenue northbound approach during the six hours counted compared to 10,000 vehicles on McGalliard Road during the same six hours.

Traffic Operational Analysis Report

I. INTRODUCTION

Traffic impact studies are commonly performed to assess the impacts on the roadway network surrounding a site from a proposed development or change in zoning and identify mitigating actions. Impacts to the roadway are typically congestion and safety related. Congestion is measured in level of service (LOS), as defined in the Highway Capacity Manual. Possible mitigating actions include providing additional lanes and changing traffic control devices such as pavement markings, signs, and signals. A traffic operational analysis is a limited scoped traffic impact study.

The City of Muncie doesn't have their own traffic impact study guidelines, so for this study we will be following the INDOT Applicant's guideline for Traffic Impact Studies, which can be found at https://www.in.gov/indot/doing-business-with-indot/files/Permits_ApplicantsGuidetoTrafficImpactStudy_2015.pdf.

A. Purposes

The purposes of this study are:

1. To assess the traffic impacts associated with the development and identify the level of access and traffic control improvements required to serve it.
2. To provide developers and public agencies a study which evaluates and documents the traffic impacts and improvements, where warranted.
3. To provide a technically sound basis to identify and negotiate mitigation requirements in response to traffic impacts, if any.

B. Objectives

The objectives of this study are:

1. To document the existing traffic and transportation network in the study area.
2. To forecast future traffic in the study area without the site traffic.
3. To forecast future site traffic.
4. To analyze the levels of service for the weekday and Saturday AM and PM street and generator peaks.
5. To develop and recommend alternatives for mitigating the impacts of the additional traffic, if needed.
6. To document the methodology, findings, recommendations, and conclusions.

C. Study Approach

This study compares the traffic impacts of three scenarios:

1. Existing
2. Opening Day without Development
3. Opening Day with Development

In each scenario, turn lane analyses, levels of service, and queue lengths were calculated.

II. AREA CONDITIONS

A. Transportation Network Study Area

1. Site Location and Study Area

Figure 1 – Muncie, IN Area Map

II. Site Location and Study Area

The site is located at 711 West McGalliard Road in Muncie, Indiana.

The study area is site and the McGalliard Road property frontage. See Figure 1 above and Figure 2 on page 5.

Study intersections:

1. McGalliard Road at Pauline Avenue
2. McGalliard Road at Driveway
3. McGalliard Road at Reserve Street

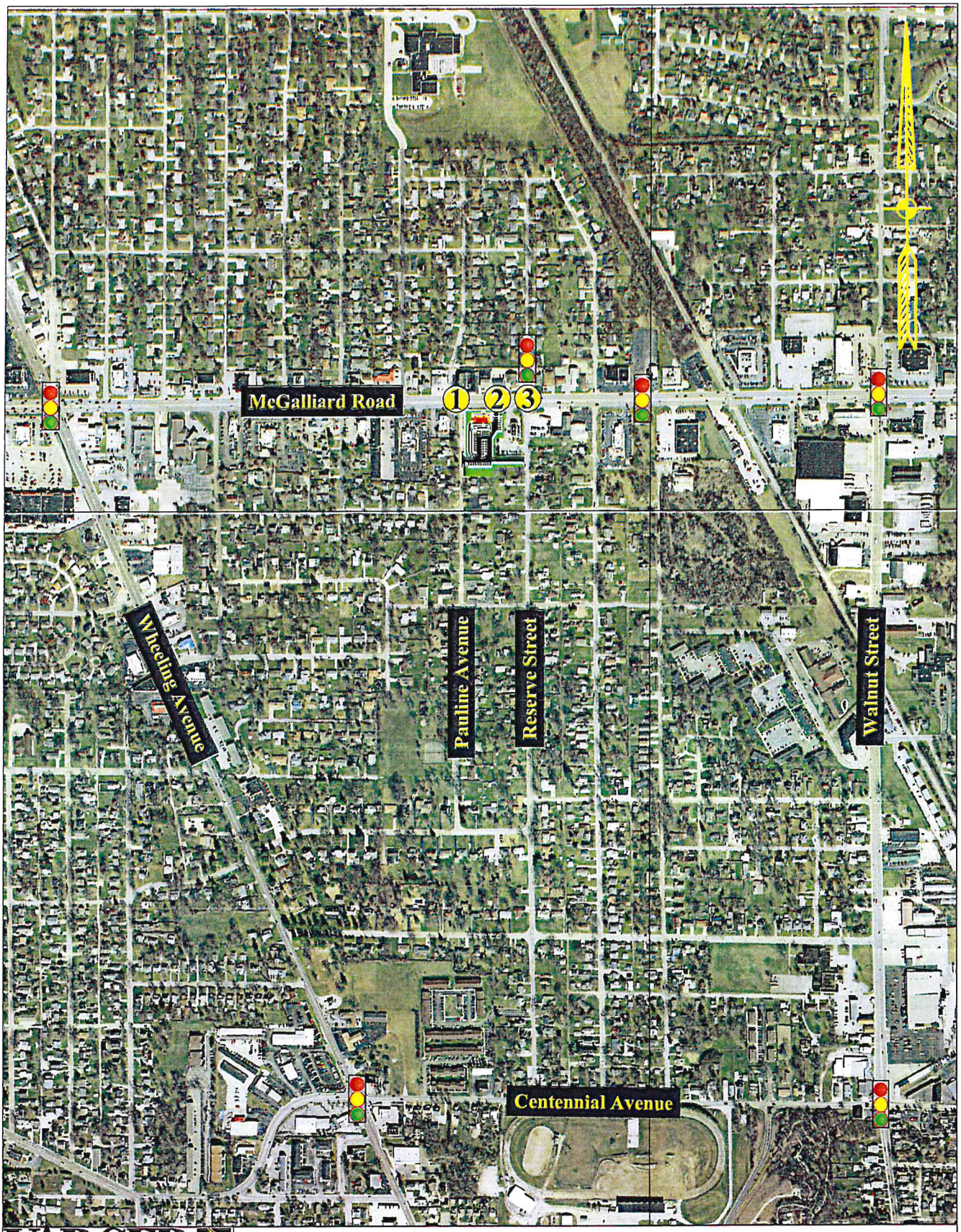

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Figure 2, Study Area
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2. Area Roadway System

a) Existing

McGalliard Road is a five-lane principal arterial with a 40 MPH speed limit.

Pauline Avenue is a two-lane local street with a 30 MPH speed limit. The north and south approaches are offset by 60 feet. Pauline Avenue is controlled by stop signs at McGalliard Road.

Reserve Street is a two-lane major collector street with a 30 MPH speed limit. The intersection with McGalliard Road is controlled by a traffic signal.

b) Future

No changes are expected to the roads in the near future.

3. Existing Traffic Volumes and Conditions

Turning movement counts were taken on Tuesday, Wednesday and Saturday, May 10, 11 and 21, 2022. Ball State University was not in session but Muncie Community Schools were. An INDOT principal arterial monthly adjustment of -3.4% was applied to get average weekday and Saturday conditions.

Street peaks are defined as occurring between 7:00 – 9:00 AM and 4:00 – 6:00 PM. Generator peaks are defined as occurring during the 11:00 AM hour for AM generator peak and noon hour for the PM generator peaks for fast-food restaurants.

Table 1 – Traffic Peak Times

Location	AM Street Peak 15 Minutes	AM Generator Peak 15 Minutes	PM Generator Peak 15 Minutes	PM Street Peak 15 Minutes
		Weekday		
McGalliard Road at Pauline Avenue	7:45 AM	11:45 AM	12:25 PM	5:00 PM
McGalliard Road at Reserve Street	7:45 AM	11:45 AM	12:25 PM	5:05 PM
		Saturday		
McGalliard Road at Pauline Avenue	8:40 AM	11:45 AM	12:40 PM	4:45 PM
McGalliard Road at Reserve Street	8:45 AM	11:40 AM	12:45 PM	4:45 PM

See Figure 3 on page 8 for the peak period turning movement flow rates. These flow rates represent the peak 15 minutes of traffic volume multiplied times four to get a peak hourly flow rate per the recommendations of the Highway Capacity Manual 2010, page 19-9. See Figure 4 on page 9 for the existing geometrics and traffic control devices. There are other

driveways along McGalliard Road in the study area so the traffic leaving one intersection may not equal the traffic at the next. There was less than one pedestrian per hour in the crosswalks on average. See the appendix for the turning movement count data.

4. Transit Service

There is bus service in Muncie, but not in front of the site. No adjustments have been made to the trip generation due to buses.

B. Study Area - Adjacent Land Use

1. Existing Land Uses (Major Generators)

The land surrounding the site is a mixture of retail, service, and residential uses. See Figure 2 on page 5 for more information.

2. Anticipated or Approved Future Development (Major Generators)

No off-site developments are anticipated for the study period.

