AGENDA

CHARTER TOWNSHIP OF MERIDIAN
PLANNING COMMISSION – REGULAR MEETING
June 26, 2023 6:30 PM

1. CALL MEETING TO ORDER

2. ROLL CALL

3. PUBLIC REMARKS

4. APPROVAL OF AGENDA

5. APPROVAL OF MINUTES
   A. June 12, 2023

6. COMMUNICATIONS
   A. None

7. PUBLIC HEARINGS
   A. None

8. UNFINISHED BUSINESS
   A. SUP #23012 – The W. Investment Holdings – 1614 W. Grand River Avenue

9. OTHER BUSINESS
   A. None

10. MASTER PLAN UPDATE
    A. Completion Timeline

11. REPORTS AND ANNOUNCEMENTS
    A. Township Board update.
    B. Liaison reports.

12. PROJECT UPDATES
    A. Project Report

13. PUBLIC REMARKS

14. COMMISSIONER COMMENTS

15. ADJOURNMENT

TENTATIVE PLANNING COMMISSION AGENDA
July 10, 2023

1. PUBLIC HEARINGS
   A. None

2. UNFINISHED BUSINESS
   A. None

3. OTHER BUSINESS
   A. None

CHARTER TOWNSHIP OF MERIDIAN
PLANNING COMMISSION
REGULAR MEETING MINUTES

June 12th, 2023
5151 Marsh Road, Okemos, MI 48864-1198
517.853.4000, Town Hall Room, 6:30 P.M.

PRESENT: **Chair Blumer, Vice-Chair Trezise, Commissioners Brooks, McConnell, Scales, Shrewsbury, Richards, Snyder**

ABSENT: **Commissioner McCurtis**

STAFF: **Senior Planner Brian Shorkey**

1. CALL MEETING TO ORDER

Chair Blumer called the regular meeting to order at 6:30 pm.

2. ROLL CALL

Chair Blumer called the roll of the Planning Commission. Commissioner McCurtis was absent.

3. PUBLIC REMARKS

None

4. APPROVAL OF AGENDA

Vice-Chair Trezise moved to approve the agenda. Seconded by Commissioner Scales.

VOICE VOTE: Motion approved unanimously.

5. APPROVAL OF MINUTES

A. May 22nd, 2023 Regular Meeting

Commissioner Scales moved to approve the minutes of May 8th, 2023. Seconded by Commissioner McConnell.

VOICE VOTE: Motion approved unanimously with friendly amendments.

6. COMMUNICATIONS

A. None

7. PUBLIC HEARINGS

A. SUP #23012 – The W. Investment Holdings – 1614 W. Grand River Avenue

Senior Planner Shorkey outlined the case for the Planning Commission. He noted that the traffic study done for this case was previously approved in 2019, and it has been found to still be valid. He further noted that the wetlands in the area are being observed with a 20-foot buffer as opposed to a 40-foot buffer due to the size.

Commissioner Brooks questioned why this is the third SUP coming before them that was previously approved in 2019 but needs to be approved again.

Senior Planner Shorkey noted that the initial approval expired, but he couldn't speak as to why the applicant didn't take action previously.

Applicant Ammar Alkhafaji on behalf of W. Investment Holdings (29580 Northwestern Hwy, Suite 1000, Southfield, MI 48034) introduced himself and opened the floor for questions from the Commission. There were no questions for the applicant representative.

Public Hearing closed.

STRAW VOTE: YEAS: Chair Blumer, Vice-Chair Trezise, Commissioners Brooks, McConnell, Scales, Shrewsbury, Snyder

NAYS: Commissioner Richards

Results: 7-1

8. UNFINISHED BUSINESS

A. None

9. OTHER BUSINESS

A. None

10. MASTER PLAN UPDATE

A. None

Commissioner Brooks inquired about the process of the Master Plan. Senior Planner Shorkey said that Staff would update the Planning Commission at their next meeting.

11. REPORTS AND ANNOUNCEMENTS

A. Township Board Update

None

B. Liaison Reports

Commissioner McConnell spoke on the Environmental Commission. At the last meeting, they started work on encouraging health food systems in the face of climate change. He outlined the key points of said meeting.

Chair Blumer spoke on the Downtown Development Authority. He spoke on their $140,000 positive balance on their bank account. He also spoke on the proposed façade improvement project.

12. PROJECT UPDATES

A. None

13. PUBLIC REMARKS

Chair Blumer opened public remarks at 7:04 pm.

NONE

Chair Blumer closed public remarks at 7:04 pm.

Informal conversation amongst the Planning Commission on the ongoing road developments across Grand River.

14. ADJOURNMENT

Chair Blumer moved to adjourn.

VOICE VOTE: Motion approved unanimously.

Chair Blumer adjourned the regular meeting at 7:11 pm.

To: **Planning Commission**

From: **Brian Shorkey, Senior Planner**

Date: **June 23, 2023**

Re: **Special Use Permit #23012 (The W. Investment Holdings), to construct a medical marijuana provisioning center at 1614 West Grand River.**

The W. Investment Holdings (Applicant) has submitted a Special Use Permit (SUP) application for the construction of a 4,000 square foot medical marijuana provisioning center at 1614 West Grand River, Okemos, MI 48864 (Subject Property). The Subject Property is approximately 2.4 acres in size and is zoned C-2 – Commercial. A public hearing for this application was held at the Planning Commission's regular meeting on Monday, June 12, 2023. The Planning Commission raised no major concerns and agreed to consider a resolution to approve the special use permit to construct a medical marijuana provisioning center at 1614 West Grand River at its next meeting.

Planning Commission Options

The Planning Commission may approve, approve with conditions, or deny the special use permit. A resolution to approve the request is provided. Staff **recommends approval** of Special Use Permit #23012 for the construction of a medical marijuana provisioning center at 1614 West Grand River, with the conditions listed in the resolution.

Attachments

1. Resolution to approve SUP #23012.
2. June 12, 2023 meeting packet.

RESOLUTION TO APPROVE **Special Use Permit #23012**
(The W. Investment Holdings)

RESOLUTION

At a regular meeting of the Planning Commission of the Charter Township of Meridian, Ingham County, Michigan, held at the Meridian Municipal Building, in said Township on the 26th day of June, 2023 at 6:30 p.m., Local Time.

PRESENT:

ABSENT:

The following resolution was offered by Commissioner _____ and supported by Commissioner _____.

WHEREAS, The W. Investment Holdings has submitted a request to establish a 4,000 square foot commercial medical marihuana provisioning center at 1614 West Grand River; and

WHEREAS, the Township Board adopted both zoning and non-zoning ordinances allowing commercial medical marihuana facilities in designated overlay areas throughout the Township at its meeting on May 21, 2019; and

WHEREAS, the zoning ordinance established seven designated areas in the Township where commercial medical marihuana facilities are permitted and identified the zoning districts in which each of the five types of commercial medical marihuana facilities can locate; and

WHEREAS, the non-zoning ordinance established the application process, the facility types allowed, the number of permits, and the general operational standards for the different types of commercial facilities, which include growers, processors, secure transporters, provisioning centers, and safety compliance facilities; and

WHEREAS, the overlay areas adopted by the Township Board allow commercial medical marihuana provisioning centers in the I (Industrial), C-1, C-2, C-3 (Commercial), and RP (Research and Office Park) zoning districts subject to the approval of a special use permit reviewed by the Planning Commission and approved by the Township Board; and

WHEREAS, the subject site is located entirely within Overlay Area 5 and is appropriately zoned C-2 (Commercial), which allows commercial medical marihuana provisioning centers by special use permit; and

WHEREAS, the proposed commercial medical marihuana provisioning center meets the required setbacks from any public or private K-12 school, church, place of worship or other religious facility, library, preschool, or child care center established in Section 40-31 of the Code of Ordinances; and

WHEREAS, the proposed commercial medical marihuana provisioning center will not adversely affect adjacent land uses or the health, safety, and general welfare of the community; and

WHEREAS, the proposed project is consistent with the general standards for granting a special use permit found in Section 86-126 of the Code of Ordinances.

NOW THEREFORE, BE IT RESOLVED THE PLANNING COMMISSION OF THE CHARTER TOWNSHIP OF MERIDIAN hereby recommends approval of Special Use Permit #23012, subject to the following conditions:

1. Approval is in accordance with the site plan prepared by ROGVOY Architects dated August 2, 2019 and received by the Township on April 28, 2023.

2. Approval is in accordance with the building elevations prepared by ROGVOY Architects dated August 2, 2019 and received by the Township on April 28, 2023.

3. Approval is subject to the applicant receiving approval of a Commercial Medical Marihuana Facility permit by the Director of Community Planning and Development.

4. Approval is subject to the applicant receiving Final Approval for a medical marihuana license from the State of Michigan, Department of Licensing and Regulatory Affairs.

5. The applicant shall obtain and maintain any and all other applicable permits, licenses, and approvals necessary to operate the proposed commercial medical marihuana provisioning center from the State of Michigan, Township, and any other applicable agencies. Copies of all permits, licenses, and approvals shall be submitted to the Department of Community Planning and Development.

6. Site plan review approval is required to construct the proposed building. The final site plan, building elevations, and landscape plan shall be subject to the approval of the Director of Community Planning and Development.

7. The applicant shall obtain all necessary permits, licenses, and approvals from the Ingham County Road Department, Ingham County Drain Commissioner, Michigan Department of Environment, Great Lakes, and Energy, and the Township, as applicable. Copies of all permits, licenses, and approval letters shall be submitted to the Department of Community Planning and Development.

8. Utility, grading, and storm drainage plans for the site are subject to the approval of the Director of Public Works and Engineering and Ingham County Drain Commissioner and shall be completed in accordance with the Township Engineering Design and Construction Standards.

9. No grading or land clearing shall take place on the site until the site plan has been approved by the Director of Community Planning and Development and grading and soil erosion and sedimentation control (SESC) permits have been issued for the project.

10. All utility service distribution lines shall be installed underground.

11. Any proposed future expansion, additions, or revisions to the proposed tenant space, building, or site, will require an amendment to Special Use Permit #23012.

12. The final design of the trash and recycling facilities and related enclosures shall be subject to the approval of the Director of Community Planning and Development.

13. Site accessories such as railings, benches, exterior lighting fixtures, and bicycle racks shall be of commercial quality and complement the building design. The final design and location

of such accessories shall be subject to the approval of the Director of Community Planning and Development.

14. All mechanical, heating, ventilation, air conditioning, and similar systems shall be screened from view by an opaque structure or landscape materials (if at street level) selected to complement the building. Such screening is subject to the approval of the Director of Community Planning and Development.

15. Sign permits shall be required for any signage proposed on the property.

16. The provisioning center shall remain in compliance with the operational requirements established in Section 40-31 of the Code of Ordinances.

17. The special use permit shall be revoked if the applicant fails to maintain a valid Commercial Medical Marihuana Facility permit from the Township and Facility License from the State of Michigan.

ADOPTED: YEAS:

NAYS:

STATE OF MICHIGAN)
) ss
COUNTY OF INGHAM)

I, the undersigned, the duly qualified and acting Chairperson of the Planning Commission of the Charter Township Meridian, Ingham County, Michigan, DO HEREBY CERTIFY that the foregoing is a true and a complete copy of a resolution adopted at a regular meeting of the Planning Commission on the 26th day of June, 2023.

_____
Mark Blumer
Planning Commission Chairperson

To: **Planning Commission**

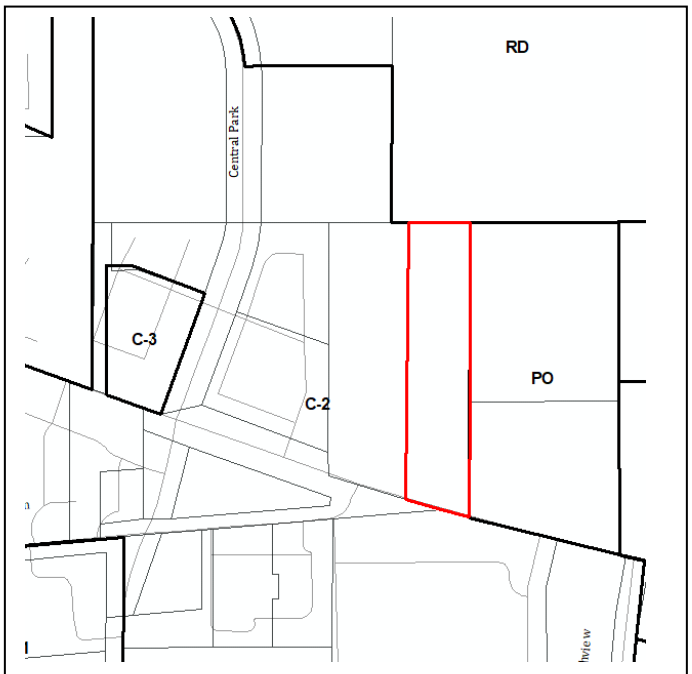
From: **Brian Shorkey, Senior Planner**

Date: **June 8, 2023**

Re: **<u>Special Use Permit #23012 (The W. Investment Holdings)</u>, to construct a medical marijuana provisioning center at 1614 West Grand River**

The W. Investment Holdings (Applicant) has submitted a Special Use Permit (SUP) application for the construction of a 4,000 square foot medical marijuana provisioning center at 1614 West Grand River, Okemos, MI 48864 (Subject Property). The Subject Property is approximately 2.4 acres in size and is zoned C-2 – Commercial.

Sec. 40-30 (e)(3) of the Township Code of Ordinances requires a successful medical marijuana applicant to apply for a special use permit, as provided in Sec. 86-124, within 60 days or issuance of a conditional approval for a medical marijuana facility permit. This SUP application fulfills that requirement and is identical to the SUP application that the Planning Commission reviewed and recommended for approval in 2019 (SUP #19131).



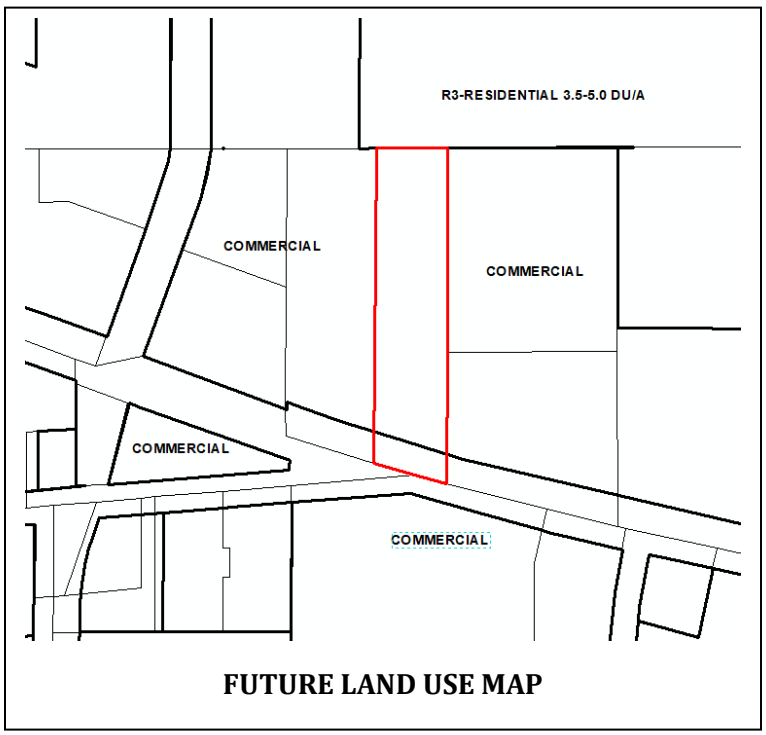
ZONING MAP

Zoning and Future Land Use

The proposed project is located in the C-2 – Commercial zoning district. A provisioning center is permitted subject to approval of a special use permit reviewed by the Planning Commission and approved by the Township Board.

The C-2 district requires a minimum of 100 feet of lot frontage and 4,000 square feet of lot area. The Subject Property is 2.4 acres in size and has 150 feet of frontage along Grand River Avenue, exceeding the ordinance standards.

The 2017 Master Plan designates the subject site as Commercial. This designation applies to the properties adjacent to the north, south, and east. The property to the north is shown as R3 – Single-Family Residential and is part of the Grand Reserve project that was approved by the Township earlier this year.



FUTURE LAND USE MAP

Staff Analysis
The site is currently undeveloped. The site was previously occupied by a single-family house that was demolished in early 2019.

Applications for special land use permits are reviewed under Sec. 86-126 in the Zoning Ordinance. Based on that review, Staff has the following comments:

1. The Subject Property lies within Medical Marijuana Overlay District 5. This has been approved of one of only seven areas in the Township where medical marijuana facilities are allowed. The proposed use conforms with this.
2. The proposed medical marijuana dispensary is a commercial use and conforms with the Subject Property's commercial zoning and Future Land Use designations.
3. The material attached to the medical marijuana application, approved on January 23, 2023, detailed the safety and odor control that was being proposed by the Applicant. The safety and odor control systems meet the Township's requirements.
4. Municipal water and sanitary sewer are available in the vicinity to serve the subject site. The location and capacity of utilities will be reviewed in detail during site plan review if the special use permit is approved, although there are no indications that the current system cannot handle a new retail use.
5. The original traffic study was reevaluated by the Applicant's traffic engineer and found to still be valid, as shown in the attached traffic study. The traffic study indicated that the existing roads are capable of handling the expected traffic, although it did suggest an optimization of traffic signal timing at the intersection of Grand River Avenue and Central Park Drive. This will be reviewed by the Michigan Department of Transportation (MDOT) during the site plan review phase.
6. The applicant is proposing to close an existing driveway and create a new driveway along Grand River Avenue to access the site. In accordance with MDOT, the Township has developed access management criteria for use in evaluating proposed access driveways along Grand River Avenue. The access management criteria for the proposed driveway are

summarized in the study provided by the applicant's traffic consultant. Based on the study, the traffic consultant noted that waivers for the spacing between adjacent driveways will be required to facilitate the development of the proposed provisioning center. This criteria will be reviewed during the site plan review process and all curb cuts on Grand River are subject to MDOT review and approval.

7. The Flood Insurance Rate Map (FIRM) for Meridian Township indicates the property is not located in a floodplain. The Township Greenspace Plan shows no special designation on the site.
8. There are two wetlands located on the Subject Property. Both wetlands are located within 30 feet of a 2-acre pond and are therefore regulated by the State of Michigan and Meridian Township. Based on the submitted plans, the Applicant is not proposing any impacts to the wetlands and the 20-foot wetland buffer is being observed.
9. A sign plan was submitted as required by Sec. 40-30. The proposed signage meets the requirements of the Township sign ordinance.

Based on the information provided by the Applicant, Staff has identified wetlands and access management as potential concerns while reviewing the proposed Special Use Permit. The attached site drawings show that the Applicant is aware of the wetlands and is working around them in accordance with the Township's wetland ordinances. The traffic study and the proposed driveway relocation will be reviewed in detail during the site plan review phase.

If the project is approved by the Planning Commission and the Township Board, the applicant will be required to submit for Site Plan Review and building permits before work on the project can begin. Site Plan Review is a detailed staff-level analysis of the project which includes reviews of storm water, utilities, landscaping, grading, and other issues to ensure compliance with all applicable ordinances as well as confirmation of approvals from local agencies such as the Ingham County Drain Commissioner's Office and Road Department.

Prior to operations, the applicant will need to receive a medical marihuana license from the State of Michigan, Department of Licensing and Regulatory Affairs, approvals from any other State agencies, and final approval of the local permit for a commercial medical marijuana facility.

Planning Commission Options
The Planning Commission has the option to recommend approval, approval with conditions, or denial of Special Use Permit #23012. A resolution will be provided at a future meeting.

Attachments
1. SUP permit application with attachments, dated March 23, 2023 and received by the Township on April 28, 2023.
2. Site concept drawing, prepared by Rogvoy Architects, dated August 2, 2019 and received by the Township on April 28, 2023.
3. Traffic Impact Study prepared by Fleis & Vandenbrink Engineering, Inc. dated January 21, 2020, with memo dated April 27, 2023, and received by the Township on April 28, 2023.

CHARTER TOWNSHIP OF MERIDIAN
DEPARTMENT OF COMMUNITY PLANNING AND DEVELOPMENT
5151 MARSH ROAD, OKEMOS, MI 48864
PLANNING DIVISION PHONE: (517) 853-4560, FAX: (517) 853-4095

SPECIAL USE PERMIT APPLICATION

Before submitting this application for review, an applicant may meet with the Director of Community Planning and Development to discuss the requirements for a special use permit and/or submit a conceptual plan for review to have preliminary technical deficiencies addressed prior to submittal of the application. If the property or land use is located in the following zoning districts RD, RC, RCC, RN then the applicant must meet with the Planning Director to discuss technical difficulties before filing a formal application.

Part I

A. Applicant The W. Investment Holdings - Ammar W. Alkhafji
Address of Applicant 29580 Northwestern Highway
Telephone - Work 248.559.5555 Home _____ Fax _____ Email ammar@investorsgroup.com
Interest in property (circle one): (Owner) Tenant Option Other
(Please attach a list of all persons with an ownership interest in the property.)

B. Site address / location / parcel number 1614 W. Grand River / 33-02-22-426-001 / Parcel 3
Legal description (please attach if necessary) Attached
Current zoning C2 - Commercial District
Use for which permit is requested / project name Commercial
Corresponding ordinance number _____

C. Developer (if different than applicant) Same as above
Address _____
Telephone – Work _____ Home _____ Fax _____

D. Architect, Engineer Planner or Surveyor responsible for design of project if different from applicant:
Name Nowak and Fraus Engineers Rogvoy Architects
Address 46777 Woodward, Pontiac, MI 48342 32500 Telegraph, Bingham Farms, MI 48025
Telephone – Work 248.332.7931 Home _____ ~~Fax~~ Tel. 248.540.7700

E. Acreage of all parcels in the project: Gross 2.40 Net _____

F. Explain the project and development phases:

G. Total number of:
Existing: structures 1 bedrooms unknown offices N/A parking spaces N/A carports N/A garages 1
Proposed: structures 1 bedrooms N/A offices N/A parking spaces 53 carports N/A garages N/A

H. Square footage: existing buildings 2,161 proposed buildings 4,000
Usable Floor area: existing buildings 2,161 proposed buildings 4,000

I. If employees will work on the site, state the number of full time and part time employees working per shift and hours of operation: It is expected that there will be 3 employees on site. Hours of operation is anticipated to be from 8 am to 7 pm

J. Existing Recreation: Type N/A Acreage _____
Proposed Recreation: Type N/ Acreage _____
Existing Open Space: Type Residential Lawn Acreage 2.28
Proposed Open Space: Type Commercial Lawn Acreage 1.60

K. If Multiple Housing:

Total acres of property N/A

Acres in floodplain _____ Percent of total _____

Acres in wetland (not in floodplain) _____ Percent of total _____

Total dwelling units _____

Dwelling unit mix:		
	Number of single family detached:	for Rent _____ Condo _____
	Number of duplexes:	for Rent _____ Condo _____
	Number of townhouses:	for Rent _____ Condo _____
	Number of garden style apartments:	for Rent _____ Condo _____
	Number of other dwellings:	for Rent _____ Condo _____

L. The following support materials must be submitted with the application:

1. Nonrefundable Fee.
2. Legal Description of the property.
3. Evidence of fee or other ownership of the property.
4. Site Plan containing the information listed in the attachment to this application.
5. Architectural sketches showing all sides and elevations of the proposed buildings or structures, including the project entrance, as they will appear upon completion. The sketches should be accompanied by material samples or a display board of the proposed exterior materials and colors.
6. A Traffic Study, prepared by a qualified traffic engineer, based on the most current edition of *Evaluating Traffic Impact Studies: A Recommended Practice for Michigan Communities*, published by the State Department of Transportation.
   a. A traffic assessment will be required for the following:
      1) New special uses which could, or expansion or change of an existing special use where increase in intensity would, generate between 50 to 99 directional trips during a peak hour of traffic.
      2) All other special uses requiring a traffic assessment as specified in the Township Code of Ordinances, Chapter 86, Article IV, Division 2.
   b. A traffic impact study will be required for the following:
      1) New special uses which would, or expansion or change of an existing special use where increase in intensity would, generate over 100 directional trips or more during a peak hour of traffic, or over 750 trips on an average day.
      2) All other special uses requiring a traffic assessment as specified in the Township Code of Ordinances, Chapter 86, Article IV, Division 2.
7. Natural features assessment which includes a written description of the anticipated impacts on the natural features at each phase and at project completion that contains the following:
   a. An inventory of natural features proposed to be retained, removed, or modified. Natural features shall include, but are not limited to, wetlands, significant stands of trees or individual trees greater than 12 inches dbh, floodways, floodplains, waterbodies, identified groundwater vulnerable areas, slopes greater than 20 percent, ravines, and vegetative cover types with potential to sustain significant or endangered wildlife.
   b. Description of the impacts on natural features.
   c. Description of any proposed efforts to mitigate any negative impacts.

   The natural features assessment may be waived by the Director of Community Planning and Development in certain circumstances.

M. Any other information specified by the Director of Community Planning and Development which is deemed necessary to evaluate the application.

N. In addition to the above requirements, for zoning districts, **RD, RC, RCC, RN, and CV** and **Group Housing Residential Developments** the following is required:

1. Existing and proposed contours of the property at two foot intervals based on United States Geological Survey (USGS) data.
2. Preliminary engineering reports in accordance with the adopted Township water and sewer standards, together with a letter of review from the Township Engineer.
3. Ten copies of a report on the intent and scope of the project including, but not limited to: Number, size, volume, and dimensions of buildings; number and size of living units; basis of calculations of floor area and density and required parking; number, size, and type of parking spaces; architectural sketches of proposed buildings.
4. Seven copies of the project plans which the Township shall submit to local agencies for review and comments.

O. In addition to the above requirements, a special use application in zoning district **RP** requires the following material as part of the site plan:

1. A description of the operations proposed in sufficient detail to indicate the effects of those operations in producing traffic congestion, noise, glare, air pollution, water pollution, fire hazards or safety hazards or the emission of any potentially harmful or obnoxious matter or radiation.
2. Engineering and architectural plans for the treatment and disposal of sewerage and industrial waste tailings, or unusable by-products.
3. Engineering and architectural plans for the handling of any excessive traffic congestion, noise, glare, air pollution, or the emission of any potentially harmful or obnoxious matter or radiation.

P. In addition to the above requirements, a special use application for a use in the Floodway Fringe of zoning district **CV** requires the following:

1. A letter of approval from the State Department of Environmental Quality.
2. A location map including existing topographic data at two-foot interval contours at a scale of one inch representing 100 feet.
3. A map showing proposed grading and drainage plans including the location of all public drainage easements, the limits, extent, and elevations of the proposed fill, excavation, and occupation.
4. A statement from the County Drain Commissioner, County Health Department, and Director of Public Works and Engineering indicating that they have reviewed and approved the proposal.

Q. In addition to the above requirements, a special use application for a use in the Groundwater Recharge area or zoning district **CV** requires the following:

1. A location map including existing topographic data at two-foot interval contours.
2. A map showing proposed grading and drainage plans including the location of all public drainage easements, the limits and extent of the proposed fill, excavation, and occupation.
3. A statement from the County Drain Commissioner, County Health Department, and Director of Public Works and Engineering indicating that they have reviewed and approved the proposal.

R. In addition to the above requirements, the Township Code of Ordinances, Article VI, should be reviewed for the following special uses: group housing residential developments, mobile home parks, nonresidential structures and uses in residential districts, planned community and regional shopping center developments, sand or gravel pits and quarries, sod farms, junk yards, sewage treatment and disposal installations, camps and clubs for outdoor sports and buildings greater than 25,000 square feet in gross floor area.

Part II **SUP REQUEST STANDARDS**
Township Code of Ordinances, Section 86-126

Applications for Special Land Uses will be reviewed with the standards stated below. An application that complies with the standards stated in the Township Ordinance, conditions imposed pursuant to the Ordinance, other applicable Ordinances, and State and Federal statutes will be approved. Your responses to the questions below will assist the Planning Commission in its review of your application.

(1) The project is consistent with the intent and purposes of this chapter.

(2) The project is consistent with applicable land use policies contained in the Township's Master Plan of current adoption.

(3) The project is designed, constructed, operated, and maintained so as to be harmonious and appropriate in appearance with the existing or intended character of the general vicinity and that such a use will not change the essential character of the same area.

(4) The project will not adversely affect or be hazardous to existing neighboring uses.

(5) The project will not be detrimental to the economic welfare of surrounding properties or the community.

(6) The project is adequately served by public facilities, such as existing roads, schools, stormwater drainage, public safety, public transportation, and public recreation, or that the persons or agencies responsible for the establishment of the proposed use shall be able to provide any such service.

(7) The project is adequately served by public sanitation facilities if so designed. If on-site sanitation facilities for sewage disposal, potable water supply, and storm water are proposed, they shall be properly designed and capable of handling the longterm needs of the proposed project.

(8) The project will not involve uses, activities, processes, materials, and equipment and conditions of operation that will be detrimental to any persons, property, or the general welfare by reason of excessive production of traffic, noise, smoke, fumes, glare, or odors.

(9) The project will not directly or indirectly have a substantial adverse impact on the natural resources of the Township, including, but not limited to, prime agricultural soils, water recharge areas, lakes, rivers, streams, major forests, wetlands, and wildlife areas.

