



## GOLLING MASERATI & ALFA ROMEO JZ19-02

### **GOLLING MASERATI & ALFA ROMEO JZ19-02 with Rezoning 18.728**

Public hearing at the request of Dorchen/Martin Associates for Planning Commission's recommendation to City Council for rezoning of property in Section 24, located on the south side of Grand River Avenue, west of Joseph Drive from NCC (Non-Center Commercial) to B-3 (General Business). The subject property is approximately 5.25 acres.

### **REQUIRED ACTION**

Recommend to City Council approval or denial of rezoning request from NCC to B-3.

REVIEW	RESULT	DATE	COMMENTS
Planning	Approval recommended	2-13-19	<ul style="list-style-type: none"> <li>Items to be addressed on the site plan submittal</li> </ul>
Engineering – Public Utilities	Approval recommended	2-8-19	<ul style="list-style-type: none"> <li>Rezoning to B-3 will have negligible impact on utilities</li> </ul>
Traffic	Approval recommended	2-6-19	<ul style="list-style-type: none"> <li>Additional information provided comparing high trip generating uses shows identical potential developments under either zoning district</li> <li>Items to be addressed on the next site plan submittal</li> </ul>

## MOTION SHEET

### Approval

In the matter of the request of Golling Maserati & Alfa Romeo, JZ19-02, with Zoning Map Amendment 18.728, motion to **recommend approval** to City Council to rezone the subject property from NCC (Non-Center Commercial) to B-3 (General Business) *for the following reasons:*

1. *The Master Plan for Land Use objective to foster a favorable business climate is fulfilled by allowing a new business to become established in the City,*
2. *The B-3 General Business District is consistent with the Future Land Use Map designation for Community Commercial,*
3. *There is no negative impact expected on public utilities as stated in the Engineering memo,*
4. *The Rezoning Traffic Impact Study has demonstrated that the proposed rezoning to B-3 district will not degrade the level of service of the local road network below acceptable levels compared to existing potential uses in the NCC district,*
5. *The site will be brought into conformance with the current zoning ordinance requirements if redevelopment occurs, with the submittal of a site plan anticipated once the rezoning is approved, and*
6. *The Master Plan advocacy item to support retail commercial uses along established transportation corridors is achieved with this proposed district,*

**-OR-**

### Denial

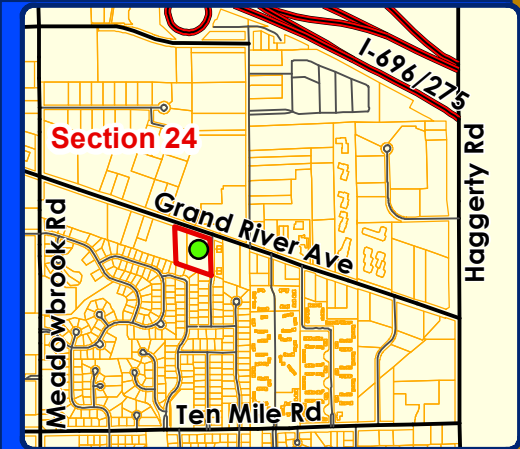
In the matter of the request of Golling Maserati & Alfa Romeo, JZ19-02, with Zoning Map Amendment 18.728, motion to **recommend denial** to City Council to rezone the subject property from NCC (Non-Center Commercial) to B-3 (General Business) *for the following reasons ...*

MAPS  
Location  
Zoning  
Future Land Use  
Natural Features

---

# GOLLING MASERATI + ALFA ROMEO: JZ 19-02

## LOCATION



### LEGEND

 Subject Property



## City of Novi

Dept. of Community Development  
City Hall / Civic Center  
45175 W Ten Mile Rd  
Novi, MI 48375  
cityofnovi.org

Map Author: Lindsay Bell  
Date: 2/8/19  
Project: GOLLING MASERATI JZ19-02  
Version #: 1

0 30 60 120 180 Feet

1 inch = 146 feet

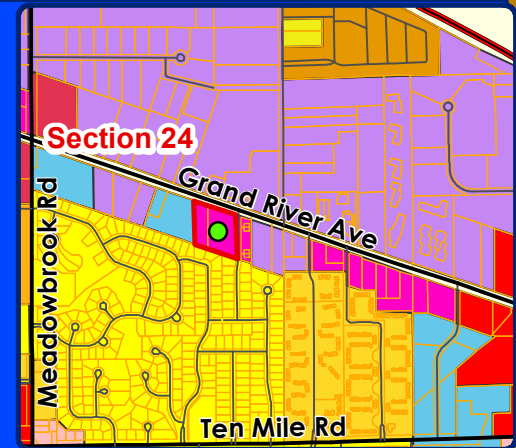
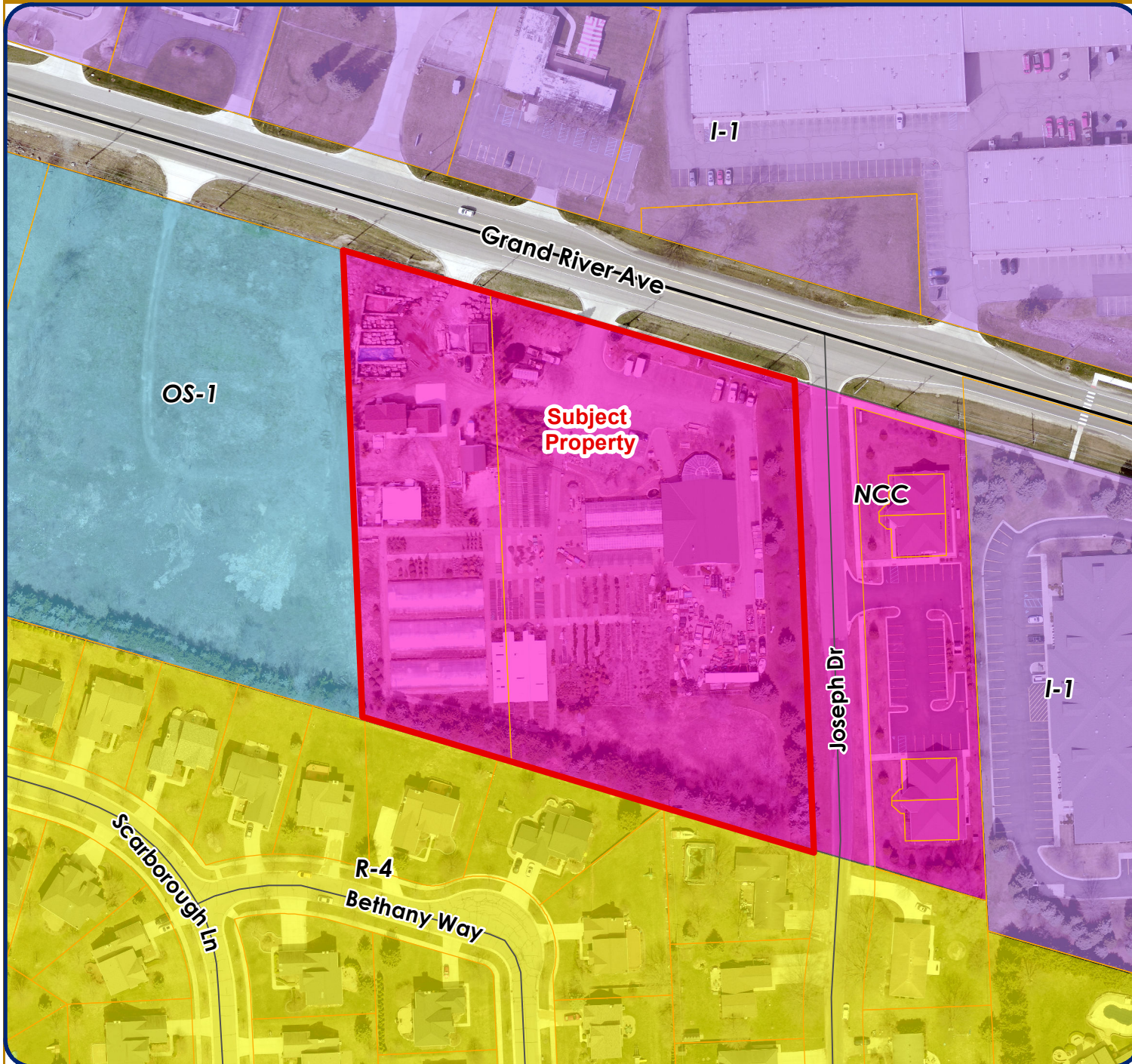


### MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

# GOLLING MASERATI + ALFA ROMEO: JZ 19-02

## ZONING



### LEGEND

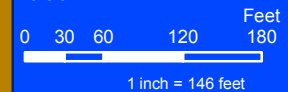
- R-1: One-Family Residential District
- R-2: One-Family Residential
- R-4: One-Family Residential District
- RM-1: Low-Density Multiple Family
- RM-2: High-Density Multiple Family
- MH: Mobile Home District
- B-1: Local Business District
- B-3: General Business District
- GE: Gateway East District
- I-1: Light Industrial District
- NCC: Non-Center Commercial District
- OS-1: Office Service District
- Subject Property



### City of Novi

Dept. of Community Development  
 City Hall / Civic Center  
 45175 W Ten Mile Rd  
 Novi, MI 48375  
[cityofnovi.org](http://cityofnovi.org)

Map Author: Lindsay Bell  
 Date: 2/8/19  
 Project: GOLLING MASERATI JZ19-02  
 Version #: 1

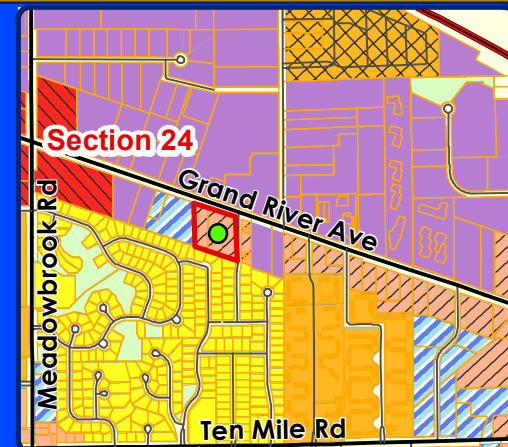


#### MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

# GOLLING MASERATI + ALFA ROMEO: JZ 19-02

## FUTURE LAND USE



### LEGEND

- Single Family
- Multiple Family
- Mobile Home Park
- Community Office
- Industrial Research Development Technology
- Local Commercial
- Community Commercial
- TC Gateway
- Private Park
- Subject Property



### City of Novi

Dept. of Community Development  
 City Hall / Civic Center  
 45175 W Ten Mile Rd  
 Novi, MI 48375  
[cityofnovi.org](http://cityofnovi.org)

Map Author: Lindsay Bell  
 Date: 2/8/19  
 Project: GOLLING MASERATI JZ19-02  
 Version #: 1



1 inch = 167 feet

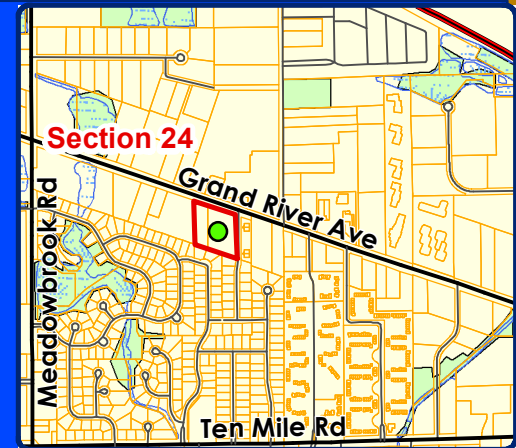


#### MAP INTERPRETATION NOTICE




Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

# GOLLING MASERATI + ALFA ROMEO: JZ 19-02

## NATURAL FEATURES



### LEGEND

-  WETLANDS
-  WOODLANDS
-  Subject Property



## City of Novi

Dept. of Community Development  
City Hall / Civic Center  
45175 W Ten Mile Rd  
Novi, MI 48375  
cityofnovi.org

Map Author: Lindsay Bell  
Date: 2/8/19  
Project: GOLLING MASERATI JZ19-02  
Version #: 1



1 inch = 125 feet

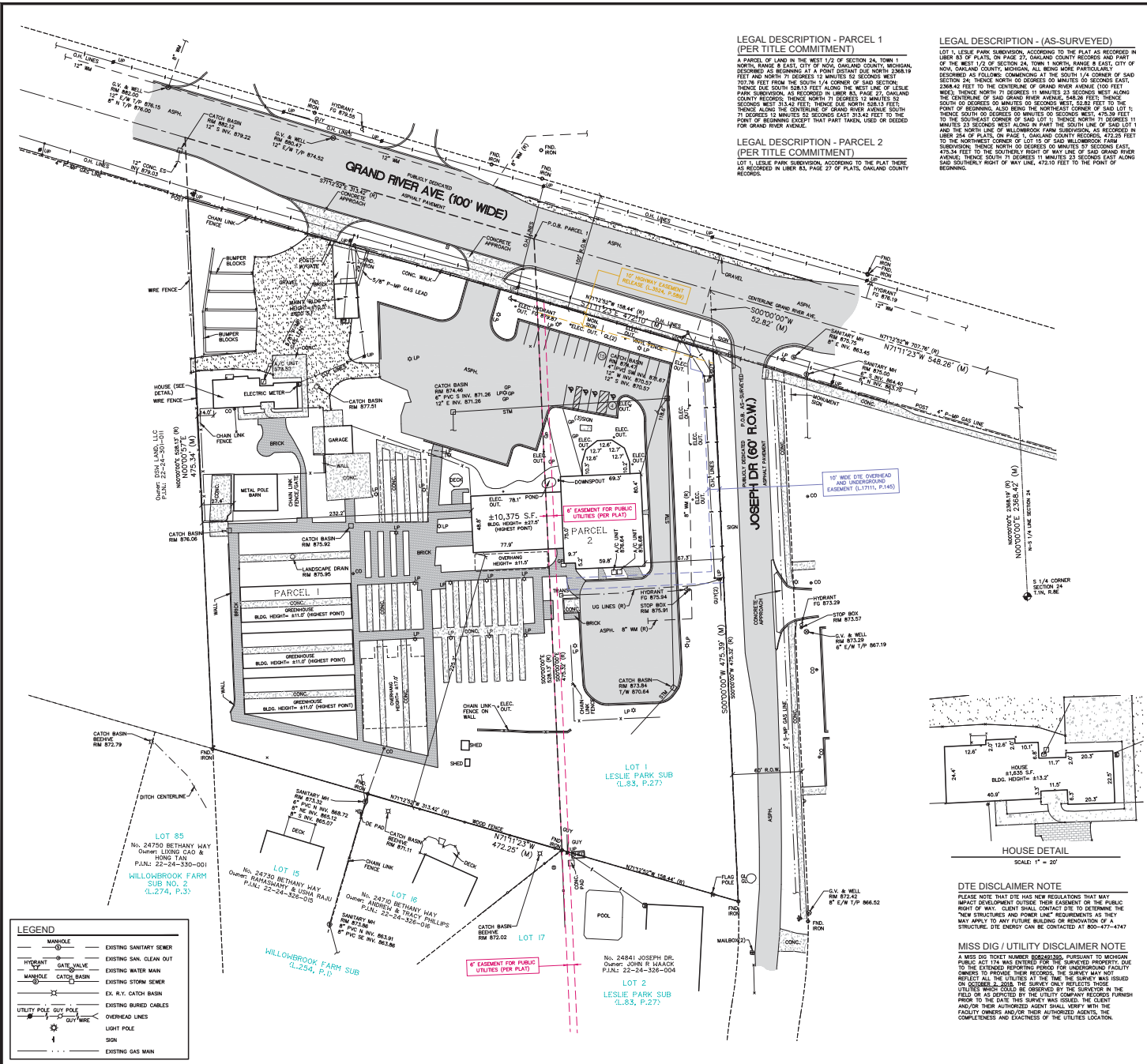


### MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

PROPOSED REZONING





**LEGAL DESCRIPTION - PARCEL 1 (PER TITLE COMMITMENT)**

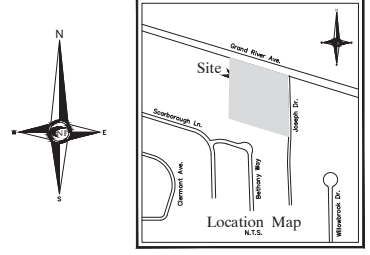
A PARCEL OF LAND IN THE WEST 1/2 OF SECTION 24, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN, DESCRIBED AS BEGINNING AT A POINT DISTANT ONE NORTH 338.19 FEET AND NORTH 71 DEGREES 13 MINUTES 53 SECONDS WEST FROM THE SOUTH 1/4 CORNER OF SAID SECTION 24, COMMENCING AT THE SOUTH 1/4 CORNER OF SAID SECTION 24, THENCE SOUTH 1/4 CORNER OF SAID SECTION 24, THENCE SOUTH 52.813 FEET TO THE WEST LINE OF LESLIE PARK SUBDIVISION, THENCE NORTH 71 DEGREES 13 MINUTES 53 SECONDS WEST 31.442 FEET, THENCE EAST 33.442 FEET TO THE POINT OF BEGINNING EXCEPT THAT PART TAKEN, USED OR DECEDED FOR GRAND RIVER AVENUE.

**LEGAL DESCRIPTION - PARCEL 2 (PER TITLE COMMITMENT)**

LOT 1, LESLIE PARK SUBDIVISION, ACCORDING TO THE PLAT THEREAS RECORDED IN UBER 83, PAGE 27 OF PLATS, OAKLAND COUNTY RECORDS.

**LEGAL DESCRIPTION - (AS-SURVEYED)**

LOT 1, LESLIE PARK SUBDIVISION, ACCORDING TO THE PLAT AS RECORDED IN UBER 83, PAGE 27 OF PLATS, OAKLAND COUNTY RECORDS AND PART OF THE WEST 1/2 OF SECTION 24, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN, DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTH 1/4 CORNER OF SAID SECTION 24, THENCE NORTH 71 DEGREES 13 MINUTES 53 SECONDS WEST 238.42 FEET TO THE CENTERLINE OF GRAND RIVER AVENUE (100 FEET WIDE), THENCE NORTH 71 DEGREES 13 MINUTES 53 SECONDS WEST 31.442 FEET TO THE POINT OF BEGINNING, ALSO BEING THE NORTHEAST CORNER OF SAID LOT 1; THENCE SOUTH 52 DEGREES 00 MINUTES 00 SECONDS WEST 47.336 FEET TO THE SOUTHWEST CORNER OF SAID LOT 1; THENCE NORTH 71 DEGREES 13 MINUTES 53 SECONDS WEST 31.442 FEET TO THE POINT OF BEGINNING EXCEPT THAT PART TAKEN, USED OR DECEDED FOR GRAND RIVER AVENUE. THENCE SOUTH 71 DEGREES 13 MINUTES 53 SECONDS EAST 33.442 FEET TO THE POINT OF BEGINNING.



**NF ENGINEERS**  
 CIVIL ENGINEERS  
 LAND SURVEYORS  
 LAND PLANNERS  
 NOWAK & FRAUS ENGINEERS  
 4677 WOODWARD AVE.  
 PONTIAC, MI 48342-5032  
 TEL: (248) 332-7931  
 FAX: (248) 332-8257

**BASE OF BEARING NOTE**  
 The basis of bearing for this survey was established by the North/South 1/4 Line of Section 24, Town 1 North, Range 8 East, Novi, Michigan.

**TITLE NOTES**  
 2) Any rights, interests, or claims that are not shown by the Public Records but that could be ascertained by making inquiry of persons in possession of the Land.  
 3) Easements, encumbrances, or claims thereof, not shown by the Public Records.

7) The terms, provisions and easements) contained in the document entitled "Highway Easement Release" recorded May 9, 1958 in Liber 3624, Page 899 of Official Records. (Affects Parcel 2) [SAID EASEMENT IS PLOTTED HEREON].