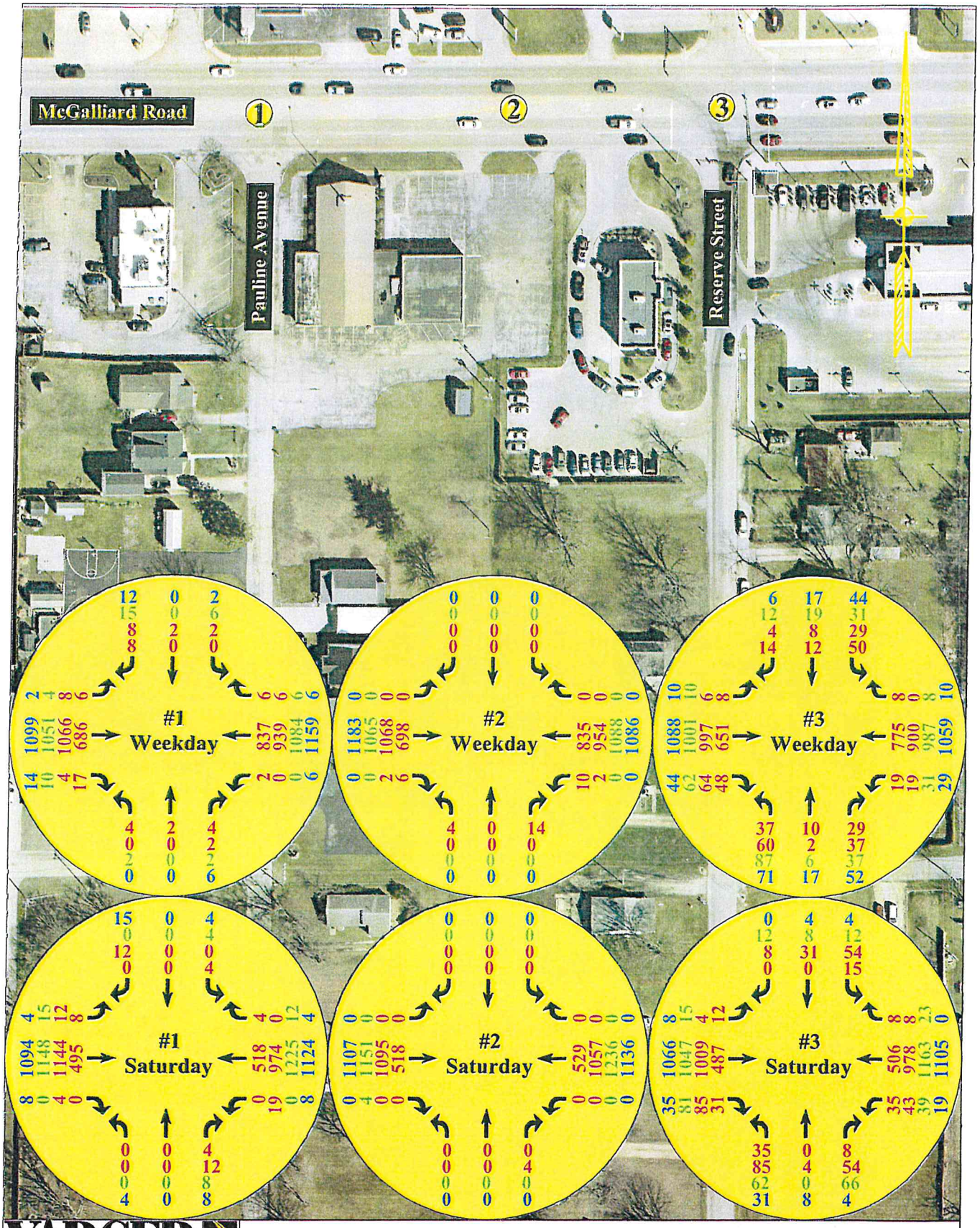

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Figure 3, Existing Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

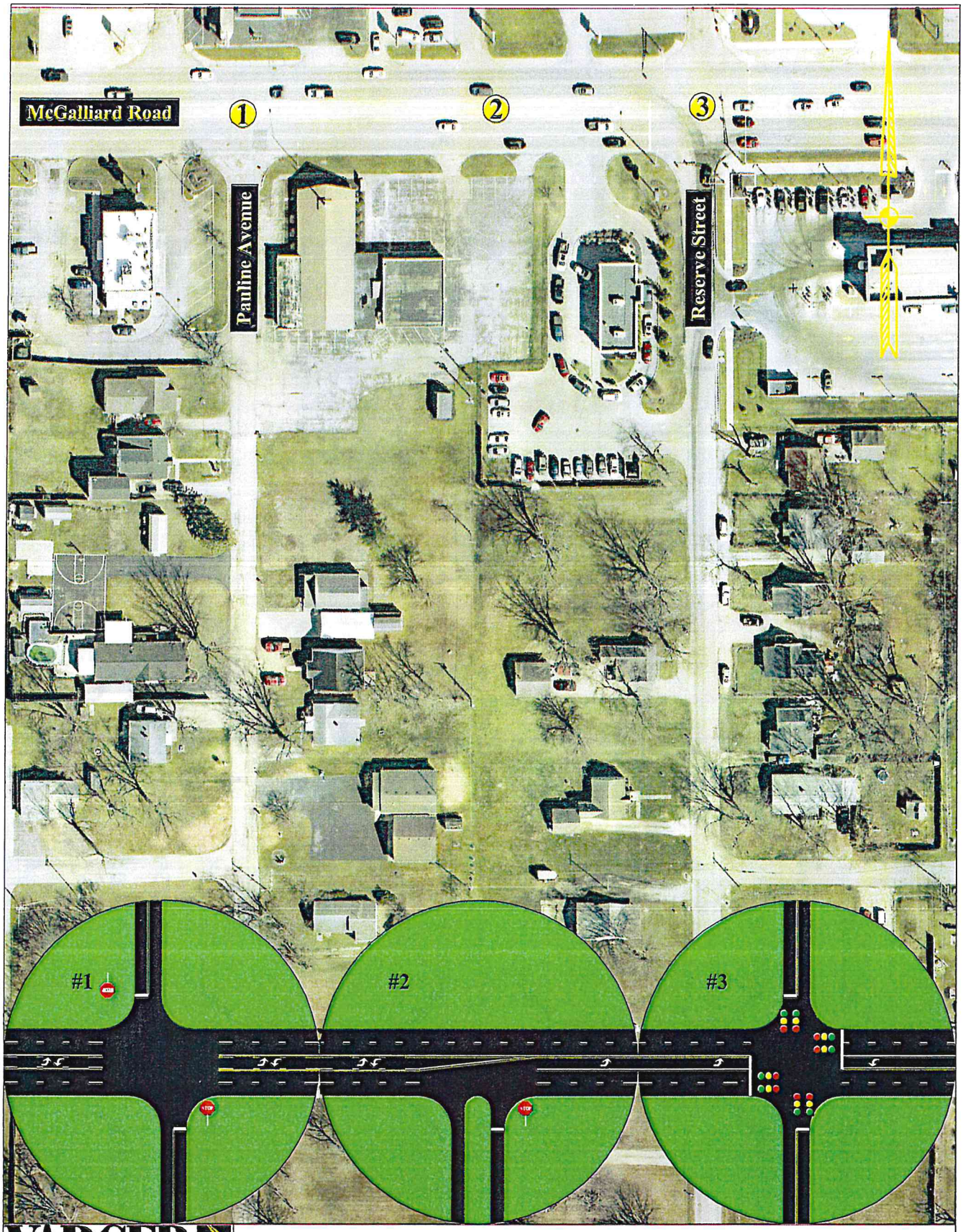

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Figure 4, Existing Geometrics and Traffic Control
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III. PROJECTED TRAFFIC

A. Methodology

This study uses forecasts using the traditional build-up method. The build-up forecast follows the typical trip generation, distribution, assignment, and analysis methodology recommended by INDOT and the Institute of Transportation Engineers (ITE).

Trip generations for Raising Cane's were estimated by using the 11th Edition of the ITE Trip Generation Report. Primary trip distributions were based on population within 30 minutes using the gravity model, and assignments were made based upon engineering judgment to the existing roadway network reflecting the distribution.

The 2010 Edition of the Highway Capacity Manual and Synchro Software, Version 8 were used to determine levels of service and queue lengths.

B. Background Traffic

1. Roadway Network Changes

No changes are anticipated.

2. Background Growth Rates

A 1% annual background growth was applied to account for the time between the counts and the opening day in 2023.

Figure 5 on page 11 shows the 2023 weekday and Saturday AM and PM street and generator peaks traffic flow rates. These flow rates are the peak 15-minute volumes times four and not hourly volumes per the Highway Capacity Manual's preferred method of calculating levels of services. Hourly volumes totaled on the hour can be found in the appendix.

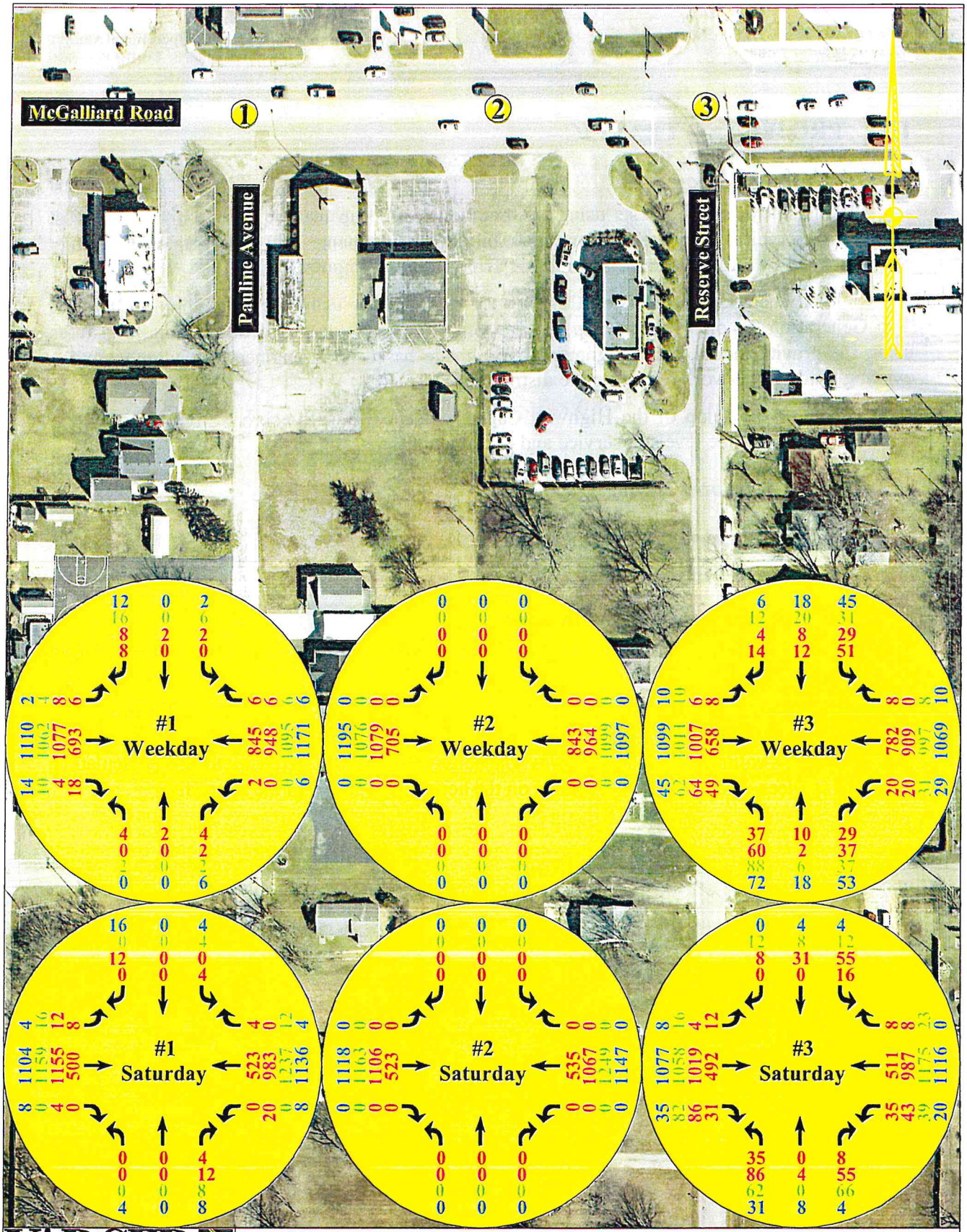

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Figure 5, 2023 Background Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

C. Site Traffic

1. Development Description

a) Land Use

Raising Cane's is located in the southeast corner of McGalliard Road at Pauline Avenue with 3,062 sft of fast-food restaurant with drive-thru lanes. See the site plans and Table 2 on page 14 for more information.

b) Site Plan

Figure 6 on page 13 shows the site plan.

c) Zoning

The site is currently zoned variety business and residential R4. The residential portion will be rezoned to variety business.

d) Phasing and Timing

This study has assumed Raising Cane's will open in 2023.

