CITY OF IONIA

PLANNING COMMISSION
REGULAR MEETING AGENDA
4:30 PM, Wednesday, March 11, 2026
IONIA CITY HALL - COUNCIL CHAMBERS

I. Call to Order

II. Roll Call

III. Approval of Agenda

IV. Approval of Minutes

1. February 11, 2026 – Regular Meeting

V. Public Comments

VI. Public Hearings and Associated Action

1. Public Hearing for Site Plan and Special Land Use Application — 90 E. Tuttle Road
   Action Required – Decision to approve or deny the site plan and special land use permit for 90 E. Tuttle Road

VII. Old Business

VIII. New Business

1. Reschedule April Planning Commission Meeting

IX. Commissioner Comments

X. Adjournment

Next Meeting - April 8, 2026

PUBLIC PARTICIPATION POLICY: The City of Ionia Planning Commission encourages public comment on agenda and non-agenda items. Those desiring to speak should do so under Public Comments at the beginning of the meeting. After that point during the meeting public comments are not normally allowed. The Chairperson may limit the amount of time allowed for each person wishing to make comments during the meeting.

CITY OF IONIA

PLANNING COMMISSION
REGULAR MEETING MINUTES
4:30 PM, Wednesday, February 11, 2026
IONIA CITY HALL - COUNCIL CHAMBERS

I. CALL TO ORDER

Chairperson Bailey called the meeting of the Ionia Planning Commission to order at 4:31 PM.

II. ROLL CALL

Roll call revealed a Quorum with Planning Commissioners Logan Bailey, Ryan Gregory, Keturah Kelley, and Jason Perry present. Commissioners Michael Donaldson, Tim Lee, and Judy Swartz were absent.

III. APPROVAL OF AGENDA

Chairperson Bailey introduced the agenda and asked if there were any requested changes. Planning Commissioner Perry made a motion, seconded by Planning Commissioner Kelley, to approve the agenda as presented.

MOTION CARRIED BY VOICE VOTE.

IV. APPROVAL OF MINUTES

(IV.1.) January 14, 2026 – Regular Meeting

Minutes from the regular meeting of January 14, were reviewed. Planning Commissioner Kelley made a motion, seconded by Planning Commissioner Perry, to approve the January 14, 2026, meeting minutes as presented.

MOTION CARRIED BY VOICE VOTE.

V. PUBLIC COMMENTS

Jason Kildea of the Gillespie Group commented that he was present for an agenda item and is willing to answer any questions.

VI. PUBLIC HEARINGS AND ASSOCIATED ACTION

(VI.1.) Public Hearing for Site Plan and Special Land Use Application — 113 S. Depot Street

Assistant City Manager Bowman provided background information on the request and Planning Consultant Kotrba summarized his staff report, including the pertinent site plan standards and special land use requirements.

Chairperson Bailey opened the public hearing for the site plan and special land use application for 113 S. Depot Street at 4:44 PM and subsequently closed the public hearing at 4:44 PM without any comments from the public.

Commissioner Gregory commented that he agreed with the staff recommendation to waive the need for a sealed site plan as there would be no external changes to the building and to waive the landscaping requirements because there is no room in front of the building.

Planning Commissioner Perry made a motion, seconded by Planning Commissioner Kelley, to approve the site plan and special land use permit for a mixed-use building with a ground-floor residential unit located at 113 S. Depot Street based on the findings that the proposed use and plan comply with the Site Plan Standards of Chapter 1276, the Special Land Use Standards of Chapter 1274, and the specific residential Special Land Use Standards in Section 1258.04 (f) of the Code of Ordinances, subject to the approval by staff of the below listed conditions. This motion also waived the detailed site plan requirement and the landscaping requirements.
MOTION CARRIED BY VOICE VOTE.

Conditions of Approval

1. Adequate steps shall be taken by the property owner to reduce noise from the commercial to residential use with the aim of preventing any disturbance to residents.
2. Ground floor dwelling unit access must be ADA compliant.
3. Off-street parking requirements are waived contingent on the property owner restricting residential tenant parking to the available public parking lots in an effort to reserve street parking for commercial customer use.
4. Dumpster enclosure should be properly maintained to contain refuse in an orderly fashion.
5. Exterior lighting must comply with Section 1296.03 of the Zoning Ordinance.
6. Signage needs to adhere to Section 1234 of the Ordinance and require a sign permit for approval.
7. Obtain all required permits and approvals from relevant local, state, and federal authorities.

VII. OLD BUSINESS

None.

VIII. NEW BUSINESS

(VIII.1.) 90 E. Tuttle Road - Site Plan and Special Land Use Application

Assistant City Manager Bowman provided background information on the request during a Preliminary Site Plan and Special Land Use Review for the accessory parking use proposed for 90 E. Tuttle Road by Gillespie Group (Abbey Residential, LLC).

Jason Kildea of the Gillespie Group was present on behalf of the property owner and presented the proposed project to the Commission answering several questions related to future development and the type of commercial and drive-thru tenants expected for the site.

Planning Consultant Kotrba reviewed with the Commission the standards and requirements pertaining to the site and special land use application. He described the challenges and unique characteristics of the project, as the majority of the development will be on a parcel in Ionia Township and only a portion featuring parking and dumpsters will be situated on a small piece of a parcel located in the City.

Planning Commissioner Kelley made a motion, seconded by Planning Commissioner Gregory, to schedule a public hearing for 4:30 PM, Wednesday, March 11, 2026, at City Hall to hear comments on the Site Plan and Special Land Use Application for 90 E. Tuttle Road and to conduct a final review of the application.
MOTION CARRIED BY VOICE VOTE.

IX. COMMISSIONER COMMENTS

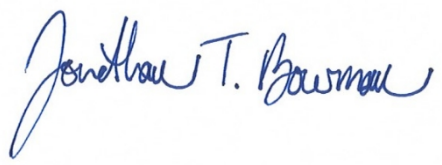
Chairperson Bailey: (1) Thanked staff for coordinating the MSU Extension training at City Hall; (2) Noted the desire to review the Planning Commission's Bylaws at a future meeting to add provisions related to Commissioner site visits and ex parte communication.

X. ADJOURNMENT

Planning Commissioner Kelley made a motion, seconded by Planning Commissioner Perry, to adjourn.
MOTION CARRIED BY VOICE VOTE.

The meeting was adjourned at 5:26 PM.

Respectfully Submitted,



Jonathan T. Bowman, Recording Secretary
for Judy Swartz, Secretary

CITY OF IONIA

STAFF REPORT FOR PLANNING COMMISSION AGENDA ITEM

Agenda Item: VI.1

TO: Planning Commissioners

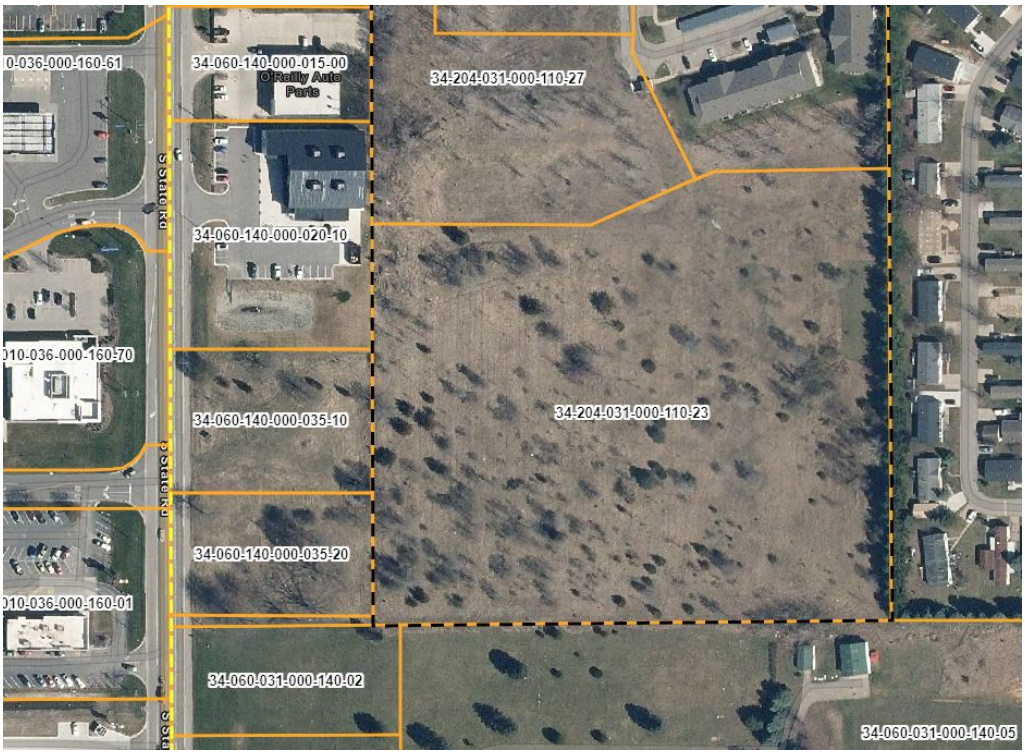
FROM: Jonathan Bowman, Assistant City Manager

DATE: March 11, 2026

RE: Public Hearing for Site Plan and Special Land Use Application — 90 E. Tuttle Road

Background:

A Site Plan Review and Special Land Use Permit Application was received by the City for utilizing a portion of property within the City limits at 90 E. Tuttle Road (PPN: 34-204-031-000-110-23) for parking associated with the development of property in Ionia Township (PPN: 34-060-140-000-035-10 and 34-060-140-000-035-20). All three of the parcels are owned by Abbey Residential Dec. LLC. See picture below.



An amendment to the City's Zoning Code was approved in January by City Council through Ordinance No. 601 to allow an accessory use on one property for a use on an adjacent lot via special land use. The amendment allows for this special land use to be granted in the B-3, General Business District in which this property is located. Section 1274.10 outlines the special land use requirements for this request.

Following this communication, the Commission will find a staff report from Williams & Works and motion sheet as well as the submitted application and plans. A traffic study along with feedback from MDOT have also been included for Planning Commission's consideration.

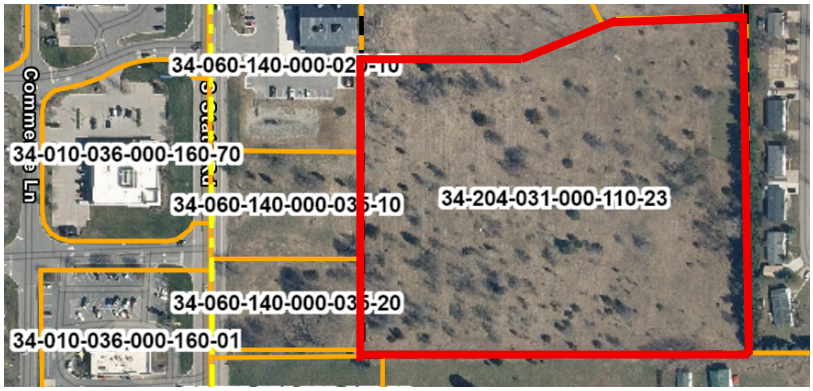
Requested Action / Motion:
See included motion sheet.

Motion By: **Seconded By:**

williams&works
engineers | surveyors | planners

MEMORANDUM

To:	City of Ionia Planning Commission
Date:	March 4, 2026
From:	Bradley S. Kotrba, AICP
RE:	**90 E. Tuttle Rd. (S. State Street) (PPN 34-204-031-000-110-23) Final Special Land Use Review**



Jason Kildea, acting as a representative for Abbey Residential, LLC, has submitted an application for a special land use permit. The purpose of this permit request is to authorize the construction of a new accessory use parking lot, located on vacant land commonly known as 90 E. Tuttle Rd. (PPN 34-204-031-000-110-23) in the City. The parcel is approximately 8.82 acres in area and zoned in the B-3 – General Business zoning district. Off-street parking lots are permitted as a special land use accessory to another development within this zoning district. The planned parking lot is designed to support a forthcoming multi-unit commercial development situated on neighboring land along South State Road. This memorandum serves to confirm the application's conformity with the City of Ionia Zoning Ordinance.

Background. A new three-unit commercial development is being proposed on a 0.83 acre vacant parcel along South State Road (34-060-140-000-035-20) within Ionia Township. A Starbucks Coffee with drive-through window will be incorporated into the northern-most commercial unit of the development. Consequently, the developer requires space for a drive-through lane allowing for the stacking of vehicles, which restricts the available area for achieving the developer's intended off-street parking capacity in the rear of the building. Therefore, the 8.82-acre parcel (PPN 34-204-031-000-110-23), situated within the city limits and located adjacent to the township parcel, will be partially developed to accommodate the additional parking facilities. It is anticipated that the suggested improvements for parking and site circulation will utilize approximately 0.18 acres of the vacant parcel in the city. At present, no

further utilization is planned for the city parcel; 8.66 acres have been designated for future development. The B-3 – General Business zoning district permits off-street parking facilities that are the principal use of the lot as a special land use, as long as it is accessory to a neighboring land use.

Completeness of Submittal. Section 1276.05(c) of the Zoning Ordinance contains the required information for a site plan review submission per Section 1274.03(b). The applicant has submitted a preliminary site plan that includes both parcels and the proposed development on each. The site plan is generally complete for final review.

Setbacks and Dimensional Requirements (Appendix I – Schedule of Regulations). While the primary development will occur in Ionia Township, the city will contain eleven 10 ft. x 18 ft. off-street parking spaces and a 27.75 ft. x 8 ft. dumpster enclosure containing three dumpsters (one for each business). This enclosure will be located 1.52 ft. from the south property line and 19.42 ft. from the west property line near the southwest corner of the lot. The vacant city property will be developed in an area approximately 37.86 feet in depth and approximately 205 feet in width for a total area of approximately 7,776 square feet, or 0.18 acres. There are no lot width or lot area minimums in the B-3 General Commercial zoning district. No additional structures or buildings are proposed for the vacant city property. The proposed multi-unit commercial building will be located 57.21 feet west of the city boundary. The drive though lane is located 14.58 feet west of this boundary line, evidence that the distance between the drive-through lane and the east property line (township parcel) is insufficient to contain both a two-way drive aisle and several off-street parking spaces.

Access/Circulation. The site plan contains a proposed 50-foot wide access easement through the township parcel and into the city parcel. The easement dead ends at a connection for future development at the western boundary of the city parcel. This easement contains a proposed 42 ft.-wide access road that would provide a connection from South State Road into both parcels. The applicant confirmed at the February Planning Commission meeting that MDOT has reviewed and approved the proposed access road/driveway design. However, future access easements and road designs will have to be reviewed by the Department of Public Works and potentially the City Engineer when the access drive enters the city parcel during future development. The applicant did note that MDOT will require the installation of traffic signals if additional property is further developed, but at this time and with this proposed development scale, no traffic signal is necessary per MDOT traffic warrant guidelines.

Vehicular ingress and egress access seems more than sufficient. The access road design includes three lanes, two 15 feet wide inbound and outbound lanes and a 12 foot center turn lane for left-hand turns exiting onto South State Road, for a combined width of 42 feet. Parking lot maneuvering lanes for vehicular traffic are 24 feet on the township side and roughly 28 feet on the city side, 19.42 feet of which is located on the city parcel proper. Section 1282.02(b) requires a minimum of 25 feet for a two-way parking lot drive aisle. Considering this particular drive aisle is 28 feet, it meets this standard. Pedestrian and bicycle facilities are absent from the submitted materials. The Township and the City's nearby parcels are not served by bicycle and pedestrian facilities.

Parking and Loading/Unloading (Section 1282). A Starbucks Coffee with a drive through will occupy one commercial unit; the other two will be retail storefronts. Zoning has not been adopted by Ionia Township, and Ionia County lacks a zoning department capable of administering such regulations for townships that have not enacted their own zoning ordinances. As this parking lot constitutes an accessory land use within the B-3 district, pursuant to Section 1274.10(c), an understanding of the land uses is not a prerequisite for approval.

Signage (Section 1284.14). Information regarding signage has not been supplied, and it is unlikely that signage will be present on the city parcel for this development, with the potential exception of incidental signage for the dumpster enclosure.

Lighting (Section 1286.03). The applicant did not provide a lighting plan; however; it appears that there are seven parking lot lights noted on the site plan. One of these parking lot lights is located on the peninsula separating the parking spaces and the proposed access road on the city side of the development. The provided information lacks details regarding the overall height of the lights and specific lighting specifications necessary to verify compliance with Section 1286.03.

Landscaping (Section 1286.02). Landscaping was added to the site plan based on the preliminary review and as requested by the City. Pursuant to Section 1286.02(e)(1), commercial properties bordering residential areas must implement buffering measures. Notwithstanding its residential use, the property immediately behind the city lot is not subject to zoning regulations as it falls within the township's jurisdiction. However, the adjacent property, situated in the north-easternmost section of the parcel, falls within municipal boundaries and is designated HDR – High-Density Residential. As this zone includes residential units, a buffering requirement would be necessitated.

A minimum buffer zone depth of 15 feet is required. With a separation of approximately 580 feet from the HDR parcel, the proposed parking construction offers sufficient buffering. The parking area's approximate width of 125 feet requires the planting of 5 canopy trees, 5 evergreen trees, and 5 ornamental trees situated behind the parking spaces, facing eastward, in accordance with Section 1286.02(g). Alternatively, if a berm is implemented in this location, it is possible for the quantities of plant material to be diminished by 25%, in accordance with Section 1286.02(j)(1). A berm would allow for the reduction of four trees (3.75 trees) from the project's requirements. The inclusion of a fence or wall may result in a 50% reduction in required plant materials, as stipulated in Section 1286.02(j)(2), thus eliminating the need for 10 trees.

The applicant has proposed planting 10 eastern white pine trees along the eastern edge of the parking development. This is five trees short of the ordinance requirement. Eastern white pines can grow to be of significant size and have a tendency to thin out in the lower branches the taller they get. However, if properly maintained, they may be capable of adequate screening. The Planning Commission should discuss whether they feel the size of the mature trees will make up for the deficient number of plantings and whether the proposed option is of equal or greater value than the required standard.

Waste (Section 1060). The applicant is proposing the installation of a dumpster enclosure at the southeast corner of the development, which lies entirely within the city. This would mandate the requirement to be screened, gated, and have licensed or contracted commercial waste removal. The applicant has shown that an enclosure of three containers is proposed. The dimensions of the enclosure are not indicated, although it is approximately 8 ft. x 27.75 ft. in size. The applicant has supplied the design specification for the dumpster enclosure, and the proposed specifications meet all city requests.

Stormwater and Drainage (Section 1043). No stormwater information has been provided with the preliminary plan, no catch basins are indicated on the plans, nor the direction of surface water flow. The requirements of Section 1043 are required to be met when developing commercial property in the city; this includes surface parking lots. Due to the very minimal size of the development portion of the city lot, stormwater will have to be accommodated on the primary lot in the township. This is not indicated on the preliminary plan, and some engineering will have to be applied to make sure that the stormwater will remain on the primary development lot.

Site Plan Review. The Planning Commission shall review the final site plan according to the general standards for site plan review in Section 1276.07 of the Zoning Ordinance. We have listed these standards, along with our comments, below.

(a) General Approval Criteria: Before approving a site plan, the Planning Commission must ensure compliance with the following standards. If all applicable standards and other City ordinances are met, the site plan shall be approved.

(b) Access and Site Circulation

(1) Buildings must be arranged to follow emergency vehicle access as required by the City's Public Safety Department.

Comments. No structures will be constructed on the vacant city property except for the dumpster enclosure. This appears to have satisfactory access in the event of a fire. The development overall also appears to have satisfactory emergency vehicle circulation and access capabilities. Emergency Fire and Medical services are provided by the City of Ionia Department of Public Safety. Public Safety has reviewed this and noted that they have no concerns with this project.

(2) The Planning Commission may:

A. Limit the number of driveways on a site.

B. Require shared driveways between contiguous parcels.

C. Require parking lots on adjacent parcels to be connected.

D. Align driveways opposite each other for improved traffic flow.

Comments. To accommodate future expansion into the vacant city lot, access has been planned, and an access point has been provided for future connectivity.

Determination of township lot connections or township lots accessing M-66 is beyond the scope of the Planning Commission and is instead the responsibility of MDOT.

(3) Public and private circulation routes must integrate with existing or planned streets, pedestrian paths, and bicycle routes.

Comments. No sidewalks, bicycle routes, or pedestrian pathways are proposed with this development. There is no sidewalk connection to any township or city property at this location.

(4) Streets and drives that are part of an existing or planned street pattern serving adjacent development shall be of a condition appropriate to the traffic volume and type of traffic they will carry.

Comments. The proposed development will not connect to any neighboring property at this time beyond the extend proposed. Therefore, this standard does not apply to this development at this time.

(5) On-site maneuvering space for trucks must be provided so that loading areas do not interfere with the public right of way.

Comments. Ionia Township has not established parking and loading requirements for the design of parking lots. Details regarding the intended land uses for this development, and consequently the parking requirements determined to be necessary for such uses, have not been provided by the applicant. It may be worthwhile asking the applicant if they have taken into consideration the necessity of unloading spaces required for semi-trucks, especially for drive-through establishments. Given that the absence of a loading/unloading zone on the preliminary site plan, a conclusive judgment cannot be rendered regarding whether this parking option would fall within the city-owned section of the parking lot development.

(c) Landscape and Site Design

(1) Landscaping must comply with the City's landscape provisions.

Comments. A minimum buffer zone depth of 15 feet is required. With a separation of approximately 580 feet from the HDR parcel, the proposed parking construction offers sufficient buffering. The parking area's approximate width of 125 feet necessitates the planting of 5 canopy trees, 5 evergreen trees, and 5 ornamental trees situated behind the parking spaces, facing eastward, in accordance with Section 1286.02(g). Alternatively, if a berm is implemented in this location, it is possible for the quantities of plant material to be diminished by 25%, in accordance with Section 1286.02(j)(1). A berm would allow for the reduction of four trees (3.75 trees) from the project's requirements. The inclusion of a fence or wall may result in a 50% reduction in required plant materials, as stipulated in Section 1286.02(j)(2), thus eliminating the need for 10 trees. No street frontage or parking lot landscaping is required because the proposed portion of the parking lot in the city is fewer than 20 parking spaces. Screening has been provided with the proposed installation of 10 white pine trees; however, this is

short of the city's requirements. The Commission will have to determine if this proposed installation meets or exceeds the required amount before they determine if this is an appropriate waiver request.

(2) The site design must consider:

A. Topography

B. Type and size of lot and buildings

C. Character of adjoining property

D. Adjoining properties to prevent negative impacts on their orderly development or improvement for uses in this Zoning Code.

Comments. The proposed development appears reasonable and complimentary to each respective lot. The portion in the city also contains an access road stub for future development connections.

(3) Natural features should be preserved where practical, with minimal removal of vegetation and alterations to topography.

Comments. The ground is relatively flat and contains few trees, no natural wetlands, or known sensitive environmental areas. The topography does slope down as the lot moves east towards the residential property; however; it is only a few feet vertically over hundreds of linear horizontal feet.

(4) Areas of natural drainage, such as wetlands, ponds, and swales, must be protected to maintain natural drainage patterns and habitats.

Comments. No wetlands or natural drainage areas exist on this site.

(d) Privacy and Screening

(1) The site plan must provide reasonable visual and sound privacy for all dwelling units through the use of fences, landscaping, and other barriers where necessary.

Comments. See the comments above for (c)(1) regarding landscape screening and buffering between commercial and residential properties.

(2) Outdoor storage and trash collection areas must comply with Chapter 1060 and be screened appropriately.

Comments. The proposed dumpster enclosure appears to comply with 1060. The proposed enclosure specifications meet the city’s enclosure requests.

(e) Pedestrian and Non-motorized Transportation

(1) In recognition that a connected sidewalk system along City streets enhances pedestrian safety and conserve energy through non-motorized transportation opportunities, sidewalks shall be required as determined by the Planning

Commission and must comply with City of Ionia sidewalk standards, as detailed in the City's Municipal Code.

Comments. No non-motorized connection is included to any city streets or existing city sidewalk networks.

(2) Factors for requiring sidewalks include:

A. Existing and future pedestrian traffic near the site.

B. Ability to enhance pedestrian safety.

C. Traffic volume on adjacent streets.

D. Potential for a connected sidewalk network.

E. Proximity to pedestrian attractors (e.g., schools, public buildings, shopping areas).

F. Location of the proposed use.

Comments. This standard does not apply to this application.

(f) Lighting

(1) Exterior lighting shall be arranged so that illumination is deflected away downward and away from adjacent properties and so that it does not interfere with the vision of motorists along adjacent streets.

Comments. Parking lot lighting is shown on the preliminary site plan; however, no detail is provided, and it lacks any information as to the type, height, brightness, and other specifications that outdoor lighting design standards are reviewed with in the City.

(2) Flashing or intermittent lights shall not be permitted.

Comments. This is likely inapplicable; however, the Planning Commission may wish to ask the applicant if any other outdoor lighting will be located on the east parcel.

(3) Excessive lighting of buildings or structures shall be minimized to reduce light pollution.

Comments. No information is provided about building lighting, and no buildings are proposed on the lot located in the city; therefore, this standard is likely inapplicable.

(g) Stormwater Management

(1) Stormwater drainage must be designed to prevent adverse impacts on neighboring properties and the public stormwater system.

Comments. No stormwater information has been provided with the preliminary plan, no catch basins are indicated on the plans, nor the direction of surface water flow. The requirements of Section 1043 are required to be met when developing commercial property in the city; this includes surface parking lots. Due to the very minimal size of

the development portion of the city lot, stormwater will have to be accommodated on the primary lot in the township. This is not indicated on the preliminary plan, and some engineering will have to be applied to make sure that the stormwater will remain on the primary development lot.

(2) Provisions must be made for:

A. Erosion control, particularly during construction.

B. Dust prevention.

C. Retention/detention ponds, when necessary.

Comments. This may be addressed as a condition of approval when constructing the parking lot.

(3) Paved surfaces must be designed to prevent water pooling and maintain safe traffic flow.

Comments. This may be addressed as a condition of approval when constructing the parking lot.

(4) The Planning Commission may require catch basins with oil filters to prevent contamination of natural drainage systems.

Comments. The final site plan should indicate where any catch basins may be located in the parking lot area. This request and filtering applications may be included as conditions of approval during the final site plan review.

(5) As deemed necessary, the Planning Commission may require the site plan to be reviewed by the Ionia County Drain Commissioner.

Comments. This is likely unnecessary; however, the Planning Commission may request this as a condition of approval.

(h) Compliance with Regulations

(1) Site plans must comply with all applicable County, State, and Federal laws and regulations.

Comments. This will be added as a condition of approval to the final site plan approval.

(2) Final site plan approval and permits may be conditioned upon obtaining necessary permits from relevant agencies.

Comments. This may be included as a condition of approval and require permit confirmation from entities such as the Ionia County Road Commission (SESC permits) and other approving authorities.

Special Land Use Review Standards. Section 1274.04 of the Zoning Ordinance requires that the Planning Commission find that the following standards are met in its review of a proposed special land use. Those standards are below, along with our comments on each:

1. Be designed, constructed, operated, and maintained so that it will be harmonious and appropriate in appearance with the existing or intended character of the general vicinity and that such use will not significantly change the essential character of the area in which it is proposed.

   Comments. The suggested project is consistent with other established uses and structures in the area, especially on the east side of South State Road. The proposed access drive configuration allows for the co-utilization of a singular driveway onto South State Road by several developments. Consolidating access points along M-66 should improve safety. The proposed application is unlikely to alter the commercial character of the area.

2. Is adequately served by essential public facilities and services such as highways, streets, police, fire protection, drainage structures, refuse disposal, water and sewage facilities, and schools.

   Comments. The applicant asserts that M-66 will service the site, with sanitary sewer access provided by Berlin Township and water service from the City of Ionia. The applicant has provided the traffic review and signal study at the S. State Road intersection. The study satisfies the City's requirements for this application; however, if further development were to take place on the 90 E. Tuttle property, it would have to meet the design standards of the City.

3. Do not create excessive additional requirements for public facilities and services at public cost.

   Comments. It is improbable that the development of a new commercial site/parking will incur substantial public service or facility expenditures. The Planning Commission may consider this standard satisfactorily met.

4. Does not involve uses, activities, processes, materials, equipment, or conditions of operation that will be detrimental to any persons, property, or the general welfare because of excessive production of traffic, noise, smoke, fumes, glare, or odors.

   Comments. The anticipated parking lot for the new commercial development is not expected to cause any adverse effects on traffic flow, nor will it generate detrimental levels of noise, smoke, fumes, glare, or odors for the property itself or any adjacent areas.

5. Be consistent with the intent and purpose of the zoning district where such use will be located.

   Comments. Section 1260.01 of the Ordinance establishes the intent of the B-3 General Business district. Complying with the Ordinance, the Commission may consider this standard met.

Specific Special Land Use Review Standards. Section 1274.10 of the Zoning Ordinance requires that the Planning Commission find that the following standards are met in its review of a proposed special land use. Those standards are below, along with our comments on each:

a) Notwithstanding the general requirement of Section 1240.11 (1) that an accessory use be located on the same zoning lot as the principal use to which it is related, the Planning Commission may permit parking as an accessory use to an adjacent lot if the applicant demonstrates that the proposed parking cannot be reasonably placed on the same lot as the principal used due to site constraints or existing development.

   Comments. The applicant has shown that they cannot reasonably accommodate off-street parking anywhere else on the primary property, especially due to the nature that there is a proposed drive-through window. Therefore, the applicant is seeking to construct the additional 11 parking spaces and also a three-container dumpster enclosure on the property. Therefore, this is considered an accessory use parking facility. The Planning Commission may consider this standard to be satisfied.

b) For purposes of the setback requirements under Section 1282.01(a) the barrier-free parking requirements under 1282.02(q), and calculating minimum and maximum parking space requirements, the two lots shall be considered one lot.

   Comments. The proposed parking spaces are set back 35.68 ft. from the southern property line, satisfying the 5 foot minimum setback requirement of Section 1282.01(a). Because Ionia Township does not have off-street parking zoning requirements, and must accept the proposed off-street parking meets the drive through coffee shop and retail storefront needs. Future development on the the 90 E. Tuttle parcel will have to comply with the City's parking ordinance requirements.

c) All requirements under Chapter 1282 apply to parking approved under this section, provided, however, that if the principal use is on a lot outside of the City, the minimum and maximum parking space requirements shall not apply.

   Comments. Referencing the previous standard, the Planning Commission is not required to follow the minimum or maximum off-street parking requirements in the City Ordinance.

d) As part of approval under this section, the Planning Commission may allow a dumpster enclosure or similar accessory structure that serves the principal use on the adjacent lot. subject to all applicable requirements of this Ordinance.

   Comments. The proposed dumpster enclosure is located in the City portion of the development, and the 8 ft. x 27.75 ft. enclosure will service all three commercial units. The enclosure proposed does meet the requirements of the city; the Commission may consider this standard met.

e) In addition to any conditions that the Planning Commission may impose under Section 1274.05, the Planning Commission shall impose the following conditions with the approval of a special land use under this section:

a. The provision for parking as an accessory use to .an adjacent lot shall be set forth in the instrument recorded at the office of the Ionia County Register of Deeds, describing the lands affected by this agreement.

b. The special land use approval shall automatically terminate if:

    i. The principal use on the adjacent lot ceases for a period of 18-months resulting in the use being considered abandoned, or;

    ii. The principal use on the adjacent lot changes in use or expands, resulting in significant alterations to site circulation. drainage. landscaping. lighting. and/or other considerations of site plan review that would require a site plan review by the Planning Commission, or;

    iii. The instrument required under Section 1274.10(e)(1) is found to be invalid or void by a court of competent jurisdiction or is terminated.

    Comments. These conditions must include these conditions if approved.

c. Accessory structures shall not be allowed unless made part of said approval when granted.

    Comments. No accessory structures outside of the dumpster enclosure have been proposed. The Planning Commission may consider this standard satisfactorily met.

Recommendation. At the March 11, 2026 meeting, the Planning Commission should open a public hearing and carefully consider any staff comments as well as comments from the applicant or the public while discussing this application. If the Planning Commission is satisfied with the proposed application, it may choose to approve this permit request. If the Commission does choose to approve the special use permit, we suggest adding the following conditions:

1. The applicant is in the process of receiving or has received approvals from all other local, state, or federal permitting agencies.
2. The Planning Commission approved the reduction of the required screening from 15 trees to 10 trees.
3. That all outdoor lighting and parking lot lighting will be compliant with Section 1286.03.
4. Any other reasonable condition the Planning Commission finds is necessary to protect the health, safety, and general welfare of the surrounding community and the residents of the City of Ionia.

CITY OF IONIA

MOTION SHEET FOR PLANNING COMMISSION AGENDA ITEM
Abbey Residential Development LLC – 90 E. Tuttle Rd. (S. State St.)

Chapter 1276 – Site Plan Standards of Approval. The following standards are outlined in Section 1276.07 of the City of Ionia Zoning Ordinance and must be met to receive approval during a site plan review.

(a) Access and Site Circulation
- (1) Buildings must be arranged to allow emergency vehicle access as required by the City's Public Safety Department.
- (2) The Planning Commission may:
  - A. Limit the number of driveways for a site.
  - B. Require shared driveways between contiguous parcels.
  - C. Require parking lots on adjacent parcels to be connected.
  - D. Align driveways opposite each other for improved traffic flow.
- (3) Public and private circulation routes must integrate with existing or planned streets, pedestrian paths, and bicycle routes.
- (4) Streets and drives that are part of an existing or planned street pattern serving adjacent development shall be of a condition appropriate to the traffic volume and type of traffic they will carry.
- (5) On-site maneuvering space for trucks must be provided so that loading areas do not interfere with public right-of-way.

(b) Landscaping and Site Design
- (1) Landscaping must comply with the City's landscape provisions.
- (2) The site design must consider:
  - A. Topography
  - B. Type and size of lot and buildings
  - C. Character of adjoining property
  - D. Adjoining properties to prevent negative impacts on their orderly development or improvement for uses in this Zoning Code
- (3) Natural features should be preserved where practical, with minimal removal of vegetation and alterations to topography.
- (4) Areas of natural drainage, such as wetlands, ponds, and swales, must be protected to maintain natural drainage patterns and habitats.

(c) Privacy and Screening
- (1) The site plan must provide reasonable visual and sound privacy for all dwelling units through the use of fences, landscaping, and other barriers where necessary.
- (2) Outdoor storage and trash collection areas must comply with Chapter 1060 and be screened appropriately.

(d) Pedestrian and Non-Motorized Transportation
- (1) In recognition that a connected sidewalk system along City streets enhances pedestrian safety and conserves energy through non-motorized transportation opportunities,

sidewalks shall be required as determined by the Planning Commission and must comply with City of Ionia sidewalk standards, as detailed in the City's Municipal Standards.

(2) Factors for requiring sidewalks include:
    A. Existing and future pedestrian traffic near the site
    B. Ability to enhance pedestrian safety
    C. Traffic volume on adjacent streets
    D. Potential for a connected sidewalk network
    E. Proximity to pedestrian attractors (e.g., schools, public buildings, shopping areas)
    F. Location of the proposed use

(e) Lighting
(1) Exterior lighting shall be arranged so that illumination is deflected downward and away from adjacent properties and so that it does not interfere with the vision of motorists along adjacent streets.
(2) Flashing or intermittent lights shall not be permitted.
(3) Excessive lighting of buildings or structures shall be minimized to reduce light pollution.

(f) Stormwater Management
(1) Stormwater drainage must be designed to prevent adverse impacts on neighboring properties and the public stormwater system.
(2) Provisions must be made for:
    A. Erosion control, particularly during construction
    B. Dust prevention
    C. Retention/detention ponds, where necessary
(3) Paved surfaces must be designed to prevent water pooling and maintain safe traffic flow.
(4) The Planning Commission may require catch basins with oil filters to prevent contamination of natural drainage systems.
(5) As deemed necessary, the Planning Commission may require the site plan to be reviewed by the Ionia County Drain Commissioner.

(g) Compliance with Regulations
(1) Site plans must comply with all applicable County, State, and Federal laws and regulations.
(2) Final site plan approval and permits may be conditioned upon obtaining necessary permits from relevant agencies.

Chapter 1274 – Special Land Use Standards

1. Be designed, constructed, operated, and maintained so it will be harmonious and appropriate in appearance with the existing or intended character of the general vicinity and that such use will not significantly change the essential character of the area in which it is proposed.

2. Be adequately served by essential public facilities and services such as highways, streets, police, fire protection, drainage structures, refuse disposal, water and sewage, and schools.

3. Not create excessive additional requirements at public cost for public facilities and services.

4. Not involve uses, activities, processes, materials, and equipment or conditions of operation that will be detrimental to any persons, property, or the general welfare because of excessive production of traffic, noise, smoke, fumes, glare, or odors.

5. Be consistent with the intent and purpose of the zoning district in which such use will be located.

Chapter 1274.10 – Specific SLU Standards: Parking as an Accessory Use to an Adjacent Lot

(a) Notwithstanding the general requirement of Section 1240.11 (1) that an accessory use be located on the same zoning lot as the principal use to which it is related, the Planning Commission may permit parking as an accessory use to an adjacent lot if the applicant demonstrates that the proposed parking cannot be reasonably placed on the same lot as the principal used due to site constraints or existing development.

(b) For purposes of the setback requirements under Section 1282.01(a) the barrier-free parking requirements under 1282.02(q), and calculating minimum and maximum parking space requirements, the two lots shall be considered one lot.

(c) All requirements under Chapter 1282 apply to parking approved under this section, provided, however, that if the principal use is on a lot outside of the City, the minimum and maximum parking space requirements shall not apply.

(d) As part of approval under this section, the Planning Commission may allow a dumpster enclosure or similar accessory structure that serves the principal use on the adjacent lot. subject to all applicable requirements of this Ordinance.

(e) In addition to any conditions that the Planning Commission may impose under Section 1274.05, the Planning Commission shall impose the following conditions with the approval of a special land use under this section:

(1) The provision for parking as an accessory use to .an adjacent lot shall be set forth in the instrument recorded at the office of the Ionia County Register of Deeds, describing the lands affected by this agreement.
(2) The special land use approval shall automatically terminate if:
A. The principal use on the adjacent lot ceases for a period of 18-months resulting in the use being considered abandoned, or;
B. The principal use on the adjacent lot changes in use or expands, resulting in significant alterations to site circulation. drainage. landscaping. lighting. and/or other considerations of site plan review that would require a site plan review by the Planning Commission, or;
C. The instrument required under Section 1274.10(e)(1) is found to be invalid or void by a court of competent jurisdiction or is terminated.

(3) Accessory structures shall not be allowed unless made part of said approval when granted.

Planning Commission Determinations

1. Decision to modify or waive the landscaping requirements of 5 canopy trees, 5 evergreen trees, and 5 ornamental trees.

Staff Recommended Conditions

1. Obtain all required permits and approvals from relevant local, state, and federal authorities.

2. All exterior lighting must comply with Section 1286.03 of the Zoning Ordinance.

3. Stormwater retention shall be provided for on the primary parcel located in Ionia Township.

4. Stormwater retention plans with location of catch basins must be submitted to the City along with an approval letter from the Ionia County Drain Commissioner.

5. Easements must be submitted for City administrative approval pertaining to the accessory uses and access road.

6. Following City approval, the applicant shall record all necessary easements with the Ionia County Register of Deeds in accordance with Section 1274.10 of the Zoning Ordinance.

7. Additional reasonable conditions may be set by the Planning Commission to ensure public health, safety, and welfare.

Motion Options:

1. Decision to Approve

Moved by _____ and seconded by _____ to approve the site plan and special land use permit for parking as an accessory use to an adjacent lot with a commercial building and drive thru located at 90 E. Tuttle Road (PPN: 34-204-031-000-110-23). This decision is based on the findings that the proposed use and plan comply with the Site Plan Standards of Chapter 1276 and the Special Land Use Standards of Chapter 1274 including Section 1274.10 of the Code of Ordinances, as detailed and discussed above, subject to administrative approval of the listed conditions.

2. Decision to Deny

Moved by _____ and seconded by _____ to deny the site plan and special land use permit for parking as an accessory use to an adjacent lot with a commercial building and drive thru located at 90 E. Tuttle Road (PPN: 34-204-031-000-110-23). This decision is based on the findings that the proposed use or plan does not comply with the Site Plan

Standards of Chapter 1276 and the Special Land Use Standards of Chapter 1274 including Section 1274.10 of the Code of Ordinances, as detailed and discussed above.

3. Decision to Approve with Additional Conditions

Moved by _____ and seconded by _____ to approve the site plan and special land use permit for parking as an accessory use to an adjacent lot with a commercial building and drive thru located at 90 E. Tuttle Road (PPN: 34-204-031-000-110-23). This decision is based on the findings that the proposed use and plan comply with the Site Plan Standards of Chapter 1276 and the Special Land Use Standards of Chapter 1274 including Section 1274.10 of the Code of Ordinances, as detailed and discussed above, subject to administrative approval of the staff recommended conditions and the following additional conditions created by the Planning Commission.

List of Additional Conditions:

4. Table the Request

Moved by _____ and seconded by _____ to table the request until the listed outstanding items are provided.

List of Outstanding Items:

CITY OF IONIA

Site Plan & Special Land Use Application

Submit Applications to City Hall
Street Address: 114 North Kidd Street Ionia, MI 48846
Mailing Address: P.O. Box 496 Ionia, MI 48846
Ph: (616) 527-4170 Website: www.ci.ionia.mi.us

Date of Application: 1/2/2026 **Permit Fee:** $1,000*

A site plan approval with a special land use permit requires action by the Planning Commission. Applications must be submitted four weeks prior to the meeting in which it will be heard and include a completed site plan checklist.

Approved site plans and special land use permits are valid for one year unless extended. If actual construction of a substantial portion of the improvements included in the approved site plan has not commenced and proceeded meaningfully toward completion during that period, the approval of the final site plan shall be voided.

Applicant Information

Applicant's Name: Jason Kildea Interest in Property: Owners Representative

Address: 330 Marshall St. Suite 100 City, State, Zip: Lansing, MI 48912

Phone: [redacted] Email: [redacted]

Owner's Name (If different from above): _____

Project Information

1. Request (check all that apply):
   - ☐ Site Condominium
   - ☑ Special Land Use
   - ☐ Plat
   - ☐ PUD
   - ☐ Site Plan Review
   - ☐ Rezoning
   - Other: _____
2. Address of Property: Vacant Land
3. Parcel Number: 34-204-031-000-110-23
4. Legal Description: See attached.
5. Project Description: Develop parking and circulation on property to aid in the developmt of a new retail center located within the township - township parcel - 34-060-140-000-035-20
6. Current Zoning: Commercial Proposed Zoning: N/A
7. Size of Parcel: 8.82 acres

(*Fee includes $500 for Special Land Use and $500 for Site Plan Review.)

Signatures

Applicant's Signature: Jason Kildea Date: 1/2/2026

Property Owner's Signature: Patrick K. Gillespie Date: 1/2/2026

OFFICE USE ONLY **Application #:** _____

☐ Fees Paid: _____

Date Advertised: _____ Date of Meeting: _____

Action Taken: _____

Comments: _____

_____

Signature: _____ Date: _____

Site Plan Review Process

I. Items to be Submitted

The following material must be submitted to the City Zoning Administrator in applying for review of a site plan by the Planning Commission.

- [x] Application
- [ ] Fee
- [ ] Special Land Use Questionnaire
- [x] 4 Copies of a Preliminary Site Plan
- [x] 1 Electronic Copy of a Preliminary Site Plan
- [ ] Site Plan Review Checklist

The site plan must contain the information required by Section 1276.05 of the City Zoning Ordinance. A site plan checklist is attached which notes the information required.

II. Meeting Dates

The City Planning Commission meets on the second Wednesday of each month at 4:30 P.M. in the city council chambers at the City Hall.

III. Processing Period.

An application for site plan review and special land use permit to the Planning Commission usually takes about 45 to 60 days to process. Applications must be submitted at least four weeks before a Planning Commission meeting in order to be placed on the agenda.

IV. Application Procedures

Whenever an application is filed for a site plan review and a special land use permit, the following steps are taken:

1. An application for a site plan and special land use permit is submitted to the Zoning Administrator along with the required fee.
2. The Zoning Administrator in conjunction with the chair of the Planning Commission, sets a public hearing date for the site plan and special land use.
3. The Zoning Administrator mails notices of the hearing to all land owners within 300 feet of the site.
4. The notices are mailed at least 15 days before the hearing.
5. The Zoning Administrator forwards copies of the application and site plan to the Planning Commission, Director of Public Safety, and Department of Public Works.
6. Reports from the Director of Public Safety, and Department of Public Works are prepared and sent to the Planning Commission.
7. The Planning Commission at the public hearing reviews the site plan, special land use permit, and staff reports. The Commission reviews the plan in accordance with the standards contained in Sect on 1274.04 and Section 1276.07 of the Zoning

Ordinance. The Commission may approve, modify or deny the site plan and special land use permit or approve it subject to revisions being made.

The Commission may require the revised plan to be brought back to the Commission for final approval or allow the Zoning Administrator to review and approve the revised plan according to the changes required by the Commission.

8. Once final approval is given and the site plan contains all required corrections, the Zoning Administrator signs two copies of the plan, one for the City Building Inspector and one for the applicant. Following this step, the applicant may apply for a building permit.
9. An approved site plan and special land use permit must be under construction within one year of the date of final site plan approval or the site plan becomes invalid. A one-year extension may be granted by the Planning Commission provided the applicant presents reasonable evidence that the development has had unforeseen difficulties but is now ready to proceed.