8) Building and use restrictions and other terms covenants and conditions, but deleting any covenant, condition or restriction indicating a preference, limitation or description based on race, color, religion, sex, handicap, familial status or national origin to the extent such covenants, conditions or restrictions violate 42 USC 3604 (c), disclosed by instrument recorded in Liber 3626, Page 183, Amended in Liber 11112, Page 147, Liber 11198, Page 454 and Liber 11972, Page 869. Affected by Affidavit recorded in Liber 18778, Page 7. (Affects Parcel 2) [SAID RESTRICTIONS ARE NOT PLOTTABLE].

9) The terms, provisions and easements) contained in the document entitled "Overhead and Underground Easement (Right of Way)" recorded April 4, 1997 as Liber 17111, Page 145 of Official Records. (Affects Parcel 2) [SAID EASEMENT IS PLOTTED HEREON].

10) Easements as disclosed by the recorded plat. [SAID EASEMENTS ARE PLOTTED HEREON].

11) Interest, if any, of the United States, State of Michigan, or any political subdivision thereof, in the oil, gas and minerals in and under and that may be produced from the captioned land.

12) Any rights, title, interest or claim thereof to that portion of the land taken, used or granted for streets, roads or highways.

13) Rights of tenants under unrecorded leases.

14) Rights of tenants under unrecorded leases.

All exceptions shown or noted on this survey were obtained from the City of Novi. No. NCS-202844-NMCL, with an effective date of 08-14-2018, issued by First American Title Insurance Company.

**EXCEPTIONS**  
 No. NCS-202844-NMCL, with an effective date of 08-14-2018, issued by First American Title Insurance Company.

**SITE DATA**  
 Gross Land Area: Parcel 1: 150,862 Square Feet or 3.65 Acres  
 Parcel 2: 71,328 Square Feet or 1.65 Acres  
 Zoned: NCG (Non-Center Commercial)  
 Building Setback: Front: 40'  
 Sides: 20'  
 Rear: 20'

Max. Building Height permitted: 2 stories / 25', whichever is less  
 Total Parking: 19 spaces including 4 barrier free spaces.

The above setback & height requirements were obtained from the City of Novi Zoning Ordinance.

A surveyor cannot make a certification on the basis of an interpretation or opinion of another party. A zoning endorsement letter should be obtained from the City of Novi to insure conformity as well as make a final determination of the required building setback requirements.

**FLOOD HAZARD NOTE**  
 The Property described on this survey does not lie within a Special Flood Hazard Area as defined by the Federal Emergency Management Agency; the property lies within Zone X of the Flood Insurance Rate Map identified as Map No. 26125C0627P bearing an effective date of September 29, 2006.

**CEMETERY NOTE**  
 There was no observable evidence of cemeteries or burial grounds within the subject property.

**UTILITY NOTE**  
 All utilities are underground unless otherwise noted.  
 The utilities shown on this survey were determined by field observation. All locations are approximate. The location of any other underground services which may exist can only be depicted if a Utility Plan is furnished to the surveyor.

**TABLE A NOTES**  
 16: There was no observable evidence of current earth moving work, building construction or building additions observed in the process of conducting the fieldwork.  
 17: There are no known proposed changes in street right-of-way lines available from the controlling jurisdiction.  
 17: There was no observable evidence of recent street or sidewalk construction or repairs observed in the process of conducting the fieldwork.

**SURVEYORS CERTIFICATION**  
 To: William A. Gollins, II, acting solely on behalf of an entity to be formed by C & F Real Estate Company, LLC, a Michigan limited liability company. First American Title Insurance Company.

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2016 Michigan Standard Code of Regulations for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes Items 2, 3, 4, 6(a), 6(b), 7(a), 7(b), 7(c), 8, 9, 13, 16, and 17 of Table A thereof. The field work was completed on September 25, 2018.

**MISS DIG / UTILITY DISCLAIMER NOTE**  
 A MISS DIG TICKET NUMBER BEARING PURSUANT TO MICHIGAN PUBLIC ACT 174 HAS BEEN OBTAINED FOR THE SURVEYED PROPERTY. DUE TO THE EXTENDED REPORTING PERIOD FOR UNDERGROUND FACILITY SERVICES TO PREVENT UNDER RECORDS, THE SURVEY CAN NOT BE CONSIDERED COMPLETE. THE SURVEY ONLY REFLECTS THOSE UTILITIES WHICH WERE OBSERVED BY THE SURVEYORS IN THE FIELD OR AS DEPICTED BY THE UTILITY COMPANY RECORDS FURNISHED PRIOR TO THE DATE THIS SURVEY WAS OBTAINED. THE CLIENT AND/OR THEIR AUTHORIZED AGENT SHALL VERIFY WITH THE FACILITY OWNERS AND/OR THEIR AUTHORIZED AGENTS, THE COMPLETENESS AND EXACTNESS OF THE UTILITIES LOCATION.

**DTE DISCLAIMER NOTE**  
 PLEASE NOTE THAT DTE HAS NEW REGULATIONS THAT MAY IMPACT DEVELOPMENT UNDER THEIR EASEMENT OR THE PUBLIC RIGHT OF WAY. CLIENT SHALL CONTACT DTE TO DETERMINE THE "NEW REGULATIONS AND POWER LINE" REQUIREMENTS AS THEY MAY APPLY TO ANY FUTURE BUILDING OR RENOVATION OF A STRUCTURE. DTE ENERGY CAN BE CONTACTED AT 800-477-4747

**HOUSE DETAIL**  
 SCALE: 1" = 20'

**HOUSE DETAIL**  
 SCALE: 1" = 20'

**HOUSE DETAIL**  
 SCALE: 1" = 20'

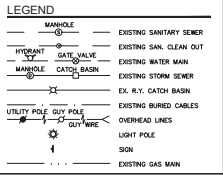
**HOUSE DETAIL**  
 SCALE: 1" = 20'

**HOUSE DETAIL**  
 SCALE: 1" = 20'

**HOUSE DETAIL**  
 SCALE: 1" = 20'

**HOUSE DETAIL**  
 SCALE: 1" = 20'

**HOUSE DETAIL**  
 SCALE: 1" = 20'



PROJECT  
 40799 Grand River  
 Novi, MI

CLIENT  
 Golling Chrysler Dodge  
 Jeep Ram, Inc.  
 2405 S. Telegraph  
 Bloomfield Hills, MI 48302

Contact: Bill Golling  
 Ph: (248) 409-2390

PROJECT LOCATION  
 Part of the SW 1/4  
 of Section 24  
 T: 1 North, R: 8 East  
 City of Novi,  
 Oakland County, Michigan

SHEET  
 ALTA/NSPS Land Title  
 Survey



DATE ISSUED/REVISED  
 10-00-00 REVISED PER

DESIGNED BY:  
 P. Williams  
 DATE:  
 October 2, 2018

APPROVED BY:  
 P. Williams

DATE:  
 October 2, 2018

SCALE: 1" = 40'  
 NFE JOB NO. SHEET NO.  
 K615 1 of 1



Kevin Nawroth, P.S.  
 No. 63503  
 Dated: October 2, 2018



**Dorchen/Martin Associates, Inc.**  
Architects/Planners

29895 Greenfield Road Suite 107  
Southfield, Michigan 48076  
248.557.1062  
Fax: 248.557.1231  
Cell: 248.224.3714  
E-mail: [fmartin@dorchenmartin.com](mailto:fmartin@dorchenmartin.com)  
<http://www.dorchenmartin.com/>

**Golling Maserati + Alfa Romeo Dealership**  
**40799 Grand River**

**December 21, 2018**

## **DEVELOPMENT OPTIONS - B-3 AND NCC ZONING**

In order for a new automobile sales and service facility to be developed on an existing 5.0 ac parcel of land currently home to Glenda's Garden Center, the current rezoning request from NCC (Non-Center Commercial District) to B-3 (General Business District) is before the City of Novi.

**Development options for B-3 Zoning are allowed in the ordinance as follows:**

### **Principal Permitted Uses:**

- i. Retail business use
- ii. Retail business service use
- iii. Dry cleaning establishments, or pick-up stations
- iv. Business establishments which perform services on the premises
- v. Professional services
- vi. Retail business or retail business service establishments
- vii. Professional and medical offices, including laboratories
- viii. Fueling station
- ix. Sale of produce and seasonal plant materials outdoors
- x. Auto wash
- xi. Bus passenger stations
- xii. **New and used car salesroom, showroom, or office**
- xiii. Other uses similar to the above uses

- xiv. Tattoo parlors
- xv. Publicly owned and operated parks, parkways and outdoor recreational facilities
- xvi. Accessory structures and uses customarily incident to the above permitted uses
- xvii. Public or private health and fitness facilities and clubs
- xviii. Microbreweries
- xix. Brewpubs

### **Special Land Uses:**

- i. Outdoor space for exclusive sale of new or used automobiles, campers, recreation vehicles, mobile homes, or rental of trailers or automobiles
- ii. Motel
- iii. Business in the character of a drive-in or open front store
- iv. Veterinary hospitals or clinics
- v. **Plant materials nursery**
- vi. Public or private indoor and private outdoor recreational facilities
- vii. Mini-lube or oil change establishments
- viii. Sale of produce and seasonal plant materials outdoors
- ix. Restaurant in the character of a fast food carryout, drive-in, fast food drive-through, or fast food sit-down

**Development options for NNC Zoning are allowed in the ordinance as follows:**

**Principal Permitted Uses:**

- i. Retail business use
- ii. Retail business service uses
- iii. Professional office buildings
- iv. Medical offices, including laboratories and clinics
- v. Financial institutions
- vi. Sit-down restaurants
- vii. Publicly owned and operated parks, parkways and outside recreational facilities
- viii. Instructional centers
- ix. Other uses similar to the above uses
- x. Accessory structures and uses customarily incident to the above permitted uses

**Special Land Uses:**

- i. Day care centers and adult day care centers
- ii. Places of worship
- iii. Private clubs, fraternal organizations and lodge halls
- iv. Museums
- v. Public utility buildings and uses without storage yards
- vi. Veterinary hospitals or clinics

The following uses are regulated according to the standards and regulations in the RM-1 Low-Density, Low Rise Multiple-Family (Section 3.1.7).

- i. Multiple-family dwellings
- ii. Independent and congregate elderly living facilities
- iii. Accessor buildings and uses customarily incident to any of the above uses

The following uses are regulated according to the standards and regulations in the RT Two-Family Residential District (Section 3.1.6).

- i. Two-family dwellings (site built)
- ii. Shared elderly housing
- iii. Accessory buildings and uses customarily incident to any of the above uses

The following uses are regulated according to the standards and regulations in the R-4 One-Family Residential District (Section 3.1.5).

- i. One-family detached dwellings
- ii. Farms and greenhouses
- iii. Publicly owned and operated parks, parkways and outdoor recreational facilities
- iv. Cemeteries
- v. Home occupations
- vi. Keeping of horses and ponies
- vii. Family Day Care Homes
- viii. Accessory buildings and uses customarily incident to any of the above uses

Sincerely,



Frank Z. Martin, AIA, NCARB  
Dorchen/Martin Associates, Inc.

FZM/

## PLANNING REVIEW

---



## PLAN REVIEW CENTER REPORT

February 13, 2019

### Planning Review

Golling Maserati & Alfa Romeo  
JZ19-05 with Rezoning 18.728

#### PETITIONER

Dorchen/Martin Associates

#### REVIEW TYPE

Rezoning Request from NCC (Non-Center Commercial District) to B-3 (General Business)

#### PROPERTY CHARACTERISTICS

<b>Section</b>	24	
<b>Site Location</b>	South of Grand River Avenue, East of Meadowbrook (Parcels 22-24-326-014, 22-24-326-024)	
<b>Site School District</b>	Novi Community School District	
<b>Site Zoning</b>	NCC Non-Center Commercial	
<b>Adjoining Zoning</b>	North	I-1 Light Industrial District
	East	NCC Non-Center Commercial
	West	OS-1 Office Service
	South	R-4 One Family Residential
<b>Current Site Use</b>	Glenda's Garden Center – plant nursery/landscaping	
<b>Adjoining Uses</b>	North	Delta Fuels, Light industrial offices, Religious Organization
	East	Office Buildings
	West	Vacant
	South	Single Family Residences
<b>Site Size</b>	5.25 Acres	
<b>Plan Date</b>	October 2, 2018	

#### PROJECT SUMMARY

The petitioner is requesting a Zoning Map amendment for a 5.25 acre property located on the southwest corner of Grand River Avenue and Joseph Drive (Section 24) from NCC (Non-Center Commercial) to B-3 (General Business). The applicant states that the rezoning request is necessary to redevelop the site as an automobile dealership, which is only permitted in the B-3 district.

The site has operated for many years (pre-1990) as Glenda's Garden Center and Market, a non-conforming use in the NCC District.

The applicant met with planning staff to discuss the project and process, and have determined to apply for a traditional rezoning. The applicant has not provided a concept plan with this request. As this is not a PRO (Planned Rezoning Overlay) rezoning, the applicant would not be bound to develop a specific plan or use after rezoning has been approved. The proposed rezoning category is supported by the Future Land Use map recommendation for the subject property.

**MASTER PLAN FOR LAND USE**

The Future Land Use Map of the 2016 City of Novi Master Plan for Land Use identifies this property and property adjacent to the east as Community Commercial. As the Master Plan states, "This land use is designated for comparison-shopping needs of a larger population base. They are along major thoroughfares and roadway intersections." The B-3 General Business District generally falls within areas planned for Community Commercial, as do the B-2 Community Business District, and NCC Non-Center Commercial.

Property to the west is identified in the Master Plan as Community Office, while the area north of Grand River are planned for Industrial, Research, Development and Technology land uses. The area to the south is planned for single family uses.

The proposal would follow objectives listed in the Master Plan for Land Use including the following:

1. Objective: Retain and support the growth of existing businesses and attract new businesses to the City of Novi.
2. Advocacy Action Item: Support retail commercial uses along established transportation corridors that are accessible for the community at large, such as along Grand River Avenue to preclude future traffic congestion.
3. Objective: Provide and maintain adequate water and sewer service for the City's needs.



**Current Image of Subject Property**

**DEVELOPMENT POTENTIAL**

The parcels to be rezoned are currently developed and used as a garden center, a non-conforming use in the NCC District. Development under either the current NCC zoning or the proposed B-3 zoning could result in the construction of a similarly sized retail shopping center, an office complex, or sit-down restaurants on the 5.25 acre site. Uses permitted in the B-3 zoning district that are not allowed in the NCC district include fueling stations, private health and fitness facilities, tattoo parlors, auto washes, and automobile sales. Fast food restaurants with a drive through window, motels, and veterinary hospitals are also permitted with Special Land Use approval in the B-3 District. A change to B-3 zoning would also remove the potential for redevelopment of the site for any residential uses, which could be permitted as special land uses in the NCC district.

**EXISTING ZONING AND LAND USE**

The following table summarizes the zoning and land use status for the subject property and surrounding properties.

**Land Use and Zoning: For Subject Property and Adjacent Properties**

	<b>Existing Zoning</b>	<b>Existing Land Use</b>	<b>Master Plan Land Use Designation</b>
<b>Subject Property</b>	NCC Non-Center Commercial	Garden Center	Community Commercial (uses consistent with NCC, B-2 and B-3 Districts)

<b>Northern Parcels</b>	I-1 Light Industrial District	Offices, Delta Fuels, Religious Center	Industrial research development and technology. (uses consistent with Light Industrial Districts, I-1)
<b>Southern Parcels</b>	R-4 One Family Residential	Single Family Neighborhood	Single Family
<b>Eastern Parcel</b>	NCC Non-Center Commercial	Offices	Community Commercial (uses consistent with NCC, B-2, and B-3 Districts)
<b>Western Parcels</b>	OS-1 Office Service	Vacant	Community Office (small and medium-scale office uses, human care, recreation)

**COMPATIBILITY WITH SURROUNDING LAND USE**

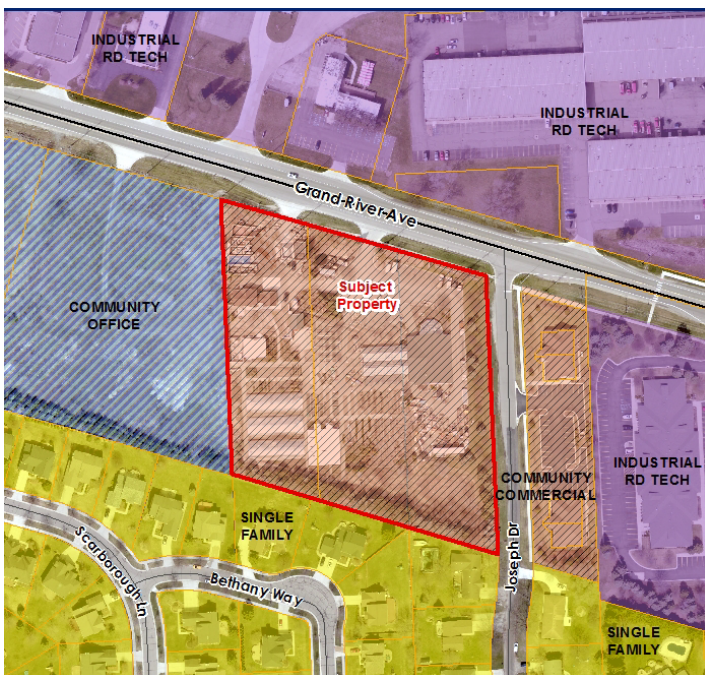
The surrounding land uses are shown in the above chart. The compatibility of the proposed rezoning with the zoning and uses on the adjacent properties should be considered by the Planning Commission in making the recommendation to City Council on the rezoning request.

The properties directly **north** of the subject area are currently used as a fuel distribution station, a religious organization, and offices of service providers. The current zoning map indicates I-1 for the properties.

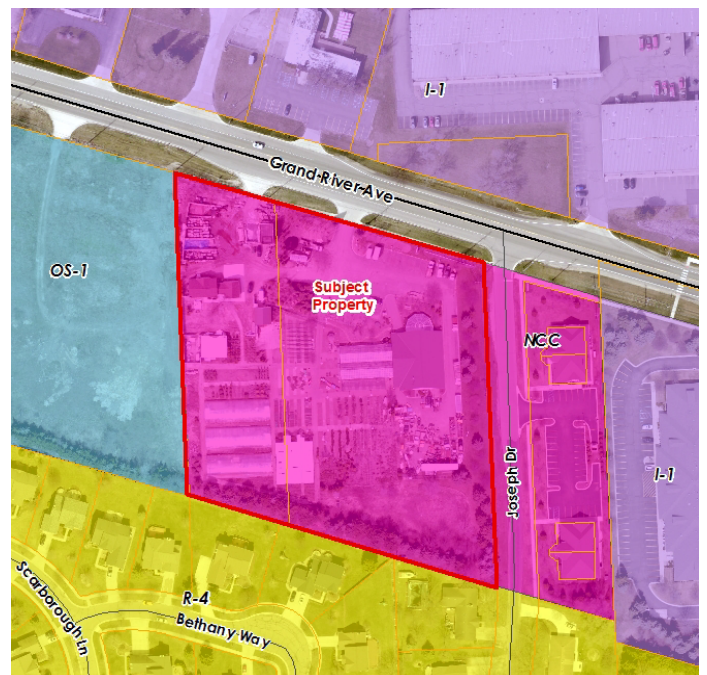
Directly to the **south** of the subject property is a single family neighborhood. Four residential lots directly abut the subject property. At the time of Preliminary Site Plan Review, the Planning Commission should review the plan carefully to insure that there will be no negative impacts (such as additional noise, lighting) on the residential properties to the south.

The property to the **west** of the subject property is currently vacant and is zoned OS-1 Office Service.

To the **east** of the subject property is a small office complex.



Future Land Use



Existing Zoning

**COMPARISON OF ZONING DISTRICTS**

The following table provides a comparison of the current (I-1) and proposed (B-3) zoning classifications.