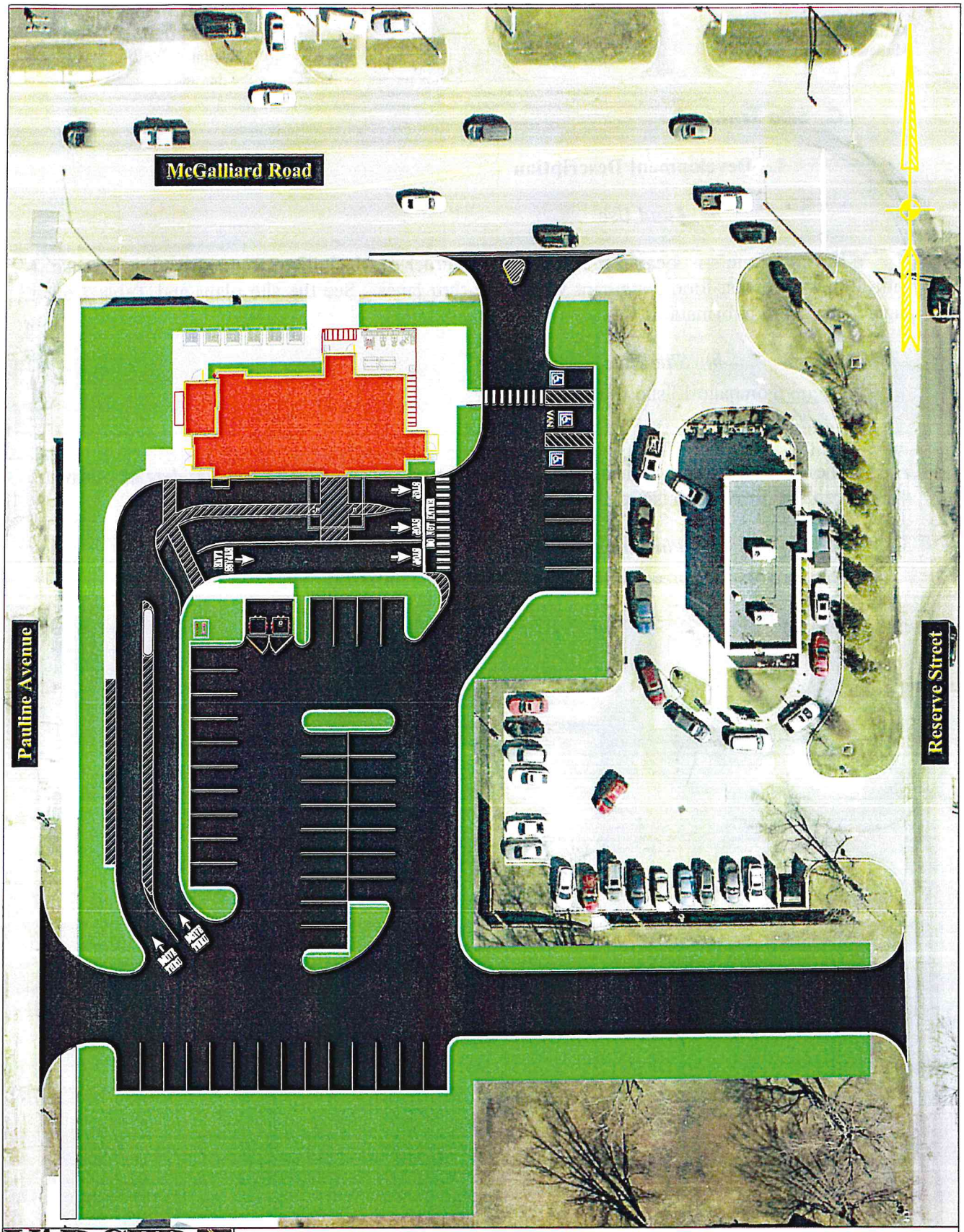

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Figure 6, Raising Cane's Site Plan
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2. Trip Generation

Trip generation forecasts for the site were based on the 11th Edition of the ITE Trip Generation Manual. Table 2 shows the AM and PM weekday and Saturday street and generator peak trip generation.

The ITE Trip Generation Manual only list daily and generator peak traffic for Saturdays, and does not provide a time-of-day when the generator peaks happened. The rest of the information comes from the Saturday daily trips times a Saturday time-of-day distribution factor. Using the daily trip generation times a time-of-day factor is less reliable than a generator peak equation due to the sample size, so while the result from daily peak traffic times the time-of-day factors is more traffic for 11:00 and noon, we use the generation peak for 11:00 and noon on Saturday because of the sample size. More information is available in the appendix including daily trips, the generator peaks, and hourly trip generation factors.

Table 2 – Trip Generation
Site

Land Use	ITE Code	Size	Units	AM Street Peak*	AM Generator Peak	PM Generator Peak	PM Street Peak
				7:45	11:45	12:25	5:00
				8:45	11:45	12:45	4:45
Weekdays							
Fast-Food with Drive-Thru	934	3	KSFT	134	152	153	99
Saturdays							
Fast-Food with Drive-Thru	934	3	KSFT	28	166	166	158

** - Raising Cane's is not open for breakfast at any of their over 600 restaurants. They typically open at 10:00 AM. The forecast shows the traffic that could be expected if they decide to offer breakfast, but it is not expected.*

a) New (Primary) Trips

New trips to the system caused by the site, also called primary trips, are estimated using the total number of trips minus the number of internal trips, pass-by trips, and diverted link trips.

b) Internal Trips

Some of the trips entering or leaving a site may visit more than one land use within a site. Since this is a single use site, no internal trips have been assumed.

c) Pass-by Trips

Pass-by trips are those trips already on the roadways immediately adjacent to the site, but alter their path to visit the site. Pass-by trips were taken from McGalliard Road at 49% in the AM and 50% in the PM per the ITE Trip Generation Handbook.

d) Diverted Link Trips

Diverted link trips are those that would have been on the roadway network anyway, but alter their path to visit the site. The diverted link trips have been assumed to use McGalliard Road for those to and from Wheeling Avenue and Walnut Street, and split evenly in both directions. Diverted link trips are assumed to be 28% in the AM and 19% in the PM per the ITE Trip Generation Handbook.

e) Trip Distribution

Trip distribution represents the geographical distribution of other trip ends. In short, where the trip that ended at the site started, or vice versa. Trip distributions were based on the gravity model using population within a 30-minute travel time applied to primary trips only.

Table 3 – Trip Distribution

Site

Land Use	North	East	South	West
Fast-Food	0%	33%	22%	45%

f) Modal Split

All trips are assumed to occur by automobile, at least to the same percentages as in the data collected for the ITE trip generation rates. Public bus, bicycle, and walking trips are considered to be insignificant for this study. Heavy vehicle traffic is considered in the analysis and queue length calculations based upon the percentages captured during the counts.

g) Trip Assignment

Trips are logically assigned to the roadway system in accordance to the trip distribution above, and are shown on Figure 7 through Figure 12 on pages 17 through 22. Since there are multiple driveways, the trips were divided per the table below. The driveways to Pauline Avenue and Reserve Street are at the southern end of the site. Those exiting to the west using Reserve Street travel much farther than using Pauline Avenue, but have a signal.

Table 4 – Driveway Distribution Site				
To and From	Enter or Exit	Pauline Avenue	Main Driveway	Reserve Street
West	Entering	50%	50%	0%
West	Exiting	40%	0%	60%
East	Entering	5%	0%	95%
East	Exiting	0%	90%	10%

Trips to and from the south are assumed to use Pauline Avenue and Reserve Street to the southern driveways and therefore do not show up in the McGalliard Road forecasts. Reserve Street is expected to see more of the traffic to and from the south since it connects farther south to Centennial Avenue and Centennial Avenue has a signal with a left turn arrow at Wheeling Avenue. If all traffic to and from the south were to use Reserve Street, it would result in five more northbound and five more southbound vehicles per hour in the busiest hour of the week.

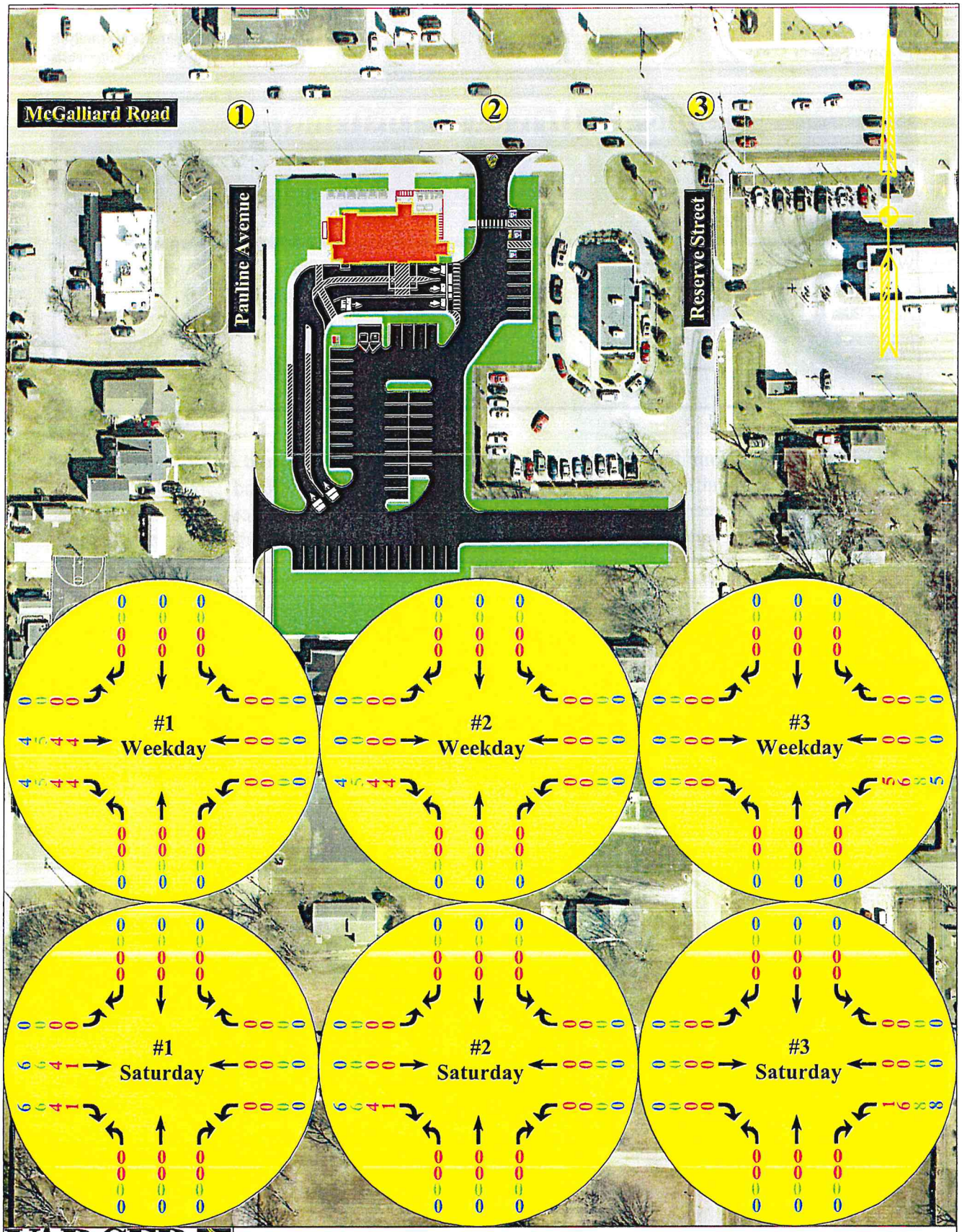

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Figure 7, Primary Entering Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