Part III

I (we) hereby grant permission for members of the Charter Township of Meridian's Boards and/or Commissions, Township staff member(s) and the Township's representatives or experts the right to enter onto the above described property (or as described in the attached information) in my (our) absence for the purpose of gathering information including but not limited to the taking and the use of photographs.

☒ Yes ☐ No (Please check one)

By the signature(s) attached hereto, I (we) certify that the information provided within this application and accompanying documentation is, to the best of my (our) knowledge, true and accurate

_____ 3/23/23
Signature of Applicant Date

AMMAR AlKhafaji
Type/Print Name

Fee: _____ Received by/Date: _____

NF ENGINEERS

CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS

LEGAL DESCRIPTION

PARCEL 3

The East 145 feet of the following description: Beginning at a point 1123.75 feet West of the East quarter post of Section 22, Town 4 North, Range 1 West, thence West 351 feet, thence South 748 feet to the center of Grand River Road, thence Easterly along center of said road 351 feet; thence North 746 feet to beginning, Meridian Township, Ingham County, Michigan.

Address: 1614 W. Grand River Avenue
Tax ID No.: 33-02-02-22-426-001

CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS

March 15, 2023

Meridian Township
5151 Marsh Road
Okemos, Michigan 48864

Attention: **Department of Community Planning and Development**

Regarding: **Parcel 3 – 1614 W. Grand River 33-02-22-426-001**
Special Land Use

To All:

The W. Investment Holdings – Ammar W. Alkhafaji desires to construct a retail business on the referenced parcel/property. Parcel 3 is 2.20 acres of a larger property that will be developed in the future by the Owner listed above. The proposed retail is planned to be a 4,000 square foot building with a total 34 parking spaces.

1. The site noted above is zoned C-2 Commercial District. The minimum lot area is 4,000 square feet. The lot/ parcel 3 is 2.40 acres. The lot width is 144 feet. The proposal meets the setback requirements.

   The proposed use is a provisioning center. At the suggestion of the Township and in accordance with Section 86-404 the applicant is submitting this project for a special use.

2. The Township Master Plan identifies the subject parcel zoned as commercial use. The proposed use as a provisioning center will be harmonious with the surrounding properties. The property to the east of this project is a medical office. The property to the west of the site is commercial. Long term plans are to develop Parcel 2 as a commercial retail site. The provisioning center is consistent with applicable land use policies contained in the Township's Master Plan of current adoption as our property has been chosen via the township's "lottery" for District 5.

3. As provided on the attached plans, the propose development fits seamlessly on the site and has been designed to meet the standards of the Meridian Township Zoning Ordinance. As indicated above the proposed development will be harmonious with the surrounding properties and will serve as a transition between the medical office to the east and the commercial operation to the west. The hours of operation will conform with the township's requirement and will not exceed what is allowed by the township. All precautionary measures will be taken in regard to the security of the operation along with the wellbeing of the community and surrounding vicinity. Building will be constructed following all Township and Michigan building code standards. The design will be appropriate with the existing general vicinity and its intended character and will not change the essential character of that area.

4. The proposed development will be a transition between the surrounding properties and will be harmonious with those properties. It will **not** adversely affect or be hazardous to existing neighboring uses. Our facility will include an odor plan including a carbon filtration system to make sure there is no

smell giving a negative effect to our neighbors and surrounding community. We will also be having full security on the property during business hours to ensure safety to our clientele and the community at large.

5. It is anticipated that the proposed provisioning center will slightly increase the amount of commercial activity in this area. The provisioning center will be replacing existing an existing residential property. It is likely that the patrons for this project will also utilize the other nearby properties. This project will **not** be detrimental to the economic welfare of surrounding properties and community, and in fact will have a positive effect to the economic welfare of surrounding properties and community.

6. The subject parcel has frontage onto West Grand River Avenue. Pedestrian access currently exists along Grand River Avenue. Public utilities such as sewer, water and storm water are available to the site.

7. The site is served by public water and sanitary sewer services. All of which will be properly designed to fit this project and will be adequately capable of handling all long term needs for the proposed project.

8. The proposed project will not involve any uses or activities, processes, materials, equipment or conditions that will be detrimental to any persons, property or general welfare through the excessive generation of traffic, noise, smoke, fumes, glare or odor. A traffic generation report along with traffic study is provided to show support of that. We have also provided an odor plan in the provisioning center application to show all preventative measures of eliminating odor to surrounding area. There will be no conduct in the place of business to create excessive noise, smoke or fumes. All lighting of the property will be conforming to townships ordinance.

9. The proposed provisioning center project will not directly or indirectly have an adverse impact on the natural resources of the Township, the agricultural soils, water recharge areas, lakes, rivers, streams, major forests, wetlands and wildlife areas.

The proposed project is located within the existing commercial area of the Township.

Please call us if there are any questions pertaining to the above.

Respectfully,
Nowak and Fraus Engineers

Michael D. Peterson, P.E.

CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS

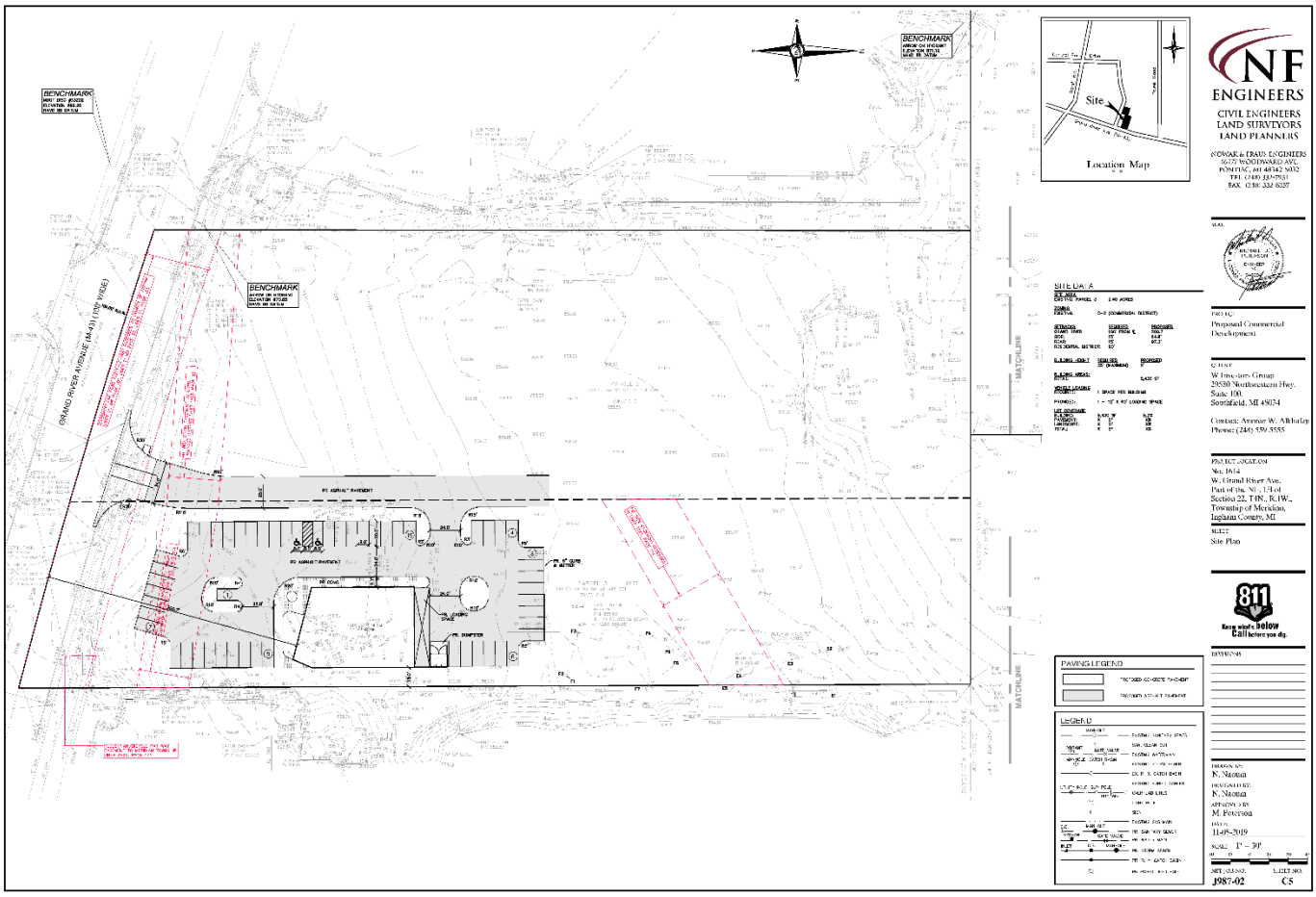
March 15, 2023

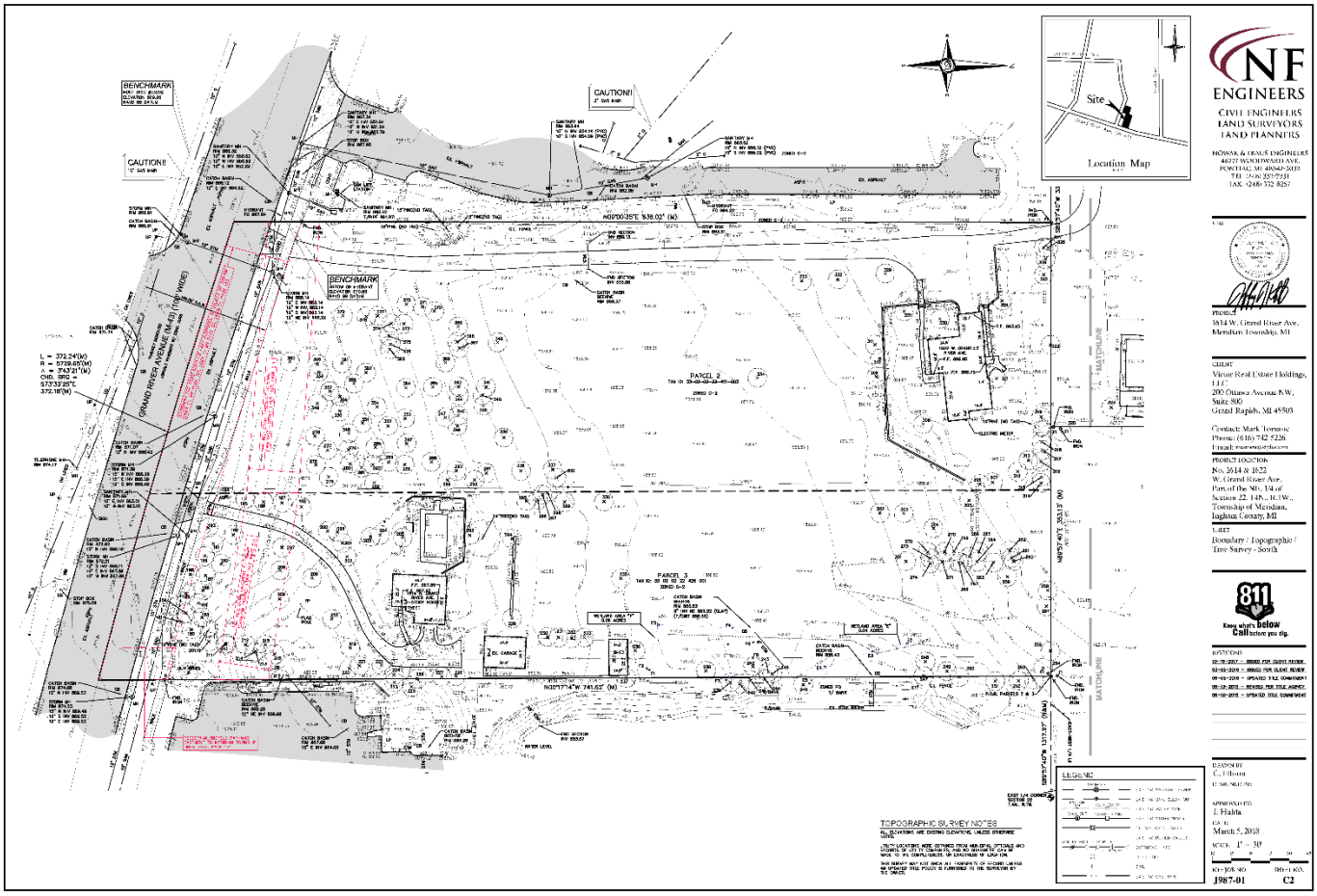
Natural Features Assessment
1614 Grand River Ave. - Meridian Township

The site is located at 1614 Grand River Avenue in Meridian Township. The proposed project will be on what is designated as parcel 3. Parcel 3 is 2.4 acres in size. The proposed project will be part of a larger project that will be developed in the future.

Access for the site will be from Grand River Avenue and is proposed to be a 3-lane ingress/egress.

The site is zoned C-2 – Commercial District. The owners are proposed to place a dispensary on the site.

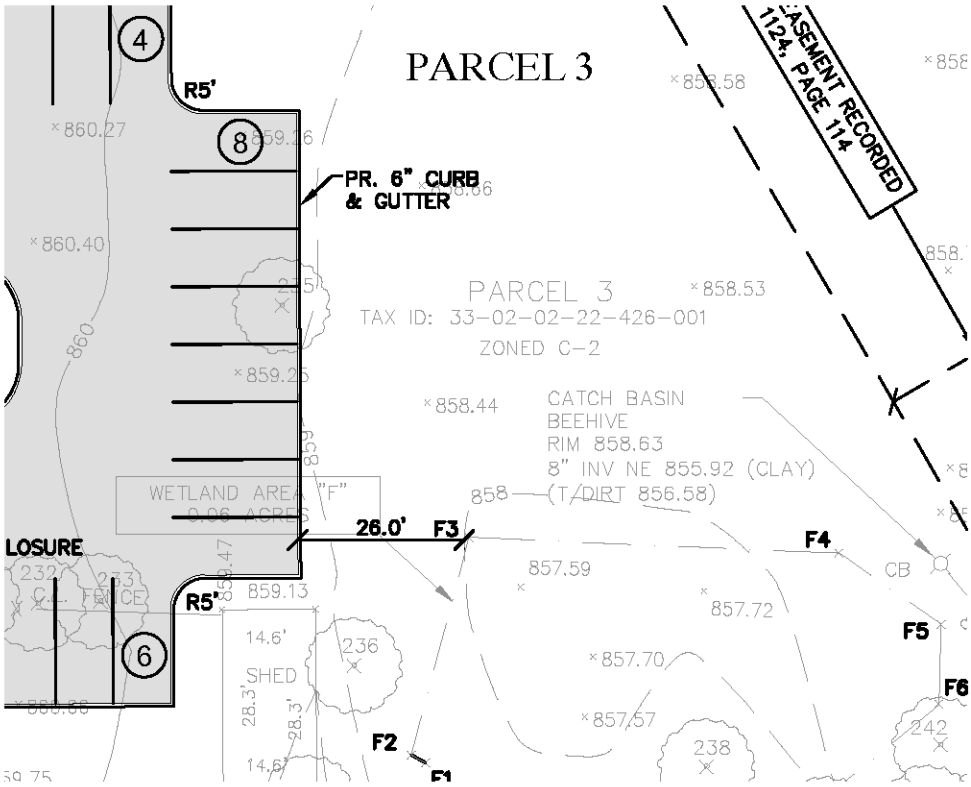




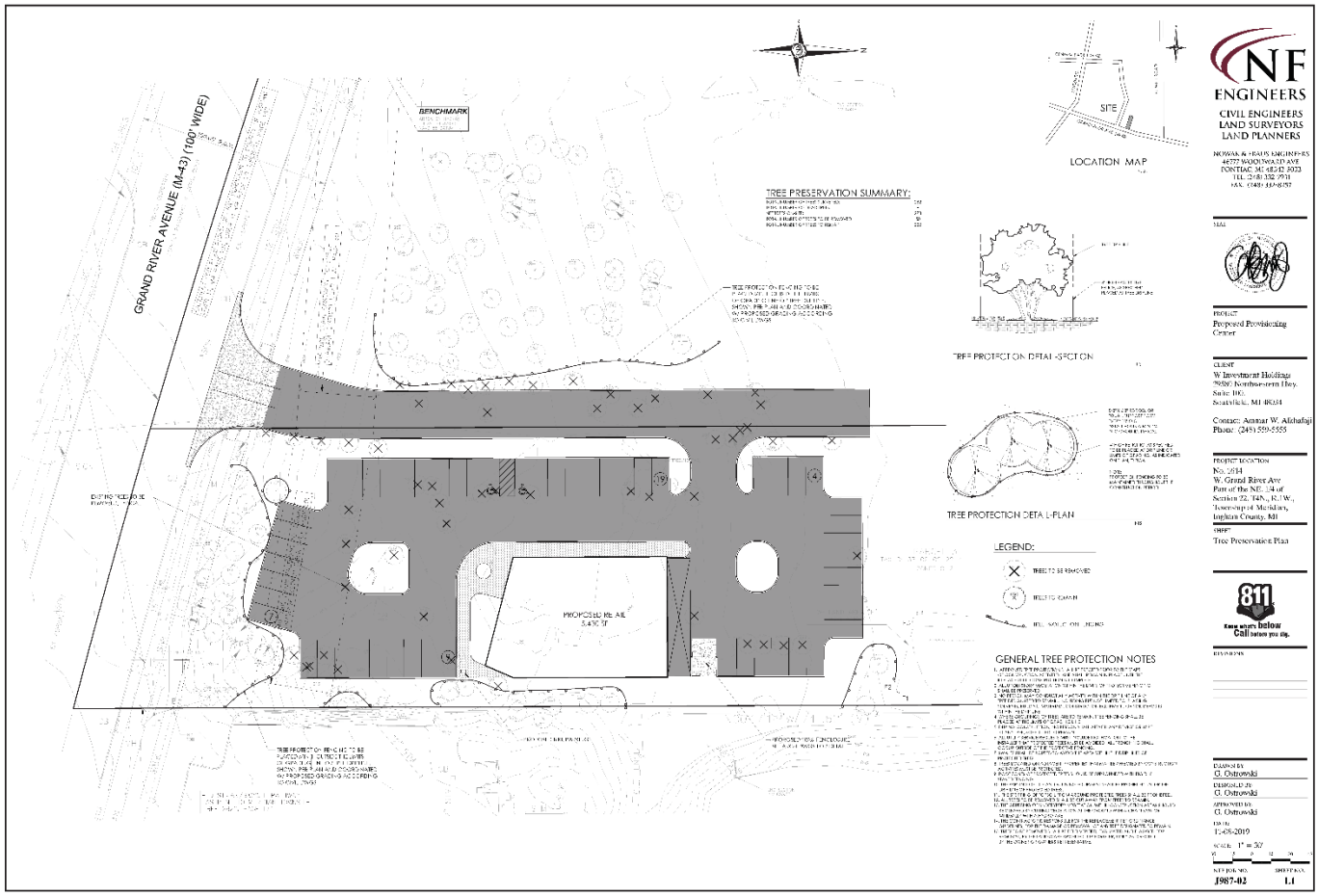
NFE has done work on this site under previous projects. As part of that work, NFE did an extensive topographic, tree and wetland survey. Based on the proposed improvement currently being developed, 50 trees will be removed. Those trees, their condition, etc., are detailed on the accompanying plans in the tree survey. The trees removed will be replaced in accordance with the accompanying landscape plan.

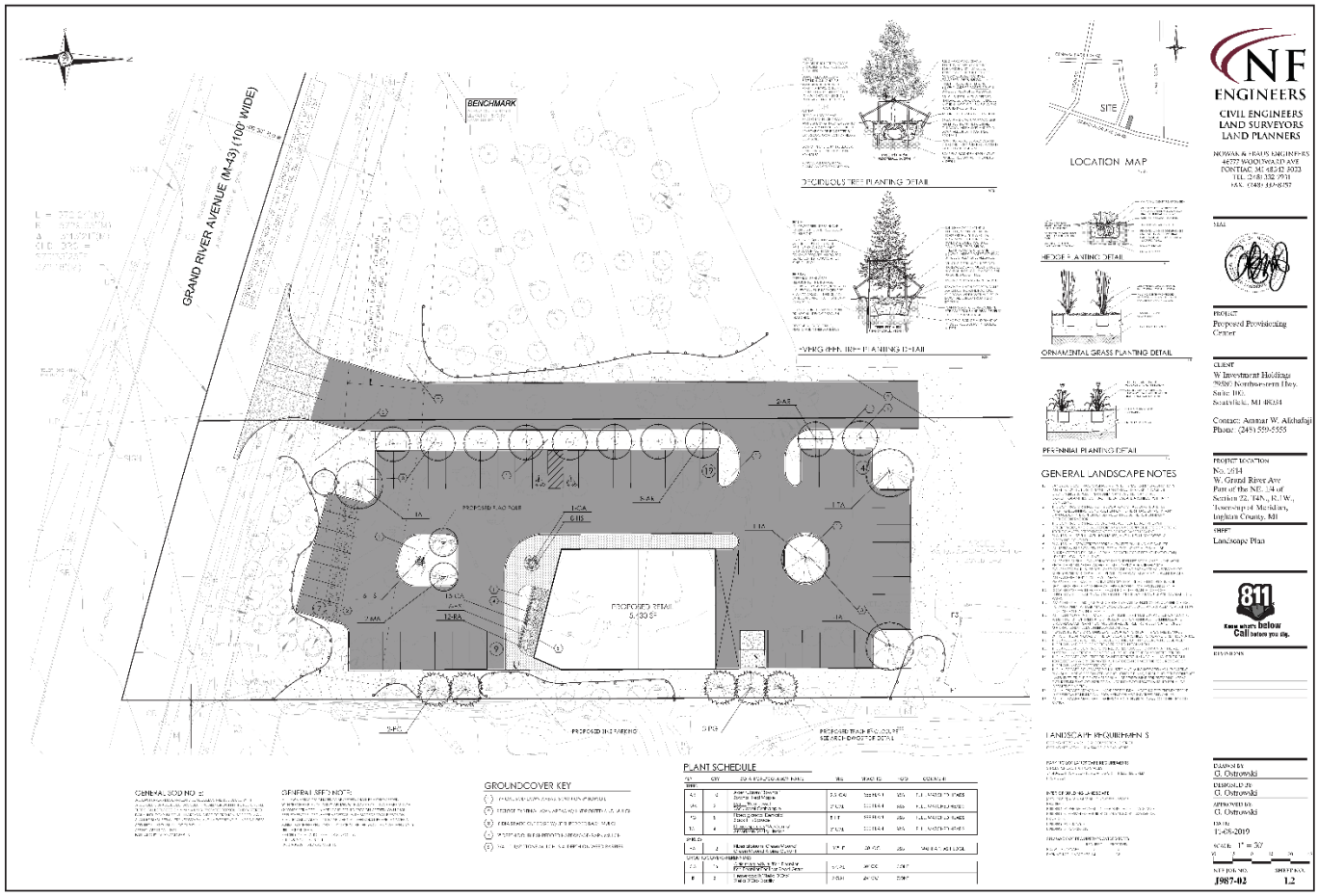
Floodways will not be impacted and are not applicable to this project. Floodplains, water bodies identified groundwater vulnerable areas, slopes greater than 20%, ravines and vegetative cover types with potential to sustain significant or endanger wildlife are none existent on this parcel.

The closest wetland to this site which was designated as Wetland Area “F” (0.06 acres) is more then 25 feet away from the proposed improvement.



As stated above, the impact on natural feature will be the removal of trees to accommodate the proposed improvement, depicted above. The plans show the plantings proposed for the proposed improvement. In accordance with the ordinance the negative removal of trees will be mitigated with new plantings. The plans also show that tree protective fencing will be place to protect those trees and areas that are not designated to be removed.


GRAND RIVER AVENUE (M-43) (100' WIDE)
BENCHMARK
TREE PRESERVATION SUMMARY:
LOCATION MAP
SITE
TREE PROTECTION DETAIL-SECTION
TREE PROTECTION DETAIL-PLAN
LEGEND:
PROPOSED RETAIL
5,490 SF
GENERAL TREE PROTECTION NOTES
NF ENGINEERS
CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS
Proposed Provisioning Center
Tree Preservation Plan
811
Know what's below
Call before you dig.
G. Ostrowski
G. Ostrowski
G. Ostrowski
12-08-2019
J987-02
L1

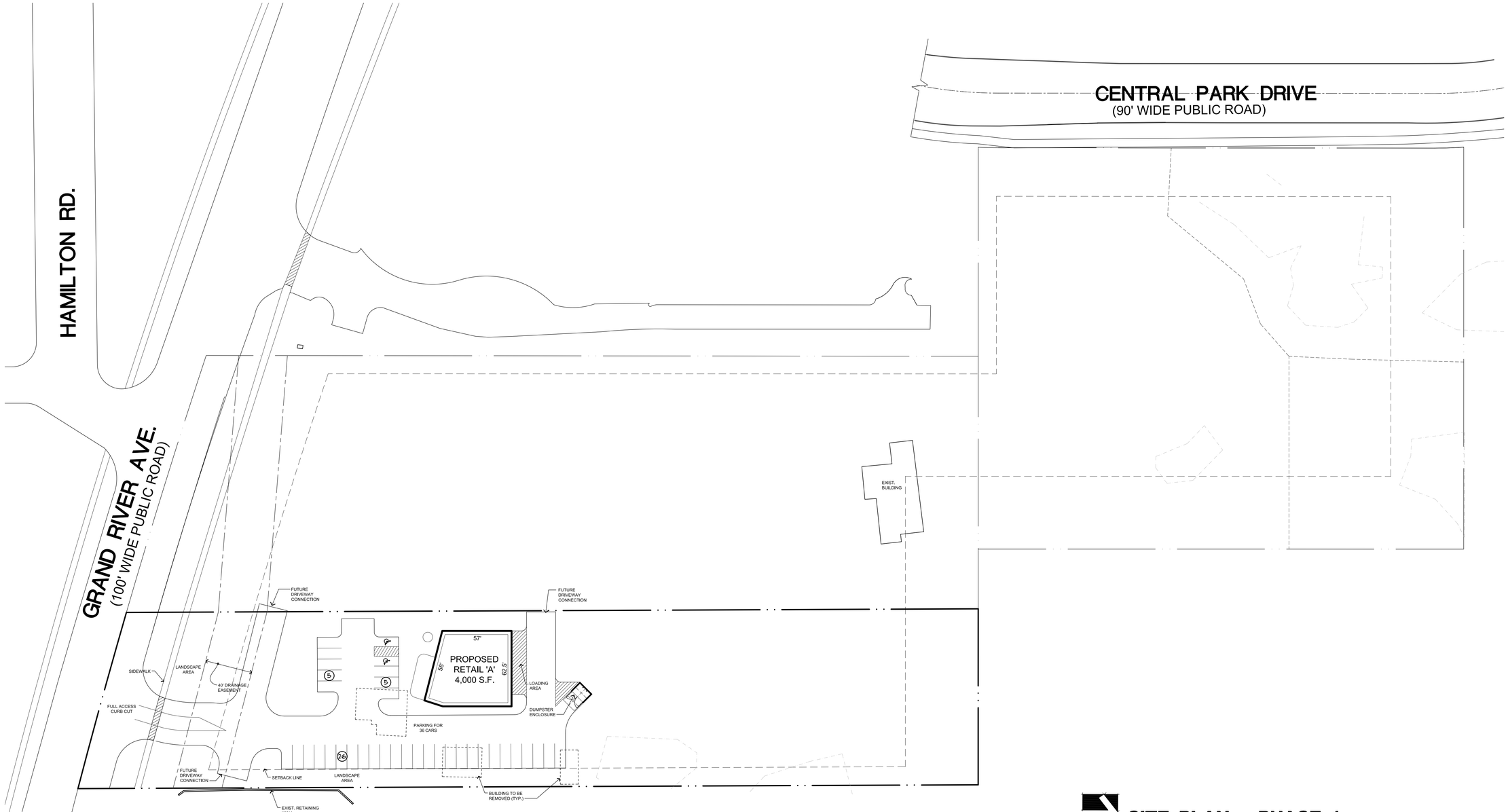


If there are any questions pertaining to the above, please call us at (248) 332-7931.