Special Land Use Standards-Section 1274.04

The following general standards shall serve as the basis for decisions by the Planning Commission involving special land use permits. The Commission shall find that, in addition to specific standards for a particular use, the proposed use shall:

a) Be designed, constructed, operated and maintained so it will be harmonious and appropriate in appearance with the existing or intended character of the general vicinity and that such use will not significantly change the essential character of the area in which it is proposed.
b) Be adequately served by essential public facilities and services such as highways, streets, police, fire protection, drainage structures, refuse disposal, water and sewage facilities and schools.
c) Not create excessive additional requirements at public cost for public facilities and services.
d) Not involve uses, activities, processes, materials and equipment or 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.
e) Be consistent with the intent and purpose of the zoning district in which such use will be located.

Site Plan Review Standards

All site plans reviewed by the Planning Commission shall be approved, approved with conditions, or denied based on the purposes, objectives, and requirements of this ordinance, and specifically, the following considerations when applicable. Please review the following standards to ensure that the proposed site plan will satisfy these requirements. Additional comments and information are encouraged.

Relationship of Request to Surrounding Area

- ☑ The relationship of uses proposed will not adversely affect the public health, safety, or welfare.
- ☑ Proposed uses and structures take into account topography, size of the property, the uses on adjoining property and relationship and size of buildings to the site.
- ☑ The site is developed so as not to impede the normal and orderly development or improvement of surrounding property for uses permitted in the ordinance.

Drives, Parking, and Circulation

- ☑ Safe, convenient, uncongested, and well-defined vehicular and pedestrian circulation is provided for ingress/egress points and within the site.
- ☑ Drives, streets and other circulation routes are designed to promote safe and efficient traffic operations within the site and at ingress/egress points.
- ☑ The arrangement of public or private vehicular and pedestrian connections to existing or planned streets in the area are planned to provide a safe and efficient circulation system for traffic within the City of Ionia.

Natural Features

- ☑ Removal or alteration of significant natural features is restricted to those areas that are reasonably necessary to develop the site in accordance with the requirements of this ordinance.
- ☑ Landscaping, buffers, and/or greenbelts are preserved and/or provided to ensure that proposed uses will be adequately buffered from one another and from surrounding public and private property.

General

- ☑ Satisfactory assurance is provided that the requirements of all other applicable ordinances, codes, and requirements of the City of Ionia will be met.
- ☑ The general purposes and spirit of this ordnance and the City of Ionia Master Plan are maintained.

Special Land Use Questionnaire

The Special Land Use Questionnaire is required as part of the application. The following general standards shall serve as the basis for decisions by the Planning Commission involving special land use permits. Indicate below how this request meets each standard.

Standard 1

The use is designed, constructed, operated and maintained so it will be harmonious and appropriate in appearance with the existing or intended character of the area in which it is proposed.

The parking wtill aid in the development of the retail center on the adjacent property that is in the township. This development is harmonious with other uses nearby.

Standard 2

The use will be adequately served by essential public facilities and services such as highways, streets, police, fire protection, drainage structures, refuse disposal, water and sewage facilities and schools.

Yes.The use will be served by M66 and will have access to sanitary sewer from Berlin Township and water service from the City of Ionai.

Standard 3

The use does not create excessive additional requirements at public cost for public facilities and services.

Correct, there is no request for cost from public.

Standard 4

The use does not involve uses, activities, processes, materials and equipment or 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.

No it will not.

Standard 5

The use is consistent with the intent and purpose of the zoning district in which such use will be located.

Yes, iit is consistent with the zoning distrct.

Site Plan Review Checklist

A site plan submitted for review by the City of Ionia Planning Commission must contain the following items unless the Commission determines such items are not needed on the plan. This list is taken from Section 1276.05 of the City of Ionia Zoning Ordinance.

- [x] Scale (not more than 1" – 100 ft.).
- [x] A vicinity map.
- [x] Date site plan was prepared.
- [x] Name, address & seal of preparer.
- [x] North arrow.
- [x] Legal description.
- [x] Property lines and dimensions.
- [x] Building setback distances.
- [x] All structures, lot lines & wetlands within 100 feet of the site.
- [ ] Location of septic tanks and drain fields.
- [ ] Location of utility easements.
- [ ] Location of all sidewalks.
- [ ] Location of all bike paths or walkways.
- [ ] Location and size of any walls, fences or other screening provisions.
- [ ] Location of all proposed landscape including size and type of planting.
- [ ] Location of all proposed accessory structures.
- [ ] Location of all light poles or fixtures including type.
- [ ] Location of all flagpoles.
- [ ] Existing & proposed topographic elevations at two-foot intervals on the site & to a distance of 50 ft. outside the boundaries.
- [ ] Identify all slopes 20% or more.
- [ ] Direction of storm water drainage & how storm water runoff will be handled.
- [ ] Location of existing buildings.
- [ ] Location of proposed buildings.
- [ ] Intended use of proposed buildings.
- [ ] Length & width of proposed buildings.
- [ ] Height of proposed buildings.
- [ ] Square footage of proposed buildings.
- [ ] First floor elevation of each building.
- [ ] Location of abutting streets.
- [ ] Location of rights-of -way.
- [ ] Location of service drives. Location of curb cuts.
- [ ] Location of access easements serving the site.
- [ ] Location of driveways opposite the site.
- [ ] Location of driveways within 100 feet on either side of the site.

- [ ] Driveway width, curb radii and deceleration lane.
- [ ] Location and size of all water lines.
- [ ] Location and size of sanitary sewer lines.
- [ ] Location of all storage sheds.
- [ ] Location of all transformers.
- [ ] Location of all dumpsters or trash removal areas or devices. Dumpsters must be screened.
- [ ] Location of all signs.
- [ ] Location of all existing and proposed utility poles.
- [ ] Location of proposed parking areas & access drives.
- [ ] Number of parking spaces & aisles.
- [ ] Dimensions of spaces & aisles.
- [ ] Location of parking blocks, landscape, timbers, etc.
- [ ] Location of loading areas.
- [ ] Location of parking islands.
- [ ] Location of handicapped spaces & access ramps.
- [ ] Type of parking lot surface.
- [ ] Location of curbs.
- [ ] Location & type of significant existing vegetation.
- [ ] Location & type of significant existing water courses.
- [ ] Location & type of significant existing water bodies.
- [ ] Location & type of significant existing county or city drains & manmade surface drainage ways.
- [ ] Location of 100-year floodplains.
- [ ] Location of existing wetlands.
- [ ] Location and size of storm drainage lines.
- [ ] Location of fire hydrants.
- [ ] Location of catch basins.
- [ ] Vegetation which is to be retained on the site must be illustrated.
- [ ] Zoning on adjacent properties.
- [ ] Location & specifications for any existing or proposed above or below ground storage facilities for any chemicals, salts, flammable materials, or hazardous materials.

City of Ionia
114 N Kidd ST
IONIA, MI 48846-0076

Print Date: 01/12/2026
PZE Number: SLU26-0001
PZE Type: Special Land Use
Location: 90 E TUTTLE RD

Pay by Account in Full

Total Balance Due: $1000.00

Gillespie Group
330 MARSHALL ST STE 100
LANSING, MI 48912-2317

Invoice	Number	Date	Due	Adjustments	Payments	Balance
	00000805	01/12/26	02/11/26	$0.00	$0.00	$1000.00

Quantity	Category	Description	Billed
1.00	Planning/Zoning	Special Land Use	$500.00
1.00	Planning/Zoning	Site Plan - PC Review	$500.00

Total Balance Due: $1000.00

PAID

JAN 2 1 2026

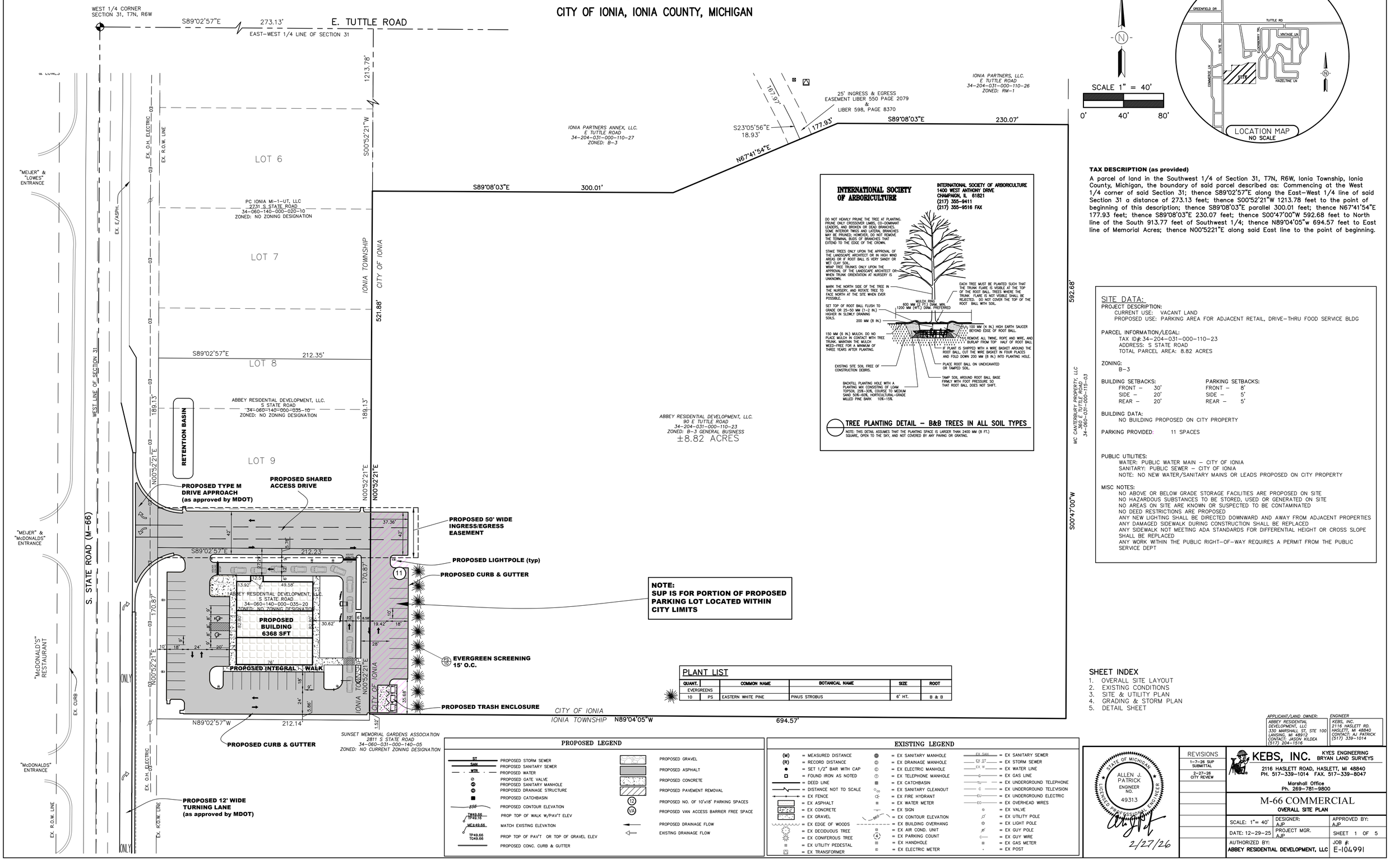
CITY OF IONIA

1/1

SUP PLAN:

M-66 COMMERCIAL

CITY OF IONIA, IONIA COUNTY, MICHIGAN



TAX DESCRIPTION (as provided)

A parcel of land in the Southwest 1/4 of Section 31, T7N, R6W, Ionia Township, Ionia County, Michigan, the boundary of said parcel described as: Commencing at the West 1/4 corner of said Section 31; thence S89°02'57"E along the East–West 1/4 line of said Section 31 a distance of 273.13 feet; thence S00°52'21"W 1213.78 feet to the point of beginning of this description; thence S89°08'03"E parallel 300.01 feet; thence N67°41'54"E 177.93 feet; thence S89°08'03"E 230.07 feet; thence S00°47'00"W 592.68 feet to North line of the South 913.77 feet of Southwest 1/4; thence N89°04'05"W 694.57 feet to East line of Memorial Acres; thence N00°5221"E along said East line to the point of beginning.

SITE DATA:

PROJECT DESCRIPTION:
CURRENT USE: VACANT LAND
PROPOSED USE: PARKING AREA FOR ADJACENT RETAIL, DRIVE–THRU FOOD SERVICE BLDG

PARCEL INFORMATION/LEGAL:
TAX ID #: 34–204–031–000–110–23
ADDRESS: S STATE ROAD
TOTAL PARCEL AREA: 8.82 ACRES

ZONING:
B–3

BUILDING SETBACKS:
FRONT – 30'
SIDE – 20'
REAR – 20'

PARKING SETBACKS:
FRONT – 8'
SIDE – 5'
REAR – 5'

BUILDING DATA:
NO BUILDING PROPOSED ON CITY PROPERTY

PARKING PROVIDED: 11 SPACES

PUBLIC UTILITIES:
WATER: PUBLIC WATER MAIN – CITY OF IONIA
SANITARY: PUBLIC SEWER – CITY OF IONIA
NOTE: NO NEW WATER/SANITARY MAINS OR LEADS PROPOSED ON CITY PROPERTY

MISC NOTES:
NO ABOVE OR BELOW GRADE STORAGE FACILITIES ARE PROPOSED ON SITE
NO HAZARDOUS SUBSTANCES TO BE STORED, USED OR GENERATED ON SITE
NO AREAS ON SITE ARE KNOWN OR SUSPECTED TO BE CONTAMINATED
NO DEED RESTRICTIONS ARE PROPOSED
ANY NEW LIGHTING SHALL BE DIRECTED DOWNWARD AND AWAY FROM ADJACENT PROPERTIES
ANY DAMAGED SIDEWALK DURING CONSTRUCTION SHALL BE REPLACED
ANY SIDEWALK NOT MEETING ADA STANDARDS FOR DIFFERENTIAL HEIGHT OR CROSS SLOPE SHALL BE REPLACED
ANY WORK WITHIN THE PUBLIC RIGHT–OF–WAY REQUIRES A PERMIT FROM THE PUBLIC SERVICE DEPT

PLANT LIST

QUANT.		COMMON NAME	BOTANICAL NAME	SIZE	ROOT
EVERGREENS					
10	PS	EASTERN WHITE PINE	PINUS STROBUS	6' HT.	B & B

SHEET INDEX

PROPOSED LEGEND

ST — PROPOSED STORM SEWER	PROPOSED GRAVEL
SAN — PROPOSED SANITARY SEWER	PROPOSED ASPHALT
WTR — PROPOSED WATER	PROPOSED CONCRETE
PROPOSED GATE VALVE	PROPOSED PAVEMENT REMOVAL
PROPOSED SANITARY MANHOLE	PROPOSED NO. OF 10'x18' PARKING SPACES
PROPOSED DRAINAGE STRUCTURE	PROPOSED VAN ACCESS BARRIER FREE SPACE
PROPOSED CATCHBASIN	PROPOSED DRAINAGE FLOW
856 — PROPOSED CONTOUR ELEVATION	EXISTING DRAINAGE FLOW
TW49.66 TP48.16 — PROP TOP OF WALK W/PAVT ELEV	
MT 849.66 — MATCH EXISTING ELEVATION	
TP49.66 TG49.66 — PROP TOP OF PAVT OR TOP OF GRAVEL ELEV	
PROPOSED CONC. CURB & GUTTER	

EXISTING LEGEND

(M) = MEASURED DISTANCE	= EX SANITARY MANHOLE	EX SAN = EX SANITARY SEWER
(R) = RECORD DISTANCE	= EX DRAINAGE MANHOLE	EX ST = EX STORM SEWER
= SET 1/2" BAR WITH CAP	= EX ELECTRIC MANHOLE	EX W = EX WATER LINE
= FOUND IRON AS NOTED	= EX TELEPHONE MANHOLE	G = EX GAS LINE
= DEED LINE	= EX CATCHBASIN	TU = EX UNDERGROUND TELEPHONE
= DISTANCE NOT TO SCALE	= EX SANITARY CLEANOUT	C = EX UNDERGROUND TELEVISION
= EX FENCE	= EX FIRE HYDRANT	EU = EX UNDERGROUND ELECTRIC
= EX ASPHALT	= EX WATER METER	EO = EX OVERHEAD WIRES
= EX CONCRETE	= EX SIGN	= EX VALVE
= EX GRAVEL	860 = EX CONTOUR ELEVATION	= EX UTILITY POLE
= EX EDGE OF WOODS	= EX BUILDING OVERHANG	= EX LIGHT POLE
= EX DECIDUOUS TREE	= EX AIR COND. UNIT	= EX GUY POLE
= EX CONIFEROUS TREE	= EX PARKING COUNT	= EX GUY WIRE
= EX UTILITY PEDESTAL	= EX HANDHOLE	= EX GAS METER
= EX TRANSFORMER	= EX ELECTRIC METER	= EX POST

APPLICANT/LAND OWNER:
ABBEY RESIDENTIAL DEVELOPMENT, LLC
330 MARSHALL ST, STE 100
LANSING, MI 48912
CONTACT: JASON KILDEA
(517) 204-1516

ENGINEER
KEBS, INC.
2116 HASLETT RD.
HASLETT, MI 48840
CONTACT: AJ PATRICK
(517) 339-1014

STATE OF MICHIGAN — ALLEN J. PATRICK — ENGINEER NO. 49313 — PROFESSIONAL ENGINEER
2/27/26

REVISIONS
1-7-26 SUP SUBMITTAL
2-27-26 CITY REVIEW

KEBS, INC. — KYES ENGINEERING / BRYAN LAND SURVEYS
2116 HASLETT ROAD, HASLETT, MI 48840
PH. 517–339–1014 FAX. 517–339–8047
Marshall Office
Ph. 269–781–9800

M-66 COMMERCIAL
OVERALL SITE PLAN

SCALE: 1"= 40'	DESIGNER: AJP	APPROVED BY: AJP	
DATE: 12–29–25	PROJECT MGR. AJP	SHEET 1 OF 5	
AUTHORIZED BY: ABBEY RESIDENTIAL DEVELOPMENT, LLC		JOB #: E-104991	

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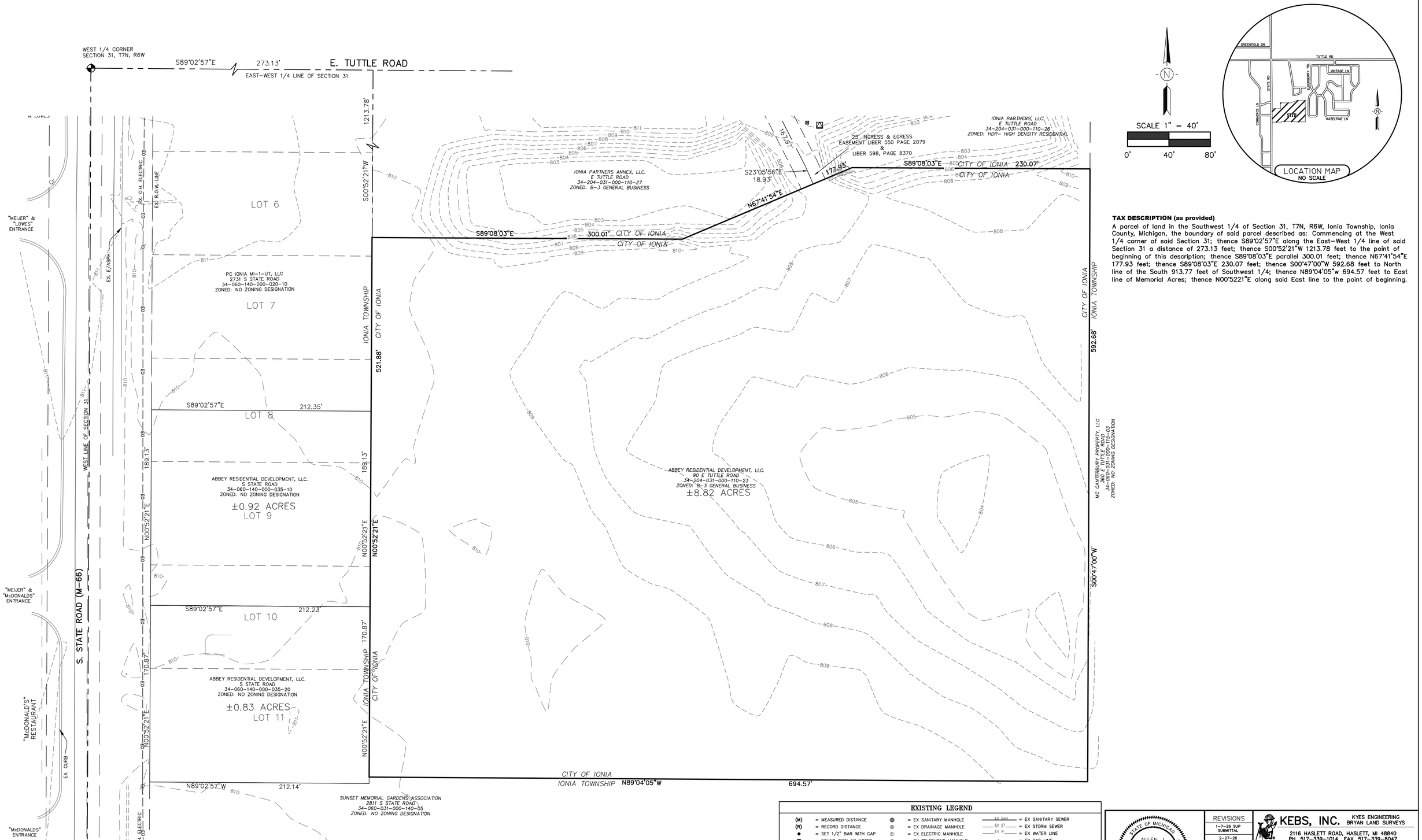

TAX DESCRIPTION (as provided)

A parcel of land in the Southwest 1/4 of Section 31, T7N, R6W, Ionia Township, Ionia County, Michigan, the boundary of said parcel described as: Commencing at the West 1/4 corner of said Section 31; thence S89°02'57"E along the East-West 1/4 line of said Section 31 a distance of 273.13 feet; thence S00°52'21"W 1213.78 feet to the point of beginning of this description; thence S89°08'03"E parallel 300.01 feet; thence N67°41'54"E 177.93 feet; thence S89°08'03"E 230.07 feet; thence S00°47'00"W 592.68 feet to North line of the South 913.77 feet of Southwest 1/4; thence N89°04'05"w 694.57 feet to East line of Memorial Acres; thence N00°5221"E along said East line to the point of beginning.

EXISTING LEGEND

(M) = MEASURED DISTANCE	= EX SANITARY MANHOLE	EX SAN = EX SANITARY SEWER
(R) = RECORD DISTANCE	= EX DRAINAGE MANHOLE	EX ST = EX STORM SEWER
= SET 1/2" BAR WITH CAP	= EX ELECTRIC MANHOLE	EX W = EX WATER LINE
= FOUND IRON AS NOTED	= EX TELEPHONE MANHOLE	G = EX GAS LINE
= DEED LINE	= EX CATCHBASIN	TU = EX UNDERGROUND TELEPHONE
= DISTANCE NOT TO SCALE	= EX SANITARY CLEANOUT	C = EX UNDERGROUND TELEVISION
= EX FENCE	= EX FIRE HYDRANT	EU = EX UNDERGROUND ELECTRIC
= EX ASPHALT	= EX WATER METER	EO = EX OVERHEAD WIRES
= EX CONCRETE	= EX SIGN	= EX VALVE
= EX GRAVEL	= EX CONTOUR ELEVATION	= EX UTILITY POLE
= EX EDGE OF WOODS	= EX BUILDING OVERHANG	= EX LIGHT POLE
= EX DECIDUOUS TREE	= EX AIR COND. UNIT	= EX GUY POLE
= EX CONIFEROUS TREE	= EX PARKING COUNT	= EX GUY WIRE
= EX UTILITY PEDESTAL	= EX HANDHOLE	= EX GAS METER
= EX TRANSFORMER	= EX ELECTRIC METER	= EX POST

STATE OF MICHIGAN
ALLEN J. PATRICK
ENGINEER NO. 49313
PROFESSIONAL ENGINEER

REVISIONS
1-7-26 SUP SUBMITTAL
2-27-26 CITY REVIEW

KEBS, INC. KYES ENGINEERING BRYAN LAND SURVEYS
2116 HASLETT ROAD, HASLETT, MI 48840
PH. 517-339-1014 FAX. 517-339-8047
Marshall Office
Ph. 269-781-9800

M-66 COMMERCIAL

EXISTING CONDITIONS

SCALE: 1"= 40'	DESIGNER: AJP	APPROVED BY: AJP	
DATE: 12-29-25	PROJECT MGR. AJP	SHEET 2 OF 5	
AUTHORIZED BY: ABBEY RESIDENTIAL DEVELOPMENT, LLC		JOB #: E-104991	

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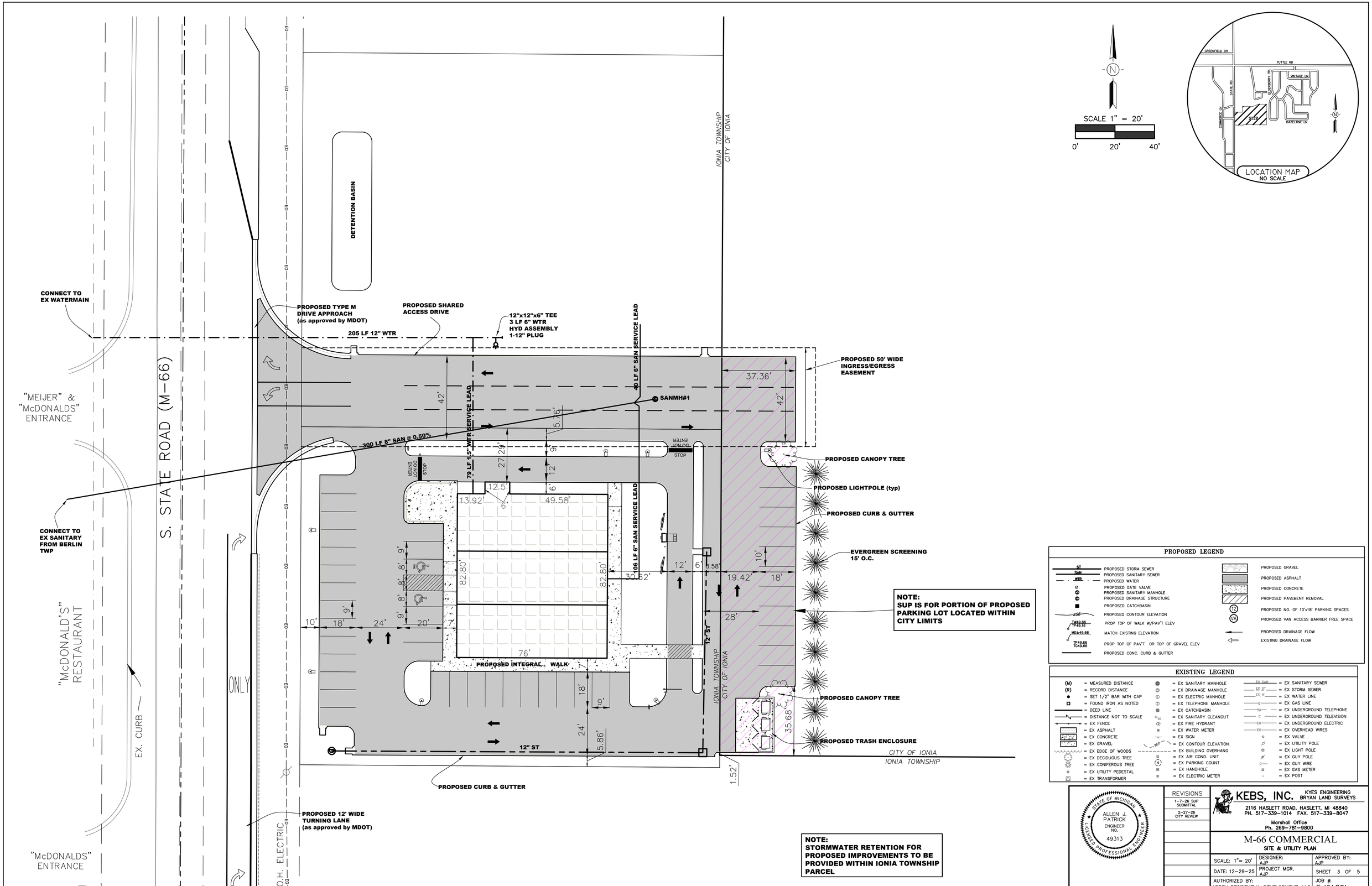

PROPOSED LEGEND

- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER
- PROPOSED GATE VALVE
- PROPOSED SANITARY MANHOLE
- PROPOSED DRAINAGE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED CONTOUR ELEVATION
- PROP TOP OF WALK W/PAVT ELEV
- MATCH EXISTING ELEVATION
- PROP TOP OF PAVT OR TOP OF GRAVEL ELEV
- PROPOSED CONC. CURB & GUTTER
- PROPOSED GRAVEL
- PROPOSED ASPHALT
- PROPOSED CONCRETE
- PROPOSED PAVEMENT REMOVAL
- PROPOSED NO. OF 10'x18' PARKING SPACES
- PROPOSED VAN ACCESS BARRIER FREE SPACE
- PROPOSED DRAINAGE FLOW
- EXISTING DRAINAGE FLOW

EXISTING LEGEND

- (M) = MEASURED DISTANCE
- (R) = RECORD DISTANCE
- = SET 1/2" BAR WITH CAP
- = FOUND IRON AS NOTED
- = DEED LINE
- = DISTANCE NOT TO SCALE
- = EX FENCE
- = EX ASPHALT
- = EX CONCRETE
- = EX GRAVEL
- = EX EDGE OF WOODS
- = EX DECIDUOUS TREE
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STATE OF MICHIGAN
ALLEN J. PATRICK
ENGINEER
NO. 49313
LICENSED PROFESSIONAL ENGINEER

REVISIONS
1-7-26 SUP SUBMITTAL
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PH. 517-339-1014 FAX. 517-339-8047
Marshall Office
Ph. 269-781-9800

M-66 COMMERCIAL
SITE & UTILITY PLAN

SCALE: 1"= 20'	DESIGNER: AJP	APPROVED BY: AJP
DATE: 12-29-25	PROJECT MGR. AJP	SHEET 3 OF 5
AUTHORIZED BY: ABBEY RESIDENTIAL DEVELOPMENT, LLC		JOB #: E-104991

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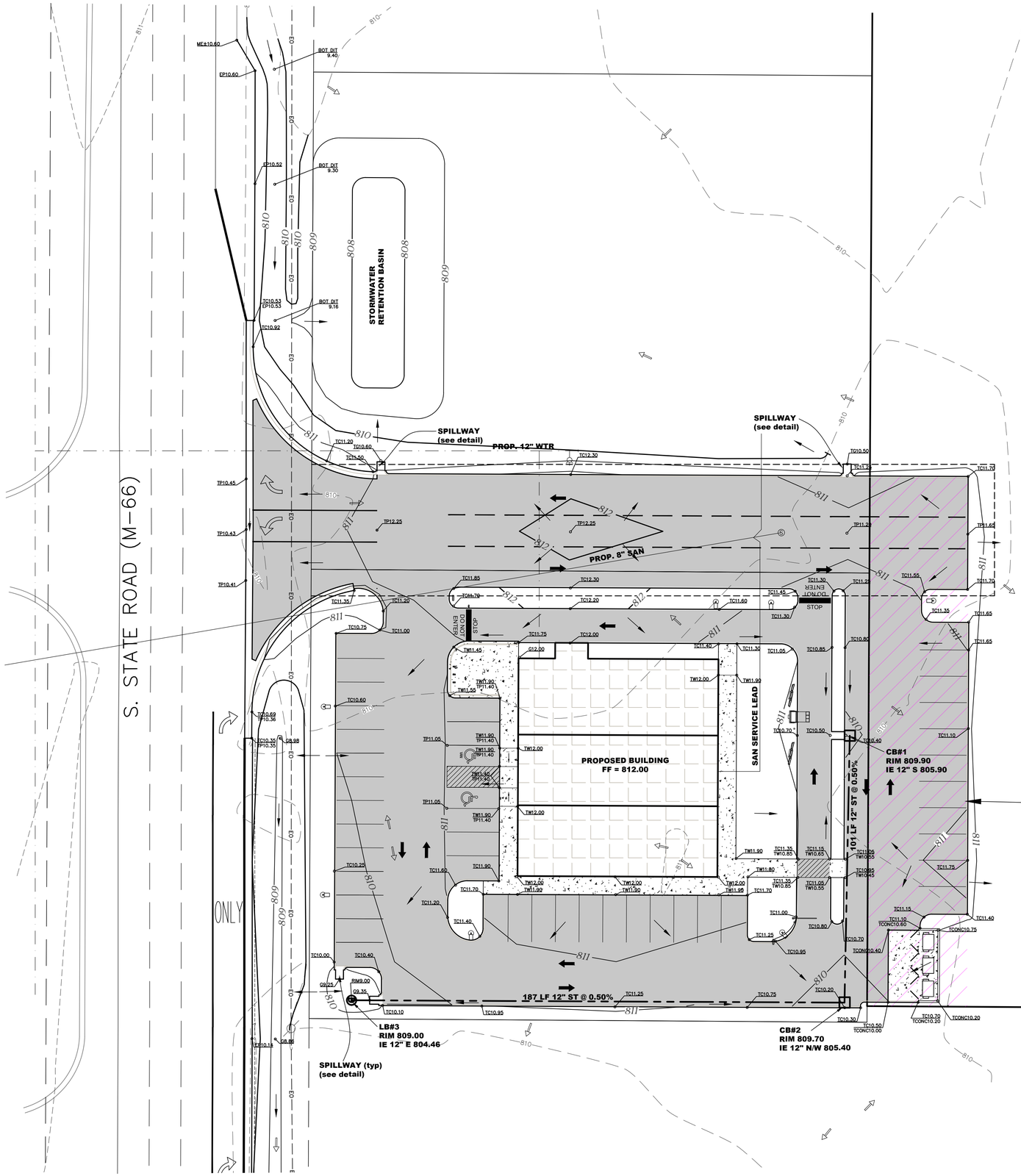

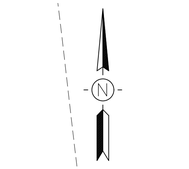

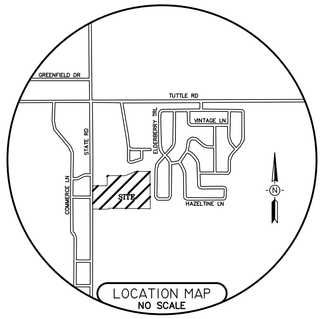

NOTE:
SUP IS FOR PORTION OF PROPOSED PARKING LOT LOCATED WITHIN CITY LIMITS

NOTE:
STORMWATER RETENTION FOR PROPOSED IMPROVEMENTS TO BE PROVIDED WITHIN IONIA TOWNSHIP PARCEL

PROPOSED LEGEND

ST — PROPOSED STORM SEWER	PROPOSED GRAVEL
SAN — PROPOSED SANITARY SEWER	PROPOSED ASPHALT
WTR — PROPOSED WATER	PROPOSED CONCRETE
PROPOSED GATE VALVE	PROPOSED PAVEMENT REMOVAL
PROPOSED SANITARY MANHOLE	
PROPOSED DRAINAGE STRUCTURE	
PROPOSED CATCHBASIN	PROPOSED NO. OF 10'x18' PARKING SPACES
856 — PROPOSED CONTOUR ELEVATION	VA — PROPOSED VAN ACCESS BARRIER FREE SPACE
TW49.66 / TP49.16 — PROP TOP OF WALK W/PAV'T ELEV	
ME±49.66 — MATCH EXISTING ELEVATION	PROPOSED DRAINAGE FLOW
TP49.66 / TC49.66 — PROP TOP OF PAV'T OR TOP OF GRAVEL ELEV	EXISTING DRAINAGE FLOW
PROPOSED CONC. CURB & GUTTER	

EXISTING LEGEND

(M) = MEASURED DISTANCE	= EX SANITARY MANHOLE
(R) = RECORD DISTANCE	= EX DRAINAGE MANHOLE
= SET 1/2" BAR WITH CAP	= EX ELECTRIC MANHOLE
= FOUND IRON AS NOTED	= EX TELEPHONE MANHOLE
= DEED LINE	= EX CATCHBASIN
= DISTANCE NOT TO SCALE	= EX SANITARY CLEANOUT
= EX FENCE	= EX FIRE HYDRANT
= EX ASPHALT	= EX WATER METER
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EX SAN = EX SANITARY SEWER	
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= EX VALVE	
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STATE OF MICHIGAN — ALLEN J. PATRICK — ENGINEER NO. 49313 — LICENSED PROFESSIONAL ENGINEER

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Ph. 269-781-9800

M-66 COMMERCIAL

GRADING & STORM PLAN

SCALE: 1"= 20'	DESIGNER: AJP	APPROVED BY: AJP
DATE: 12-29-25	PROJECT MGR. AJP	SHEET 4 OF 5
AUTHORIZED BY: ABBEY RESIDENTIAL DEVELOPMENT, LLC		JOB #: E-104991

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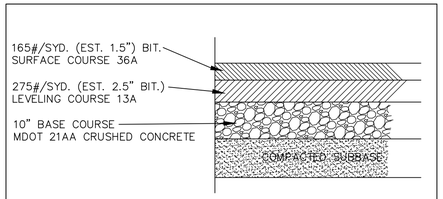
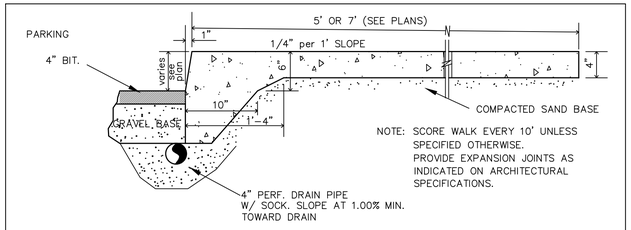
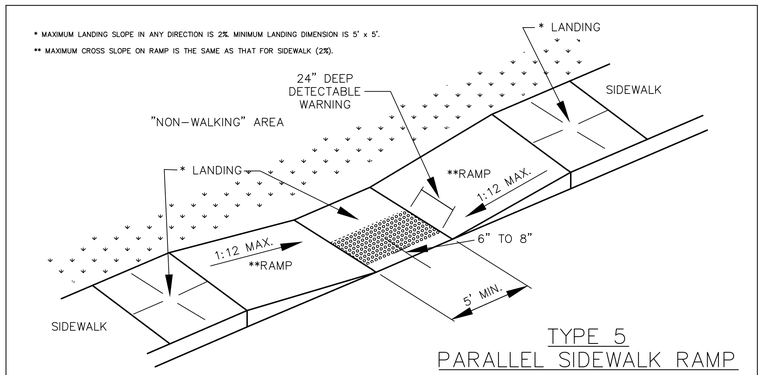


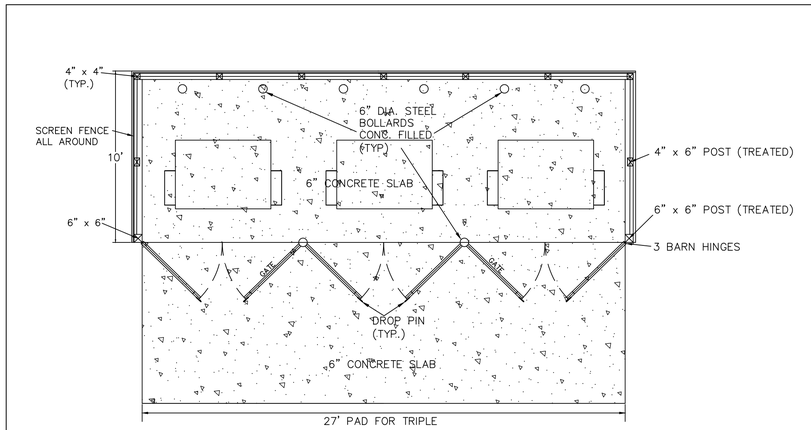
ASPHALT PAVEMENT SECTION



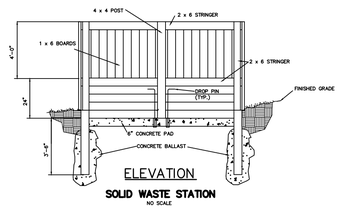
INTEGRAL SIDEWALK AND CURB DETAIL
NO SCALE



TYPE 5
PARALLEL SIDEWALK RAMP
REFERENCE MDOT DETAIL R-28-D



PLAN



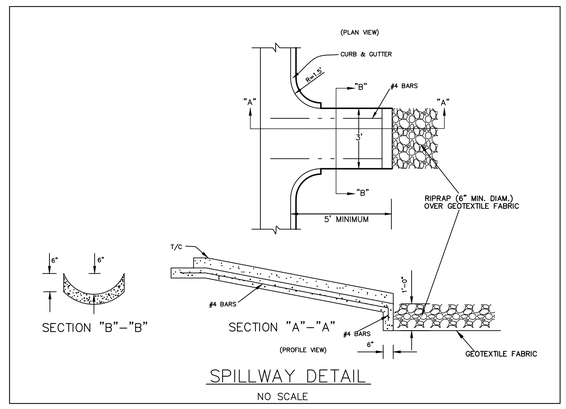
ELEVATION
SOLID WASTE STATION
NO SCALE

NOTE:
gates must swing completely open and have 8" min. ground clearance w/mechanism to keep gates open.

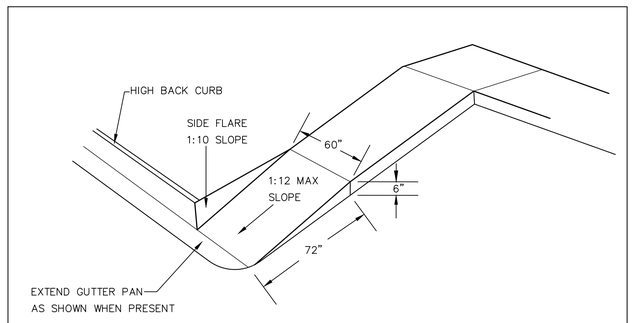
height 4 or 6 yd. container – 6' min.