	<b>NCC (Existing)</b>	<b>B-3 Zoning (Proposed)</b>
Principal Permitted Uses	<ol style="list-style-type: none"> <li>1. Retail businesses use</li> <li>2. Retail business service use</li> <li>3. Professional office buildings</li> <li>4. Medical offices, including laboratories and clinics</li> <li>5. Financial institutions, stock brokerages</li> <li>6. Sit-down restaurants</li> <li>7. Publicly owned and operated parks, parkways and outdoor recreational facilities</li> <li>8. Instructional centers</li> <li>9. Other uses similar to the above uses</li> <li>10. Accessory buildings, structures and uses customarily incident to the above permitted uses</li> </ol>	<ol style="list-style-type: none"> <li>1. Retail businesses use</li> <li>2. Retail business service uses</li> <li>3. Dry cleaning establishments, or pick-up stations, dealing directly with the consumer</li> <li>4. Business establishments which perform services on the premises</li> <li>5. Professional services</li> <li>6. Retail business or retail business service establishments</li> <li>7. Professional or medical offices, including laboratories</li> <li>8. Fueling station</li> <li>9. Sale of produce and seasonal plant materials</li> <li>10. Auto wash</li> <li>11. Bus passenger stations</li> <li>12. New and used car salesroom, showroom, or office</li> <li>13. Other uses similar to the above uses</li> <li>14. Tattoo parlors</li> <li>15. Publicly owned and operated parks, parkways and outdoor recreational facilities</li> <li>16. Accessory structures and uses customarily incident to the above permitted uses</li> <li>17. Public or private health and fitness facilities and clubs</li> <li>18. Microbreweries</li> <li>19. Brewpubs</li> </ol>
Special Land Uses	<ol style="list-style-type: none"> <li>1. Day care centers and adult day care centers</li> <li>2. Places of worship</li> <li>3. Private clubs, fraternal organizations and lodge halls</li> <li>4. Museums</li> <li>5. Publicly utility buildings and uses without service yards</li> <li>6. Veterinary hospitals or clinics</li> <li>7. Multiple-family dwellings</li> <li>8. Independent and congregate elderly living facilities</li> <li>9. Two-family dwellings</li> <li>10. Shared elderly housing</li> <li>11. One-family detached dwellings</li> <li>12. Farms and greenhouses</li> <li>13. Publicly owned and operated parks, parkways and outdoor recreational facilities</li> <li>14. Cemeteries</li> </ol>	<ol style="list-style-type: none"> <li>1. Outdoor space for exclusive sale of new or used automobiles, campers, recreation vehicles, mobile homes, or rental of trailers or automobiles</li> <li>2. Motel</li> <li>3. Business in the character of a drive-in or open front store</li> <li>4. Veterinary hospitals or clinics</li> <li>5. Plant materials nursery</li> <li>6. Public or private indoor and private outdoor recreation facilities</li> <li>7. Mini-lube or oil change establishments</li> <li>8. Sale of produce and seasonal plant materials outdoors</li> <li>9. Restaurant in the character of a fast food carryout, drive-in, fast food drive-through, or fast food sit-down</li> </ol>



	15. Home occupations 16. Keeping of horses and ponies 17. Family Day Care Homes 18. Accessory buildings and uses customarily incident to any of the above permitted uses	
Minimum Lot Size	2 acres	Determined by off-street parking, loading, greenbelt screening, yard setback or usable open space requirements
Minimum Lot Width	200 feet	Determined by off-street parking, loading, greenbelt screening, yard setback or usable open space requirements
Building Height	25 feet or 2 stories	30 feet
Building Setbacks	Front: 40 feet Side: 20 feet Rear: 20 feet	Front: 30 feet Side: 15 feet Rear: 20 feet

**INFRASTRUCTURE**

**Engineering**

The Staff Engineer has reviewed the rezoning request and expressed no concerns regarding sanitary sewer capacity and available water capacity. The impacts of B-3 land use on the utilities in this area are expected to be similar to utility demands if developed under NCC uses.

**Traffic**

City Traffic consultants reviewed the Traffic Impact Assessment provided by the applicant and indicates that it does not meet the requirements of the Rezoning Traffic Impact Study. The TIA only assesses the impact of a 25,825 square foot car dealership. A Rezoning Traffic Impact Study should also include trip generation comparisons of typical uses permitted under the requested zoning district with those in the existing zoning district. The report should be modified to include this information and resubmitted for review. See the traffic review letter for additional information.

**NATURAL FEATURES**

There are no significant natural features present on the site or adjacent to the site.

**RECOMMENDATION**

Approval of the **Rezoning is recommended** because

- The rezoning request fulfills objectives of the Master Plan for Land Use by fostering a favorable business climate and attracting a new business to Novi.
- The rezoning is consistent with recommended Future Land Use of the Master Plan.
- The rezoning provides an opportunity to bring a non-conforming parcel into conformance with the current Zoning Ordinance.
- The rezoning is not expected to negatively impact public utilities in the area.

The rezoning is the first step in the process; the applicant will still need to seek the required approvals from Planning Commission for the Preliminary Site Plan and Stormwater Management Plan depending on the requirements as determined at the time of site plan review. Any outdoor storage of new or used automobiles will also require Special Land Use approval by the Planning Commission.

**NEXT STEP: PLANNING COMMISSION PUBLIC HEARING**

---

This Rezoning request will be scheduled for public hearing before the **Planning Commission once revisions to the Rezoning Traffic Impact Study are made as requested and resubmitted for review.**

If the applicant has any questions concerning the above review or the process in general, do not hesitate to contact me at 248.347.0484 or [lbell@cityofnovi.org](mailto:lbell@cityofnovi.org).



---

Lindsay Bell – Planner

**ENGINEERING REVIEW**

---

# MEMORANDUM



**TO:** LINDSAY BELL, PLANNER  
**FROM:** KATE RICHARDSON, PLAN REVIEW ENGINEER  
**SUBJECT:** GOLLING MASERATI AND ALFA ROMEO DEALERSHIP REZONING  
**DATE:** FEBRUARY 8, 2019

---

The Engineering Division has reviewed a rezoning request for the 5.25 acres located south of Grand River Avenue and east of Meadowbrook Road. The applicant is requesting to rezone parcel 22-24-326-014 and 22-24-326-024 from the existing zoning of NCC (Non-Center Commercial) to B-3 (General Business). The Master Plan for Land Use indicates a future land use of Community Commercial for this location.

### Utility Demands

A residential equivalency unit (REU) equates to the utility demand from one single family home. Under the current zoning, the garden center places a demand of 1.80 REUs per acre on the utilities. The applicant intends to propose a Maserati and Alfa Romeo dealership with an adjacent parking lot. This would have an approximate utility demand of 1.80 REUs per acre.

### Water System

The site is located within the Lower Water Pressure District. Water service is currently available from an eight-inch water main extension from the twelve-inch water main that runs parallel to Grand River Avenue. The proposed rezoning would have minimal impact on available capacity, pressure and flows in the City's water distribution system.

### Sanitary Sewer

The site is located within the Willowbrook Sewer District. Sanitary service is available by connection to an existing eight-inch sanitary sewer that runs parallel to Grand River Avenue. The proposed rezoning is not anticipated to have an apparent impact on the capacity of the downstream sanitary sewer within the City's infrastructure.

### Summary

The requested rezoning will result in utility demands that are approximately equal to the utility demand if the property were to be developed under the current zoning. Further, the requested rezoning is consistent with the future land use for this location. Therefore, the rezoning would have negligible impact on utility demands.

cc: Ben Croy, P.E.; Water & Sewer Senior Manager  
Darcy Rechten, P.E.; Construction Engineer  
Barb McBeth, AICP; City Planner  
George Melistas; Engineering Senior Manager

# REZONING TRAFFIC IMPACT STATEMENT REVIEW

---



AECOM  
27777 Franklin Road  
Southfield  
MI, 48034  
USA  
aecom.com

**To:**  
Barbara McBeth, AICP  
City of Novi  
45175 10 Mile Road  
Novi, Michigan 48375

**Project name:**  
JZ19-04 Golling Maserati & Alfa Romeo  
Dealership Rezoning Traffic Review Letter  
**From:**  
AECOM

**Date:**  
February 6, 2019

**CC:**  
Sri Komaragiri, Lindsay Bell, George Melistas, Darcy  
Rechtien, Hannah Smith

# Memo

**Subject:** JZ19-04 Golling Maserati & Alfa Romeo Dealership Rezoning Traffic Review Letter

The Traffic Impact Assessment for the Golling Maserati & Alfa Romeo Dealership was reviewed to the level of detail provided and AECOM **recommends denial** of the Rezoning Study; the applicant should review the comments provided below and provide a rezoning study to the City.

## GENERAL COMMENTS

1. The memo will provide comments on a section-by-section basis following the format of the submitted report.

## TRAFFIC COUNTS

1. The applicant collected peak period turning movement counts at three (3) intersections on Wednesday, December 12<sup>th</sup>, 2018. Grand River Avenue with Meadowbrook Road, Joseph Drive, and Haggerty Road were included.

## BACKGROUND TRAFFIC SCENARIO

1. The applicant used community profile data from the SEMCOG website to determine a background growth rate of 1.1 percent.
2. Two planned developments in the area were also included.

## TRIP GENERATION

1. The applicant has provided trip generation information for the proposed development.
  - a. Average weight was used for the AM and PM peak hour trips. No fitted curve equation is available to the AM peak hour, but there is one for the PM peak hour, so that value should be used in place of the average rate.
  - b. A rounded value of 25.83 (as the trip generation manual is limited to 2 decimal places) results in a total trips of 711 instead of 710.
2. The applicant has not indicated the potential land uses under the current zoning for the parcel and what the trip generation values for those land uses would be.

## LEVEL OF SERVICE ANALYSIS

1. The applicant has indicated that the AM and PM peak hours at Grand River and Meadowbrook will not experience decreases in LOS with the addition of the development, especially if SCATS is allowed to continue to optimize the signal.
2. The AM and PM peak hours at Grand River and Haggerty are not projected to experience decreases in LOS with the addition of the development as well.
3. In tables 8, 9, 10, and 11, the applicant has indicated with a foot-note that the westbound delay listed is for the left turning movement.
4. The applicant has not indicated the predicted future LOS if a new development under the current zoning of the parcel.

## CONCLUSIONS AND RECOMMENDATIONS

1. In summary, the impacts of the development (with or without the proposed mitigation measures) are not anticipated to degrade intersection levels of services beyond those under existing conditions during either the AM or PM peak periods.
2. The Traffic Impact Assessment did not address the differences in trips that would be permitted under the parcel's current zoning and the proposed zoning.
3. The applicant should review the remaining comments contained herein and provide a rezoning study to the City.

Should the City or applicant have questions regarding this review, they should contact AECOM for further clarification.

Sincerely,

**AECOM**



Patricia A. Thompson, EIT  
Traffic Engineer



Josh A. Bocks, AICP, MBA  
Senior Transportation Planner/Project Manager

REZONING TRAFFIC IMPACT STATEMENT

---





# ROWE PROFESSIONAL SERVICES COMPANY

*Large Firm Resources. Personal Attention.*<sup>sm</sup>

February 28, 2019

Mr. William Golling  
C/O Mr. Frank Z. Martin AIA, NCARB  
Dorchen/Martin Associates, Inc.  
29895 Greenfield Road  
Suite 107  
Southfield, MI 48076

RE: Proposed Maserati/Alfa Romeo Car Dealership Development  
Traffic Impact Assessment, Response to Review Comments  
City of Novi, Michigan

Dear Mr. Golling:

ROWE Professional Services Company has prepared this response to review comments received from the City of Novi and their traffic consultant AECOM dated February 6, 2019. Their review was related to the proposed Maserati/Alfa Romeo car dealership development to be located on the southwest quadrant of Grand River Avenue and Joseph Drive in the City of Novi, Oakland County. Below are our responses.

### **Trip Generation**

AECOM provided two comments regarding the forecast trip generation for the proposed development. As stated in the original submission, we used the information and methodologies specified in the latest version of *Trip Generation (10<sup>th</sup> Edition)* published by the Institute of Transportation Engineers (ITE) to forecast the weekday AM and PM peak hour trips associated with the proposed car dealership development.

#### **Trip Generation Forecast, Proposed Development**

Specifically, the *Trip Generation Handbook, 3<sup>rd</sup> Edition* recommends that if the  $R^2$  value for an equation is below 0.75, the average rate should be considered for forecasting trips for a proposed development, since the equation does not correlate as well with the available data. Since the  $R^2$  value for the equation developed for the weekday, peak hour of adjacent street traffic, one hour between 4 and 6 p.m. is below the recommended threshold ( $R^2=0.57$ ), the average rate was utilized for forecasting trips during this peak period.

Regarding the results of the weekday daily trip generation forecast, while the website only allows for two decimal places, actual hand calculations using all available information reveal that when using 25.825 in the equation provided result in a forecast of 710 daily trips. However, the difference of one daily trip for the site is not significant, nor expected to have a noticeable effect the operation of the site or the adjacent street network.

Trip Generation Comparison, Existing and Proposed Zoning, and Proposed Development

Based on discussions with the site designer, the proposed rezoning for the site is from Non-Center Commercial (NCC) to General Business (B-3). When considering potential uses allowed, building sizes permitted, and what would be the greatest traffic generators for both zonings, this would result in identical developments being allowed under both zonings.

- 1) Medical Office Building – 75,000 sq. ft.
- 2) General Retail with Sit-Down Restaurant – 42,000 and 8,000 sq. ft.; 50,000 sq. ft. total

The results of the trip generation forecasts for the uses above, along with a comparison with the forecast for the proposed site, are provided below in Table 1.

**Table 1**  
**ITE Trip Generation for Permitted Uses, NCC and B-3 Zoning**  
**and Proposed Car Dealership Development**

Land Use	Land Use Code	Size	AM Peak Hour			PM Peak Hour			Week Day
			In	Out	Total	In	Out	Total	
Medical-Dental Office Building	720	75,000 sq. ft.	135	38	173	73	187	260	2,794
<b>TOTAL TRIPS, MEDICAL OFFICE</b>			<b>135</b>	<b>38</b>	<b>173</b>	<b>73</b>	<b>187</b>	<b>260</b>	<b>2,794</b>
Shopping Center	820	42,000 sq. ft.	24	15	39	137	149	286	3,333
High-Turnover Sit-Down Restaurant	932	8,000 sq. ft.	44	36	80	48	30	78	897
<b>TOTAL TRIPS, RETAIL/RESTAURANT</b>			<b>68</b>	<b>51</b>	<b>119</b>	<b>185</b>	<b>179</b>	<b>364</b>	<b>4,230</b>
Automobile Sales (New)	840	25,825 sq. ft.	35	13	48	25	38	63	710
<b>TOTAL TRIPS, PROPOSED CAR DEALERSHIP</b>			<b>35</b>	<b>13</b>	<b>48</b>	<b>25</b>	<b>38</b>	<b>63</b>	<b>710</b>

**Conclusion**

The trip generation forecasts presented in the original submission were prepared in accordance with ITE recommendations, as outlined in the latest versions of their manuals.

A review of potential building uses, and sizes permitted under the existing and proposed zonings indicated that similar developments could be built under both zonings. The results of the trip generation forecasts for these possible uses under the existing and proposed zonings were significantly higher than the forecast for the proposed car dealership proposed for the site.

Sincerely,  
 ROWE Professional Services Company



Michael J. Labadie, PE  
 Senior Project Manager



# ROWE PROFESSIONAL SERVICES COMPANY

*Large Firm Resources. Personal Attention.™*

## Memorandum

**To:** William Golling  
**From:** Michael J. Labadie, PE and Jill M. Bauer, PE, PTOE  
**Date:** January 14, 2019  
**RE:** Proposed Automobile Dealership Development  
Traffic Impact Assessment  
Novi, Michigan

---

ROWE Professional Services Company has completed our traffic impact assessment related to the proposed Maserati/Alfa Romeo car dealership development to be located on the southwest quadrant of Grand River Avenue and Joseph Drive in the City of Novi, Oakland County. The current site plan (included in the materials attached to this report) indicates a 25,825 square-foot car dealership. This traffic impact assessment has been completed in accordance with the requirements specified by the City of Novi and the Road Commission for Oakland County (RCOC).

### **Traffic Counts**

Turning movement traffic count were collected during the weekday AM (7 a.m. to 9 a.m.) and PM (4 pm. to 6 p.m.) peak periods on December 12, 2018 at the intersections of Grand River Avenue with Meadowbrook Road, Joseph Drive, and Haggerty Road. The existing turning movement traffic counts are shown in Figure 2 attached to this memorandum.

### **Background Traffic Scenario**

Community profile data on the SEMCOG website for the City of Novi was referenced to determine the applicable growth rate for the existing traffic volumes to the project build-out year in 2019. Based on this review, a background growth rate of 1.1 percent was utilized. In addition, the Huntley Homes and Erhard Jaguar/Land Rover auto dealership background developments were identified and included in the background traffic condition, based on trip distribution information provided by AECOM.

The background traffic volumes are shown in Figure 3 attached to this memorandum, and the AECOM trip distribution information is included in the appendix materials.

### **Trip Generation**

Using the information and methodologies specified in the latest version of *Trip Generation (10<sup>th</sup> Edition)* published by the Institute of Transportation Engineers (ITE), ROWE forecast the weekday AM and PM peak hour trips associated with the proposed car dealership development. The results of the trip generation forecasts for the proposed site are provided below in Table 1.

**Table 1**  
**ITE Trip Generation for Proposed Car Dealership Development**

Land Use	Land Use Code	Size	AM Peak Hour			PM Peak Hour			Week Day
			In	Out	Total	In	Out	Total	
Automobile Sales (New)	840	25,825 sq. ft.	35	13	48	25	38	63	710
<b>TOTAL TRIPS</b>			<b>35</b>	<b>13</b>	<b>48</b>	<b>25</b>	<b>38</b>	<b>63</b>	<b>710</b>

**Trip Distribution**

The existing traffic volumes were used to develop a trip distribution model for the AM and PM peak hours for traffic generated by the proposed development. The existing traffic patterns indicate the following probable distribution for the proposed development:

**AM Peak Hour**

22% from and 51% to the north  
 40% from and 23% to the south  
 19% from and 12% to the east  
 19% from and 14% to the west

**PM Peak Hour**

42% from and 25% to the north  
 27% from and 38% to the south  
 16% from and 15% to the east  
 15% from and 22% to the west

The proposed trip distribution for the site is shown in Figure 4 attached to this letter. The background traffic volumes were combined with the site generated traffic volumes to obtain the total future traffic volumes, which are shown in Figure 5 attached to this letter.

**Level of Service Analysis**

Level of service (LOS) analyses for existing and background (no build) conditions for the AM and PM peak hours was performed for the intersections of Grand River Avenue with Meadowbrook Road, Joseph Drive, and Haggerty Road. The three proposed site driveway intersections were also analyzed under total future conditions.

According to the most recent edition (6<sup>th</sup> Edition) of the *Highway Capacity Manual*, level of service is a qualitative measure describing operational conditions of a traffic stream or intersection. Level of service ranges from A to F, with LOS A being the best. LOS D is generally considered to be acceptable. Tables 2 and 3 present the criteria for defining the various levels of service for unsignalized and signalized intersections, respectively.

**Table 2**  
**Level of Service Criteria (Unsignalized Intersection)**

Level of Service	Average Stopped Delay/Vehicle (seconds)
A	≤10
B	>10 and ≤ 15
C	>15 and ≤ 25
D	>25 and ≤ 35
E	>35 and ≤ 50
F	> 50

Note: LOS "D" is considered acceptable in urban/suburban areas.

**Table 3**  
**Level of Service Criteria (Signalized Intersection)**

<b>Level of Service</b>	<b>Average Stopped Delay/Vehicle (seconds)</b>
A	≤10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

Note: LOS "D" is considered acceptable in urban/suburban areas.

The results of the level of service analyses for the intersections listed above are summarized in Tables 4 through 12.

*Signalized Intersection of Grand River Avenue and Meadowbrook Road*

The intersection of Grand River Avenue and Meadowbrook Road is part of the RCOC SCATS system, which continually monitors traffic and adjusts signal timing depending on demand, so the intersection continually undergoes an optimization process, and cannot be further optimized. The operational results for the existing and background conditions represent the default or "starting" timings provided in the controller, while the background with improvement and total future conditions represent the operational results possible under forecast demand conditions and balancing of vehicle delays on all approaches. Below is a summary of our operational review for the intersection.