Respectfully,
Nowak and Fraus Engineers

_____
Michael D. Peterson, P.E.
Principal

LAND/ BUILDING/ PARKING DATA :	
PHASE 1	
LAND DATA :	
OVERALL LAND AREA :	2.4 ACRES
BUILDING DATA :	
PROPOSED RETAIL 'A' :	4,000 S.F.
PARKING REQUIRED :	20 SPACES
RETAIL :	
5 SPACES/ 1,000 GFA	
(4,000/ 1000 = 4 X 5 = 20 SPACES	
PARKING PROVIDED :	36 SPACES



issued for:

- OWNER REVIEW: 17 OCTOBER 2019
- OWNER REVIEW: 21 OCTOBER 2019
- OWNER REVIEW: 23 OCTOBER 2019
- OWNER REVIEW: 28 OCTOBER 2019
- OWNER REVIEW: 31 OCTOBER 2019
- OWNER REVIEW: 15 JAN. 2020
- OWNER REVIEW: 17 JAN. 2020
- OWNER REVIEW: 22 JAN. 2020

project:

Proposed for

Commercial Development

Grand River Ave.
Meridian Twp., MI

SITE PLAN - PHASE 1

SCALE: 1"=40'-0"

ROGVOY ARCHITECTS

32500 TELEGRAPH ROAD
SUITE 250
BINGHAM FARMS, MICHIGAN
48025-2404

PH 248.540.7700 FX 248.540.2710
www.rogvoy.com

drawing:

Conceptual Site Plan Phase 1

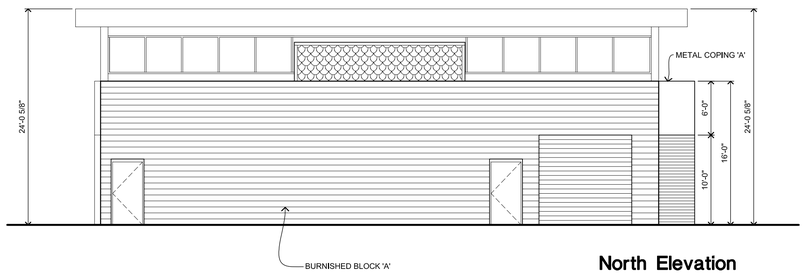
DO NOT SCALE DRAWING

issue date: 02 AUG. 2019
drawn: KS/KL
checked: MD
approved: MD

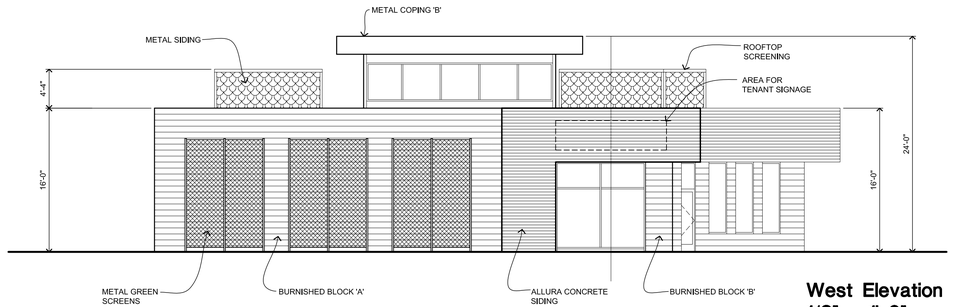
file number: 19030

sheet:

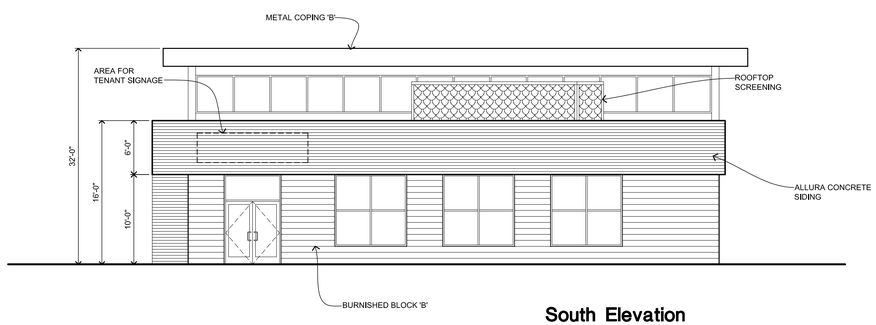
SP-1A



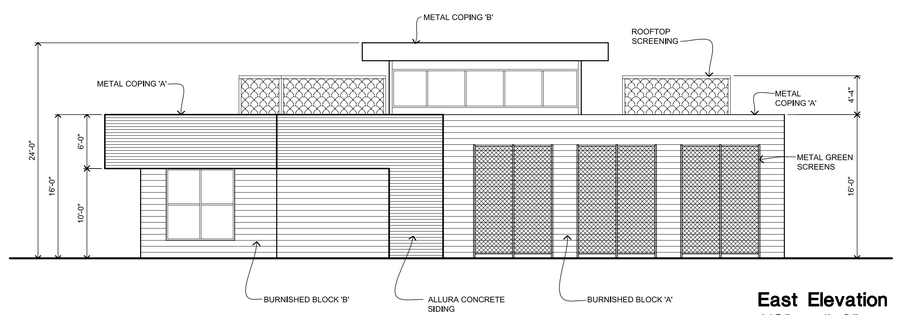
North Elevation
1/8" = 1'-0"



West Elevation
1/8" = 1'-0"



South Elevation
1/8" = 1'-0"



East Elevation
1/8" = 1'-0"

issued for:
OWNER REVIEW: 08 NOVEMBER 2019
OWNER REVIEW: 11 NOVEMBER 2019
SPECIAL LAND USE: 11 NOVEMBER 2019
OWNER REVIEW: 23 JAN. 2020

project:

Proposed for
Commercial Development
Grand River Ave.
Meridian, MI

ROGVOY
ARCHITECTS
32500 TELEGRAPH ROAD
SUITE 250
BINGHAM FARMS, MICHIGAN
48025-2404
PH 248.540.7700 FX 248.540.2710
www.rogvoy.com

drawing:

Conceptual Floor Plan

DO NOT SCALE DRAWING

issue date: 02 AUG. 2019
drawn: BDB
checked: MD
approved: MD

file number: 19030

sheet:

ELEV

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MEMO

VIA EMAIL Dominic@bacallgroupllc.com

To: **W. Investment Holdings, LLC**

From: **Jacob Swanson, PE**
Fleis & VandenBrink Engineering

Date: **April 27, 2023**

Re: **1614 W. Grand River Avenue – Provisioning Center Development**
Resubmission, April 2023
Traffic Volume & Trip Generation Comparisons

1 INTRODUCTION

This memorandum presents the results of the traffic volume comparison and trip generation analysis for the proposed provisioning center site, located at 1614 W. Grand River Avenue, in Meridian Township, Michigan. Fleis & VandenBrink (F&V) previously completed a Traffic Impact Study (TIS) for the proposed development, dated January 21, 2020. Since this study was completed, the site plan has been revised and the traffic volumes utilized in the study were over five (5) years old at this time. Therefore, the Township has requested a comparison of the 2018 traffic volumes utilized in the TIS to the available current traffic volume data and a comparison between the trip generation calculations associated with the previous TIS and the currently proposed development plans for this site.

The scope of the study was developed based on Fleis & VandenBrink's (F&V) understanding of the development program, accepted traffic engineering practice, information provided by Meridian Township, and methodologies published by the Institute of Transportation Engineers (ITE).

2 TRAFFIC VOLUME COMPARISON

The previous 2020 TIS utilized turning movement count data that was collected by Traffic Engineering Associates (TEA) in 2018. Therefore, a comparison with current traffic volume data was evaluated, in order to verify the accuracy of the previous analyses. The MDOT Transportation Data Management System (TDMS) was utilized to review historical traffic volume data and Average Annual Daily Traffic (AADT) volume information along the study roadways of Grand River Avenue and Dobie Road / Central Park Drive. The results of the comparison are summarized in **Table 1**.

Table 1: Traffic Volume (AADT) Comparison

Year	Grand River (At Dobie Rd.)	Dobie Road / Central Park (At Grand River Ave.)	Grand River (E. of Hamilton Rd.)	Average
2018	0%	0%	0%	0%
2019	-4%	0%	-1%	-2%
2020	-20%	-15%	-20%	-18%
2021	+14%	+14%	+5%	11%
2022	+1%	0%	+1%	1%
Difference (2018 - 2022)	**-9%**	**-1%**	**-15%**	**-8%**

The results of the comparison indicates that the historical AADT (vpd) data has been decreasing on the adjacent roadways since 2018. Therefore, the 2018 TEA turning movement counts that were utilized in the original 2020 TIS are expected to provide a conservative analysis of the current 2023 conditions.

27725 Stansbury Boulevard, Suite 195
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

3 TRIP GENERATION ANALYSIS

The number of weekday peak hour (AM and PM) and daily vehicle trips that would be generated by the proposed development was forecast based on data published by ITE in the *Trip Generation, 11th Edition*. It should be noted that the trip generation analysis completed for this site in the F&V 2020 TIS utilized the ITE *Trip Generation, 10th Edition.* No changes to the previous trip generation calculations were made for this comparison. The site trip generation forecast is summarized in **Table 2**.

Table 2: Site Trip Generation Comparison

Scenario	Land Use	ITE Code	Size	Unit	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
						In	Out	Total	In	Out	Total
Previous Site Plan (1/21/2020 TIS)	Marijuana Dispensary*	882	5,430	SF	1,372	32	25	57	60	59	119
Current Site Plan (2023)	Marijuana Dispensary	882	4,000	SF	844	22	20	42	38	38	76
				Difference	**-528**	**-10**	**-5**	**-15**	**-22**	**-21**	**-43**

** ITE Trip Generation 10th Edition*

4 CONCLUSIONS

- The results of the traffic volume comparison indicates that the historical AADT (vpd) data has been decreasing since 2018. Therefore, the turning movement counts that were utilized in the original 2020 TIS are expected to provide a conservative analysis of the current 2023 conditions.
- The trip generation comparison indicates that the currently proposed site plan will generate **less trips** than the trip generation projections utilized for the previous 2020 TIS, based on the reduced building size and the updated ITE rates and equations.
- The results of this comparison show that trip generation and the traffic volumes in 2023 are *less* that the analysis that was performed in 2020.
    - Therefore, the proposed development is expected to have less of an impact to the adjacent roadway network than evaluated in the 2020 TIS.

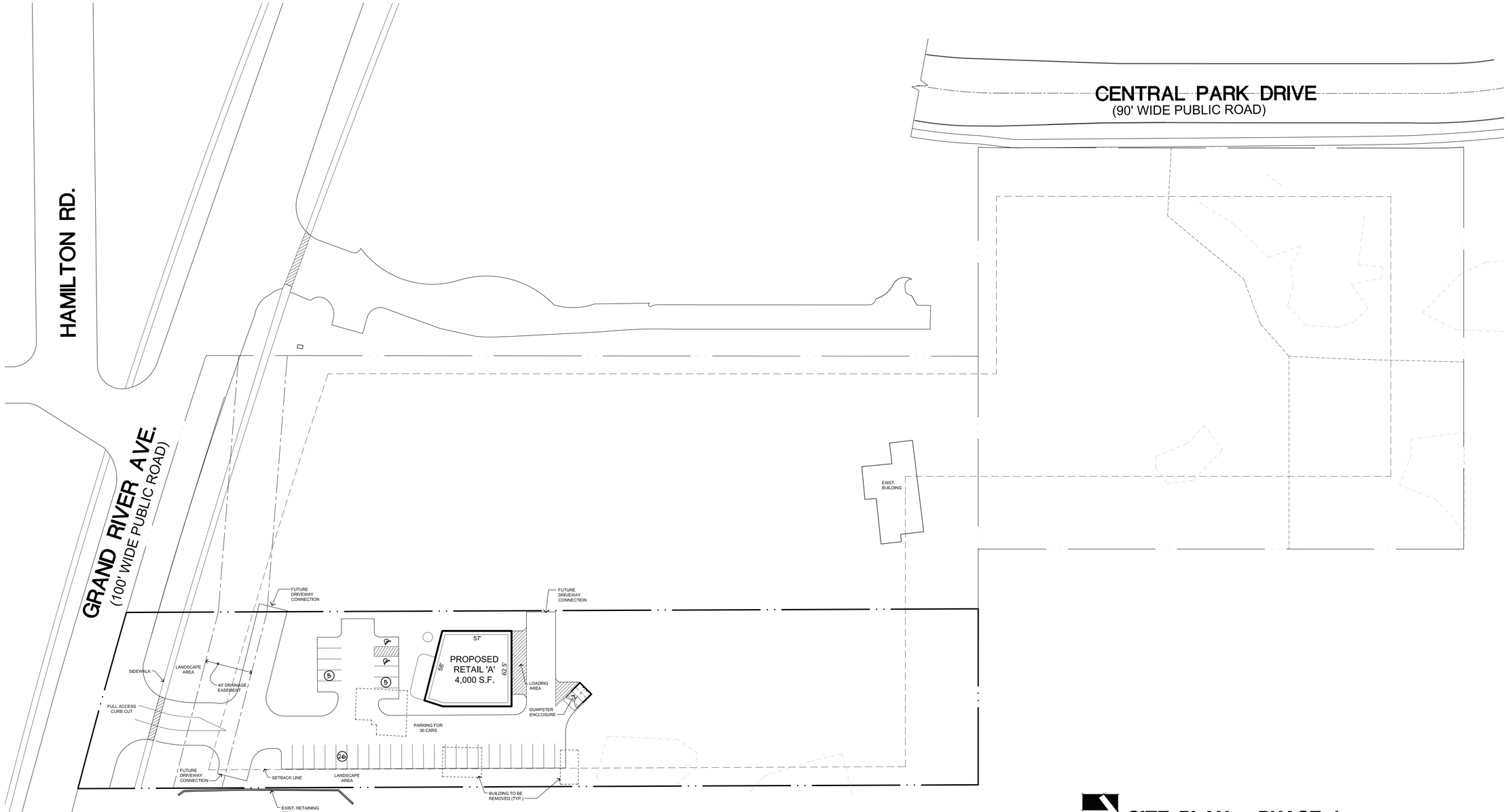
Any questions related to this memorandum, study, analysis, and results should be addressed to Fleis & VandenBrink.

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Michigan.

Attached: Proposed Site Plan
2020 Traffic Impact Study

JJS2:jmk

LAND/ BUILDING/ PARKING DATA :	
PHASE 1	
LAND DATA :	
OVERALL LAND AREA :	2.4 ACRES
BUILDING DATA :	
PROPOSED RETAIL 'A' :	4,000 S.F.
PARKING REQUIRED :	20 SPACES
RETAIL :	
5 SPACES/ 1,000 GFA	
(4,000/ 1000 = 4 X 5 = 20 SPACES	
PARKING PROVIDED :	36 SPACES



issued for:

- OWNER REVIEW: 17 OCTOBER 2019
- OWNER REVIEW: 21 OCTOBER 2019
- OWNER REVIEW: 23 OCTOBER 2019
- OWNER REVIEW: 28 OCTOBER 2019
- OWNER REVIEW: 31 OCTOBER 2019
- OWNER REVIEW: 15 JAN. 2020
- OWNER REVIEW: 17 JAN. 2020
- OWNER REVIEW: 22 JAN. 2020

project:

Proposed for

Commercial Development

Grand River Ave.
Meridian Twp., MI

SITE PLAN - PHASE 1

SCALE: 1"=40'-0"

ROGVOY ARCHITECTS

32500 TELEGRAPH ROAD
SUITE 250
BINGHAM FARMS, MICHIGAN
48025-2404

PH 248.540.7700 FX 248.540.2710
www.rogvoy.com

drawing:

Conceptual Site Plan Phase 1

DO NOT SCALE DRAWING

issue date: 02 AUG. 2019
drawn: KS/KL
checked: MD
approved: MD

file number: 19030

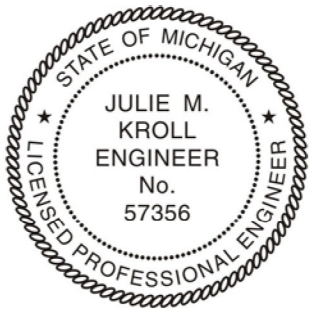
sheet:

SP-1A

PROPOSED PROVISION CENTER TRAFFIC IMPACT STUDY

MERIDIAN TOWNSHIP, MICHIGAN

JANUARY 21, 2020



Julie M. Kroll

Digitally signed by Julie M. Kroll
Date: 2020.01.21 16:52:39 -05'00'

PREPARED FOR:
W INVESTMENT HOLDINGS, LLC
29580 NORTHWESTERN HWY, SUITE 1000
SOUTHFIELD, MI 48034

PREPARED BY:

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

27725 STANSBURY BLVD., SUITE 195
FARMINGTON HILLS, MI 48834

#842350

Notice and Disclaimer

This document is provided by Fleis & VandenBrink Engineering, Inc. for informational purposes only. No changes or revisions may be made to the information presented in the document without the express consent of Fleis & VandenBrink Engineering, Inc. The information contained in this document is as accurate and complete as reasonably possible. Should you find any errors or inconsistencies, we would be grateful if you could bring them to our attention.

The opinions, findings, and conclusions expressed herein are those of Fleis & VandenBrink Engineering, Inc. and do not necessarily reflect the official views or policy of the Meridian Township, or the Michigan Department of Transportation (MDOT), which makes no warranty, either implied or expressed, for the information contained in this document; neither does it assume legal liability or responsibility for the accuracy, completeness or usefulness of this information. Any products, manufacturers or trademarks referenced in this document are used solely for reference purposes.

Agency Review	Date	Comments

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

EXISTING OPERATIONS 1
Grand River Ave. & Central Park Drive 1
Grand River Ave. & Hamilton Road 2
FUTURE CONDITIONS 2
Grand River Ave. & Central Park Drive 2
Grand River Ave. & Hamilton Road 2
Grand River Ave. & Site Drive 2
ACCESS MANAGEMENT 2
RECOMMENDATIONS 2

1 INTRODUCTION 3

2 BACKGROUND DATA 6

2.1 EXISTING ROAD NETWORK 6
2.2 EXISTING TRAFFIC VOLUMES 6

3 ANALYSIS 6

3.1 EXISTING CONDITIONS 6
Grand River Ave. & Central Park Drive 9
3.2 EXISTING IMPROVEMENTS 9
3.3 BACKGROUND CONDITIONS 10
3.4 SITE TRIP GENERATION 10
3.5 SITE TRAFFIC ASSIGNMENT 10
3.6 FUTURE CONDITIONS 13
Grand River Ave. & Central Park Drive 14
3.7 FUTURE IMPROVEMENTS 14
3.8 ACCESS MANAGEMENT 14
3.8.1 Grand River Ave. (M-43) Corridor Access Management 14
3.8.2 MDOT Right-Turn Lane Analysis 15
3.8.3 Intersection Sight Distance Analysis 15

4 CONCLUSIONS 16

5 RECOMMENDATIONS 17

LIST OF TABLES

TABLE 1: EXISTING INTERSECTION OPERATIONS 9
TABLE 2: EXISTING INTERSECTION OPERATIONS-WITH IMPROVEMENTS 10
TABLE 3: SITE TRIP GENERATION 10
TABLE 4: SITE TRIP DISTRIBUTION 10
TABLE 5: FUTURE INTERSECTION OPERATIONS 13
TABLE 6: FUTURE INTERSECTION OPERATIONS WITH IMPROVEMENTS 14
TABLE 7: INTERSECTION/ DRIVEWAY SPACING SUMMARY 14
TABLE 8: INTERSECTION/ DRIVEWAY SPACING SUMMARY-ALTERNATIVE MINIMUMS 15

List of Figures

Figure E1: Site Location 1
Figure 1: Site Location 4
Figure 2: Lane Use and Traffic Control 7
Figure 3: Existing Traffic Volumes 8
Figure 4: Site-Generated Traffic Volumes 11
Figure 5: Future Traffic Volumes 12
Figure 6: Access Management Intersection Spacing 15
Figure 7: Intersection Sight Distance 16

List of Appendices

A. Background Information
B. Existing Traffic Conditions
C. Future Traffic Conditions
D. Warrant Summaries

References

American Association of State Highway and Transportation Officials (AASHTO). (2018). *A Policy on Geometric Design of Highways and Streets.* Washington DC.

Federal Highway Administration, Michigan Department of Transporation, Michigan State Police. (2011). *Michigan Manual on Uniform Traffic Control Devices.*

Institute of Transportation Engineers. (2017). *Trip Generation Manual, 10th Edition.* Washington DC.

National Research Council (U.S.) Transportation Research Board. (2016). *Highway Capacity Manual, 6th Edition (HCM6).* Washington, D.C.: Transportation Research Board.

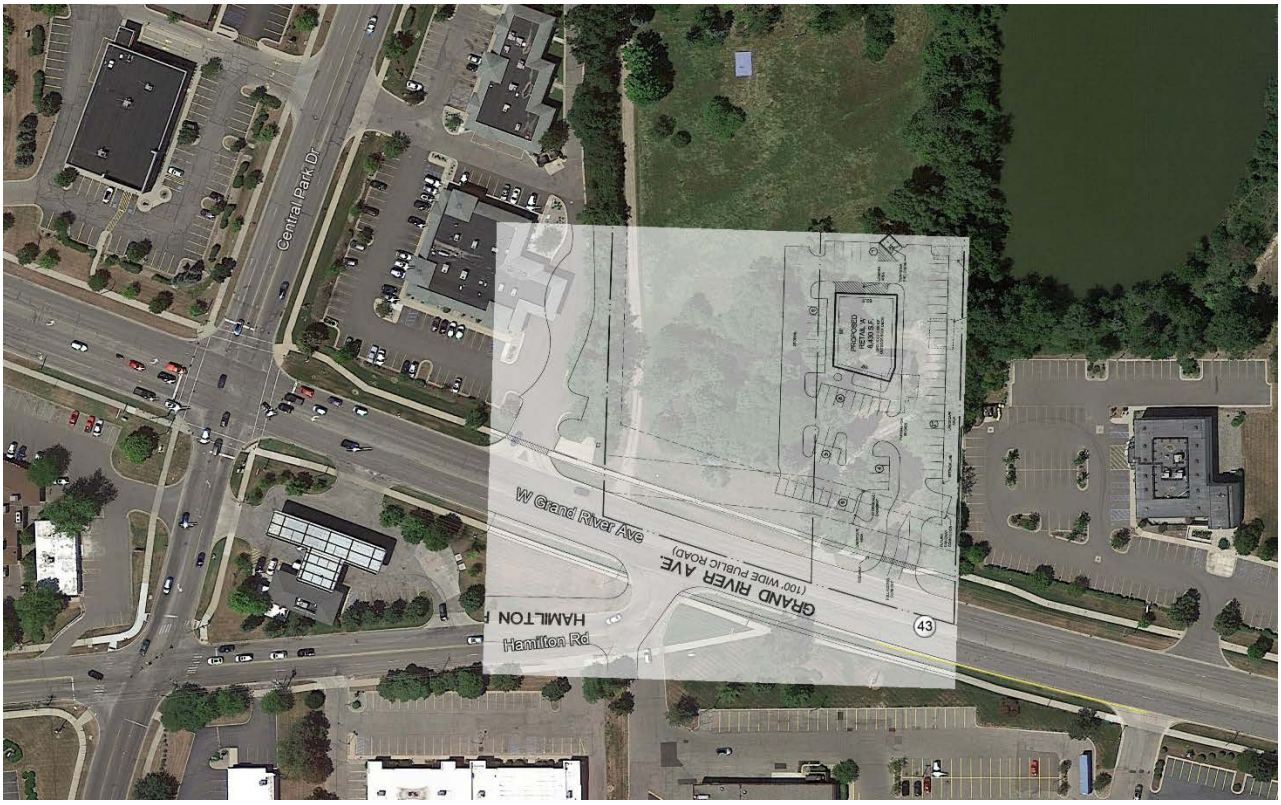
Papacostas, & Prevedouros. (2001). *Transportation Engineering and Planning.*

Stover, V. G., & Koepke, F. J. (2006). *Transportation and Land Development* (Vol. 2nd Edition). Washington DC: Institute of Transportation Engineers (ITE).

EXECUTIVE SUMMARY

This report presents the results of a Traffic Impact Study (TIS) for the proposed provision center development in Meridian Township, Michigan. The project site is located generally in the northeast quadrant of W. Grand River Avenue and Central Park Avenue, adjacent to the north side of W. Grand River Avenue, opposite the intersection with Hamilton Road, as shown on **Figure E1**. The proposed development includes a 5,430 SF marijuana dispensary with site access to be provided via one site driveway to W. Grand River Ave. The Michigan Department of Transportation (MDOT) has jurisdiction over W. Grand River Ave. (M-43).

FIGURE E1: SITE LOCATION



This TIA has been completed at the request of Meridian Township to identify the impacts (if any) of the proposed development on the proposed site access point and the permitting of the site access. The scope of the study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practice, methodologies published by the Institute of Transportation Engineers (ITE) and the requirements of Meridian Township. Additionally, F&V obtained input regarding the scope of work from Meridian Township Planning Department. In accordance with Township Ordinance, a Traffic Impact Study (TIS) is required for site plan approval.

EXISTING OPERATIONS

The existing conditions analysis included the evaluation of the existing 2020 operations at the study intersections. The results of the existing conditions analysis are summarized below.

Grand River Ave. & Central Park Drive

- During the AM peak hour, the intersection operates well, with an acceptable LOS and queue lengths for all approaches and movements.
- During the PM peak hour, the southbound left-turns on Central Park Drive operate at a LOS E, with excessive queue lengths that extend beyond the existing left-turn lane and impact the southbound through traffic on Central Park Drive.

- In order to improve the existing operations at this intersection mitigation measures were investigated, including signal timing changes and operations.
    - Signal timing optimization **is** recommended.
    - Left-turn phasing *is not* recommended.
- With the signal timing optimization at this intersection the operations improve to acceptable LOS and significantly reduce queue length.

Grand River Ave. & Hamilton Road

- During the both the AM and PM peak hours the intersection operates well, with an acceptable LOS and queue lengths for all approaches and movements.

FUTURE CONDITIONS

The future conditions analysis included the evaluation of the future 2020 operations with the addition of the proposed development traffic at the study intersections. The results of the future conditions analysis are summarized below.

Grand River Ave. & Central Park Drive

- During the AM peak hour the intersection operates well, with acceptable LOS and queue lengths for all approaches and movements.
- During the PM peak hour the southbound left-turns on Central Park Drive operate at a LOS E, with excessive queue lengths that extend beyond the existing left-turn lane and impact the southbound through traffic on Central Park Drive.
    - With the signal timing optimization at this intersection the operations improve to an acceptable LOS and significantly reduce queue length.

Grand River Ave. & Hamilton Road

- During the both the AM and PM peak hours the intersection operates well, with an acceptable LOS and queue lengths for all approaches and movements.

Grand River Ave. & Site Drive

- During both the AM and PM peak hours the intersection operates well, at a LOS B/C during the peak periods with queue lengths of 1-2 vehicles.

ACCESS MANAGEMENT

1. The proposed site driveway meets Grand River Ave. (M-43) Corridor Access Management criterion, provided the exceptions are granted by the Township and MDOT for the following driveways:
    - Tom's Driveway
    - Speedway Driveway
    - Sparrow Driveway
2. There is an existing center left-turn lane adjacent to the site; therefore, only the MDOT right-turn lane criteria was evaluated for the proposed site drive intersection. The results of the analysis show that a right-turn lane or taper is not required.
3. The results of the intersection sight distance analysis show that there will be adequate intersection sight distance at the proposed site driveway on Grand River Ave.

RECOMMENDATIONS

The recommendations of this TIS are as follows:

- MDOT should investigate signal timing optimization at the Grand River & Central Park Drive intersection to improve existing and future PM peak hour operations.

1 INTRODUCTION

This report presents the results of a Traffic Impact Study (TIS) for the proposed provision center development in Meridian Township, Michigan. The project site is located generally in the northeast quadrant of W. Grand River Avenue and Central Park Avenue, adjacent to the north side of W. Grand River Avenue, opposite the intersection with Hamilton Road, as shown on **Figure 1**. The proposed development includes a 5,430 SF marijuana dispensary with site access to be provided via one site driveway to W. Grand River Ave. The Michigan Department of Transportation (MDOT) has jurisdiction over W. Grand River Ave. (M-43).

This TIA has been completed at the request of Meridian Township to identify the impacts (if any) of the proposed development on the proposed site access point and the permitting of the site access. The scope of the study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practice, methodologies published by the Institute of Transportation Engineers (ITE) and the requirements of Meridian Township. Additionally, F&V obtained input regarding the scope of work from Meridian Township Planning Department. In accordance with Township Ordinance, a Traffic Impact Study (TIS) is required for site plan approval.

The purpose of this study is to identify the traffic related impacts, if any, of the proposed development project on the adjacent road network. Specific tasks undertaken for this study include the following:

1. **Study Area**
    a. Provide a description of the study area including surrounding land uses, intersection and roadway geometries, speed limits, functional classifications and traffic volume data (where available). In addition, a study area site map showing the site location and the study intersections will also be provided.
2. **Proposed Land Use**
    a. Obtain and review the proposed site plan which includes the proposed land uses, densities, and desired site access locations. A description of the current and proposed land use will be accompanied with a complete project site plan (with buildings identified as to proposed use). A schedule for construction of the development will also be provided.
3. **Existing Conditions**
    a. Provide an analysis of the traffic-related impacts of the proposed development at the following study intersections:
        - Grand River Ave. & Central Park Drive/Dobie Road
        - Grand River Ave. & Hamilton Road
        - Grand River Ave. & Proposed Site Drive
    b. Obtain existing AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak period turning movement counts at the study intersections from Meridian Township for use in this study.
    c. Identify the Existing AM and PM peak hour traffic volumes at the study intersections based on turning movement count data provided.
    d. Calculate the **Existing** vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM. The analysis will be performed at each of the study intersections. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.
    e. Identify improvements (if any) for the study road network that would be required to accommodate the existing traffic volumes.
4. **Future Background Growth**
    a. If the planned completion date for the project or the last phase of the project is beyond one year of the study, an estimate of background traffic growth for the adjacent street network will be made and included in the analysis.
    b. Calculate the future background traffic volumes based on an appropriate traffic growth determined from local or statewide data to the project build-out year and/or any applicable background developments in the vicinity of this project as identified by Meridian Township.