45° min. straight away approach

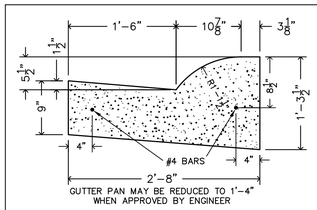
SOLID WASTE STATION
NO SCALE



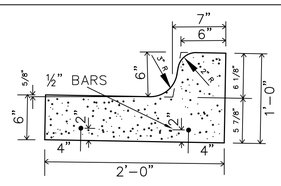
SPILLWAY DETAIL
NO SCALE



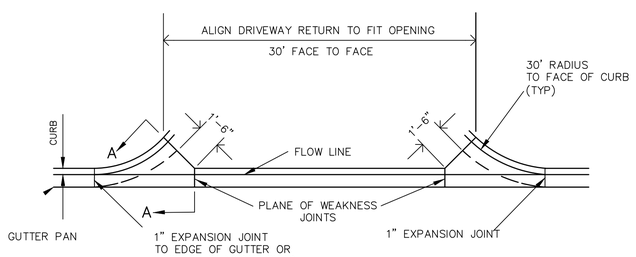
CURB RAMP
NO SCALE



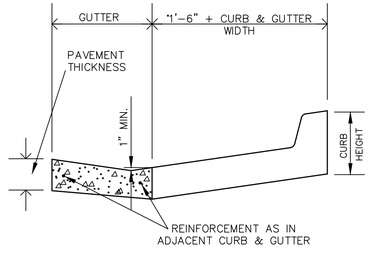
MDOT CONCRETE CURB & GUTTER (B-2)
NO SCALE
(USE AT DRIVE APPROACH AT M-66)



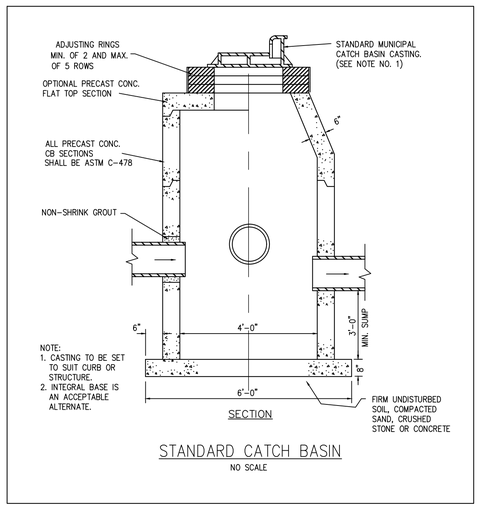
STANDARD CONCRETE CURB & GUTTER
NO SCALE
(USE IN PARKING LOT AND SHARED DRIVE



DRIVEWAY OPENING – MDOT DETAIL M
NO SCALE

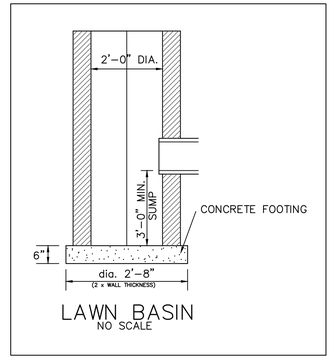


SECTION A-A



SECTION

STANDARD CATCH BASIN
NO SCALE



LAWN BASIN
NO SCALE

STATE OF MICHIGAN
ALLEN J. PATRICK
ENGINEER NO. 49313
LICENSED PROFESSIONAL ENGINEER

REVISIONS
1-7-26 SUP SUBMITTAL
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M-66 COMMERCIAL
DETAIL SHEET

NO SCALE	DESIGNER: AJP	APPROVED BY: AJP
DATE: 12-29-25	PROJECT MGR. AJP	SHEET 5 OF 5
AUTHORIZED BY: ABBEY RESIDENTIAL DEVELOPMENT, LLC		JOB #: E-104991

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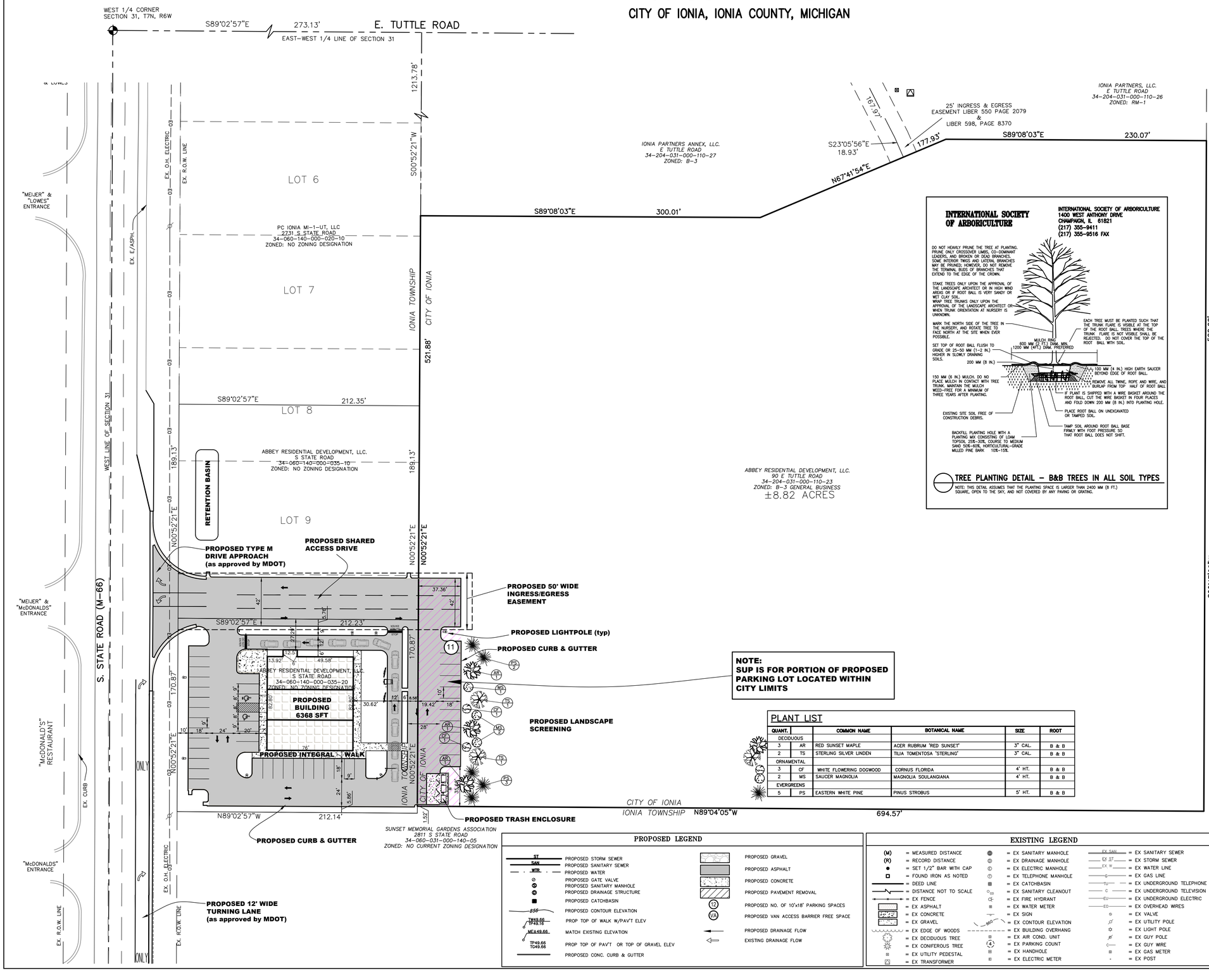
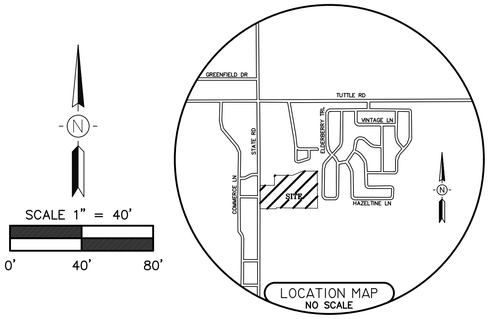
SUP PLAN:

M-66 COMMERCIAL

CITY OF IONIA, IONIA COUNTY, MICHIGAN





TAX DESCRIPTION (as provided)

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SITE DATA:

PROJECT DESCRIPTION:
- CURRENT USE: VACANT LAND
- PROPOSED USE: PARKING AREA FOR ADJACENT RETAIL, DRIVE–THRU FOOD SERVICE BLDG

PARCEL INFORMATION/LEGAL:
- TAX ID #: 34–204–031–000–110–23
- ADDRESS: S STATE ROAD
- TOTAL PARCEL AREA: 8.82 ACRES

ZONING:
- B–3

BUILDING SETBACKS:
- FRONT – 30'
- SIDE – 20'
- REAR – 20'

PARKING SETBACKS:
- FRONT – 8'
- SIDE – 5'
- REAR – 5'

BUILDING DATA:
- NO BUILDING PROPOSED ON CITY PROPERTY

PARKING PROVIDED: 11 SPACES

PUBLIC UTILITIES:
- WATER: PUBLIC WATER MAIN – CITY OF IONIA
- SANITARY: PUBLIC SEWER – CITY OF IONIA
- NOTE: NO NEW WATER/SANITARY MAINS OR LEADS PROPOSED ON CITY PROPERTY

MISC NOTES:
- NO ABOVE OR BELOW GRADE STORAGE FACILITIES ARE PROPOSED ON SITE
- NO HAZARDOUS SUBSTANCES TO BE STORED, USED OR GENERATED ON SITE
- NO AREAS ON SITE ARE KNOWN OR SUSPECTED TO BE CONTAMINATED
- NO DEED RESTRICTIONS ARE PROPOSED
- ANY NEW LIGHTING SHALL BE DIRECTED DOWNWARD AND AWAY FROM ADJACENT PROPERTIES
- ANY DAMAGED SIDEWALK DURING CONSTRUCTION SHALL BE REPLACED
- ANY SIDEWALK NOT MEETING ADA STANDARDS FOR DIFFERENTIAL HEIGHT OR CROSS SLOPE SHALL BE REPLACED
- ANY WORK WITHIN THE PUBLIC RIGHT–OF–WAY REQUIRES A PERMIT FROM THE PUBLIC SERVICE DEPT

PLANT LIST

QUANT.		COMMON NAME	BOTANICAL NAME	SIZE	ROOT
DECIDUOUS					
3	AR	RED SUNSET MAPLE	ACER RUBRUM 'RED SUNSET'	3" CAL.	B & B
2	TS	STERLING SILVER LINDEN	TILIA TOMENTOSA 'STERLING'	3" CAL.	B & B
ORNAMENTAL					
3	CF	WHITE FLOWERING DOGWOOD	CORNUS FLORIDA	4' HT.	B & B
2	MS	SAUCER MAGNOLIA	MAGNOLIA SOULANGIANA	4' HT.	B & B
EVERGREENS					
5	PS	EASTERN WHITE PINE	PINUS STROBUS	5' HT.	B & B

SHEET INDEX

APPLICANT/LAND OWNER:
ABBEY RESIDENTIAL DEVELOPMENT, LLC
330 MARSHALL ST, STE 100
LANSING, MI 48912
CONTACT: JASON KILDEA
(517) 204-1516

ENGINEER
KEBS, INC.
2116 HASLETT RD.
HASLETT, MI 48840
CONTACT: AJ PATRICK
(517) 339-1014

PROPOSED LEGEND

- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER
- PROPOSED GATE VALVE
- PROPOSED SANITARY MANHOLE
- PROPOSED DRAINAGE STRUCTURE
- PROPOSED CATCHBASIN
- 856 PROPOSED CONTOUR ELEVATION
- TM49.66 TP48.16 PROP TOP OF WALK W/PAVT ELEV
- ME±49.66 MATCH EXISTING ELEVATION
- TP49.66 TG49.66 PROP TOP OF PAVT OR TOP OF GRAVEL ELEV
- PROPOSED CONC. CURB & GUTTER
- PROPOSED GRAVEL
- PROPOSED ASPHALT
- PROPOSED CONCRETE
- PROPOSED PAVEMENT REMOVAL
- 12 PROPOSED NO. OF 10'x18' PARKING SPACES
- VA PROPOSED VAN ACCESS BARRIER FREE SPACE
- PROPOSED DRAINAGE FLOW
- EXISTING DRAINAGE FLOW

EXISTING LEGEND

- (M) = MEASURED DISTANCE
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- = EX TRANSFORMER
- = EX SANITARY MANHOLE
- = EX DRAINAGE MANHOLE
- = EX ELECTRIC MANHOLE
- = EX TELEPHONE MANHOLE
- = EX CATCHBASIN
- = EX SANITARY CLEANOUT
- = EX FIRE HYDRANT
- = EX WATER METER
- = EX SIGN
- 880 = EX CONTOUR ELEVATION
- = EX BUILDING OVERHANG
- = EX AIR COND. UNIT
- = EX PARKING COUNT
- = EX HANDHOLE
- = EX ELECTRIC METER
- EX. SAN = EX SANITARY SEWER
- EX. ST = EX STORM SEWER
- EX. W = EX WATER LINE
- G = EX GAS LINE
- TU = EX UNDERGROUND TELEPHONE
- C = EX UNDERGROUND TELEVISION
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M-66 COMMERCIAL
OVERALL SITE PLAN

SCALE: 1"= 40'	DESIGNER: AJP	APPROVED BY: AJP
DATE: 12–29–25	PROJECT MGR. AJP	SHEET 1 OF 5
AUTHORIZED BY: ABBEY RESIDENTIAL DEVELOPMENT, LLC		JOB #: E-104991

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08.07.2024

Traffic Impact Study

Multi-use Development

On behalf of:

Contact:

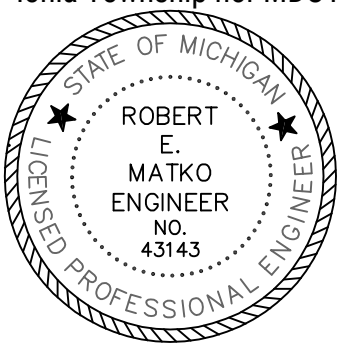
Gillespie Group
Jason Kildea
330 Marshall Street Suite 100
Lansing, MI 48912

Preparation Date:

Original: 01/30/2024
Revised: 08/07/2024

Traffic Impact Study Disclaimer

The findings and conclusions expressed in this TIA are those of the authors and not necessarily those of Ionia Township nor MDOT



Sincerely,

CESO, INC.

Robert E. Matko, P.E., P.S., PTOE
Engineering Manager

Traffic Study

CLIENT	Gillespie Group
LOCATION:	Ionia Township, Michigan
ADDRESS	2776 S. State Road (M-66)
COUNTY	Ionia
CITY, STATE	Ionia Township, MI

PREPARED BY	David Borja
	CESO Inc
ADDRESS	13060 S. US Highway 27, Suite D
CITY, STATE	DeWitt, MI 48820
PHONE	517.212.4229
DATE	August 7, 2024

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1. Executive Summary

1.1. Summary

Recommendations are listed in Section 1.3 – Summary of Recommendations.

This report is submitted on behalf of The Gillespie Group in connection with its application to the Michigan Department of Transportation (MDOT) for access permit approval. The Traffic Impact Study (TIS) conducted by CESO, Inc. identifies the traffic related impacts, if any, associated with the proposed Multi-use Development; referred to herein as "Multi-use Development."

The proposed Multi-use Development is to be constructed on the east side of M-66 across from Meijer within Ionia County, MI. The proposed Multi-use Development will consist of three phases:

2024 Build Year – Phase I
- 16,014 square-foot strip retail plaza.
- 2,289 square-foot fast food restaurant with a drive-through window.

2026 Build Year – Phase II
- Phase I
- 4,500 square foot fast food restaurant with a drive-through window

2029 Design Year – Phase III
- Phase II
- 123,840 square-foot shopping plaza.

The Gillespie Group retained CESO, Inc. to prepare the Traffic Impact Study for the Multi-use Development and present the details of a safe and efficient access system relating to Gillespie Group's application for approval of the following:

- Site driveways connecting to M-66 and Heartland Boulevard.
- Work within the right-of-way for construction of any necessary improvements.

The Traffic Impact Study focused on evaluating the 2024 No-Build, 2024 Build Year, 2026 No-Build, 2026 Build Year, 2029 No-Build, and 2029 Design Year Traffic conditions near the site.

1.2. Conclusions

In 2024, the proposed Multi-use Development (Phase I) is anticipated to generate 1,400 trips per day on a typical weekday (700 inbound and 700 outbound), of which 112 total trips will be generated during the weekday AM peak hour (59 inbound and 53 outbound) and 84 total trips during the weekday PM peak hour (41 inbound and 43 outbound). The generated trips in 2024 for the proposed Multi-use Development are anticipated to approach and depart the Site following the distribution patterns illustrated on Figures 6.A-6.B.

In 2026, the proposed Multi-use Development (Phase II) is anticipated to generate 3,504 trips per day on a typical weekday (1,752 inbound and 1,752 outbound), of which 311 total trips will be generated during the weekday AM peak hour (160 inbound and 151 outbound) and 233 total trips during the weekday PM peak hour (118 inbound and 115 outbound). The generated trips in 2026 for the proposed Multi-use Development are anticipated to approach and depart the Site following the distribution patterns illustrated on Figures 6.C-6.D.

In 2029, the proposed Multi-use Development (Phase III) is anticipated to generate 11,842 trips per day on a typical weekday (5,921 inbound and 5,921 outbound), of which 486 total trips will be generated during the weekday AM peak hour (271 inbound and 216 outbound) and 750 total trips during the weekday PM peak hour (372 inbound and 378 outbound). The generated trips in 2029 for the proposed Multi-use Development are anticipated to approach and depart the Site following the distribution patterns illustrated on Figures 6.E-6.F.

Highway Capacity Manual/Synchro V.12 methodology was used to analyze the level of service at the key study intersections and site driveways.

Under the **2024 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "C" and "D" in the AM and PM Peak Hours. All individual movements at the stop-controlled intersections operate at LOS "C" or better in the AM and PM Peak Hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM Peak Hours.

Under the **2024 Build Year Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "D" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "D" or better in the AM and PM peak hours except the following movements:

- EBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the PM peak hour).
- WBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "E" and "F" in the AM and PM peak hours).

Under the **2026 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "D" in the AM and PM Peak Hours. All individual movements at the stop-controlled intersections operate at LOS "C" or better in the AM and PM Peak Hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM Peak Hours.

Under the **2026 Build Year Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "D" and "E" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "D" or better in the AM and PM peak hours except the following movements:

- EBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the AM and PM peak hours).
- WBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the AM and PM peak hours).

With the recommended improvements implemented, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "C" in the AM and PM peak hours. The M-66 and Meijer Driveway signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours.

Under the **2029 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "D" in the AM and PM Peak Hours. All individual movements at the stop-controlled intersections operate at

LOS "C" or better in the AM and PM Peak Hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM Peak Hours.

Under the **2029 Design Year Traffic Scenario** with the recommended improvements implemented, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "C" and "D" in the AM and PM peak hours. The M-66 and Meijer Driveway signalized intersection operates at an overall LOS "A" and "B" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours.

CESO conducted turn lane analyses for the study network and concluded the following:

- According to MDOT *Traffic & Safety Note 604A (July 2022)*, a right-turn lane **is warranted** at the M-66 and Meijer Driveway/Site driveway intersection under the 2026 Build Year traffic scenario.

CESO conducted a queue length analyses for the study network and verified the following:

- The westbound left-turn movement at the M-66 and Tuttle Road intersection exceeds the existing storage length under the 2029 No-Build and 2029 Design Year traffic scenarios during the AM and PM peak hours.

- The southbound left-turn movement at the M-66 and Tuttle Road intersection exceeds the existing storage length under the 2029 No-Build and 2029 Design Year traffic scenarios during the PM peak hours.

CESO conducted an intersection sight distance analysis for the M-66 and Meijer Driveway/Site Driveway and verified the following:

- MDOT Intersection Sight Distance (ISD) requirements are satisfied for the intersection of M-66 and Meijer Driveway/Site Driveway.

CESO conducted a signal warrant analysis for the M-66 and Meijer Driveway/Site Driveway and verified the following:

- Warrant 1 – Eight-Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2029 Design Year Traffic Scenario.

- Warrant 2 – Four-Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2026 Build and 2029 Design Year Traffic Scenarios.

- Warrant 3 – Peak Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2026 Build and 2029 Design Year Traffic Scenarios.

Based on satisfying Warrants 1, 2, and 3, CESO recommends that a traffic signal be installed at the intersection of M-66 and Meijer Driveway upon completion of Phase II construction.

1.3. Summary of Recommendations

The following summary of recommendations was generated based upon the findings in the Traffic Impact Study.

2024 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2024 Build Year Traffic Scenario (Responsibility – Gillespie Group):

M-66 and Meijer Driveway/Site Driveway

- Construct Site Driveway connecting to M-66 with two (2) egress lanes (one (1) dedicated left-turn lane and one (1) dedicated through-right lane).

2026 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2026 Build Year Traffic Scenario (Responsibility – Gillespie Group):

M-66 and Meijer Driveway/Site Driveway

- Install a traffic signal. Coordinate signal timing with the traffic signals along M-66 at Tuttle Road and Sprague Road.
- Restripe the existing two-way left-turn lane to show dedicated 150-foot northbound and southbound turn lanes.
- Construct 175' northbound right-turn lane with a 50-foot taper.

2029 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2029 Design Year Traffic Scenario (Responsibility – Gillespie Group):

No improvements are recommended or required.

2. Introduction

This report is submitted on behalf of The Gillespie Group in connection with its application to the Michigan Department of Transportation (MDOT) for access permit approval. The Traffic Impact Study (TIS) conducted by CESO, Inc. identifies the traffic related impacts, if any, associated with the proposed Multi-use Development; referred to herein as "Multi-use Development."

The proposed Multi-use Development is to be constructed on the east side of M-66 across from Meijer within Ionia County, MI. The proposed Multi-use Development will consist of three phases:

2024 Build Year – Phase I
- 16,014 square-foot strip retail plaza.
- 2,289 square-foot fast food restaurant with a drive-through window.

2026 Build Year – Phase II
- Phase I
- 4,500 square foot fast food restaurant with a drive-through window

2029 Design Year – Phase III
- Phase II
- 123,840 square-foot shopping plaza.

Gillespie Group retained CESO, Inc. to prepare the Traffic Impact Study for the Multi-use Development and present the details of a safe and efficient access system relating to Gillespie Group's application for approval of the following:

- Site driveways connecting to M-66 and Heartland Boulevard.
- Work within the right-of-way for construction of any necessary improvements.

This report presents the methodologies, analyses, and results of the Traffic Impact Study (TIS) for traffic generated by the proposed Multi-use Development. The purpose of the TIS was to identify and mitigate traffic related impacts associated with the Multi-use Development during the weekday AM and PM Peak Hours of the adjacent street traffic, corresponding with the weekday AM and PM Peak Hours of operation for the Multi-use Development. The following intersections were analyzed in the Traffic Impact Study:

- M-66 & Tuttle Road (Signal Controlled).
- M-66 & Meijer Driveway (Stop-sign Controlled).
- Heartland Boulevard & Tuttle Road (Stop-sign Controlled).
- M-66 & Sprague Road (Signal Controlled).

The following traffic scenarios were included in analysis:

2024 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2024, without the proposed Multi-use Development.

2024 Build Year Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2024, with the proposed Multi-use Development Phase I.

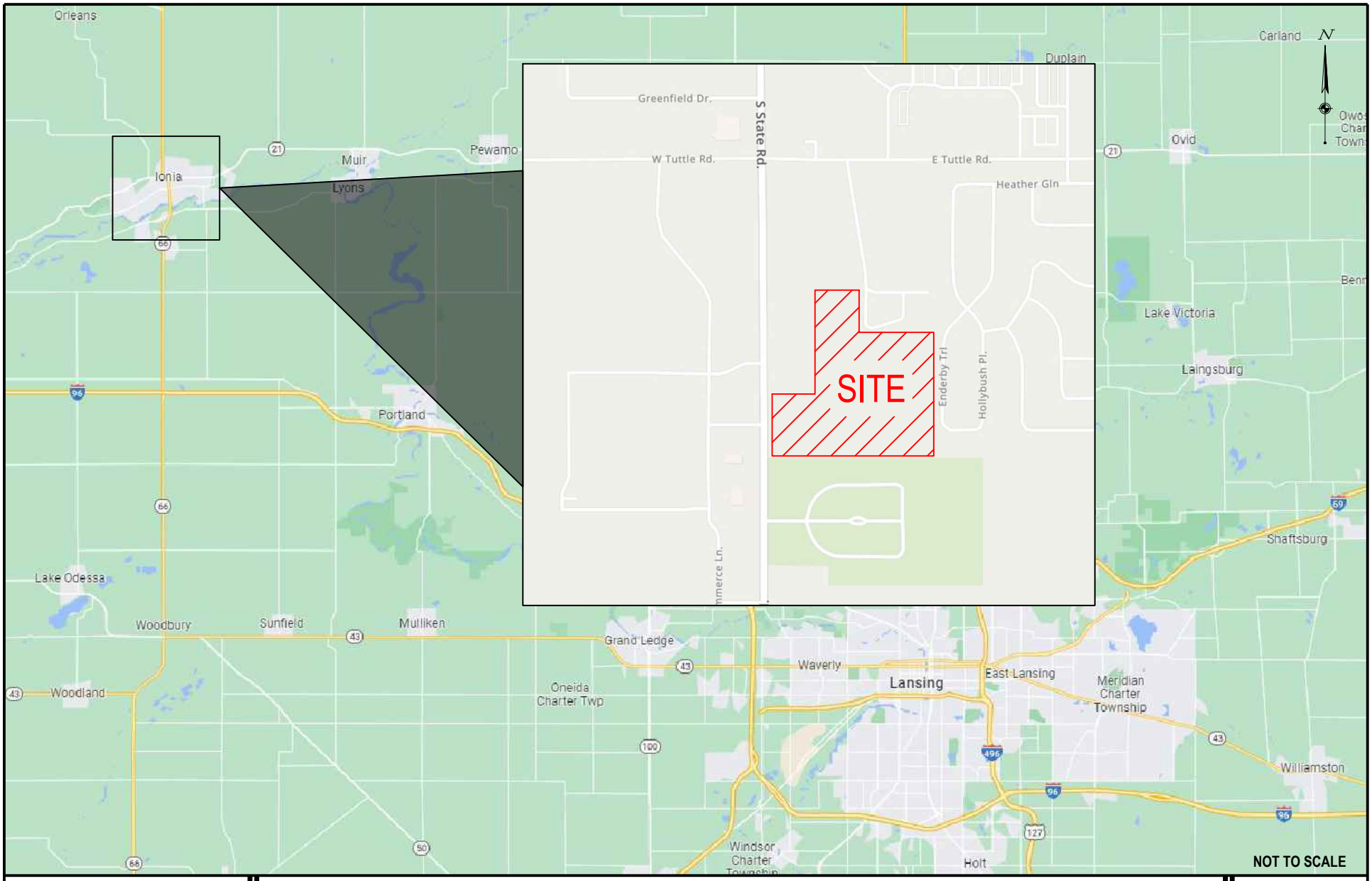
2026 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2026, without the proposed Multi-use Development.

2026 Build Year Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2026, with the proposed Multi-use Development Phase II.

2029 No-Build Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2029, without the proposed Multi-use Development.

2029 Design Year Traffic Scenario – Represents traffic conditions during the weekday AM and PM Peak Hours of the adjacent roadway network that would exist during year 2029, with the proposed Multi-use Development Phase III.

Figure 1 illustrates the Site Location with respect to the study area and Figure 2 illustrates the Site Plan for the proposed Multi-use Development.



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SITE LOCATION

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

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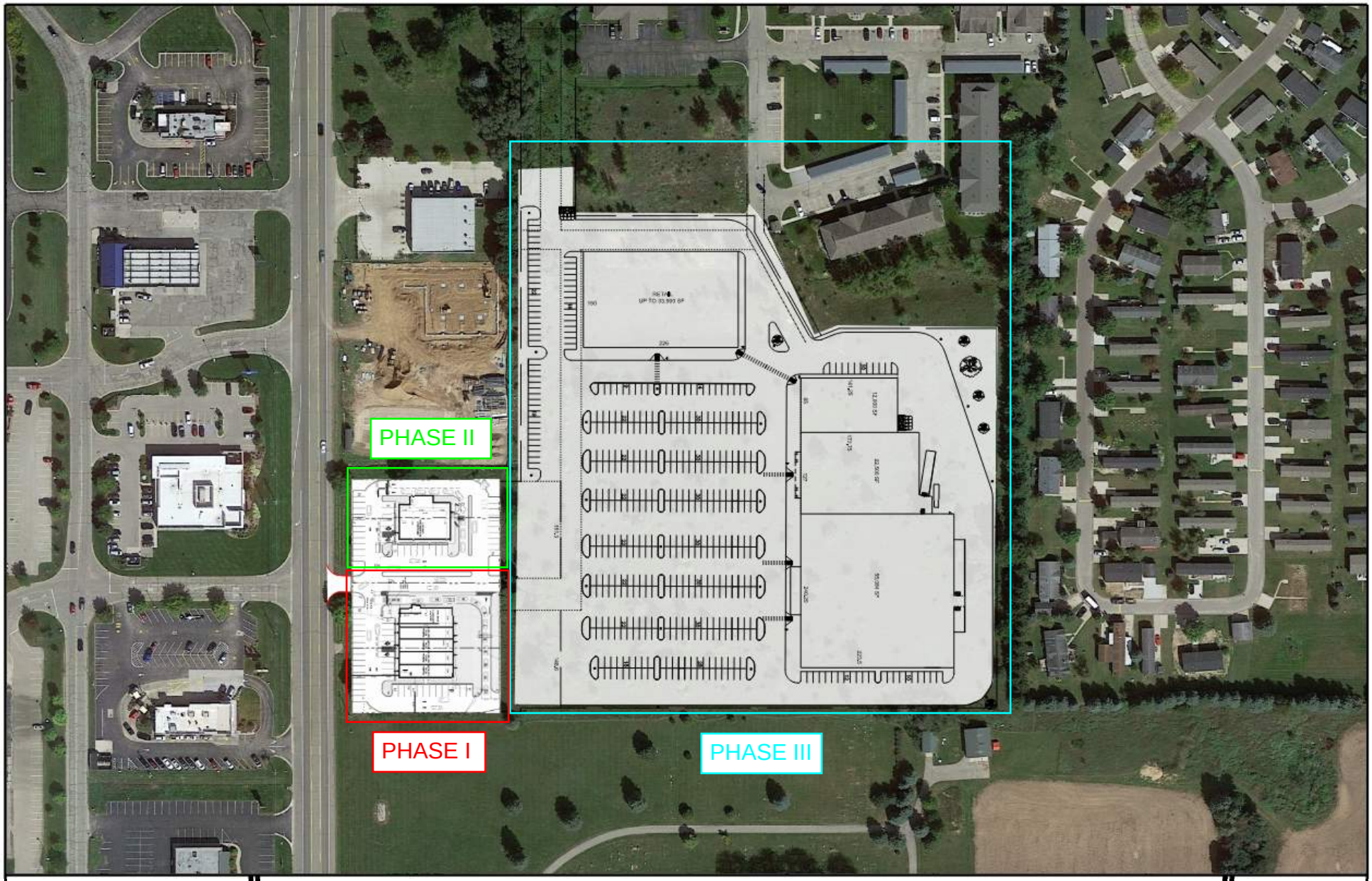

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SITE PLAN

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE 2

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2.1. Study Procedure

The following studies and analyses were undertaken:

1. Traffic counts were conducted by Gewalt Hamilton Associates, Inc. (GHA) on Tuesday, October 3rd, 2023, between the hours of 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the following intersections:

   - M-66 & Tuttle Road (Signal Controlled).
   - M-66 & Meijer Driveway (Stop-sign Controlled).
   - Heartland Boulevard & Tuttle Road (Stop-sign Controlled).

   Additional traffic counts were conducted by Gewalt Hamilton Associates, Inc. (GHA) on Tuesday, October 3rd, 2023, between the hours of 9:00 AM to 10:00 AM and 11:00 AM to 4:00 PM at the following intersection:

   - M-66 & Meijer Driveway (Stop-sign Controlled).

   Additional traffic counts were provided by MDOT from March 28th, 2012, between the hours of 7:00 AM to 6:00 PM at the following intersection:

   - M-66 & Sprague Road (Signal Controlled).

2. A growth rate of 0.50 percent (%) was applied to the traffic data from the M-66 & Sprague intersection for eleven (11) years (1.055) growth factor) to increase the 2012 data to match the existing traffic count data from the other intersections. The Existing Weekday Peak Hour Traffic Volumes (Year 2023) were reviewed and illustrated on Figure 4.

3. The 2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2023) (Figure 4). A growth rate of 0.50 percent (%) per year was applied to all volumes within the study area for one (1) year (1.005 growth factor) to reach the 2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5).

4. Capacity analyses of the 2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5) were completed to determine the capacity of the key study intersections during the Weekday AM and PM Peak Hours using Synchro V.12.

5. Directional distribution analyses were conducted to determine the potential distribution of patrons for the proposed Multi-use Development traffic (Figures 6.A-6.E).

6. Analyses were conducted to determine the potential traffic volumes generated by the proposed Multi-use Development under the 2024 Build Year, 2026 Build Year, and 2029 Design Year Traffic Scenarios utilizing data provided in the Institute of Transportation Engineers' *Trip Generation Manual, 11th Edition* (see Tables 3-5).

7. Addition of the Multi-use Development (Phase I) Generated Traffic Volumes (Figures 7.A-7.B) were added to the 2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5) to reflect the 2024 Build Year Weekday Peak Hour Traffic Volumes (Figure 8).

8. Capacity analyses of the 2024 Build Year Weekday Peak Hour Traffic Volumes (Figure 8) were completed to determine the capacity of the key study intersections during the Weekday AM and PM Peak Hours using Synchro V.12.

9. The 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2023) (Figure 4). A growth rate of 0.50 percent (%) per year was applied to all volumes within the study area for three (3) years (1.015 growth factor) to reach the 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9).

10. Capacity analyses of the 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9) were completed to determine the capacity of the key study intersections during the Weekday AM and PM Peak Hours using Synchro V.12.

11. Addition of the Multi-use Development (Phase II) Generated Traffic Volumes (Figures 7.C-7.D) were added to the 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9) to reflect the 2026 Build Year Weekday Peak Hour Traffic Volumes (Figure 10).

12. Capacity analyses of the 2026 Build Year Weekday Peak Hour Traffic Volumes (Figure 10) were completed to determine the capacity of the key study intersections during the Weekday AM and PM Peak Hours using Synchro V.12.

13. The 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2023) (Figure 4). A growth rate of 0.50 percent (%) per year was applied to all volumes within the study area for six (6) years (1.030 growth factor) to reach the 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11).

14. Capacity analyses of the 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11) were completed to determine the capacity of the key study intersections during the Weekday AM and PM Peak Hours using Synchro V.12.

15. Addition of the Multi-use Development (Phase III) Generated Traffic Volumes (Figures 7.E-7.F) were added to the 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11) to reflect the 2029 Design Year Weekday Peak Hour Traffic Volumes (Figure 12).

16. Capacity analyses of the 2029 Design Year Weekday Peak Hour Traffic Volumes (Figure 12) were completed to determine the capacity of the key study intersections during the Weekday AM and PM Peak Hours using Synchro V.12.

17. Turn lane analyses were completed at all study intersections per MDOT standards and charts.

18. Queue length analyses were completed using the 95th percentile queue lengths provided from SimTraffic 12 results.

19. Intersection sight distance analysis was completed at the site driveway along M-66 per MDOT standards.

20. Signal warrant analysis was completed for the M-66 and Meijer Driveway intersection under the 2024 Build Year, 2026 Build Year, and 2029 Design Year traffic scenarios.

21. Recommendations for roadway improvements were generated under the 2024 Build Year, 2026 Build Year, and 2029 Design Year traffic scenarios based upon the capacity/queue length analyses of the surrounding roadway network. Application of the recommendations and evaluation of the capacity at the key study intersections, during the Weekday AM and PM Peak Hours, were completed using Synchro V.12.

2.2. References

This report utilizes information from the following sources:

1. *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis.* Transportation Research Board, Washington, D.C., 2022.

2. *Trip Generation Manual*. 11th ed. Washington, DC: Institute of Transportation Engineers, 2022.

3. "Ionia, Michigan." 42°56'49" N and 85°04'29" W, *Google Earth*. October 30th, 2023.

4. *Michigan Manual of Uniform Traffic Control Devices (MMUTCD).* Michigan Department of Transportation (MDOT).

5. Most recent Site Plan obtained from the Gillespie Group.

3. Roadway and Traffic Conditions in the Vicinity of the Site

3.1. Study Location and Area Land Use

The proposed Multi-use Development is to be constructed on the east side of M-66 across from Meijer within Ionia County, MI. The proposed Multi-use Development is to be constructed on the east side of M-66 across from Meijer within Ionia County, MI. The proposed Multi-use Development will consist of three phases:

2024 Build Year – Phase I
- 16,014 square-foot strip retail plaza.
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2026 Build Year – Phase II
- Phase I
- 4,500 square foot fast food restaurant with a drive-through window

2029 Design Year – Phase III
- Phase II
- 123,840 square-foot shopping plaza.

The existing land use in the area of the site in primarily commercial and residential.

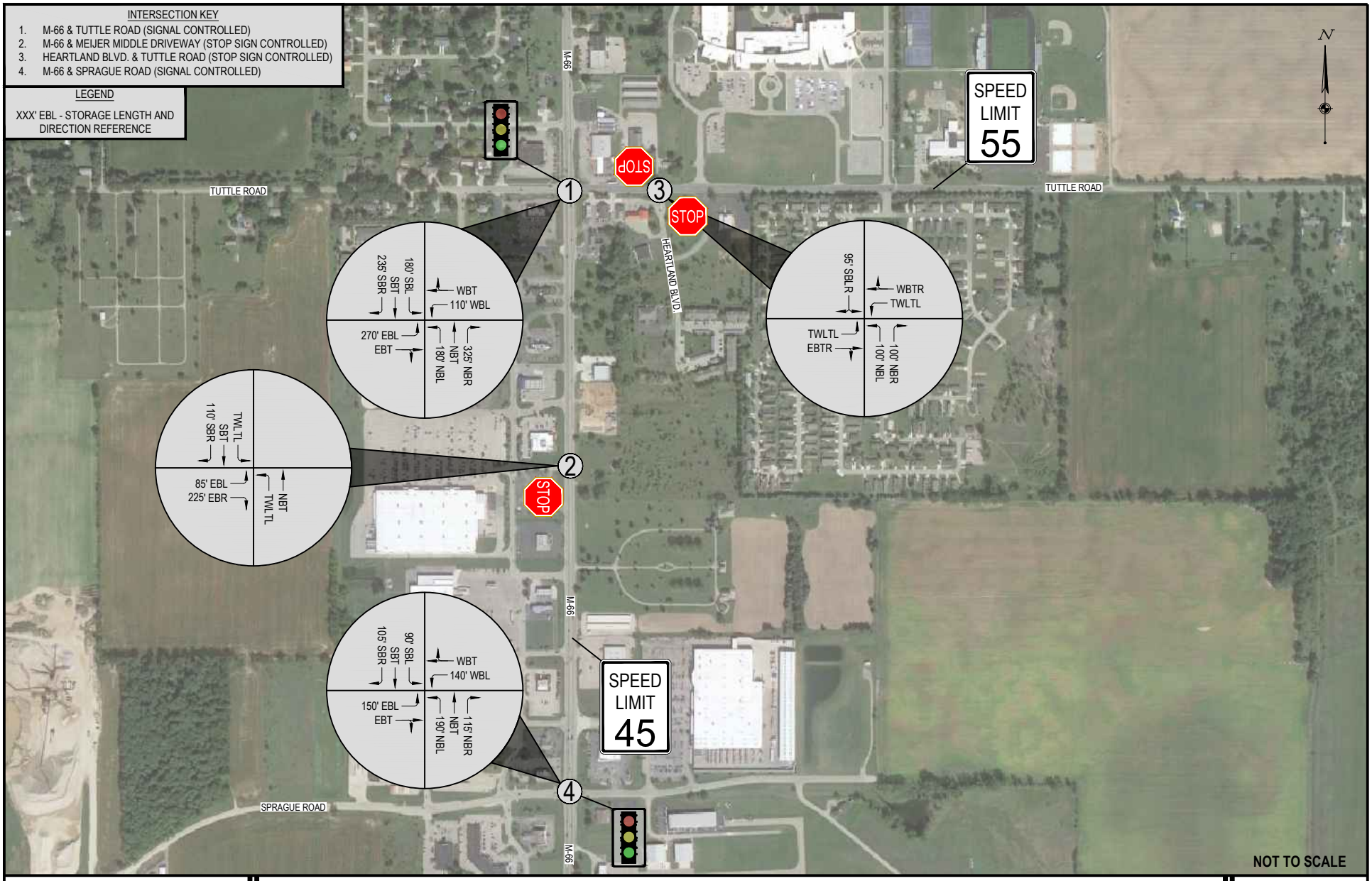
3.2. Area Roadway Characteristics

S State Road (M-66) – M-66 runs in a north/south direction in the vicinity of the site. M-66 is a two-lane urban minor arterial road. M-66 is under the jurisdiction of the MDOT. The posted speed limit on M-66 in the area of the site is 45 mph.

Tuttle Road – Tuttle Road runs in an east/west direction in the vicinity of the site. Tuttle Road is a two-lane undivided urban major collector road. Tuttle Road is under the jurisdiction of the City of Ionia. The posted speed limit on Tuttle Road in the area of the site is 35 mph.

Heartland Boulevard – Heartland Boulevard runs in a north/south direction in the vicinity of the site. Heartland Boulevard is a two-lane local road. Heartland Boulevard is under the jurisdiction of the City of Ionia. The posted speed limit on Heartland Boulevard in the area of the site is 35 mph.

The Existing Transportation System is shown on Figure 3 of the report.



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EXISTING TRANSPORTATION SYSTEM

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

FIGURE 3	
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3.3. Existing Traffic Volumes

Traffic counts were conducted by Gewalt Hamilton Associates, Inc. (GHA) on Tuesday, October 3rd, 2023, between the hours of 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the following intersections:

- M-66 & Tuttle Road (Signal Controlled).
- M-66 & Meijer Driveway (Stop-sign Controlled).
- Heartland Boulevard & Tuttle Road (Stop-sign Controlled).

Additional traffic counts were conducted by Gewalt Hamilton Associates, Inc. (GHA) on Tuesday, October 3rd, 2023, between the hours of 9:00 AM to 10:00 AM and 11:00 AM to 4:00 PM at the following intersection:

- M-66 & Meijer Driveway (Stop-sign Controlled).

Additional traffic counts were provided by MDOT from March 28th, 2012, between the hours of 7:00 AM to 6:00 PM at the following intersection:

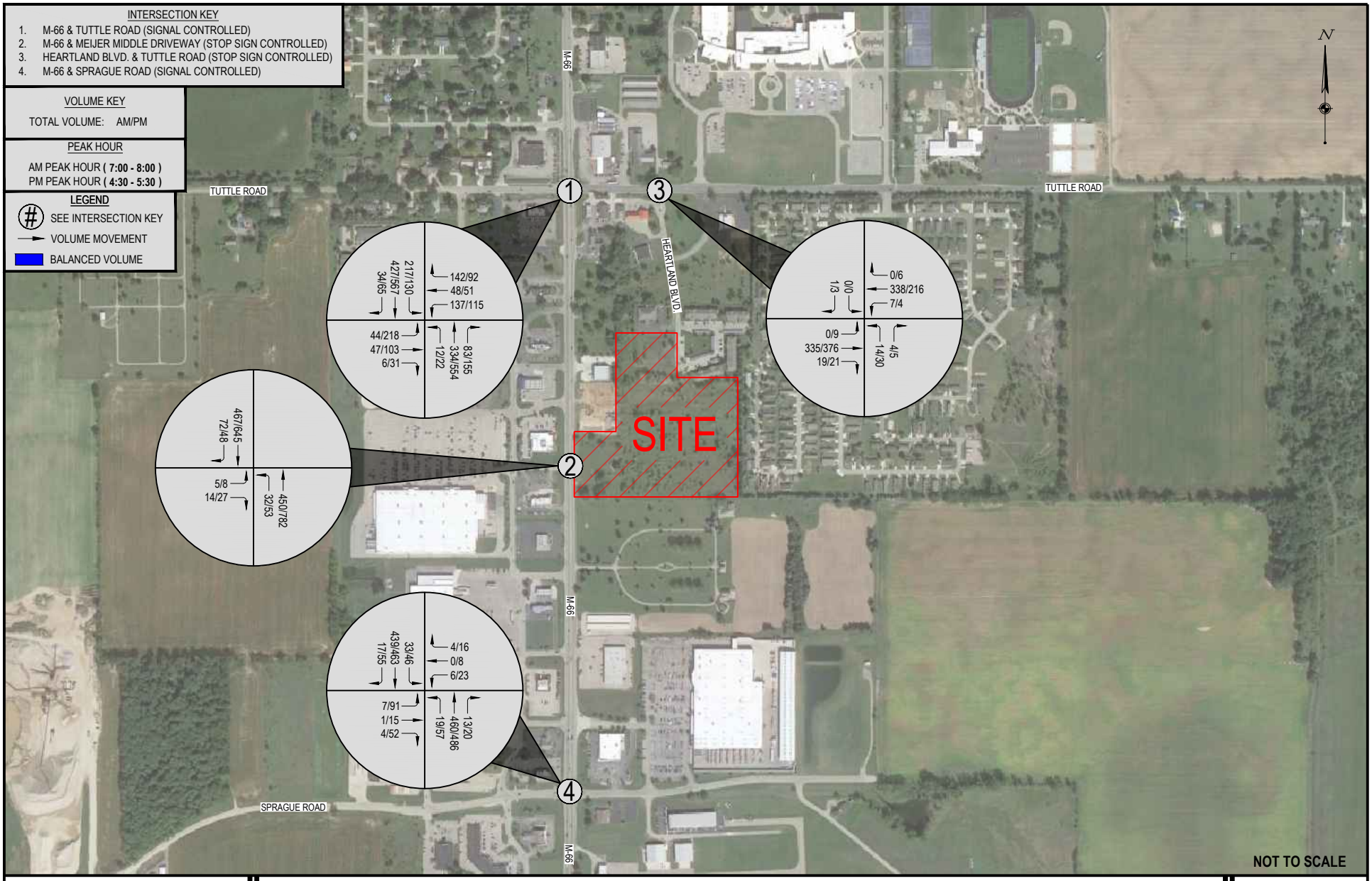
- M-66 & Sprague Road (Signal Controlled).

A growth rate of 0.50 percent (%) was applied to the traffic data from the M-66 & Sprague intersection for eleven (11) years (1.055) growth factor) to increase the 2012 data to match the existing traffic count data from the other intersections.

The Existing Traffic Count Data is located in Appendix B of the report. The Existing Weekday Peak Hour Traffic Volumes (Year 2023) are illustrated on Figure 4.

The peak hours of the study network were determined from the traffic count data located in Appendix B. The peak hours for the study network are the following:

- AM Peak Hour: 7:00 AM to 8:00 AM
- PM Peak Hour: 4:30 PM to 5:30 PM



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EXISTING WEEKDAY PEAK HOUR TRAFFIC VOLUMES (YEAR 2023)

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE 4

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4. Estimates of 2024 No-Build Traffic in the Vicinity of the Site

4.1. 2024 No-Build Traffic Volumes

2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2023) (Figure 4). A growth rate of 0.50 percent (%) per year was applied to all volumes within the study area for one (1) year (1.005 growth factor) to reach the 2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5).

The growth rate calculation documentation can be found in Appendix B.

4.2. Capacity Analysis Parameters

The capacity of an intersection (signalized or unsignalized) can best be described by its corresponding level of service (LOS). The level of service of an intersection is a qualitative measure of the various attributes of an intersection. There are six levels of service ranging from "ideal" free flow conditions at LOS "A," to forced or "breakdown" conditions at LOS "F." The level of service for signalized intersections is based upon the average stopped delay per vehicle for various movements within the intersection. Although the Volume to Capacity Ratio (v/c) affects delay, there are other parameters that more strongly affect it, such as the quality of progression, length of green phases, cycle lengths, and others. Thus, for a given v/c ratio, a range of delay values may result, and vice versa.

The level of service for unsignalized intersections is based upon total delay. Total delay is defined in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis*, as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. Table 1 summarizes the LOS definitions for unsignalized intersections. Throughout the report "unsignalized intersections" are commonly referred to as "stop sign controlled."

Highway Capacity Manual 2022 (HCM 7th Edition) methodology was used in the Traffic Impact Study to remain consistent with "state-of-the-practice" professional standards. It is important to note that the Level of Service Criteria for unsignalized intersections is different than for signalized intersections. For example, a delay of 18 seconds yields level of service C under the unsignalized LOS criteria while yielding level of service B under the signalized intersection LOS criteria (see Table 1). Table 1 summarizes the LOS definitions for unsignalized and signalized intersections.