The results of the level of service analysis for the signalized intersection of Grand River Avenue and Meadowbrook Road indicate that, under existing conditions, all approaches to the intersection operate at an LOS D or better during both the AM and PM peak hours, except for the northbound approach which operates at an LOS E during both peak periods, and the southbound approach which operates at an LOS F during the PM peak hour. The overall intersection operates at an LOS C during the AM peak hour and at an LOS D during the PM peak hour.

With the addition of background traffic, all approaches to the intersection would operate at an LOS D or better during both peak periods, but the northbound approach would continue to operate at an LOS E during both peak periods and the southbound approach would continue to operate at an LOS F during the PM peak hour. The overall intersection would operate at an LOS D during the AM peak hour and at an LOS E during the PM peak hour.

Under both background and total future traffic conditions, and accounting for possible SCATS optimization of the intersection signal timing, all approaches to the intersection would operate at an LOS D or better during both the AM and PM peak hours. The overall intersection would operate at an LOS C during the AM peak period, and at an LOS D during the PM peak period. Therefore, the traffic generated by the proposed development would have a minimal impact on the operation of this intersection.

The operational results for the intersection of Grand River Avenue and Meadowbrook Road are presented in Tables 4 and 5.

**Table 4**  
**AM Peak Hour**  
**Level of Service Analysis for Grand River Avenue and Meadowbrook Road**

<b>Approach</b>	<b>2018 Existing<sup>1</sup></b>	<b>2019 Background<sup>1</sup></b>	<b>2019 Background w/ Imp.<sup>2</sup></b>	<b>2019 Total Future<sup>2</sup></b>
Eastbound Grand River Avenue	C (20.2)	C (20.7)	C (21.0)	C (21.3)
Westbound Grand River Avenue	B (17.4)	B (17.9)	B (18.2)	B (18.3)
Northbound Meadowbrook Road	E (63.9)	E (63.7)	D (55.0)	D (55.0)
Southbound Meadowbrook Road	D (49.2)	D (49.8)	D (49.3)	D (49.2) <sup>3</sup>
<b>Overall Intersection</b>	<b>C (35.0)</b>	<b>D (35.3)</b>	<b>C (33.2)</b>	<b>C (33.2)</b>

(XX.X) Average seconds of delay per vehicle.

1. Operational results represent existing splits provided in timing permit.
2. Operational results represent SCATS optimization.
3. Nominal improved operation the result of improved efficiency of southbound left-turn movement due to increased volume calling left-turn phase more consistently.

**Table 5**  
**PM Peak Hour**  
**Level of Service Analysis for Grand River Avenue and Meadowbrook Road**

<b>Approach</b>	<b>2018 Existing<sup>1</sup></b>	<b>2019 Background<sup>1</sup></b>	<b>2019 Background w/ Imp.<sup>2</sup></b>	<b>2019 Total Future<sup>2</sup></b>
Eastbound Grand River Avenue	C (25.8)	C (27.7)	C (34.4)	C (34.9)
Westbound Grand River Avenue	C (34.4)	D (38.1)	D (53.4)	D (54.8)
Northbound Meadowbrook Road	E (59.6)	E (66.2)	D (48.8)	D (48.9)
Southbound Meadowbrook Road	F (93.7)	F (97.1)	D (54.7)	D (54.6) <sup>3</sup>
<b>Overall Intersection</b>	<b>D (51.5)</b>	<b>E (55.0)</b>	<b>D (47.5)</b>	<b>D (48.0)</b>

(XX.X) Average seconds of delay per vehicle.

1. Operational results represent existing splits provided in timing permit.
2. Operational results represent SCATS optimization.
3. Nominal improved operation the result of improved efficiency of southbound left-turn movement due to increased volume calling left-turn phase more consistently.

*Signalized Intersection of Grand River Avenue and Haggerty Road*

The intersection of Grand River Avenue and Haggerty Road is part of the RCOG SCATS system, which continually monitors traffic and adjusts signal timing depending on demand, so the intersection continually undergoes an optimization process, and cannot be further optimized. The operational results for the existing and background conditions represent the default or “starting” timings provided in the controller, while the background with improvement and total future conditions represent the operational results possible under forecast demand conditions and balancing of vehicle delays on all approaches. Below is a summary of our operational review for the intersection.

The results of the level of service analysis for the signalized intersection of Grand River Avenue and Haggerty Road indicate that, under existing conditions, all approaches to the intersection operate at an LOS D or better during both the AM and PM peak hours, except for the southbound approach, which operates at an LOS E during the PM peak period. The overall intersection operates at an LOS D during both the AM and PM peak hours.

The intersection would continue to operate in a manner like existing conditions with the addition of background traffic.

Under both background and total future traffic conditions, and accounting for possible SCATS optimization of the intersection signal timing, all approaches to the intersection would operate at an LOS D or better during both the AM and PM peak hours. The overall intersection would operate at an LOS C during the AM peak period, and at an LOS D during the PM peak period. Therefore, the traffic generated by the proposed development would have a minimal impact on the operation of this intersection.

The operational results for the intersection of Grand River Avenue and Haggerty Road are presented in Tables 6 and 7.

**Table 6  
 AM Peak Hour  
 Level of Service Analysis for Grand River Avenue and Haggerty Road**

Approach	2018 Existing <sup>1</sup>	2019 Background <sup>1</sup>	2019 Total Future <sup>1</sup>
Eastbound Grand River Avenue	B (19.4)	C (20.2)	C (20.5)
Westbound Grand River Avenue	C (26.3)	C (27.1)	C (27.4)
Northbound Haggerty Road	D (53.8)	D (53.9)	D (54.1)
Southbound Haggerty Road	D (40.0)	D (39.8) <sup>2</sup>	D (39.8)
<b>Overall Intersection</b>	<b>D (36.5)</b>	<b>D (36.8)</b>	<b>D (36.9)</b>

(XX.X) Average seconds of delay per vehicle.

- Operational results represent existing splits provided in timing permit.
- Nominal improved operation the result of improved efficiency of southbound left-turn movement due to increased volume calling left-turn phase more consistently.

**Table 7  
 PM Peak Hour  
 Level of Service Analysis for Grand River Avenue and Haggerty Road**

Approach	2018 Existing <sup>1</sup>	2019 Background <sup>1</sup>	2019 Background w/ Imp. <sup>2</sup>	2019 Total Future <sup>2</sup>
Eastbound Grand River Avenue	C (25.9)	C (26.7)	C (28.5)	C (29.1)
Westbound Grand River Avenue	D (36.1)	D (38.0)	D (41.6)	D (42.5)
Northbound Haggerty Road	D (44.7)	D (45.0)	D (43.9)	D (44.0)
Southbound Haggerty Road	E (66.1)	E (68.1)	D (54.5)	D (54.5)
<b>Overall Intersection</b>	<b>D (46.3)</b>	<b>D (47.5)</b>	<b>D (43.6)</b>	<b>D (43.9)</b>

(XX.X) Average seconds of delay per vehicle.

- Operational results represent existing splits provided in timing permit.
- Operational results represent SCATS optimization.

Unsignalized Intersection of Grand River Avenue and Joseph Drive

The results of the level of service analysis for the unsignalized intersection of Grand River Avenue and Joseph Drive indicate that, under existing conditions, the northbound Joseph Drive approach operates at an LOS B during the AM peak hour at an LOS C during the PM peak hour. The Grand River Avenue eastbound and westbound approaches operate at an LOS A during both peak periods.

The intersection would continue to operate in a similar manner to existing conditions with the addition of both background and site generated traffic. The proposed development would have a minimal impact on the operation of this intersection.

The operational results for the intersection of Grand River Avenue and Joseph Drive are presented in Tables 8 and 9.

**Table 8**  
**AM Peak Hour**  
**Level of Service Analysis for Grand River Avenue and Joseph Drive**

Approach	2018 Existing	2019 Background	2019 Total Future
Eastbound Grand River Avenue	A (-)	A (-)	A (-)
Westbound Grand River Avenue	A (9.2) <sup>1</sup>	A (9.2) <sup>1</sup>	A (9.3) <sup>1</sup>
Northbound Joseph Drive	B (14.2)	B (14.4)	B (14.9)

(XX.X) Average seconds of delay per vehicle. (-) Movement is unopposed and experiences no delay.  
 1. Operational results for left-turn movements; through movements are unopposed and experience minimal delays.

**Table 9**  
**PM Peak Hour**  
**Level of Service Analysis for Grand River Avenue and Joseph Drive**

Approach	2018 Existing	2019 Background	2019 Total Future
Eastbound Grand River Avenue	A (-)	A (-)	A (-)
Westbound Grand River Avenue	A (9.6) <sup>1</sup>	A (9.7) <sup>1</sup>	A (9.8) <sup>1</sup>
Northbound Joseph Drive	C (18.6)	C (19.1)	C (19.6)

(XX.X) Average seconds of delay per vehicle. (-) Movement is unopposed and experiences no delay.  
 1. Operational results for left-turn movements; through movements are unopposed and experience minimal delays.

Unsignalized Intersection of Grand River Avenue and the West Site Driveway

The west site driveway will be located on the south side of Grand River Avenue approximately 300 feet west of Joseph Drive. The results of the level of service analysis for this intersection indicate that, under future traffic conditions, the west site driveway would operate at an LOS B during the AM peak period and at an LOS C during the PM peak period. The Grand River Avenue approaches would operate at an LOS A during both peak periods.

The RCOC requirements for right-turn deceleration lanes and left-turn by-pass lanes at driveways were not evaluated for the west site driveway, since there is an existing two-way center left-turn lane and an eastbound right-turn lane on Grand River Avenue at the location of the west site driveway.

The operational results for the intersection of Grand River Avenue and the west site driveway are presented in Table 10.

**Table 10**  
**Level of Service Analysis for**  
**Grand River Avenue and the West Site Driveway**

Approach	2026 Future AM	2026 Future PM
Eastbound Grand River Avenue	A (-)	A (-)
Westbound Grand River Avenue	A (9.4) <sup>1</sup>	A (9.3) <sup>1</sup>
Northbound West Site Driveway	B (14.1)	C (17.7)

(XX.X) Average seconds of delay per vehicle. (-) Approach is unopposed and experiences no delay.  
 1. Operational results for left-turn movements; through movements are unopposed and experience minimal delays.



Unsignalized Intersection of Grand River Avenue and the East Site Driveway

The east site driveway will be located on the south side of Grand River Avenue approximately 125 feet west of Joseph Drive. The results of the level of service analysis for this intersection indicate that, under future traffic conditions, the east site driveway would operate at an LOS B during the AM peak period and at an LOS C during the PM peak period. The Grand River Avenue approaches would operate at an LOS A during both peak periods.

The RCOC requirements for right-turn deceleration lanes and left-turn by-pass lanes at driveways were not evaluated for the west site driveway, since there is an existing two-way center left-turn lane and an eastbound right-turn lane on Grand River Avenue at the location of the east site driveway.

The operational results for the intersection of Grand River Avenue and the east site driveway are presented in Table 11.

**Table 11**  
**Level of Service Analysis for**  
**Grand River Avenue and the East Site Driveway**

Approach	2026	2026
	Future AM	Future PM
Eastbound Grand River Avenue	A (-)	A (-)
Westbound Grand River Avenue	A (9.4) <sup>1</sup>	A (9.3) <sup>1</sup>
Northbound West Site Driveway	B (14.2)	C (17.3)

(XX.X) Average seconds of delay per vehicle. (-) Approach is unopposed and experiences no delay.

1. Operational results for left-turn movements; through movements are unopposed and experience minimal delays.

Unsignalized Intersection of Joseph Drive and the South Site Driveway

The south site driveway will be located on the west side of Joseph Drive approximately 375 feet south of Grand River Avenue and will be a left-turn outbound-only driveway (the geometry of the driveway will inhibit both entering vehicles and outbound right-turns). The results of the level of service analysis for this intersection indicate that under future traffic conditions all approaches to the intersection would operate at an LOS A during both peak periods.

The RCOC requirements for turn lanes at driveways was not evaluated for the south site driveway as entering vehicles will not be permitted.

The operational results for the intersection of Joseph Drive and the south site driveway are presented in Table 12.

**Table 12**  
**Level of Service Analysis for**  
**Joseph Drive and the South Site Driveway**

Approach	2026	2026
	Future AM	Future PM
Northbound Joseph Drive	A (-)	A (-)
Southbound Joseph Drive	A (-)	A (-)
Eastbound East Site Driveway	A (8.7)	A (8.8)

(XX.X) Average seconds of delay per vehicle. (-) Approach is unopposed and experiences no delay.

**Conclusions and Recommendations**

The proposed Maserati/Alfa Romeo car dealership development in the City of Novi consists of a 25,825 square-foot new car dealership. The proposed development will have access to Grand River Avenue via two site driveway intersections, and access to Joseph Drive via a single site driveway, but this driveway is to be configured to only allow outbound left-turning vehicles (the geometry of the driveway will inhibit both entering vehicles and outbound right-turns).

The proposed development is forecast to generate 48 trips during the AM peak hour (35 inbound and 13 outbound from the site) and 63 trips during the PM peak hour (25 inbound and 38 outbound from the site).

An operational analysis was performed for the existing, background, and total future conditions for the signalized intersections of Grand River Avenue with Meadowbrook Road and Haggerty Road, and the unsignalized intersection of Grand River Avenue and Joseph Drive. Under potential SCATS optimization of these intersections, all approaches to these intersections could and would continue to operate at acceptable levels during both the AM and PM peak hours.

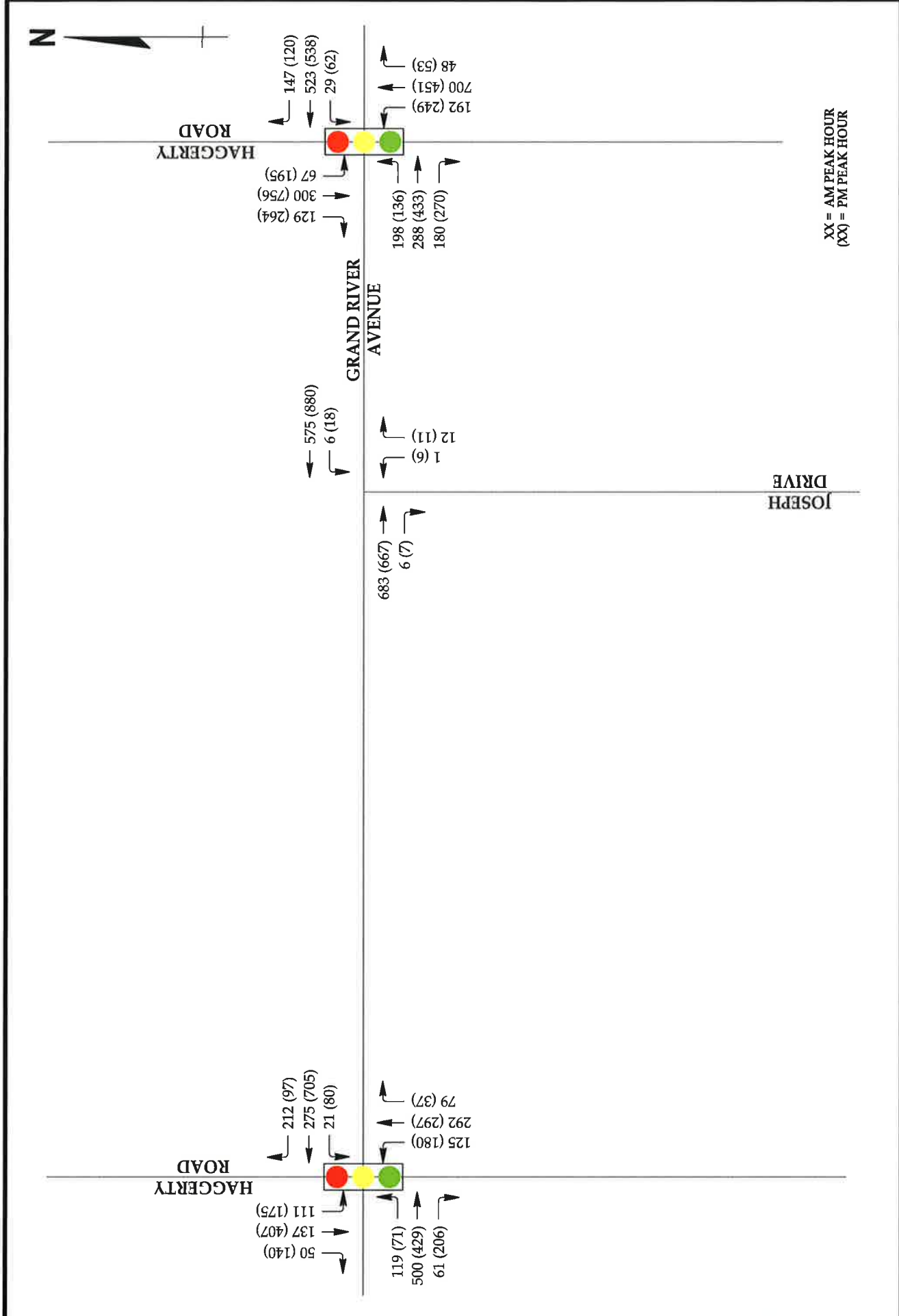
All the approaches to the unsignalized intersection of Grand River Avenue and Joseph Drive currently and would continue to operate at acceptable levels under all traffic conditions. All the site driveways would operate at acceptable levels under future traffic conditions.