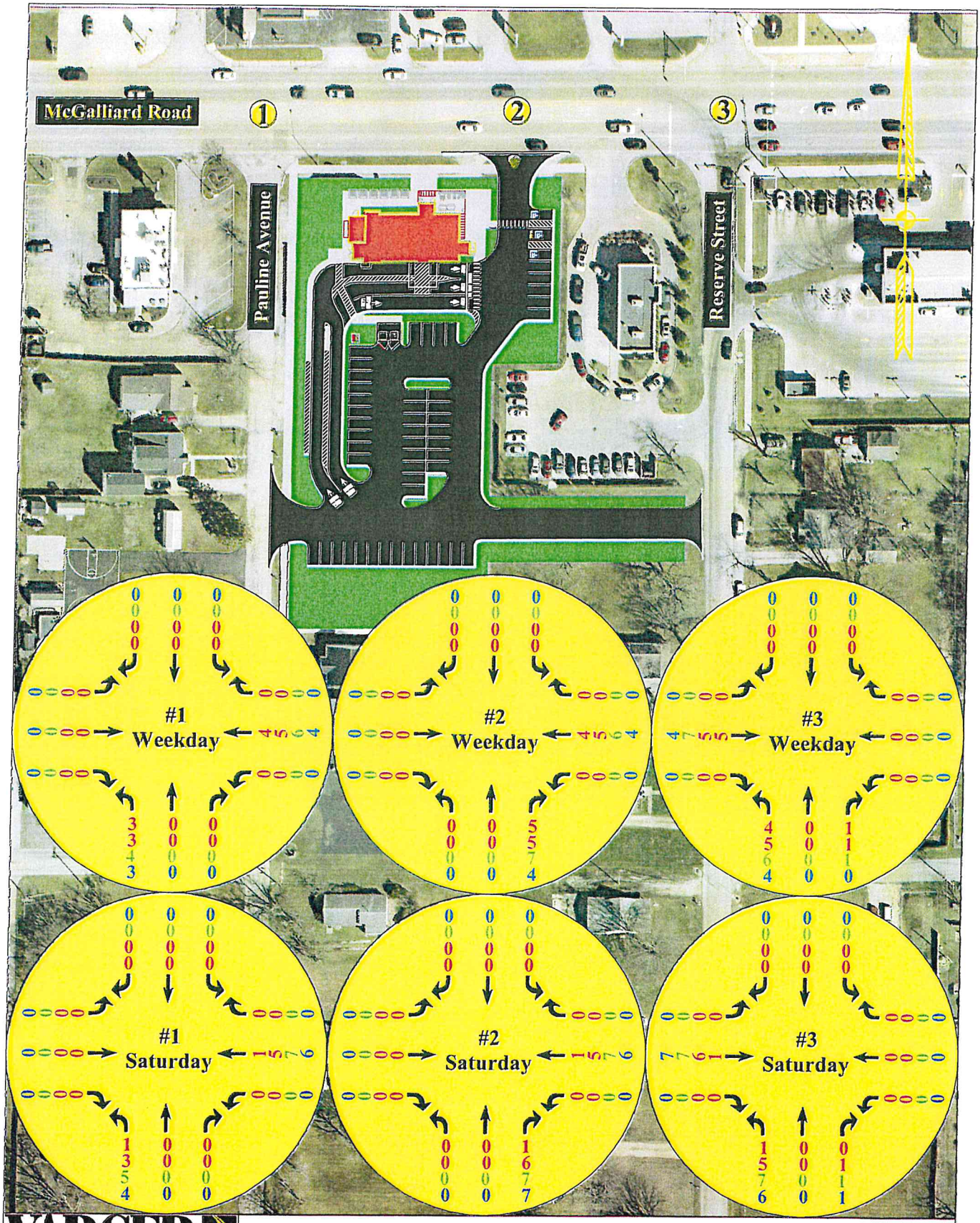

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Figure 8, Primary Exiting Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

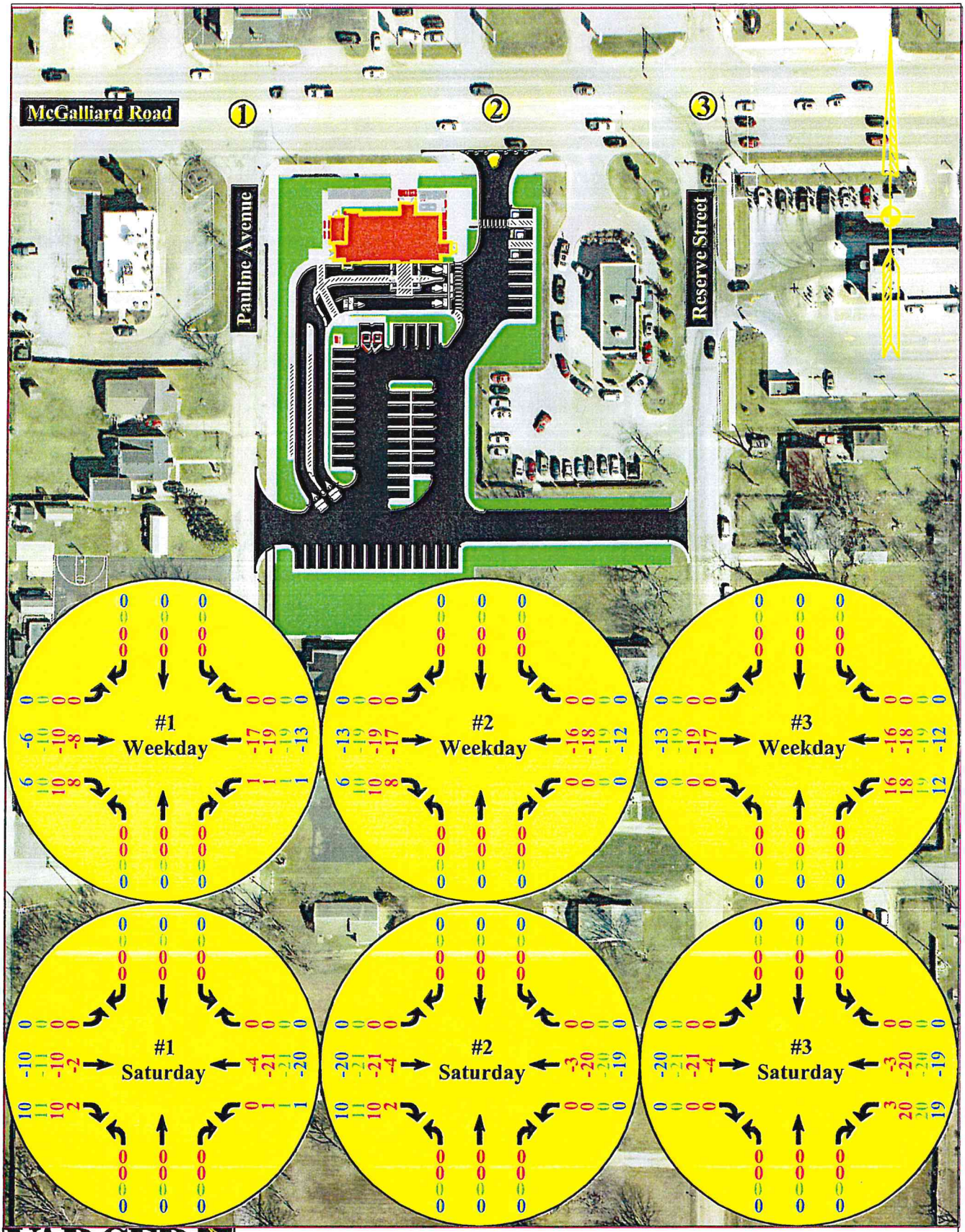

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Figure 9, Pass-by Entering Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