Table 1
Level of Service Criteria

Level of Service	**Unsignalized Intersection** Average Total Delay (Seconds/Vehicle)	**Signalized Intersection** Average Total Delay (Seconds/Vehicle)
A	≤ 10.0	< 10.0
B	> 10.0 and ≤ 15.0	> 10.0 and ≤ 20.0
C	> 15.0 and ≤ 25.0	> 20.0 and ≤ 35.0
D	> 25.0 and ≤ 35.0	> 35.0 and ≤ 55.0
E	> 35.0 and ≤ 50.0	> 55.0 and ≤ 80.0
F	≥ 50.0	> 80.0

Source: *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis*. Transportation Research Board.

4.3. 2024 No-Build Traffic Scenario Capacity Analysis

Utilizing the 2024 No-Build Weekday Peak Hour Traffic Volumes illustrated on Figure 5, capacity calculations were performed for the key study intersections. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2022). All study intersections were analyzed using Synchro V.12 methodology.

Table 2 summarizes the capacity analyses results for the 2024 No-Build Traffic Scenario.

Table 2
Summary of 2024 No-Build Traffic Scenario Capacity Analysis

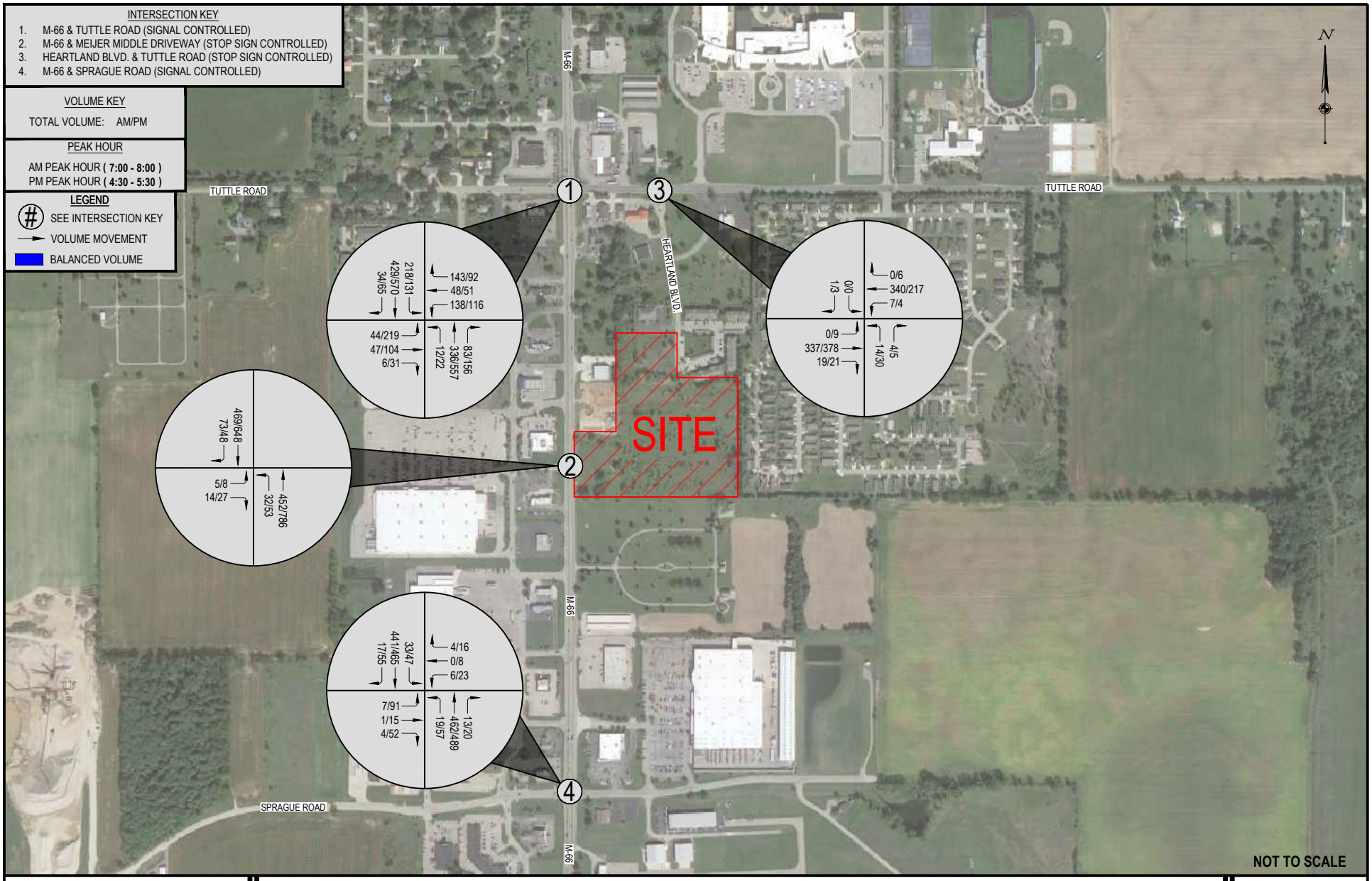
Intersection →	Year →	2024 AM and PM Peak Hours			
	Volume →	No-Build Year 2024			
	Geometry →	Existing			
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
M-66 & Tuttle Road (Signal Controlled)	Intersection Overall →		**C**	**34.7**	**D**	**50.7**
	Eastbound	EBL	C	34.3	C	29.8
		EBTR	C	24.2	C	20.5
	Westbound	WBL	C	29.7	C	24.8
		WBTR	C	29.5	C	20.9
	Northbound	NBL	C	22.3	C	27.5
		NBT	D	36.2	F	74.1
		NBR	C	21.2	C	21.7
	Southbound	SBL	C	21.5	C	28.2
		SBT	D	49.7	F	73.4
		SBR	B	18.6	B	19.2
*Delay in seconds L – Left T – Through R – Right						

Table 2 - Continued
Summary of 2024 No-Build Traffic Scenario Capacity Analysis

Intersection →	Year →	2024 AM and PM Peak Hours				
	Volume →	No-Build Year 2024				
	Geometry →	Existing				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
M-66 & Meijer Driveway (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	EBL	C	15.7	C	20.4
		EBR	B	12.3	B	13.9
	Northbound	TWLTL	A	9.0	A	9.4
		NBT	A	0.0	A	0.0
	Southbound	SBT	A	0.0	A	0.0
		SBR	A	0.0	A	0.0
Heartland Boulevard & Tuttle Road (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	TWLTL	A	0.0	A	7.9
		EBTR	A	0.0	A	0.0
	Westbound	TWLTL	A	8.4	A	8.6
		WBTR	A	0.0	A	0.0
	Northbound	NBLT	C	23.1	C	22.1
		NBR	B	11.3	B	11.9
	Southbound	SBLTR	B	11.2	A	10.0
M-66 & Sprague Road (Signal Controlled)	Intersection Overall →		**A**	**3.4**	**A**	**9.5**
	Eastbound	EBL	D	36.1	C	33.8
		EBTR	D	36.9	C	32.0
	Westbound	WBL	D	36.1	C	33.1
		WBTR	D	36.7	C	30.1
	Northbound	NBL	A	2.8	A	6.7
		NBT	A	2.7	A	5.3
		NBR	A	1.5	A	3.2
	Southbound	SBL	A	3.1	A	6.8
		SBT	A	2.6	A	5.2
		SBR	A	1.5	A	3.4
*Delay in seconds L – Left T – Through R – Right						

Under the **2024 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "C" and "D" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "C" or better in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM peak hours.

The 2024 No-Build Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix C.



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2024 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

FIGURE	5
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5. Trip Generation

5.1. Multi-use Development Weekday Peak Hour Generated Traffic Volumes

Studies of similar developments throughout North America have shown that the amount of traffic generated will be functionally related to some unit of activity (i.e., number of fueling stations, square footage, etc.). In development, site traffic fluctuates substantially on different days and hours throughout the year. Therefore, it is imperative to select an appropriate hourly volume on which to base the design of the external roadway and site access facilities. The Weekday AM and PM Peak Hours were selected based on the adjacent street traffic during this hour.

The 2024 Build Year Traffic Scenario includes the proposed Multi-use Development (Phase I) that will consist of:

- 6,014 square-foot strip retail plaza
- 2,289 square-foot fast food restaurant with a drive-through window

The 2026 Build Year Traffic Scenario includes the proposed Multi-use Development (Phase II) that will consist of:

- Phase I
- 4,500 square foot fast food restaurant with a drive-through window

The 2029 Design Year Traffic Scenario includes the proposed Multi-use Development (Phase III) that will consist of:

- Phase II
- A 123,840 square-foot shopping plaza

For analysis purposes, the base variable units for the trip generation rates were square footage and fueling stations. The Multi-use Development Generated Traffic Volumes were calculated by utilizing data contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* in combination with methods outlined in the (ITE) *Trip Generation Handbook*. The 2024 Multi-use Development Generated Traffic Volumes are presented in Table 3, the 2026 Multi-use Development Generated Traffic Volumes are presented in Table 4, and the 2029 Multi-use Development Generated Traffic Volumes are presented in Table 5. The sheets from ITE *Trip Generation Manual, 11th Edition* can be found in Appendix D.

Table 3
Multi-use Development (Phase I) Weekday Peak Hour Generated Traffic Volumes

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips										
				Weekday			Weekday AM Peak Hour				Weekday PM Peak Hour			
				Trips			Trips				Trips			
				Tot	In	Out	[A]Tot	In	Out	[B]PB	[A]Tot	In	Out	[B]PB
Strip Retail Plaza (<40k)	822	6,014	S.F.	328	164	164	14	9	5	0	40	20	20	0
ITE Cat. 822 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*60%*	*40%*	[C]*0%*	*100%*	*50%*	*50%*	[C]*0%*
Internal Capture Applied				-------	-------	-------	12	8	4	0	24	10	14	0
Internal Capture Rates				-------	-------	-------	-------	*11%*	*20%*	-------	-------	*50%*	*30%*	-------
Fast-Food Restaurant with Drive-Through Window	934	2,289	S.F.	1,072	536	536	102	27	25	50	76	18	16	42
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	100	26	24	50	60	14	12	34
Internal Capture				-------	-------	-------	-------	*2%*	*2%*	-------	-------	*15%*	*27%*	-------
Total (No Internal Capture Applied)				1,400	700	700	116	36	30	50	116	38	36	42
Total (Internal Capture Subtracted)				-------	-------	-------	112	34	28	50	84	24	26	34
Net Trip Generation Summary				1,400	700	700	112	34	28	50	84	24	26	34

[A] – Primary Trips + Pass-by Trips, [B] – Pass-by Trips Generated, [C] – Percent (%) of [A]Tot

In 2024, the proposed Multi-use Development (Phase I) is anticipated to generate 1,400 trips per day on a typical weekday (700 inbound and 700 outbound), of which 112 total trips will be generated during the weekday AM peak hour (59 inbound and 53 outbound) and 84 total trips during the weekday PM peak hour (41 inbound and 43 outbound). Appendix D includes trip generation calculations, internal capture calculations, and ITE Trip Generation Sheets utilized to calculate the values presented in Table 3.

Table 4
Multi-use Development (Phase II) Weekday Peak Hour Generated Traffic Volumes

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips										
				Weekday			Weekday AM Peak Hour				Weekday PM Peak Hour			
				Trips			Trips				Trips			
				Tot	In	Out	[A]Tot	In	Out	[B]PB	[A]Tot	In	Out	[B]PB
Strip Retail Plaza (<40k)	822	6,014	S.F.	328	164	164	14	9	5	0	40	20	20	0
ITE Cat. 822 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*60%*	*40%*	[C]*0%*	*100%*	*50%*	*50%*	[C]*0%*
Internal Capture Applied				-------	-------	-------	12	8	4	0	24	10	14	0
Internal Capture Rates				-------	-------	-------	-------	*11%*	*20%*	-------	-------	*50%*	*30%*	-------
Fast-Food Restaurant with Drive-Through Window	934	2,289	S.F.	1,072	536	536	102	27	25	50	76	18	16	42
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	100	26	24	50	71	17	14	40
Internal Capture				-------	-------	-------	-------	*1%*	*1%*	-------	-------	*5%*	*9%*	-------
Fast-Food Restaurant with Drive-Through Window	934	4,500	S.F.	2,104	1,052	1,052	201	52	49	100	149	35	32	82
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	199	51	48	100	138	33	29	76
Internal Capture				-------	-------	-------	-------	*1%*	*1%*	-------	-------	*5%*	*9%*	-------
Total (No Internal Capture Applied)				3,504	1,752	1,752	317	88	79	150	265	73	68	124
Total (Internal Capture Subtracted)				-------	-------	-------	311	85	76	150	233	60	57	116
Net Trip Generation Summary				3,504	1,752	1,752	311	85	76	150	233	60	57	116

[A] – Primary Trips + Pass-by Trips, [B] – Pass-by Trips Generated, [C] – Percent (%) of [A]Tot

In 2026, the proposed Multi-use Development (Phase II) is anticipated to generate 3,504 trips per day on a typical weekday (1,752 inbound and 1,752 outbound), of which 311 total trips will be generated during the weekday AM peak hour (160 inbound and 151 outbound) and 233 total trips during the weekday PM peak hour (118 inbound and 115 outbound). Appendix D includes trip generation calculations, internal capture calculations, and ITE Trip Generation Sheets utilized to calculate the values presented in Table 4.

Table 5
Multi-use Development (Phase III) Weekday Peak Hour Generated Traffic Volumes

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips										
				Weekday			Weekday AM Peak Hour				Weekday PM Peak Hour			
				Trips			Trips				Trips			
				Tot	In	Out	[A]Tot	In	Out	[B]PB	[A]Tot	In	Out	[B]PB
Strip Retail Plaza (<40k)	822	6,014	S.F.	328	164	164	14	9	5	0	40	20	20	0
ITE Cat. 822 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*60%*	*40%*	[C]*0%*	*100%*	*50%*	*50%*	[C]*0%*
Internal Capture Applied				-------	-------	-------	12	8	5	0	35	17	18	0
Internal Capture Rates				-------	-------	-------	-------	*8%*	*13%*	-------	-------	*13%*	*10%*	-------
Fast-Food Restaurant with Drive-Through Window	934	2,289	S.F.	1,072	536	536	102	27	25	50	76	18	16	42
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	95	24	23	48	50	11	11	28
Internal Capture				-------	-------	-------	-------	*7%*	*7%*	-------	-------	*29%*	*41%*	-------
Fast-Food Restaurant with Drive-Through Window	934	4,500	S.F.	2,104	1,052	1,052	201	52	49	100	149	35	32	82
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	187	47	46	94	97	22	21	54
Internal Capture				-------	-------	-------	-------	*7%*	*7%*	-------	-------	*29%*	*41%*	-------
Shopping Plaza (40 – 150k)	821	123,840	S.F.	8,338	4,169	4,169	214	132	82	0	641	189	196	256
ITE Cat. 821 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*62%*	*38%*	[C]*0%*	*100%*	*49%*	*51%*	[C]*40%*
Internal Capture Applied				-------	-------	-------	192	121	71	0	568	167	173	228
Internal Capture Rates				-------	-------	-------	-------	*8%*	*13%*	-------	-------	*13%*	*10%*	-------
Total (No Internal Capture Applied)				11,842	5,921	5,921	531	220	161	150	906	262	264	380
Total (Internal Capture Subtracted)				-------	-------	-------	486	200	145	142	750	217	223	310
Net Trip Generation Summary				11,842	5,921	5,921	486	200	145	142	750	217	223	310

[A] – Primary Trips + Pass-by Trips, [B] – Pass-by Trips Generated, [C] – Percent (%) of [A]Tot

In 2029, the proposed Multi-use Development (Phase III) is anticipated to generate 11,842 trips per day on a typical weekday (5,921 inbound and 5,921 outbound), of which 486 total trips will be generated during the weekday AM peak hour (271 inbound and 216 outbound) and 750 total trips during the weekday PM peak hour (372 inbound and 378 outbound). Appendix D includes trip generation calculations, internal capture calculations, and ITE Trip Generation Sheets utilized to calculate the values presented in Table 5.

5.2. Directional Distribution of Multi-use Development Generated Traffic Volumes

The directional distribution of the development-generated traffic is a function of several variables. The assumptions and methods used in estimating the direction in which traffic will approach and depart the Site varies with several location-specific conditions such as:

- Size and type of the proposed development.
- Population distribution within the defined area of influence.
- Prevailing operating conditions on the existing street system.

The analysis of directional distribution is based on the observation that drivers normally will choose the fastest (not necessarily the most direct) routes to and from a given traffic generator. Additionally, the land use of the traffic generator will determine the types of trips generated. The internal site trip assignment for the access drives was based upon the proposed Site Plan and understanding of the Multi-use Development operation. The traffic entering and exiting the development will not always travel the most direct route.

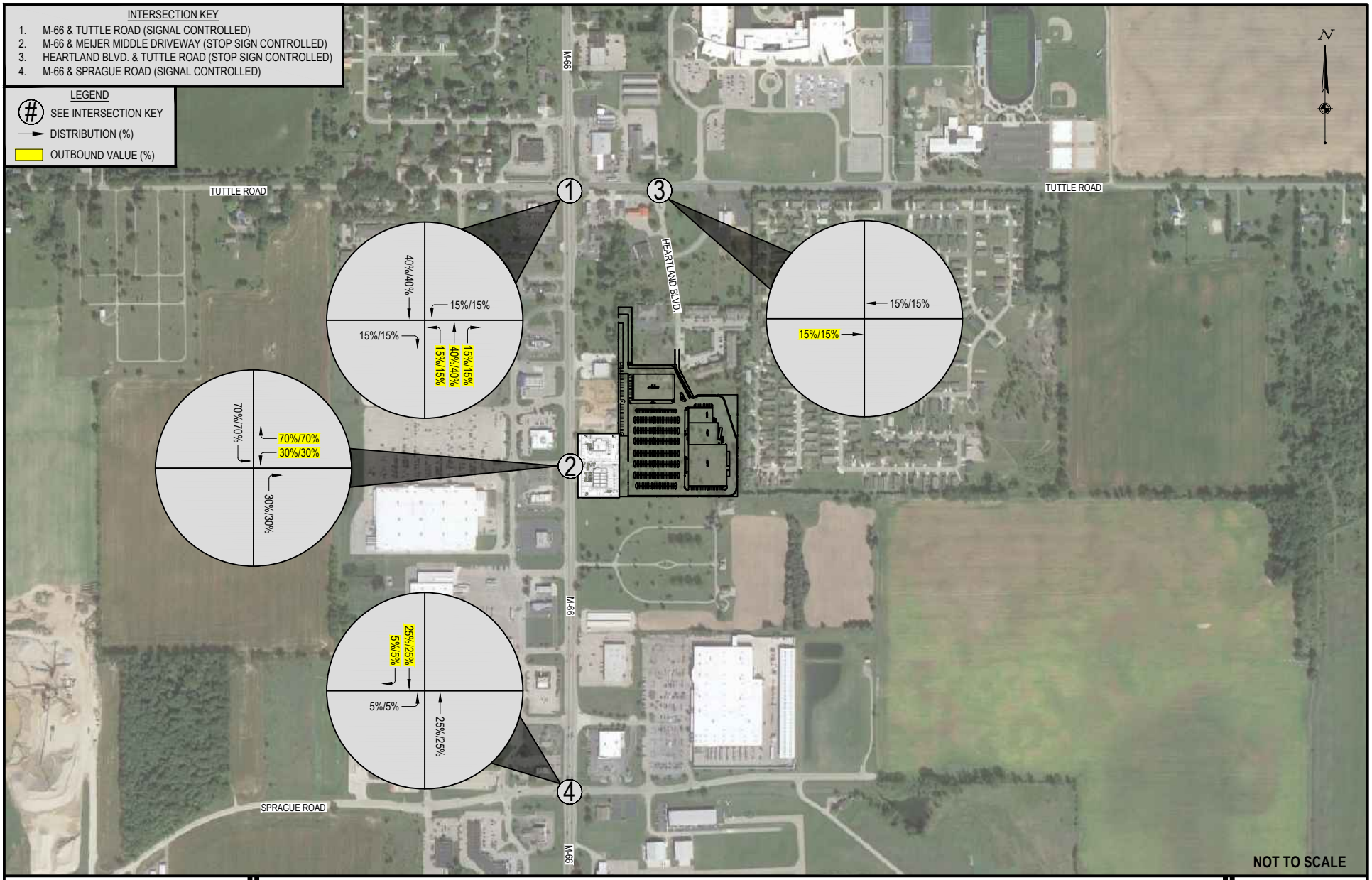
The anticipated directional distribution of trips generated by the proposed Multi-use Development is shown in Table 5. The directional distribution percentages were calculated using traffic data at the M-66 and Tuttle Road intersection. The directional distribution calculations can be found in Appendix D.

A pass-by trip is defined as a vehicle trip made as an intermediate stop on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the site. Pass-by trips are not diverted from another roadway not adjacent to the site.

Figures 6.A-6.F illustrate the primary and pass-by/diverted trip directional distributions for the Multi-use Development Generated Traffic Volumes. Based upon the directional distributions listed in Table 6 and illustrated on Figures 6.A-6.F, the estimated 2024 Multi-use Development Generated Traffic Volumes shown in Table 3, the estimated 2026 Multi-use Development Generated Traffic Volumes shown in Table 4, and the estimated 2029 Multi-use Development Generated Traffic Volumes shown in Table 5 were distributed to the adjacent roadway system. The Multi-use Development Generated Traffic Volumes are illustrated on Figures 7.A-7.F.

Table 6
Directional Distribution of Multi-use Development Generated Traffic Volumes

Route	Distribution Approach/Departure	
	AM Peak Hour	PM Peak Hour
Primary Trip Distribution	Primary Cars Percentages	
To/From the East on Tuttle Road	15%/15%	15%/15%
To/From the West on Tuttle Road	15%/15%	15%/15%
To/From the North on State Road	40%/40%	40%/40%
To/From the South on State Road	30%/30%	30%/30%
TOTAL	**100%/100%**	**100%/100%**
Pass-by Trip Distribution	Pass-by Cars Percentages	
To the West from the East on Tuttle Road	15%/15%	15%/15%
To the East from the West on Tuttle Road	15%/15%	15%/15%
To the South from the North on State Road	35%/35%	35%/35%
To the North from the South on State Road	35%/35%	35%/35%
TOTAL	**100%/100%**	**100%/100%**



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DIRECTIONAL DISTRIBUTION FOR MULTI USE DEVELOPMENT (PHASE I) GENERATED TRAFFIC VOLUMES - PRIMARY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE 6.A	
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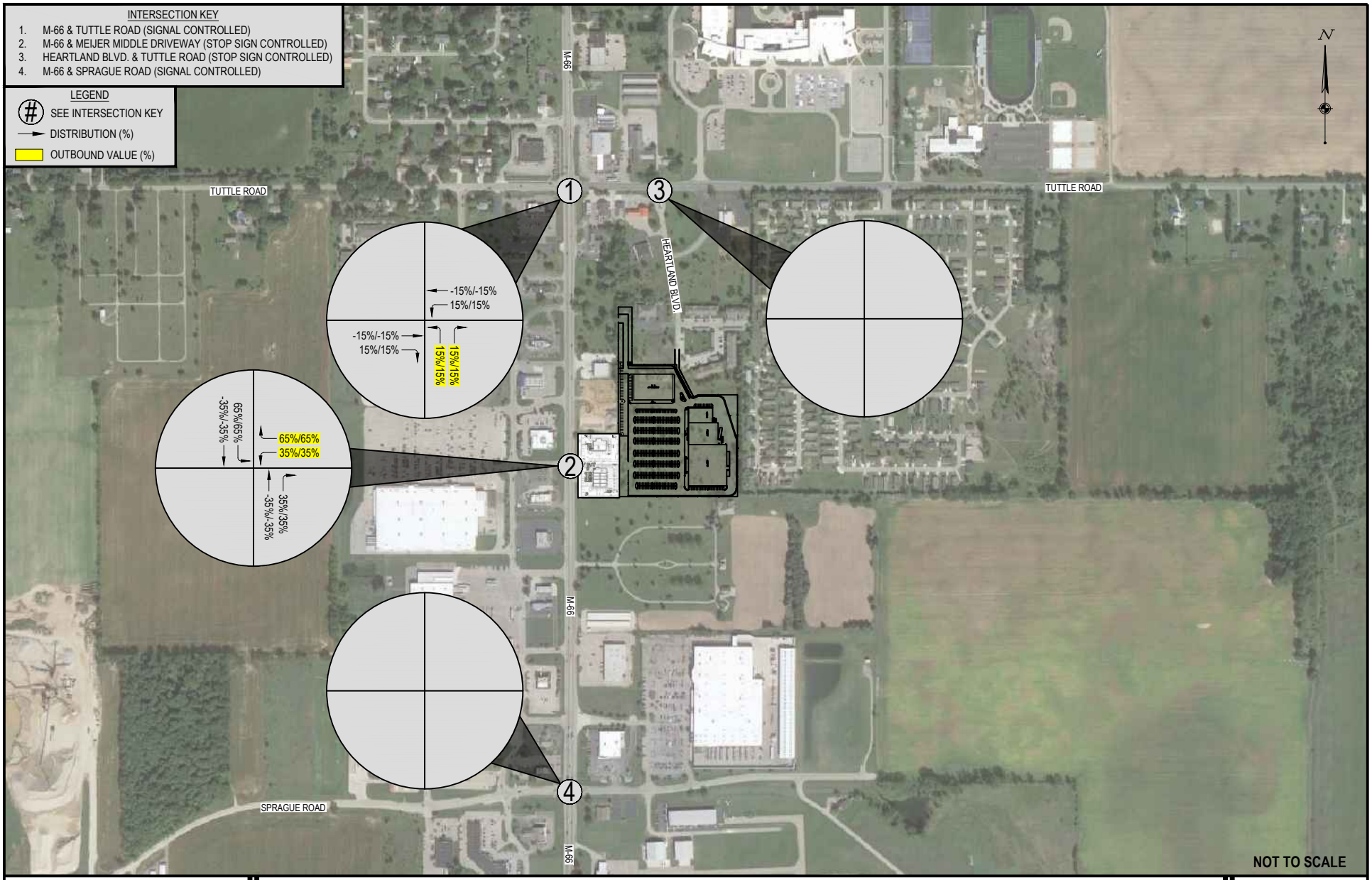

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DIRECTIONAL DISTRIBUTION FOR MULTI USE DEVELOPMENT (PHASE I) GENERATED TRAFFIC VOLUMES - PASS-BY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE	6.B
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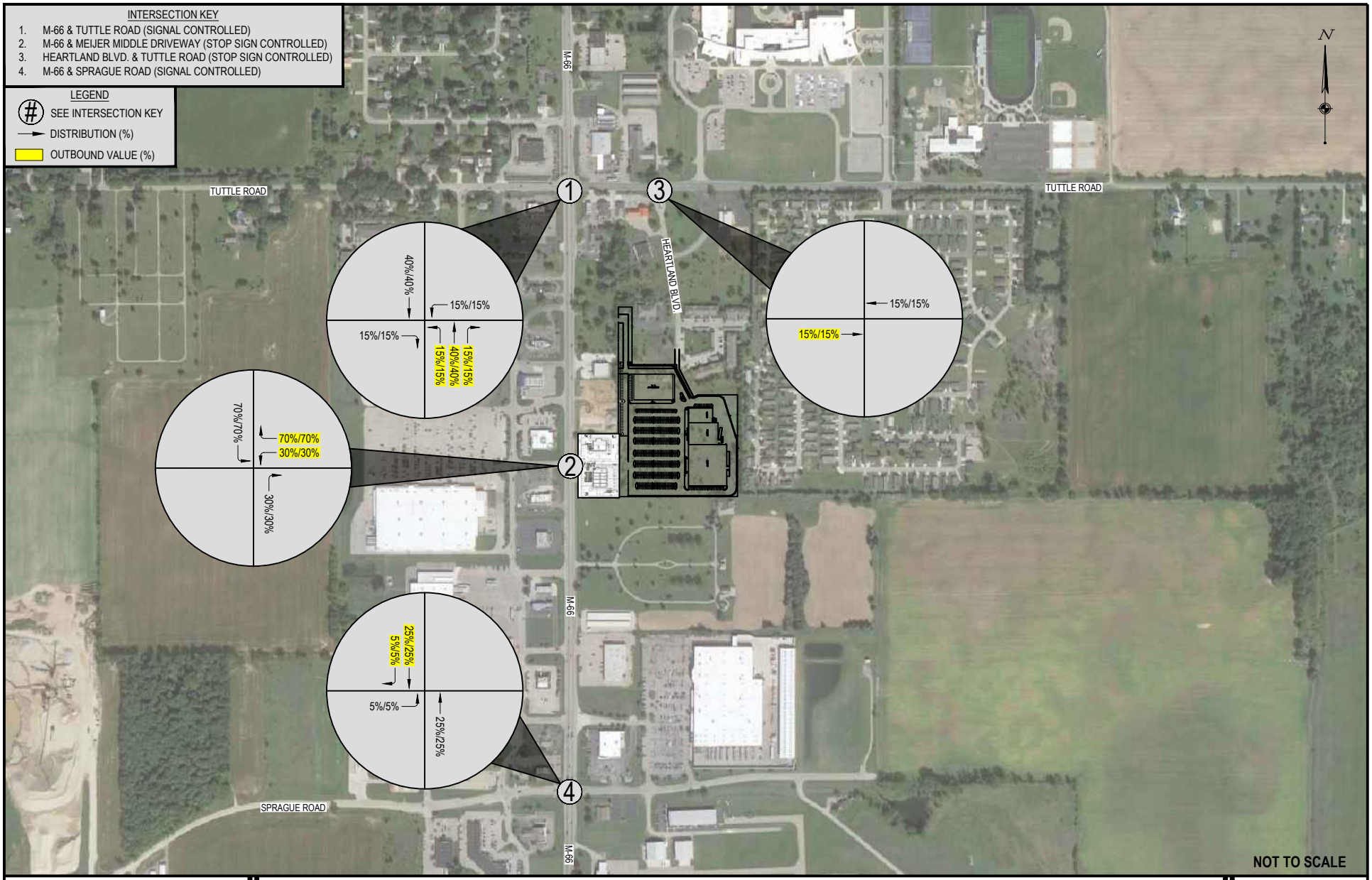

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DIRECTIONAL DISTRIBUTION FOR MULTI USE DEVELOPMENT (PHASE II) GENERATED TRAFFIC VOLUMES - PRIMARY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE 6.C	
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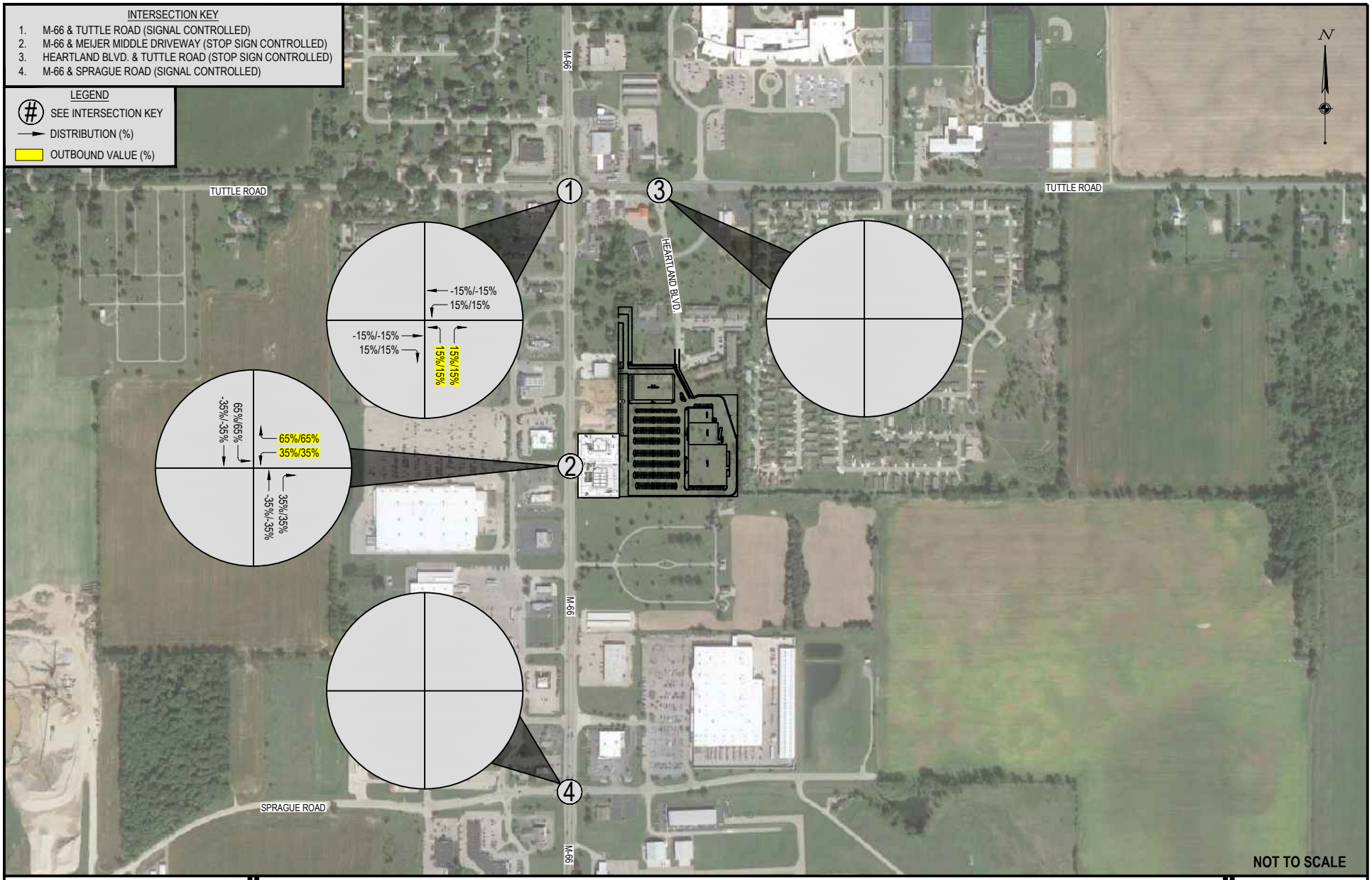

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DIRECTIONAL DISTRIBUTION FOR MULTI USE DEVELOPMENT (PHASE II) GENERATED TRAFFIC VOLUMES - PASS-BY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE	6.D
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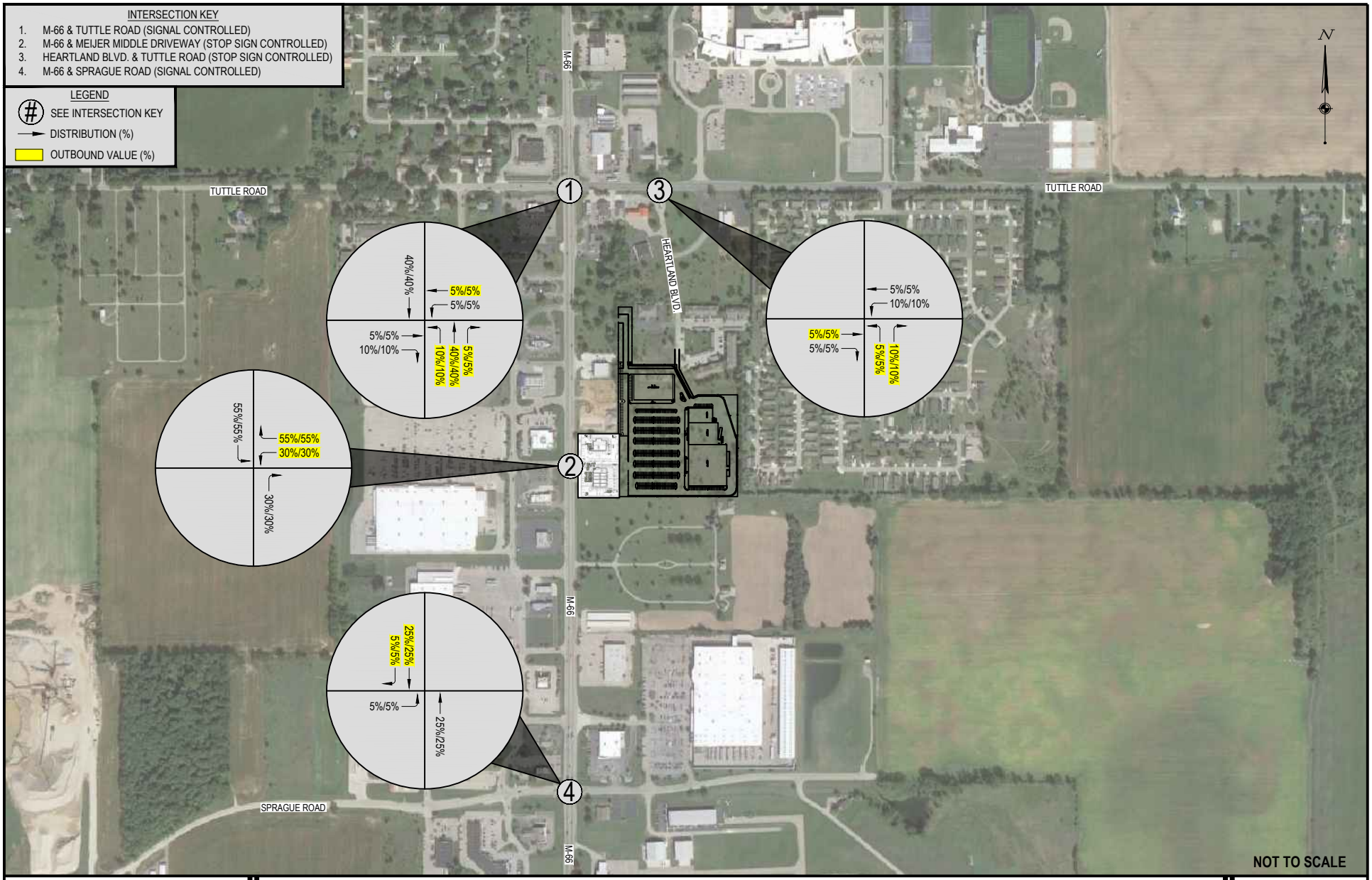

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DIRECTIONAL DISTRIBUTION FOR MULTI USE DEVELOPMENT (PHASE III) GENERATED TRAFFIC VOLUMES - PRIMARY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE 6.E	
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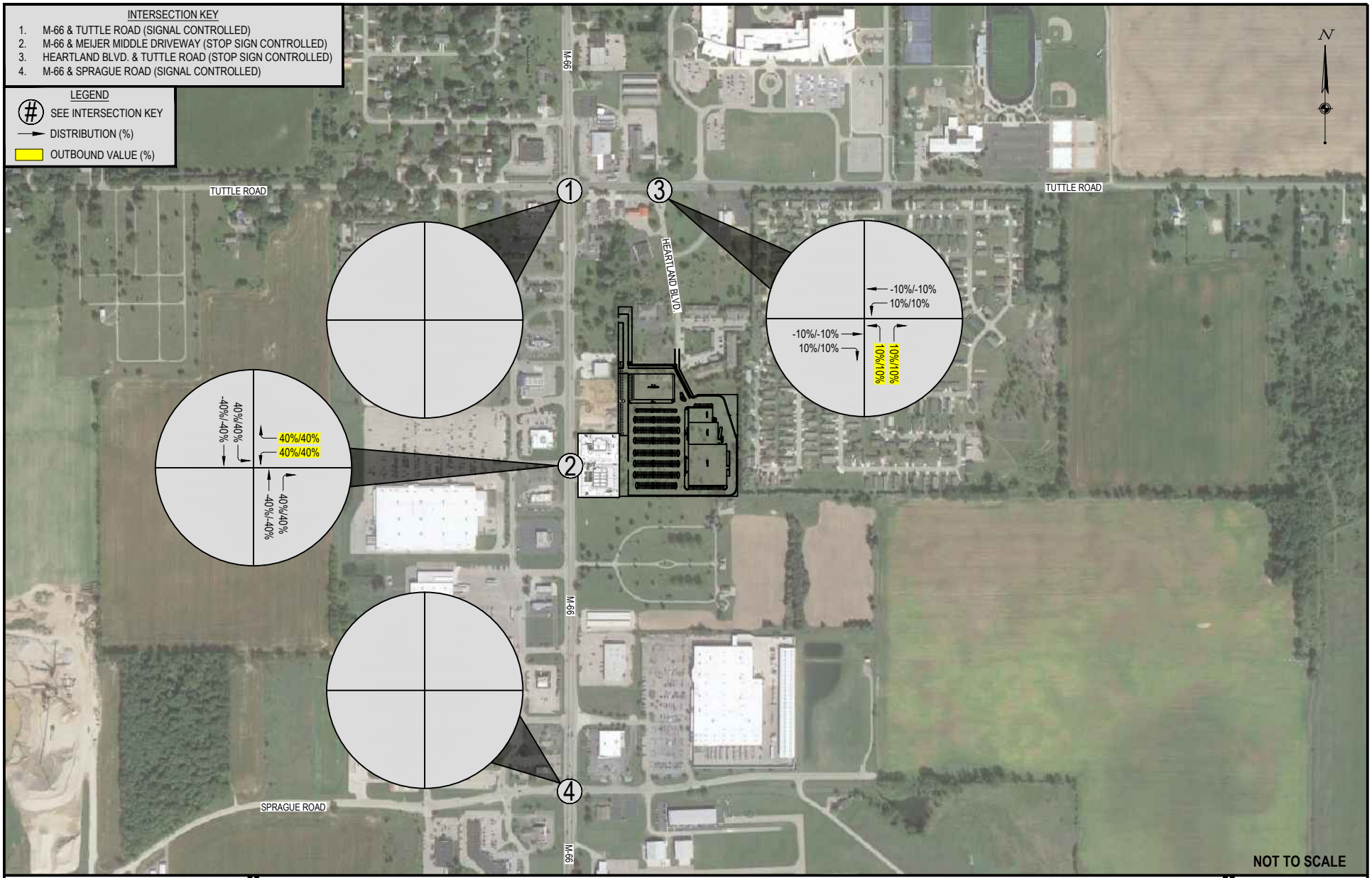

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DIRECTIONAL DISTRIBUTION FOR MULTI USE DEVELOPMENT (PHASE III) GENERATED TRAFFIC VOLUMES - PASS-BY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE 6.F	
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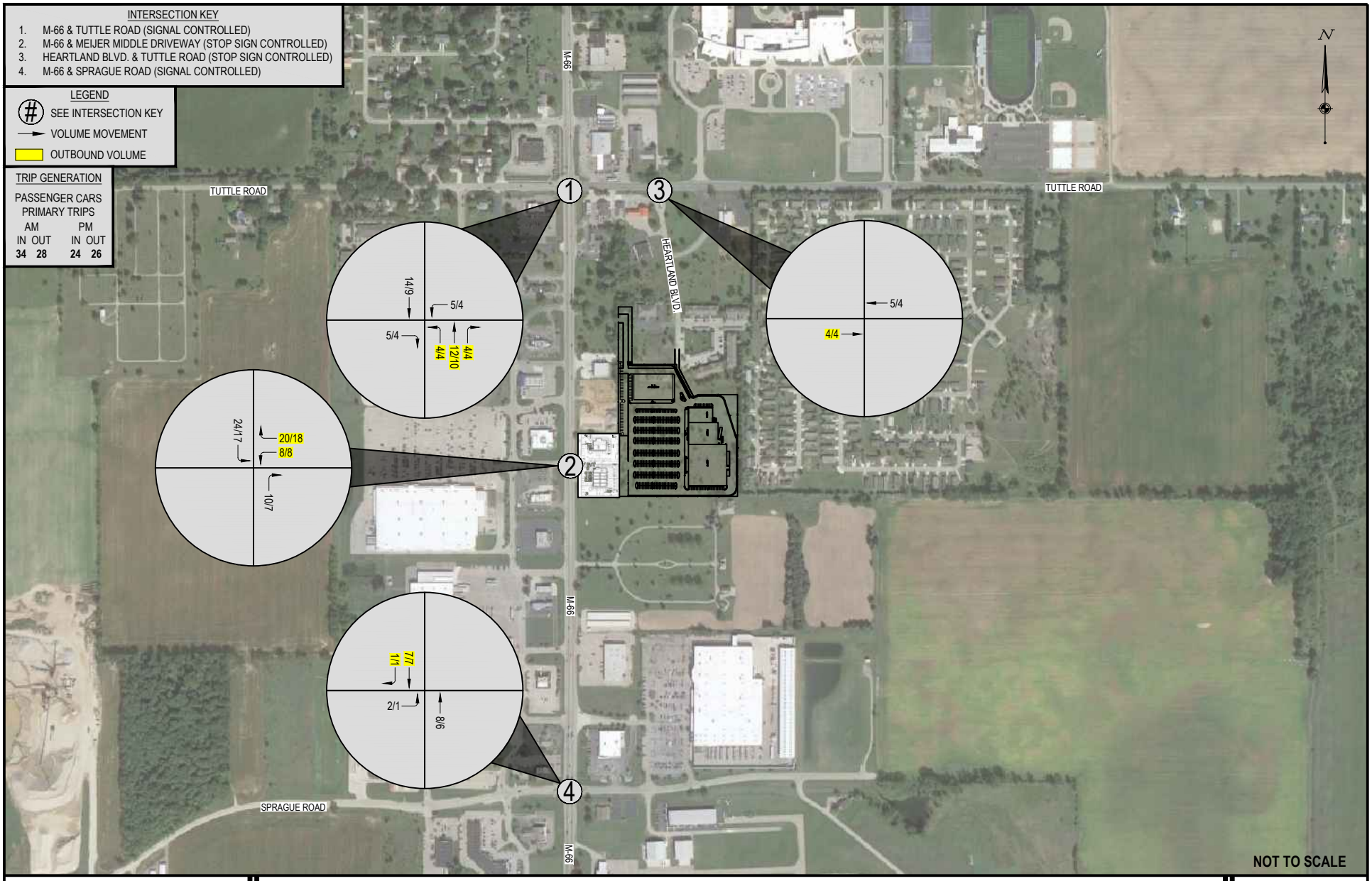