# **REPORT FIGURES**



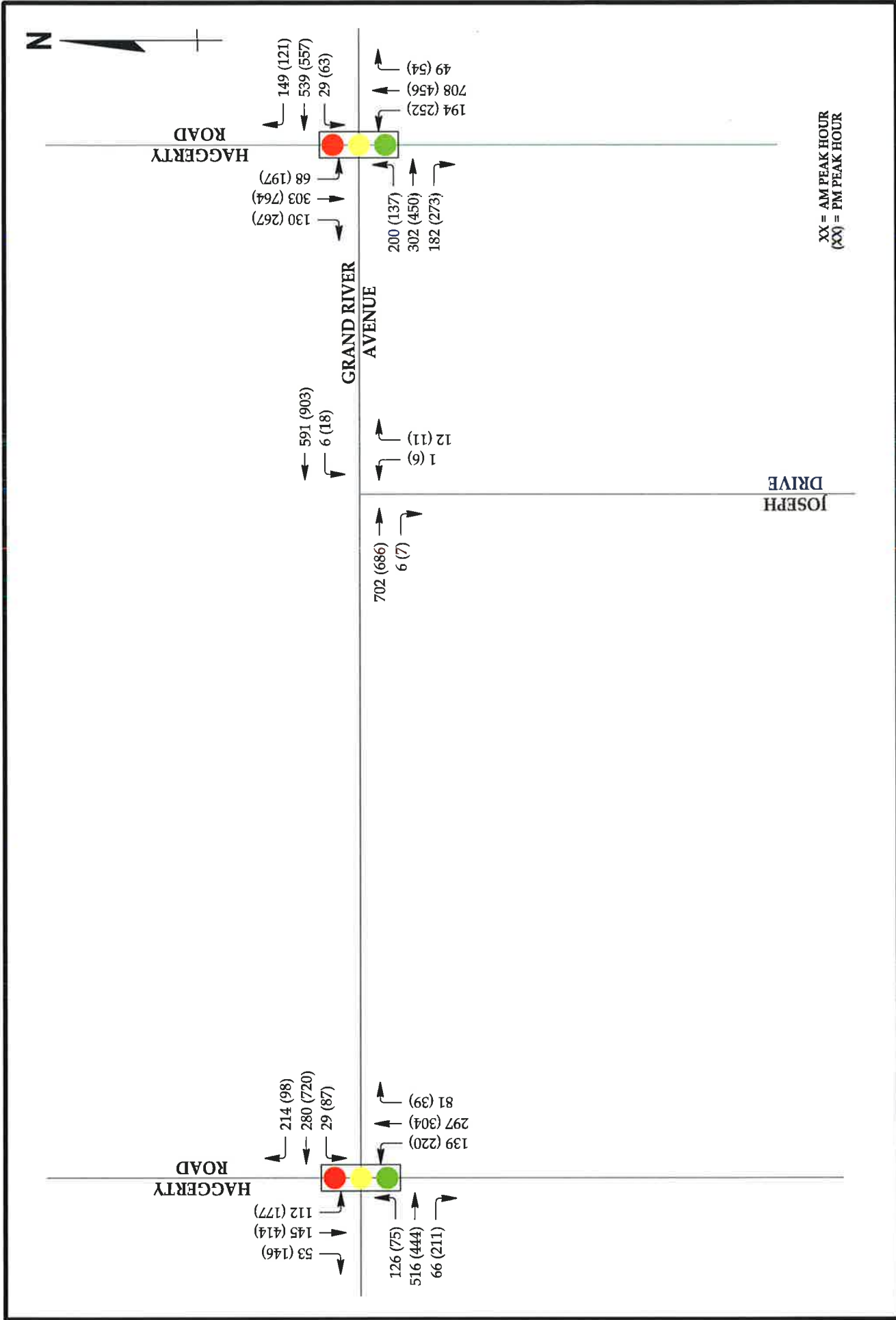
SITE LOCATION MAP

FIGURE 1



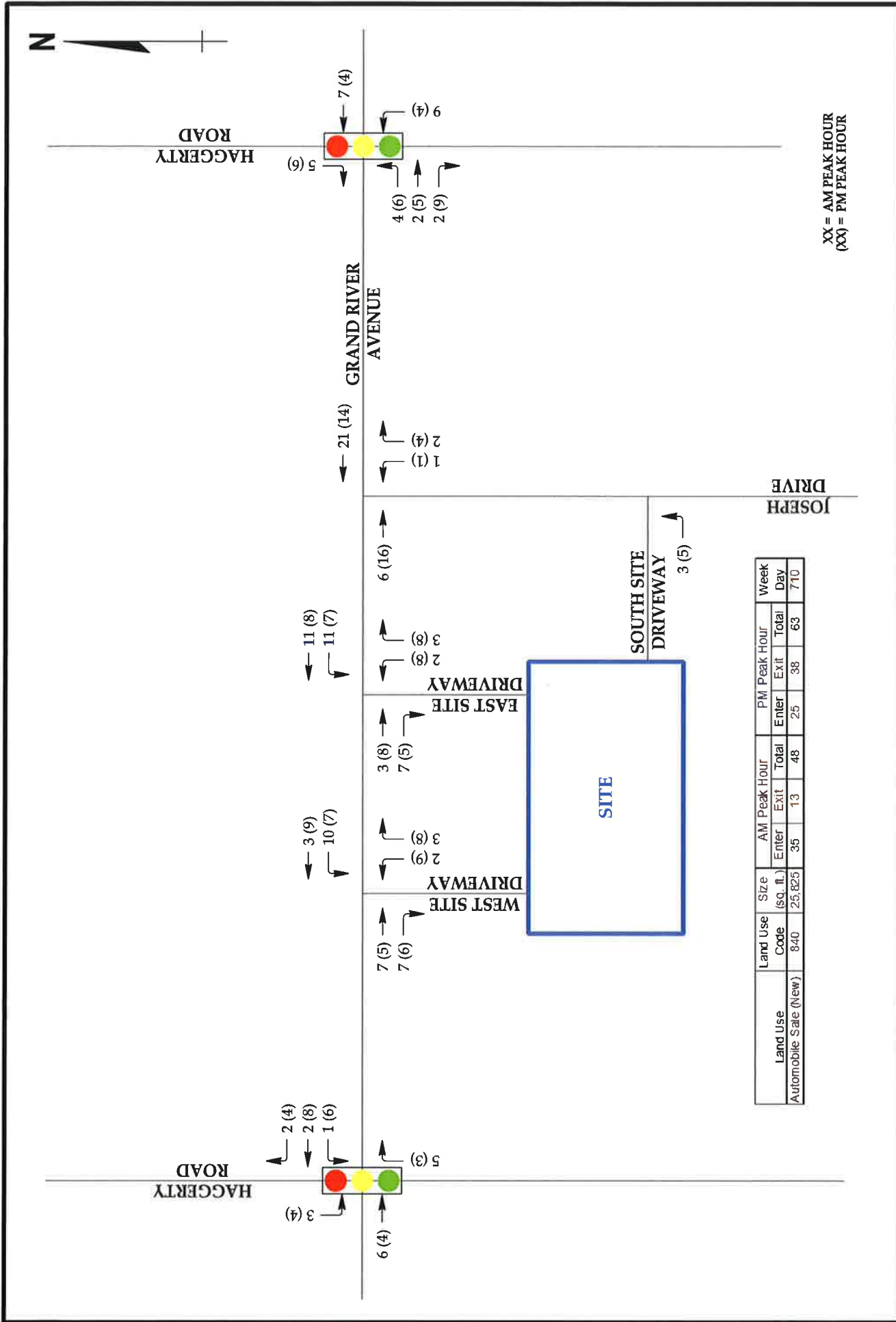
**2018 EXISTING AM (PM) PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 2**

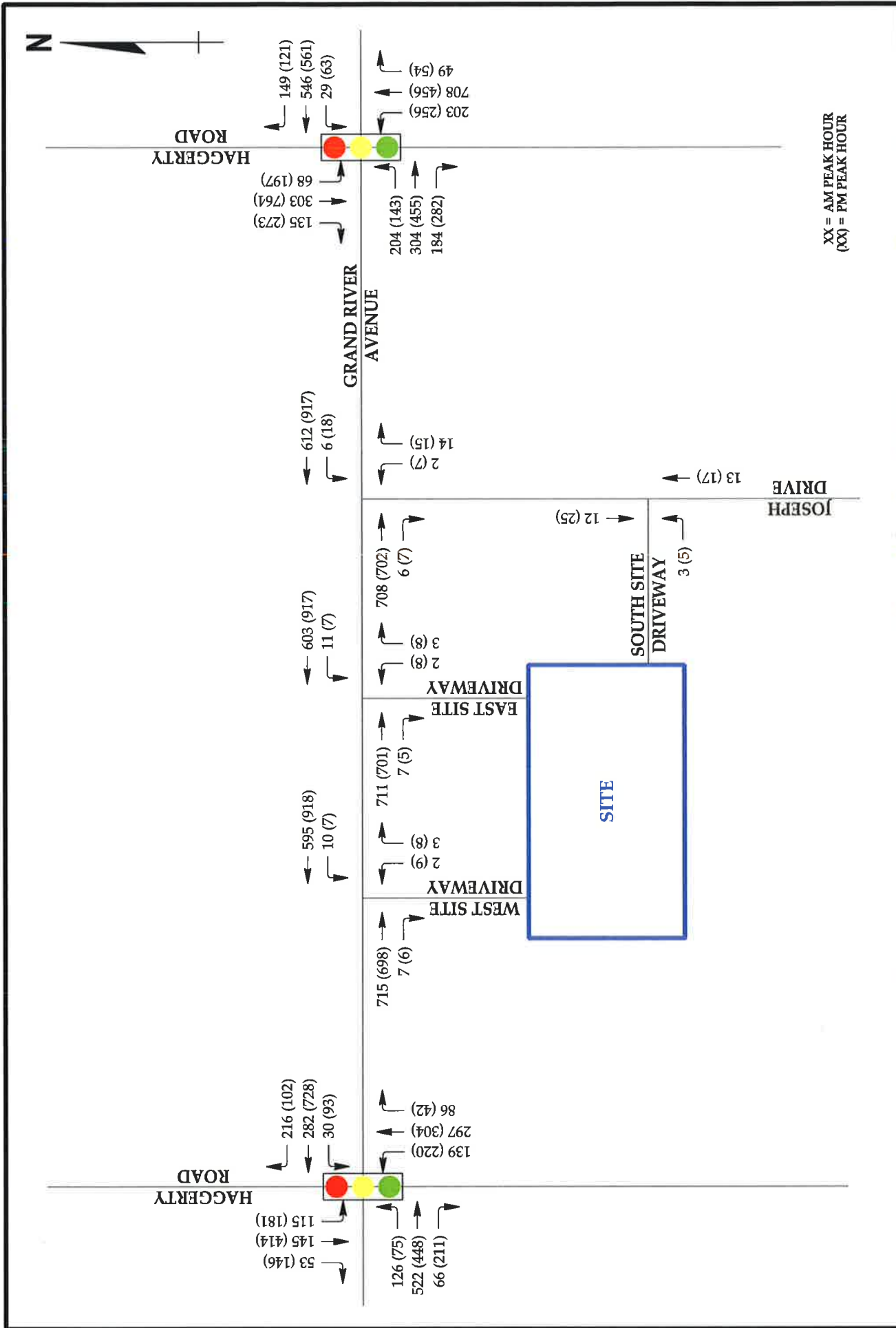


**2019 BACKGROUND AM (PM) PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 3**



**SITE GENERATED AM (PM) PEAK HOUR TRAFFIC VOLUMES**  
**FIGURE 4**

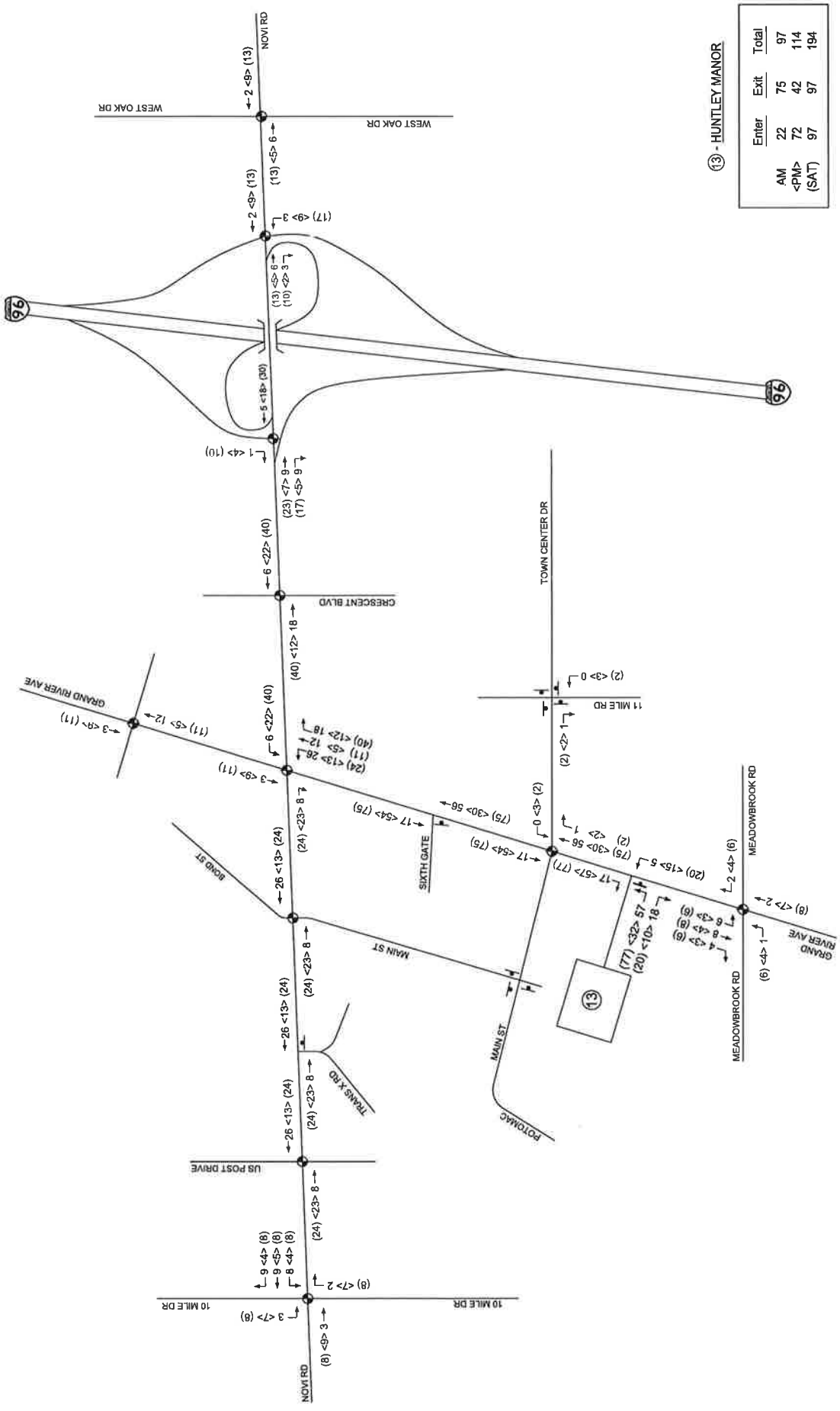


**2019 TOTAL FUTURE AM (PM) PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 5**



# **TRAFFIC COUNTS**



13 - HUNTLEY MANOR

NOVI RD / GRAND RIVER AVE AREA TRAFFIC IMPACT STUDY

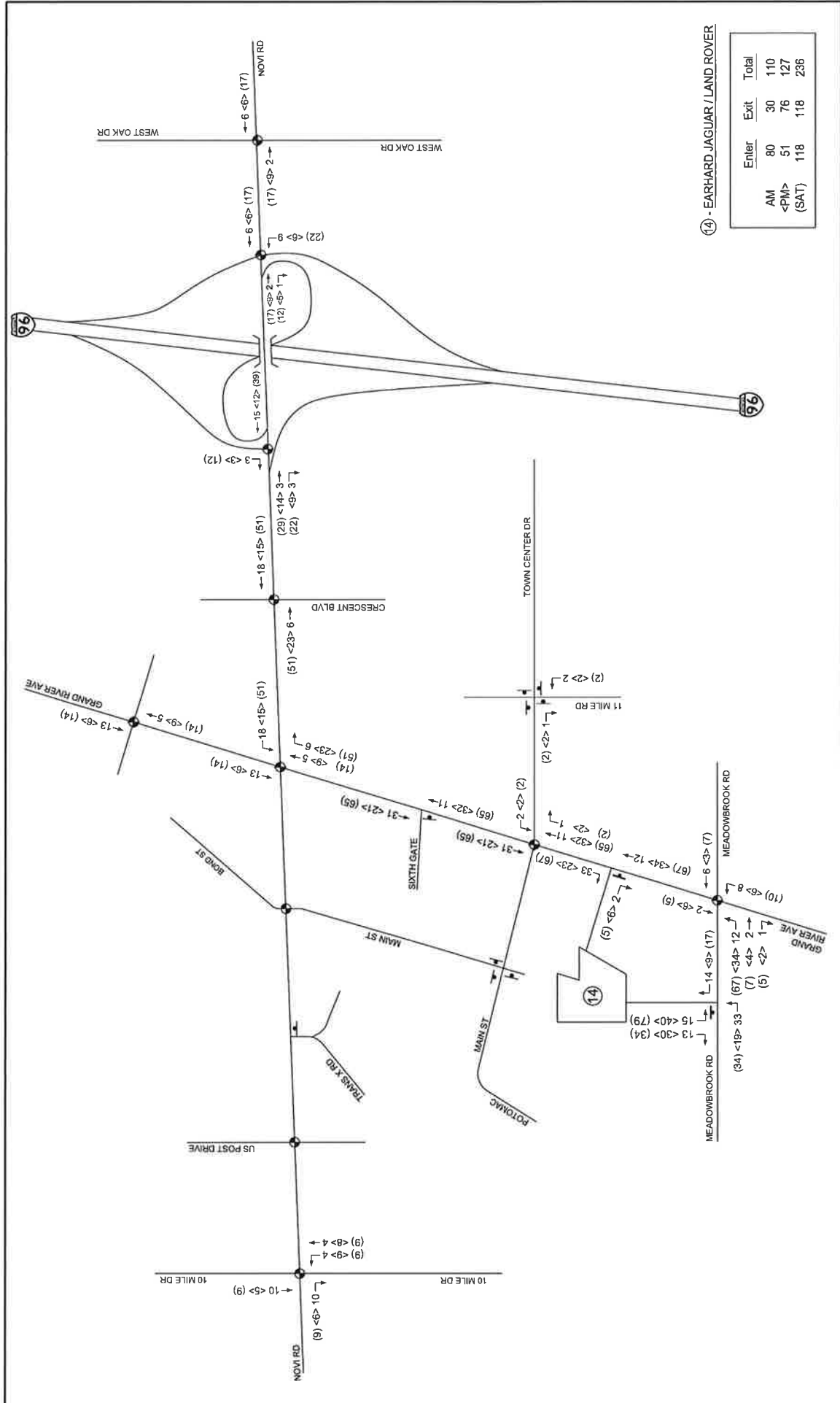
HUNTLEY MANOR  
GENERATED TRAFFIC VOLUMES

LEGEND

- XXX - AM PEAK WEEKDAY TRAFFIC VOLUME
- <XXX> - PM PEAK WEEKDAY TRAFFIC VOLUME
- (XXX) - SATURDAY PEAK TRAFFIC VOLUME

- ⊕ - TRAFFIC SIGNAL
- ⊘ - STOP SIGN
- - LANE MOVEMENT





NOVI RD / GRAND RIVER AVE AREA TRAFFIC IMPACT STUDY  
**ERHARD JAGUAR / LAND ROVER**  
**GENERATED TRAFFIC VOLUMES**



**AECOM**

LEGEND  
 XXX - AM PEAK WEEKDAY TRAFFIC VOLUME  
 <XXX> - PM PEAK WEEKDAY TRAFFIC VOLUME  
 (XXX) - SATURDAY PEAK TRAFFIC VOLUME

Growth Rate: 1.1%

Buildout Year: 2019

Count Year: 2018

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
																PHF
Grand River & Meadowbrook  <b>A.M.</b>	A.M. Peak 12/12/18	2018	Existing	119	500	61	21	275	212	125	292	79	111	137	50	
		2019	Background	120	506	62	21	278	214	126	295	80	112	139	51	
			Huntley Manor	6	8	4		2			1					2
			Erhard Jaguar		2		8				12	2	1		6	
			Total Background	126	516	66	29	280	214	139	297	81	112	145	53	
			Site Generated		6		1	2	2			5	3			
			Total Future	126	522	66	30	282	216	139	297	86	115	145	53	

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
																PHF
Grand River & Haggerty Rd.	A.M. Peak 12/12/18	2018	Existing	198	288	180	29	523	147	192	700	48	67	300	129	
		2019	Background	200	291	182	29	529	149	194	708	49	68	303	130	
			Huntley Manor		8			2								
			Erhard Jaguar		3			8								
			Total Background	200	302	182	29	539	149	194	708	49	68	303	130	
			Site Generated		4	2	2	7			9				5	
			Total Future	204	304	184	29	546	149	194	708	49	68	303	135	

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
																PHF
Grand River & Joseph St.	A.M. Peak 12/12/18	2018	Existing	0	683	6	6	575		1		12				
		2019	Background	0	691	6	6	581	0	1	0	12	0	0	0	
			Huntley Manor		8			2								
			Erhard Jaguar		3			8								
			Total Background	0	702	6	6	591	0	1	0	12	0	0	0	
			Site Generated		6			21			1		2			
			Total Future	0	708	6	6	612	0	2	0	14	0	0	0	

Growth Rate: 1.1%

Buildout Year: 2019

Count Year: 2018

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Grand River & Meadowbrook  <b>P.M.</b>	P.M. Peak 12/12/18		PHF		0.76			0.95			0.92			0.87		
		2018	Existing	71	429	206	80	705	97	180	297	37	175	407	140	
		2019	Background	72	434	208	81	713	98	182	300	37	177	411	142	
			Huntley Manor	3	4	3		7			4					4
			Erhard Jaguar		6		6				34	4	2		3	
			Total Background	75	444	211	87	720	98	220	304	39	177	414	146	
			Site Generated		4		6	8	4			3	4			
	Total Future	75	448	211	93	728	102	220	304	42	181	414	146			

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Grand River & Haggerty Rd.	P.M. Peak 12/12/18		PHF		0.95			0.90			0.95			0.88	
		2018	Existing	136	433	270	62	538	120	249	451	53	195	756	264
		2019	Background	137	438	273	63	544	121	252	456	54	197	764	267
			Huntley Manor		4			7							
			Erhard Jaguar		8			6							
			Total Background	137	450	273	63	557	121	252	456	54	197	764	267
			Site Generated	6	5	9		4		4					6
	Total Future	143	455	282	63	561	121	256	456	54	197	764	273		