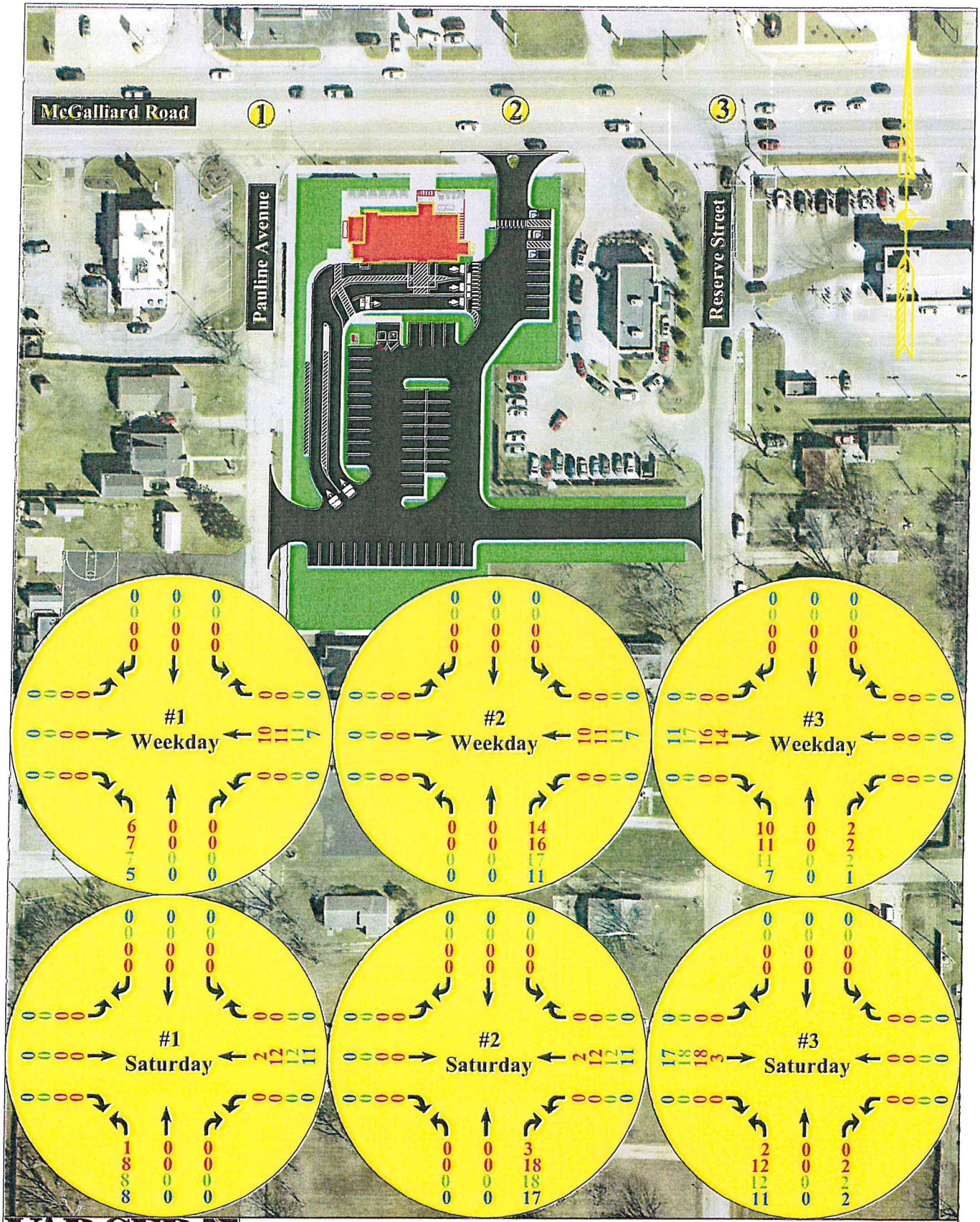

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Figure 10, Pass-by Exiting Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

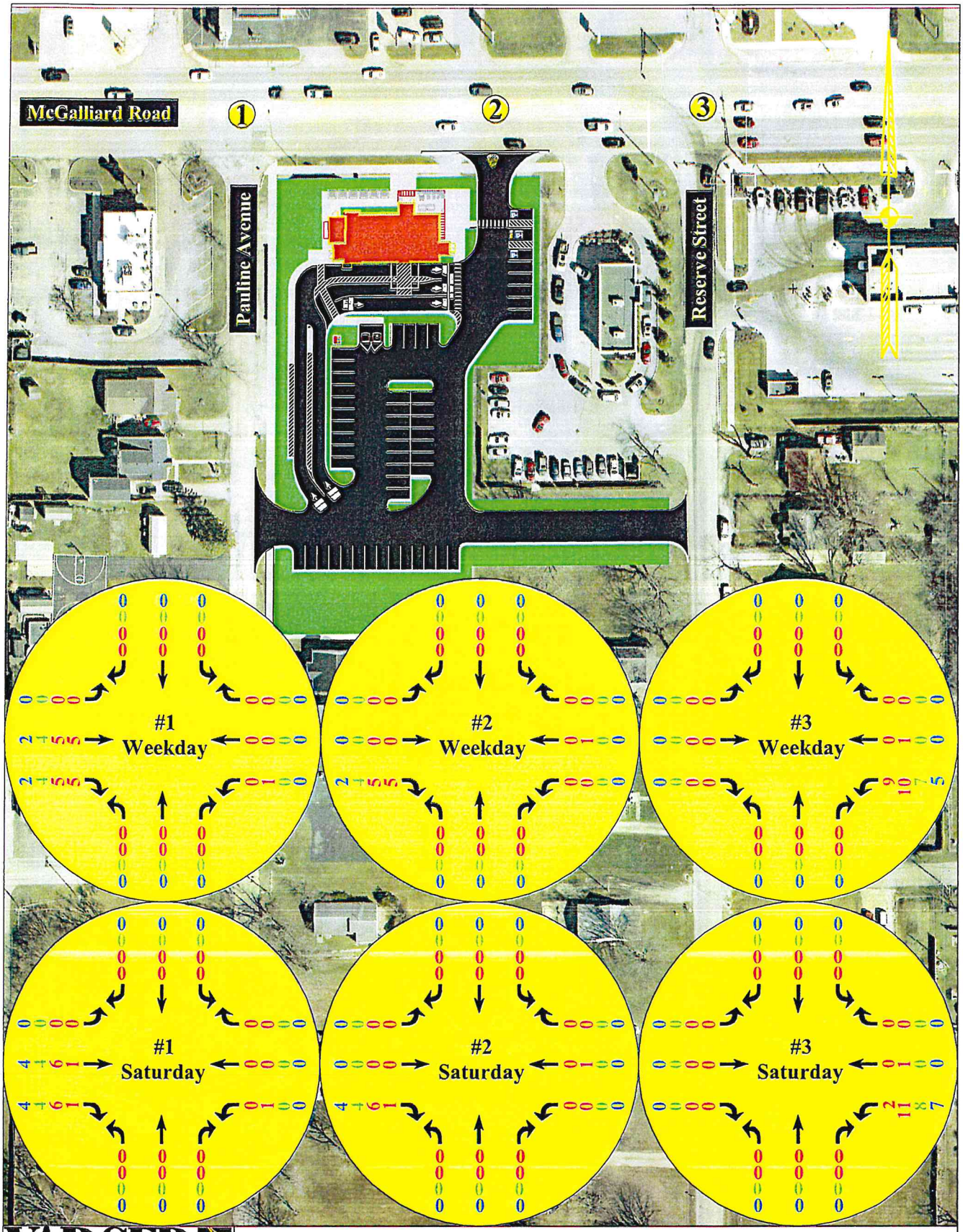

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Figure 11, Diverted Link Entering Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

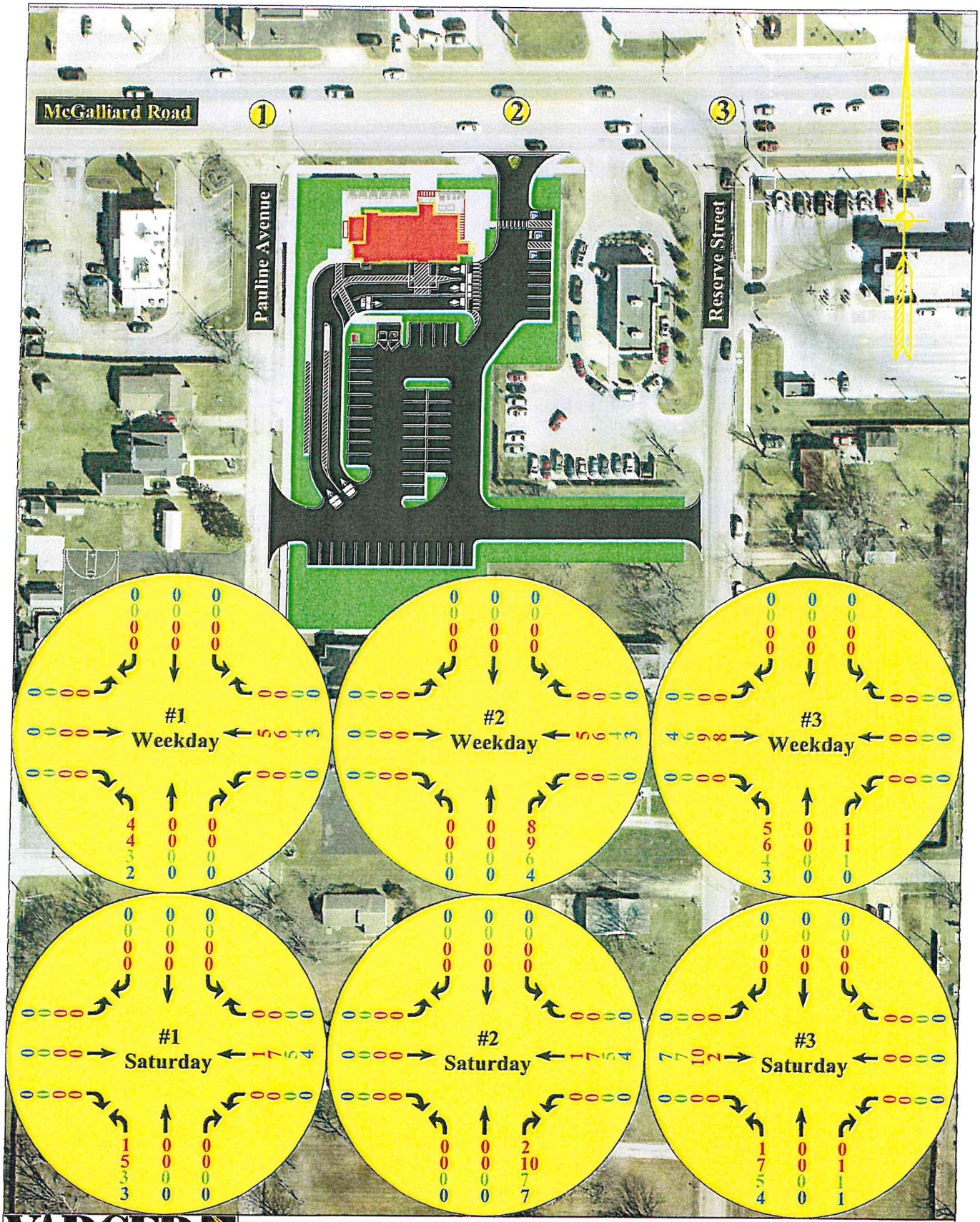

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Figure 12, Diverted Link Exiting Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

D. Combined Traffic

1. Opening Day with Development

Figure 13 on page 24 shows the forecasted weekday and Saturday morning and afternoon street and generator peak turning movements for the opening day with development scenario.