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MULTI USE DEVELOPMENT (PHASE I) PEAK HOUR GENERATED TRAFFIC VOLUMES - PRIMARY

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

FIGURE	7.A
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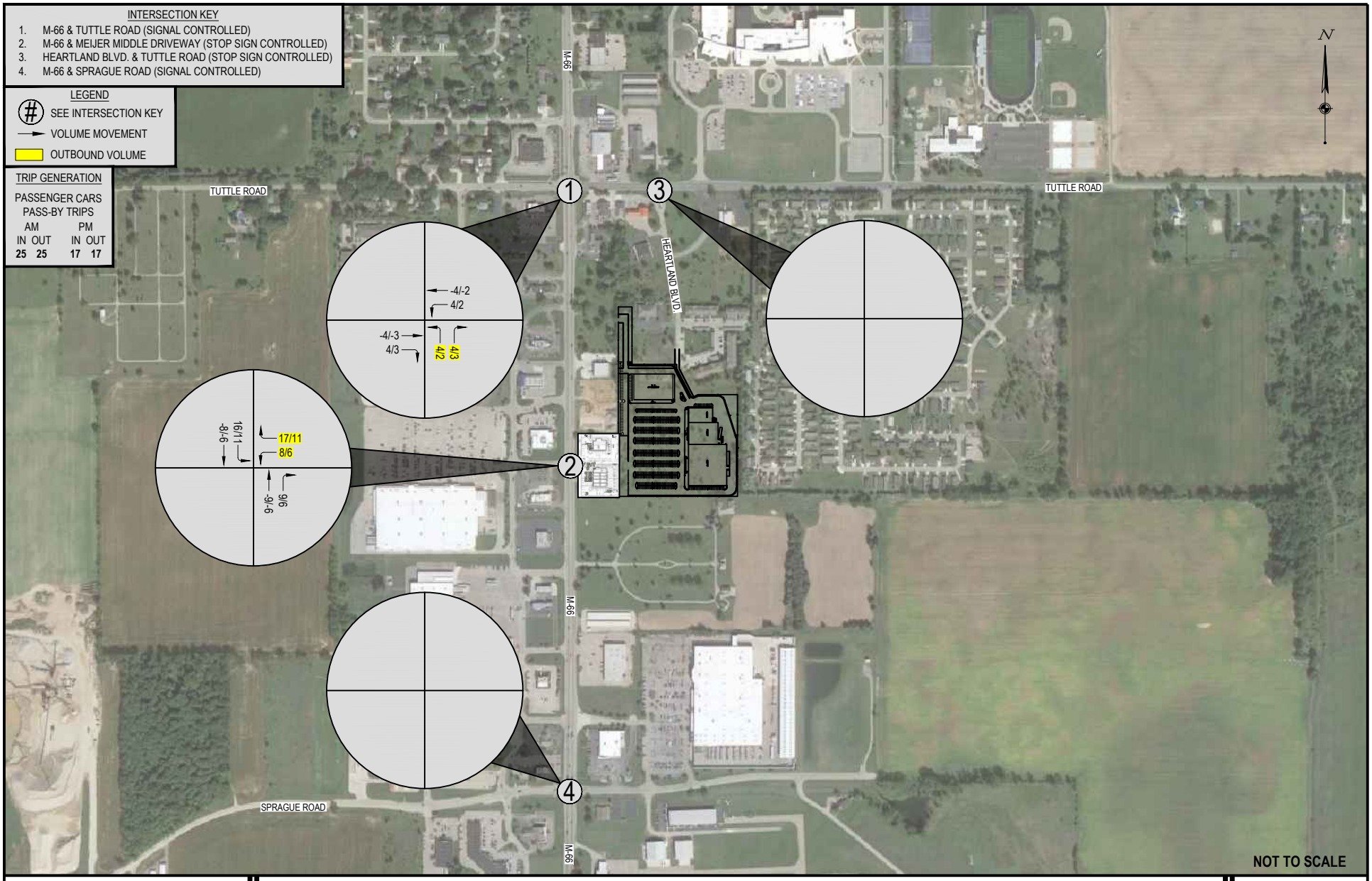

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MULTI USE DEVELOPMENT (PHASE I) PEAK HOUR GENERATED TRAFFIC VOLUMES - PASS-BY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE	7.B
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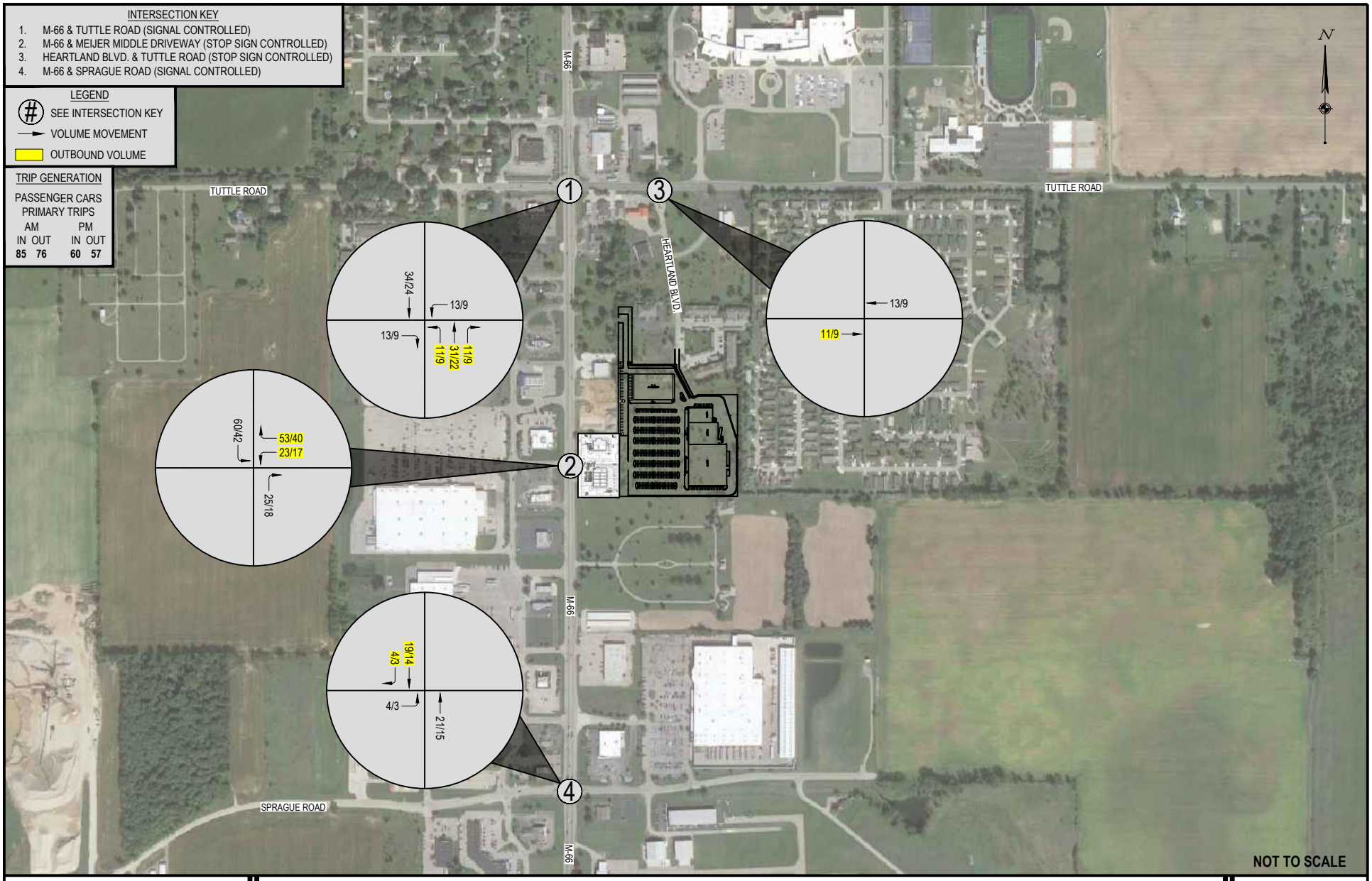

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MULTI USE DEVELOPMENT (PHASE II) PEAK HOUR GENERATED TRAFFIC VOLUMES - PRIMARY

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

FIGURE	7.C
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JOB NO.:	763233
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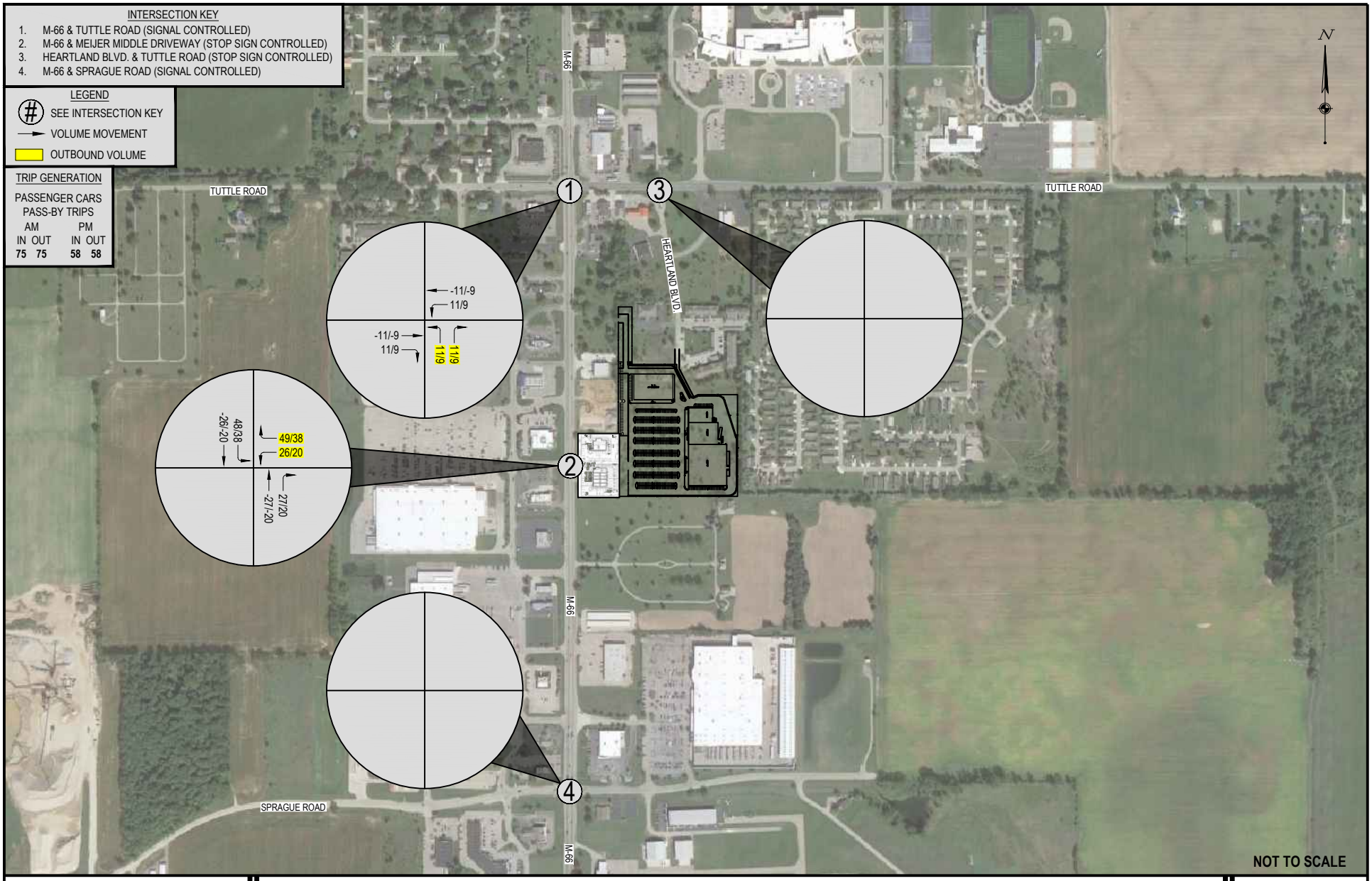

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MULTI USE DEVELOPMENT (PHASE II) PEAK HOUR GENERATED TRAFFIC VOLUMES - PASS-BY

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

FIGURE	7.D
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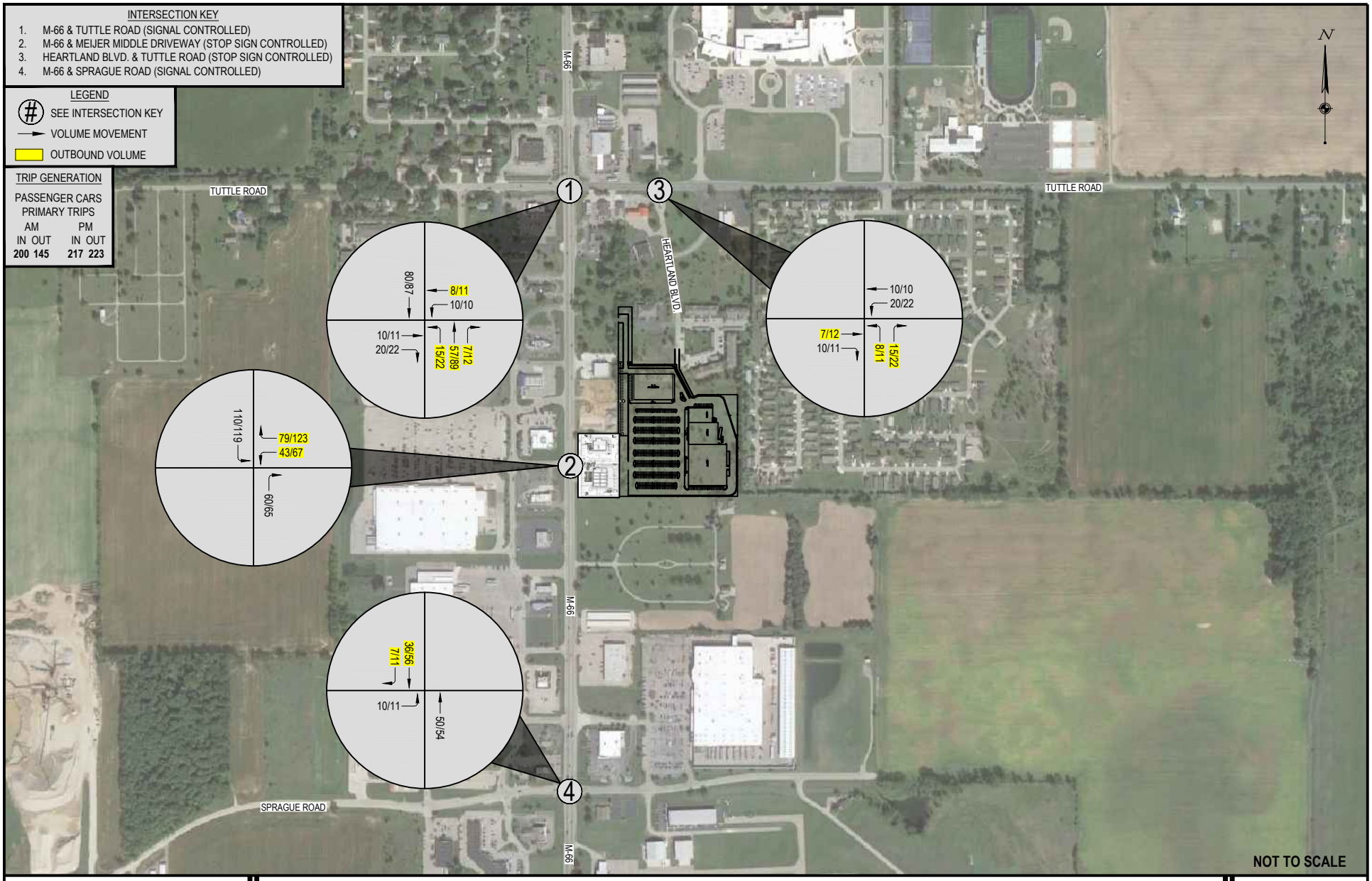

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MULTI USE DEVELOPMENT (PHASE III) PEAK HOUR GENERATED TRAFFIC VOLUMES - PRIMARY

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

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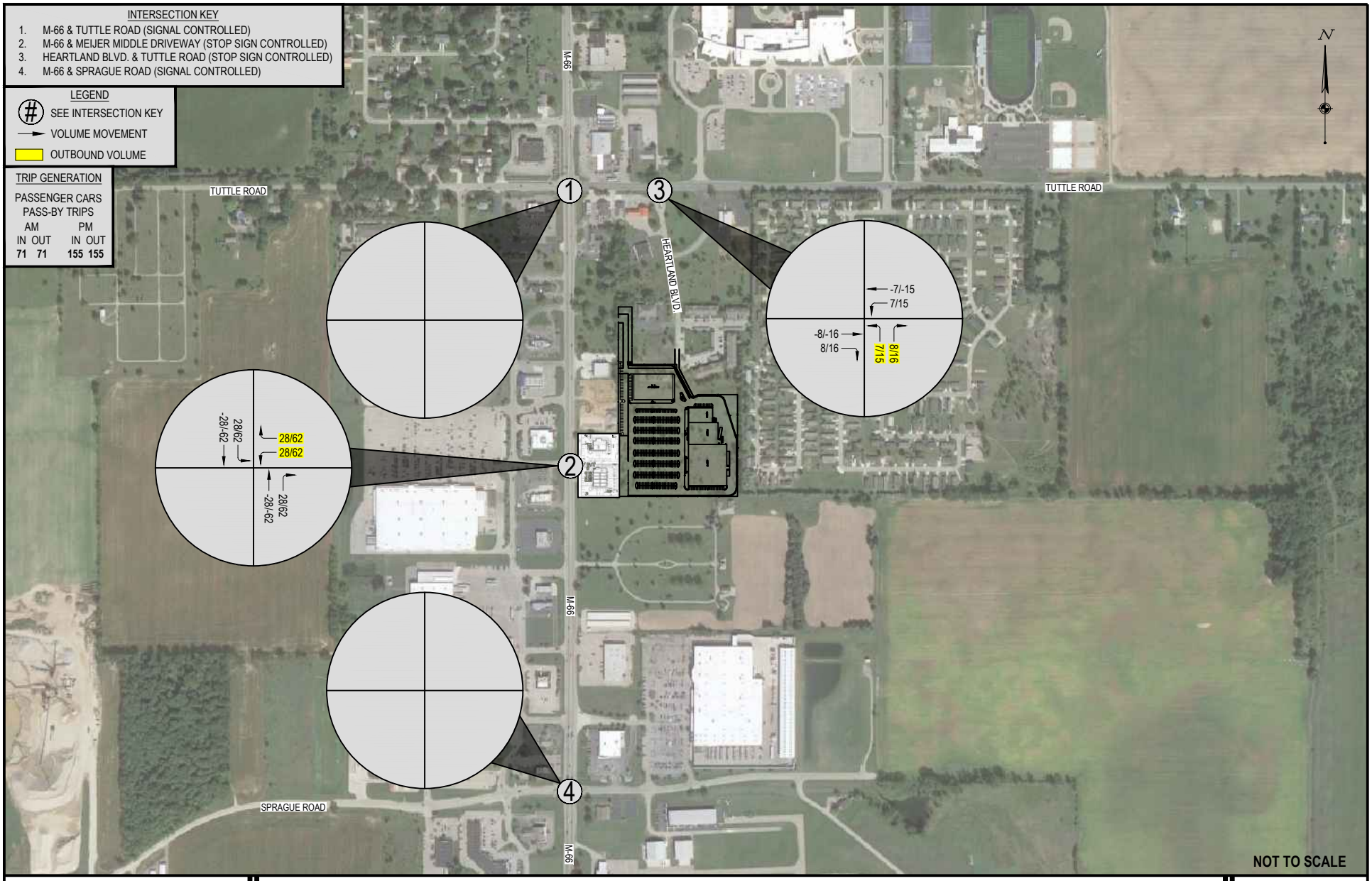

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MULTI USE DEVELOPMENT (PHASE III) PEAK HOUR GENERATED TRAFFIC VOLUMES - PASS-BY

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

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6. Estimates of 2024 Build Year Traffic in the Vicinity of the Site

6.1. 2024 Build Year Traffic Volumes

The 2024 Build Year Weekday Peak Hour Traffic Volumes in the vicinity of the proposed Multi-use Development were calculated by adding the 2024 No-Build Weekday Peak Hour Traffic Volumes (Figure 5) and the estimated Multi-use Development (Phase I) Generated Traffic Volumes (Figures 7.A-7.B). The 2024 Build Year Weekday Peak Hour Traffic Volumes are illustrated on Figure 8.

6.2. 2024 Build Year Traffic Scenario Capacity Analysis

Utilizing the 2024 Build Year Weekday Peak Hour Traffic Volumes illustrated on Figure 8, capacity calculations were performed for the key study intersections and site driveways. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2022). All study intersections were analyzed using Synchro V.12 methodology.

Table 7 summarizes the capacity analyses results for the 2024 Build Year Traffic Scenario.

Table 7
Summary of 2024 Build Year Traffic Scenario Capacity Analysis

Intersection →	Year →	2024 AM and PM Peak Hours			
	Volume →	Build Year 2024			
	Geometry →	Existing (Proposed)			
	Direction / Movement	AM Peak Hour		PM Peak Hour	
		LOS	*Delay	LOS	*Delay
M-66 & Tuttle Road (Signal Controlled)	Intersection Overall →	**D**	**36.8**	**D**	**53.5**
	Eastbound EBL	C	34.2	C	29.8
	Eastbound EBTR	C	24.4	C	20.6
	Westbound WBL	C	30.6	C	25.2
	Westbound WBTR	C	29.4	C	20.9
	Northbound NBL	C	22.5	C	27.4
	Northbound NBT	D	38.3	F	80.1
	Northbound NBR	C	21.4	C	21.9
	Southbound SBL	C	21.8	C	28.1
	Southbound SBT	E	55.4	F	78.2
	Southbound SBR	B	18.6	B	19.2
M-66 & Meijer Driveway (Stop-Sign Controlled)	Intersection Overall →	--	--	--	--
	Eastbound EBL	D	34.1	F	68.5
	Eastbound EBTR	B	12.3	B	13.8
	Westbound WBL	E	36.1	F	75.8
	Westbound WBTR	B	12.2	C	15.5
	Northbound TWLTL	A	9.0	A	9.4
	Northbound NBTR	A	0.0	A	0.0
	Southbound TWLTL	A	8.7	B	9.7
	Southbound SBT	A	0.0	A	0.0
	Southbound SBR	A	0.0	A	0.0

*Delay in seconds L – Left T – Through R – Right

Table 7 - Continued
Summary of 2024 Build Year Traffic Scenario Capacity Analysis

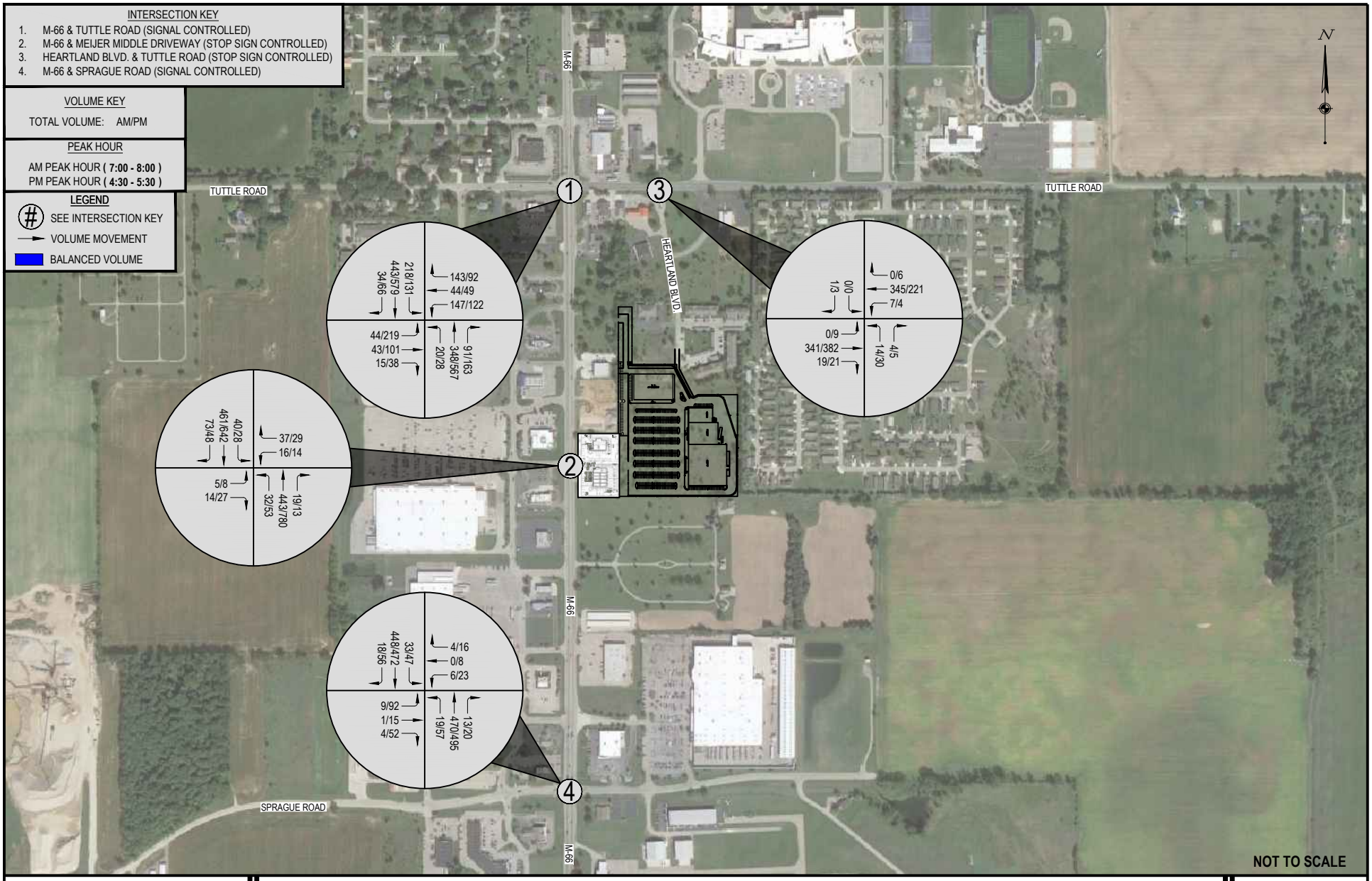
Intersection →	Year →	2024 AM and PM Peak Hours				
	Volume →	Build Year 2024				
	Geometry →	Existing (Proposed)				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
Heartland Boulevard & Tuttle Road (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	TWLTL	A	0.0	A	7.9
		EBTR	A	0.0	A	0.0
	Westbound	TWLTL	A	8.5	A	8.6
		WBTR	A	0.0	A	0.0
	Northbound	NBLT	C	23.5	C	22.5
		NBR	B	11.4	B	11.9
	Southbound	SBLTR	B	11.3	B	10.0
M-66 & Sprague Road (Signal Controlled)	Intersection Overall →		**A**	**3.5**	**A**	**9.5**
	Eastbound	EBL	D	36.1	C	33.8
		EBTR	D	36.6	C	32.0
	Westbound	WBL	D	36.0	C	33.0
		WBTR	D	36.4	C	30.0
	Northbound	NBL	A	2.9	A	6.9
		NBT	A	2.7	A	5.4
		NBR	A	1.5	A	3.2
	Southbound	SBL	A	3.1	A	6.9
		SBT	A	2.7	A	5.2
		SBR	A	1.6	A	3.4
*Delay in seconds L – Left T – Through R – Right						

Under the **2024 Build Year Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "D" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "D" or better in the AM and PM peak hours except the following movements:

- EBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the PM peak hour).
- WBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "E" and "F" in the AM and PM peak hours).

Note: Volume is low for the WBL movement during the weekday AM/PM peak hours (16/14 vehicles). This movement will operate at acceptable levels of service during the weekday off-peak hours.

The 2024 Build Year Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix E.



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2024 BUILD YEAR WEEKDAY PEAK HOUR TRAFFIC VOLUMES

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FIGURE 8	
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7. Estimates of 2026 No-Build Traffic in the Vicinity of the Site

7.1. 2026 No-Build Traffic Volumes

The 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2023) (Figure 4). A growth rates of 0.50 percent (%) per year was applied to all volumes within the study area for three (3) years (1.015 growth factor) to reach the 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9).

The growth rate calculation documentation can be found in Appendix B.

7.2. 2026 No-Build Traffic Scenario Capacity Analysis

Utilizing the 2026 No-Build Weekday Peak Hour Traffic Volumes illustrated on Figure 9, capacity calculations were performed for the key study intersections. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2022). All study intersections were analyzed using Synchro V.12 methodology.

Table 8 summarizes the capacity analyses results for the 2026 No-Build Traffic Scenario.

Table 8
Summary of 2026 No-Build Traffic Scenario Capacity Analysis

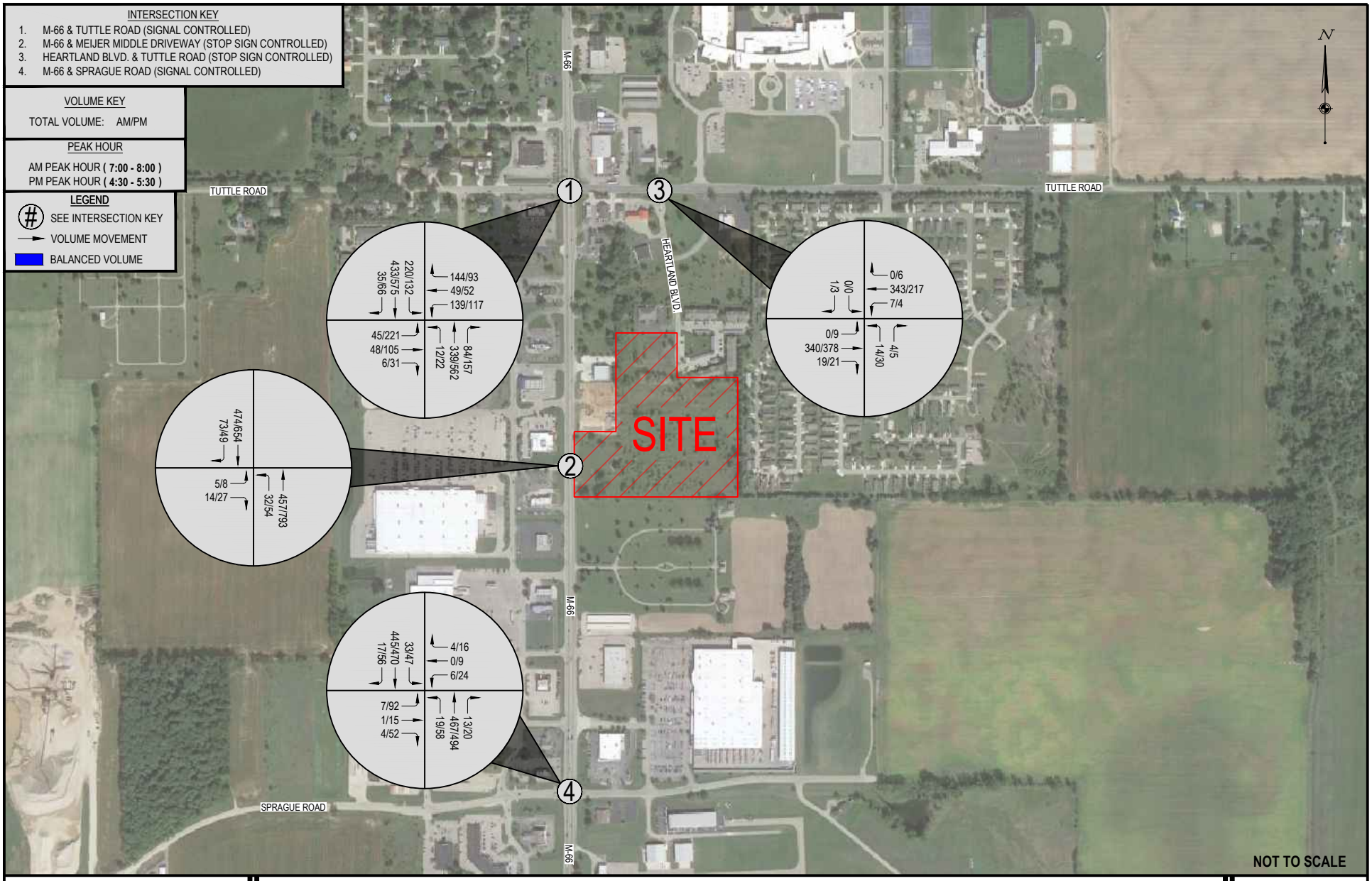
Intersection →	Year →	2026 AM and PM Peak Hours				
	Volume →	No-Build Year 2026				
	Geometry →	Existing				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
M-66 & Tuttle Road (Signal Controlled)	Intersection Overall →		**D**	**35.2**	**D**	**52.1**
	Eastbound	EBL	C	34.3	C	29.8
		EBTR	C	24.0	C	20.4
	Westbound	WBL	C	29.6	C	24.7
		WBTR	C	29.3	C	20.7
	Northbound	NBL	C	22.6	C	27.6
		NBT	D	36.7	F	76.7
		NBR	C	21.2	C	21.7
	Southbound	SBL	C	21.8	C	28.4
		SBT	D	51.3	F	76.0
		SBR	B	18.7	B	19.2
M-66 & Meijer Driveway (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	EBL	C	15.8	C	20.6
		EBR	B	12.4	B	14.0
	Northbound	TWLTL	A	9.0	A	9.4
		NBT	A	0.0	A	0.0
	Southbound	SBT	A	0.0	A	0.0
		SBR	A	0.0	A	0.0
*Delay in seconds L – Left T – Through R – Right						

Table 8 - Continued
Summary of 2026 No-Build Traffic Scenario Capacity Analysis

Intersection →	Year →	2026 AM and PM Peak Hours				
	Volume →	No-Build Year 2026				
	Geometry →	Existing				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
Heartland Boulevard & Tuttle Road (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	TWLTL	A	0.0	A	7.9
		EBTR	A	0.0	A	0.0
	Westbound	TWLTL	A	8.5	A	8.6
		WBTR	A	0.0	A	0.0
	Northbound	NBLT	C	23.4	C	22.1
		NBR	B	11.4	B	11.9
	Southbound	SBLTR	B	11.2	A	10.0
M-66 & Sprague Road (Signal Controlled)	Intersection Overall →		**A**	**3.4**	**A**	**9.5**
	Eastbound	EBL	D	36.1	C	33.8
		EBTR	D	36.9	C	31.9
	Westbound	WBL	D	36.1	C	33.0
		WBTR	D	36.7	C	30.0
	Northbound	NBL	A	2.9	A	6.9
		NBT	A	2.7	A	5.4
		NBR	A	1.5	A	3.2
	Southbound	SBL	A	3.1	A	7.0
		SBT	A	2.6	A	5.2
		SBR	A	1.5	A	3.4
*Delay in seconds L – Left T – Through R – Right						

Under the **2026 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS “D” in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS “C” or better in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS “A” in the AM and PM peak hours.

The 2026 No-Build Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix F.



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2026 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

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8. Estimates of 2026 Build Year Traffic in the Vicinity of the Site

8.1. 2026 Build Year Traffic Volumes

The 2026 Build Year Weekday Peak Hour Traffic Volumes in the vicinity of the proposed Multi-use Development were calculated by adding the 2026 No-Build Weekday Peak Hour Traffic Volumes (Figure 9) and the estimated Multi-use Development (Phase II) Generated Traffic Volumes (Figures 7.C-7.D). The 2026 Build Year Weekday Peak Hour Traffic Volumes are illustrated on Figure 10.

8.2. 2026 Build Year Traffic Scenario Capacity Analysis

Utilizing the 2026 Build Year Weekday Peak Hour Traffic Volumes illustrated on Figure 10, capacity calculations were performed for the key study intersections and site driveways. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2022). All study intersections were analyzed using Synchro V.12 methodology.

Table 9 summarizes the capacity analyses results for the 2026 Build Year Traffic Scenario.

Table 9
Summary of 2026 Build Year Traffic Scenario Capacity Analysis

Intersection →	Year →	2026 AM and PM Peak Hours			
	Volume →	Build Year 2026			
	Geometry →	Existing (Proposed)			
	Direction / Movement	AM Peak Hour		PM Peak Hour	
		LOS	*Delay	LOS	*Delay
M-66 & Tuttle Road (Signal Controlled)	Intersection Overall →	**D (C)**	**41.3 (25.1)**	**E (C)**	**59.4 (31.4)**
	Eastbound EBL	C (D)	32.0 (39.3)	C (D)	29.7 (38.8)
	Eastbound EBTR	C (C)	23.3 (28.6)	C (C)	20.9 (25.6)
	Westbound WBL	C (D)	30.2 (37.2)	C (C)	26.0 (32.0)
	Westbound WBTR	C (C)	27.1 (33.1)	C (C)	20.9 (25.7)
	Northbound NBL	C (B)	23.8 (13.0)	C (C)	27.4 (22.6)
	Northbound NBT	D (C)	43.4 (31.9)	F (D)	90.1 (41.4)
	Northbound NBR	C (C)	22.0 (23.7)	C (C)	22.3 (27.0)
	Southbound SBL	C (B)	23.9 (15.9)	C (D)	28.0 (37.9)
	Southbound SBT	F (B)	68.0 (17.3)	F (C)	90.3 (23.9)
	Southbound SBR	B (B)	18.7 (10.3)	B (B)	19.2 (13.3)
*Delay in seconds L – Left T – Through R – Right					

Table 9 - Continued
Summary of 2026 Build Year Traffic Scenario Capacity Analysis

Intersection →	Year →	2026 AM and PM Peak Hours				
	Volume →	Build Year 2026				
	Geometry →	Existing (Proposed)				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
M-66 & Meijer Driveway (Stop-Sign Controlled)	Intersection Overall →		**-- (A)**	**-- (7.0)**	**-- (A)**	**-- (8.0)**
	Eastbound	EBL	F (D)	50.4 (43.0)	F (D)	107.2 (43.1)
		EBTR	B (D)	12.1 (37.6)	B (D)	13.7 (39.7)
	Westbound	WBL	F (D)	77.2 (39.8)	F (D)	195.3 (41.4)
		WBTR	B (D)	13.3 (46.3)	C (D)	17.5 (46.4)
	Northbound	TWLTL (NBL)	A (A)	8.9 (5.0)	A (A)	9.3 (6.1)
		NBTR (NBT)	A (A)	0.0 (1.0)	A (A)	0.0 (2.1)
		(NBR)	-- (A)	-- (0.1)	-- (A)	-- (0.1)
	Southbound	TWLTL (SBL)	A (A)	9.1 (9.6)	B (A)	10.1 (8.9)
		SBT	A (A)	0.0 (1.4)	A (A)	0.0 (7.3)
		SBR	A (A)	0.0 (0.2)	A (A)	0.0 (4.0)
Heartland Boulevard & Tuttle Road (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	TWLTL	A	0.0	A	8.0
		EBTR	A	0.0	A	0.0
	Westbound	TWLTL	A	8.5	A	8.7
		WBTR	A	0.0	A	0.0
	Northbound	NBLT	C	24.5	C	23.3
		NBR	B	11.5	B	12.0
	Southbound	SBLTR	B	11.4	B	10.1
M-66 & Sprague Road (Signal Controlled)	Intersection Overall →		**A (A)**	**3.6 (2.5)**	**A (A)**	**9.6 (8.4)**
	Eastbound	EBL	D (D)	36.1 (43.5)	C (D)	33.7 (40.9)
		EBTR	D (D)	36.4 (43.7)	C (D)	31.7 (38.3)
	Westbound	WBL	D (D)	35.9 (43.2)	C (D)	32.9 (39.8)
		WBTR	D (D)	36.2 (43.5)	C (D)	29.9 (36.1)
	Northbound	NBL	A (A)	3.1 (1.4)	A (A)	7.2 (3.5)
		NBT	A (A)	2.8 (2.5)	A (A)	5.6 (5.2)
		NBR	A (A)	1.6 (1.4)	A (A)	3.3 (3.1)
	Southbound	SBL	A (A)	3.3 (0.4)	A (A)	7.2 (1.0)
		SBT	A (A)	2.7 (0.5)	A (A)	5.4 (0.7)
		SBR	A (A)	1.6 (0.0)	A (A)	3.4 (0.1)
*Delay in seconds L – Left T – Through R – Right						

Under the **2026 Build Year Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "D" and "E" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "D" or better in the AM and PM peak hours except the following movements:

- EBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the AM and PM peak hours).
- WBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the AM and PM peak hours).

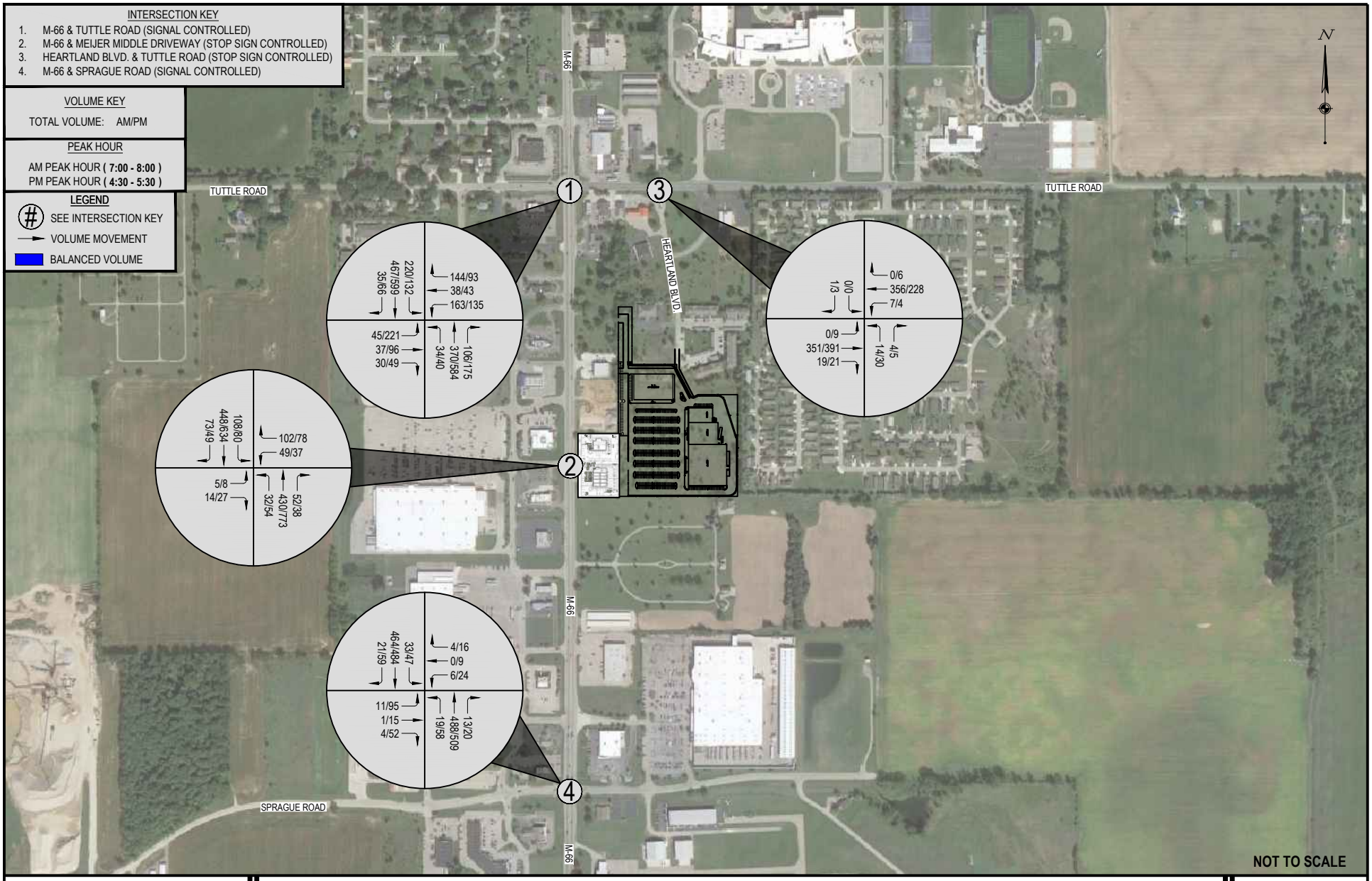
With the recommended improvements implemented, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "C" in the AM and PM peak hours. The M-66 and Meijer Driveway signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. The following recommendations were included in the analysis:

M-66 and Meijer Driveway/Site Driveway

- Install a traffic signal. Coordinate signal timing with the signals along M-66 at Tuttle Road and Sprague Road.
- Restripe the existing two-way left-turn lane to show dedicated northbound and southbound turn lanes.
- Construct 175' northbound right-turn lane with a 50-foot taper.

Note: LOS changes at the other signalized intersections were due to timing changes after timing coordination was done.

The 2026 Build Year Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix G.



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2026 BUILD YEAR WEEKDAY PEAK HOUR TRAFFIC VOLUMES

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9. Estimates of 2029 No-Build Traffic in the Vicinity of the Site

9.1. 2029 No-Build Traffic Volumes

The 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11) were calculated by applying a growth rate to the Existing Weekday Peak Hour Traffic Volumes (Year 2023) (Figure 4). A growth rates of 0.50 percent (%) per year was applied to all volumes within the study area for six (6) years (1.030 growth factor) to reach the 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11).

The growth rate calculation documentation can be found in Appendix B.