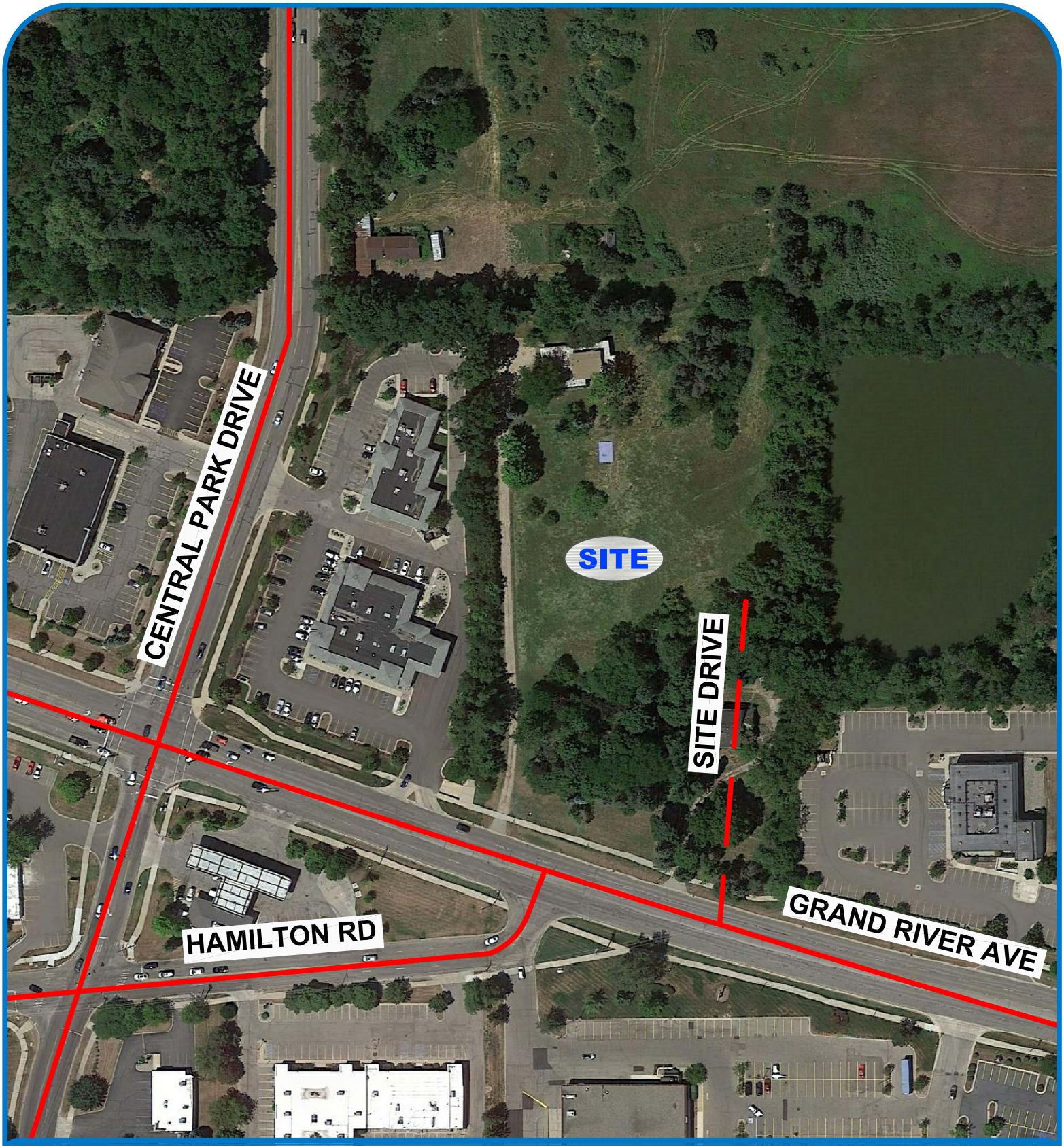


FIGURE 1
SITE LOCATION MAP

PROPOSED PROVISIONING CENTER
MERIDIAN TOWNSHIP, MI

LEGEND

SITE — SITE LOCATION

NORTH
SCALE: NOT TO SCALE

5. Background Conditions (No Build)

a. Calculate the **Background *(without the proposed development)*** vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM peak periods. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.

b. Any state, local, or private transportation improvement projects in the project study area that will be underway in the build-out year and traffic that is generated by other proposed developments in the study area will be included as background conditions.

c. Identify improvements (if any) for the study road network that would be required to accommodate the background traffic volumes.

6. Trip Generation

a. Forecast the number of AM and PM peak hour trips that would be generated by the proposed development based on data published by the Institute of Transportation Engineers (ITE) in *Trip Generation, 10th Edition*.

b. A table will be provided in the report outlining the categories and quantities of land uses, with the corresponding trip generation rates or equations, and the resulting number of trips.

7. Trip Distribution and Traffic Assignment

a. Assign the trips that would be generated by the proposed development to the adjacent road network based on existing traffic patterns. The distribution of the estimated trip generation to the adjacent street network and nearby intersections shall be included in the report and the basis will be explained. The distribution percentages with the corresponding volumes will be provided in a graphical format.

b. Combine the site-generated traffic assignments with the background traffic forecasts to establish the Future AM and PM peak hour traffic volumes.

8. Future Conditions

a. Calculate the **Future (with the proposed development)** vehicle delays, LOS, and vehicle queues at the study intersections. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.

b. Identify improvements (if any) for the study road network that would be required to accommodate the future traffic volumes.

9. Access Management

a. Evaluate the Meridian Township Access Management criteria for the proposed site driveway on Grand River Ave., including adjacent driveway locations, opposite driveway locations, the location and spacing of the proposed site access in relation to the existing adjacent driveway and intersections.

b. Evaluate the proposed intersection sight distance at the proposed site driveway intersection on Grand River Ave.

The scope of this study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practice and information published by the Institute of Transportation Engineers (ITE). In addition, Meridian Township provided input regarding the scope of work for this study. The study analyses were completed using Synchro/SimTraffic (Version 10). Sources of data for this study included Traffic Engineering Associates (TEA) and information provided by Meridian Township, MDOT and ITE. All background information is provided in **Appendix A**.

2 BACKGROUND DATA

2.1 EXISTING ROAD NETWORK

Vehicle transportation for the proposed development is provided via Grand River Avenue located adjacent to the south side of the project site location. The lane use and traffic control at the study intersections are shown on **Figure 2** and the study roadways are further described below. For the purpose of this study, all minor streets and driveways are assumed to have an operating speed of 25 miles per hour (mph).

Grand River Avenue (M-43) runs generally in the east and west directions with a posted speed limit of 45 mph. Grand River Ave. is under the jurisdiction of MDOT and is classified a *Minor Arterial* adjacent to the proposed project site. The study segment has an AADT of approximately 13,250 vehicles per day (MDOT 2019). Grand River has a typical five-lane cross section in the vicinity of the site location, with two lanes in each direction and a center left-turn lane. The intersection with Central Park Drive is signalized, the intersection with Hamilton Road is unsignalized.

2.2 EXISTING TRAFFIC VOLUMES

The existing weekday turning movement count data used in this study were obtained from Meridian Township. TEA performed a traffic impact study in the vicinity of this project in 2018 and turning movement count data was collected at the study intersections for that project. The turning movement count data collected in 2018 was compared to the weekday traffic volume data obtained from the MDOT Traffic Data Management System (TDMS). This data included 24-hour traffic volume data collected on March 11-12, 2019 and recorded in 15-minute intervals. This data was used as a baseline to determine if a background growth rate was necessary to calculate the existing 2020 traffic volume for use in this study. The results of this comparison showed that the 2018 traffic volumes were essentially equal to the 2019 traffic volumes; therefore, no background growth was applied to the 2018 traffic volumes to establish the existing 2020 traffic conditions without the proposed development. The 2018 data were used as a baseline to establish the current 2020 peak hour traffic volumes for the analysis of existing traffic conditions. During collection of the turning movement counts, pedestrian data and commercial truck percentages were recorded and used in the traffic analysis. Peak Hour Factors (PHFs) were also calculated for each study intersection approach.

The peak hour volumes for each intersection were utilized for this study and the volumes were balanced upward through the study network, and through volumes were carried along the main study roadways. The peak hour traffic volumes were identified to occur between 7:45 AM to 8:45 AM and 5:00 PM to 6:00 PM. The traffic volume data are included in **Appendix A** and the existing peak hour traffic volumes used in the analysis are summarized on **Figure 3**.

3 ANALYSIS

3.1 EXISTING CONDITIONS

The existing AM and PM peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersection using Synchro traffic analysis software. The results of the analysis of existing conditions were based on the existing lane use and traffic control shown on **Figure 2**, the existing traffic volumes shown on **Figure 3**, and the methodologies presented in the Highway Capacity Manual 6th Edition (HCM6).

Descriptions of LOS “A” through “F” as defined in the HCM, are provided in **Appendix B** for signalized and unsignalized intersections. Typically, LOS D is considered acceptable, with LOS A representing minimal delay, and LOS F indicating failing conditions. The results of the analysis of existing conditions are presented in **Appendix B** and are summarized in **Table 1**. Microsimulations were also conducted at the study intersections using SimTraffic to further evaluate the network performance.

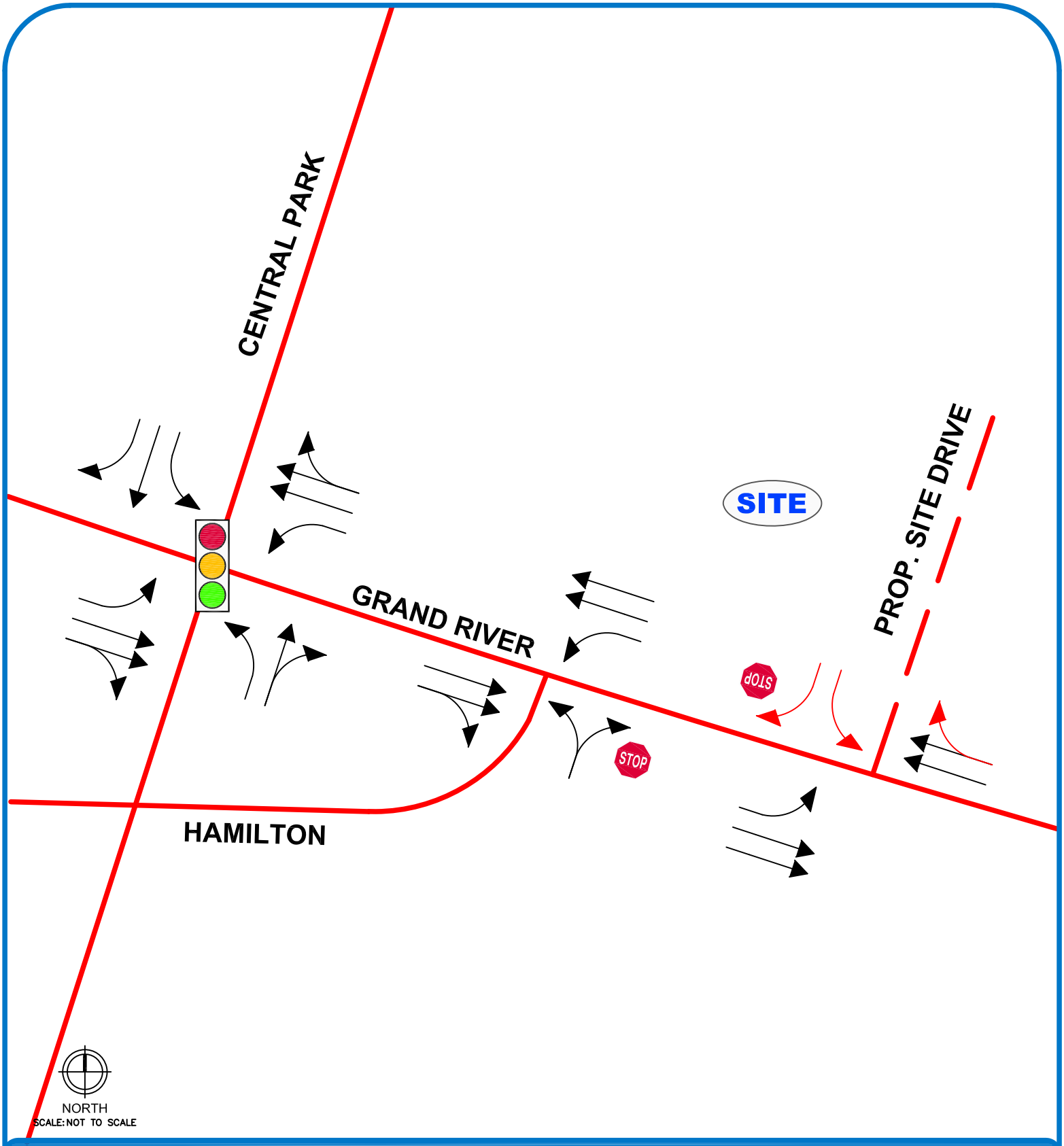


FIGURE 2
LANE USE AND TRAFFIC CONTROL

PROPOSED PROVISIONING CENTER
MERIDIAN TOWNSHIP, MI

LEGEND

- ROADS
- LANE USE
- PROPOSED LANE USE
- UNSIGNALIZED INTERSECTION
- SIGNALIZED INTERSECTION

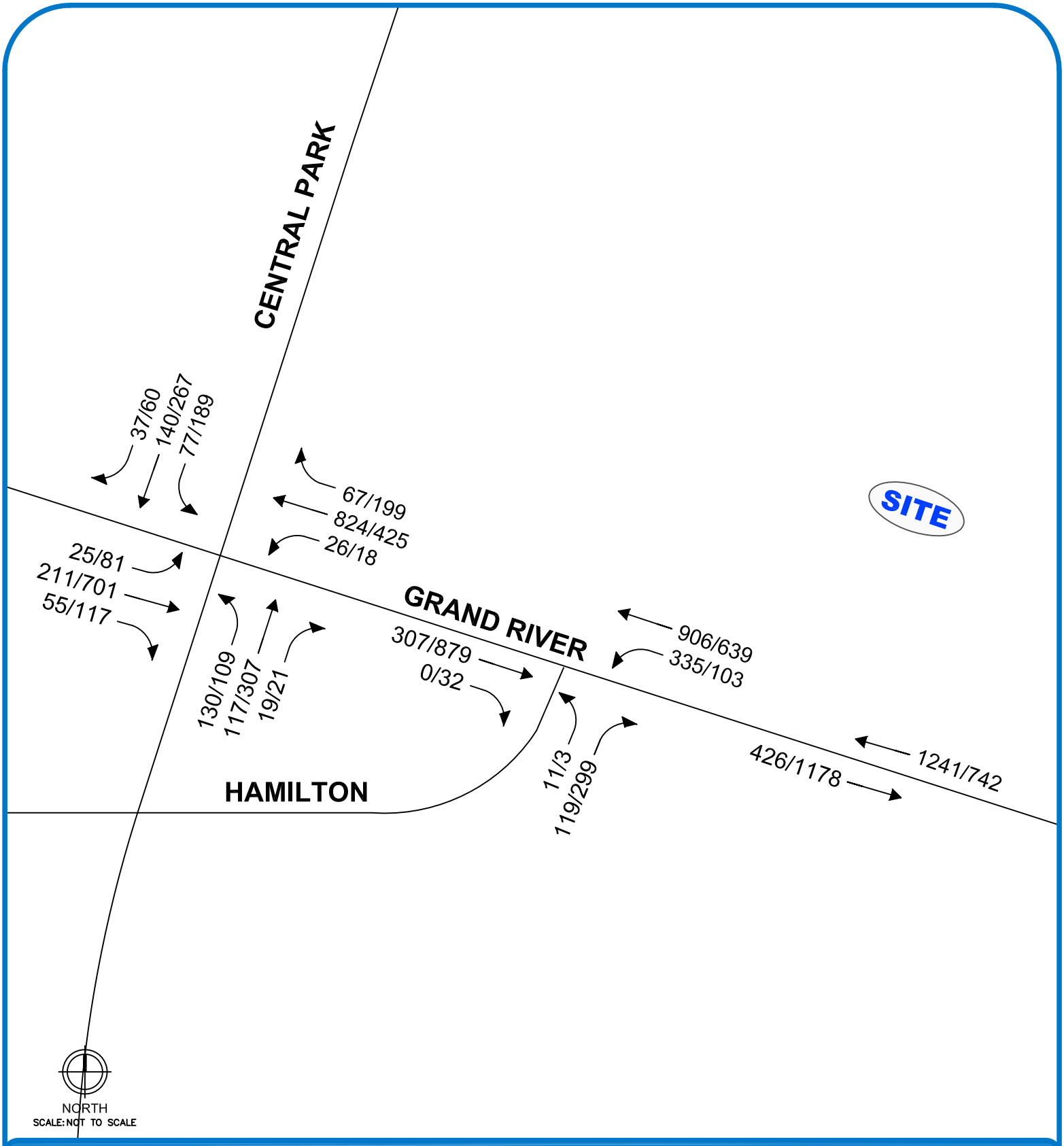


FIGURE 3
EXISTING TRAFFIC VOLUMES

PROPOSED PROVISIONING CENTER
MERIDIAN TOWNSHIP, MI

LEGEND

ROADS

TRAFFIC VOLUMES (AM/PM)

Table 1: Existing Intersection Operations

Intersection		Control	Approach	Existing Conditions							
				AM Peak				PM Peak			
				Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)
1	Grand River Ave. & Central Park/Dobie	Signalized	NBL	43.6	D	94	170	36.1	D	70	137
			NBTR	32.6	C	65	126	28.8	C	140	240
			SBL	38.6	D	49	95	55.9	E	326	503
			SBT	32.9	C	67	123	27.0	C	441	991
			SBR	30.1	C	17	43	23.3	C	131	647
			EBL	15.8	B	17	48	20.4	C	45	92
			EBT	8.0	A	37	82	14.7	B	95	149
			EBR	7.8	A	8	28	12.6	B	21	53
			WBL	8.9	A	11	42	18.5	B	11	34
			WBTR	11.7	B	125	214	14.8	B	97	162
			Overall	18.4	B			22.4	C		
2	Grand River Ave. & Hamilton Road	STOP (Minor Street)	NB	9.0	A	43	72	26.2	D	67	98
			WBL	9.4	A	40	73	11.1	B	34	76

The results of the existing conditions analysis show that all approaches and movements at the study intersections are currently operating acceptably at a LOS D or better, with the exception of the following:

Grand River Ave. & Central Park Drive

- During the PM peak hour, the southbound left-turns on Central Park Drive operate at a LOS E, with excessive queue lengths that extend beyond the existing left-turn lane and impact the southbound through traffic on Central Park Drive.

3.2 EXISTING IMPROVEMENTS

In order to improve the existing operations at this intersection mitigation measures were investigated, including signal timing changes and operations. The signal timing changes evaluated include optimizing the existing splits, and the amount of green time allocated for N/S and E/W movements. The operations evaluation included a review of the MDOT left-turn phasing calculations to determine if permissive/protected left-turn phasing should be added to the signal operations.

Signal Timing Changes

The signal currently operates during the PM peak hour with the 100 sec cycle length and 60(E/W)/40(N/S) splits. The 40 seconds does not provide adequate time to accommodate the existing southbound left-turn volume on the Central Park Drive approach. Therefore, the splits were optimized to provide 46(E/W)/54(N/S). The results of this change in signal timing are summarized below in **Table 2** and show significant improvement in the existing operations and reductions in queue lengths on the southbound approach. Furthermore, these changes in signal timing did not impact the operations on Grand River Ave.

Left-Turn Phasing

The MDOT left-turn phasing analysis spreadsheet was used to evaluate the existing left-turn volumes at this intersection to determine if separate left-turn phasing should be provided. The results of the analysis are attached and show that permissive/protected left-turns are warranted only on the SB Central Park Drive approach during the PM peak hour. Therefore, left-turn phasing is not recommended at this intersection to mitigate existing left-turn delays.

Table 2: Existing Intersection Operations-With Improvements

Intersection		Control	Approach	PM Peak Period											
				Existing Conditions				Existing with Improvements				Difference			
				Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)
1	Grand River Ave. & Central Park/Dobie	Signalized	NBL	36.1	D	70	137	30.5	C	62	118	-5.6	D to C	-8	-19
			NBTR	28.8	C	140	240	24.2	C	127	223	-4.6	n/c	-13	-17
			SBL	55.9	E	326	503	39.3	D	119	200	-16.6	E to D	-207	-303
			SBT	27.0	C	441	991	23.0	C	106	186	-4.0	n/c	-335	-805
			SBR	23.3	C	131	647	20.0	B	20	42	-3.3	C to B	-111	-605
			EBL	20.4	C	45	92	25.0	C	47	101	4.6	n/c	2	9
			EBT	14.7	B	95	149	18.0	B	125	199	3.3	n/c	30	50
			EBR	12.6	B	21	53	15.4	B	19	46	2.8	n/c	-2	-7
			WBL	18.5	B	11	34	22.6	C	15	40	4.1	B to C	4	6
			WBTR	14.8	B	97	162	18.3	B	112	183	3.5	n/c	15	21
			Overall	22.4	C			21.8	C			-0.6	n/c		

3.3 BACKGROUND CONDITIONS

Since the proposed development is anticipated to be constructed and completed within the next year, existing conditions were assumed equal to background (no build) conditions with a project buildout year of 2020.

3.4 SITE TRIP GENERATION

The number of Weekday AM and PM peak hour and daily vehicle trips that would be generated by the proposed development was forecast based on data published by ITE in the *Trip Generation Manual, 10th Edition*. The site trip generation forecast is summarized in **Table 3**.

Table 3: Site Trip Generation

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Marijuana Dispensary	882	5,430	SF	1,372	32	25	57	60	59	119

3.5 SITE TRAFFIC ASSIGNMENT

The vehicular trips that would be generated by the proposed development were assigned to the study roads based on existing peak hour traffic patterns in the adjacent roadway network, the proposed site access points, and the methodologies published by ITE. To determine trip distribution using the adjacent street traffic, it was assumed that the development land uses are trip generators; therefore, the global trip generation is based on trips entering the study network and traveling to the development. The ITE trip distribution methodology also assumes that new trips will return to their direction of origin. The resulting site trip distributions used in the analysis are summarized in **Table 4**.

Table 4: Site Trip Distribution

To / From	Via	AM	PM
West	Grand River Ave.	13%	31%
East	Grand River Ave.	57%	25%
South/West	Hamilton Rd./Dobie Rd.	18%	26%
North	Central Park Drive	12%	18%
Total		100%	100%

The vehicular traffic volumes shown in **Table 3** were distributed to the roadway network according to the distribution shown in **Table 4**. The site generated trips are shown on **Figure 4** and were added to the future existing traffic volumes shown on **Figure 2** to calculate the future peak hour traffic volumes with the proposed development, as shown on **Figure 5**.

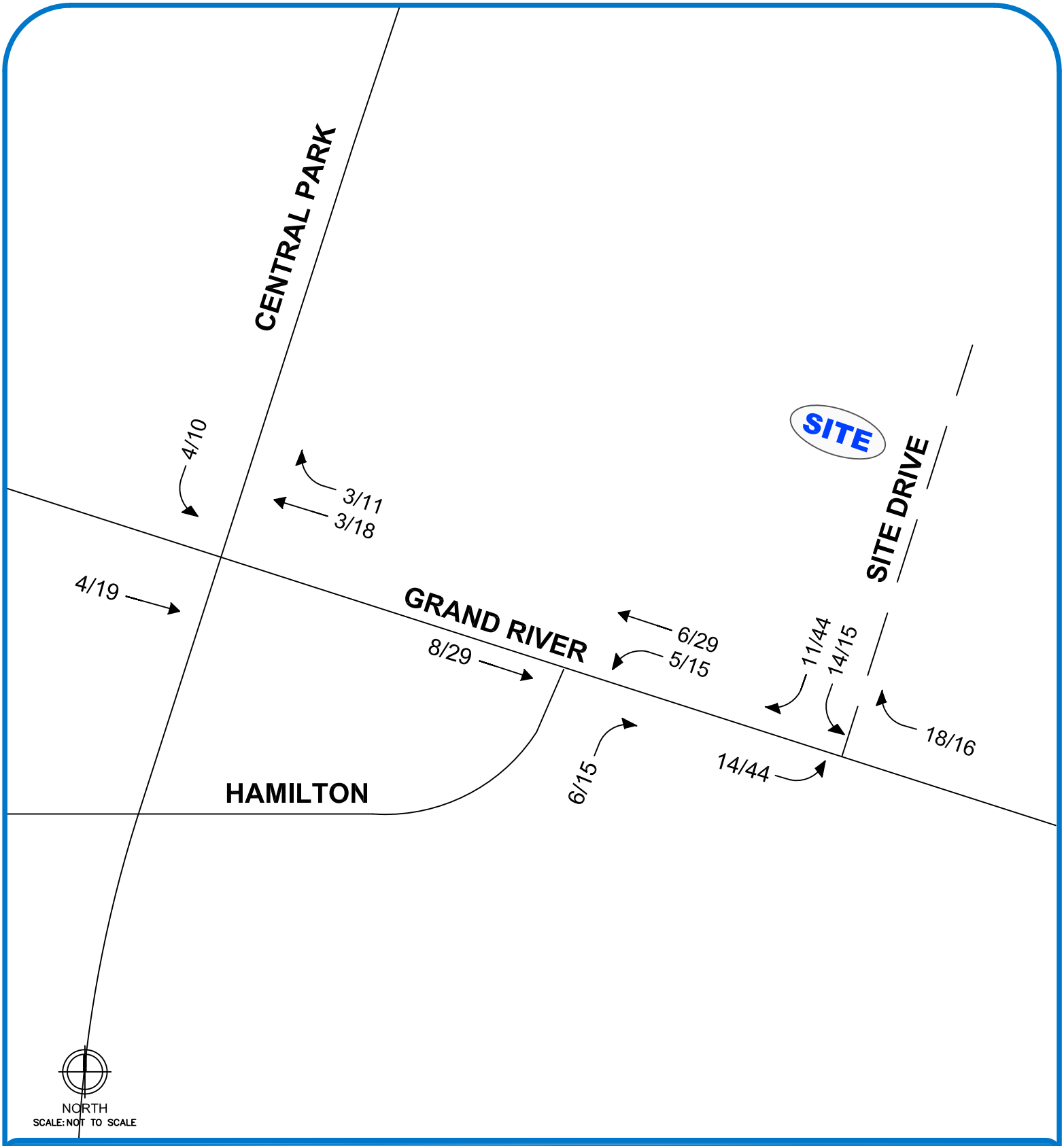


FIGURE 4
SITE-GENERATED TRAFFIC VOLUMES

PROPOSED PROVISIONING CENTER
MERIDIAN TOWNSHIP, MI

LEGEND

ROADS

TRAFFIC VOLUMES (AM/PM)

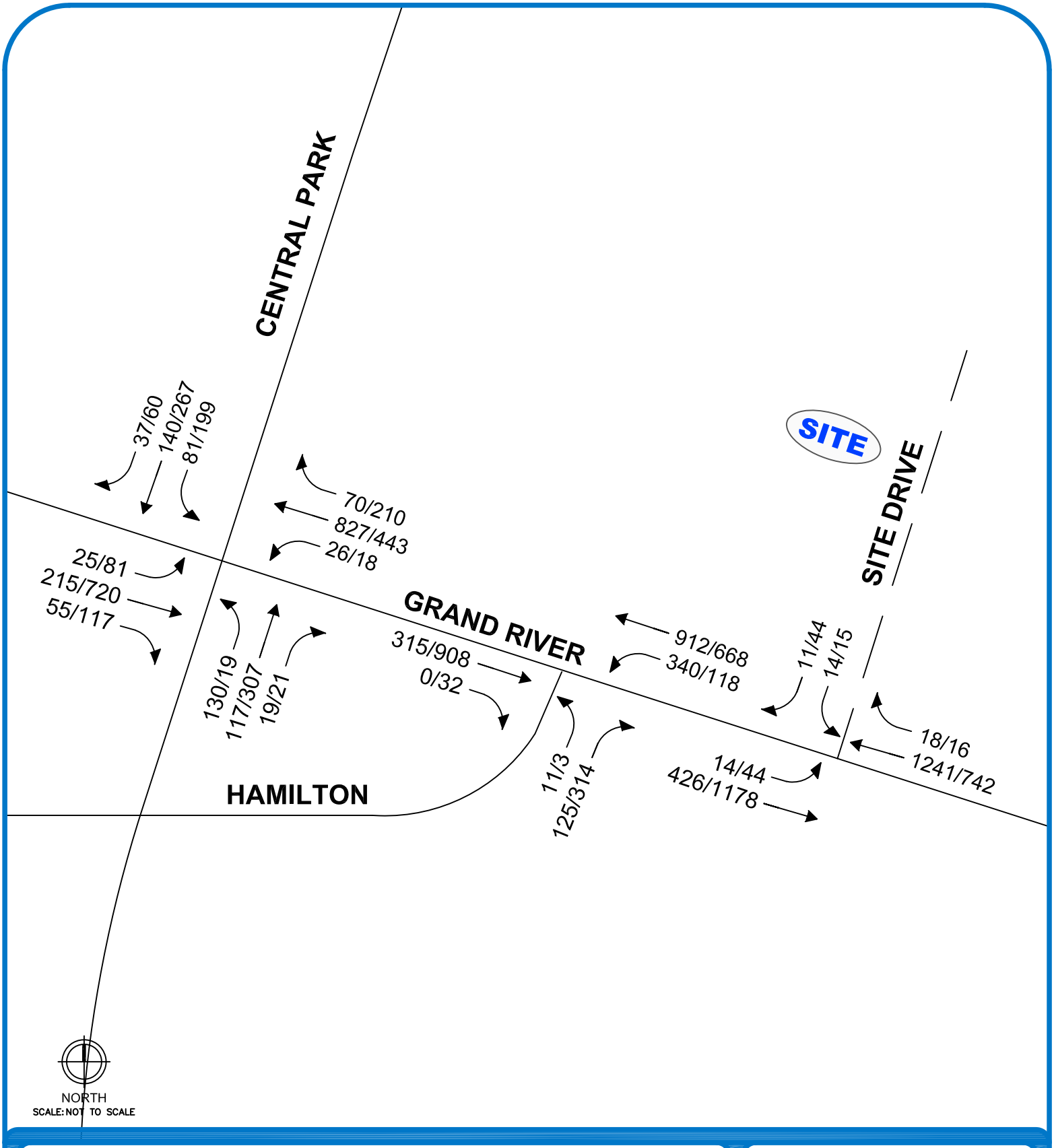


FIGURE 5
FUTURE TRAFFIC VOLUMES

PROPOSED PROVISIONING CENTER
MERIDIAN TOWNSHIP, MI

LEGEND

ROADS

TRAFFIC VOLUMES (AM/PM)