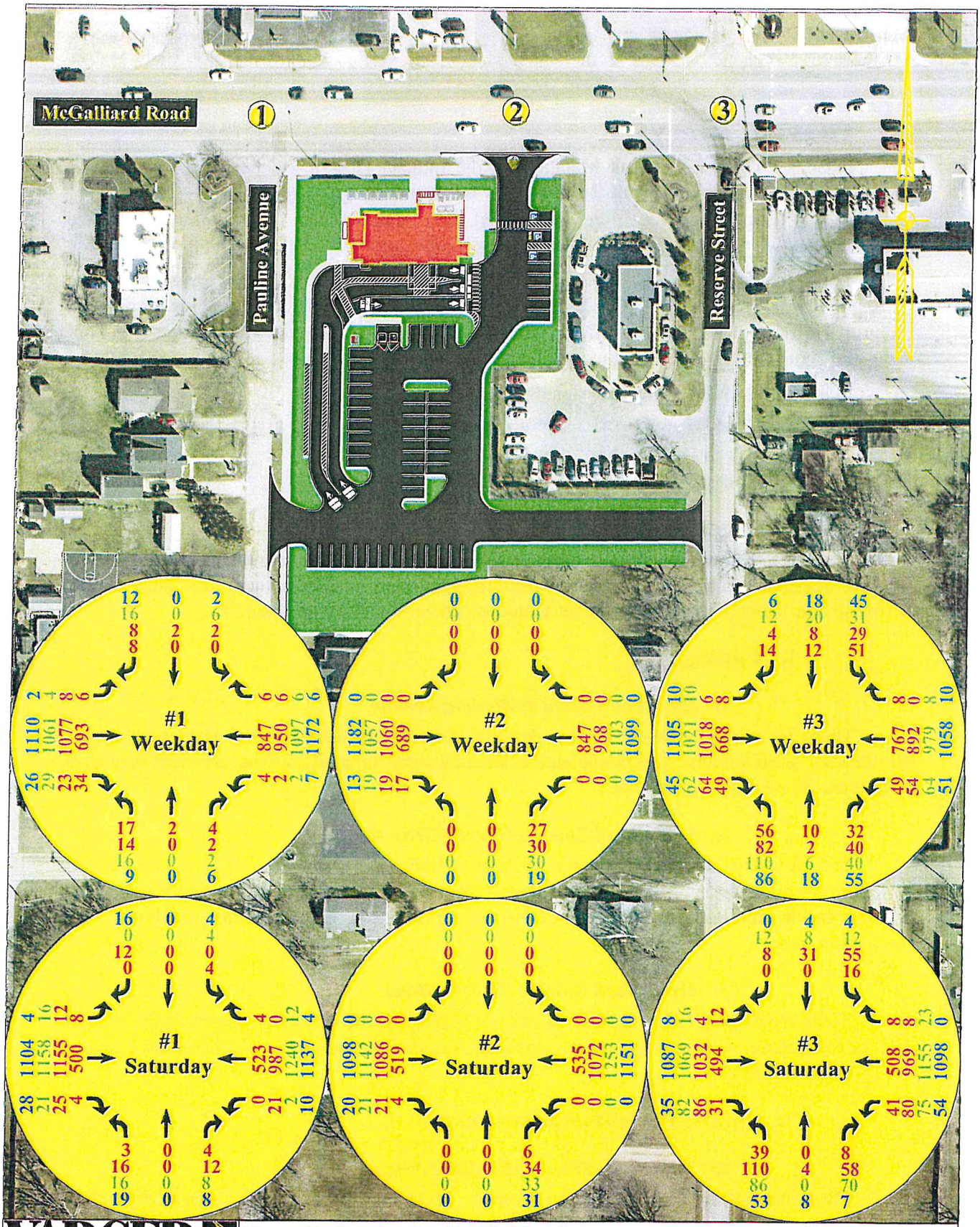

Figure 13, Opening Day Traffic Flow Rates
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AM Street Peak
AM Generator Peak
PM Generator Peak
PM Street Peak

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IV. TRAFFIC ANALYSIS

INDOT's Driveway Permit Manual and the Indiana Design Manual contain turn lane guidelines. The Driveway Permit Manual can be found at https://www.in.gov/indot/doing-business-with-indot/files/Driveway-Permit-Manual.pdf. The Indiana Design Manual can be found at https://www.in.gov/dot/div/contracts/design/IDM.htm.

Traffic control devices (signs, signals, pavement markings, etc.) in the State of Indiana are covered under Indiana Code IC 9-21 which mandates the following of the Indiana Manual on Uniform Traffic Control Devices (IMUTCD). The IMUTCD contains specific warrants for when stop signs, multi-way stop signs, and traffic signals may be installed.

Indiana Code 9-21-3 covering signals can be found at
http://iga.in.gov/legislative/laws/2021/ic/titles/009#9-21-3.

The IMUTCD can be found at
https://www.in.gov/dot/div/contracts/design/mutcd/2011rev3MUTCD.htm.

A. INDOT Turn Lane Analysis

The INDOT Driveway Permit Manual and Design Manual contain charts and tables for turn lane guidelines. They use the peak hourly turning volumes to determine if turn lanes should be considered. Hourly turning movement volumes can be found in the appendix.

1. Existing

a) McGalliard Road at Pauline Avenue

There are no turn lanes on Pauline Avenue. McGalliard Road has five lanes with a dual left turn lane in the middle. Eastbound and westbound right turns do not meet the right turn lane guidelines. See Figure 4 on page 9.

b) McGalliard Road at Church Driveway

The driveway has one lane in and one lane out with a large median. It does not meet the guidelines for multiple driveway approach lanes. McGalliard Road has five lanes with a dual left turn lane in the middle. Eastbound right turns do not meet the right turn lane guidelines. See Figure 4 on page 9.

c) McGalliard Road at Reserve Street

There are no turn lanes on Reserve Street. McGalliard Road has five lanes with left turn lanes in the middle. The intersection is signalized, so the right turn lane guidelines don't apply. See Figure 4 on page 9.

2. Opening Day without Development

a) McGalliard Road at Pauline Avenue

There are no turn lanes on Pauline Avenue. McGalliard Road has five lanes with a dual left turn lane in the middle. Eastbound and westbound right turns do not meet the right turn lane guidelines. See Figure 4 on page 9.

b) McGalliard Road at Church Driveway

The driveway has one lane in and one lane out. It does not meet the guidelines for multiple driveway approach lanes. McGalliard Road has five lanes with a dual left turn lane in the middle. Eastbound right turns do not meet the right turn lane guidelines. See Figure 4 on page 9.

c) McGalliard Road at Reserve Street

There are no turn lanes on Reserve Street. McGalliard Road has five lanes with a dual left turn lane in the middle. The intersection is signalized, so the right turn lane guidelines don't apply. See Figure 4 on page 9.

3. Opening Day with Development

a) McGalliard Road at Reserve Street

There are no turn lanes on Pauline Avenue. McGalliard Road has five lanes with a dual left turn lane in the middle. Eastbound and westbound right turns do not meet the right turn lane guidelines. See Figure 14 on page 24.

b) McGalliard Road at Raising Cane's Driveway

The driveway has one lane in and one lane out and designed as a right-in/right-out, so it does not meet the guidelines for multiple driveway approach lanes. McGalliard Road has five lanes with a dual left turn lane in the middle, but the driveway design is to prohibit westbound left turns. Eastbound right turns do not meet the right turn lane guidelines. See Figure 14 on page 27.

c) McGalliard Road at Pauline Avenue

There are no turn lanes on Reserve Street. McGalliard Road has five lanes with left turn lanes in the middle. The intersection is signalized, so the right turn lane guidelines don't apply. See Figure 14 on page 27.

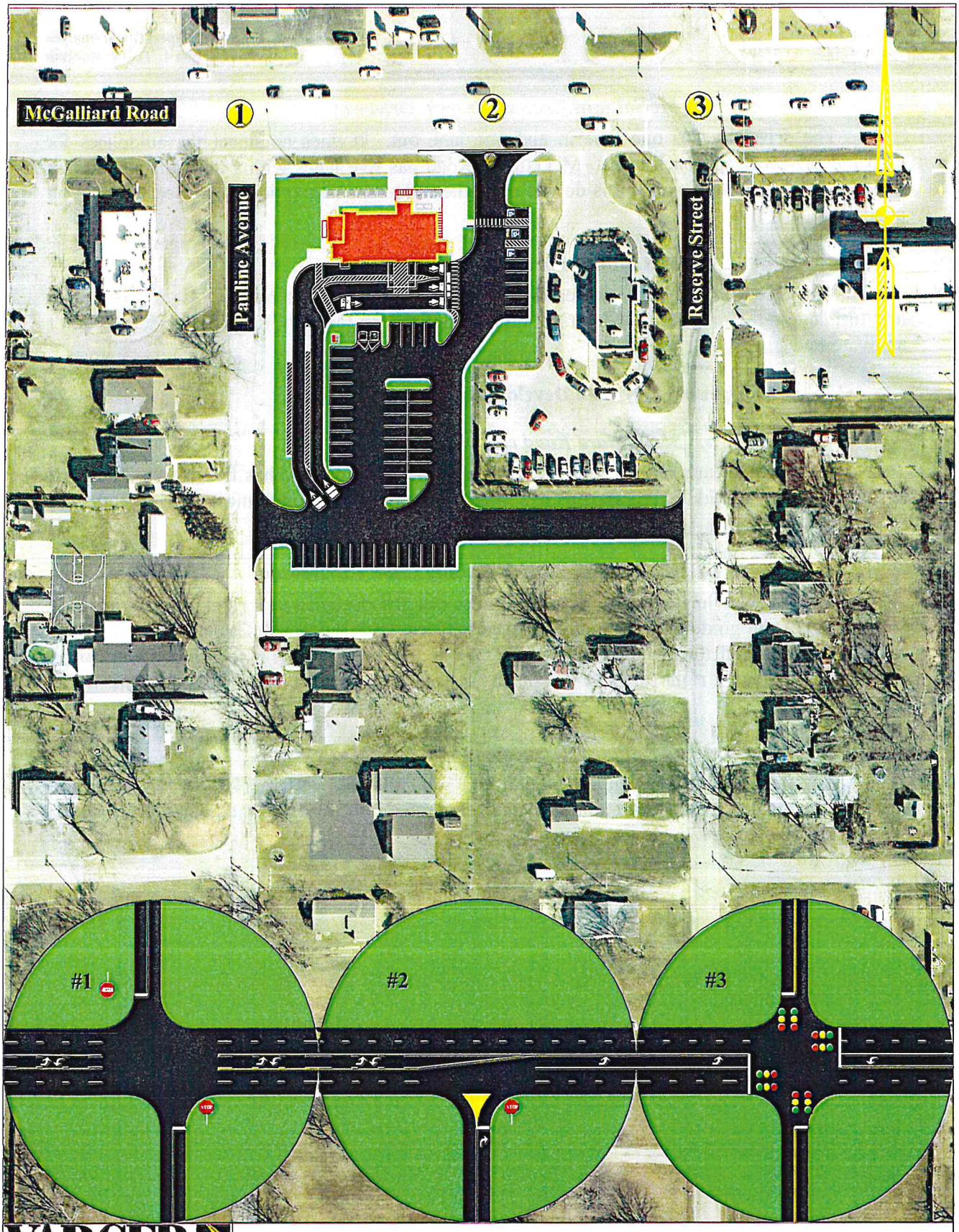

Figure 14, Opening Day Geometrics and Traffic Control
Muncie, Indiana 47303, Approximate Scale: 1" = 100'

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B. Traffic Control Devices

1. Multi-way Stop Warrants

Multi-way stops can be warranted by meeting minimum volume and delays requirements, accidents, intersection sight distance restrictions, and other criteria. None of the intersections warrant all-way stop signs in any of the scenarios.