9.2. 2029 No-Build Traffic Scenario Capacity Analysis

Utilizing the 2029 No-Build Weekday Peak Hour Traffic Volumes illustrated on Figure 11, capacity calculations were performed for the key study intersections. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2022). All study intersections were analyzed using Synchro V.12 methodology.

Table 10 summarizes the capacity analyses results for the 2029 No-Build Traffic Scenario.

Table 10
Summary of 2029 No-Build Traffic Scenario Capacity Analysis

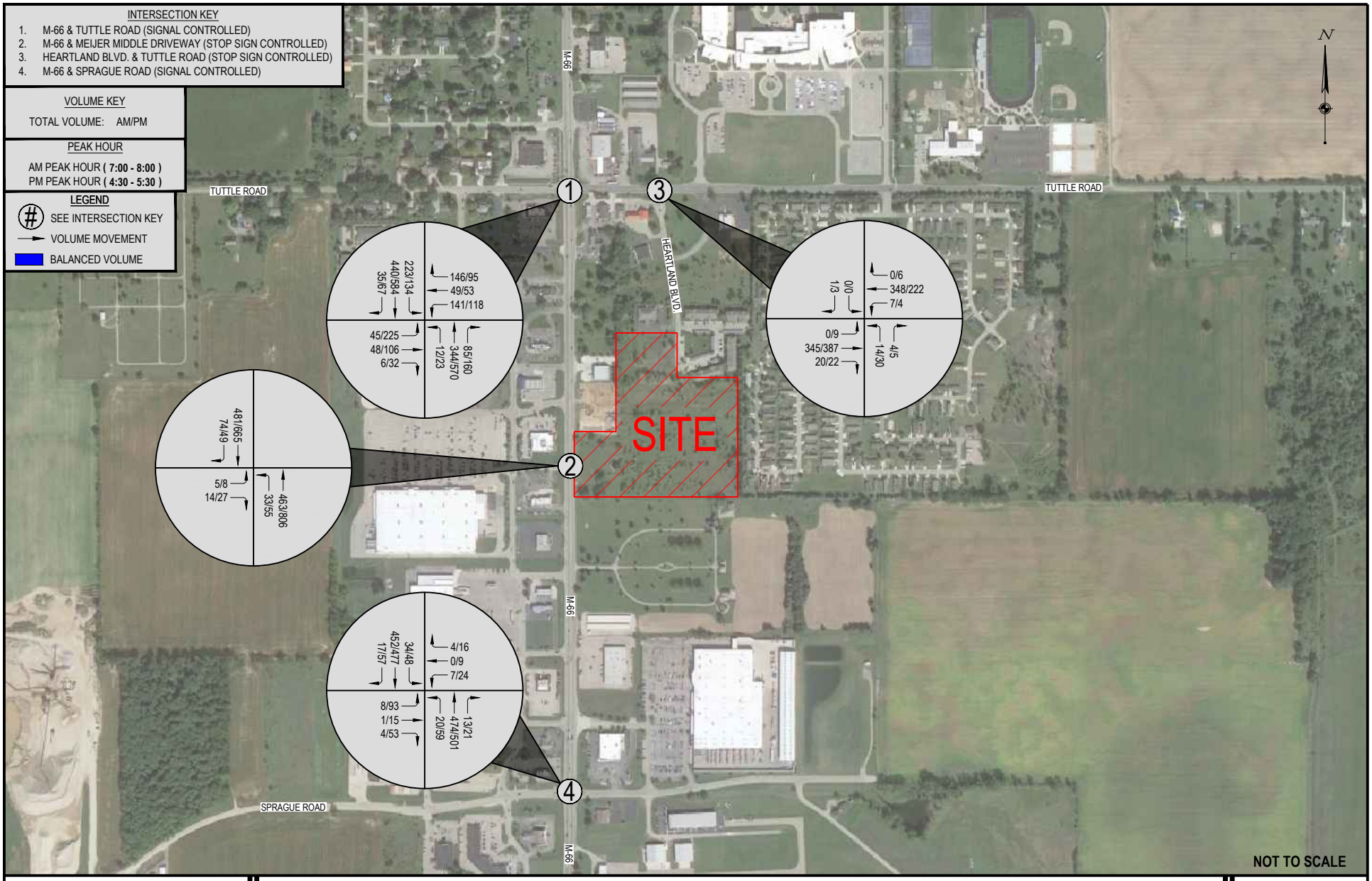
Intersection →	Year →	2029 AM and PM Peak Hours				
	Volume →	No-Build Year 2029				
	Geometry →	Existing				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
M-66 & Tuttle Road (Signal Controlled)	Intersection Overall →		**D**	**36.2**	**D**	**54.7**
	Eastbound	EBL	C	34.3	C	29.9
		EBTR	C	23.9	C	20.1
	Westbound	WBL	C	29.5	C	24.4
		WBTR	C	29.2	C	20.5
	Northbound	NBL	C	22.8	C	27.9
		NBT	D	37.6	F	81.8
		NBR	C	21.2	C	21.8
	Southbound	SBL	C	22.1	C	28.8
		SBT	D	53.9	F	80.9
		SBR	B	18.7	B	19.2
M-66 & Meijer Driveway (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	EBL	C	16.0	C	20.9
		EBR	B	12.5	B	14.1
	Northbound	TWLTL	A	9.1	A	9.5
		NBT	A	0.0	A	0.0
	Southbound	SBT	A	0.0	A	0.0
		SBR	A	0.0	A	0.0
*Delay in seconds L – Left T – Through R – Right						

Table 10 - Continued
Summary of 2029 No-Build Traffic Scenario Capacity Analysis

Intersection →	Year →	2029 AM and PM Peak Hours				
	Volume →	No-Build Year 2029				
	Geometry →	Existing				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
Heartland Boulevard & Tuttle Road (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	TWLTL	A	0.0	A	7.9
		EBTR	A	0.0	A	0.0
	Westbound	TWLTL	A	8.5	A	8.7
		WBTR	A	0.0	A	0.0
	Northbound	NBLT	C	23.8	C	22.8
		NBR	B	11.4	B	12.0
	Southbound	SBLTR	B	11.3	A	10.0
M-66 & Sprague Road (Signal Controlled)	Intersection Overall →		**A**	**3.5**	**A**	**9.6**
	Eastbound	EBL	D	36.1	C	33.7
		EBTR	D	36.6	C	31.8
	Westbound	WBL	D	36.1	C	33.0
		WBTR	D	36.4	C	30.0
	Northbound	NBL	A	3.0	A	7.0
		NBT	A	2.7	A	5.5
		NBR	A	1.5	A	3.3
	Southbound	SBL	A	3.2	A	7.1
		SBT	A	2.7	A	5.3
		SBR	A	1.6	A	3.4
*Delay in seconds L – Left T – Through R – Right						

Under the **2029 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS “D” in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS “C” or better in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS “A” in the AM and PM peak hours.

The 2029 No-Build Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix H.



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2029 NO-BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

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10. Estimates of 2029 Design Year Traffic in the Vicinity of the Site

10.1. 2029 Design Year Traffic Volumes

The 2029 Design Year Weekday Peak Hour Traffic Volumes in the vicinity of the proposed Multi-use Development were calculated by adding the 2029 No-Build Weekday Peak Hour Traffic Volumes (Figure 11) and the estimated Multi-use Development (Phase III) Generated Traffic Volumes (Figures 7.E-7.F). The 2029 Design Year Weekday Peak Hour Traffic Volumes are illustrated on Figure 12.

10.2. 2029 Design Year Traffic Scenario Capacity Analysis

Utilizing the 2029 Design Year Weekday Peak Hour Traffic Volumes illustrated on Figure 12, capacity calculations were performed for the key study intersections and site driveways. All capacity calculations within the TIS followed procedures documented in the *Highway Capacity Manual, Seventh Edition: A Guide for Multimodal Mobility Analysis* (Transportation Research Board, 2022). All study intersections were analyzed using Synchro V.12 methodology.

Table 11 summarizes the capacity analyses results for the 2029 Design Year Traffic Scenario.

Table 11
Summary of 2029 Design Year Traffic Scenario Capacity Analysis

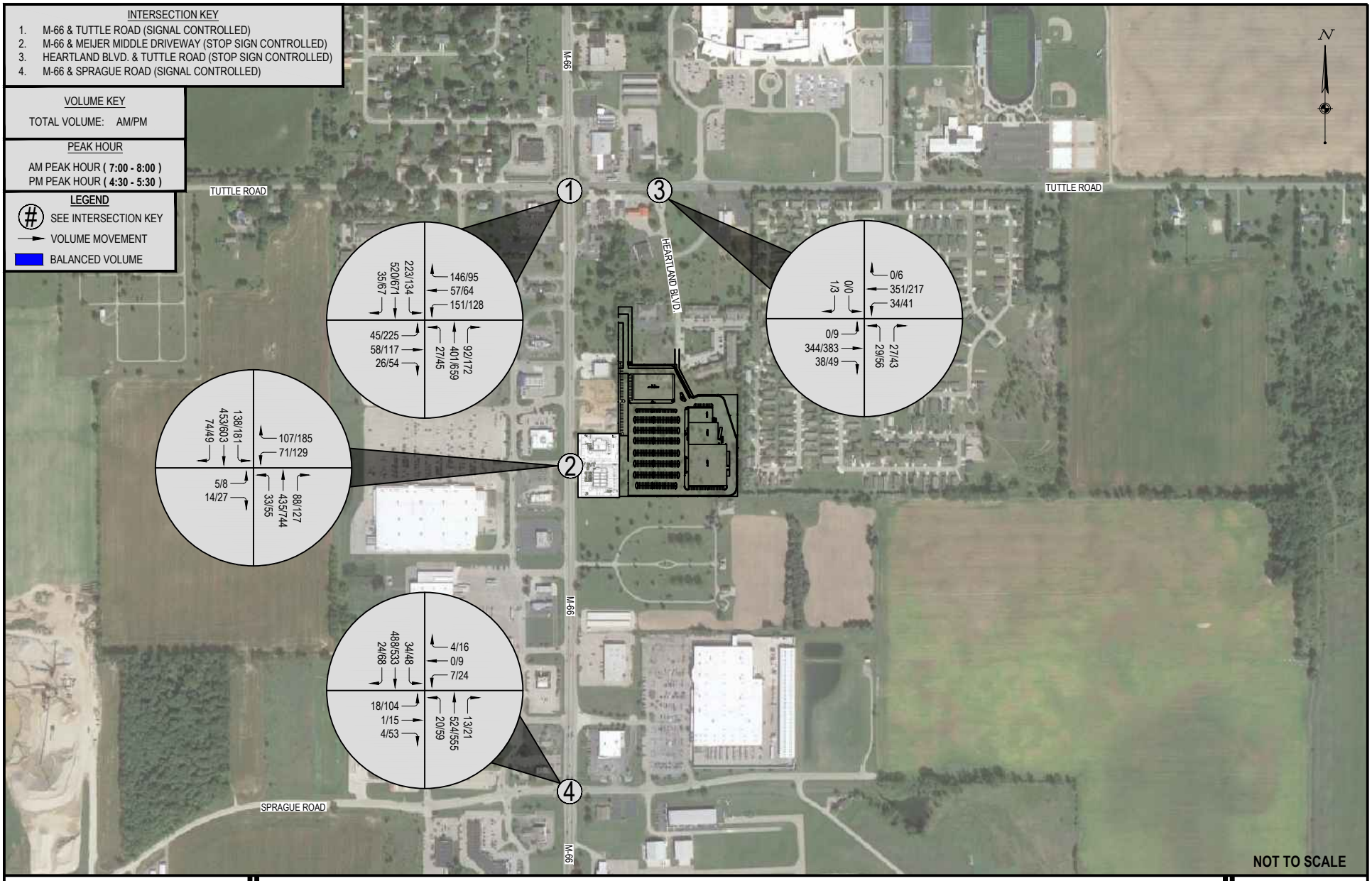
Intersection →	Year →	2029 AM and PM Peak Hours			
	Volume →	Design Year 2029			
	Geometry →	Proposed			
	Direction / Movement	AM Peak Hour		PM Peak Hour	
		LOS	*Delay	LOS	*Delay
M-66 & Tuttle Road (Signal Controlled)	Intersection Overall →	**C**	**26.3**	**D**	**35.3**
	Eastbound EBL	D	40.7	D	39.6
	Eastbound EBTR	C	28.9	C	25.0
	Westbound WBL	D	37.4	C	31.5
	Westbound WBTR	C	33.9	C	25.0
	Northbound NBL	B	13.7	C	24.3
	Northbound NBT	C	33.3	D	47.1
	Northbound NBR	C	23.3	C	26.8
	Southbound SBL	B	18.3	D	45.4
	Southbound SBT	B	18.6	C	31.0
	Southbound SBR	B	10.2	B	14.2
*Delay in seconds L – Left T – Through R – Right					

Table 11 - Continued
Summary of 2029 Design Year Traffic Scenario Capacity Analysis

Intersection →	Year →	2029 AM and PM Peak Hours				
	Volume →	Design Year 2029				
	Geometry →	Proposed				
	Direction	Movement	AM Peak Hour		PM Peak Hour	
			LOS	*Delay	LOS	*Delay
M-66 & Meijer Driveway (Signal Controlled)	Intersection Overall →		**A**	**7.5**	**B**	**16.9**
	Eastbound	EBL	D	42.8	D	42.9
		EBTR	D	37.2	C	33.1
	Westbound	WBL	D	40.6	D	38.7
		WBTR	D	45.8	D	49.9
	Northbound	TWLTL (NBL)	A	5.5	B	10.4
		NBTR (NBT)	A	1.0	B	14.8
		(NBR)	A	0.2	A	7.4
	Southbound	TWLTL (SBL)	A	9.7	B	17.2
		SBT	A	1.3	A	6.7
		SBR	A	0.2	A	4.0
Heartland Boulevard & Tuttle Road (Stop-Sign Controlled)	Intersection Overall →		--	--	--	--
	Eastbound	TWLTL	A	0.0	A	7.9
		EBTR	A	0.0	A	0.0
	Westbound	TWLTL	A	8.7	A	9.0
		WBTR	A	0.0	A	0.0
	Northbound	NBLT	D	31.8	E	36.0
		NBR	B	11.9	B	13.0
	Southbound	SBLTR	B	11.3	A	10.0
M-66 & Sprague Road (Signal Controlled)	Intersection Overall →		**A**	**2.9**	**A**	**8.4**
	Eastbound	EBL	D	43.5	D	40.7
		EBTR	D	42.9	D	37.5
	Westbound	WBL	D	42.8	D	39.2
		WBTR	D	42.7	D	35.6
	Northbound	NBL	A	1.5	A	3.8
		NBT	A	2.8	A	5.8
		NBR	A	1.5	A	3.3
	Southbound	SBL	A	0.5	A	1.4
		SBT	A	0.6	A	0.8
		SBR	A	0.0	A	0.1
*Delay in seconds L – Left T – Through R – Right						

Under the **2029 Design Year Traffic Scenario** with the recommended improvements implemented, the M-66 and Tuttle Road signalized intersection operates at an overall LOS “C” and “D” in the AM and PM peak hours. The M-66 and Meijer Driveway signalized intersection operates at an overall LOS “A” and “B” in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS “A” in the AM and PM peak hours.

The 2029 Design Year Traffic Scenario Capacity Analysis Summary Sheets are contained in Appendix H.



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2029 DESIGN YEAR WEEKDAY PEAK HOUR TRAFFIC VOLUMES

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

FIGURE	12
DATE:	8/2/24
JOB NO.:	763233
DESIGNED BY:	DMB
DRAWN BY:	DMB
CHECKED BY:	REM
PAGE:	53

11. Turn Lane Length Analysis

Turn lane analyses were completed using the turn lane warrant charts from the MDOT *Traffic & Safety Note 604A (July 2022).* Left turn lane analysis was not performed as there are existing dedicated left-turn lanes or two-way left-turn lanes at all study intersections. MDOT turn lane warrant charts can be found in Appendix J.

11.1. Right-Turn Lane Analysis

Table 12 provides a summary of the data and results utilized in the review of each study location for a right-turn lane. MDOT *Traffic & Safety Note 604A (July 2022)* were used to determine if right-turn lanes were warranted at the applicable study locations.

Table 12
Right-Turn Lane Warrant Review

Intersection and Traffic Scenario	Control Type	Direction	*Advancing Traffic (am/pm)	Right-Turn (am/pm)	Method or Chart Used	Warranted
2024 No-Build						
Heartland Boulevard & Tuttle Road	Stop Sign	EBR	356/408	19/21	604A	**No/No**
2024 Build						
M-66 & Meijer Driveway/Site Driveway	Stop Sign	NBR	462/793	19/13	604A	**No/No**
Heartland Boulevard & Tuttle Road	Stop Sign	EBR	360/412	19/21	604A	**No/No**
2026 No-Build						
Heartland Boulevard & Tuttle Road	Stop Sign	EBR	359/412	19/21	604A	**No/No**
2026 Build						
M-66 & Meijer Driveway/Site Driveway	Stop Sign	NBR	482/811	52/38	604A	**Yes/Yes**
Heartland Boulevard & Tuttle Road	Stop Sign	EBR	370/421	19/21	604A	**No/No**
2029 No-Build						
Heartland Boulevard & Tuttle Road	Stop Sign	EBR	365/417	19/21	604A	**No/No**
2029 Design						
M-66 & Meijer Driveway/Site Driveway	Stop Sign	NBR	523/871	88/127	604A	**Yes/Yes**
Heartland Boulevard & Tuttle Road	Stop Sign	EBR	382/432	38/49	604A	**No/No**

* Includes Right Turns

11.2. Right-Turn Lane Warrant Review Summary

According to MDOT *Traffic & Safety Note 604A (July 2022)*, a right-turn lane **is warranted** at the M-66 and Meijer Driveway/Site driveway intersection under the 2026 Build Year traffic scenario.

12. Queue Length Analysis

12.1. 95th Percentile Queue Lengths

The 95th percentile queue lengths for the key study intersections were calculated using SimTraffic 12. CESO reviewed the 2029 No-Build, and 2029 Design Year Traffic Scenarios. The results of the analyses are listed below in Table 13. SimTraffic queue length reports can be found in Appendix K.

Table 13
Queue Lengths – 2029 No-Build and Design Year Traffic Scenarios

Location	Movement (proposed)	Storage Length Ex (Prop)	2029 No-Build and Design Year Traffic Scenario (feet)			
			AM Peak Hour		PM Peak Hour	
Traffic Scenario →			2029 No-Build	2029 Build	2029 No-Build	2029 Build
M-66 & Tuttle Road	EBL	*270'*	73	80 (79)	221	225 (267)
	EBTR	--	62	87 (86)	109	125 (209)
	WBL	*110'*	136	136 (153)	113	120 (135)
	WBTR	--	146	145 (175)	130	124 (158)
	NBL	*180'*	43	64 (70)	116	175 (111)
	NBT	--	189	229 (244)	459	679 (492)
	NBR	*325'*	50	51 (54)	206	360 (227)
	SBL	*180'*	159	209 (174)	183	264 (242)
	SBT	--	227	382 (291)	319	696 (473)
	SBR	*235'*	35	58 (71)	93	218 (186)
M-66 & Meijer Driveway/Site Driveway	EBL	*85'*	16	15 (17)	22	28 (23)
	EBR (EBTR)	*85'*	33	31 (29)	42	43 (38)
	(WBL)	--	--	81 (92)	--	392 (137)
	(WBTR)	--	--	64 (55)	--	478 (121)
	TWLTL (NBL)	--	35	40 (55)	45	48 (103)
	NBTR (NBT)	--	0	12 (140)	0	36 (391)
	(NBR)	*175'*	--	-- (58)	--	-- (155)
	TWLTL (SBL)	--	--	67 (81)	--	128 (129)
	SBT	--	0	0 (138)	4	144 (259)
	SBR		3	3 (33)	10	5 (23)
L – Left T – Through R – Right (xx) – With Improvements						

Table 13 – Continued
Queue Lengths – 2029 No-Build and Design Year Traffic Scenarios

Location	Movement (proposed)	Storage Length Ex (Prop)	2029 No-Build and Design Year Traffic Scenario (feet)			
			AM Peak Hour		PM Peak Hour	
Traffic Scenario →			2029 No-Build	2029 Build	2029 No-Build	2029 Build
Heartland Boulevard & Tuttle Road	TWLTL	--	0	0	11	12
	EBTR	--	2	4	0	7
	TWLTL	--	14	36	12	39
	WBTR	--	0	13	0	0
	NBLT	--	35	45	46	59
	NBR	--	18	42	23	51
	SBLTR	--	11	9	18	16
M-66 & Sprague Road	EBL	*155'*	22	44 (47)	106	111 (128)
	EBTR	--	13	14 (13)	60	62 (67)
	WBL	*140'*	22	21 (22)	52	46 (48)
	WBTR	--	14	14 (14)	36	33 (39)
	NBL	*215'*	29	32 (31)	63	58 (58)
	NBT	--	60	80 (77)	133	148 (147)
	NBR	*115'*	7	8 (10)	20	22 (19)
	SBL	*90'*	33	35 (37)	61	54 (49)
	SBT	--	51	82 (67)	155	158 (116)
	SBR	*105'*	7	13 (11)	49	42 (30)
L – Left T – Through R – Right (xx) – With Improvements						

12.2. Queue Length Analysis Summary

CESO reviewed all study locations to determine if calculated queue lengths exceed existing and proposed storage lengths. The queue length analysis revealed the following:

- The westbound left-turn movement at the M-66 and Tuttle Road intersection exceeds the existing storage length under the 2029 No-Build and 2029 Design Year traffic scenarios during the AM and PM peak hours.

- The southbound left-turn movement at the M-66 and Tuttle Road intersection exceeds the existing storage length under the 2029 No-Build and 2029 Design Year traffic scenarios during the PM peak hours.

13. Intersection Sight Distance Analysis

CESO conducted intersection sight distance analyses for the intersection of M-66 and Meijer Driveway/Site Driveway. Sight distance requirements were obtained from the MDOT Sight Distance Guidelines document dated April 22, 2015. Table 14 provides a summary of the Sight Distance Analysis results at the studied location.

Table 14
Intersection Sight Distance Summary

Intersection	Direction and Case	Design Speed	MDOT ISD Requirement	ISD Provided
2024 Build Traffic Scenario				
M-66 & Meijer Driveway/Site Driveway	North – Case B2 Right-Turn from Stop	50 MPH	480 FT	Greater than 480 FT
M-66 & Meijer Driveway/Site Driveway	South – Case B1 Left-Turn from Stop	50 MPH	555 FT	Greater than 555 FT

13.1. Intersection Sigh Distance Analysis Summary

The MDOT ISD requirements are satisfied for the intersection of M-66 and Meijer Driveway/Site Driveway. The Sight Distance Calculations are in Appendix L of the report.

14. Signal Warrant Analysis

The following Traffic Signal Warrant Study was performed according to the specifications stated in the Michigan Manual of Uniform Traffic Control Devices (MMUTCD), Section 4C, for the intersection of M-66 and Meijer Driveway.

14.1. Traffic Signal Warrants

In accordance with the MMUTCD, Chapter 4C, the aforementioned study intersections were tested against the following nine (9) warrants:

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

While meeting one or more warrants is not considered sufficient justification for the installation of a traffic signal, it is necessary to do so before a signal can be considered.

Examination of the 9 warrants shows that not all warrants are appropriate for consideration at the studied locations. For example, it would not be appropriate to consider Warrant 5 – School Crossing at this location. **The specific warrants that were analyzed include Warrants 1, 2 and 3**. These warrants are discussed in the sections below.

The volumes used in the Traffic Signal Warrant Study are listed below in Table 15. The volumes listed in Table 15 were subjected to right-turn factorization.

Table 15
Signal Warrant Volumes

Time	2024 Build Year Traffic Scenario		2026 Build Year Traffic Scenario		2029 Design Year Traffic Scenario	
Intersection →	Major	Minor	Major	Minor	Major	Minor
7:00 am – 8:00 am	1041	20	1073	53	1113	104
8:00 am – 9:00 am	910	26	942	62	1010	164
9:00 am – 10:00 am	1034	27	1066	61	1175	227
11:00 am – 12:00 pm	1287	51	1358	132	1500	366
12:00 pm – 1:00 pm	1448	74	1539	200	1697	462
1:00 pm – 2:00 pm	1405	58	1470	150	1636	410
2:00 pm – 3:00 pm	1494	45	1546	113	1698	343
3:00 pm – 4:00 pm	1464	43	1515	103	1667	334
4:00 pm – 5:00 pm	1486	43	1538	101	1690	335
5:00 pm – 6:00 pm	1453	48	1512	117	1675	372

14.2. Warrant 1 – Eight Hour Vehicular Volume

According to the MMUTCD, two conditions need to be examined to determine if this warrant is satisfied. The Minimum Vehicular Volume condition (Condition A) "... is intended for application where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal." The Interruption of Continuous Traffic condition (Condition B) "… is intended for application where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street."

It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

The following conditions must exist for any eight (8) hours of an average day for a traffic control signal to be considered:

Traffic Scenarios – M-66 & Meijer Driveway (3 Lane Major/2 Lane Minor):

- Condition A: The major street traffic volume must exceed 420 vehicles (total of both approaches) per hour, while the minor street traffic volume must exceed 140 vehicles (higher volume approach) for the same eight (8) hours.

- Condition B: The major street traffic volume must exceed 630 vehicles (total of both approaches) per hour, while the minor street traffic volume must exceed 70 vehicles (higher volume approach) for the same eight (8) hours.

- Conditions A and B can be combined for locations where neither Condition A nor Condition B is satisfied. However, this combination should only be applied after a trial of other alternatives has failed to solve the traffic problems.

Table 16 lists the Minimum Vehicular Volumes for Warrant 1 (Table 4C-1 from the MMUTCD).

Table 16
Minimum Vehicular Volumes for Warrant 1 (Table 4C-1 from the MMUTCD)

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

The traffic volumes in Table 15 were tested against the volume thresholds listed in Table 16 Minimum Vehicular Volumes for Warrant 1 (Table 4C-1 from the MMUTCD). Table 17 presents the results for the analysis of Warrant 1 – Eight-Hour Vehicular Volume.

Table 17
Summary of Warrant 1 – Eight-Hour Vehicular Volume

Traffic Scenario	Study Year	Condition A		Condition B	
		Hours Satisfied	Condition Satisfied	Hours Satisfied	Condition Satisfied
M-66 & Meijer Driveway					
2024 Build Year	2024	0	**No**	1	**No**
2026 Build Year	2026	2	**No**	7	**No**
2029 Design Year	2029	9	**Yes**	10	**Yes**

14.3. Warrant 2 – Four Hour Vehicular Volume

According to the MMUTCD, this warrant is "…intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal." Warrant 2 is satisfied when the vehicular volumes (summarized in Table 10) in each of four (4) hours of an average day fall above the appropriate curve of the graphs labeled as Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume.

Table 18 presents the results for the analysis of Warrant 2 – Four-Hour Vehicular Volume.

Table 18
Summary of Warrant 2 – Four-Hour Vehicular Volume

Traffic Scenario	Study Year	No. of Plotted Points That Fall Above the Appropriate Line	Warrant Satisfied?
M-66 & Meijer Driveway			
2024 Build Year	2024	0	**No**
2026 Build Year	2026	7	**Yes**
2029 Design Year	2029	10	**Yes**

14.4. Warrant 3 – Peak Hour

According to the MMUTCD, this warrant "…is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street."

A traffic control signal will be considered if the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same one (1) hour (any four consecutive 15-minute periods) of an average day:

- The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, and;
- The volume on the same minor-street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, and;
- The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four or more approaches.

B. For one hour of an average day, the vehicular volumes fall above the appropriate curve of the graphs labeled as Figure 4C-4. Warrant 3, Peak Hour.

Table 19 presents the results for the analysis of Warrant 3 – Peak-Hour Vehicular Volume.

Table 19
Summary of Warrant 3 – Peak Hour

Traffic Scenario	Study Year	No. of Plotted Points That Fall Above the Appropriate Line	Warrant Satisfied?
M-66 & Meijer Driveway			
2024 Build Year	2024	0	**No**
2026 Build Year	2026	7	**Yes**
2029 Design Year	2029	9	**Yes**

14.5. Traffic Signal Warrant Study Summary

The following summary was generated based upon the findings in the Traffic Signal Warrant Study.

- Warrant 1 – Eight-Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2029 Design Year Traffic Scenario.
- Warrant 2 – Four-Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2026 Build and 2029 Design Year Traffic Scenarios.
- Warrant 3 – Peak Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2026 Build and 2029 Design Year Traffic Scenarios.
- Based on satisfying Warrants 1, 2, and 3, CESO recommends that a signal be installed at the intersection of M-66 and Meijer Driveway upon the completion of Phase II construction.

Detailed Signal Warrant Study calculations are located in Appendix K of the report.

15. Summary of Recommendations

15.1. Recommendations

The following summary of recommendations was generated based upon the findings in the Traffic Impact Study.

2024 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2024 Build Year Traffic Scenario (Responsibility – Gillespie Group):

M-66 and Meijer Driveway/Site Driveway

- Construct Site Driveway connecting to M-66 with two (2) egress lanes (one (1) dedicated left-turn lane and one (1) dedicated through-right lane).

2026 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2026 Build Year Traffic Scenario (Responsibility – Gillespie Group):

M-66 and Meijer Driveway/Site Driveway

- Install a traffic signal. Coordinate signal timing with the traffic signals along M-66 at Tuttle Road and Sprague Road.
- Restripe the existing two-way left-turn lane to show dedicated 150-foot northbound and southbound turn lanes.
- Construct 175' northbound right-turn lane with a 50-foot taper.

2029 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2029 Design Year Traffic Scenario (Responsibility – Gillespie Group):

No improvements are recommended or required.

APPENDIX A
Memorandum of Understanding dated 10/19/23

13060 S. US Highway 27
Suite D
Dewitt, MI 48820
517-622-3000

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cesoinc.com

MEMORANDUM OF UNDERSTANDING

TO: Jason Cole, PE, MDOT Assistant Operations Engineer

CC: Robert Matko, PE, PS, PTOE, CESO Senior Engineering Manager

FROM: David Borja, CESO Project Engineer

DATE: October 19, 2023

SUBJECT: Traffic Impact Study Scope
Multi Use Development
City of Ionia, Ionia County, Michigan

The TIS Scope was prepared based on a conceptual site layout and discussions with MDOT. The site is located on the east side of M-66, just south of the existing Petco Development in the City of Ionia, Ionia County, Michigan.

The site area has both Ionia Township and the City of Ionia land. The two (2) acre area along M-66 is in Ionia Township. The larger portion of land within the site area is considered the City of Ionia property (see image below).

Traffic Study Scope

1. **Conduct weekday (Tuesday – Thursday) peak hour (7:00 – 9:00 am, and 4:00 – 6:00 pm) traffic counts at the following study intersections.**
   (1) M-66 & Tuttle Road (Signal Controlled)
   (2) M-66 & Meijer Middle Driveway (Stop Sign Controlled)
   (3) Tuttle Road & Heartland Blvd. (Stop Sign Controlled)

- Note: Counts will not be taken during inclement weather and during holidays. CESO will contact MDOT of the dates the counts will be performed.
- Traffic Counts will be collected by our sub-consultant (Miovision) and will be video collected for twelve (12) hours.

2. **Inventory the existing roadway system (existing traffic controls, signage, and lane geometry).**

3. **Growth Rates**
   Determine growth rates for each study roadway from historical traffic data. This growth rate will be applied to the 2023 Existing Peak Hour Traffic Volumes to arrive at the 2024 No-Build Traffic Volumes.

4. **2024 No-Build Traffic Volumes**
   Apply growth rate from #3 to the 2023 Existing Peak Hour Traffic Volumes for one (1) year to arrive at 2024 No-Build Traffic Volumes.

5. **Perform capacity analysis (No-Build Year Traffic Scenarios - 2024) at the study intersections during the peak study hours.**
   Perform capacity analyses using procedures documented in the most recent edition of the *Highway Capacity Manual* and using Highway Capacity Software (HCS) Version 8.2 at the key study intersections utilizing 2024 No-Build Year traffic volumes during the study peak hour time periods.

6. Prepare trip generation

Prepare trip generation for the proposed development using the *Institute of Transportation Engineers Trip Generation manual, 11th edition.*

Pass-By/Diverted

Pass-By/Diverted trips will be applied and will be based on percentages found in the ITE Trip Generation Handbook, 3rd Edition.

Table 1
Multi Use Development Weekday Peak Hour Generated Traffic Volumes

ITE Land Use Description	ITE Cat.	Size	Unit	Total Generated Trips										
				Weekday			Weekday AM Peak Hour				Weekday PM Peak Hour			
				Trips			Trips				Trips			
				Tot	In	Out	[A]Tot	In	Out	[B]PB	[A]Tot	In	Out	[B]PB
Strip Retail Plaza (<40k)	822	6,014	S.F.	328	164	164	14	9	5	0	40	20	20	0
ITE Cat. 822 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*60%*	*40%*	[C]*0%*	*100%*	*50%*	*50%*	[C]*0%*
Internal Capture Applied				-------	-------	-------	12	8	5	0	35	17	18	0
Internal Capture Rates				-------	-------	-------	-------	*8%*	*13%*	-------	-------	*13%*	*10%*	-------
Fast-Food Restaurant with Drive-Through Window	934	2,289	S.F.	1,072	536	536	102	27	25	50	76	18	16	42
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	95	24	23	48	50	11	11	28
Internal Capture				-------	-------	-------	-------	*7%*	*7%*	-------	-------	*29%*	*41%*	-------
Fast-Food Restaurant with Drive-Through Window	934	4,500	S.F.	2,104	1,052	1,052	201	52	49	100	149	35	32	82
ITE Cat. 934 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*51%*	*49%*	[C]*50%*	*100%*	*52%*	*48%*	[C]*55%*
Internal Capture Applied				-------	-------	-------	187	47	46	94	97	22	21	54
Internal Capture				-------	-------	-------	-------	*7%*	*7%*	-------	-------	*29%*	*41%*	-------
Shopping Plaza (40 – 150k)	821	123.84	K.S.F.	8,338	4,169	4,169	214	132	82	0	641	189	196	256
ITE Cat. 821 Entering (%)/Exiting (%)				*100%*	*50%*	*50%*	*100%*	*62%*	*38%*	[C]*0%*	*100%*	*49%*	*51%*	[C]*40%*
Internal Capture Applied				-------	-------	-------	192	121	71	0	568	167	173	228
Internal Capture Rates				-------	-------	-------	-------	*8%*	*13%*	-------	-------	*13%*	*10%*	-------
Total (No Internal Capture Applied)				11,842	5,921	5,921	531	220	161	150	906	262	264	380
Total (Internal Capture Subtracted)				-------	-------	-------	486	200	145	142	750	217	223	310
Net Trip Generation Summary				11,842	5,921	5,921	486	200	145	142	750	217	223	310

7. Determine directional distribution of development traffic

The directional distribution site traffic will be based on population and existing traffic patterns within the study area.

Table 2
Directional Distribution of Multi Use Development Generated Traffic Volumes

Route	Distribution Approach/Departure	
	Cars and Trucks	
	AM Peak Hour	PM Peak Hour
Primary Trip Distribution	Primary Cars Percentages	
To/From the East on Tuttle Road	20%/20%	20%/20%
To/From the West on Tuttle Road	20%/20%	20%/20%
To/From the North on State Road	35%/35%	35%/35%
To/From the South on State Road	25%/25%	25%/25%
TOTAL	**100%/100%**	**100%/100%**
Pass-by Trip Distribution	Pass-by Cars Percentages	
To the West from the East on Tuttle Road	20%/20%	20%/20%
To the East from the West on Tuttle Road	20%/20%	20%/20%
To the South from the North on State Road	30%/30%	30%/30%
To the North from the South on State Road	30%/30%	30%/30%
TOTAL	**100%/100%**	**100%/100%**

8. Assign project traffic to surrounding road network.

Based on the traffic projections, the development generated traffic volumes will be assigned to the adjacent street network.

9. 2024 Build Traffic Volumes.

Add the 2024 No-Build Traffic Volumes to the Site Generated Traffic Volumes to arrive at the 2024 Build Traffic Volumes.

10. Perform capacity analysis (Build Traffic Scenario - 2024) at the study intersections during the peak study hours.

Perform capacity analyses using procedures documented in the most recent edition of the *Highway Capacity Manual* and using Highway Capacity Software (HCS) Version 8.2 at the key study intersections utilizing 2024 Build Year traffic volumes during the study peak hour time periods.

11. Perform turn lane warrant/queuing analysis

Perform turn lane warrant/queuing analysis to determine if turn lanes are required at the key study intersections and Site Driveway(s) according to MDOT methodologies.

12. Horizontal Sight Distance Analysis

CESO will conduct a Horizontal Sight Distance Analysis at the proposed driveway(s) according to MDOT's standards.

13. Based on Projected traffic volumes, recommend geometry for the proposed Project.

Based on the projected volumes from the analysis, CESO will recommend the geometry for the proposed Development including turn lane length calculations at the keys study intersections and site driveway(s). A figure showing the conceptual geometry will be included.

According to MDOT, recommendations shall be made in the TIS for the site access points and external roadway improvements (such as additional through lanes, turn lanes, and traffic control devices) necessitated as a result of the proposed development. The traffic impacts of the proposed/planned development must be properly mitigated. Suggested improvements/modifications must be practical and acceptable to the appropriate agency/jurisdiction.

A scaled concept sketch or (at least a schematic figure) shall be provided illustrating the improvements/modifications that properly mitigate the traffic impacts of the proposed development.

14. Traffic Volume Submittal

CESO will submit all volumes including the trip generation summary for MDOT to review prior to commencing with the analysis portion of the study. The following information will be submitted for review and approval in a memorandum type format:

- Location map
- Site Plan
- Original raw traffic counts
- Growth rate documentation or calculations
- Existing, No-Build, and Build Volumes Graphics (For each analysis period)
- Trip Generation worksheets or table
- Site Generated Volume Graphics (with Primary, Pass-by and Diverted Link Trips delineated, for each analysis period)
- Documented assumptions including detailed sources and computations.

15. Prepare a written report summarizing the study process, conclusions, and recommendations

Prepare a detailed report and submit to the ODOT District 3 & the City of Oberlin offices for review and approval.

Report shall the following:

a. Title Page
b. Table of Contents including a list of figures, tables and appendices.
c. Introduction, which includes the description of the project, purpose of the report and executive summary.
d. Proposed development description, including location, land use, and proposed use. This section will also include a regional map, vicinity map and site plan.
e. Description of the study area.
f. Existing conditions, including study site land use, adjacent roadway description and traffic volumes. This section will also include a summary of existing traffic counts, graphic of existing daily and peak hour traffic and roadway condition diagram.
g. Project traffic, including site traffic generation, distribution and assignment and non-site traffic for each time period to be analyzed. Graphics will be included showing the peak hour traffic volumes for each analysis time period and project phase for both the on and off-site traffic.
h. Site traffic and total traffic volumes will be shown for each analysis time period.
i. Traffic analysis showing tabular and graphic result of the analyses.
j. Turn Lane Analysis.
k. Site Access Review.
l. Summary of findings with conclusions and recommendations, including a graphic illustration of the recommendation/conclusion.
m. Appendix including all computer-run data as well as any material related to the traffic study data collection and results.

CESO will submit all analysis files along with the written report.