3.6 FUTURE CONDITIONS

The future peak hour vehicle delays and LOS ***with the proposed development*** were calculated based on the existing lane use and traffic control shown on **Figure 2**, the proposed site access plan, the future traffic volumes shown on **Figure 5**, and the methodologies presented in the HCM6. The results of the future conditions analysis are presented in **Appendix C** and are summarized in **Table 5.**

Table 5: Future Intersection Operations

Intersection		Control	Approach	AM Peak Period											
				Existing Conditions				Future Conditions				Difference			
				Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)
1	Grand River Ave. & Central Park Drive/Dobie Road	Signalized	NBL	43.6	D	94	170	43.6	D	82	139	0.0	n/c	-12	-31
			NBTR	32.6	C	65	126	32.6	C	67	129	0.0	n/c	2	3
			SBL	38.6	D	49	95	38.9	D	52	101	0.3	n/c	3	6
			SBT	32.9	C	67	123	32.9	C	67	120	0.0	n/c	0	-3
			SBR	30.1	C	17	43	30.1	C	17	44	0.0	n/c	0	1
			EBL	15.8	B	17	48	15.9	B	16	50	0.1	n/c	-1	2
			EBT	8.0	A	37	82	8.0	A	36	74	0.0	n/c	-1	-8
			EBR	7.8	A	8	28	7.8	A	15	24	0.0	n/c	7	-4
			WBL	8.9	A	11	42	8.9	A	12	36	0.0	n/c	1	-6
			WBTR	11.7	B	125	214	11.7	B	126	210	0.0	n/c	1	-4
			Overall	18.4	B			18.4	B			0.0	n/c		
2	Grand River Ave. & Hamilton Road	STOP (Minor Street)	NB	9.0	A	43	72	9.3	A	42	71	0.3	n/c	-1	-1
			WBL	9.4	A	40	73	9.5	A	41	71	0.1	n/c	1	-2
3	Grand River Ave. & Site Drive	STOP (Minor Street)	SBL					28.7	D	15	42	28.7	D	15	42
			SBR					14.5	B	10	33	14.5	B	10	33
			EBL					12.5	B	9	32	12.5	B	9	32

Intersection		Control	Approach	PM Peak Period											
				Existing Conditions				Future Conditions				Difference			
				Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)	Delay (s/veh)	LOS	Avg. Queue (ft)	95th% Queue (ft)
1	Grand River Ave. & Central Park/Dobie	Signalized	NBL	36.1	D	70	137	36.1	D	62	124	0.0	n/c	-8	-13
			NBTR	28.8	C	140	240	28.8	C	153	258	0.0	n/c	13	18
			SBL	55.9	E	326	503	60.3	E	380	528	4.4	n/c	54	25
			SBT	27.0	C	441	991	27.0	C	695	1276	0.0	n/c	254	285
			SBR	23.3	C	131	647	23.3	C	360	1138	0.0	n/c	229	491
			EBL	20.4	C	45	92	21.0	C	39	84	0.6	n/c	-6	-8
			EBT	14.7	B	95	149	14.9	B	102	159	0.2	n/c	7	10
			EBR	12.6	B	21	53	12.6	B	17	47	0.0	n/c	-4	-6
			WBL	18.5	B	11	34	18.8	B	13	37	0.3	n/c	2	3
			WBTR	14.8	B	97	162	15.2	B	98	164	0.4	n/c	1	2
			Overall	22.4	C			22.8	C			0.4	n/c		
2	Grand River Ave. & Hamilton Road	STOP (Minor Street)	NB	26.2	D	67	98	30.1	D	70	100	3.9	n/c	3	2
			WBL	11.1	B	34	76	11.5	B	42	81	0.4	n/c	8	5
3	Grand River Ave. & Site Drive	STOP (Minor Street)	SBL					22.4	C	13	38	22.4	C	13	38
			SBR					11.6	B	25	53	11.6	B	25	53
			EBL					9.7	A	19	47	9.7	A	19	47

Note: Slight variations (+/-) in the vehicle queuing from existing and future conditions are due to the multiple iterations included in the SimTraffic modeling of the network. Approaches/movements with significant increases in queue lengths were further evaluated for mitigation measures as summarized in Section 3.7.

The results of the future conditions analysis show that all approaches and movements at the study intersections are expected to operate in a manner similar to existing conditions, operating acceptably at a LOS D or better, with the exception of the following:

Grand River Ave. & Central Park Drive

- During the PM peak hour, the southbound left-turns on Central Park Drive will continue to operate at a LOS E, with excessive queue lengths that extend beyond the existing left-turn lane and impact the southbound through traffic on Central Park Drive.

3.7 FUTURE IMPROVEMENTS

In order to improve traffic operations to a LOS D or better for all approaches and movements at the study intersections under future conditions ***with the proposed development***, mitigation measures were investigated. The results of the analyses are summarized in **Table 6** and summarized below.

- Signal timing optimization was evaluated for Grand River Ave. & Central Park Drive and found to adequately mitigate the impact of the proposed development and improve the existing operations.

Table 6: Future Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Period											
				Future Conditions				Future with Improvements				Difference			
				Delay (s/veh	LOS	Avg. Queue	95th% Queue	Delay (s/veh	LOS	Avg. Queue	95th% Queue	Delay (s/veh)	LOS	Avg. Queue	95th% Queue
1	Grand River Ave. & Central Park/Dobie	Signalized	NBL	36.1	D	62	124	29.7	C	60	122	-6.4	D to C	-2	-2
			NBTR	28.8	C	153	258	23.6	C	119	206	-5.2	n/c	-34	-52
			SBL	60.3	E	380	528	39.1	D	125	207	-21.2	E to D	-255	-321
			SBT	27.0	C	695	1276	22.4	C	105	189	-4.6	n/c	-590	-1087
			SBR	23.3	C	360	1138	19.5	B	17	41	-3.8	C to B	-343	-1097
			EBL	21.0	C	39	84	26.5	C	48	100	5.5	n/c	9	16
			EBT	14.9	B	102	159	18.7	B	126	192	3.8	n/c	24	33
			EBR	12.6	B	17	47	15.8	B	20	45	3.2	n/c	3	-2
			WBL	18.8	B	13	37	23.6	C	14	43	4.8	B to C	1	6
			WBTR	15.2	B	98	164	19.0	B	119	191	3.8	n/c	21	27
			Overall	22.8	C			22.1	C			-0.7	n/c		

3.8 ACCESS MANAGEMENT

3.8.1 Grand River Ave. (M-43) Corridor Access Management

Meridian Township, in coordination with MDOT, has developed access management criteria for use in evaluating proposed site access driveways along this corridor. The access management criteria for the proposed site driveway location are summarized in **Table 7** and shown on **Figure 6**.

Table 7: Intersection/ Driveway Spacing Summary

Adjacent Driveways/ Intersections	Same Side/Opposite	Distance	Meridian Twp. Rec.	Meets Req.
Speedway	Opposite	550	630	NO
Bank of America	Same Side	400	350	YES
Hamilton Road	Opposite-Intersection	225	200	YES
Sparrow (1600 Grand River)	Same Side	317	350	NO
Tom's	Opposite	286	630	YES*

* With exception granted by Meridian Township Planning (minimum 150 ft for non-conflicting left-turns)

In accordance with MDOT guidelines, in the event that a particular parcel lacks sufficient frontage to maintain adequate spacing, the Region/TSC Traffic and Safety and Utility and Permit Engineers have the following options:

1. *Choose the next lowest spacing. For example, on 30 mph roadway requiring 185 ft spacing, the distance may be reduced to no less than 130 ft which is the spacing from 25 mph speed.*

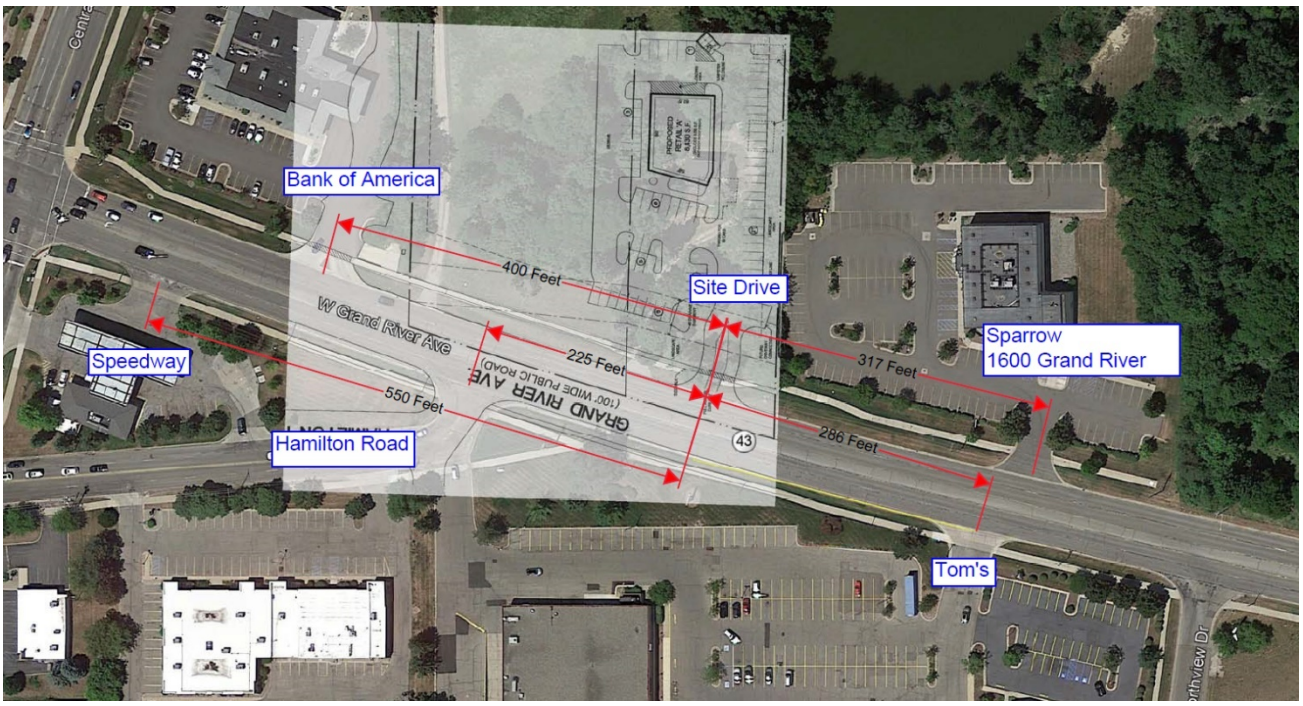
   The next lowest speed was reviewed at the locations that do not meet the minimum spacing requirements. The results of this analysis are summarized in **Table 8** and show that the spacing requirements are still not met at these locations.

Table 8: Intersection/ Driveway Spacing Summary-Alternative Minimums

Adjacent Driveways/ Intersections	Adjacent/Opposite	Distance	Meridian Twp. Rec.	Meets Req.
Speedway	Opposite	550	525	YES
Sparrow (1600 Grand River)	Same Side	317	300	YES

By using the next lowest speed category, all of the driveways and intersections will meet access management spacing criteria. Therefore, none of the further criterion was necessary for consideration for this site driveway.

FIGURE 6: ACCESS MANAGEMENT INTERSECTION SPACING



3.8.2 MDOT Right-Turn Lane Analysis

The MDOT Geometric Design Guidance Sections 1.1.4 (formerly MDOT Traffic & Safety Notes 604A) was utilized in order to determine if a right-turn lane or taper is required at the proposed site driveway. The results of the analysis are provided in **Appendix D** and indicate the following:

- A right-turn radius only is recommended for the proposed Site Drive. No additional right-turn treatment is required.

3.8.3 Intersection Sight Distance Analysis

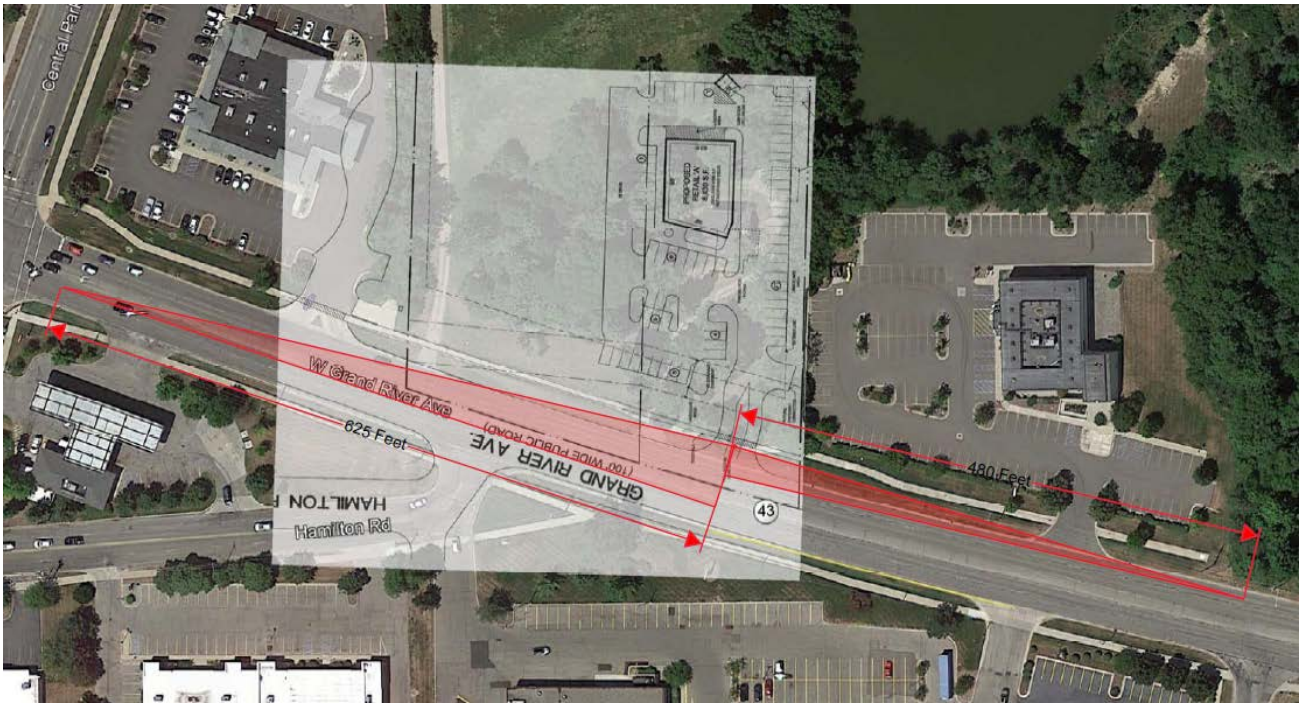
The intersection sight distance was reviewed at the proposed Grand River Ave. & Site Drive intersection. According to *Section 9.5 – Intersection Sight Distance* of the AASHTO design manual *A Policy on Geometric Design of Highways and Streets, 7th Edition (2018),* an intersection sight distance of 625 feet is required for a left turn from a complete stop and a sight distance of 480 feet is required for a right turn from a stopped position at the study intersection based on the existing 45 mph speed limit (50 mph design speed).

The AASHTO manual states that the "vertex (decision point) of the departure sight triangle on the minor road should be 14.5 ft from the edge of the major-road traveled way". This gives an accurate depiction of driver

behavior when making a turn from a minor roadway. The results of the sight distance analysis show that there is adequate sight distance at the proposed intersection location. In addition, this section of Grand River Ave. has very little grade change and vertical distance is not a concern at this location. The intersection sight distance measurements are shown on **Figure 7**.

The results of the intersection sight distance analysis show that there will be adequate intersection sight distance at the proposed site driveway on Grand River Ave. There is the potential for vehicles queued on EB Grand River Ave. at the signalized intersection at Central Park Drive to block the view for egress left-turns; however, based on the vehicle queueing analysis (both with and without recommended signal timing improvements) the peak vehicle queues on this approach will not extend into the sight distance area as shown on **Figure 7**.

FIGURE 7: INTERSECTION SIGHT DISTANCE



4 CONCLUSIONS

The conclusions of this Traffic Impact Study are as follows:

1. The results of the existing conditions analysis show that all approaches and movements at the study intersections are currently operating acceptably at a LOS D or better, with the exception of the Grand River Ave. & Central Park Drive. During the PM peak hour, the southbound left-turns on Central Park Drive operate at a LOS E, with excessive queue lengths that extend beyond the existing left-turn lane and impact the southbound through traffic on Central Park Drive.
2. In order to improve the existing operations at this intersection, mitigation measures were investigated, including signal timing changes and operations.
    a. Signal timing optimization **is** recommended.
    b. Left-turn phasing *is not* recommended.
3. With the addition of site generated traffic volumes, the Grand River Ave. & Central Park Drive intersection is expected to operate similar to existing conditions, with both increased delays and vehicle queue lengths on the southbound approach.
4. In order to improve the future operations at the Grand River Ave. & Central Park Drive intersection, signal timing optimization is recommended.

5. The proposed site driveway is expected to operate well, at LOS B/C during the peak periods with queue lengths of 1-2 vehicles.
6. The proposed site driveway meets Grand River Ave. (M-43) Corridor Access Management criterion, provided the following exceptions are granted by the Township and MDOT.
    a. The Tom's driveway is located opposite the proposed site driveway, approximately 286 feet to the east. The requirement is 630 feet; however, "The Director of Community Planning and Development may reduce this to no less than 150 feet where the offsets are aligned to not create left-turn conflict[1]", as they are in this location.
    b. The Speedway driveway is located opposite the proposed site driveway, approximately 550 feet to the west. The requirement is 630 feet; however, in accordance with MDOT guidelines, in the event that a particular parcel lacks sufficient frontage to maintain adequate spacing, the Region/TSC Traffic and Safety and Utility and Permit Engineers may reduce this and choose the next lowest spacing. The next lowest spacing would be for a design speed of 45 mph, with a spacing criteria of 525 feet. Therefore, the driveway spacing would meet the spacing requirement.
    c. The Sparrow driveway is located on the same side as the proposed site driveway, approximately 317 feet to the east. The requirement is 350 feet; again due to limited frontage, the next lowest spacing is 300 feet. Therefore, the driveway spacing would meet the spacing requirement.
7. There is an existing center left-turn lane adjacent to the site; therefore, only the MDOT right-turn lane criteria was evaluated for the proposed site drive intersection. The results of the analysis show that a right-turn lane or taper is not required.
8. The results of the intersection sight distance analysis show that there will be adequate intersection sight distance at the proposed site driveway on Grand River Ave.

5 RECOMMENDATIONS

The recommendations of this TIS are as follows:

- MDOT should investigate signal timing optimization at the Grand River & Central Park Drive intersection to improve PM peak hour operations.

[1] Ord. No. 2004-06, 9-5-2004, (e) (8)

Appendix A

BACKGROUND INFORMATION

LAND/ BUILDING/ PARKING DATA :

PHASE 1

LAND DATA :

OVERALL LAND AREA :	8.67 ACRES

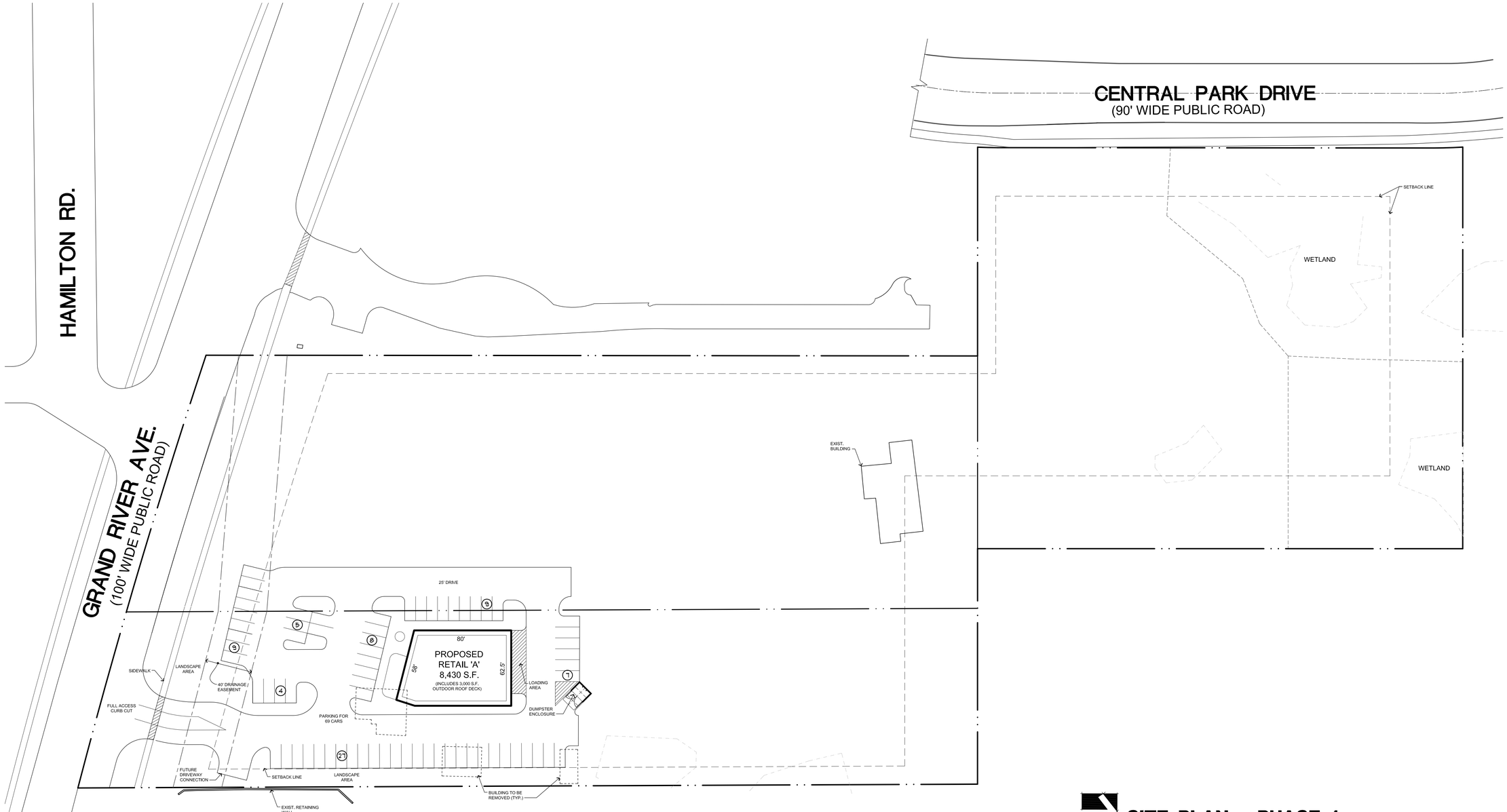
BUILDING DATA :

PROPOSED RETAIL 'A' :	5,430 S.F.
OUTDOOR ROOF DECK :	3,000 S.F.
TOTAL BUILDING AREA :	8,430 S.F.

PARKING REQUIRED : 42 SPACES

RETAIL : 42 SPACES
5 SPACES/ 1,000 GFA
(8,430/ 1000 = 8,43 X 5 = 42 SPACES

PARKING PROVIDED : 69 SPACES



SITE PLAN - PHASE 1

SCALE: 1"=40'-0"

issued for:

- OWNER REVIEW: 17 OCTOBER 2019
- OWNER REVIEW: 21 OCTOBER 2019
- OWNER REVIEW: 23 OCTOBER 2019
- OWNER REVIEW: 28 OCTOBER 2019
- OWNER REVIEW: 31 OCTOBER 2019
- OWNER REVIEW: 15 JAN. 2020

project:

Proposed for
Commercial Development
Grand River Ave.
Meridian Twp., MI

ROGVOY ARCHITECTS
32500 TELEGRAPH ROAD
SUITE 250
BINGHAM FARMS, MICHIGAN
48025-2404
PH 248.540.7700 FX 248.540.2710
www.rogvoy.com

drawing:

Conceptual Site Plan Phase 1

DO NOT SCALE DRAWING

issue date: 02 AUG. 2019
drawn: KS/KL
checked: MD
approved: MD

file number: 19030

sheet:

SP-1A

Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Central Park Dr
County/City: Meridian Twp
Weather: Sunny
Counted By: DES & JJ

File Name : Grand River & Central Park - AM
Site Code : 09201801
Start Date : 9/20/2018
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - Bicycles

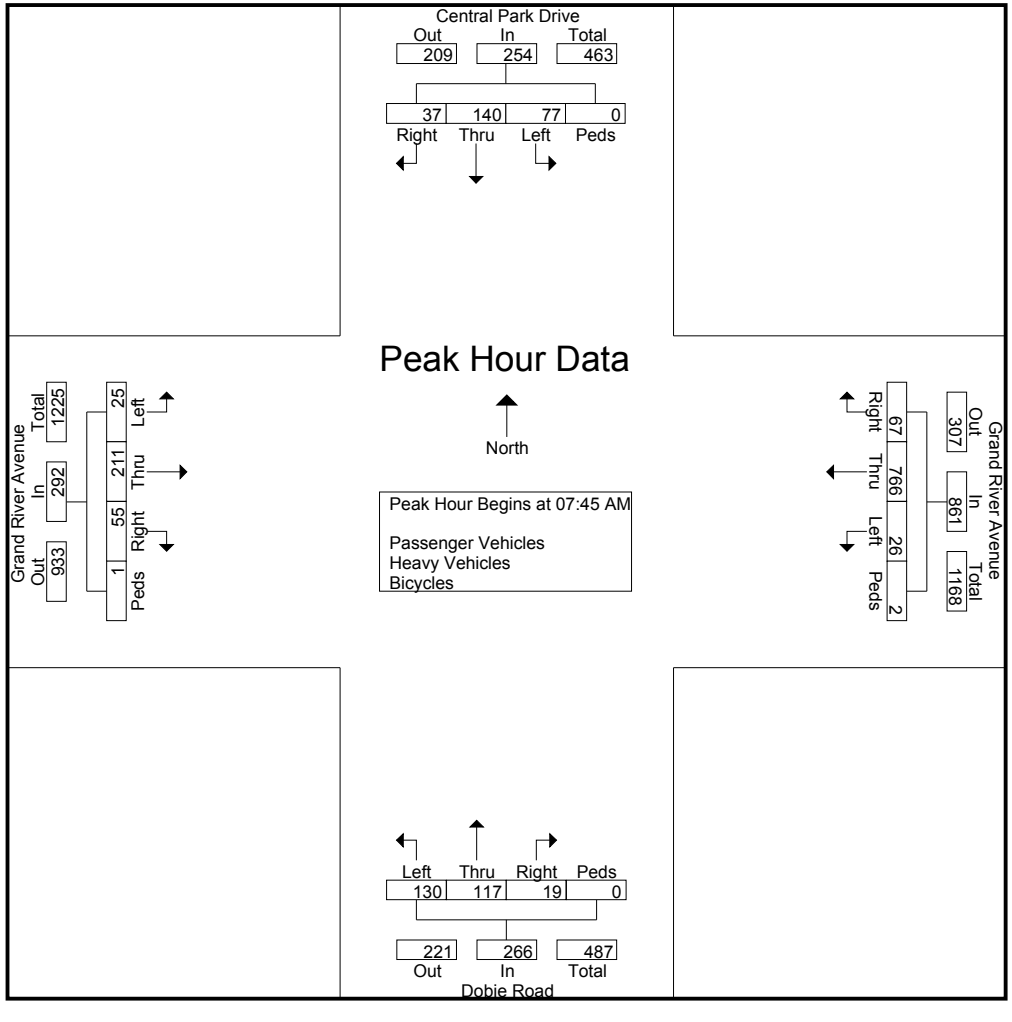
	Central Park Drive From North					Grand River Avenue From East					Dobie Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	9	11	3	0	23	6	102	5	0	113	15	24	4	0	43	3	31	7	0	41	220
07:15 AM	10	20	4	0	34	8	166	13	0	187	20	11	0	0	31	4	35	7	0	46	298
07:30 AM	5	31	5	0	41	8	199	17	1	225	33	13	8	0	54	2	51	9	0	62	382
07:45 AM	17	31	7	0	55	3	233	13	0	249	32	33	8	0	73	11	57	9	0	77	454
Total	41	93	19	0	153	25	700	48	1	774	100	81	20	0	201	20	174	32	0	226	1354
08:00 AM	18	32	6	0	56	7	178	21	1	207	31	32	2	0	65	6	49	15	1	71	399
08:15 AM	19	37	10	0	66	12	166	13	1	192	33	31	5	0	69	5	58	22	0	85	412
08:30 AM	23	40	14	0	77	4	189	20	0	213	34	21	4	0	59	3	47	9	0	59	408
08:45 AM	14	28	8	0	50	7	143	30	0	180	37	52	3	0	92	13	56	13	0	82	404
Total	74	137	38	0	249	30	676	84	2	792	135	136	14	0	285	27	210	59	1	297	1623
Grand Total	115	230	57	0	402	55	1376	132	3	1566	235	217	34	0	486	47	384	91	1	523	2977
Apprch %	28.6	57.2	14.2	0		3.5	87.9	8.4	0.2		48.4	44.7	7	0		9	73.4	17.4	0.2		
Total %	3.9	7.7	1.9	0	13.5	1.8	46.2	4.4	0.1	52.6	7.9	7.3	1.1	0	16.3	1.6	12.9	3.1	0	17.6	
Passenger Vehicles	111	229	57	0	397	55	1367	130	3	1555	230	212	32	0	474	46	355	83	1	485	2911
% Passenger Vehicles	96.5	99.6	100	0	98.8	100	99.3	98.5	100	99.3	97.9	97.7	94.1	0	97.5	97.9	92.4	91.2	100	92.7	97.8
Heavy Vehicles	4	1	0	0	5	0	9	2	0	11	5	5	2	0	12	1	29	8	0	38	66
% Heavy Vehicles	3.5	0.4	0	0	1.2	0	0.7	1.5	0	0.7	2.1	2.3	5.9	0	2.5	2.1	7.6	8.8	0	7.3	2.2
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Central Park Drive From North					Grand River Avenue From East					Dobie Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	17	31	7	0	55	3	**233**	13	0	**249**	32	**33**	**8**	0	**73**	**11**	57	9	0	77	**454**
08:00 AM	18	32	6	0	56	7	178	**21**	**1**	207	31	32	2	0	65	6	49	15	**1**	71	399
08:15 AM	19	37	10	0	66	**12**	166	13	1	192	33	31	5	0	69	5	**58**	**22**	0	**85**	412
08:30 AM	**23**	**40**	**14**	0	**77**	4	189	20	0	213	**34**	21	4	0	59	3	47	9	0	59	408
Total Volume	77	140	37	0	254	26	766	67	2	861	130	117	19	0	266	25	211	55	1	292	1673
% App. Total	30.3	55.1	14.6	0		3	89	7.8	0.2		48.9	44	7.1	0		8.6	72.3	18.8	0.3		
PHF	.837	.875	.661	.000	.825	.542	.822	.798	.500	.864	.956	.886	.594	.000	.911	.568	.909	.625	.250	.859	.921

Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Central Park Dr
County/City: Meridian Twp
Weather: Sunny
Counted By: DES & JJ

File Name : Grand River & Central Park - AM
Site Code : 09201801
Start Date : 9/20/2018



Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Central Park Dr
County/City: Meridian Twp.
Weather: Sunny
Counted By: DES & JJ

File Name : Grand River & Central Park - PM
Site Code : 09201801
Start Date : 9/20/2018
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - Bicycles

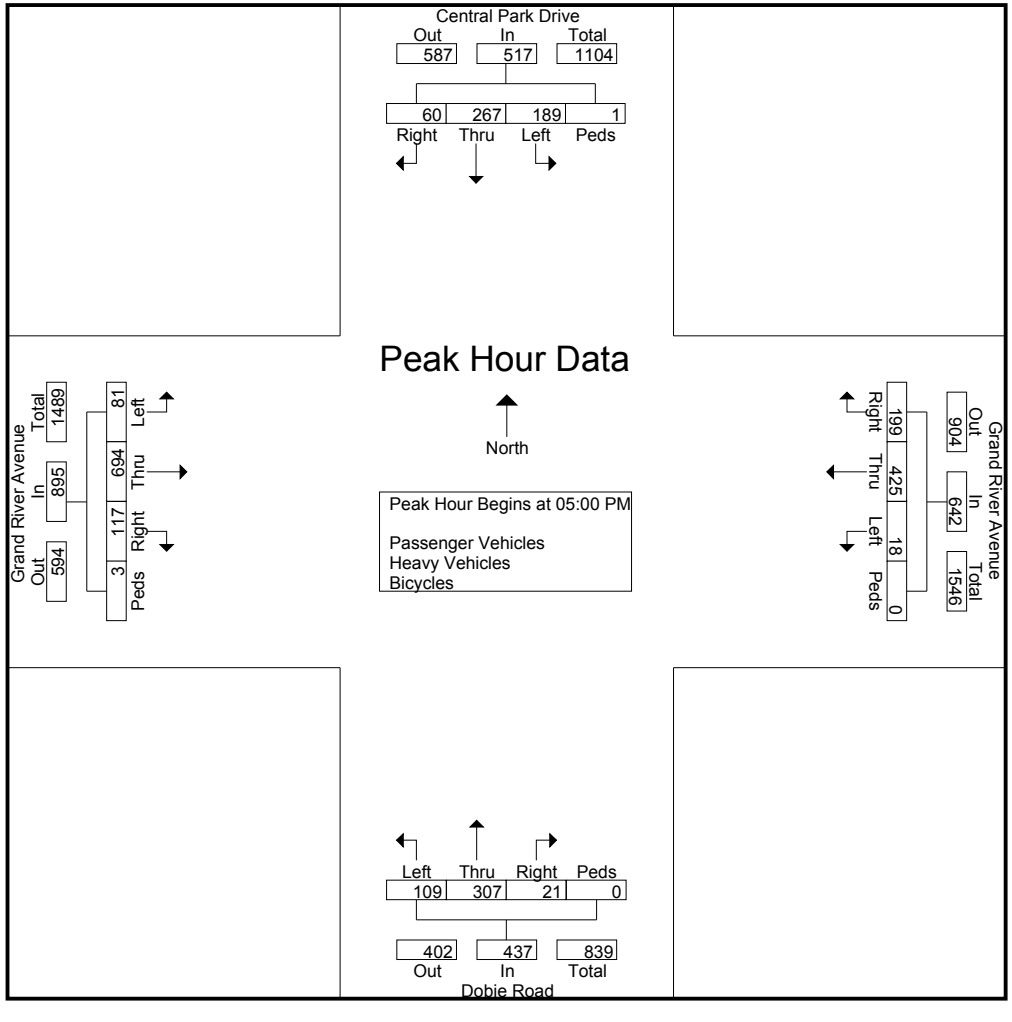
	Central Park Drive From North					Grand River Avenue From East					Dobie Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	53	32	18	0	103	4	96	38	0	138	16	56	7	0	79	19	123	16	0	158	478
04:15 PM	44	55	16	0	115	6	91	29	0	126	22	72	2	0	96	13	126	20	0	159	496
04:30 PM	42	61	17	0	120	3	97	29	0	129	21	78	5	0	104	12	143	20	1	176	529
04:45 PM	46	60	16	0	122	12	100	42	1	155	20	68	4	0	92	23	161	21	0	205	574
Total	185	208	67	0	460	25	384	138	1	548	79	274	18	0	371	67	553	77	1	698	2077
05:00 PM	53	73	10	0	136	6	90	63	0	159	29	68	5	0	102	15	163	23	1	202	599
05:15 PM	51	75	15	0	141	5	107	47	0	159	18	81	5	0	104	20	185	31	1	237	641
05:30 PM	38	66	15	0	119	1	117	35	0	153	30	74	9	0	113	20	176	35	0	231	616
05:45 PM	47	53	20	1	121	6	111	54	0	171	32	84	2	0	118	26	170	28	1	225	635
Total	189	267	60	1	517	18	425	199	0	642	109	307	21	0	437	81	694	117	3	895	2491
Grand Total	374	475	127	1	977	43	809	337	1	1190	188	581	39	0	808	148	1247	194	4	1593	4568
Apprch %	38.3	48.6	13	0.1		3.6	68	28.3	0.1		23.3	71.9	4.8	0		9.3	78.3	12.2	0.3		
Total %	8.2	10.4	2.8	0	21.4	0.9	17.7	7.4	0	26.1	4.1	12.7	0.9	0	17.7	3.2	27.3	4.2	0.1	34.9	
Passenger Vehicles	372	474	127	1	974	43	805	335	1	1184	183	578	39	0	800	147	1231	191	4	1573	4531
% Passenger Vehicles	99.5	99.8	100	100	99.7	100	99.5	99.4	100	99.5	97.3	99.5	100	0	99	99.3	98.7	98.5	100	98.7	99.2
Heavy Vehicles	2	1	0	0	3	0	4	2	0	6	5	3	0	0	8	1	16	3	0	20	37
% Heavy Vehicles	0.5	0.2	0	0	0.3	0	0.5	0.6	0	0.5	2.7	0.5	0	0	1	0.7	1.3	1.5	0	1.3	0.8
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Central Park Drive From North					Grand River Avenue From East					Dobie Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	**53**	73	10	0	136	**6**	90	**63**	0	159	29	68	5	0	102	15	163	23	**1**	202	599
05:15 PM	51	**75**	15	0	**141**	5	107	47	0	159	18	81	5	0	104	20	**185**	31	1	**237**	**641**
05:30 PM	38	66	15	0	119	1	**117**	35	0	153	30	74	**9**	0	113	20	176	**35**	0	231	616
05:45 PM	47	53	**20**	**1**	121	6	111	54	0	**171**	**32**	**84**	2	0	**118**	**26**	170	28	1	225	635
Total Volume	189	267	60	1	517	18	425	199	0	642	109	307	21	0	437	81	694	117	3	895	2491
% App. Total	36.6	51.6	11.6	0.2		2.8	66.2	31	0		24.9	70.3	4.8	0		9.1	77.5	13.1	0.3		
PHF	.892	.890	.750	.250	.917	.750	.908	.790	.000	.939	.852	.914	.583	.000	.926	.779	.938	.836	.750	.944	.972

Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Central Park Dr
County/City: Meridian Twp.
Weather: Sunny
Counted By: DES & JJ

File Name : Grand River & Central Park - PM
Site Code : 09201801
Start Date : 9/20/2018



Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Hamilton Rd.
County/City: Meridian Twp.
Weather: Sunny
Counted By: JJ

File Name : Grand River & Hamilton - AM
Site Code : 09181802
Start Date : 9/18/2018
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - Bicycles

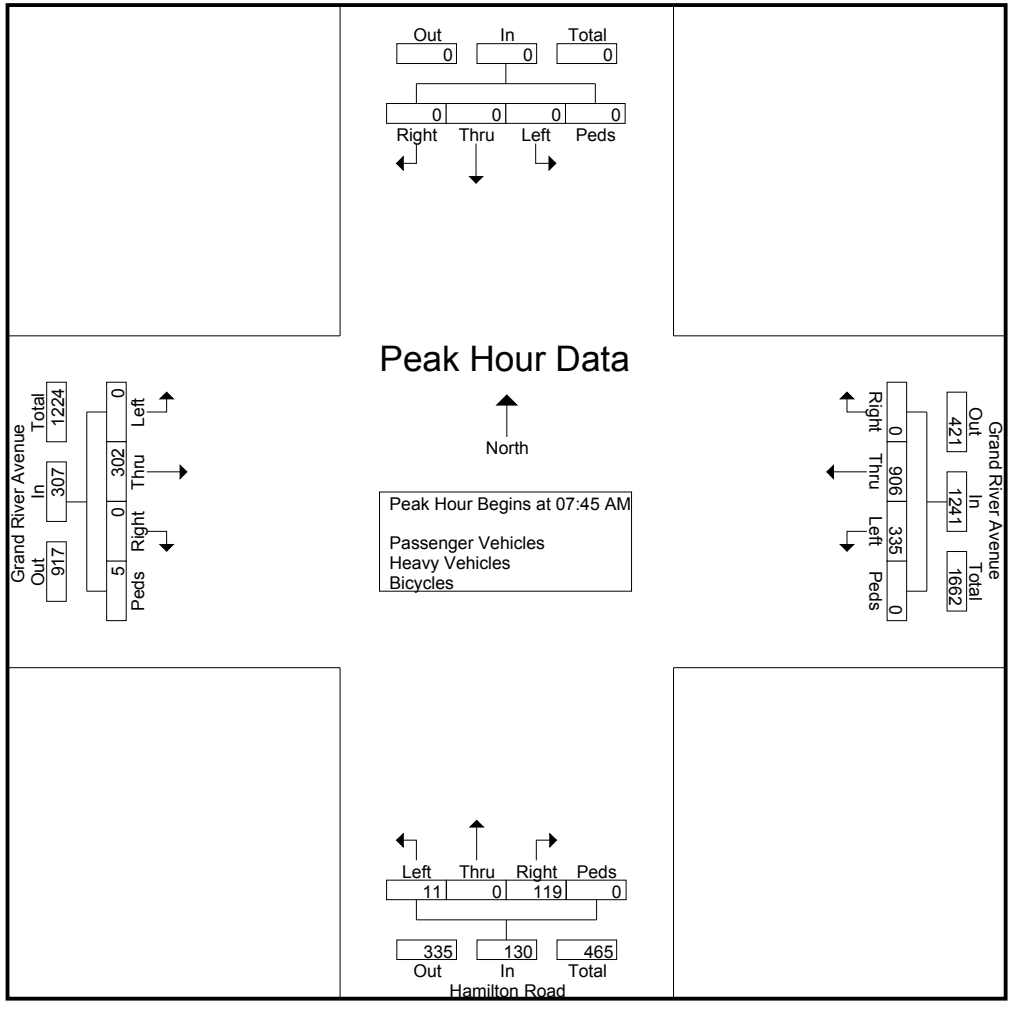
	From North					Grand River Avenue From East					Hamilton Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	41	121	0	0	162	3	0	10	0	13	0	42	3	0	45	220
07:15 AM	0	0	0	0	0	78	197	0	0	275	4	0	14	0	18	0	40	0	0	40	333
07:30 AM	0	0	0	0	0	89	270	0	0	359	4	0	28	0	32	0	74	0	2	76	467
07:45 AM	0	0	0	0	0	103	255	0	0	358	5	0	50	0	55	0	84	0	0	84	497
Total	0	0	0	0	0	311	843	0	0	1154	16	0	102	0	118	0	240	3	2	245	1517
08:00 AM	0	0	0	0	0	78	223	0	0	301	2	0	18	0	20	0	57	0	0	57	378
08:15 AM	0	0	0	0	0	71	227	0	0	298	1	0	20	0	21	0	80	0	1	81	400
08:30 AM	0	0	0	0	0	83	201	0	0	284	3	0	31	0	34	0	81	0	4	85	403
08:45 AM	0	0	0	0	0	69	219	0	0	288	3	0	28	0	31	0	75	1	2	78	397
Total	0	0	0	0	0	301	870	0	0	1171	9	0	97	0	106	0	293	1	7	301	1578
Grand Total	0	0	0	0	0	612	1713	0	0	2325	25	0	199	0	224	0	533	4	9	546	3095
Apprch %	0	0	0	0		26.3	73.7	0	0		11.2	0	88.8	0		0	97.6	0.7	1.6		
Total %	0	0	0	0	0	19.8	55.3	0	0	75.1	0.8	0	6.4	0	7.2	0	17.2	0.1	0.3	17.6	
Passenger Vehicles	0	0	0	0	0	601	1669	0	0	2270	23	0	191	0	214	0	506	4	9	519	3003
% Passenger Vehicles	0	0	0	0	0	98.2	97.4	0	0	97.6	92	0	96	0	95.5	0	94.9	100	100	95.1	97
Heavy Vehicles	0	0	0	0	0	11	44	0	0	55	2	0	8	0	10	0	27	0	0	27	92
% Heavy Vehicles	0	0	0	0	0	1.8	2.6	0	0	2.4	8	0	4	0	4.5	0	5.1	0	0	4.9	3
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	From North					Grand River Avenue From East					Hamilton Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:45 AM to 08:30 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	**103**	**255**	0	0	**358**	**5**	0	**50**	0	**55**	0	**84**	0	0	84	**497**
08:00 AM	0	0	0	0	0	78	223	0	0	301	2	0	18	0	20	0	57	0	0	57	378
08:15 AM	0	0	0	0	0	71	227	0	0	298	1	0	20	0	21	0	80	0	1	81	400
08:30 AM	0	0	0	0	0	83	201	0	0	284	3	0	31	0	34	0	81	0	**4**	**85**	403
Total Volume	0	0	0	0	0	335	906	0	0	1241	11	0	119	0	130	0	302	0	5	307	1678
% App. Total	0	0	0	0		27	73	0	0		8.5	0	91.5	0		0	98.4	0	1.6		
PHF	.000	.000	.000	.000	.000	.813	.888	.000	.000	.867	.550	.000	.595	.000	.591	.000	.899	.000	.313	.903	.844

Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Hamilton Rd.
County/City: Meridian Twp.
Weather: Sunny
Counted By: JJ

File Name : Grand River & Hamilton - AM
Site Code : 09181802
Start Date : 9/18/2018



Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Hamilton Rd.
County/City: Meridian Twp.
Weather: Sunny
Counted By: JJ

File Name : Grand River & Hamilton - PM
Site Code : 09181802
Start Date : 9/18/2018
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - Bicycles

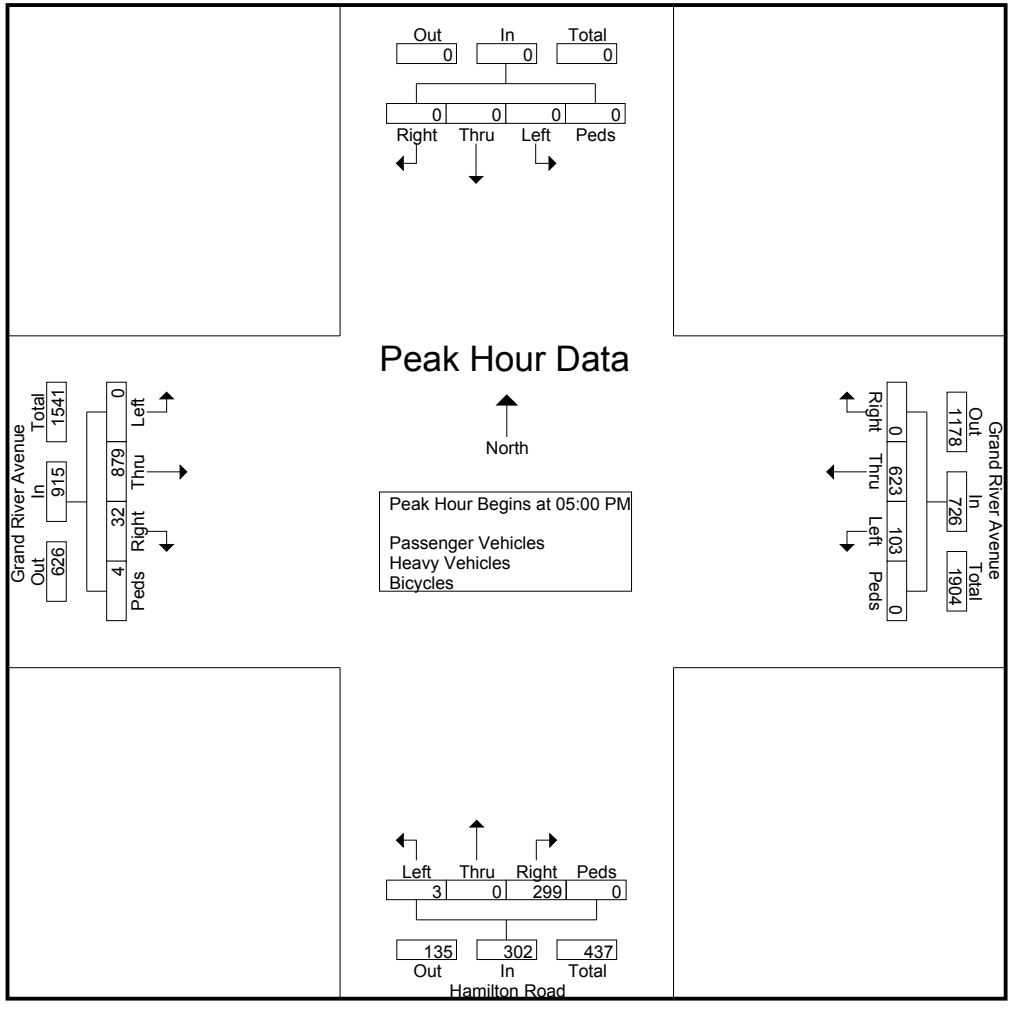
	From North					Grand River Avenue From East					Hamilton Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	37	153	0	0	190	0	0	56	0	56	0	166	3	2	171	417
04:15 PM	0	0	0	0	0	32	129	0	0	161	0	0	67	0	67	0	178	6	0	184	412
04:30 PM	0	0	0	0	0	28	144	0	0	172	11	0	67	0	78	0	188	10	2	200	450
04:45 PM	0	0	0	0	0	46	173	0	0	219	0	0	48	0	48	0	196	6	0	202	469
Total	0	0	0	0	0	143	599	0	0	742	11	0	238	0	249	0	728	25	4	757	1748
05:00 PM	0	0	0	0	0	16	153	0	0	169	0	0	89	0	89	0	203	16	3	222	480
05:15 PM	0	0	0	0	0	29	142	0	0	171	0	0	61	0	61	0	233	9	1	243	475
05:30 PM	0	0	0	0	0	26	164	0	0	190	2	0	80	0	82	0	228	4	0	232	504
05:45 PM	0	0	0	0	0	32	164	0	0	196	1	0	69	0	70	0	215	3	0	218	484
Total	0	0	0	0	0	103	623	0	0	726	3	0	299	0	302	0	879	32	4	915	1943
Grand Total	0	0	0	0	0	246	1222	0	0	1468	14	0	537	0	551	0	1607	57	8	1672	3691
Apprch %	0	0	0	0		16.8	83.2	0	0		2.5	0	97.5	0		0	96.1	3.4	0.5		
Total %	0	0	0	0	0	6.7	33.1	0	0	39.8	0.4	0	14.5	0	14.9	0	43.5	1.5	0.2	45.3	
Passenger Vehicles	0	0	0	0	0	238	1197	0	0	1435	14	0	528	0	542	0	1583	57	8	1648	3625
% Passenger Vehicles	0	0	0	0	0	96.7	98	0	0	97.8	100	0	98.3	0	98.4	0	98.5	100	100	98.6	98.2
Heavy Vehicles	0	0	0	0	0	8	25	0	0	33	0	0	9	0	9	0	24	0	0	24	66
% Heavy Vehicles	0	0	0	0	0	3.3	2	0	0	2.2	0	0	1.7	0	1.6	0	1.5	0	0	1.4	1.8
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	From North					Grand River Avenue From East					Hamilton Road From South					Grand River Avenue From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	16	153	0	0	169	0	0	**89**	0	**89**	0	203	**16**	**3**	222	480
05:15 PM	0	0	0	0	0	29	142	0	0	171	0	0	61	0	61	0	**233**	9	1	**243**	475
05:30 PM	0	0	0	0	0	26	**164**	0	0	190	**2**	0	80	0	82	0	228	4	0	232	**504**
05:45 PM	0	0	0	0	0	**32**	164	0	0	**196**	1	0	69	0	70	0	215	3	0	218	484
Total Volume	0	0	0	0	0	103	623	0	0	726	3	0	299	0	302	0	879	32	4	915	1943
% App. Total	0	0	0	0		14.2	85.8	0	0		1	0	99	0		0	96.1	3.5	0.4		
PHF	.000	.000	.000	.000	.000	.805	.950	.000	.000	.926	.375	.000	.840	.000	.848	.000	.943	.500	.333	.941	.964

Traffic Engineering Associates, Inc.
PO Box 100
Saranac, MI 48881
517-627-6028

Location: Grand River & Hamilton Rd.
County/City: Meridian Twp.
Weather: Sunny
Counted By: JJ

File Name : Grand River & Hamilton - PM
Site Code : 09181802
Start Date : 9/18/2018



TRAFFIC SIGNAL TIMING PERMIT

	PHASE	1	2	3	4	5	6	7	8			
APPROACH			EB		NB		WB		SB			
MINIMUM GREEN			10		7		10		7			
PASSAGE			0.0		5.0		0.0		5.0			
MAXIMUM NO. 1			38		30		38		30			
MAXIMUM NO. 2			0		0		0		0			
YELLOW CHANGE			4.7		3.7		4.7		3.7			
RED CLEARANCE			3.0		3.0		3.0		3.0			
WALK			7		7		7		7			
PEDESTRIAN CLEARANCE			17		22		17		22			
EXTENDED PED. CLEARANCE			2		2		2		2			
REST IN WALK			0		0		0		0			
INITIALIZATION			4		1		4		1			
NON-ACT RESPONSE			0		0		0		0			
VEHICLE RECALL			3		0		3		0			
PEDESTRIAN RECALL			2		0		2		0			
NON-LOCK MEMORY			0		1		0		1			
DUAL ENTRY			0		1		0		1			
	CYCLE									O1	O2	O3
DIAL 1 SPLIT 1	100		63		37		63		37	1		
DIAL 2 SPLIT 1	100		50		50		50		50	1		
DIAL 3 SPLIT 1	100		60		40		60		40	10		
DIAL SPLIT												
DIAL SPLIT												
DIAL SPLIT												
	MODE		1		0		1		0			

PHASE

1

2 Eastbound M-43 (Grand River Ave.)

3

4 Northbound Dobie Road

5

6 Westbound M-43 (Grand River Ave.)

7

8 Southbound Dobie Road

D1/S1/O1: Normal
D2/S1/O1: 06:30 - 09:00 Monday - Friday
D3/S1/O1: 15:00 - 18:00 Monday - Friday

OVERLAPS

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

TIMING INSTALLED

REMARKS

*03/23/2018 Revised timing per TSC request.

Base-Mounted, Epac-Type Controller. D4/S1/O1, D4/S2/O1, and D4/S3/O1 have been removed due to the completion of construction along Okemos Road.

D1/S1/O1, D2/S1/O1, and D3/S1/O1 have been reinstated.

This subject intersection is incorporated within a CLOSED-LOOP system and is equipped with RADIO interconnect. The MASTER controller is located at M-43 (Grand River Avenue) at Okemos Road (33082-01-016).

PREPARED BY: WRS DATE: 03/23/18

FLASH HOURS:
23:00 to 06:00 DAILY ☒ NONE ☐

NIGHT FLASH:
FY = M-43 (GRAND RIVER AVENUE) FR = DOBIE ROAD

CONFLICT FLASH:
FY = M-43 (GRAND RIVER AVENUE) FR = DOBIE ROAD

CONTROLLER TYPE:
☒ EPAC
☐ Other:

PRE-EMPT ☒
COUNTDOWN PEDS ☐

LOCATION:
M-43 (Grand River Avenue) at Dobie Road
CITY/TWP: Meridian Township
COUNTY : Ingham

MILE POINT	CONTROL SECTION-SPOT #
5.14	33082-01-031

Job # (If Applicable):

CLEAR PAGE 1

CLEAR ALL

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- [x] EPAC
- [ ] Other:

System Type:
- [x] Closed Loop
  - [x] Stand By
  - [ ] Group 1
  - [ ] Group 2
  - Address: 06
- [ ] TBC
- [ ] TBC/GPS
- [ ] None
- [ ] Other:

If TBC, Synch by:
- [ ] TOD
- [ ] Event

Interconnect Type:
- [ ] Hardwire
- [ ] Fiber-Optic
- [x] Radio
- [ ] Phone Drop
- [ ] None
- [ ] Other:

If Phone Drop,
Phone #

Controller Status:
- [ ] Master
- [x] Slave
- [ ] Isolated
- [ ] TBC

If Slave,
Master Location:
M-43 at OKEMOS Road

Master Spot # : 33082-01-016

LEFT-TURN PHASING

Phase # / Description	*Permissive-Protected* Lead	Lag	*Protected-Only* Split	Lead	Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1	B2	B3	B4
R1	2	4		
R2	6	8		
R3				
R4				

VEHICULAR AND PEDESTRIAN DETECTION

Approach	*Vehicular Detection* Movements and Call Delay (s) Left	Thru	Right	Type Loop	Video	Other	*Pedestrian Detection* Push-Button Crossing Locations
Northbound DOBIE Road	☒	☒	☐	☒	☐	☐	M-43 (Gd. River) at EAST leg
Southbound DOBIE Road	☒	☒	☒	☒	☐	☐	M-43 (Gd. River) at WEST leg
	☐	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	☐	

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	0
Correction Mode	3
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

This subject intersection is incorporated within a CLOSED-LOOP system and is equipped with RADIO interconnect.