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Grand River & Joseph St.	P.M. Peak 12/12/18		PHF		0.82			0.89			0.65				
		2018	Existing	0	667	7	18	880	0	6	0	11	0	0	0
		2019	Background	0	674	7	18	890	0	6	0	11	0	0	0
			Huntley Manor		4			7							
			Erhard Jaguar		8			6							
			Total Background	0	686	7	18	903	0	6	0	11	0	0	0
			Site Generated		16			14		1		4			
	Total Future	0	702	7	18	917	0	7	0	15	0	0	0		

**LEVEL OF SERVICE**

**OUTPUT REPORTS**

HCM 6th Signalized Intersection Summary  
1481: Meadowbrook Road & Grand River Avenue

2018 Existing AM  
01/10/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Traffic Volume (veh/h)	119	500	61	21	275	212	125	292	79	111	137	50
Future Volume (veh/h)	119	500	61	21	275	212	125	292	79	111	137	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	134	562	69	23	302	233	144	336	91	118	146	53
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	519	1063	1031	389	1025	979	326	367	359	194	345	373
Arrive On Green	0.05	0.54	0.54	0.03	0.52	0.52	0.08	0.19	0.19	0.07	0.18	0.18
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	134	562	69	23	302	233	144	336	91	118	146	53
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	4.6	25.7	2.3	0.8	12.2	9.4	8.7	23.4	6.3	7.1	9.2	3.6
Cycle Q Clear(g_c), s	4.6	25.7	2.3	0.8	12.2	9.4	8.7	23.4	6.3	7.1	9.2	3.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	519	1063	1031	389	1025	979	326	367	359	194	345	373
V/C Ratio(X)	0.26	0.53	0.07	0.06	0.29	0.24	0.44	0.92	0.25	0.61	0.42	0.14
Avail Cap(c_a), veh/h	556	1063	1031	462	1025	979	381	436	417	271	436	450
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.6	20.7	10.7	16.4	19.0	13.9	42.7	55.9	45.6	44.9	51.4	43.6
Incr Delay (d2), s/veh	0.3	1.9	0.1	0.1	0.7	0.6	0.9	21.7	0.4	3.1	0.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	11.6	0.9	0.3	5.5	3.6	4.1	13.7	2.7	3.5	4.6	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.0	22.6	10.8	16.4	19.8	14.5	43.6	77.5	46.0	48.0	52.3	43.8
LnGrp LOS	B	C	B	B	B	B	D	E	D	D	D	D
Approach Vol, veh/h	765			558			571			317		
Approach Delay, s/veh	20.2			17.4			63.9			49.2		
Approach LOS	C			B			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	80.5	82.1	16.9	30.5	13.3	79.4	15.3	32.1				
Change Period (Y+Rc), s	6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	60	* 60	15.0	31.0	* 9.5	* 60	15.0	31.0				
Max Q Clear Time (g_c+1), s	12.8	27.7	10.7	11.2	6.6	14.2	9.1	25.4				
Green Ext Time (p_c), s	0.0	2.6	0.2	0.5	0.1	2.2	0.1	0.7				

Intersection Summary												
HCM 6th Ctrl Delay	35.0											
HCM 6th LOS	C											

Notes  
\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
 1481: Meadowbrook Road & Grand River Avenue

2019 No Build AM  
 01/10/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Traffic Volume (veh/h)	126	516	66	29	280	214	139	297	81	112	145	53
Future Volume (veh/h)	126	516	66	29	280	214	139	297	81	112	145	53
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	142	580	74	32	308	235	160	341	93	119	154	56
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	513	1057	1037	373	1014	971	328	372	363	195	337	370
Arrive On Green	0.05	0.54	0.54	0.03	0.51	0.51	0.08	0.19	0.19	0.07	0.17	0.17
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	142	580	74	32	308	235	160	341	93	119	154	56
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	5.0	27.1	2.5	1.1	12.6	9.6	9.7	23.8	6.5	7.2	9.8	3.8
Cycle Q Clear(g_c), s	5.0	27.1	2.5	1.1	12.6	9.6	9.7	23.8	6.5	7.2	9.8	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	513	1057	1037	373	1014	971	328	372	363	195	337	370
V/C Ratio(X)	0.28	0.55	0.07	0.09	0.30	0.24	0.49	0.92	0.26	0.61	0.46	0.15
Avail Cap(c_a), veh/h	545	1057	1037	446	1014	971	370	436	417	270	436	454
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.0	21.3	10.5	17.0	19.5	14.2	42.8	55.7	45.4	45.2	52.2	43.9
Incr Delay (d2), s/veh	0.3	2.0	0.1	0.1	0.8	0.6	1.1	22.1	0.4	3.1	1.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	12.3	0.9	0.5	5.7	3.7	4.6	13.9	2.7	3.5	4.9	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.3	23.3	10.6	17.1	20.3	14.8	43.9	77.8	45.8	48.3	53.1	44.1
LnGrp LOS	B	C	B	B	C	B	D	E	D	D	D	D
Approach Vol, veh/h	796			575			594			329		
Approach Delay, s/veh	20.7			17.9			63.7			49.8		
Approach LOS	C			B			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	80.5	81.7	17.9	30.0	13.6	78.6	15.4	32.4				
Change Period (Y+Rc), s	6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	90.5	* 60	15.0	31.0	* 9.5	* 60	15.0	31.0				
Max Q Clear Time (g_c+I), s	29.1	11.7	11.8	7.0	14.6	9.2	25.8					
Green Ext Time (p_c), s	0.0	2.7	0.1	0.5	0.1	2.2	0.1	0.6				

Intersection Summary												
HCM 6th Ctrl Delay	35.3											
HCM 6th LOS	D											

Notes  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



HCM 6th Signalized Intersection Summary  
1481: Meadowbrook Road & Grand River Avenue

2019 No Build AM (SCATS Optimized)

01/10/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↘	↘	↗	↘	↘	↗	↘	↘	↗	↘
Traffic Volume (veh/h)	126	516	66	29	280	214	139	297	81	112	145	53
Future Volume (veh/h)	126	516	66	29	280	214	139	297	81	112	145	53
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	142	580	74	32	308	235	160	341	93	119	154	56
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	510	1051	1031	369	1007	964	332	379	369	198	345	377
Arrive On Green	0.05	0.53	0.53	0.03	0.51	0.51	0.08	0.19	0.19	0.07	0.18	0.18
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	142	580	74	32	308	235	160	341	93	119	154	56
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	5.0	27.3	2.5	1.1	12.7	9.7	9.7	23.7	6.4	7.2	9.8	3.8
Cycle Q Clear(g_c), s	5.0	27.3	2.5	1.1	12.7	9.7	9.7	23.7	6.4	7.2	9.8	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	510	1051	1031	369	1007	964	332	379	369	198	345	377
V/C Ratio(X)	0.28	0.55	0.07	0.09	0.31	0.24	0.48	0.90	0.25	0.60	0.45	0.15
Avail Cap(c_a), veh/h	542	1051	1031	443	1007	964	349	689	632	248	689	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.2	21.6	10.7	17.2	19.8	14.5	42.4	55.2	45.0	44.8	51.7	43.4
Incr Delay (d2), s/veh	0.4	2.1	0.1	0.1	0.8	0.6	1.1	7.8	0.4	2.9	0.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	12.4	0.9	0.5	5.8	3.7	4.5	12.4	2.7	3.5	4.9	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.5	23.6	10.8	17.4	20.6	15.1	43.5	63.0	45.3	47.7	52.6	43.6
LnGrp LOS	B	C	B	B	C	B	D	E	D	D	D	D
Approach Vol, veh/h		796			575			594			329	
Approach Delay, s/veh		21.0			18.2			55.0			49.3	
Approach LOS		C			B			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.5	81.2	17.7	30.5	13.6	78.1	15.3	33.0				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 44	13.0	49.0	* 9.5	* 44	13.0	49.0				
Max Q Clear Time (g_c+I1), s	3.1	29.3	11.7	11.8	7.0	14.7	9.2	25.7				
Green Ext Time (p_c), s	0.0	2.3	0.1	0.6	0.1	2.1	0.1	1.3				

Intersection Summary

HCM 6th Ctrl Delay	33.2
HCM 6th LOS	C

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
 1481: Meadowbrook Road & Grand River Avenue

2019 Build AM  
 01/10/2019



Movement	EBL	EST	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Traffic Volume (veh/h)	126	522	66	30	282	216	139	297	86	115	145	53
Future Volume (veh/h)	126	522	66	30	282	216	139	297	86	115	145	53
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	142	587	74	33	310	237	160	341	99	122	154	56
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.87	0.87	0.87	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	507	1049	1029	364	1005	964	333	379	369	200	347	379
Arrive On Green	0.05	0.53	0.53	0.03	0.51	0.51	0.08	0.19	0.19	0.07	0.18	0.18
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	142	587	74	33	310	237	160	341	99	122	154	56
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	5.0	27.8	2.5	1.2	12.8	9.8	9.7	23.7	6.9	7.4	9.8	3.8
Cycle Q Clear(g_c), s	5.0	27.8	2.5	1.2	12.8	9.8	9.7	23.7	6.9	7.4	9.8	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	507	1049	1029	364	1005	964	333	379	369	200	347	379
V/C Ratio(X)	0.28	0.56	0.07	0.09	0.31	0.25	0.48	0.90	0.27	0.61	0.44	0.15
Avail Cap(c_a), veh/h	539	1049	1029	437	1005	964	350	689	632	248	689	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.3	21.8	10.8	17.4	19.9	14.5	42.3	55.2	45.2	44.7	51.5	43.3
Incr Delay (d2), s/veh	0.4	2.2	0.1	0.1	0.8	0.6	1.1	7.9	0.4	3.0	0.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	12.7	0.9	0.5	5.8	3.8	4.5	12.4	2.9	3.6	4.9	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.6	23.9	10.9	17.5	20.7	15.1	43.4	63.1	45.6	47.7	52.4	43.4
LnGrp LOS	B	C	B	B	C	B	D	E	D	D	D	D
Approach Vol, veh/h	803			580			600			332		
Approach Delay, s/veh	21.3			18.3			55.0			49.2		
Approach LOS	C			B			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.5	81.1	17.7	30.7	13.6	78.0	15.5	32.9				
Change Period (Y+Rc), s	6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	49.5	* 44	13.0	49.0	* 9.5	* 44	13.0	49.0				
Max Q Clear Time (g_c+I), s	29.8	11.7	11.8	7.0	14.8	9.4	25.7					
Green Ext Time (p_c), s	0.0	2.3	0.1	0.6	0.1	2.2	0.1	1.2				

Intersection Summary												
HCM 6th Ctrl Delay	33.2											
HCM 6th LOS	C											

Notes  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
1481: Meadowbrook Road & Grand River Avenue

2018 Existing PM  
01/10/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Traffic Volume (veh/h)	71	429	206	80	705	97	180	297	37	175	407	140
Future Volume (veh/h)	71	429	206	80	705	97	180	297	37	175	407	140
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	93	564	271	84	742	102	196	323	40	201	468	161
Peak Hour Factor	0.76	0.76	0.76	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	226	932	950	295	927	949	231	418	417	294	422	425
Arrive On Green	0.04	0.47	0.47	0.04	0.47	0.47	0.10	0.21	0.21	0.10	0.21	0.21
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	93	564	271	84	742	102	196	323	40	201	468	161
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	3.6	29.6	11.7	3.2	44.8	3.9	11.3	21.6	2.6	11.6	30.0	11.1
Cycle Q Clear(g_c), s	3.6	29.6	11.7	3.2	44.8	3.9	11.3	21.6	2.6	11.6	30.0	11.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	226	932	950	295	927	949	231	418	417	294	422	425
V/C Ratio(X)	0.41	0.61	0.29	0.28	0.80	0.11	0.85	0.77	0.10	0.68	1.11	0.38
Avail Cap(c_a), veh/h	277	932	950	351	927	949	252	422	421	311	422	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	27.2	15.5	21.2	31.4	13.9	40.6	52.0	40.3	39.4	55.0	43.0
Incr Delay (d2), s/veh	1.5	2.9	0.8	0.6	7.2	0.2	21.5	8.5	0.1	5.7	76.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/rl	6	14.0	4.5	1.4	21.8	1.5	6.5	11.5	1.1	5.7	23.6	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.4	30.1	16.3	21.8	38.6	14.1	62.1	60.5	40.4	45.1	131.9	43.6
LnGrp LOS	C	C	B	C	D	B	E	E	D	D	F	D
Approach Vol, veh/h	928			928			559			830		
Approach Delay, s/veh	25.8			34.4			59.6			93.7		
Approach LOS	C			C			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	1.8	72.8	19.4	36.0	12.2	72.4	19.7	35.7				
Change Period (Y+Rc), s	6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	9.5	* 61	15.0	30.0	* 9.5	* 61	15.0	30.0				
Max Q Clear Time (g_c+I), s	15.2	31.6	13.3	32.0	5.6	46.8	13.6	23.6				
Green Ext Time (p_c), s	0.1	3.6	0.1	0.0	0.1	3.2	0.1	0.6				

Intersection Summary												
HCM 6th Ctrl Delay	51.5											
HCM 6th LOS	D											

Notes  
\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
1481: Meadowbrook Road & Grand River Avenue

2019 No Build PM  
01/10/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Traffic Volume (veh/h)	75	444	211	87	720	98	220	304	39	177	414	146
Future Volume (veh/h)	75	444	211	87	720	98	220	304	39	177	414	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	99	584	278	92	758	103	239	330	42	203	476	168
Peak Hour Factor	0.76	0.76	0.76	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	207	904	945	276	900	927	252	439	440	303	422	429
Arrive On Green	0.04	0.46	0.46	0.04	0.46	0.46	0.11	0.22	0.22	0.10	0.21	0.21
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	99	584	278	92	758	103	239	330	42	203	476	168
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	3.9	31.9	12.1	3.6	47.6	4.1	13.9	21.9	2.7	11.7	30.0	11.6
Cycle Q Clear(g_c), s	3.9	31.9	12.1	3.6	47.6	4.1	13.9	21.9	2.7	11.7	30.0	11.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	207	904	945	276	900	927	252	439	440	303	422	429
V/C Ratio(X)	0.48	0.65	0.29	0.33	0.84	0.11	0.95	0.75	0.10	0.67	1.13	0.39
Avail Cap(c_a), veh/h	254	904	945	327	900	927	252	439	440	320	422	429
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.0	29.1	15.8	22.7	33.5	14.7	40.2	50.8	38.9	39.0	55.0	43.0
Incr Delay (d2), s/veh	2.1	3.6	0.8	0.8	9.4	0.2	42.2	7.1	0.1	5.0	83.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	15.2	4.7	1.6	23.7	1.6	9.3	11.5	1.1	5.7	24.4	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	32.7	16.6	23.6	42.9	15.0	82.4	57.9	39.0	44.0	138.6	43.5
LnGrp LOS	C	C	B	C	D	B	F	E	D	D	F	D
Approach Vol, veh/h	961			953			611			847		
Approach Delay, s/veh	27.7			38.1			66.2			97.1		
Approach LOS	C			D			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	2.2	70.8	21.0	36.0	12.5	70.5	19.8	37.2				
Change Period (Y+Rc), s	6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	9.5	* 61	15.0	30.0	* 9.5	* 61	15.0	30.0				
Max Q Clear Time (g_c+I), s	15.6	33.9	15.9	32.0	5.9	49.6	13.7	23.9				
Green Ext Time (p_c), s	0.1	3.7	0.0	0.0	0.1	3.0	0.1	0.6				

Intersection Summary

























HCM 6th Ctrl Delay 55.0  
HCM 6th LOS E

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
1481: Meadowbrook Road & Grand River Avenue

2019 No Build PM (SCATS Optimized)  
01/10/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	444	211	87	720	98	220	304	39	177	414	146
Future Volume (veh/h)	75	444	211	87	720	98	220	304	39	177	414	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	99	584	278	92	758	103	239	330	42	203	476	168
Peak Hour Factor	0.76	0.76	0.76	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	159	805	864	235	801	837	275	540	530	359	513	510
Arrive On Green	0.05	0.41	0.41	0.04	0.41	0.41	0.11	0.27	0.27	0.09	0.26	0.26
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	99	584	278	92	758	103	239	330	42	203	476	168
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	4.3	34.9	13.5	4.0	52.0	4.6	12.9	20.5	2.5	11.0	33.0	10.9
Cycle Q Clear(g_c), s	4.3	34.9	13.5	4.0	52.0	4.6	12.9	20.5	2.5	11.0	33.0	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	159	805	864	235	801	837	275	540	530	359	513	510
V/C Ratio(X)	0.62	0.73	0.32	0.39	0.95	0.12	0.87	0.61	0.08	0.57	0.93	0.33
Avail Cap(c_a), veh/h	201	805	864	281	801	837	325	619	596	435	619	600
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	34.8	19.5	27.2	40.0	18.5	36.5	44.3	33.4	34.1	50.5	37.5
Incr Delay (d2), s/veh	4.7	5.6	1.0	1.3	21.1	0.3	19.3	1.4	0.1	1.4	18.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	17.2	5.4	1.8	28.5	1.8	7.3	10.1	1.0	5.1	18.6	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.9	40.4	20.5	28.5	61.2	18.8	55.8	45.7	33.5	35.5	68.9	37.9
LnGrp LOS	D	D	C	C	E	B	E	D	C	D	E	D
Approach Vol, veh/h		961			953			611			847	
Approach Delay, s/veh		34.4			53.4			48.8			54.7	
Approach LOS		C			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.6	63.8	21.2	42.5	12.9	63.5	19.3	44.4				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 43	19.0	44.0	* 9.5	* 43	19.0	44.0				
Max Q Clear Time (g_c+1), s	6.0	36.9	14.9	35.0	6.3	54.0	13.0	22.5				
Green Ext Time (p_c), s	0.1	1.9	0.3	1.5	0.1	0.0	0.3	1.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			47.5									
HCM 6th LOS			D									
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary  
1481: Meadowbrook Road & Grand River Avenue

2019 Build PM  
01/10/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↑	↗	↖	↑	↗
Traffic Volume (veh/h)	75	448	211	93	728	102	220	304	42	181	414	146
Future Volume (veh/h)	75	448	211	93	728	102	220	304	42	181	414	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	99	589	278	98	766	107	239	330	46	208	476	168
Peak Hour Factor	0.76	0.76	0.76	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	802	861	234	801	840	275	536	530	360	513	510
Arrive On Green	0.05	0.41	0.41	0.05	0.41	0.41	0.11	0.27	0.27	0.10	0.26	0.26
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	99	589	278	98	766	107	239	330	46	208	476	168
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	4.3	35.4	13.6	4.2	52.9	4.8	12.9	20.5	2.7	11.2	33.0	10.9
Cycle Q Clear(g_c), s	4.3	35.4	13.6	4.2	52.9	4.8	12.9	20.5	2.7	11.2	33.0	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	155	802	861	234	801	840	275	536	530	360	513	510
V/C Ratio(X)	0.64	0.73	0.32	0.42	0.96	0.13	0.87	0.62	0.09	0.58	0.93	0.33
Avail Cap(c_a), veh/h	197	802	861	277	801	840	325	619	600	433	619	600
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	35.1	19.7	27.5	40.3	18.4	36.5	44.5	33.5	34.1	50.5	37.5
Incr Delay (d2), s/veh	5.2	5.9	1.0	1.4	22.8	0.3	19.3	1.4	0.1	1.5	18.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	17.5	5.4	1.9	29.3	1.9	7.3	10.1	1.1	5.2	18.6	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.6	41.0	20.7	28.9	63.1	18.7	55.8	46.0	33.6	35.6	68.9	37.9
LnGrp LOS	D	D	C	C	E	B	E	D	C	D	E	D
Approach Vol, veh/h		966			971			615			852	
Approach Delay, s/veh		34.9			54.8			48.9			54.6	
Approach LOS		C			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	32.8	63.5	21.2	42.5	12.9	63.5	19.6	44.1				
Change Period (Y+Rc), s	6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	43	* 43	19.0	44.0	* 9.5	* 43	19.0	44.0				
Max Q Clear Time (g_c+I), s	37.4	37.4	14.9	35.0	6.3	54.9	13.2	22.5				
Green Ext Time (p_c), s	0.1	1.8	0.3	1.5	0.1	0.0	0.3	1.0				