2. Signal Warrants

There are nine traffic signal warrants in the IMUTCD, some with parts and adjustment factors. They are:

1. Eight-Hour Vehicular Volume
2. Four-Hour Vehicular Volume
3. Peak Hour
4. Pedestrian Volume
5. School Crossing
6. Coordinated Signal System
7. Crash Experience
8. Roadway Network
9. Intersection Near A Grade Crossing

Satisfying one or more of the warrants does not mandate the installation of a traffic signal.

Under warrant number one (eight-hour), there are parts A, B, and C. Part A is Minimum Vehicle Volume. Part B is interruption of continuous traffic. Part C is a combination of parts A and B at 80% of the requirements of both. There are various volume requirements depending on the number of lanes, side street right turns, speed limits, and population of the built-up area. The warrants must be satisfied for the same eight hours of the main street (higher volume) and the side street (lower volume) of a normal day. Friday, Saturday and Sunday are not considered to be normal days. Warrant one allows signals to be installed on forecasted volumes and confirmed within six months to a year after the signal is turned on.

Under warrant number two (four-hour), there are equations that set the side street volume requirements based on the main street volumes, the number of lanes, side street right turns, speed limits, and population of the built-up area. The warrants must be satisfied for the same four hours of the main street (higher volume) and the side street (lower volume) of a normal day.

Under warrant number three (peak hour), there are equations that set the side street volume requirements based on the main street volumes, the number of lanes, side street right turns, speed limits, and population of the built-up area. The warrants must be satisfied for the same hour of the main street (higher volume) and the side street (lower volume) of a normal day. Since only one hour satisfying the warrant is required, the required volumes are higher than the four-hour warrant. The warrant is to be applied only to developments that demonstrate high peaking over a short duration, such as offices and industrial complexes. The warrant has been numerically evaluated at all study intersections, but would not be appropriate at any of them.

Under warrant number seven, there is an allowable adjustment to warrant number one if an "*adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency and five or more reported crashes of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash.*" Crashes were not analyzed, so this signal warrant is not applicable.

Pedestrian volume, school crossing, coordinated signal system, roadway network, and intersection near a grade crossing warrants were deemed inappropriate for this study. The school crossing warrants require the trial of other traffic control devices such as crossing guards before a signal warrant may be satisfied.

The estimated population of Muncie in 2022 is approximately 67,650; therefore, the minimum volume 30% reduction factor based on an isolated population being under 10,000 people does not apply. The speed limits on McGalliard Road is 40 MPH, so the 30% speed reduction factor based on speed over 40 MPH does not apply.

Reserve Street already has a signal. Warrants were not checked at the other two intersections since 12 hours of counts are required by the MUTCD, but the hours counted don't reach the threshold values for signal warrants.

C. Capacity and Level of Service

Capacity and level of service are interrelated. This section deals directly with level of service and therefore indirectly with capacity. In the 2010 Highway Capacity Manual, delay per vehicle is the primary method of determining level of service. Unsignalized intersections are analyzed based on estimated delay using movement flow rate and capacity that provides a level of service by movement. Signalized intersections also use capacity and flow rates to determine level of service for movements and for the overall intersection.

The following tables summarize levels of service definitions for signalized and unsignalized intersections.

Table 5 – Levels of Service Definitions

Level of Service (LOS)	Unsignalized (Second of Delay Per Vehicle)	Signalized (Second of Delay Per Vehicle)
A	0 – 10.0	0 – 10.0
B	10.1 – 15.0	10.1 – 20.0
C	15.1 – 25.0	20.1 – 35.0
D	25.1 – 35.0	35.1 – 55.0
E	35.1 – 50.0	55.1 – 80.0
F	Over 50 or V/C > 1.0*	Over 80 or V/C > 1.0*

V/C is volume to capacity ratio. V/C criteria is applicable only to movements, not approaches or intersections.

Levels of service for this project were calculated using the peak 15-minute forecasts multiplied times four to get an equivalent hourly flow rate. Level of service E has been assumed to be the minimum acceptable level of service for individual movements and approaches, and level of service D is the minimum for intersections.

1. Existing

With the geometry and traffic control shown in Figure 4 on page 9, the levels of service are as shown on the following table.

Table 6 – Level of Service and Delay
Existing

Intersection	AM Street Peak 7:45 AM & 8:45 AM					AM Generator Peak 11:45 AM & 11:45 AM					PM Generator Peak 12:25 PM & 12:45 PM					PM Street Peak 5:00 PM & 4:45 PM				
	EB	WB	NB	SB	All	EB	WB	NB	SB	All	EB	WB	NB	SB	All	EB	WB	NB	SB	All
Weekday																				
McGalliard Road at Pauline Avenue	0.1 A	0 A	24 C	13 B	0.3 A	0.1 A	0 A	13 B	29 D	0.2 A	0.1 A	0 A	37 E	29 D	0.3 A	0 A	0.1 A	13 B	22 C	0.2 A
McGalliard Road at Church Driveway	0 A	0.2 A	14 B	-	0.3 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A
McGalliard Road at Reserve Street	14 B	15 B	17 B	17 B	15 B	17 B	15 B	23 C	22 C	17 B	17 B	17 B	24 C	22 C	17 B	18 B	17 B	24 C	23 C	18 B
Saturday																				
McGalliard Road at Pauline Avenue	0.1 A	0 A	10 A	18 C	0.2 A	0.1 A	0.2 A	13 B	12 B	0.3 A	0.2 A	0 A	12 B	93 F	0.3 A	0 A	0.1 A	34 D	26 D	0.4 A
McGalliard Road at Church Driveway	0 A	0 A	0 A	-	0 A	0 A	0 A	13 C	-	0 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A
McGalliard Road at Reserve Street	13 B	13 B	16 B	16 B	13 B	17 B	17 B	24 C	23 C	18 B	18 B	19 B	24 C	22 C	19 B	17 B	16 B	22 C	21 C	17 B

2. Opening Day without Development

With the geometry and traffic control shown in Figure 4 on page 9, the levels of service are as shown on the following table.

Table 7 – Level of Service and Delay
Opening Day without Development

Intersection	AM Street Peak 7:45 AM & 8:45 AM					AM Generator Peak 11:45 AM & 11:45 AM					PM Generator Peak 12:25 PM & 12:45 PM					PM Street Peak 5:00 PM & 4:45 PM				
	EB	WB	NB	SB	All	EB	WB	NB	SB	All	EB	WB	NB	SB	All	EB	WB	NB	SB	All
Weekday																				
McGalliard Road at Pauline Avenue	0.1 A	0 A	25 C	11 B	0.3 A	0.1 A	0 A	13 B	30 D	0.2 A	0 A	0 A	38 E	29 D	0.4 A	0 A	0.1 A	13 B	23 C	0.2 A
McGalliard Road at Church Driveway	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A
McGalliard Road at Reserve Street	14 B	15 B	17 B	17 B	15 B	17 B	15 B	23 C	22 C	17 B	17 B	17 B	24 C	22 C	17 B	18 B	17 B	24 C	23 C	18 B
Saturday																				
McGalliard Road at Pauline Avenue	0.1 A	0 A	10 A	18 C	0.2 A	0.1 A	0.2 A	13 B	12 B	0.3 A	0.2 A	0 A	13 B	97 F	0.3 A	0 A	0.1 A	35 D	26 D	0.5 A
McGalliard Road at Church Driveway	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A	0 A	0 A	0 A	-	0 A
McGalliard Road at Reserve Street	13 B	13 B	16 B	16 B	13 B	18 B	17 B	24 C	23 C	18 B	18 B	19 B	24 C	22 C	19 B	18 B	17 B	22 C	21 C	17 B

3. Opening Day with Development

With the geometric and traffic control improvements shown in Figure 14 on page 27, the levels of service are as shown on the following table. Most of the levels of service experienced very little change by adding Raising Cane's traffic.

The levels of service F on northbound Pauline Avenue impact very little existing traffic since the existing volumes are so low. Traffic counts found 40 northbound vehicles during the peak six hours on a weekday, and 46 on the peak six hours of a Saturday. By comparison, McGalliard Road had about 11,000 vehicles in the same six hours on a weekday and 10,000 on Saturday. Adding a northbound right turn lane on northbound Pauline Avenue would lower the delays slightly, but the levels of service would remain F throughout most of the day.

Table 8 – Level of Service and Delay
Opening Day with Development

Intersection	AM Street Peak 7:45 AM & 8:45 AM					AM Generator Peak 11:45 AM & 11:45 AM					PM Generator Peak 12:25 PM & 12:45 PM					PM Street Peak 5:00 PM & 4:45 PM				
	EB	WB	NB	SB	All	EB	WB	NB	SB	All	EB	WB	NB	SB	All	EB	WB	NB	SB	All
Weekday																				
McGalliard Road at Pauline Avenue	0.1 A	0 A	31 D	11 B	0.5 A	0.1 A	0 A	66 F	31 D	0.7 A	0 A	0 A	75 F	29 D	0.6 A	0 A	0.1 A	58 F	23 C	0.6 A
McGalliard Road at Raising Caine's Driveway	0 A	0 A	11 B	-	0.2 A	0 A	0 A	13 B	-	0.2 A	0 A	0 A	13 B	-	0.2 A	0 A	0 A	13 B	-	0.1 A
McGalliard Road at Reserve Street	15 B	15 B	17 B	17 B	15 B	17 B	15 B	23 C	22 C	17 B	17 B	17 B	24 C	22 C	18 C	18 B	18 B	24 C	23 C	18 B
Saturday																				
McGalliard Road at Pauline Avenue	0.1 A	0 A	14 B	18 C	0.2 A	0.1 A	0.2 A	70 F	12 B	1.1 A	0.2 A	0 A	88 F	97 F	1.1 A	0 A	0.1 A	81 F	27 D	1.2 A
McGalliard Road at Raising Cane's Driveway	0 A	0 A	10 A	-	0.1 A	0 A	0 A	13 B	-	0.2 A	0 A	0 A	14 B	-	0.2 A	0 A	0 A	13 B	-	0.2 A
McGalliard Road at Reserve Street	13 B	13 B	16 B	16 B	13 B	18 B	17 B	25 C	23 C	18 B	18 B	19 B	25 C	22 C	19 B	18 B	17 B	23 C	21 C	17 B

** - Raising Cane's is not open for breakfast at any of their over 600 restaurants. They typically open at 10:00 AM. The forecast shows the traffic that could be expected if they decide to offer breakfast, but it is not expected.*

D. Queuing Analyses

Queuing analyses for the intersections comes from the level of service analyses. The level of service was analyzed using Synchro with its internal methods as well as HCM methods. The queue lengths shown are the longest forecasted for any of the peak periods. These queue lengths do not include deceleration or tapers.