APPENDIX B
Existing Traffic Count Data and Growth Rate Documentation

M-66 & Tuttle Road - TMC

Tue Oct 3, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113275, Location: 42.951121, -85.074738

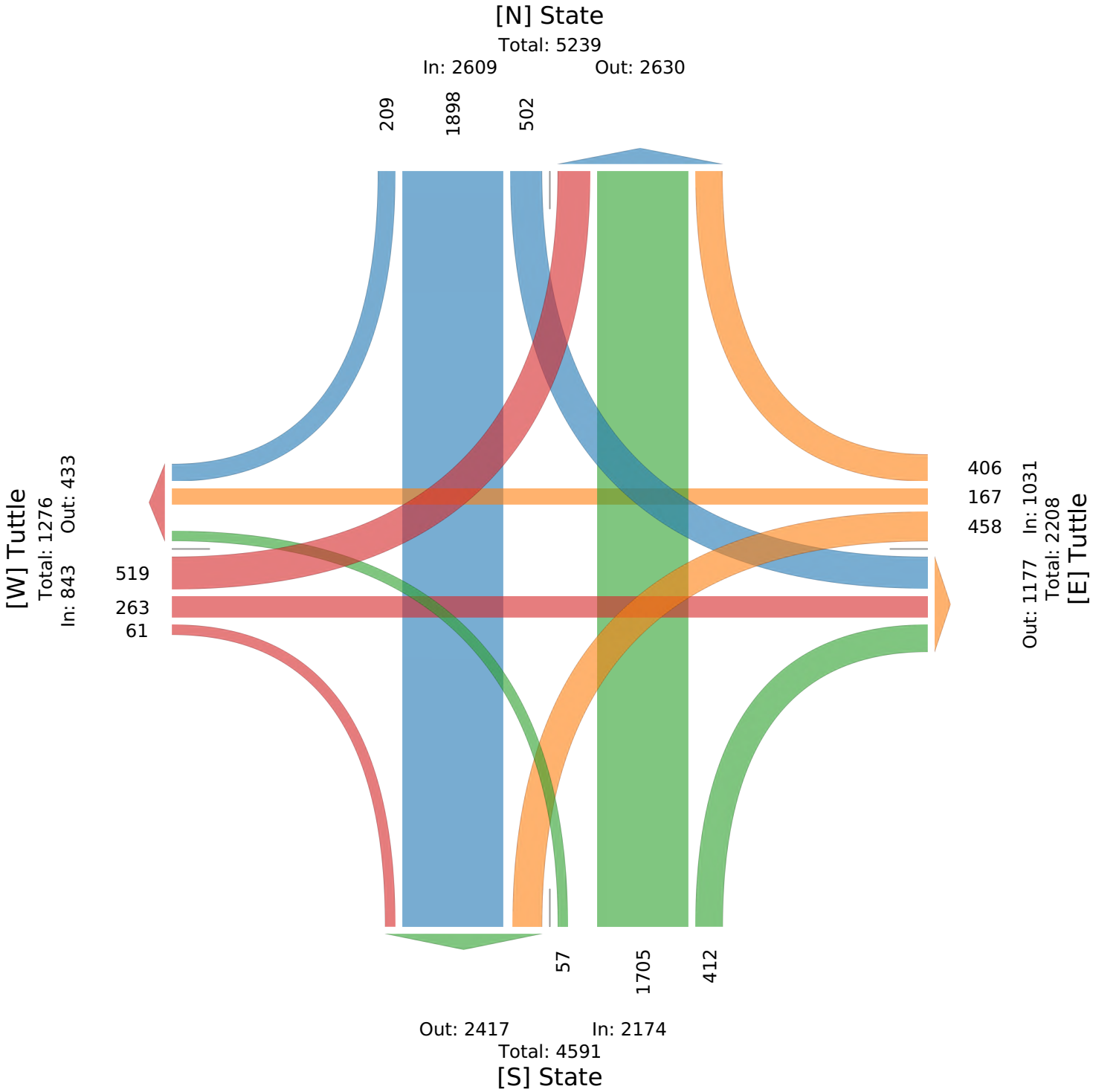
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Tuttle					Tuttle					State					State					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-10-03 7:00AM	4	14	0	0	**18**	22	6	13	0	**41**	2	66	13	0	**81**	51	97	6	0	**154**	**294**
7:15AM	11	18	1	0	**30**	36	9	36	0	**81**	1	70	37	0	**108**	76	88	11	0	**175**	**394**
7:30AM	12	10	4	0	**26**	55	24	70	0	**149**	5	84	23	0	**112**	72	101	11	0	**184**	**471**
7:45AM	17	5	1	0	**23**	24	9	23	0	**56**	4	114	10	0	**128**	18	141	6	0	**165**	**372**
Hourly Total	44	47	6	0	**97**	137	48	142	0	**327**	12	334	83	0	**429**	217	427	34	0	**678**	**1531**
8:00AM	17	14	3	0	**34**	23	6	15	0	**44**	2	73	15	0	**90**	14	93	9	0	**116**	**284**
8:15AM	12	5	1	0	**18**	16	6	20	0	**42**	1	85	9	0	**95**	19	90	9	0	**118**	**273**
8:30AM	18	4	1	0	**23**	17	2	11	0	**30**	0	83	10	0	**93**	11	110	8	0	**129**	**275**
8:45AM	28	3	1	0	**32**	22	5	16	0	**43**	2	74	14	0	**90**	19	114	11	0	**144**	**309**
Hourly Total	75	26	6	0	**107**	78	19	62	0	**159**	5	315	48	0	**368**	63	407	37	0	**507**	**1141**
4:00PM	38	33	6	0	**77**	41	12	30	0	**83**	2	128	29	0	**159**	24	146	33	0	**203**	**522**
4:15PM	55	18	7	0	**80**	33	13	28	0	**74**	8	123	33	0	**164**	24	126	15	0	**165**	**483**
4:30PM	57	30	4	0	**91**	38	13	22	0	**73**	8	142	37	0	**187**	27	148	19	0	**194**	**545**
4:45PM	46	28	8	0	**82**	28	15	22	0	**65**	6	136	43	0	**185**	29	130	14	0	**173**	**505**
Hourly Total	196	109	25	0	**330**	140	53	102	0	**295**	24	529	142	0	**695**	104	550	81	0	**735**	**2055**
5:00PM	55	19	11	0	**85**	22	8	21	0	**51**	3	147	35	0	**185**	36	151	22	0	**209**	**530**
5:15PM	60	26	8	0	**94**	27	15	27	0	**69**	5	129	40	0	**174**	38	138	10	0	**186**	**523**
5:30PM	47	16	3	0	**66**	32	10	30	0	**72**	6	145	23	0	**174**	18	116	17	0	**151**	**463**
5:45PM	42	20	2	0	**64**	22	14	22	0	**58**	2	106	41	0	**149**	26	109	8	0	**143**	**414**
Hourly Total	204	81	24	0	**309**	103	47	100	0	**250**	16	527	139	0	**682**	118	514	57	0	**689**	**1930**
Total	519	263	61	0	**843**	458	167	406	0	**1031**	57	1705	412	0	**2174**	502	1898	209	0	**2609**	**6657**
% Approach	61.6%	31.2%	7.2%	0%	**-**	44.4%	16.2%	39.4%	0%	**-**	2.6%	78.4%	19.0%	0%	**-**	19.2%	72.7%	8.0%	0%	**-**	-
% Total	7.8%	4.0%	0.9%	0%	**12.7%**	6.9%	2.5%	6.1%	0%	**15.5%**	0.9%	25.6%	6.2%	0%	**32.7%**	7.5%	28.5%	3.1%	0%	**39.2%**	-
Lights	510	260	59	0	**829**	449	163	389	0	**1001**	54	1611	403	0	**2068**	465	1805	207	0	**2477**	6375
% Lights	98.3%	98.9%	96.7%	0%	**98.3%**	98.0%	97.6%	95.8%	0%	**97.1%**	94.7%	94.5%	97.8%	0%	**95.1%**	92.6%	95.1%	99.0%	0%	**94.9%**	95.8%
Articulated Trucks and Single-Unit Trucks	5	0	0	0	**5**	6	1	2	0	**9**	2	92	2	0	**96**	3	90	2	0	**95**	205
% Articulated Trucks and Single-Unit Trucks	1.0%	0%	0%	0%	**0.6%**	1.3%	0.6%	0.5%	0%	**0.9%**	3.5%	5.4%	0.5%	0%	**4.4%**	0.6%	4.7%	1.0%	0%	**3.6%**	3.1%
Buses	4	3	2	0	**9**	3	3	15	0	**21**	1	2	7	0	**10**	34	3	0	0	**37**	77
% Buses	0.8%	1.1%	3.3%	0%	**1.1%**	0.7%	1.8%	3.7%	0%	**2.0%**	1.8%	0.1%	1.7%	0%	**0.5%**	6.8%	0.2%	0%	0%	**1.4%**	1.2%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Tuttle Road - TMC
Tue Oct 3, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113275, Location: 42.951121, -85.074738

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-66 & Tuttle Road - TMC

Tue Oct 3, 2023
AM Peak (7 AM - 8 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113275, Location: 42.951121, -85.074738

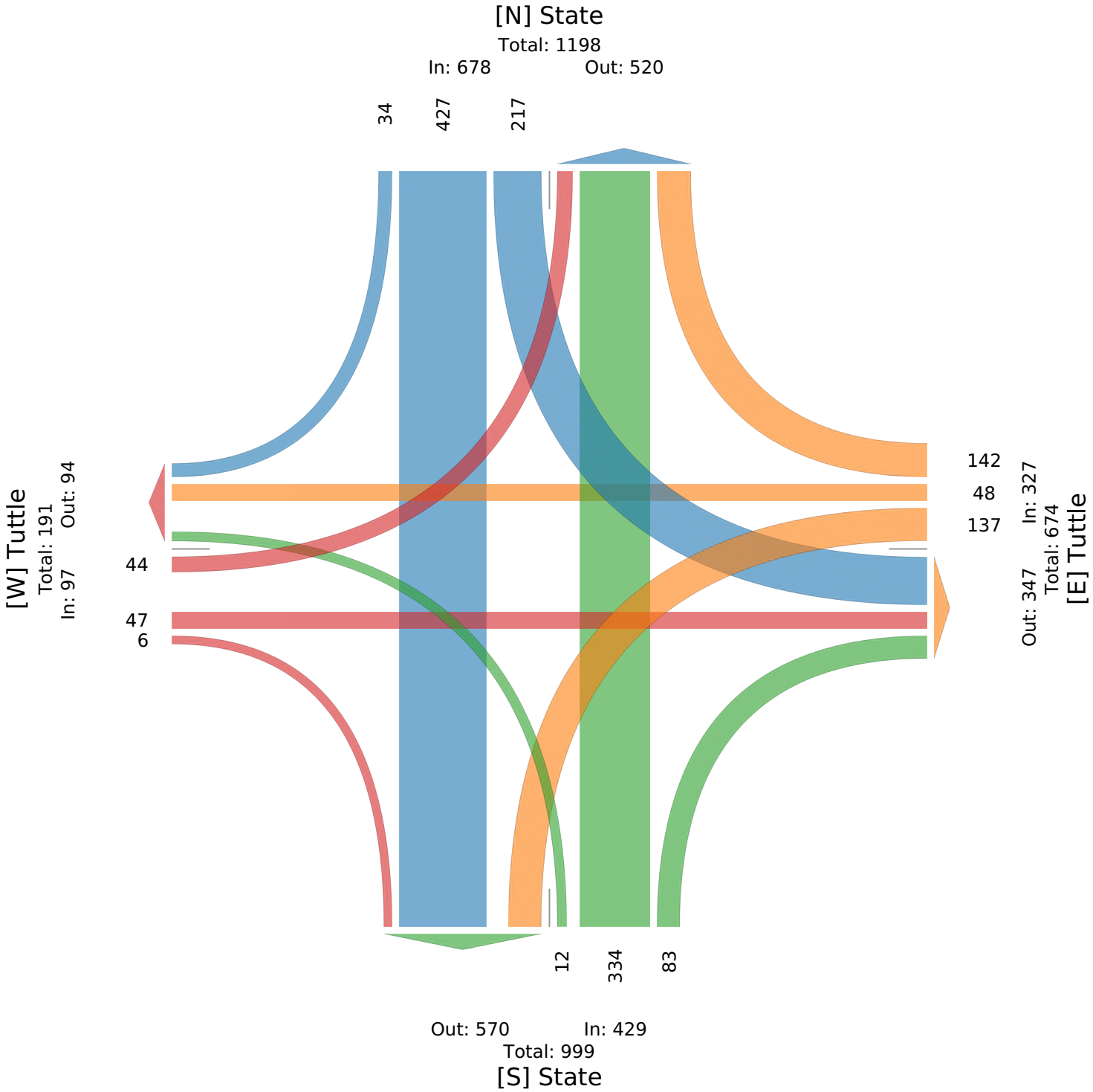
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Tuttle					Tuttle					State					State					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2023-10-03 7:00AM	4	14	0	0	**18**	22	6	13	0	**41**	2	66	13	0	**81**	51	97	6	0	**154**	**294**
7:15AM	11	18	1	0	**30**	36	9	36	0	**81**	1	70	37	0	**108**	76	88	11	0	**175**	**394**
7:30AM	12	10	4	0	**26**	55	24	70	0	**149**	5	84	23	0	**112**	72	101	11	0	**184**	**471**
7:45AM	17	5	1	0	**23**	24	9	23	0	**56**	4	114	10	0	**128**	18	141	6	0	**165**	**372**
Total	44	47	6	0	**97**	137	48	142	0	**327**	12	334	83	0	**429**	217	427	34	0	**678**	**1531**
% Approach	45.4%	48.5%	6.2%	0%	-	41.9%	14.7%	43.4%	0%	-	2.8%	77.9%	19.3%	0%	-	32.0%	63.0%	5.0%	0%	-	-
% Total	2.9%	3.1%	0.4%	0%	**6.3%**	8.9%	3.1%	9.3%	0%	**21.4%**	0.8%	21.8%	5.4%	0%	**28.0%**	14.2%	27.9%	2.2%	0%	**44.3%**	-
PHF	0.647	0.653	0.375	-	**0.808**	0.623	0.500	0.507	-	**0.549**	0.600	0.732	0.561	-	**0.838**	0.714	0.757	0.773	-	**0.921**	0.813
Lights	40	45	6	0	**91**	131	45	133	0	**309**	12	304	79	0	**395**	201	401	34	0	**636**	1431
% Lights	90.9%	95.7%	100%	0%	**93.8%**	95.6%	93.8%	93.7%	0%	**94.5%**	100%	91.0%	95.2%	0%	**92.1%**	92.6%	93.9%	100%	0%	**93.8%**	93.5%
Articulated Trucks and Single-Unit Trucks	3	0	0	0	**3**	3	0	1	0	**4**	0	29	1	0	**30**	1	25	0	0	**26**	63
% Articulated Trucks and Single-Unit Trucks	6.8%	0%	0%	0%	**3.1%**	2.2%	0%	0.7%	0%	**1.2%**	0%	8.7%	1.2%	0%	**7.0%**	0.5%	5.9%	0%	0%	**3.8%**	4.1%
Buses	1	2	0	0	**3**	3	3	8	0	**14**	0	1	3	0	**4**	15	1	0	0	**16**	37
% Buses	2.3%	4.3%	0%	0%	**3.1%**	2.2%	6.3%	5.6%	0%	**4.3%**	0%	0.3%	3.6%	0%	**0.9%**	6.9%	0.2%	0%	0%	**2.4%**	2.4%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Tuttle Road - TMC
Tue Oct 3, 2023
AM Peak (7 AM - 8 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113275, Location: 42.951121, -85.074738

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-66 & Tuttle Road - TMC

Tue Oct 3, 2023
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113275, Location: 42.951121, -85.074738

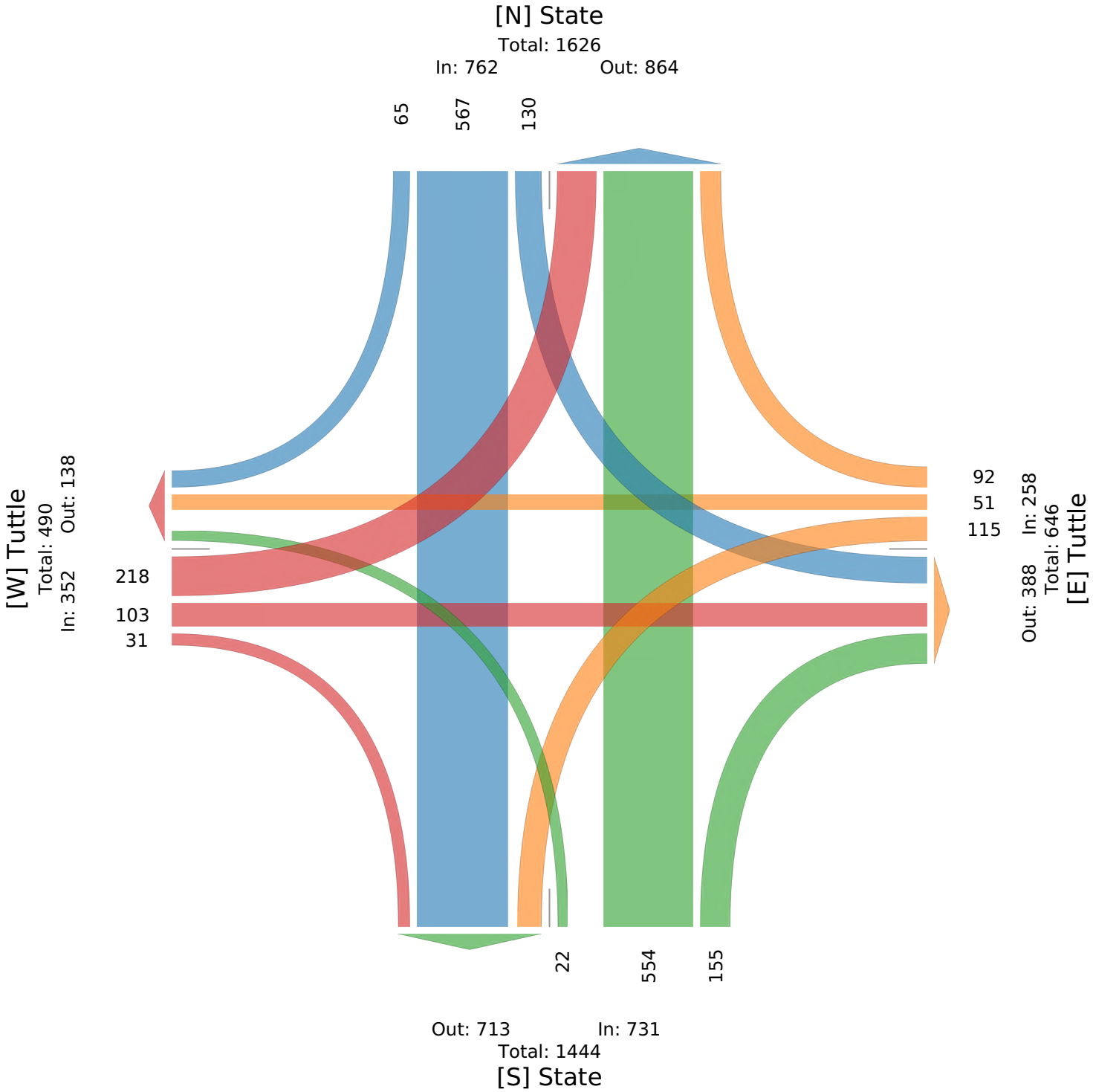
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Tuttle					Tuttle					State					State					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-10-03 4:30PM	57	30	4	0	**91**	38	13	22	0	**73**	8	142	37	0	**187**	27	148	19	0	**194**	**545**
4:45PM	46	28	8	0	**82**	28	15	22	0	**65**	6	136	43	0	**185**	29	130	14	0	**173**	**505**
5:00PM	55	19	11	0	**85**	22	8	21	0	**51**	3	147	35	0	**185**	36	151	22	0	**209**	**530**
5:15PM	60	26	8	0	**94**	27	15	27	0	**69**	5	129	40	0	**174**	38	138	10	0	**186**	**523**
Total	218	103	31	0	**352**	115	51	92	0	**258**	22	554	155	0	**731**	130	567	65	0	**762**	**2103**
% Approach	61.9%	29.3%	8.8%	0%	**-**	44.6%	19.8%	35.7%	0%	**-**	3.0%	75.8%	21.2%	0%	**-**	17.1%	74.4%	8.5%	0%	**-**	-
% Total	10.4%	4.9%	1.5%	0%	**16.7%**	5.5%	2.4%	4.4%	0%	**12.3%**	1.0%	26.3%	7.4%	0%	**34.8%**	6.2%	27.0%	3.1%	0%	**36.2%**	-
PHF	0.908	0.858	0.705	-	**0.936**	0.757	0.850	0.852	-	**0.884**	0.688	0.942	0.901	-	**0.977**	0.855	0.939	0.739	-	**0.911**	0.965
Lights	218	103	31	0	**352**	114	50	92	0	**256**	21	544	153	0	**718**	125	551	64	0	**740**	2066
% Lights	100%	100%	100%	0%	**100%**	99.1%	98.0%	100%	0%	**99.2%**	95.5%	98.2%	98.7%	0%	**98.2%**	96.2%	97.2%	98.5%	0%	**97.1%**	98.2%
Articulated Trucks and Single-Unit Trucks	0	0	0	0	**0**	1	1	0	0	**2**	1	9	0	0	**10**	1	16	1	0	**18**	30
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	0%	**0%**	0.9%	2.0%	0%	0%	**0.8%**	4.5%	1.6%	0%	0%	**1.4%**	0.8%	2.8%	1.5%	0%	**2.4%**	1.4%
Buses	0	0	0	0	**0**	0	0	0	0	**0**	0	1	2	0	**3**	4	0	0	0	**4**	7
% Buses	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0.2%	1.3%	0%	**0.4%**	3.1%	0%	0%	0%	**0.5%**	0.3%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Tuttle Road - TMC
Tue Oct 3, 2023
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113275, Location: 42.951121, -85.074738

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Heart Boulevard & Tuttle Road - TMC

Tue Oct 3, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113276, Location: 42.951121, -85.072888

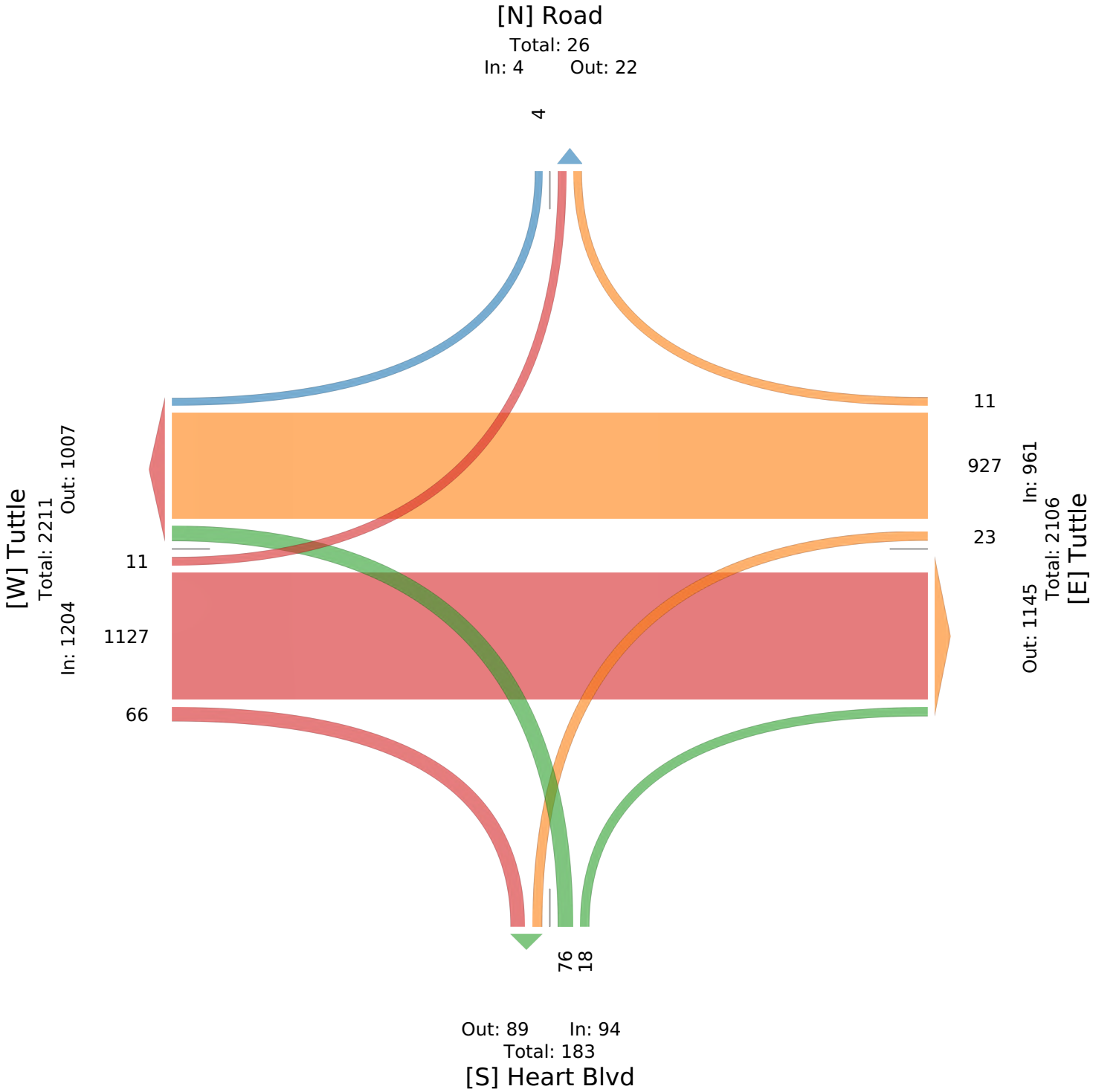
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Tuttle					Tuttle					Heart Blvd					Road					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-10-03 7:00AM	0	78	2	0	**80**	0	41	0	0	**41**	4	0	2	0	**6**	0	0	0	0	**0**	**127**
7:15AM	0	127	5	0	**132**	2	85	0	0	**87**	4	0	1	0	**5**	0	0	1	0	**1**	**225**
7:30AM	0	104	7	0	**111**	2	162	0	0	**164**	5	0	1	0	**6**	0	0	0	0	**0**	**281**
7:45AM	0	26	5	0	**31**	3	50	0	0	**53**	1	0	0	0	**1**	0	0	0	0	**0**	**85**
Hourly Total	0	335	19	0	**354**	7	338	0	0	**345**	14	0	4	0	**18**	0	0	1	0	**1**	**718**
8:00AM	0	37	4	0	**41**	1	35	0	0	**36**	4	0	2	0	**6**	0	0	0	0	**0**	**83**
8:15AM	0	29	1	0	**30**	2	37	0	0	**39**	2	0	0	0	**2**	0	0	0	0	**0**	**71**
8:30AM	0	21	1	0	**22**	1	28	0	0	**29**	2	0	0	0	**2**	0	0	0	0	**0**	**53**
8:45AM	0	36	3	0	**39**	1	29	0	0	**30**	7	0	1	0	**8**	0	0	0	0	**0**	**77**
Hourly Total	0	123	9	0	**132**	5	129	0	0	**134**	15	0	3	0	**18**	0	0	0	0	**0**	**284**
4:00PM	0	88	3	0	**91**	1	72	0	0	**73**	4	0	1	0	**5**	0	0	0	0	**0**	**169**
4:15PM	0	69	3	0	**72**	2	66	0	0	**68**	3	0	0	0	**3**	0	0	0	0	**0**	**143**
4:30PM	0	93	5	0	**98**	0	63	0	0	**63**	12	0	1	0	**13**	0	0	0	0	**0**	**174**
4:45PM	2	103	4	0	**109**	1	56	0	0	**57**	7	0	2	0	**9**	0	0	0	0	**0**	**175**
Hourly Total	2	353	15	0	**370**	4	257	0	0	**261**	26	0	4	0	**30**	0	0	0	0	**0**	**661**
5:00PM	4	82	8	0	**94**	2	48	0	0	**50**	6	0	1	0	**7**	0	0	0	0	**0**	**151**
5:15PM	3	98	4	0	**105**	1	49	6	0	**56**	5	0	1	0	**6**	0	0	3	0	**3**	**170**
5:30PM	2	59	6	0	**67**	3	64	2	0	**69**	3	0	3	0	**6**	0	0	0	0	**0**	**142**
5:45PM	0	77	5	0	**82**	1	42	3	0	**46**	7	0	2	0	**9**	0	0	0	0	**0**	**137**
Hourly Total	9	316	23	0	**348**	7	203	11	0	**221**	21	0	7	0	**28**	0	0	3	0	**3**	**600**
Total	11	1127	66	0	**1204**	23	927	11	0	**961**	76	0	18	0	**94**	0	0	4	0	**4**	**2263**
% Approach	0.9%	93.6%	5.5%	0%	**-**	2.4%	96.5%	1.1%	0%	**-**	80.9%	0%	19.1%	0%	**-**	0%	0%	100%	0%	**-**	-
% Total	0.5%	49.8%	2.9%	0%	**53.2%**	1.0%	41.0%	0.5%	0%	**42.5%**	3.4%	0%	0.8%	0%	**4.2%**	0%	0%	0.2%	0%	**0.2%**	-
Lights	11	1077	66	0	**1154**	22	887	11	0	**920**	76	0	18	0	**94**	0	0	4	0	**4**	2172
% Lights	100%	95.6%	100%	0%	**95.8%**	95.7%	95.7%	100%	0%	**95.7%**	100%	0%	100%	0%	**100%**	0%	0%	100%	0%	**100%**	96.0%
Articulated Trucks and Single-Unit Trucks	0	3	0	0	**3**	0	5	0	0	**5**	0	0	0	0	**0**	0	0	0	0	**0**	8
% Articulated Trucks and Single-Unit Trucks	0%	0.3%	0%	0%	**0.2%**	0%	0.5%	0%	0%	**0.5%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0.4%
Buses	0	47	0	0	**47**	1	35	0	0	**36**	0	0	0	0	**0**	0	0	0	0	**0**	83
% Buses	0%	4.2%	0%	0%	**3.9%**	4.3%	3.8%	0%	0%	**3.7%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	3.7%

*L: Left, R: Right, T: Thru, U: U-Turn

Heart Boulevard & Tuttle Road - TMC
Tue Oct 3, 2023
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113276, Location: 42.951121, -85.072888

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Heart Boulevard & Tuttle Road - TMC

Tue Oct 3, 2023
AM Peak (7 AM - 8 AM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113276, Location: 42.951121, -85.072888

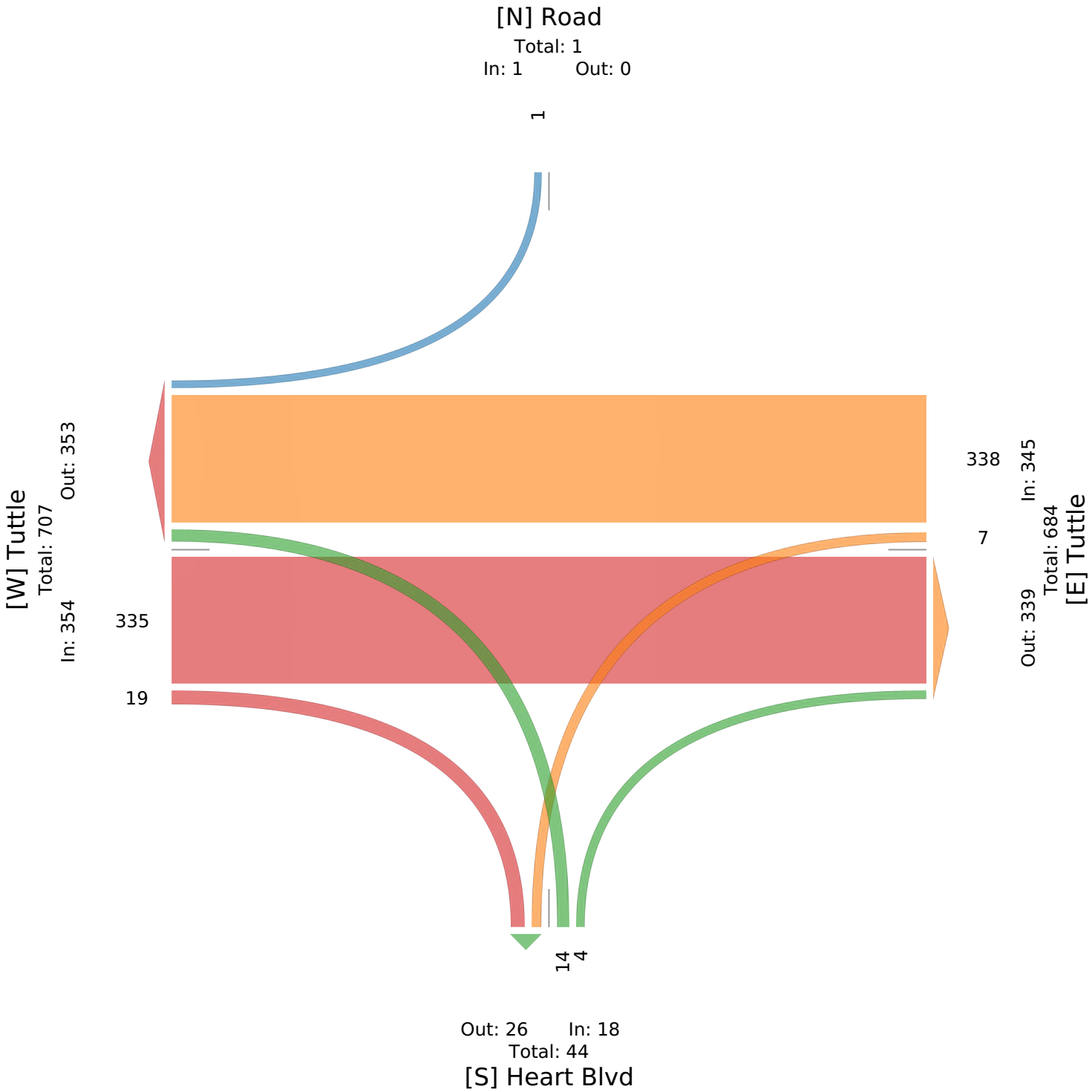
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Tuttle					Tuttle					Heart Blvd					Road					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	L	T	R	U	**App**	**Int**
2023-10-03 7:00AM	0	78	2	0	**80**	0	41	0	0	**41**	4	0	2	0	**6**	0	0	0	0	**0**	**127**
7:15AM	0	127	5	0	**132**	2	85	0	0	**87**	4	0	1	0	**5**	0	0	1	0	**1**	**225**
7:30AM	0	104	7	0	**111**	2	162	0	0	**164**	5	0	1	0	**6**	0	0	0	0	**0**	**281**
7:45AM	0	26	5	0	**31**	3	50	0	0	**53**	1	0	0	0	**1**	0	0	0	0	**0**	**85**
Total	0	335	19	0	**354**	7	338	0	0	**345**	14	0	4	0	**18**	0	0	1	0	**1**	**718**
% Approach	0%	94.6%	5.4%	0%	**-**	2.0%	98.0%	0%	0%	**-**	77.8%	0%	22.2%	0%	**-**	0%	0%	100%	0%	**-**	-
% Total	0%	46.7%	2.6%	0%	**49.3%**	1.0%	47.1%	0%	0%	**48.1%**	1.9%	0%	0.6%	0%	**2.5%**	0%	0%	0.1%	0%	**0.1%**	-
PHF	-	0.659	0.679	-	**0.670**	0.583	0.522	-	-	**0.526**	0.700	-	0.500	-	**0.750**	-	-	0.250	-	**0.250**	0.639
Lights	0	312	19	0	**331**	6	310	0	0	**316**	14	0	4	0	**18**	0	0	1	0	**1**	666
% Lights	0%	93.1%	100%	0%	**93.5%**	85.7%	91.7%	0%	0%	**91.6%**	100%	0%	100%	0%	**100%**	0%	0%	100%	0%	**100%**	92.8%
Articulated Trucks and Single-Unit Trucks	0	1	0	0	**1**	0	4	0	0	**4**	0	0	0	0	**0**	0	0	0	0	**0**	5
% Articulated Trucks and Single-Unit Trucks	0%	0.3%	0%	0%	**0.3%**	0%	1.2%	0%	0%	**1.2%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0.7%
Buses	0	22	0	0	**22**	1	24	0	0	**25**	0	0	0	0	**0**	0	0	0	0	**0**	47
% Buses	0%	6.6%	0%	0%	**6.2%**	14.3%	7.1%	0%	0%	**7.2%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	6.5%

*L: Left, R: Right, T: Thru, U: U-Turn

Heart Boulevard & Tuttle Road - TMC
Tue Oct 3, 2023
AM Peak (7 AM - 8 AM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113276, Location: 42.951121, -85.072888

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Heart Boulevard & Tuttle Road - TMC

Tue Oct 3, 2023
PM Peak (4:30 PM - 5:30 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113276, Location: 42.951121, -85.072888

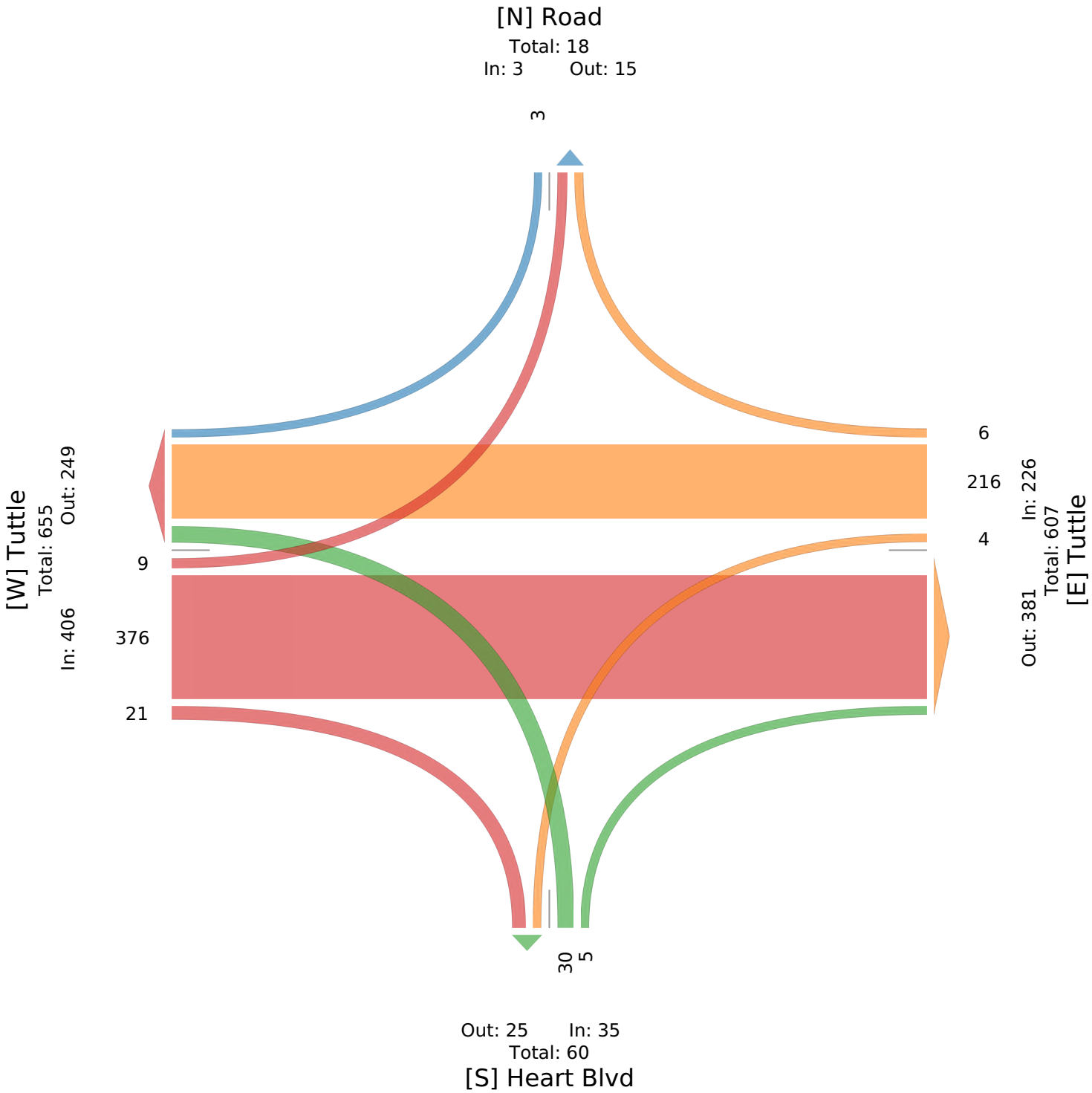
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Tuttle					Tuttle					Heart Blvd					Road					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2023-10-03 4:30PM	0	93	5	0	**98**	0	63	0	0	**63**	12	0	1	0	**13**	0	0	0	0	**0**	**174**
4:45PM	2	103	4	0	**109**	1	56	0	0	**57**	7	0	2	0	**9**	0	0	0	0	**0**	**175**
5:00PM	4	82	8	0	**94**	2	48	0	0	**50**	6	0	1	0	**7**	0	0	0	0	**0**	**151**
5:15PM	3	98	4	0	**105**	1	49	6	0	**56**	5	0	1	0	**6**	0	0	3	0	**3**	**170**
Total	9	376	21	0	**406**	4	216	6	0	**226**	30	0	5	0	**35**	0	0	3	0	**3**	**670**
% Approach	2.2%	92.6%	5.2%	0%	**-**	1.8%	95.6%	2.7%	0%	**-**	85.7%	0%	14.3%	0%	**-**	0%	0%	100%	0%	**-**	-
% Total	1.3%	56.1%	3.1%	0%	**60.6%**	0.6%	32.2%	0.9%	0%	**33.7%**	4.5%	0%	0.7%	0%	**5.2%**	0%	0%	0.4%	0%	**0.4%**	-
PHF	0.563	0.913	0.656	-	**0.931**	0.500	0.857	0.250	-	**0.897**	0.625	-	0.625	-	**0.673**	-	-	0.250	-	**0.250**	0.957
Lights	9	369	21	0	**399**	4	214	6	0	**224**	30	0	5	0	**35**	0	0	3	0	**3**	661
% Lights	100%	98.1%	100%	0%	**98.3%**	100%	99.1%	100%	0%	**99.1%**	100%	0%	100%	0%	**100%**	0%	0%	100%	0%	**100%**	98.7%
Articulated Trucks and Single-Unit Trucks	0	1	0	0	**1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	1
% Articulated Trucks and Single-Unit Trucks	0%	0.3%	0%	0%	**0.2%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0.1%
Buses	0	6	0	0	**6**	0	2	0	0	**2**	0	0	0	0	**0**	0	0	0	0	**0**	8
% Buses	0%	1.6%	0%	0%	**1.5%**	0%	0.9%	0%	0%	**0.9%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	1.2%

*L: Left, R: Right, T: Thru, U: U-Turn

Heart Boulevard & Tuttle Road - TMC
Tue Oct 3, 2023
PM Peak (4:30 PM - 5:30 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1113276, Location: 42.951121, -85.072888

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-66 & Meijer Driveway - TMC

Tue Oct 3, 2023
Full Length (9 AM-10 AM, 11 AM-4 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

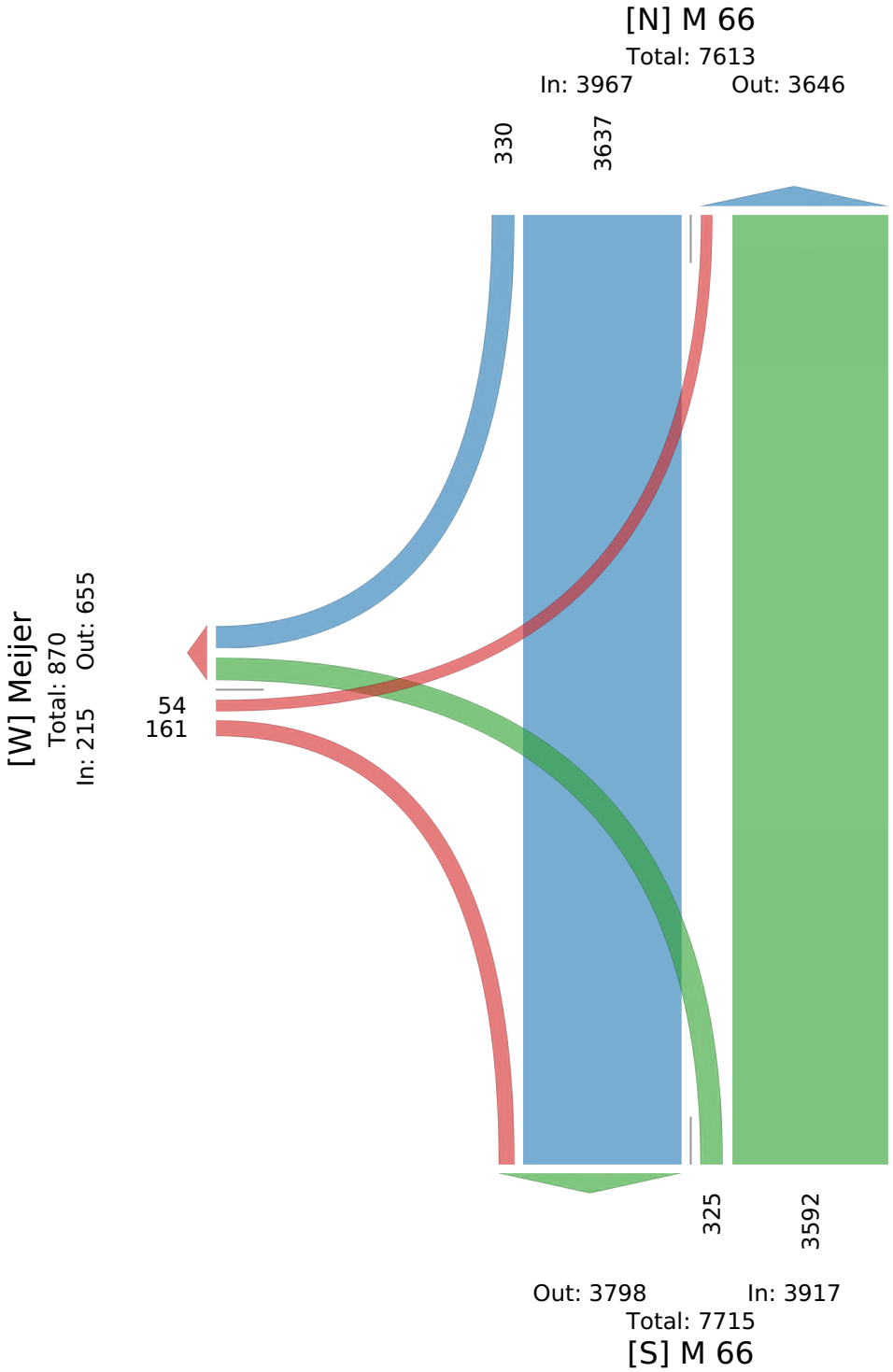
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Meijer				M 66				M 66				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	App	L	T	U	App	T	R	U	App	Int
2023-10-03 9:00AM	2	5	0	**7**	9	93	0	**102**	106	28	0	**134**	**243**
9:15AM	0	8	0	**8**	8	113	0	**121**	94	14	0	**108**	**237**
9:30AM	4	2	0	**6**	16	119	0	**135**	112	20	0	**132**	**273**
9:45AM	3	6	0	**9**	11	116	0	**127**	133	16	0	**149**	**285**
Hourly Total	9	21	0	**30**	44	441	0	**485**	445	78	0	**523**	**1038**
11:00AM	0	7	0	**7**	9	132	0	**141**	146	11	0	**157**	**305**
11:15AM	4	8	0	**12**	13	134	0	**147**	147	14	0	**161**	**320**
11:30AM	2	9	0	**11**	15	147	0	**162**	138	4	0	**142**	**315**
11:45AM	2	6	0	**8**	12	153	0	**165**	144	21	0	**165**	**338**
Hourly Total	8	30	0	**38**	49	566	0	**615**	575	50	0	**625**	**1278**
12:00PM	0	6	0	**6**	22	163	0	**185**	166	17	0	**183**	**374**
12:15PM	5	9	0	**14**	12	141	0	**153**	158	13	0	**171**	**338**
12:30PM	2	5	0	**7**	9	175	0	**184**	163	13	0	**176**	**367**
12:45PM	3	3	0	**6**	13	143	0	**156**	170	14	0	**184**	**346**
Hourly Total	10	23	0	**33**	56	622	0	**678**	657	57	0	**714**	**1425**
1:00PM	4	4	0	**8**	12	143	0	**155**	181	10	0	**191**	**354**
1:15PM	2	8	0	**10**	14	143	0	**157**	187	18	0	**205**	**372**
1:30PM	3	8	0	**11**	12	171	0	**183**	138	12	0	**150**	**344**
1:45PM	4	7	0	**11**	18	155	0	**173**	139	8	0	**147**	**331**
Hourly Total	13	27	0	**40**	56	612	0	**668**	645	48	0	**693**	**1401**
2:00PM	1	8	0	**9**	8	164	0	**172**	187	13	0	**200**	**381**
2:15PM	0	9	0	**9**	19	145	0	**164**	167	15	0	**182**	**355**
2:30PM	1	5	0	**6**	18	176	0	**194**	164	15	0	**179**	**379**
2:45PM	2	8	0	**10**	9	171	0	**180**	173	13	0	**186**	**376**
Hourly Total	4	30	0	**34**	54	656	0	**710**	691	56	0	**747**	**1491**
3:00PM	4	6	0	**10**	14	182	0	**196**	146	14	0	**160**	**366**
3:15PM	2	8	0	**10**	19	141	0	**160**	173	14	0	**187**	**357**
3:30PM	2	7	0	**9**	14	180	0	**194**	148	5	0	**153**	**356**
3:45PM	2	9	0	**11**	19	192	0	**211**	157	8	0	**165**	**387**
Hourly Total	10	30	0	**40**	66	695	0	**761**	624	41	0	**665**	**1466**
Total	54	161	0	**215**	325	3592	0	**3917**	3637	330	0	**3967**	**8099**
% Approach	25.1%	74.9%	0%	**-**	8.3%	91.7%	0%	**-**	91.7%	8.3%	0%	**-**	-
% Total	0.7%	2.0%	0%	**2.7%**	4.0%	44.4%	0%	**48.4%**	44.9%	4.1%	0%	**49.0%**	-
Lights	54	161	0	**215**	324	3348	0	**3672**	3418	329	0	**3747**	7634
% Lights	100%	100%	0%	**100%**	99.7%	93.2%	0%	**93.7%**	94.0%	99.7%	0%	**94.5%**	94.3%
Articulated Trucks and Single-Unit Trucks	0	0	0	**0**	1	226	0	**227**	207	1	0	**208**	435
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	**0%**	0.3%	6.3%	0%	**5.8%**	5.7%	0.3%	0%	**5.2%**	5.4%
Buses	0	0	0	**0**	0	18	0	**18**	12	0	0	**12**	30
% Buses	0%	0%	0%	**0%**	0%	0.5%	0%	**0.5%**	0.3%	0%	0%	**0.3%**	0.4%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Meijer Driveway - TMC
Tue Oct 3, 2023
Full Length (9 AM-10 AM, 11 AM-4 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-66 & Meijer Driveway - TMC

Tue Oct 3, 2023
AM Peak (9 AM - 10 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