Intersection Summary

























HCM 6th Ctrl Delay	48.0
HCM 6th LOS	D

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
 1444: Haggerty Road & Grand River Avenue

2018 Existing AM  
 01/10/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	198	288	180	29	523	147	192	700	48	67	300	129
Future Volume (veh/h)	198	288	180	29	523	147	192	700	48	67	300	129
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	208	303	189	31	551	155	206	753	52	74	333	143
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	349	934	929	465	873	820	330	844	58	172	760	446
Arrive On Green	0.06	0.47	0.47	0.03	0.44	0.44	0.08	0.24	0.24	0.05	0.20	0.20
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3550	245	1875	3741	1668
Grp Volume(v), veh/h	208	303	189	31	551	155	206	397	408	74	333	143
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1925	1875	1870	1668
Q Serve(g_s), s	7.4	11.5	6.8	1.1	25.9	6.2	9.9	24.6	24.6	3.7	9.3	8.2
Cycle Q Clear(g_c), s	7.4	11.5	6.8	1.1	25.9	6.2	9.9	24.6	24.6	3.7	9.3	8.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	349	934	929	465	873	820	330	445	458	172	760	446
V/C Ratio(X)	0.60	0.32	0.20	0.07	0.63	0.19	0.62	0.89	0.89	0.43	0.44	0.32
Avail Cap(c_a), veh/h	349	934	929	523	873	820	330	575	592	237	1150	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.3	19.6	13.3	17.0	25.8	17.1	35.4	44.2	44.3	37.0	41.8	35.2
Incr Delay (d2), s/veh	2.7	0.9	0.5	0.1	3.5	0.5	3.7	13.4	13.2	1.7	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	5.2	2.5	0.4	12.3	2.4	5.0	12.7	13.0	1.7	4.2	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.0	20.5	13.8	17.0	29.2	17.6	39.1	57.7	57.5	38.7	42.2	35.6
LnGrp LOS	C	C	B	B	C	B	D	E	E	D	D	D
Approach Vol, veh/h		700			737			1011			550	
Approach Delay, s/veh		19.4			26.3			53.8			40.0	
Approach LOS		B			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.3	63.2	16.0	30.5	14.0	59.5	11.8	34.6				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 41	* 9.9	* 37	7.7	40.7	* 9.9	* 37				
Max Q Clear Time (g_c+I1), s	3.1	13.5	11.9	11.3	9.4	27.9	5.7	26.6				
Green Ext Time (p_c), s	0.0	1.4	0.0	1.5	0.0	1.9	0.1	1.9				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			36.5									
HCM 6th LOS			D									
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary  
1444: Haggerty Road & Grand River Avenue

2019 No Build AM  
01/10/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	200	302	182	29	539	149	194	708	49	68	303	130
Future Volume (veh/h)	200	302	182	29	539	149	194	708	49	68	303	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	211	318	192	31	567	157	209	761	53	76	337	144
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	337	928	924	451	867	816	331	852	59	173	771	451
Arrive On Green	0.06	0.47	0.47	0.03	0.44	0.44	0.08	0.24	0.24	0.05	0.21	0.21
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3548	247	1875	3741	1668
Grp Volume(v), veh/h	211	318	192	31	567	157	209	401	413	76	337	144
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1924	1875	1870	1668
Q Serve(g_s), s	7.5	12.2	7.0	1.1	27.2	6.4	9.9	24.9	24.9	3.8	9.4	8.3
Cycle Q Clear(g_c), s	7.5	12.2	7.0	1.1	27.2	6.4	9.9	24.9	24.9	3.8	9.4	8.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	337	928	924	451	867	816	331	449	462	173	771	451
V/C Ratio(X)	0.63	0.34	0.21	0.07	0.65	0.19	0.63	0.89	0.89	0.44	0.44	0.32
Avail Cap(c_a), veh/h	337	928	924	509	867	816	331	575	592	236	1150	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	20.0	13.5	17.2	26.4	17.3	35.3	44.1	44.1	36.8	41.6	35.0
Incr Delay (d2), s/veh	3.6	1.0	0.5	0.1	3.8	0.5	3.8	13.7	13.5	1.8	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	5.5	2.6	0.4	13.0	2.5	5.1	12.8	13.2	1.8	4.3	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.6	21.0	14.0	17.3	30.2	17.8	39.2	57.8	57.6	38.5	41.9	35.4
LnGrp LOS	C	C	B	B	C	B	D	E	E	D	D	D
Approach Vol, veh/h		721			755			1023			557	
Approach Delay, s/veh		20.2			27.1			53.9			39.8	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.3	62.9	16.0	30.8	14.0	59.2	11.9	34.9				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 41	* 9.9	* 37	7.7	40.7	* 9.9	* 37				
Max Q Clear Time (g_c+1), s	3.1	14.2	11.9	11.4	9.5	29.2	5.8	26.9				
Green Ext Time (p_c), s	0.0	1.5	0.0	1.5	0.0	1.9	0.1	1.9				

Intersection Summary

HCM 6th Ctrl Delay	36.8
HCM 6th LOS	D

























Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



























HCM 6th Signalized Intersection Summary  
1444: Haggerty Road & Grand River Avenue

2019 Build AM  
01/10/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	204	304	184	29	546	149	203	708	49	68	303	135
Future Volume (veh/h)	204	304	184	29	546	149	203	708	49	68	303	135
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	215	320	194	31	575	157	218	761	53	76	337	150
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	332	928	924	449	867	816	331	852	59	173	771	451
Arrive On Green	0.06	0.47	0.47	0.03	0.44	0.44	0.08	0.24	0.24	0.05	0.21	0.21
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3548	247	1875	3741	1668
Grp Volume(v), veh/h	215	320	194	31	575	157	218	401	413	76	337	150
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1924	1875	1870	1668
Q Serve(g_s), s	7.7	12.3	7.0	1.1	27.7	6.4	9.9	24.9	24.9	3.8	9.4	8.6
Cycle Q Clear(g_c), s	7.7	12.3	7.0	1.1	27.7	6.4	9.9	24.9	24.9	3.8	9.4	8.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	332	928	924	449	867	816	331	449	462	173	771	451
V/C Ratio(X)	0.65	0.34	0.21	0.07	0.66	0.19	0.66	0.89	0.89	0.44	0.44	0.33
Avail Cap(c_a), veh/h	332	928	924	507	867	816	331	575	592	236	1150	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	20.0	13.5	17.2	26.5	17.3	36.0	44.1	44.1	36.8	41.6	35.1
Incr Delay (d2), s/veh	4.3	1.0	0.5	0.1	4.0	0.5	4.8	13.7	13.5	1.8	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	5.6	2.6	0.4	13.2	2.5	5.4	12.8	13.2	1.8	4.3	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.5	21.0	14.0	17.3	30.5	17.8	40.7	57.8	57.6	38.5	41.9	35.5
LnGrp LOS	C	C	B	B	C	B	D	E	E	D	D	D
Approach Vol, veh/h		729			763			1032				563
Approach Delay, s/veh		20.5			27.4			54.1				39.8
Approach LOS		C			C			D				D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.3	62.9	16.0	30.8	14.0	59.2	11.9	34.9				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 41	* 9.9	* 37	7.7	40.7	* 9.9	* 37				
Max Q Clear Time (g_c+I1), s	3.1	14.3	11.9	11.4	9.7	29.7	5.8	26.9				
Green Ext Time (p_c), s	0.0	1.5	0.0	1.6	0.0	1.9	0.1	1.9				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			36.9									
HCM 6th LOS			D									
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary  
1444: Haggerty Road & Grand River Avenue

2018 Existing PM  
01/10/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	136	433	270	62	538	120	249	451	53	195	756	264
Future Volume (veh/h)	136	433	270	62	538	120	249	451	53	195	756	264
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	143	456	284	69	598	133	262	475	56	222	859	300
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	257	795	884	295	749	818	296	811	95	367	839	479
Arrive On Green	0.06	0.40	0.40	0.04	0.38	0.38	0.13	0.24	0.24	0.11	0.22	0.22
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3372	396	1875	3741	1668
Grp Volume(v), veh/h	143	456	284	69	598	133	262	263	268	222	859	300
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1898	1875	1870	1668
Q Serve(g_s), s	5.5	21.6	11.6	2.7	32.4	5.3	12.7	14.9	15.0	10.7	26.9	18.8
Cycle Q Clear(g_c), s	5.5	21.6	11.6	2.7	32.4	5.3	12.7	14.9	15.0	10.7	26.9	18.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	257	795	884	295	749	818	296	450	456	367	839	479
V/C Ratio(X)	0.56	0.57	0.32	0.23	0.80	0.16	0.88	0.58	0.59	0.61	1.02	0.63
Avail Cap(c_a), veh/h	260	795	884	342	749	818	387	450	456	487	839	479
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.6	27.7	16.0	22.6	33.1	16.9	32.5	40.3	40.3	31.1	46.5	37.2
Incr Delay (d2), s/veh	2.5	3.0	1.0	0.4	8.7	0.4	17.2	1.9	2.0	1.6	37.4	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	10.2	4.4	1.2	16.5	2.0	6.9	6.9	7.1	4.8	16.4	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.1	30.7	16.9	23.0	41.8	17.4	49.7	42.2	42.3	32.8	84.0	39.8
LnGrp LOS	C	C	B	C	D	B	D	D	D	C	F	D
Approach Vol, veh/h		883			800			793			1381	
Approach Delay, s/veh		25.9			36.1			44.7			66.1	
Approach LOS		C			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	54.8	21.2	33.0	13.8	51.9	19.3	35.0				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 40	* 21	* 27	7.7	39.7	* 21	* 27				
Max Q Clear Time (g_c+I1), s	4.7	23.6	14.7	28.9	7.5	34.4	12.7	17.0				
Green Ext Time (p_c), s	0.0	2.1	0.5	0.0	0.0	1.2	0.4	1.1				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			46.3									
HCM 6th LOS			D									
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary  
 1444: Haggerty Road & Grand River Avenue

2019 No Build PM  
 01/10/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	450	273	63	557	121	252	456	54	197	764	267
Future Volume (veh/h)	137	450	273	63	557	121	252	456	54	197	764	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	144	474	287	70	619	134	265	480	57	224	868	303
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	245	792	884	284	746	817	299	811	96	367	839	479
Arrive On Green	0.06	0.40	0.40	0.04	0.38	0.38	0.13	0.24	0.24	0.11	0.22	0.22
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3369	398	1875	3741	1668
Grp Volume(v), veh/h	144	474	287	70	619	134	265	266	271	224	868	303
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1897	1875	1870	1668
Q Serve(g_s), s	5.6	22.7	11.7	2.7	34.2	5.4	12.8	15.1	15.2	10.8	26.9	19.0
Cycle Q Clear(g_c), s	5.6	22.7	11.7	2.7	34.2	5.4	12.8	15.1	15.2	10.8	26.9	19.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	245	792	884	284	746	817	299	450	457	367	839	479
V/C Ratio(X)	0.59	0.60	0.32	0.25	0.83	0.16	0.89	0.59	0.59	0.61	1.04	0.63
Avail Cap(c_a), veh/h	247	792	884	330	746	817	387	450	457	486	839	479
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.4	28.2	16.0	22.9	33.8	17.0	32.4	40.3	40.4	31.1	46.6	37.2
Incr Delay (d2), s/veh	3.6	3.3	1.0	0.4	10.4	0.4	17.8	2.0	2.1	1.7	40.5	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	10.8	4.4	1.2	17.6	2.1	7.0	7.0	7.2	4.9	16.8	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.9	31.6	17.0	23.4	44.2	17.4	50.2	42.3	42.4	32.8	87.0	39.9
LnGrp LOS	C	C	B	C	D	B	D	D	D	C	F	D
Approach Vol, veh/h		905			823			802			1395	
Approach Delay, s/veh		26.7			38.0			45.0			68.1	
Approach LOS		C			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	54.6	21.4	33.0	13.9	51.7	19.4	35.0				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 40	* 21	* 27	7.7	39.7	* 21	* 27				
Max Q Clear Time (g_c+I1), s	4.7	24.7	14.8	28.9	7.6	36.2	12.8	17.2				
Green Ext Time (p_c), s	0.0	2.1	0.5	0.0	0.0	1.0	0.5	1.1				

Intersection Summary

HCM 6th Ctrl Delay	47.5
HCM 6th LOS	D

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary  
 1444: Haggerty Road & Grand River Avenue

2019 No Build PM (SCATS Optimized)  
 01/10/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	450	273	63	557	121	252	456	54	197	764	267
Future Volume (veh/h)	137	450	273	63	557	121	252	456	54	197	764	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	144	474	287	70	619	134	265	480	57	224	868	303
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	764	855	272	717	788	298	865	102	378	901	509
Arrive On Green	0.06	0.39	0.39	0.04	0.36	0.36	0.12	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3369	398	1875	3741	1668
Grp Volume(v), veh/h	144	474	287	70	619	134	265	266	271	224	868	303
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1897	1875	1870	1668
Q Serve(g_s), s	5.7	23.3	12.2	2.8	35.0	5.5	12.5	14.8	14.9	10.6	27.5	18.5
Cycle Q Clear(g_c), s	5.7	23.3	12.2	2.8	35.0	5.5	12.5	14.8	14.9	10.6	27.5	18.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	232	764	855	272	717	788	298	480	487	378	901	509
V/C Ratio(X)	0.62	0.62	0.34	0.26	0.86	0.17	0.89	0.55	0.56	0.59	0.96	0.60
Avail Cap(c_a), veh/h	232	764	855	317	717	788	361	480	487	471	901	509
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	29.6	17.2	24.0	35.4	18.2	31.6	38.6	38.7	29.8	45.0	35.4
Incr Delay (d2), s/veh	5.0	3.8	1.1	0.5	13.1	0.5	20.0	1.4	1.4	1.5	21.5	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	11.2	4.6	1.2	18.5	2.1	7.1	6.7	6.9	4.8	15.0	7.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.7	33.3	18.3	24.5	48.5	18.6	51.6	40.0	40.1	31.3	66.5	37.3
LnGrp LOS	C	C	B	C	D	B	D	D	D	C	E	D
Approach Vol, veh/h		905			823			802			1395	
Approach Delay, s/veh		28.5			41.6			43.9			54.5	
Approach LOS		C			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	52.9	21.0	35.0	14.0	50.0	19.1	36.9				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 40	* 19	* 29	7.7	39.7	* 19	* 29				
Max Q Clear Time (g_c+I1), s	4.8	25.3	14.5	29.5	7.7	37.0	12.6	16.9				
Green Ext Time (p_c), s	0.0	2.1	0.4	0.0	0.0	0.8	0.4	1.3				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			43.6									
HCM 6th LOS			D									
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary  
 1444: Haggerty Road & Grand River Avenue

2019 Build PM  
 01/10/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	143	455	282	63	561	121	256	456	54	197	764	273
Future Volume (veh/h)	143	455	282	63	561	121	256	456	54	197	764	273
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	151	479	297	70	623	134	269	480	57	224	868	310
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	228	761	855	267	714	785	301	871	103	380	901	509
Arrive On Green	0.06	0.39	0.39	0.04	0.36	0.36	0.13	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	3369	398	1875	3741	1668
Grp Volume(v), veh/h	151	479	297	70	623	134	269	266	271	224	868	310
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1870	1897	1875	1870	1668
Q Serve(g_s), s	6.0	23.7	12.7	2.8	35.4	5.5	12.7	14.7	14.9	10.6	27.5	19.0
Cycle Q Clear(g_c), s	6.0	23.7	12.7	2.8	35.4	5.5	12.7	14.7	14.9	10.6	27.5	19.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	228	761	855	267	714	785	301	483	490	380	901	509
V/C Ratio(X)	0.66	0.63	0.35	0.26	0.87	0.17	0.89	0.55	0.55	0.59	0.96	0.61
Avail Cap(c_a), veh/h	228	761	855	312	714	785	361	483	490	472	901	509
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.1	29.8	17.4	24.2	35.7	18.3	31.6	38.5	38.5	29.8	45.0	35.6
Incr Delay (d2), s/veh	7.0	3.9	1.1	0.5	13.9	0.5	20.9	1.3	1.4	1.5	21.5	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	11.4	4.9	1.2	18.9	2.2	7.2	6.7	6.9	4.8	15.0	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.0	33.8	18.5	24.8	49.6	18.7	52.5	39.8	39.9	31.3	66.5	37.7
LnGrp LOS	D	C	B	C	D	B	D	D	D	C	E	D
Approach Vol, veh/h		927			827			806			1402	
Approach Delay, s/veh		29.1			42.5			44.0			54.5	
Approach LOS		C			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	52.7	21.2	35.0	14.0	49.8	19.1	37.1				
Change Period (Y+Rc), s	6.3	* 6.3	* 6.1	* 6.1	6.3	6.3	* 6.1	* 6.1				
Max Green Setting (Gmax), s	7.7	* 40	* 19	* 29	7.7	39.7	* 19	* 29				
Max Q Clear Time (g_c+I1), s	4.8	25.7	14.7	29.5	8.0	37.4	12.6	16.9				
Green Ext Time (p_c), s	0.0	2.1	0.4	0.0	0.0	0.7	0.4	1.3				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			43.9									
HCM 6th LOS			D									
<b>Notes</b>												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

**Intersection**

Int Delay, s/veh 0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↘	↙
Traffic Vol, veh/h	683	6	6	575	1	12
Future Vol, veh/h	683	6	6	575	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	355	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	727	6	6	612	2	18

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	733	0	1351 727
Stage 1	-	-	-	-	727 -
Stage 2	-	-	-	-	624 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	872	-	166 424
Stage 1	-	-	-	-	478 -
Stage 2	-	-	-	-	534 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	872	-	165 424
Mov Cap-2 Maneuver	-	-	-	-	303 -
Stage 1	-	-	-	-	475 -
Stage 2	-	-	-	-	534 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	411	-	-	872	-
HCM Lane V/C Ratio	0.049	-	-	0.007	-
HCM Control Delay (s)	14.2	-	-	9.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

**Intersection**

Int Delay, s/veh 0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	
Traffic Vol, veh/h	702	6	6	591	1	12
Future Vol, veh/h	702	6	6	591	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	355	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	747	6	6	629	2	18

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	753	0	1388
Stage 1	-	-	-	-	747
Stage 2	-	-	-	-	641
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	857	-	157
Stage 1	-	-	-	-	468
Stage 2	-	-	-	-	525
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	857	-	156
Mov Cap-2 Maneuver	-	-	-	-	295
Stage 1	-	-	-	-	465
Stage 2	-	-	-	-	525

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	401	-	-	857	-
HCM Lane V/C Ratio	0.05	-	-	0.007	-
HCM Control Delay (s)	14.4	-	-	9.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

**Intersection**

Int Delay, s/veh 0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	708	6	6	612	2	14
Future Vol, veh/h	708	6	6	612	2	14
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	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	753	6	6	651	3	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	759
Stage 1	-	-	753
Stage 2	-	-	663
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	852	151
Stage 1	-	-	465
Stage 2	-	-	512
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	852	150
Mov Cap-2 Maneuver	-	-	289
Stage 1	-	-	462
Stage 2	-	-	512

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	390	-	-	852	-
HCM Lane V/C Ratio	0.063	-	-	0.007	-
HCM Control Delay (s)	14.9	-	-	9.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-



**Intersection**

Int Delay, s/veh 0.4

**Movement** EBT EBR WBL WBT NBL NBR

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	667	7	18	880	6	11
Future Vol, veh/h	667	7	18	880	6	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	355	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	89	89	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	813	9	20	989	9	17

**Major/Minor** Major1 Major2 Minor1

Conflicting Flow All	0	0	822	0	1842	813
Stage 1	-	-	-	-	813	-
Stage 2	-	-	-	-	1029	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	807	-	83	378
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	345	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	807	-	81	378
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	345	-