1. Existing

Figure 15 on page 35 shows the calculated peak queue lengths in blue and the existing storage lengths in red. In some cases, the queues extend past driveways and even into other intersections.

2. Opening Day without Development

Figure 16 on page 36 shows the calculated peak queue lengths in blue and the existing storage lengths in red. In some cases, the queues extend past driveways and even into other intersections.

3. Opening Day with Development

Figure 17 on page 37 shows the calculated peak queue lengths in blue and the longer of the existing or recommended storage lengths in red. In some cases, the queues extend past driveways and even into other intersections.

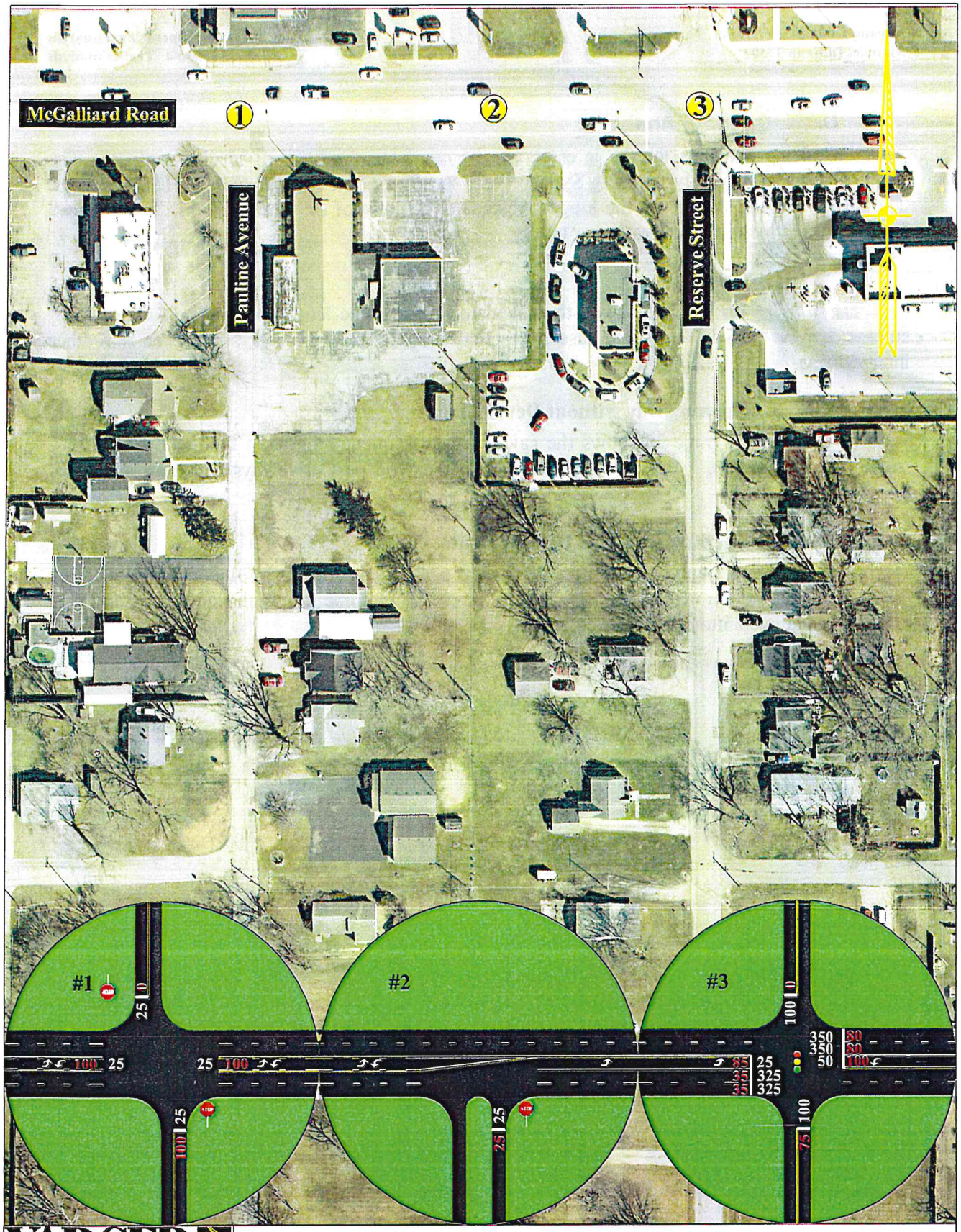

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Figure 15, Existing Queue and Storage Lengths
Muncie, Indiana 47303, Approximate Scale: 1" = 100' Queue, Storage
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June 2, 2022

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Figure 16, Opening Day without Development Queue and Storage Lengths
Muncie, Indiana 47303, Approximate Scale: 1" = 100' Queue, Storage
Prepared by Yarger Engineering, Inc.©
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317-475-1100, Fax: 317-475-0100 **June 2, 2022**

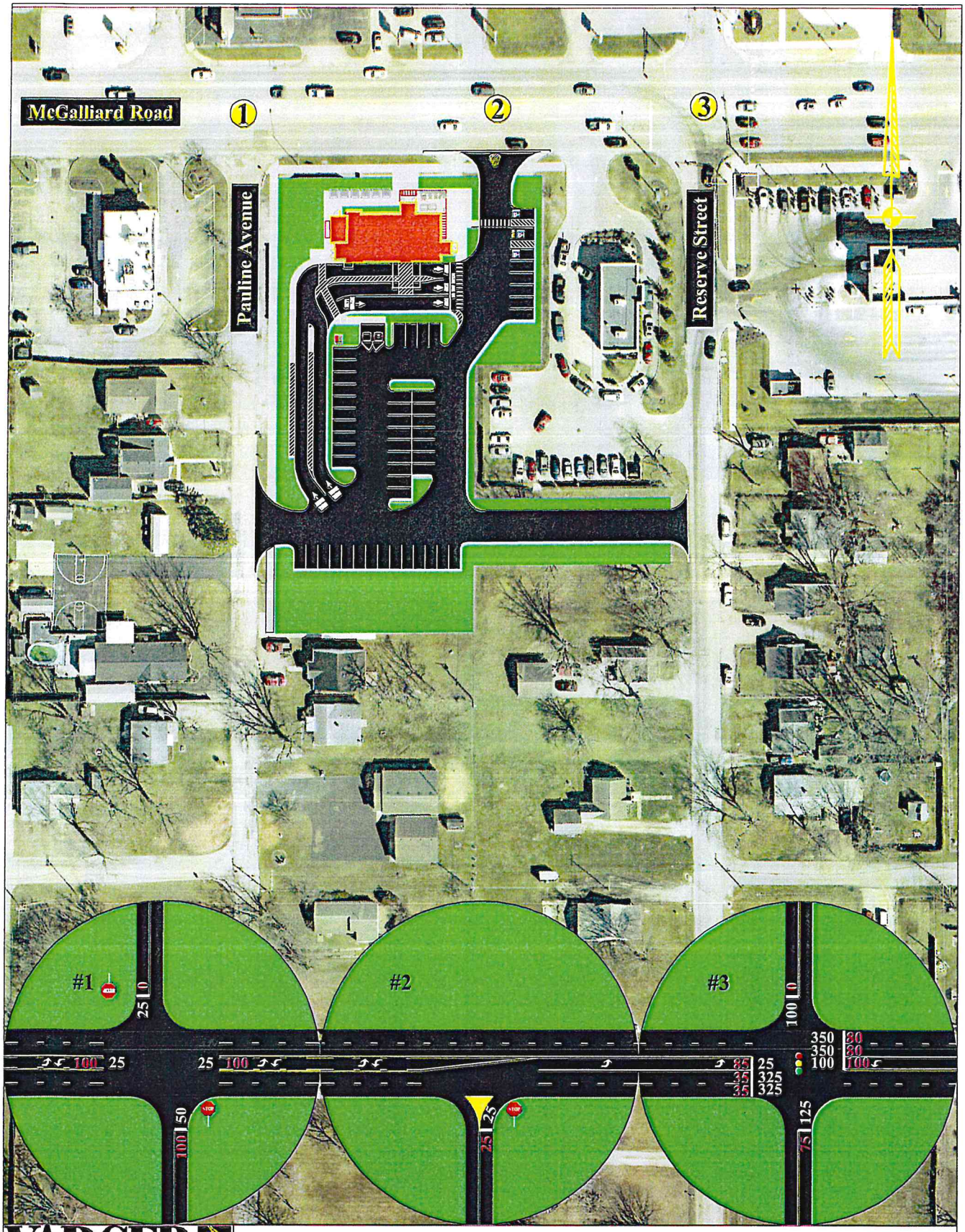

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Figure 17, Opening Day Queue and Storage Lengths
Muncie, Indiana 47303, Approximate Scale: 1" = 100'
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317-475-1100, Fax: 317-475-0100

Queue, Storage

June 2, 2022

V. RECOMMENDED IMPROVEMENTS

A. Existing Conditions

1. McGalliard Road at Pauline Avenue

No changes are recommended.

2. McGalliard Road at Church Driveway

No changes are recommended.

3. McGalliard Road at Reserve Avenue

No changes are recommended.

B. Opening Day without Development

1. McGalliard Road at Pauline Avenue

No changes are recommended.

2. McGalliard Road at Church Driveway

No changes are recommended.

3. McGalliard Road at Reserve Street

No changes are recommended.

C. Opening Day with Raising Cane's

1. McGalliard Road at Pauline Avenue

No changes are recommended.

2. McGalliard Road at Raising Cane's Driveway

The driveway should be one lane in and one lane out, and designed to promote right-in/right-out flow.

3. McGalliard Road at Reserve Street

No changes are recommended.

VI. CONCLUSION

Traffic in the study area should not be unreasonably delayed due to the construction of Raising Cane's with the recommended road improvements. The only recommended improvement is the construction of a right-in/right-out driveway on McGalliard Road.

The existing traffic on McGalliard Road is already there and adding the traffic from Raising Cane's restaurant won't increase that much. About half of Raising Cane's traffic will come from the existing traffic.

Most approaches show little change in levels of service and queue lengths. The primary impact will be to northbound traffic on Pauline Avenue, which will mostly be Raising Cane's customers. There were less than 50 vehicles on the Pauline Avenue northbound approach during the six hours counted compared to 10,000 vehicles on McGalliard Road during the same six hours.