The MASTER controller is located at the subject intersection of M-43 (Grand River Avenue) at Okemos Road (33082-01-016).

ADDITIONAL OVERLAP DATA

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: WRS DATE: 03/23/18

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION:
M-43 (Grand River Avenue) at Dobie Road

CONTROL SECTION-SPOT #
33082-01-031

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description: EASTBOUND M-43 (GRAND RIVER AVENUE) EMERGENCY VEHICLE VIA OPTICOM

Preempt # = 1	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl	22	Vehicle	Track																
SEL Yellow	4.7		Dwell		G		R		R		R								
SEL Red Cl	3.0		Cycle		NO		NO		NO		NO								
TRACK Green	0		Exit		1				1										
TRACK Ped Cl	0	Ped	Track																
TRACK Yellow	0.0		Dwell		DW		DW		DW		DW								
TRACK Red CL	0.0		Cycle		NO		NO		NO		NO								
DWELL Green	0		Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl	0	Overlap Vehicle	Track																
RET Yellow	4.7		Dwell																
RET Red Cl	3.0		Cycle																

☐ Locking
☒ Non-Locking

Delay (s)	0
Extend (s)	20
Duration (s)	0
Max Call (s)	180
Lockout (s)	0
Link PE #	0

Preemption Description: WESTBOUND M-43 (GRAND RIVER AVENUE) EMERGENCY VEHICLE VIA OPTICOM

Preempt # = 2	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl	22	Vehicle	Track																
SEL Yellow	4.7		Dwell		R		R		G		R								
SEL Red Cl	3.0		Cycle		NO		NO		NO		NO								
TRACK Green	0		Exit		1				1										
TRACK Ped Cl	0	Ped	Track																
TRACK Yellow	0.0		Dwell		DW		DW		DW		DW								
TRACK Red CL	0.0		Cycle		NO		NO		NO		NO								
DWELL Green	0		Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl	0	Overlap Vehicle	Track																
RET Yellow	4.7		Dwell																
RET Red Cl	3.0		Cycle																

☐ Locking
☒ Non-Locking

Delay (s)	0
Extend (s)	20
Duration (s)	0
Max Call (s)	180
Lockout (s)	0
Link PE #	0

Preemption Description: NORTHBOUND DOBIE ROAD EMERGENCY VEHICLE VIA OPTICOM

Preempt # = 3	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl	22	Vehicle	Track																
SEL Yellow	4.7		Dwell		R		G		R		R								
SEL Red Cl	3.0		Cycle		NO		NO		NO		NO								
TRACK Green	0		Exit		1				1										
TRACK Ped Cl	0	Ped	Track																
TRACK Yellow	0.0		Dwell		DW		DW		DW		DW								
TRACK Red CL	0.0		Cycle		NO		NO		NO		NO								
DWELL Green	0		Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl	0	Overlap Vehicle	Track																
RET Yellow	3.7		Dwell																
RET Red Cl	3.0		Cycle																

☐ Locking
☒ Non-Locking

Delay (s)	0
Extend (s)	20
Duration (s)	0
Max Call (s)	180
Lockout (s)	0
Link PE #	0

Preemption Description: SOUTHBOUND DOBIE ROAD EMERGENCY VEHICLE VIA OPTICOM

Preempt # = 4	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl	22	Vehicle	Track																
SEL Yellow	4.7		Dwell		R		R		R		G								
SEL Red Cl	3.0		Cycle		NO		NO		NO		NO								
TRACK Green	0		Exit		1				1										
TRACK Ped Cl	0	Ped	Track																
TRACK Yellow	0.0		Dwell		DW		DW		DW		DW								
TRACK Red CL	0.0		Cycle		NO		NO		NO		NO								
DWELL Green	0		Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl	0	Overlap Vehicle	Track																
RET Yellow	3.7		Dwell																
RET Red Cl	3.0		Cycle																

☐ Locking
☒ Non-Locking

Delay (s)	0
Extend (s)	20
Duration (s)	0
Max Call (s)	180
Lockout (s)	0
Link PE #	0

Preempt System Data

Ring	1	2	3	4		
MIN GRN/WLK (s)	7.0	7.0				
Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status	0	0	0	0		

REMARKS :

PREPARED BY: WRS DATE: 03/23/18

LOCATION:

M-43 (Grand River Avenue) at Dobie Road

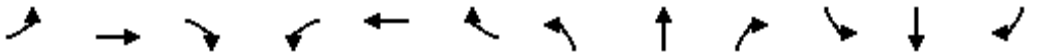
CONTROL SECTION-SPOT #

33082-01-031

CLEAR PAGE 3

Appendix B

EXISTING TRAFFIC CONDITIONS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	211	55	26	824	67	130	117	19	77	140	37
Future Volume (veh/h)	25	211	55	26	824	67	130	117	19	77	140	37
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	1796	1796	1796	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	29	245	64	30	958	78	143	129	21	93	169	45
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.91	0.91	0.91	0.83	0.83	0.83
Percent Heavy Veh, %	7	7	7	1	1	1	3	3	3	1	1	1
Cap, veh/h	314	2105	938	705	2069	168	262	372	61	284	451	382
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	523	3413	1520	1078	3354	273	1158	1557	253	1247	1885	1598
Grp Volume(v), veh/h	29	245	64	30	512	524	143	0	150	93	169	45
Grp Sat Flow(s),veh/h/ln	523	1706	1520	1078	1791	1836	1158	0	1810	1247	1885	1598
Q Serve(g_s), s	3.1	3.0	1.7	1.2	15.3	15.3	11.8	0.0	6.9	6.7	7.5	2.2
Cycle Q Clear(g_c), s	18.5	3.0	1.7	4.1	15.3	15.3	19.3	0.0	6.9	13.6	7.5	2.2
Prop In Lane	1.00		1.00	1.00		0.15	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	314	2105	938	705	1105	1132	262	0	433	284	451	382
V/C Ratio(X)	0.09	0.12	0.07	0.04	0.46	0.46	0.55	0.00	0.35	0.33	0.37	0.12
Avail Cap(c_a), veh/h	314	2105	938	705	1105	1132	487	0	784	526	816	692
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.2	7.9	7.7	8.8	10.3	10.3	39.9	0.0	31.6	37.2	31.8	29.8
Incr Delay (d2), s/veh	0.6	0.1	0.1	0.1	1.4	1.4	3.7	0.0	1.0	1.4	1.1	0.3
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	0.4	1.0	0.5	0.3	5.5	5.6	3.5	0.0	3.1	2.1	3.5	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.8	8.0	7.8	8.9	11.7	11.6	43.6	0.0	32.6	38.6	32.9	30.1
LnGrp LOS	B	A	A	A	B	B	D	A	C	D	C	C
Approach Vol, veh/h		338			1066			293			307	
Approach Delay, s/veh		8.6			11.6			38.0			34.2	
Approach LOS		A			B			D			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		69.4		30.6		69.4		30.6				
Change Period (Y+Rc), s		7.7		* 6.7		7.7		* 6.7				
Max Green Setting (Gmax), s		42.3		* 43		42.3		* 43				
Max Q Clear Time (g_c+I1), s		0.0		15.6		0.0		21.3				
Green Ext Time (p_c), s		0.0		2.9		0.0		2.6				

Intersection Summary												
HCM 6th Ctrl Delay			18.4									
HCM 6th LOS			B									

Notes

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

Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	307	0	335	906	11	119
Future Vol, veh/h	307	0	335	906	11	119
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	500	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	87	87	60	60
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	341	0	385	1041	18	198

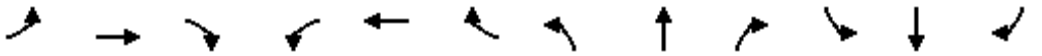
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	346	0	1637	176
Stage 1	-	-	-	-	346	-
Stage 2	-	-	-	-	1291	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1210	-	91	837
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	222	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1204	-	62	833
Mov Cap-2 Maneuver	-	-	-	-	~ -407	-
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	222	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1122	-	-	1204	-
HCM Lane V/C Ratio	0.193	-	-	0.32	-
HCM Control Delay (s)	9	-	-	9.4	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	1.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	701	117	18	425	199	109	307	21	189	267	60
Future Volume (veh/h)	81	701	117	18	425	199	109	307	21	189	267	60
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	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	86	746	124	19	452	212	117	330	23	205	290	65
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	396	1972	877	332	1306	607	299	611	43	267	666	564
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.52	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	777	3770	1677	641	2497	1161	1034	1833	128	1044	2000	1693
Grp Volume(v), veh/h	86	746	124	19	340	324	117	0	353	205	290	65
Grp Sat Flow(s),veh/h/ln	777	1885	1677	641	1885	1773	1034	0	1961	1044	2000	1693
Q Serve(g_s), s	7.3	11.8	3.8	1.8	10.5	10.7	10.0	0.0	14.6	18.7	11.3	2.7
Cycle Q Clear(g_c), s	17.9	11.8	3.8	13.6	10.5	10.7	21.3	0.0	14.6	33.3	11.3	2.7
Prop In Lane	1.00		1.00	1.00		0.66	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	396	1972	877	332	986	927	299	0	653	267	666	564
V/C Ratio(X)	0.22	0.38	0.14	0.06	0.35	0.35	0.39	0.00	0.54	0.77	0.44	0.12
Avail Cap(c_a), veh/h	396	1972	877	332	986	927	299	0	653	267	666	564
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.1	14.2	12.3	18.2	13.9	13.9	34.3	0.0	27.1	41.1	26.0	23.1
Incr Delay (d2), s/veh	1.3	0.6	0.3	0.3	1.0	1.0	1.8	0.0	1.6	14.7	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	1.4	4.6	1.4	0.3	4.3	4.1	2.6	0.0	6.9	6.1	5.4	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.4	14.7	12.6	18.5	14.8	15.0	36.1	0.0	28.8	55.9	27.0	23.3
LnGrp LOS	C	B	B	B	B	B	D	A	C	E	C	C
Approach Vol, veh/h		956			683			470			560	
Approach Delay, s/veh		15.0			15.0			30.6			37.1	
Approach LOS		B			B			C			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		60.0		40.0		60.0		40.0				
Change Period (Y+Rc), s		7.7		* 6.7		7.7		* 6.7				
Max Green Setting (Gmax), s		52.3		* 33		52.3		* 33				
Max Q Clear Time (g_c+I1), s		0.0		35.3		0.0		23.3				
Green Ext Time (p_c), s		0.0		0.0		0.0		3.2				

Intersection Summary	
HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

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

Intersection	
Int Delay, s/veh	5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	879	32	103	639	3	299
Future Vol, veh/h	879	32	103	639	3	299
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	500	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	93	93	85	85
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	935	34	111	687	4	352

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	973	0	1522	489
Stage 1	-	-	-	-	956	-
Stage 2	-	-	-	-	566	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	704	-	109	525
Stage 1	-	-	-	-	334	-
Stage 2	-	-	-	-	532	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	701	-	91	523
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	280	-
Stage 2	-	-	-	-	532	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	26.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	514	-	-	701	-
HCM Lane V/C Ratio	0.691	-	-	0.158	-
HCM Control Delay (s)	26.2	-	-	11.1	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	5.3	-	-	0.6	-

Intersection: 1: Dobie Road/Central Park Drive & Grand River Ave

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	62	102	90	50	61	240	237	204	152	130	153	54
Average Queue (ft)	17	37	18	8	11	114	125	94	65	49	67	17
95th Queue (ft)	48	82	54	28	42	206	214	170	126	95	123	43
Link Distance (ft)		2046	2046			398	398	522	522		1029	1029
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			250	500					400		
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Hamilton Road & Grand River Ave

Movement	WB	NB	B7
Directions Served	L	LR	T
Maximum Queue (ft)	96	82	50
Average Queue (ft)	40	43	3
95th Queue (ft)	73	72	25
Link Distance (ft)		15	400
Upstream Blk Time (%)		17	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	500		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Dobie Road/Central Park Drive & Grand River Ave

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	113	169	167	74	39	153	201	154	272	424	866	644
Average Queue (ft)	45	95	86	21	11	79	97	70	140	326	441	131
95th Queue (ft)	92	149	147	53	34	130	162	137	240	503	991	647
Link Distance (ft)		2046	2046			398	398	522	522		1029	1029
Upstream Blk Time (%)											8	3
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	500			250	500					400		
Storage Blk Time (%)										31	7	
Queuing Penalty (veh)										83	14	

Intersection: 2: Hamilton Road & Grand River Ave

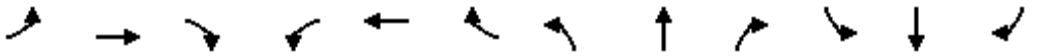
Movement	EB	WB	NB	B7
Directions Served	TR	L	LR	T
Maximum Queue (ft)	9	99	97	144
Average Queue (ft)	0	34	67	17
95th Queue (ft)	4	76	98	71
Link Distance (ft)	398		15	400
Upstream Blk Time (%)			37	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)		500		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Bend

Movement	SB
Directions Served	T
Maximum Queue (ft)	22
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	15
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 96



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	701	117	18	425	199	109	307	21	189	267	60
Future Volume (veh/h)	81	701	117	18	425	199	109	307	21	189	267	60
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	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	86	746	124	19	452	212	117	330	23	205	290	65
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	349	1785	794	292	1182	550	359	701	49	330	765	648
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.38	0.38	0.38	0.38	0.38	0.38
Sat Flow, veh/h	777	3770	1676	641	2496	1161	1034	1833	128	1044	2000	1694
Grp Volume(v), veh/h	86	746	124	19	340	324	117	0	353	205	290	65
Grp Sat Flow(s),veh/h/ln	777	1885	1676	641	1885	1773	1034	0	1961	1044	2000	1694
Q Serve(g_s), s	8.0	13.0	4.2	2.0	11.6	11.8	9.2	0.0	13.6	18.4	10.5	2.5
Cycle Q Clear(g_c), s	19.8	13.0	4.2	15.0	11.6	11.8	19.7	0.0	13.6	32.0	10.5	2.5
Prop In Lane	1.00		1.00	1.00		0.66	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	349	1785	794	292	893	839	359	0	750	330	765	648
V/C Ratio(X)	0.25	0.42	0.16	0.06	0.38	0.39	0.33	0.00	0.47	0.62	0.38	0.10
Avail Cap(c_a), veh/h	349	1785	794	292	893	839	453	0	928	424	946	801
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.3	17.3	15.0	22.2	16.9	17.0	29.4	0.0	23.2	35.3	22.3	19.8
Incr Delay (d2), s/veh	1.7	0.7	0.4	0.4	1.2	1.3	1.1	0.0	1.0	4.0	0.7	0.1
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	1.5	5.3	1.6	0.3	4.9	4.7	2.3	0.0	6.3	4.9	4.9	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.0	18.0	15.4	22.6	18.2	18.3	30.5	0.0	24.2	39.3	23.0	20.0
LnGrp LOS	C	B	B	C	B	B	C	A	C	D	C	B
Approach Vol, veh/h		956			683			470			560	
Approach Delay, s/veh		18.3			18.3			25.8			28.6	
Approach LOS		B			B			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		55.0		45.0		55.0		45.0				
Change Period (Y+Rc), s		7.7		* 6.7		7.7		* 6.7				
Max Green Setting (Gmax), s		38.3		* 47		38.3		* 47				
Max Q Clear Time (g_c+I1), s		0.0		34.0		0.0		21.7				
Green Ext Time (p_c), s		0.0		4.3		0.0		5.3				

Intersection Summary												
HCM 6th Ctrl Delay			21.8									
HCM 6th LOS			C									

Notes

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

Intersection: 1: Dobie Road/Central Park Drive & Grand River Ave

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	133	217	223	73	48	166	200	137	265	215	224	51
Average Queue (ft)	47	125	119	19	15	92	112	62	127	119	106	20
95th Queue (ft)	101	195	199	46	40	148	183	118	223	200	186	42
Link Distance (ft)		2046	2046			398	398	522	522		1029	1029
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			250	500					400		
Storage Blk Time (%)			0									
Queuing Penalty (veh)			0									

Intersection: 2: Hamilton Road & Grand River Ave

Movement	EB	WB	NB	B7
Directions Served	TR	L	LR	T
Maximum Queue (ft)	9	77	101	121
Average Queue (ft)	0	30	67	16
95th Queue (ft)	5	62	98	72
Link Distance (ft)	398		15	400
Upstream Blk Time (%)			37	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)		500		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Bend

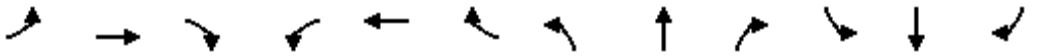
Movement	SB
Directions Served	T
Maximum Queue (ft)	11
Average Queue (ft)	0
95th Queue (ft)	8
Link Distance (ft)	15
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Appendix C

FUTURE TRAFFIC CONDITIONS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	215	55	26	827	70	130	117	19	81	140	37
Future Volume (veh/h)	25	215	55	26	827	70	130	117	19	81	140	37
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	1796	1796	1796	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	29	250	64	30	962	81	143	129	21	98	169	45
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.91	0.91	0.91	0.83	0.83	0.83
Percent Heavy Veh, %	7	7	7	1	1	1	3	3	3	1	1	1
Cap, veh/h	312	2105	938	701	2063	174	262	372	61	284	451	382
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	519	3413	1520	1073	3344	282	1158	1557	253	1247	1885	1598
Grp Volume(v), veh/h	29	250	64	30	515	528	143	0	150	98	169	45
Grp Sat Flow(s),veh/h/ln	519	1706	1520	1073	1791	1834	1158	0	1810	1247	1885	1598
Q Serve(g_s), s	3.2	3.0	1.7	1.2	15.5	15.5	11.8	0.0	6.9	7.1	7.5	2.2
Cycle Q Clear(g_c), s	18.7	3.0	1.7	4.2	15.5	15.5	19.3	0.0	6.9	14.0	7.5	2.2
Prop In Lane	1.00		1.00	1.00		0.15	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	312	2105	938	701	1105	1132	262	0	433	284	451	382
V/C Ratio(X)	0.09	0.12	0.07	0.04	0.47	0.47	0.55	0.00	0.35	0.34	0.37	0.12
Avail Cap(c_a), veh/h	312	2105	938	701	1105	1132	487	0	784	526	816	692
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.3	7.9	7.7	8.8	10.3	10.3	39.9	0.0	31.6	37.4	31.8	29.8
Incr Delay (d2), s/veh	0.6	0.1	0.1	0.1	1.4	1.4	3.7	0.0	1.0	1.5	1.1	0.3
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	0.4	1.0	0.5	0.3	5.6	5.7	3.5	0.0	3.1	2.2	3.5	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.9	8.0	7.8	8.9	11.7	11.7	43.6	0.0	32.6	38.9	32.9	30.1
LnGrp LOS	B	A	A	A	B	B	D	A	C	D	C	C
Approach Vol, veh/h		343			1073			293			312	
Approach Delay, s/veh		8.7			11.6			38.0			34.4	
Approach LOS		A			B			D			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		69.4		30.6		69.4		30.6				
Change Period (Y+Rc), s		7.7		* 6.7		7.7		* 6.7				
Max Green Setting (Gmax), s		42.3		* 43		42.3		* 43				
Max Q Clear Time (g_c+I1), s		0.0		16.0		0.0		21.3				
Green Ext Time (p_c), s		0.0		2.9		0.0		2.6				

Intersection Summary												
HCM 6th Ctrl Delay			18.4									
HCM 6th LOS			B									

Notes

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

Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	315	0	340	912	11	125
Future Vol, veh/h	315	0	340	912	11	125
Conflicting Peds, #/hr	0	5	5	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	90	90	87	87	60	60
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	350	0	391	1048	18	208

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	355	0	1661	180
Stage 1	-	-	-	-	355	-
Stage 2	-	-	-	-	1306	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1200	-	88	832
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	218	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1194	-	59	828
Mov Cap-2 Maneuver	-	-	-	-	124	-
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	147	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	567	-	-	1194	-
HCM Lane V/C Ratio	0.4	-	-	0.327	-
HCM Control Delay (s)	15.5	-	-	9.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.9	-	-	1.4	-

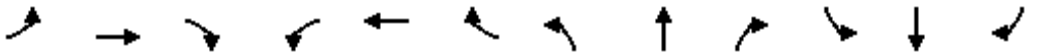
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	426	1241	18	14	11
Future Vol, veh/h	14	426	1241	18	14	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	50	-	-	-	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	15	463	1349	20	15	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1369	0	-	0	1621	685
Stage 1	-	-	-	-	1359	-
Stage 2	-	-	-	-	262	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	497	-	-	-	94	391
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	758	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	497	-	-	-	91	391
Mov Cap-2 Maneuver	-	-	-	-	167	-
Stage 1	-	-	-	-	198	-
Stage 2	-	-	-	-	758	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	22.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	497	-	-	-	167	391
HCM Lane V/C Ratio	0.031	-	-	-	0.091	0.031
HCM Control Delay (s)	12.5	-	-	-	28.7	14.5
HCM Lane LOS	B	-	-	-	D	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	720	117	18	443	210	109	307	21	199	267	60
Future Volume (veh/h)	81	720	117	18	443	210	109	307	21	199	267	60
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	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	86	766	124	19	471	223	117	330	23	216	290	65
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	382	1972	877	325	1301	612	299	611	43	267	666	564
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.52	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	756	3770	1677	629	2487	1170	1034	1833	128	1044	2000	1693
Grp Volume(v), veh/h	86	766	124	19	356	338	117	0	353	216	290	65
Grp Sat Flow(s),veh/h/ln	756	1885	1677	629	1885	1771	1034	0	1961	1044	2000	1693
Q Serve(g_s), s	7.6	12.2	3.8	1.9	11.1	11.2	10.0	0.0	14.6	18.7	11.3	2.7
Cycle Q Clear(g_c), s	18.8	12.2	3.8	14.0	11.1	11.2	21.3	0.0	14.6	33.3	11.3	2.7
Prop In Lane	1.00		1.00	1.00		0.66	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	382	1972	877	325	986	926	299	0	653	267	666	564
V/C Ratio(X)	0.22	0.39	0.14	0.06	0.36	0.36	0.39	0.00	0.54	0.81	0.44	0.12
Avail Cap(c_a), veh/h	382	1972	877	325	986	926	299	0	653	267	666	564
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	14.3	12.3	18.5	14.0	14.1	34.3	0.0	27.1	41.6	26.0	23.1
Incr Delay (d2), s/veh	1.4	0.6	0.3	0.3	1.0	1.1	1.8	0.0	1.6	18.7	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	1.4	4.8	1.4	0.3	4.5	4.3	2.6	0.0	6.9	6.7	5.4	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.0	14.9	12.6	18.8	15.1	15.2	36.1	0.0	28.8	60.3	27.0	23.3
LnGrp LOS	C	B	B	B	B	B	D	A	C	E	C	C
Approach Vol, veh/h		976			713			470			571	
Approach Delay, s/veh		15.1			15.2			30.6			39.2	
Approach LOS		B			B			C			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		60.0		40.0		60.0		40.0				
Change Period (Y+Rc), s		7.7		* 6.7		7.7		* 6.7				
Max Green Setting (Gmax), s		52.3		* 33		52.3		* 33				
Max Q Clear Time (g_c+I1), s		0.0		35.3		0.0		23.3				
Green Ext Time (p_c), s		0.0		0.0		0.0		3.2				

Intersection Summary												
HCM 6th Ctrl Delay			22.8									
HCM 6th LOS			C									

Notes

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

Intersection	
Int Delay, s/veh	5.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	908	32	118	668	3	314
Future Vol, veh/h	908	32	118	668	3	314
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	500	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	93	93	85	85
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	966	34	127	718	4	369

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1004	0	1600	504
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	686	-	97	513
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	503	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	683	-	79	511
Mov Cap-2 Maneuver	-	-	-	-	175	-
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	503	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	30.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	502	-	-	683	-
HCM Lane V/C Ratio	0.743	-	-	0.186	-
HCM Control Delay (s)	30.1	-	-	11.5	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	6.2	-	-	0.7	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	44	1178	742	16	15	44
Future Vol, veh/h	44	1178	742	16	15	44
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	-	-	-	50	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	93	93	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	47	1253	798	17	16	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	815	0	-	0	1528	408
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	721	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	808	-	-	-	108	593
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	443	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	808	-	-	-	102	593
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	443	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	808	-	-	-	223	593
HCM Lane V/C Ratio	0.058	-	-	-	0.073	0.081
HCM Control Delay (s)	9.7	-	-	-	22.4	11.6
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0.3

Intersection: 1: Dobie Road/Central Park Drive & Grand River Ave

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	67	101	54	33	47	231	228	162	159	131	133	54
Average Queue (ft)	16	36	15	8	12	111	126	82	67	52	67	17
95th Queue (ft)	50	74	44	24	36	194	210	139	129	101	120	44
Link Distance (ft)		2046	2046			398	398	522	522		1029	1029
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			250	500					400		
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Hamilton Road & Grand River Ave

Movement	WB	WB	NB	B7
Directions Served	L	T	LR	T
Maximum Queue (ft)	72	48	82	51
Average Queue (ft)	41	2	42	3
95th Queue (ft)	71	24	71	28
Link Distance (ft)		182	15	400
Upstream Blk Time (%)			14	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	50			
Storage Blk Time (%)	3	0		
Queuing Penalty (veh)	12	0		

Intersection: 3: Grand River Ave & Site Drive

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	41	44	35
Average Queue (ft)	9	15	10
95th Queue (ft)	32	42	33
Link Distance (ft)			271
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	50	50	
Storage Blk Time (%)	1	3	0
Queuing Penalty (veh)	2	0	0

Network Summary

Network wide Queuing Penalty: 14

Intersection: 1: Dobie Road/Central Park Drive & Grand River Ave

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	110	183	164	67	44	144	191	163	287	425	969	845
Average Queue (ft)	39	102	92	17	13	82	98	62	153	380	695	360
95th Queue (ft)	84	159	156	47	37	133	164	124	258	528	1276	1138
Link Distance (ft)		2046	2046			398	398	522	522		1029	1029
Upstream Blk Time (%)											27	11
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	500			250	500					400		
Storage Blk Time (%)										60	16	
Queuing Penalty (veh)										161	31	

Intersection: 2: Hamilton Road & Grand River Ave

Movement	EB	EB	WB	NB	B7
Directions Served	T	TR	L	LR	T
Maximum Queue (ft)	10	22	100	99	117
Average Queue (ft)	0	1	42	70	18
95th Queue (ft)	7	7	81	100	69
Link Distance (ft)	398	398		15	400
Upstream Blk Time (%)				41	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)			500		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Grand River Ave & Site Drive

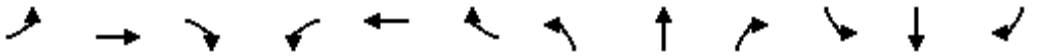
Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	50	17	4	45	62
Average Queue (ft)	19	1	0	13	25
95th Queue (ft)	47	10	3	38	53
Link Distance (ft)		174	1722		270
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	50			50	
Storage Blk Time (%)	1			1	1
Queuing Penalty (veh)	3			0	0

Intersection: 7: Bend

Movement	SB
Directions Served	T
Maximum Queue (ft)	33
Average Queue (ft)	1
95th Queue (ft)	14
Link Distance (ft)	15
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 196



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	720	117	18	443	210	109	307	21	199	267	60
Future Volume (veh/h)	81	720	117	18	443	210	109	307	21	199	267	60
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	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	86	766	124	19	471	223	117	330	23	216	290	65
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	329	1757	781	280	1159	545	368	715	50	339	780	661
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	756	3770	1676	629	2487	1170	1034	1833	128	1044	2000	1694
Grp Volume(v), veh/h	86	766	124	19	356	338	117	0	353	216	290	65
Grp Sat Flow(s),veh/h/ln	756	1885	1676	629	1885	1771	1034	0	1961	1044	2000	1694
Q Serve(g_s), s	8.5	13.6	4.3	2.1	12.4	12.6	9.1	0.0	13.4	19.4	10.3	2.4
Cycle Q Clear(g_c), s	21.1	13.6	4.3	15.7	12.4	12.6	19.4	0.0	13.4	32.8	10.3	2.4
Prop In Lane	1.00		1.00	1.00		0.66	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	329	1757	781	280	878	825	368	0	765	339	780	661
V/C Ratio(X)	0.26	0.44	0.16	0.07	0.41	0.41	0.32	0.00	0.46	0.64	0.37	0.10
Avail Cap(c_a), veh/h	329	1757	781	280	878	825	454	0	928	426	946	801
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.6	17.9	15.4	23.2	17.6	17.6	28.7	0.0	22.7	34.9	21.8	19.3
Incr Delay (d2), s/veh	1.9	0.8	0.4	0.5	1.4	1.5	1.0	0.0	0.9	4.2	0.6	0.1
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	1.6	5.6	1.6	0.3	5.3	5.1	2.3	0.0	6.1	5.2	4.8	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.5	18.7	15.8	23.6	19.0	19.1	29.7	0.0	23.6	39.1	22.4	19.5
LnGrp LOS	C	B	B	C	B	B	C	A	C	D	C	B
Approach Vol, veh/h		976			713			470			571	
Approach Delay, s/veh		19.0			19.2			25.1			28.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.3		45.7		54.3		45.7				
Change Period (Y+Rc), s		7.7		* 6.7		7.7		* 6.7				
Max Green Setting (Gmax), s		38.3		* 47		38.3		* 47				
Max Q Clear Time (g_c+I1), s		0.0		34.8		0.0		21.4				
Green Ext Time (p_c), s		0.0		4.2		0.0		5.3				