**Approach** EB WB NB

HCM Control Delay, s 0 0.2 18.6  
HCM LOS C

**Minor Lane/Major Mvmt** NBLn1 EBT EBR WBL WBT

Capacity (veh/h)	291	-	-	807	-
HCM Lane V/C Ratio	0.09	-	-	0.025	-
HCM Control Delay (s)	18.6	-	-	9.6	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

**Intersection**

Int Delay, s/veh 0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	686	7	18	903	6	11
Future Vol, veh/h	686	7	18	903	6	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	355	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	89	89	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	837	9	20	1015	9	17

**Major/Minor**

	Major1	Major2	Minor1	Minor2
Conflicting Flow All	0	0	846	0
Stage 1	-	-	-	837
Stage 2	-	-	-	1055
Critical Hdwy	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-
Pot Cap-1 Maneuver	-	-	791	-
Stage 1	-	-	-	425
Stage 2	-	-	-	335
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	791	-
Mov Cap-2 Maneuver	-	-	-	197
Stage 1	-	-	-	414
Stage 2	-	-	-	335

**Approach**

	EB	WB	NB
HCM Control Delay, s	0	0.2	19.1
HCM LOS			C

**Minor Lane/Major Mvmt**

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	281	-	-	791	-
HCM Lane V/C Ratio	0.093	-	-	0.026	-
HCM Control Delay (s)	19.1	-	-	9.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

**Intersection**

Int Delay, s/veh 0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	702	7	18	917	7	15
Future Vol, veh/h	702	7	18	917	7	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	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	89	89	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	856	9	20	1030	11	23

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	865
Stage 1	-	-	856
Stage 2	-	-	1070
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	778	73
Stage 1	-	-	416
Stage 2	-	-	329
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	778	71
Mov Cap-2 Maneuver	-	-	192
Stage 1	-	-	405
Stage 2	-	-	329

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	19.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	280	-	-	778	-
HCM Lane V/C Ratio	0.121	-	-	0.026	-
HCM Control Delay (s)	19.6	-	-	9.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

**Intersection**

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑	↑	↑
Traffic Vol, veh/h	715	7	10	595	2	3
Future Vol, veh/h	715	7	10	595	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	75	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	777	8	11	647	2	3

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	785
Stage 1	-	-	781
Stage 2	-	-	669
Critical Hdwy	-	4.13	6.63
Critical Hdwy Stg 1	-	-	5.83
Critical Hdwy Stg 2	-	-	5.43
Follow-up Hdwy	-	2.219	3.519
Pot Cap-1 Maneuver	-	832	132
Stage 1	-	-	413
Stage 2	-	-	508
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	832	130
Mov Cap-2 Maneuver	-	-	263
Stage 1	-	-	408
Stage 2	-	-	508

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	399	-	-	832	-
HCM Lane V/C Ratio	0.014	-	-	0.013	-
HCM Control Delay (s)	14.1	-	-	9.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

**Intersection**

Int Delay, s/veh 0.2

**Movement** EBT EBR WBL WBT NBL NBR

Lane Configurations	↑↑		↑	↑	↑	
Traffic Vol, veh/h	698	6	7	918	9	8
Future Vol, veh/h	698	6	7	918	9	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	75	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	759	7	8	998	10	9

**Major/Minor** Major1 Major2 Minor1

Conflicting Flow All	0	0	766	0	1777	383
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	1014	-
Critical Hdwy	-	-	4.13	-	6.63	6.93
Critical Hdwy Stg 1	-	-	-	-	5.83	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.219	-	3.519	3.319
Pot Cap-1 Maneuver	-	-	845	-	82	616
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	349	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	845	-	81	616
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	418	-
Stage 2	-	-	-	-	349	-

**Approach** EB WB NB

HCM Control Delay, s 0 0.1 17.7  
 HCM LOS C

**Minor Lane/Major Mvmt** NBLn1 EBT EBR WBL WBT

Capacity (veh/h)	302	-	-	845	-
HCM Lane V/C Ratio	0.061	-	-	0.009	-
HCM Control Delay (s)	17.7	-	-	9.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

**Intersection**

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑	↘	
Traffic Vol, veh/h	711	7	11	603	2	3
Future Vol, veh/h	711	7	11	603	2	3
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, %	2	2	2	2	2	2
Mvmt Flow	773	8	12	655	2	3

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	781
Stage 1	-	-	777
Stage 2	-	-	679
Critical Hdwy	-	4.13	6.63
Critical Hdwy Stg 1	-	-	5.83
Critical Hdwy Stg 2	-	-	5.43
Follow-up Hdwy	-	2.219	3.519
Pot Cap-1 Maneuver	-	834	131
Stage 1	-	-	415
Stage 2	-	-	503
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	834	129
Mov Cap-2 Maneuver	-	-	262
Stage 1	-	-	409
Stage 2	-	-	503

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	398	-	-	834	-
HCM Lane V/C Ratio	0.014	-	-	0.014	-
HCM Control Delay (s)	14.2	-	-	9.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↓		↖	↑	↘	
Traffic Vol, veh/h	701	5	7	917	8	8
Future Vol, veh/h	701	5	7	917	8	8
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, %	2	2	2	2	2	2
Mvmt Flow	762	5	8	997	9	9

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	767	0	1778
Stage 1	-	-	-	-	765
Stage 2	-	-	-	-	1013
Critical Hdwy	-	-	4.13	-	6.63
Critical Hdwy Stg 1	-	-	-	-	5.83
Critical Hdwy Stg 2	-	-	-	-	5.43
Follow-up Hdwy	-	-	2.219	-	3.519
Pot Cap-1 Maneuver	-	-	845	-	82
Stage 1	-	-	-	-	421
Stage 2	-	-	-	-	350
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	845	-	81
Mov Cap-2 Maneuver	-	-	-	-	208
Stage 1	-	-	-	-	417
Stage 2	-	-	-	-	350

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	17.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	311	-	-	845	-
HCM Lane V/C Ratio	0.056	-	-	0.009	-
HCM Control Delay (s)	17.3	-	-	9.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

**Intersection**

Int Delay, s/veh 0.9

**Movement** EBL EBR NBL NBT SBT SBR

Lane Configurations	↘			↗	↗	
Traffic Vol, veh/h	3	0	0	13	12	0
Future Vol, veh/h	3	0	0	13	12	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	0	0	14	13	0

**Major/Minor** Minor2 Major1 Major2

Conflicting Flow All	27	-	-	0	-	0
Stage 1	13	-	-	-	-	-
Stage 2	14	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	988	0	0	-	-	0
Stage 1	1010	0	0	-	-	0
Stage 2	1009	0	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	988	-	-	-	-	-
Mov Cap-2 Maneuver	988	-	-	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	1009	-	-	-	-	-

**Approach** EB NB SB

HCM Control Delay, s	8.7	0	0
HCM LOS	A		

**Minor Lane/Major Mvmt** NBT EBLn1 SBT

Capacity (veh/h)	-	988	-
HCM Lane V/C Ratio	-	0.003	-
HCM Control Delay (s)	-	8.7	-
HCM Lane LOS	-	A	-
HCM 95th %tile Q(veh)	-	0	-



**Intersection**

Int Delay, s/veh 0.9

**Movement** EBL EBR NBL NBT SBT SBR

Lane Configurations	↖			↑	↑	
Traffic Vol, veh/h	5	0	0	17	25	0
Future Vol, veh/h	5	0	0	17	25	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	0	18	27	0

**Major/Minor** Minor2 Major1 Major2

Conflicting Flow All	45	-	-	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	18	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	965	0	0	-	-	0
Stage 1	996	0	0	-	-	0
Stage 2	1005	0	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	965	-	-	-	-	-
Mov Cap-2 Maneuver	965	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	1005	-	-	-	-	-

**Approach** EB NB SB

HCM Control Delay, s 8.8 0 0  
 HCM LOS A

**Minor Lane/Major Mvmt** NET EBLn1 SBT

Capacity (veh/h)	-	965	-
HCM Lane V/C Ratio	-	0.006	-
HCM Control Delay (s)	-	8.8	-
HCM Lane LOS	-	A	-
HCM 95th %tile Q(veh)	-	0	-

**SOUTH EAST MICHIGAN  
COUNCIL OF GOVERNMENTS  
(SEMCOG)**

**CITY OF NOVI  
COMMUNITY PROFILE**

[SEMCOG | Southeast Michigan Council of Governments](#)

# Community Profiles

YOU ARE VIEWING DATA FOR:

## City of Novi

45175 W 10 Mile Rd  
Novi, MI 48375-3024  
<http://www.cityofnovi.org>

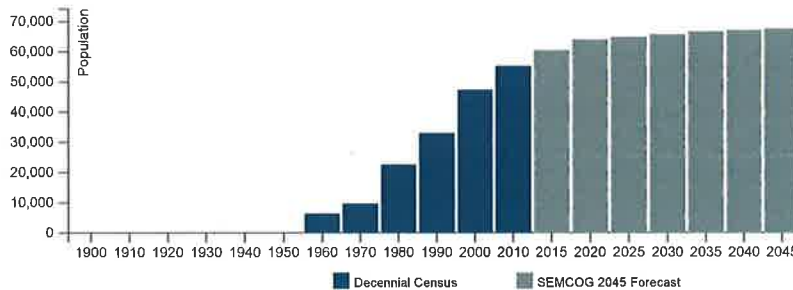


Census 2010 Population:  
55,224  
Area: 31.2 square miles

### Population and Households

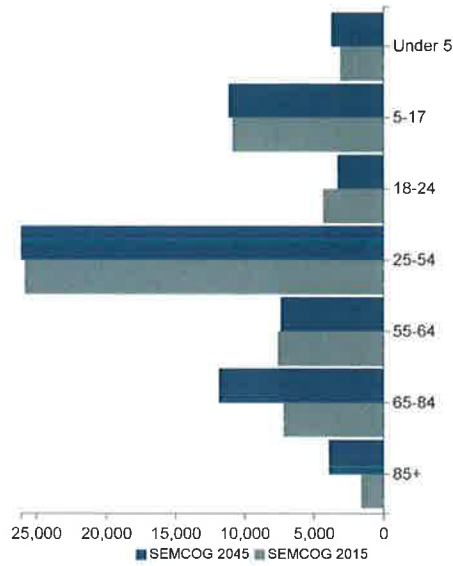
Link to American Community Survey (ACS) Profiles: **Select a Year**  **Social | Demographic**  
**Population and Household Estimates for Southeast Michigan, 2018**

### Population Forecast



Note for City of Novi : Incorporated as of the 1970 Census from Village of Novi. Population numbers prior to 1970 are of the village. The Village of Novi was incorporated in 1958 from the majority of Novi Township. Population numbers not available before 1960 as area was part of Novi Township.

### Forecasted Population Change 2015-2045



Age Group	2015	2020	2025	2030	2035	2040	2045	Change 2015 - 2045	Pct Change 2015 - 2045
<b>Under 5</b>	3,089	3,707	3,901	4,063	4,027	3,841	3,732	643	20.8%
<b>5-17</b>	10,883	11,268	10,881	10,883	11,074	11,296	11,160	277	2.5%
<b>18-24</b>	4,334	4,194	3,840	3,236	3,039	3,206	3,273	-1,061	-24.5%
<b>25-54</b>	25,831	25,436	25,432	25,654	25,972	25,851	26,081	250	1%
<b>55-64</b>	7,571	8,898	8,401	7,700	6,951	7,113	7,383	-188	-2.5%
<b>65-84</b>	7,159	8,847	10,696	12,080	12,828	12,386	11,868	4,709	65.8%
<b>85+</b>	1,591	1,616	1,650	2,022	2,718	3,368	3,920	2,329	146.4%
<b>Total</b>	60,458	63,966	64,801	65,638	66,609	67,061	67,417	6,959	11.5%

Source: SEMCOG 2045 Regional Development Forecast

$$\begin{aligned}
 \text{Growth Rate} &= [(Present \setminus Past)^{(1 \setminus n)}] - 1 \\
 &= [(63,966 \setminus 60,458)^{(1 \setminus (2020 - 2015))}] - 1 \\
 &= [(1.058024)^{(0.2)}] - 1 \\
 &= [1.011344] - 1 \\
 &= 0.01134 \text{ or } 1.1\%
 \end{aligned}$$

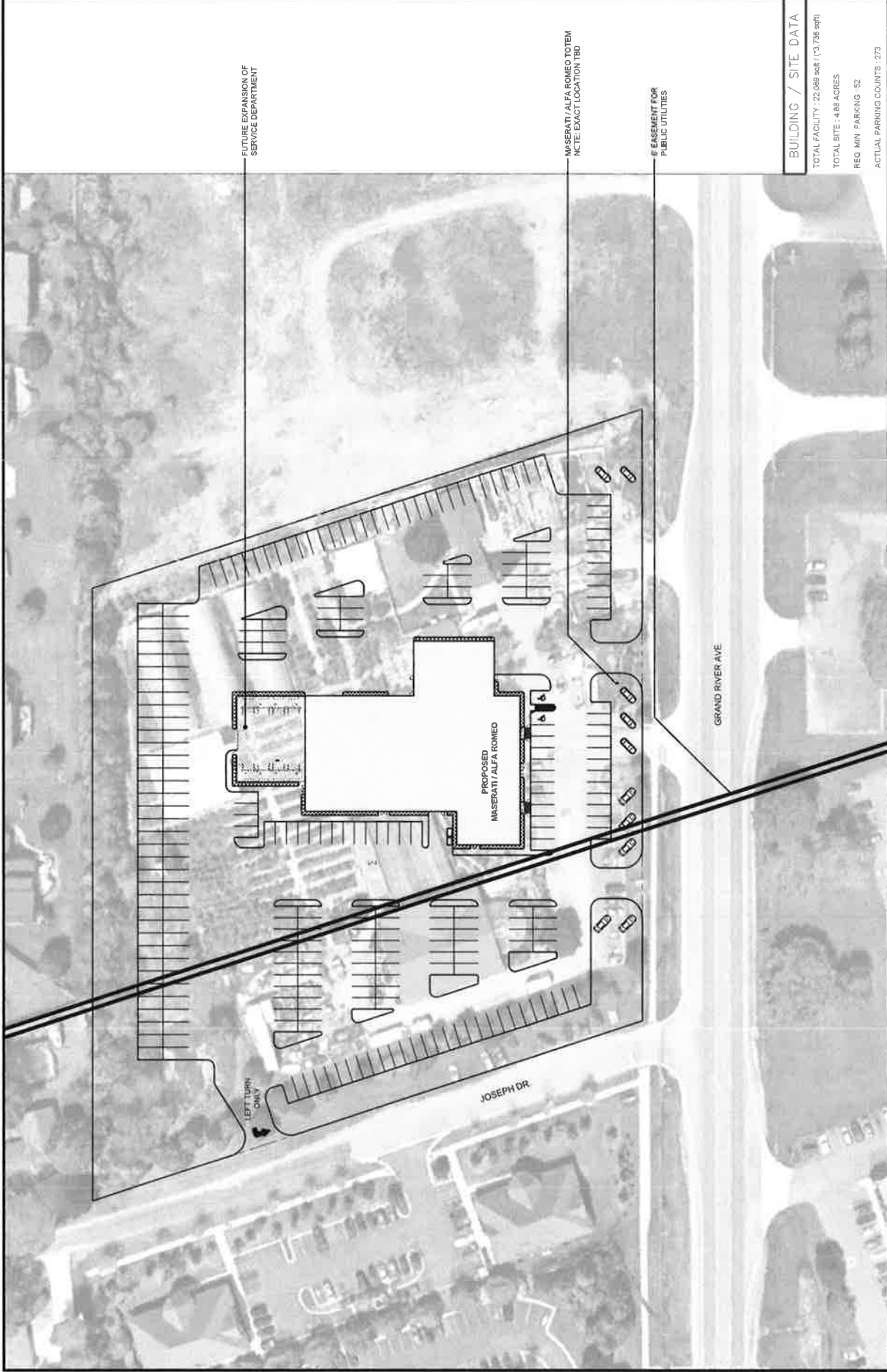
# **SITE PLAN**

CLIENT: FCA US LLC  
 1000 CRYSTLER DRIVE  
 AUBURN HILLS, MI

MASERATI / ALFA ROMEO  
 40799 GRAND RIVER AVE.  
 NOVI, MI

THIS PLAN IS THE PROPERTY OF THE ENGINEER AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT THE WRITTEN PERMISSION OF THE ENGINEER. THE ENGINEER'S LIABILITY IS LIMITED TO THE PROFESSIONAL SERVICES PROVIDED HEREON AND DOES NOT INCLUDE CONSTRUCTION OF THE PROJECT OR THE PERFORMANCE THEREOF. THE ENGINEER'S LIABILITY IS LIMITED TO THE PROFESSIONAL SERVICES PROVIDED HEREON AND DOES NOT INCLUDE CONSTRUCTION OF THE PROJECT OR THE PERFORMANCE THEREOF.

NO.	REVISIONS	DATE
1	ISSUE FOR PERMIT	08/20/2024
2	ISSUE FOR PERMIT	08/20/2024
3	ISSUE FOR PERMIT	08/20/2024
4	ISSUE FOR PERMIT	08/20/2024
5	ISSUE FOR PERMIT	08/20/2024
6	ISSUE FOR PERMIT	08/20/2024
7	ISSUE FOR PERMIT	08/20/2024
8	ISSUE FOR PERMIT	08/20/2024
9	ISSUE FOR PERMIT	08/20/2024
10	ISSUE FOR PERMIT	08/20/2024
11	ISSUE FOR PERMIT	08/20/2024
12	ISSUE FOR PERMIT	08/20/2024
13	ISSUE FOR PERMIT	08/20/2024
14	ISSUE FOR PERMIT	08/20/2024
15	ISSUE FOR PERMIT	08/20/2024
16	ISSUE FOR PERMIT	08/20/2024
17	ISSUE FOR PERMIT	08/20/2024
18	ISSUE FOR PERMIT	08/20/2024
19	ISSUE FOR PERMIT	08/20/2024
20	ISSUE FOR PERMIT	08/20/2024
21	ISSUE FOR PERMIT	08/20/2024
22	ISSUE FOR PERMIT	08/20/2024
23	ISSUE FOR PERMIT	08/20/2024
24	ISSUE FOR PERMIT	08/20/2024
25	ISSUE FOR PERMIT	08/20/2024
26	ISSUE FOR PERMIT	08/20/2024
27	ISSUE FOR PERMIT	08/20/2024
28	ISSUE FOR PERMIT	08/20/2024
29	ISSUE FOR PERMIT	08/20/2024
30	ISSUE FOR PERMIT	08/20/2024
31	ISSUE FOR PERMIT	08/20/2024
32	ISSUE FOR PERMIT	08/20/2024
33	ISSUE FOR PERMIT	08/20/2024
34	ISSUE FOR PERMIT	08/20/2024
35	ISSUE FOR PERMIT	08/20/2024
36	ISSUE FOR PERMIT	08/20/2024
37	ISSUE FOR PERMIT	08/20/2024
38	ISSUE FOR PERMIT	08/20/2024
39	ISSUE FOR PERMIT	08/20/2024
40	ISSUE FOR PERMIT	08/20/2024
41	ISSUE FOR PERMIT	08/20/2024
42	ISSUE FOR PERMIT	08/20/2024
43	ISSUE FOR PERMIT	08/20/2024
44	ISSUE FOR PERMIT	08/20/2024
45	ISSUE FOR PERMIT	08/20/2024
46	ISSUE FOR PERMIT	08/20/2024
47	ISSUE FOR PERMIT	08/20/2024
48	ISSUE FOR PERMIT	08/20/2024
49	ISSUE FOR PERMIT	08/20/2024
50	ISSUE FOR PERMIT	08/20/2024



**BUILDING / SITE DATA**  
 TOTAL FACILITY: 22,089 sqft (3,796 sqft)  
 TOTAL SITE: 4.88 ACRES  
 REQ MIN PARKING: 52  
 ACTUAL PARKING COUNTS: 273

SEE PLAN  
**A-100**

**1 SITE PLAN**