Intersection Summary												
HCM 6th Ctrl Delay			22.1									
HCM 6th LOS			C									

Notes

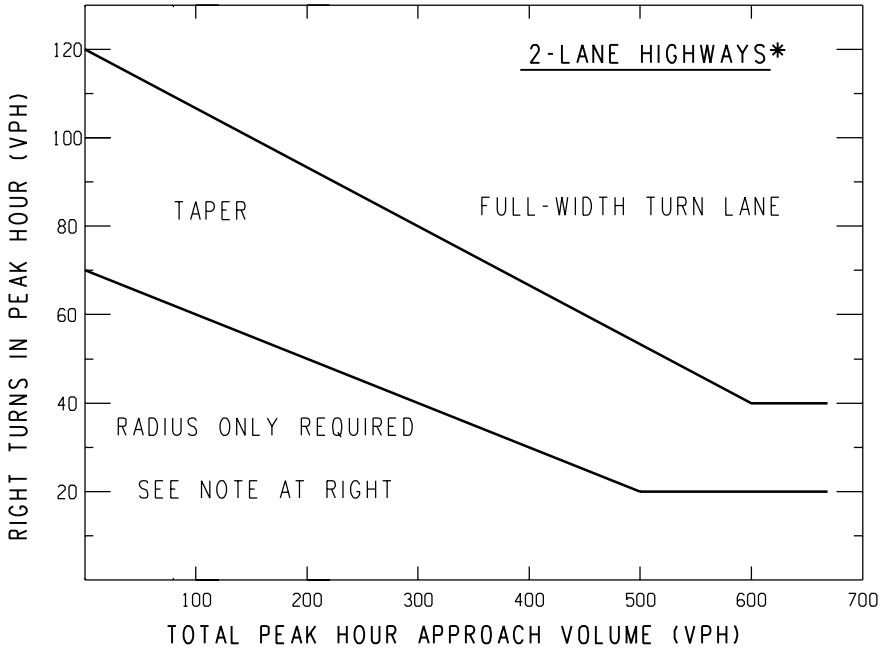
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Dobie Road/Central Park Drive & Grand River Ave

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (ft)	131	209	202	59	65	195	229	150	250	242	238	50
Average Queue (ft)	48	126	117	20	14	98	119	60	119	125	105	17
95th Queue (ft)	100	192	188	45	43	163	191	122	206	207	189	41
Link Distance (ft)		2046	2046			398	398	522	522		1029	1029
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			250	500					400		
Storage Blk Time (%)												
Queuing Penalty (veh)												

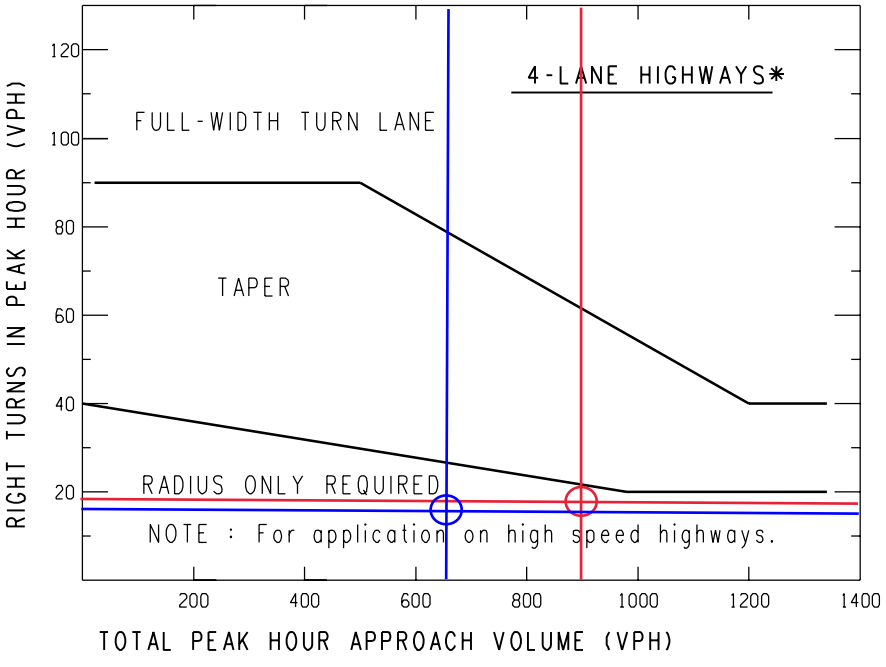
Appendix D

WARRANT SUMMARIES



NOTE:
For posted speeds at or under 45 mph, peak hour right turns greater than 40 vph, and total peak hour approach less than 300 vph, adjust right turn volumes.

Adjust peak hour right turns = Peak hour right turns - 20



*If a center left-turn lane exists(i.e. 3 or 5 lane highway), subtract the number of left turns in approach volume from the total approach volume to get an adjusted total approach volume.

AM
18 Right-turns
906 Approach

PM
16 Right-turns
639 Approach

Sample Problem:
The Design Speed is 55 mph. The Peak Hour Approach Volume is 300 vph. The Number of Right Turns in the Peak Hour is 100 vph. Determine if a right turn lane is recommended.

Solution:
Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus,a right-turn lane may be recommended.

MDOT Michigan Department of Transportation

TRAFFIC AND SAFETY NOTE

TRAFFIC VOLUME GUIDELINES FOR RIGHT-TURN LANES AND TAPERS

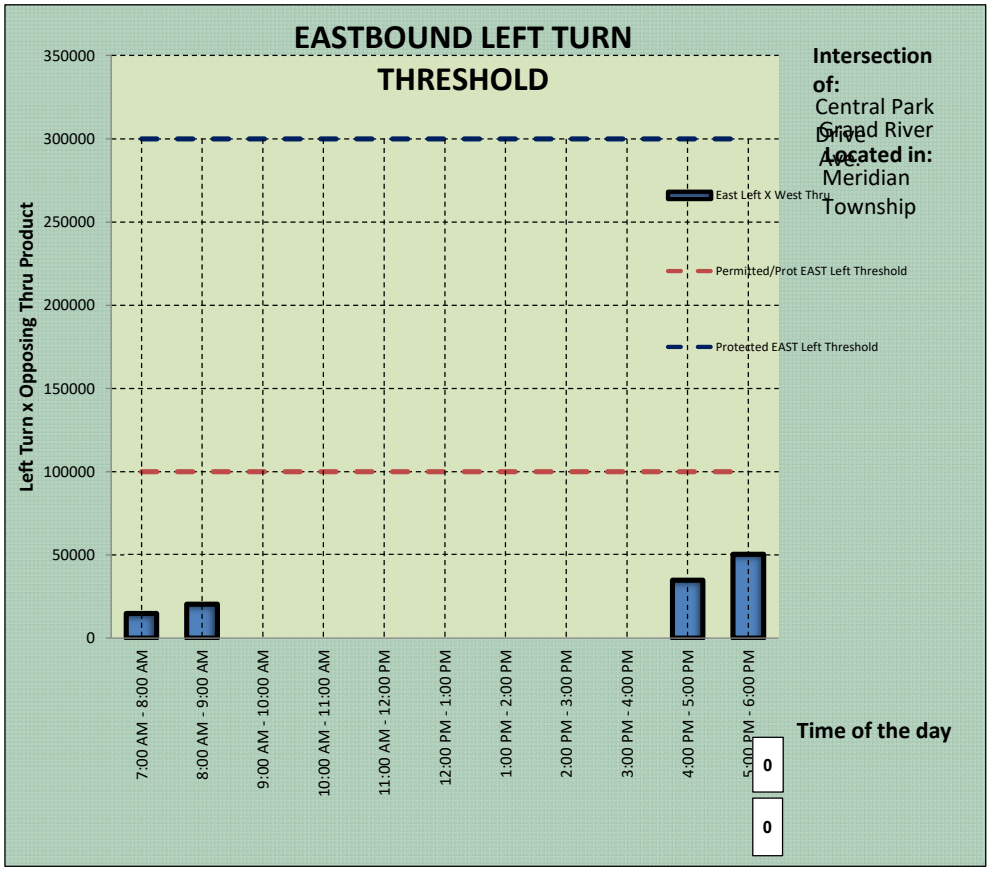
DRAWN BY: MTS	08/05/2004	604A	SHEET 2 OF 2
CHECKED BY: JAT	PLAN DATE:		
FILE: K:/DGN/ts notes/Note604A tsn.dgn		REV. 08/05/2004	

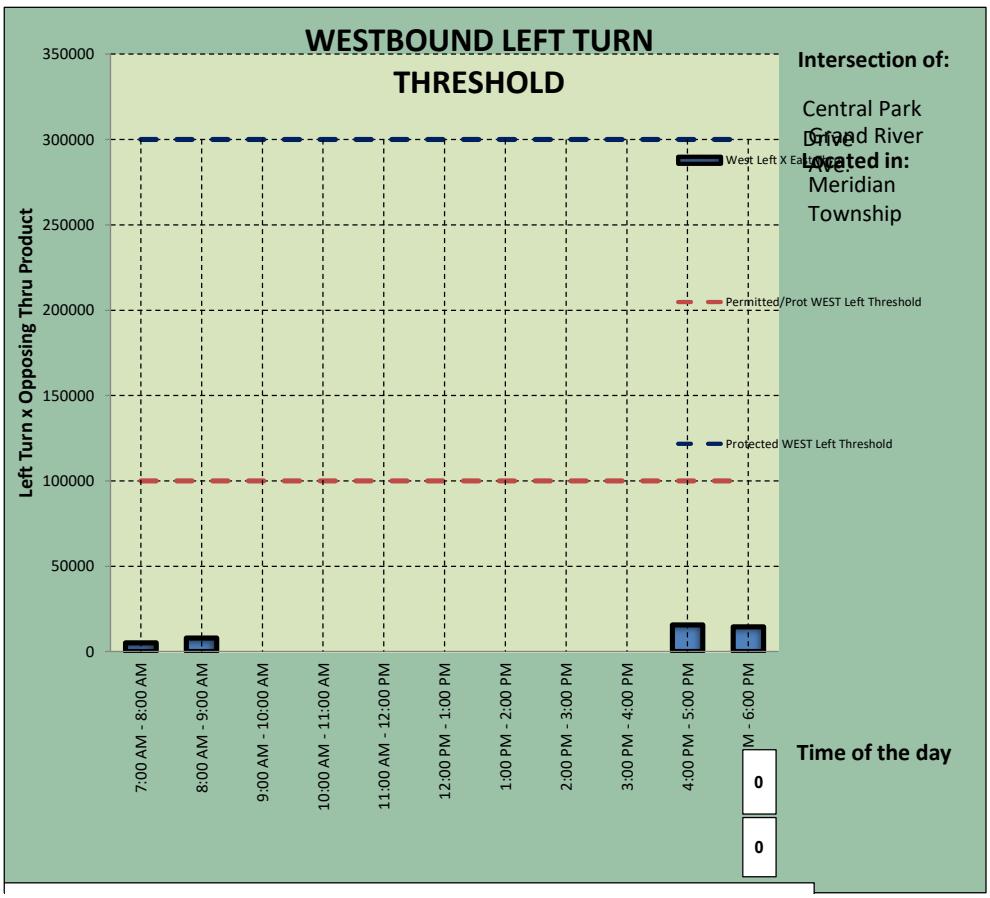
EASTBOUND AND WESTBOUND LEFT TURN PHASE THRESHOLDS

Please enter Data in Yellow Boxes ONLY

CONDITIONS		Items to Consider for Protected Only	Items to Consider for Permissive/Protected
EASTBOUND LEFT TURN GEOMETRY			
No. of Opposing WESTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing WESTbound Right Turn Only Lanes	0		N / A
What is the Opposing WESTbound speed limit or 85%ile? (mph)	45	NO	N / A
No. of EASTbound Left Turning Lanes	1	NO	N / A
What is the EASTbound sight distance in the field? (ft)	500	NO	YES
Minimum Required Sight Distance (ft)	**397**		
WESTBOUND LEFT TURN GEOMETRY			
No. of Opposing EASTbound Thru Lanes (include combination thru lanes)	2	NO	YES
No. of Opposing EASTbound Right Turn Only Lanes	0		N / A
What is the Opposing EASTbound speed limit or 85%ile? (mph)	45	NO	N / A
No. of WESTbound Left Turning Lanes	1	NO	N / A
What is the WESTbound sight distance in the field? (ft)	500	NO	YES
Minimum Required Sight Distance (ft)	**397**		
TRAFFIC CHARACTERISTICS			
EASTbound Left Turn Vol (vph)	**81**	NO	
WESTbound Left Turn Vol (vph)	**30**	**NO**	
Cross Product of LEFT TURN EAST (See Chart Below)	**50544**	**NO**	**NO**
Cross Product of LEFT TURN WEST (See Chart Below)	**15750**	**NO**	**NO**
CRASH HISTORY			
Is there an existing permissive/protected or permissive/protected LT phase?	**NO**		
Which Approach does the "One Left Turn Movement" crashes correspond to?	**EASTBOUND**		
ONE LEFT TURN MOVEMENT — Crash History for 12 Month Period			
ONE LEFT TURN MOVEMENT — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
ONE LEFT TURN MOVEMENT — Crash History for 24 Month Period			
ONE LEFT TURN MOVEMENT — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
TWO LEFT TURN MOVEMENTS — Crash History for 12 Month Period			
TWO LEFT TURN MOVEMENTS — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
TWO LEFT TURN MOVEMENTS — Crash History for 24 Month Period			
TWO LEFT TURN MOVEMENTS — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
EASTbound Left Turn DELAY per vehicle? Sec. / Veh.	20.4	NO	
EASTbound TOTAL Left Turn DELAY? Veh-Hr	0.46		
WESTbound Left Turn DELAY per vehicle? Sec. / Veh.	55.9	**NO**	
WESTbound TOTAL Left Turn DELAY? Veh-Hr	0.47		

Left-turn phasing should only be approved and installed after a comprehensive engineering study indicates such an operation is necessary for the safe and efficient operation of an intersection. The type of left-turn phasing will be determined based on data from the engineering study which includes the amount of delay experienced by left-turning traffic, crash patterns that may be occurring and available capacity of the intersection.


EASTBOUND LEFT TURN
THRESHOLD
Intersection of:
Central Park Drive
Grand River Ave.
Located in:
Meridian Township
Left Turn x Opposing Thru Product
350000
300000
250000
200000
150000
100000
50000
0
East Left X West Thru
Permitted/Prot EAST Left Threshold
Protected EAST Left Threshold
7:00 AM - 8:00 AM
8:00 AM - 9:00 AM
9:00 AM - 10:00 AM
10:00 AM - 11:00 AM
11:00 AM - 12:00 PM
12:00 PM - 1:00 PM
1:00 PM - 2:00 PM
2:00 PM - 3:00 PM
3:00 PM - 4:00 PM
4:00 PM - 5:00 PM
5:00 PM - 6:00 PM
Time of the day
0
0

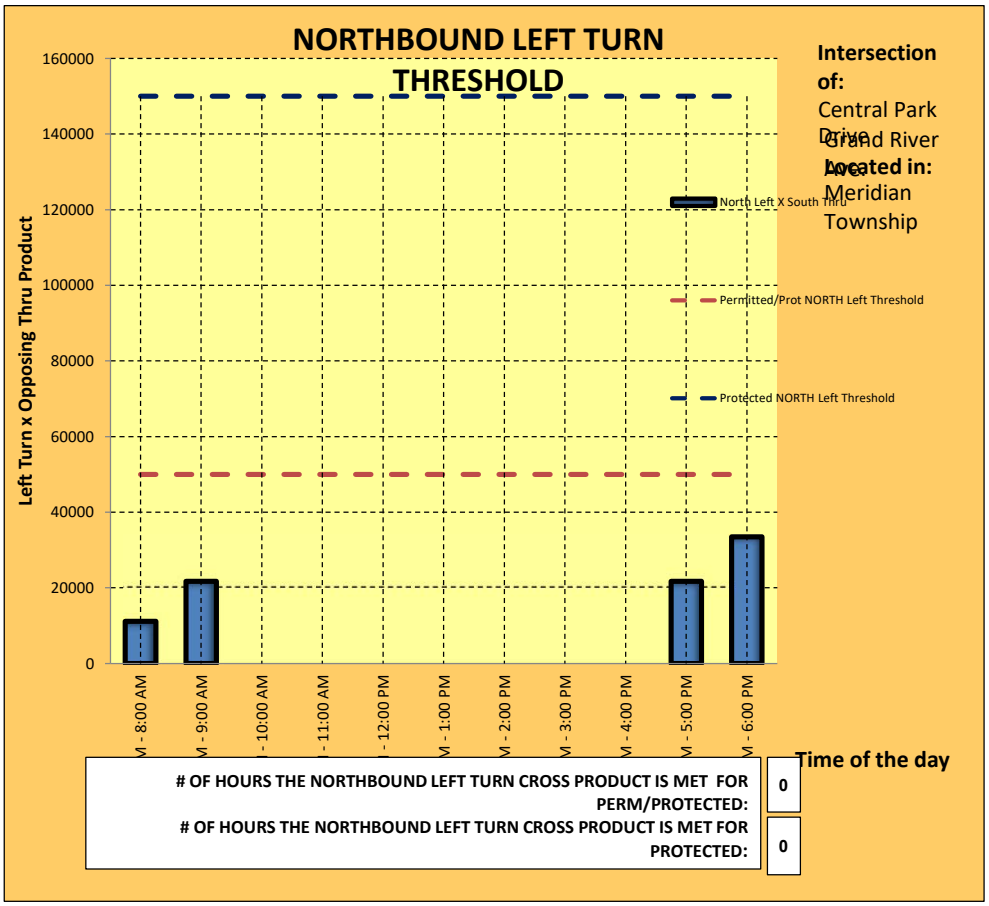

WESTBOUND LEFT TURN
THRESHOLD
Intersection of:
Central Park Drive
Grand River Ave.
Located in:
Meridian Township
Left Turn x Opposing Thru Product
350000
300000
250000
200000
150000
100000
50000
0
Permitted/Prot WEST Left Threshold
Protected WEST Left Threshold
7:00 AM - 8:00 AM
8:00 AM - 9:00 AM
9:00 AM - 10:00 AM
10:00 AM - 11:00 AM
11:00 AM - 12:00 PM
12:00 PM - 1:00 PM
1:00 PM - 2:00 PM
2:00 PM - 3:00 PM
3:00 PM - 4:00 PM
4:00 PM - 5:00 PM
Time of the day
0
0

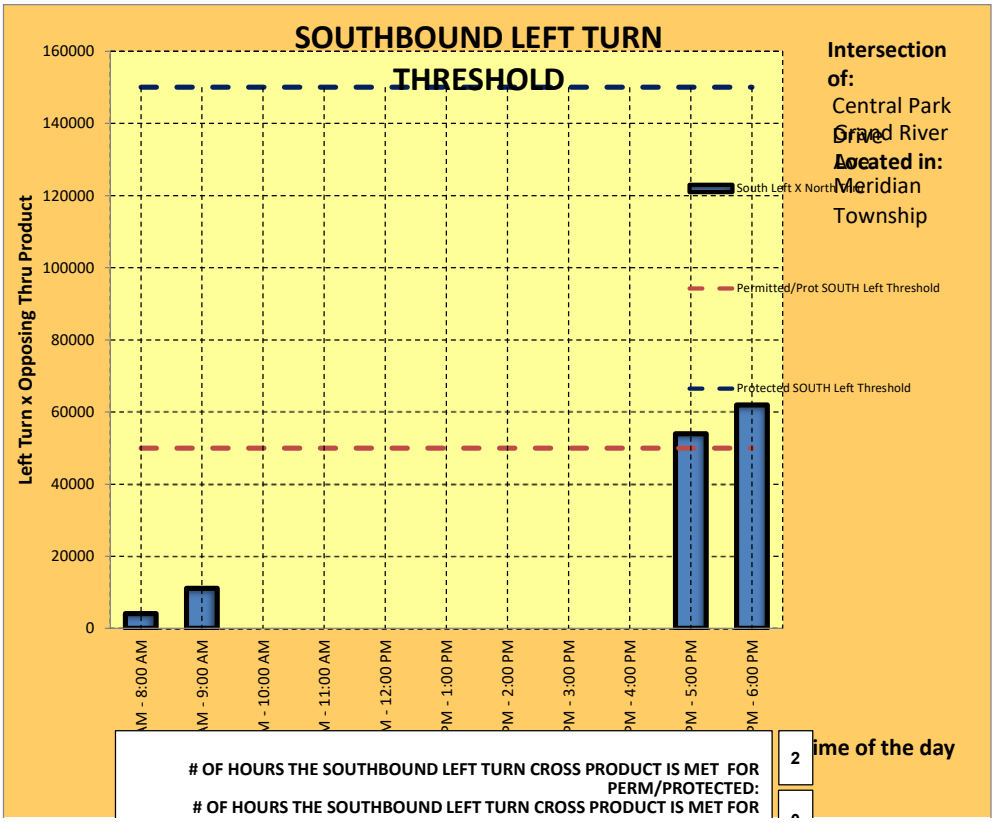
NORTHBOUND AND SOUTHBOUND LEFT TURN PHASE THRESHOLDS

Please enter Data in Yellow Boxes ONLY

CONDITIONS		Items to Consider for Protected Only	Items to Consider for Permissive/Protected
NORTHBOUND LEFT TURN GEOMETRY			
No. of Opposing SOUTHbound Thru Lanes (include combination thru lanes)	1	NO	YES
No. of Opposing SOUTHbound Right Turn Only Lanes	1	N / A	
What is the Opposing SOUTHbound speed limit or 85%ile? (mph)	35	NO	N / A
No. of NORTHbound Left Turning Lanes	1	NO	N / A
What is the NORTHbound sight distance in the field? (ft)	500	NO	YES
Minimum Required Sight Distance (ft)	309		
SOUTHBOUND LEFT TURN GEOMETRY			
No. of Opposing NORTHbound Thru Lanes (include combination thru lanes)	1	NO	YES
No. of Opposing NORTHbound Right Turn Only Lanes	0	N / A	
What is the Opposing NORTHbound speed limit or 85%ile? (mph)	35	NO	N / A
No. of SOUTHbound Left Turning Lanes	1	NO	N / A
What is the SOUTHbound sight distance in the field? (ft)	500	NO	YES
Minimum Required Sight Distance (ft)	283		
TRAFFIC CHARACTERISTICS			
NORTHbound Left Turn Vol (vph)	135	YES	
SOUTHbound Left Turn Vol (vph)	189	YES	
Cross Product of LEFT TURN NORTH (See Chart Below)	33463	NO	NO
Cross Product of LEFT TURN SOUTH (See Chart Below)	61992	NO	YES
CRASH HISTORY			
Is there an existing permissive/protected or permissive/protected LT phase?	YES		
Which Approach does the "One Left Turn Movement" crashes correspond to?	SOUTHBOUND		
ONE LEFT TURN MOVEMENT — Crash History for 12 Month Period			
ONE LEFT TURN MOVEMENT — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
ONE LEFT TURN MOVEMENT — Crash History for 24 Month Period			
ONE LEFT TURN MOVEMENT — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
TWO LEFT TURN MOVEMENTS — Crash History for 12 Month Period			
TWO LEFT TURN MOVEMENTS — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
TWO LEFT TURN MOVEMENTS — Crash History for 24 Month Period			
TWO LEFT TURN MOVEMENTS — Enter Number of Correctable crashes? (Left-Turn Head-On)	0	NO	NO
NORTHbound Left Turn DELAY per vehicle? Sec. / Veh.	36.1	NO	
NORTHbound TOTAL Left Turn DELAY? Veh-Hr	1.35		
SOUTHbound Left Turn DELAY per vehicle? Sec. / Veh.	55.9	YES	
SOUTHbound TOTAL Left Turn DELAY? Veh-Hr	2.93		

Left-turn phasing should only be approved and installed after a comprehensive engineering study indicates such an operation is necessary for the safe and efficient operation of an intersection. The type of left-turn phasing will be determined based on data from the engineering study which includes the amount of delay experienced by left-turning traffic, crash patterns that may be occurring and available capacity of the intersection.


NORTHBOUND LEFT TURN THRESHOLD
Intersection of:
Central Park Drive
Grand River Ave
Located in:
Meridian Township
Left Turn x Opposing Thru Product
160000
140000
120000
100000
80000
60000
40000
20000
0
North Left X South Thru
Permitted/Prot NORTH Left Threshold
Protected NORTH Left Threshold
M - 8:00 AM
M - 9:00 AM
- 10:00 AM
- 11:00 AM
- 12:00 PM
M - 1:00 PM
M - 2:00 PM
M - 3:00 PM
M - 4:00 PM
M - 5:00 PM
M - 6:00 PM
Time of the day
OF HOURS THE NORTHBOUND LEFT TURN CROSS PRODUCT IS MET FOR PERM/PROTECTED:
0
OF HOURS THE NORTHBOUND LEFT TURN CROSS PRODUCT IS MET FOR PROTECTED:
0


SOUTHBOUND LEFT TURN THRESHOLD
Intersection of:
Central Park Drive
Grand River Ave
Located in:
Meridian Township
Left Turn x Opposing Thru Product
160000
140000
120000
100000
80000
60000
40000
20000
0
South Left X North Thru
Permitted/Prot SOUTH Left Threshold
Protected SOUTH Left Threshold
AM - 8:00 AM
AM - 9:00 AM
M - 10:00 AM
M - 11:00 AM
- 12:00 PM
PM - 1:00 PM
PM - 2:00 PM
PM - 3:00 PM
PM - 4:00 PM
PM - 5:00 PM
PM - 6:00 PM
ime of the day
OF HOURS THE SOUTHBOUND LEFT TURN CROSS PRODUCT IS MET FOR PERM/PROTECTED:
2
OF HOURS THE SOUTHBOUND LEFT TURN CROSS PRODUCT IS MET FOR

To: **Members of Planning Commission**

From: **Brian Shorkey, *AICP*, Senior Planner**

Date: **June 23, 2023**

Re: **Project Report**

The Planning Commission has asked Staff to compile a list of ongoing projects. As of June 2023, the following projects are under construction, under site plan review, or have been submitted as a new application:

Under Construction

	Name	Location	Date Approved	Description	Status
1.	Sanctuary III	North of Robins Way	March 15, 2022	7 SFR Homes	Under Site Plan Review
2.	Copper Creek 3 & 4	Haslett Road, east of Green Road	August 5, 2019	38 SFR	Awaiting building permits
3.	American House	SW Corner of Haslett Road and Marsh Road	August 5, 2020	Mixed Use w/ 132 MFR	Under construction
4.	Elevation Phase 3	North of Jolly Road, West of Jolly Oak	December 28, 2021	66 MFR	Almost built out
5.	Newton Pointe	6276 Newton Road	February 24, 2022	Mixed Use w/ 105 MFR & 14 SFR	2023 construction
6.	Commons Church	4720 Marsh Road	August 9, 2022	Expanded Parking Lot	Under construction
7.	Singh	1954 Saginaw	June 25, 2018	Convert garage to SFR, 5 MFR	Under construction
8.	Trader Joe's	2755 Grand River	April 22, 2022	Trader Joe's retail	Under construction
9.	Radmoor Montessori	2745 Mount Hope	April 11, 2022	Building addition	Awaiting building permits
10.	MSU to Lake Lansing	West end of	December 12, 2022	Township trail	Under construction

Trail, Phase 1 (SUP)	Red Cedar River	

Under Site Plan Review

	Name	Location	Date Approved	Description	Status
1.	Village of Okemos	Downtown Okemos	October 6, 2022 (MUPUD)	206 MFR	First round of comments
2.	Haslett Village	SW Corner of Haslett Road and Marsh Road	July 26, 2019 (MUPUD)	290 MFR	Waiting for plan
3.	Silverleaf Phase 1	West Bennett Road	February 28, 2022 (SUP)	25 SFR	Site Plan Approved
4.	Consumers CU	2763 Grand River	N/A	Credit Union	Finalized
5.	Grand Reserve (SUP)	Central Park Drive & Powell Road	115-unit MFR and SFR development		Under Site Plan review
6.	Elevation Phase 4	North of Jolly Road, West of Jolly Oak		MUPUD Amendment	Under Site Plan Review
7.	Schultz Vet Clinic	2806 Bennet Road	4/24/2023	Vet clinic expansion	Under Site Plan Review
8.	Tidal Wave Auto Spa	4880 Okemos Road	3/13/2023	New auto wash	Public meeting 5/12/2023
9.	Work of Christ	1502 River Terrace Drive	4/10/2023	Conversion of home to religious office	Under Site Plan Review

New Applications

	Name	Location	Description	Status
1.	MSU to Lake Lansing Trail, Phase 2 (SUP)	Park Lake Road to Okemos Road	Township trail	Public hearing 4/24/2023
2.	Herbana	2119A Haslett Road	SUP for Dispensary	Public hearing 4/24/2023
3.	Skymint	Northwind Drive	SUP for Dispensary	Public hearing 5/8/2023
4.	Hulett Road Estates	3560 Hulett Road	Site Plan for approved PUD	Under Site Plan Review