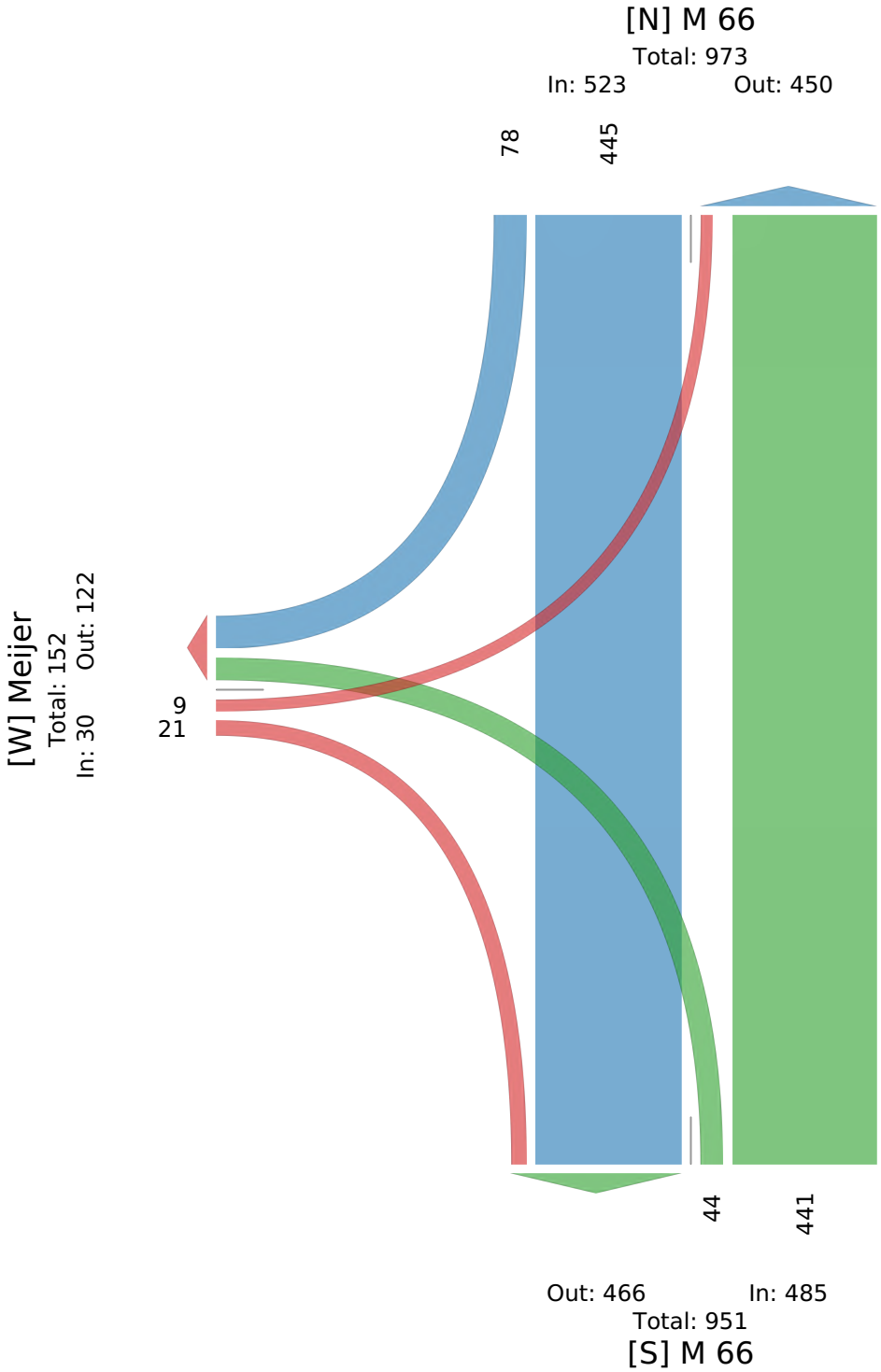
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Meijer				M 66				M 66				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2023-10-03 9:00AM	2	5	0	**7**	9	93	0	**102**	106	28	0	**134**	**243**
9:15AM	0	8	0	**8**	8	113	0	**121**	94	14	0	**108**	**237**
9:30AM	4	2	0	**6**	16	119	0	**135**	112	20	0	**132**	**273**
9:45AM	3	6	0	**9**	11	116	0	**127**	133	16	0	**149**	**285**
Total	9	21	0	**30**	44	441	0	**485**	445	78	0	**523**	**1038**
% Approach	30.0%	70.0%	0%	**-**	9.1%	90.9%	0%	**-**	85.1%	14.9%	0%	**-**	-
% Total	0.9%	2.0%	0%	**2.9%**	4.2%	42.5%	0%	**46.7%**	42.9%	7.5%	0%	**50.4%**	-
PHF	0.563	0.656	-	**0.833**	0.688	0.926	-	**0.898**	0.836	0.696	-	**0.878**	0.911
Lights	9	21	0	**30**	44	402	0	**446**	426	78	0	**504**	980
% Lights	100%	100%	0%	**100%**	100%	91.2%	0%	**92.0%**	95.7%	100%	0%	**96.4%**	94.4%
Articulated Trucks and Single-Unit Trucks	0	0	0	**0**	0	37	0	**37**	19	0	0	**19**	56
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	**0%**	0%	8.4%	0%	**7.6%**	4.3%	0%	0%	**3.6%**	5.4%
Buses	0	0	0	**0**	0	2	0	**2**	0	0	0	**0**	2
% Buses	0%	0%	0%	**0%**	0%	0.5%	0%	**0.4%**	0%	0%	0%	**0%**	0.2%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Meijer Driveway - TMC
Tue Oct 3, 2023
AM Peak (9 AM - 10 AM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-66 & Meijer Driveway - TMC

Tue Oct 3, 2023
Midday Peak (12:30 PM - 1:30 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

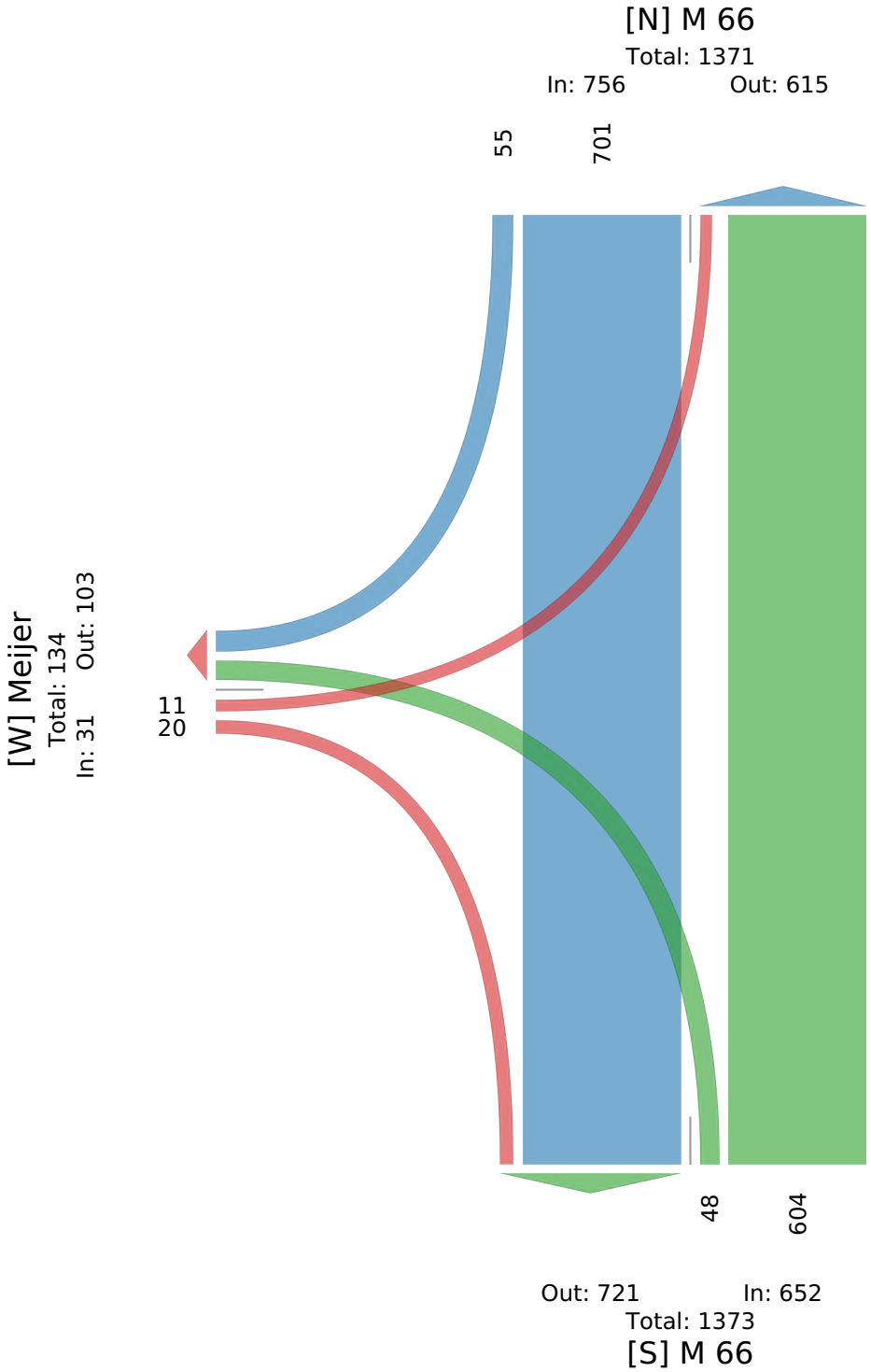
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Meijer				M 66				M 66				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2023-10-03 12:30PM	2	5	0	**7**	9	175	0	**184**	163	13	0	**176**	**367**
12:45PM	3	3	0	**6**	13	143	0	**156**	170	14	0	**184**	**346**
1:00PM	4	4	0	**8**	12	143	0	**155**	181	10	0	**191**	**354**
1:15PM	2	8	0	**10**	14	143	0	**157**	187	18	0	**205**	**372**
Total	11	20	0	**31**	48	604	0	**652**	701	55	0	**756**	**1439**
% Approach	35.5%	64.5%	0%	**-**	7.4%	92.6%	0%	**-**	92.7%	7.3%	0%	**-**	-
% Total	0.8%	1.4%	0%	**2.2%**	3.3%	42.0%	0%	**45.3%**	48.7%	3.8%	0%	**52.5%**	-
PHF	0.688	0.625	-	**0.775**	0.857	0.863	-	**0.886**	0.937	0.764	-	**0.922**	0.967
Lights	11	20	0	**31**	48	559	0	**607**	660	55	0	**715**	1353
% Lights	100%	100%	0%	**100%**	100%	92.5%	0%	**93.1%**	94.2%	100%	0%	**94.6%**	94.0%
Articulated Trucks and Single-Unit Trucks	0	0	0	**0**	0	42	0	**42**	41	0	0	**41**	83
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	**0%**	0%	7.0%	0%	**6.4%**	5.8%	0%	0%	**5.4%**	5.8%
Buses	0	0	0	**0**	0	3	0	**3**	0	0	0	**0**	3
% Buses	0%	0%	0%	**0%**	0%	0.5%	0%	**0.5%**	0%	0%	0%	**0%**	0.2%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Meijer Driveway - TMC
Tue Oct 3, 2023
Midday Peak (12:30 PM - 1:30 PM)
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



M-66 & Meijer Driveway - TMC

Tue Oct 3, 2023
PM Peak (2 PM - 3 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

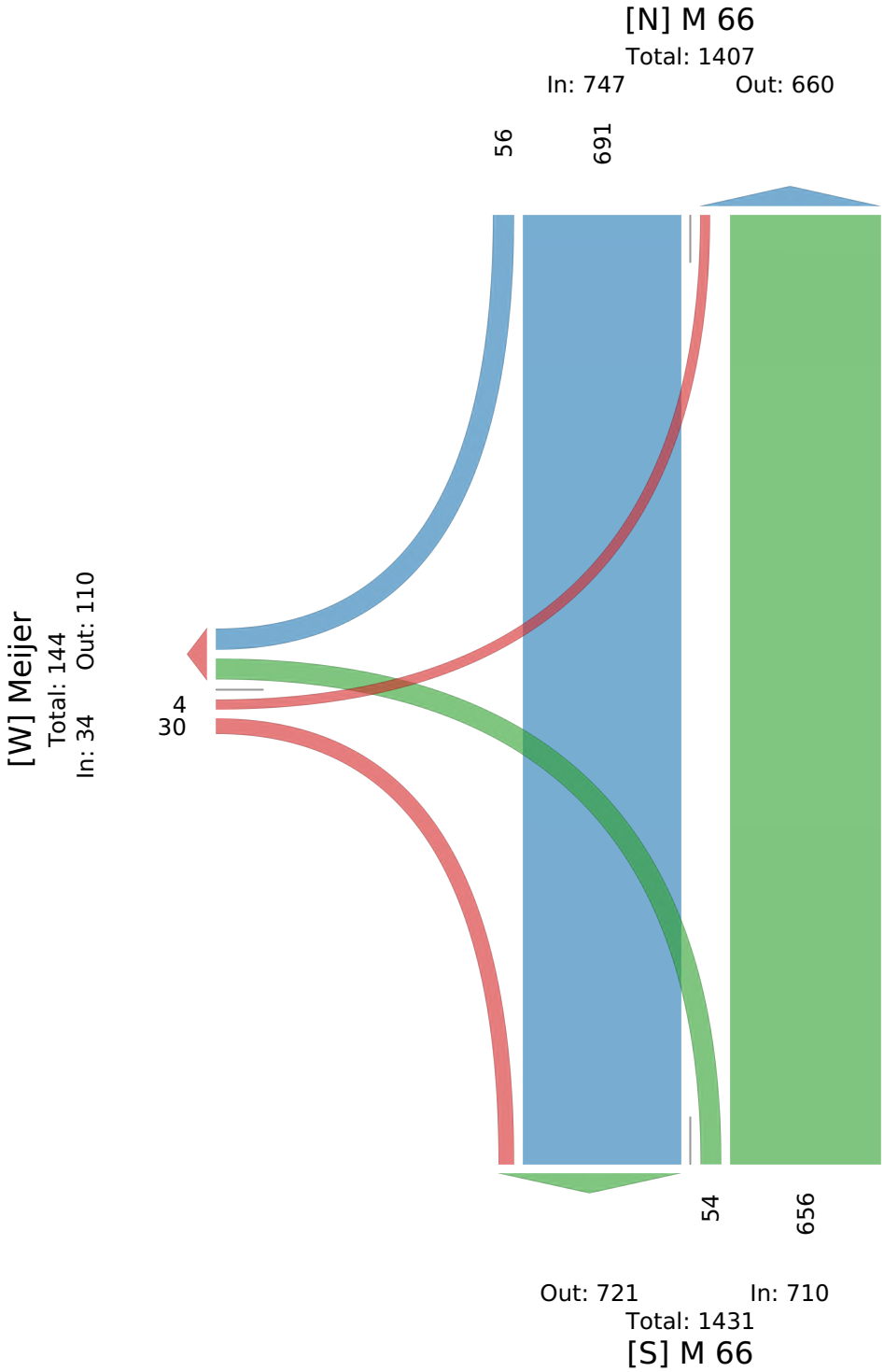
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Meijer				M 66				M 66				
Direction	Eastbound				Northbound				Southbound				
Time	L	R	U	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2023-10-03 2:00PM	1	8	0	**9**	8	164	0	**172**	187	13	0	**200**	**381**
2:15PM	0	9	0	**9**	19	145	0	**164**	167	15	0	**182**	**355**
2:30PM	1	5	0	**6**	18	176	0	**194**	164	15	0	**179**	**379**
2:45PM	2	8	0	**10**	9	171	0	**180**	173	13	0	**186**	**376**
Total	4	30	0	**34**	54	656	0	**710**	691	56	0	**747**	**1491**
% Approach	11.8%	88.2%	0%	**-**	7.6%	92.4%	0%	**-**	92.5%	7.5%	0%	**-**	-
% Total	0.3%	2.0%	0%	**2.3%**	3.6%	44.0%	0%	**47.6%**	46.3%	3.8%	0%	**50.1%**	-
PHF	0.500	0.833	-	**0.850**	0.711	0.932	-	**0.915**	0.924	0.933	-	**0.934**	0.978
Lights	4	30	0	**34**	54	618	0	**672**	649	56	0	**705**	1411
% Lights	100%	100%	0%	**100%**	100%	94.2%	0%	**94.6%**	93.9%	100%	0%	**94.4%**	94.6%
Articulated Trucks and Single-Unit Trucks	0	0	0	**0**	0	35	0	**35**	35	0	0	**35**	70
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	**0%**	0%	5.3%	0%	**4.9%**	5.1%	0%	0%	**4.7%**	4.7%
Buses	0	0	0	**0**	0	3	0	**3**	7	0	0	**7**	10
% Buses	0%	0%	0%	**0%**	0%	0.5%	0%	**0.4%**	1.0%	0%	0%	**0.9%**	0.7%

*L: Left, R: Right, T: Thru, U: U-Turn

M-66 & Meijer Driveway - TMC
Tue Oct 3, 2023
PM Peak (2 PM - 3 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses)
All Movements
ID: 1144909, Location: 42.946849, -85.074733

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



From: Cole, Jason (MDOT) <ColeJ@michigan.gov>
Sent: Monday, October 30, 2023 4:31 PM
To: Robert Matko
Cc: Jason Kildea; David Borja; Keen, Kerwin (MDOT)
Subject: RE: Ionia, MI Proposed Site

Caution: External Email

Robert,

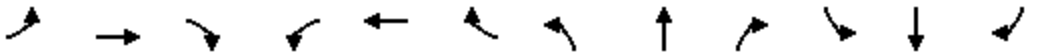
After talking with our Planning Unit in Lansing, their projections for traffic growth in this area is 0.5%/year. Please compare that to the rate you get between your counts and the historical counts in the area.

Thanks,

Jason E. Cole, P.E.
Assistant Operations Engineer

Michigan Dept. of Transportation
Grand Rapids TSC
2660 Leonard St NE
Grand Rapids, MI 49525
(616) 295-2132
ColeJ@michigan.gov

APPENDIX C
2024 No-Build Traffic Scenario
Capacity Analysis Summary Sheets

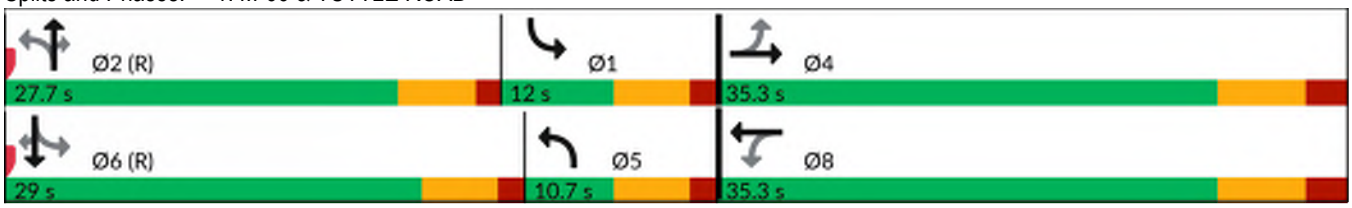


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	47	6	138	48	143	12	336	83	218	429	34
Future Volume (vph)	44	47	6	138	48	143	12	336	83	218	429	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.887				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1817	0	1736	1594	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.545			0.715			0.328			0.407		
Satd. Flow (perm)	950	1817	0	1306	1594	0	611	1759	1553	723	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			177				145			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	54	58	7	170	59	177	15	415	102	269	530	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	65	0	170	236	0	15	415	102	269	530	42
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	12.0	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	36.9%	36.9%	16.0%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	22.0	22.0	6.3	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	15.4	15.4		15.4	15.4		39.6	34.6	34.6	45.7	44.4	44.4
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.53	0.46	0.46	0.61	0.59	0.59
v/c Ratio	0.27	0.17		0.63	0.50		0.03	0.51	0.12	0.51	0.49	0.04
Control Delay (s/veh)	26.5	21.1		36.9	10.9		7.2	17.5	1.1	15.6	13.8	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	26.5	21.1		36.9	10.9		7.2	17.5	1.1	15.6	13.8	0.0
LOS	C	C		D	B		A	B	A	B	B	A
Approach Delay (s/veh)		23.6			21.8			14.1			13.7	
Approach LOS		C			C			B			B	

Intersection Summary		
Area Type:	Other	
Cycle Length: 75		
Actuated Cycle Length: 75		
Offset: 40 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 80		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.63		
Intersection Signal Delay (s/veh): 16.2	Intersection LOS: B	
Intersection Capacity Utilization 66.9%	ICU Level of Service C	
Analysis Period (min) 15		

Splits and Phases: 1: M-66 & TUTTLE ROAD



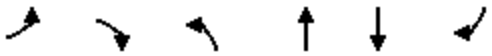
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	47	6	138	48	143	12	336	83	218	429	34
Future Volume (veh/h)	44	47	6	138	48	143	12	336	83	218	429	34
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	54	58	7	170	59	177	15	415	102	269	530	42
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	182	349	42	340	86	259	507	523	458	578	567	492
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.23	0.29	0.29	0.24	0.31	0.31
Sat Flow, veh/h	1081	1624	196	1315	402	1207	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	54	0	65	170	0	236	15	415	102	269	530	42
Grp Sat Flow(s),veh/h/ln	1081	0	1820	1315	0	1609	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	3.6	0.0	2.2	9.1	0.0	10.1	0.0	16.1	3.7	2.1	21.1	1.4
Cycle Q Clear(g_c), s	13.8	0.0	2.2	11.2	0.0	10.1	0.0	16.1	3.7	2.1	21.1	1.4
Prop In Lane	1.00		0.11	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	182	0	391	340	0	345	507	523	458	578	567	492
V/C Ratio(X)	0.30	0.00	0.17	0.50	0.00	0.68	0.03	0.79	0.22	0.47	0.93	0.09
Avail Cap(c_a), veh/h	354	0	680	549	0	601	507	523	458	578	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	24.0	28.6	0.0	27.1	22.2	24.4	20.0	20.9	25.1	18.3
Incr Delay (d2), s/veh	0.9	0.0	0.2	1.1	0.0	2.4	0.0	11.8	1.1	0.6	24.6	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	1.0	0.0	0.9	2.8	0.0	3.9	0.2	7.8	1.4	3.4	11.9	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.3	0.0	24.2	29.7	0.0	29.5	22.3	36.2	21.2	21.5	49.7	18.6
LnGrp LOS	C		C	C		C	C	D	C	C	D	B
Approach Vol, veh/h		119			406			532			841	
Approach Delay, s/veh		28.8			29.6			32.9			39.2	
Approach LOS		C			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	23.9	27.7		23.4	22.6	29.0		23.4				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 6.3	* 22		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	4.1	18.1		15.8	2.0	23.1		13.2				
Green Ext Time (p_c), s	0.2	1.0		0.3	0.0	0.1		1.7				

Intersection Summary		
HCM 7th Control Delay, s/veh	34.7	
HCM 7th LOS	C	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	14	32	452	469	73
Future Volume (vph)	5	14	32	452	469	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85	0	100			115
Storage Lanes	1	0	1			0
Taper Length (ft)	65		60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1417	1770	1759	1792	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1417	1770	1759	1792	1583
Link Speed (mph)	30			45	45	
Link Distance (ft)	311			1828	1569	
Travel Time (s)	7.1			27.7	23.8	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	14%	2%	8%	6%	2%
Adj. Flow (vph)	6	17	38	538	558	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	6	17	38	538	558	87
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

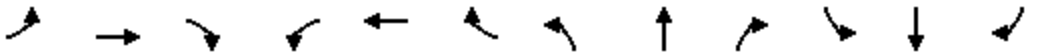
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	14	32	452	469	73
Future Vol, veh/h	5	14	32	452	469	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	6	17	38	538	558	87

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1173	558	645	0	-	0
Stage 1	558	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	212	507	940	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	204	507	940	-	-	-
Mov Cap-2 Maneuver	342	-	-	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	540	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	13.24	0.59	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	940	-	342	507	-	-
HCM Lane V/C Ratio	0.041	-	0.017	0.033	-	-
HCM Control Delay (s/veh)	9	-	15.7	12.3	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	337	19	7	340	0	14	0	4	0	0	1
Future Volume (vph)	0	337	19	7	340	0	14	0	4	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	481	27	10	486	0	20	0	6	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	508	0	10	486	0	0	20	6	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.6%		ICU Level of Service A	
Analysis Period (min) 15			

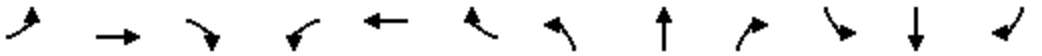
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	337	19	7	340	0	14	0	4	0	0	1
Future Vol, veh/h	0	337	19	7	340	0	14	0	4	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	481	27	10	486	0	20	0	6	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	486	0	0	509	0	0	1001	1001	495	987	1014	486
Stage 1	-	-	-	-	-	-	495	495	-	506	506	-
Stage 2	-	-	-	-	-	-	506	506	-	481	509	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1077	-	-	1056	-	-	222	243	575	226	238	582
Stage 1	-	-	-	-	-	-	556	546	-	549	540	-
Stage 2	-	-	-	-	-	-	549	540	-	566	538	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1077	-	-	1056	-	-	219	241	575	222	236	582
Mov Cap-2 Maneuver	-	-	-	-	-	-	219	241	-	222	236	-
Stage 1	-	-	-	-	-	-	556	546	-	544	535	-
Stage 2	-	-	-	-	-	-	542	535	-	560	538	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.17	20.47	11.21
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	219	575	1077	-	-	1056	-	-	582
HCM Lane V/C Ratio	0.091	0.01	-	-	-	0.009	-	-	0.002
HCM Control Delay (s/veh)	23.1	11.3	0	-	-	8.4	-	-	11.2
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	0	-	-	0	-	-	0

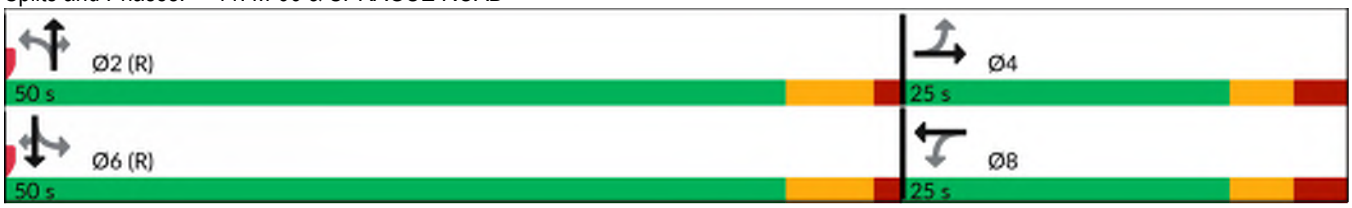


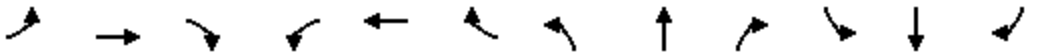
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1	4	6	0	4	19	462	13	33	441	17
Future Volume (vph)	7	1	4	6	0	4	19	462	13	33	441	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.490			0.479		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	904	1845	1568	884	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			357				52			52
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	8	1	4	7	0	4	21	502	14	36	479	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	5	0	7	4	0	21	502	14	36	479	18
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	18.4	18.4		18.4	18.4		43.6	43.6	43.6	43.6	43.6	43.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.1	6.1		6.1	6.1		71.0	71.0	71.0	71.0	71.0	71.0
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.95	0.95	0.95	0.95	0.95	0.95
v/c Ratio	0.05	0.03		0.04	0.00		0.02	0.28	0.00	0.04	0.27	0.01
Control Delay (s/veh)	32.1	23.0		32.0	0.0		1.4	1.6	0.0	0.2	0.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.1	23.0		32.0	0.0		1.4	1.6	0.0	0.2	0.4	0.0
LOS	C	C		C	A		A	A	A	A	A	A
Approach Delay (s/veh)		28.6			20.4			1.6			0.4	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 72 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.29			
Intersection Signal Delay (s/veh): 1.5		Intersection LOS: A	
Intersection Capacity Utilization 44.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1	4	6	0	4	19	462	13	33	441	17
Future Volume (veh/h)	7	1	4	6	0	4	19	462	13	33	441	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	8	1	4	7	0	4	21	502	14	36	479	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	129	9	34	129	0	41	749	1485	1259	734	1485	1259
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.80	0.80	0.80	0.80	0.80	0.80
Sat Flow, veh/h	1401	324	1298	1400	0	1572	893	1856	1572	878	1856	1572
Grp Volume(v), veh/h	8	0	5	7	0	4	21	502	14	36	479	18
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	893	1856	1572	878	1856	1572
Q Serve(g_s), s	0.4	0.0	0.2	0.4	0.0	0.2	0.5	5.6	0.1	0.9	5.2	0.2
Cycle Q Clear(g_c), s	0.6	0.0	0.2	0.6	0.0	0.2	5.7	5.6	0.1	6.4	5.2	0.2
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	0	43	129	0	41	749	1485	1259	734	1485	1259
V/C Ratio(X)	0.06	0.00	0.12	0.05	0.00	0.10	0.03	0.34	0.01	0.05	0.32	0.01
Avail Cap(c_a), veh/h	436	0	398	435	0	386	749	1485	1259	734	1485	1259
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	35.7	36.0	0.0	35.6	2.8	2.0	1.5	2.9	2.0	1.5
Incr Delay (d2), s/veh	0.2	0.0	1.2	0.2	0.0	1.0	0.1	0.6	0.0	0.1	0.6	0.0
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	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.7	0.0	0.1	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.1	0.0	36.9	36.1	0.0	36.7	2.8	2.7	1.5	3.1	2.6	1.5
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		13			11			537			533	
Approach Delay, s/veh		36.4			36.3			2.6			2.6	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		66.4		8.6		66.4		8.6				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		43.6		18.4		43.6		18.4				
Max Q Clear Time (g_c+I1), s		7.7		2.6		8.4		2.6				
Green Ext Time (p_c), s		3.3		0.0		3.2		0.0				

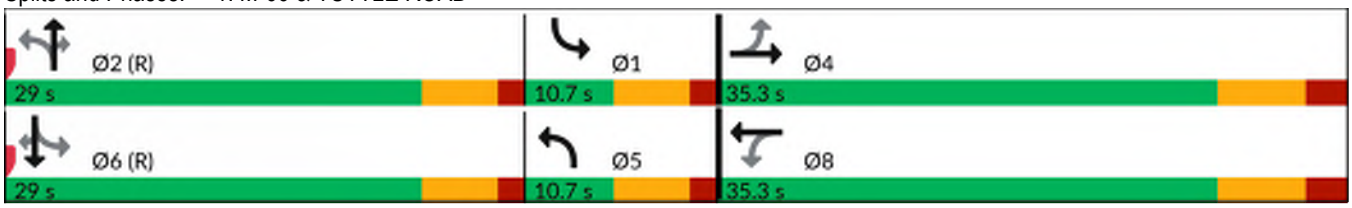
Intersection Summary												
HCM 7th Control Delay, s/veh			3.4									
HCM 7th LOS			A									

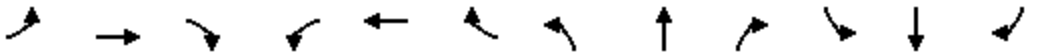
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	219	104	31	116	51	92	22	557	156	131	570	66
Future Volume (vph)	219	104	31	116	51	92	22	557	156	131	570	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.965			0.904				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1784	0	1736	1626	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.663			0.668			0.221			0.230		
Satd. Flow (perm)	1156	1784	0	1220	1626	0	412	1759	1553	408	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			95				161			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	226	107	32	120	53	95	23	574	161	135	588	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	226	139	0	120	148	0	23	574	161	135	588	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	29.0	29.0	10.7	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	38.7%	38.7%	14.3%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	23.3	23.3	5.0	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	19.9	19.9		19.9	19.9		36.4	31.4	31.4	39.9	37.9	37.9
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.49	0.42	0.42	0.53	0.51	0.51
v/c Ratio	0.73	0.28		0.37	0.29		0.07	0.77	0.21	0.44	0.64	0.07
Control Delay (s/veh)	38.8	17.7		23.9	9.3		9.5	27.8	2.6	20.9	22.9	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.8	17.7		23.9	9.3		9.5	27.8	2.6	20.9	22.9	0.1
LOS	D	B		C	A		A	C	A	C	C	A
Approach Delay (s/veh)		30.8			15.9			21.9			20.7	
Approach LOS		C			B			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 66 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay (s/veh): 22.2		Intersection LOS: C	
Intersection Capacity Utilization 78.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





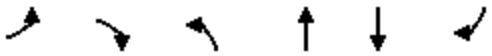
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	219	104	31	116	51	92	22	557	156	131	570	66
Future Volume (veh/h)	219	104	31	116	51	92	22	557	156	131	570	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	226	107	32	120	53	95	23	574	161	135	588	68
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	359	404	121	385	173	309	355	553	485	345	567	492
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.15	0.31	0.31	0.15	0.31	0.31
Sat Flow, veh/h	1171	1372	410	1230	586	1051	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	226	0	139	120	0	148	23	574	161	135	588	68
Grp Sat Flow(s),veh/h/ln	1171	0	1782	1230	0	1637	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	13.9	0.0	4.5	6.2	0.0	5.3	0.0	23.3	6.0	0.9	23.3	2.3
Cycle Q Clear(g_c), s	19.2	0.0	4.5	10.7	0.0	5.3	0.0	23.3	6.0	0.9	23.3	2.3
Prop In Lane	1.00		0.23	1.00		0.64	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	359	0	525	385	0	482	355	553	485	345	567	492
V/C Ratio(X)	0.63	0.00	0.26	0.31	0.00	0.31	0.06	1.04	0.33	0.39	1.04	0.14
Avail Cap(c_a), veh/h	451	0	665	482	0	611	355	553	485	345	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.0	0.0	20.2	24.3	0.0	20.5	27.4	25.8	19.9	27.5	25.8	18.6
Incr Delay (d2), s/veh	1.8	0.0	0.3	0.5	0.0	0.4	0.1	48.2	1.8	0.7	47.6	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	1.8	1.8	0.0	1.9	0.3	16.1	2.2	2.0	16.4	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.8	0.0	20.5	24.8	0.0	20.9	27.5	74.1	21.7	28.2	73.4	19.2
LnGrp LOS	C		C	C		C	C	F	C	C	F	B
Approach Vol, veh/h		365			268			758			791	
Approach Delay, s/veh		26.3			22.6			61.5			61.0	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.6	29.0		29.4	16.6	29.0		29.4				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5	* 23		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	2.9	25.3		21.2	2.0	25.3		12.7				
Green Ext Time (p_c), s	0.1	0.0		0.9	0.0	0.0		1.1				

Intersection Summary	
HCM 7th Control Delay, s/veh	50.7
HCM 7th LOS	D

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	27	53	786	648	48
Future Volume (vph)	8	27	53	786	648	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85	0	100			115
Storage Lanes	1	0	1			0
Taper Length (ft)	65		60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1417	1770	1759	1792	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1417	1770	1759	1792	1583
Link Speed (mph)	30			45	45	
Link Distance (ft)	311			1828	1569	
Travel Time (s)	7.1			27.7	23.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	14%	2%	8%	6%	2%
Adj. Flow (vph)	8	28	55	819	675	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	28	55	819	675	50
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.4%		ICU Level of Service A	
Analysis Period (min) 15			

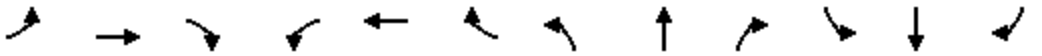
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	27	53	786	648	48
Future Vol, veh/h	8	27	53	786	648	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	8	28	55	819	675	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1604	675	725	0	-	0
Stage 1	675	-	-	-	-	-
Stage 2	929	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	116	434	878	-	-	-
Stage 1	506	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	109	434	878	-	-	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	474	-	-	-	-	-
Stage 2	384	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.36	0.59	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878	-	243	434	-	-
HCM Lane V/C Ratio	0.063	-	0.034	0.065	-	-
HCM Control Delay (s/veh)	9.4	-	20.4	13.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	378	21	4	217	6	30	0	5	0	0	3
Future Volume (vph)	9	378	21	4	217	6	30	0	5	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	540	30	6	310	9	43	0	7	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	570	0	6	319	0	0	43	7	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.8%		ICU Level of Service A	
Analysis Period (min) 15			

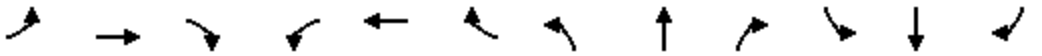
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	378	21	4	217	6	30	0	5	0	0	3
Future Vol, veh/h	9	378	21	4	217	6	30	0	5	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	540	30	6	310	9	43	0	7	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	319	0	0	570	0	0	902	911	555	891	921	314
Stage 1	-	-	-	-	-	-	581	581	-	326	326	-
Stage 2	-	-	-	-	-	-	321	330	-	566	596	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1241	-	-	1002	-	-	259	274	531	263	270	726
Stage 1	-	-	-	-	-	-	500	500	-	687	649	-
Stage 2	-	-	-	-	-	-	690	646	-	509	492	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1241	-	-	1002	-	-	253	270	531	255	266	726
Mov Cap-2 Maneuver	-	-	-	-	-	-	253	270	-	255	266	-
Stage 1	-	-	-	-	-	-	494	495	-	683	645	-
Stage 2	-	-	-	-	-	-	682	642	-	497	487	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.17	0.15	20.65	9.99
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	253	531	1241	-	-	1002	-	-	726
HCM Lane V/C Ratio	0.169	0.013	0.01	-	-	0.006	-	-	0.006
HCM Control Delay (s/veh)	22.1	11.9	7.9	-	-	8.6	-	-	10
HCM Lane LOS	C	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0	-	-	0

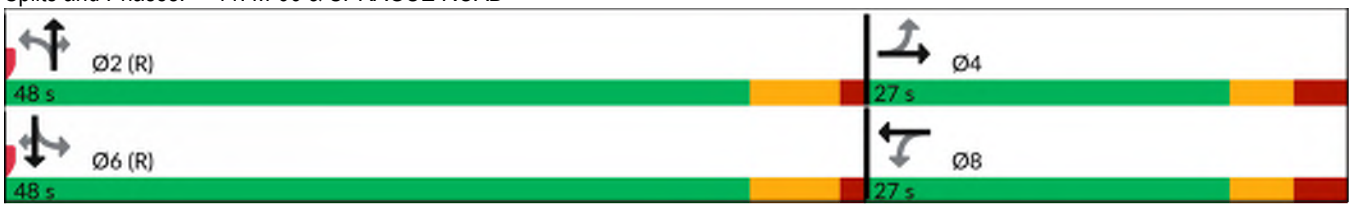


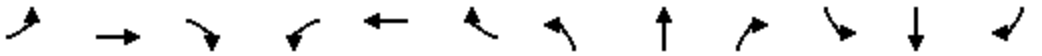
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	15	53	23	8	16	57	489	20	47	465	55
Future Volume (vph)	91	15	53	23	8	16	57	489	20	47	465	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.902				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1664	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.456			0.439		
Satd. Flow (perm)	1365	1627	0	1308	1664	0	841	1845	1568	810	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				52			60
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	99	16	58	25	9	17	62	532	22	51	505	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	99	74	0	25	26	0	62	532	22	51	505	60
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		41.6	41.6	41.6	41.6	41.6	41.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.7	10.7		10.6	10.6		55.1	55.1	55.1	55.1	55.1	55.1
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.50	0.26		0.13	0.10		0.10	0.39	0.01	0.08	0.37	0.05
Control Delay (s/veh)	37.8	13.0		27.7	16.2		5.5	6.6	0.5	2.1	2.8	0.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.8	13.0		27.7	16.2		5.5	6.6	0.5	2.1	2.8	0.5
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		27.2			21.9			6.3			2.6	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 24 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay (s/veh): 7.8		Intersection LOS: A	
Intersection Capacity Utilization 57.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	15	53	23	8	16	57	489	20	47	465	55
Future Volume (veh/h)	91	15	53	23	8	16	57	489	20	47	465	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	99	16	58	25	9	17	62	532	22	51	505	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	236	41	148	193	67	126	602	1319	1118	600	1319	1118
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.71	0.71	0.71	0.71	0.71	0.71
Sat Flow, veh/h	1374	352	1275	1315	575	1085	839	1856	1572	848	1856	1572
Grp Volume(v), veh/h	99	0	74	25	0	26	62	532	22	51	505	60
Grp Sat Flow(s),veh/h/ln	1374	0	1626	1315	0	1660	839	1856	1572	848	1856	1572
Q Serve(g_s), s	5.2	0.0	3.2	1.3	0.0	1.1	2.4	8.7	0.3	1.9	8.1	0.9
Cycle Q Clear(g_c), s	6.3	0.0	3.2	4.5	0.0	1.1	10.5	8.7	0.3	10.7	8.1	0.9
Prop In Lane	1.00		0.78	1.00		0.65	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	236	0	189	193	0	192	602	1319	1118	600	1319	1118
V/C Ratio(X)	0.42	0.00	0.39	0.13	0.00	0.14	0.10	0.40	0.02	0.09	0.38	0.05
Avail Cap(c_a), veh/h	450	0	442	398	0	452	602	1319	1118	600	1319	1118
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.6	0.0	30.7	32.8	0.0	29.8	6.4	4.4	3.2	6.6	4.3	3.3
Incr Delay (d2), s/veh	1.2	0.0	1.3	0.3	0.0	0.3	0.3	0.9	0.0	0.3	0.8	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	1.8	0.0	1.3	0.4	0.0	0.4	0.4	2.2	0.1	0.3	2.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.8	0.0	32.0	33.1	0.0	30.1	6.7	5.3	3.2	6.8	5.2	3.4
LnGrp LOS	C		C	C		C	A	A	A	A	A	A
Approach Vol, veh/h		173			51			616			616	
Approach Delay, s/veh		33.0			31.6			5.4			5.1	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		59.7		15.3		59.7		15.3				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		41.6		20.4		41.6		20.4				
Max Q Clear Time (g_c+I1), s		12.5		8.3		12.7		6.5				
Green Ext Time (p_c), s		3.8		0.5		3.6		0.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			9.5									
HCM 7th LOS			A									

APPENDIX D
ITE Trip Generation, Internal Capture Sheets, And Directional Distribution Calculations

Strip Retail Plaza (<40k)
(822)

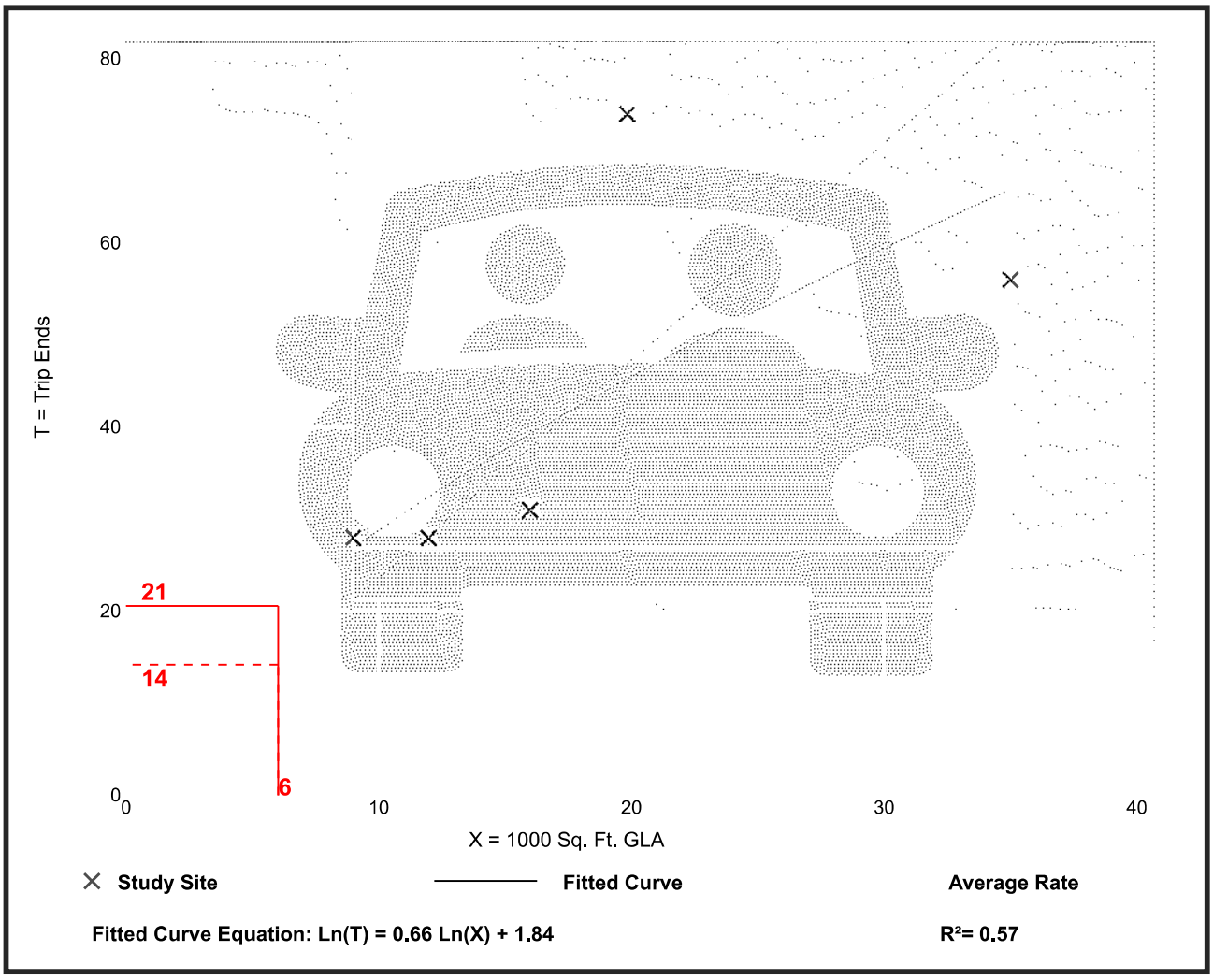
Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 5
Avg. 1000 Sq. Ft. GLA: 18
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
2.36	1.60 - 3.73	0.94

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Ln(T) = 0.66 Ln(X) + 1.84

R^2= 0.57

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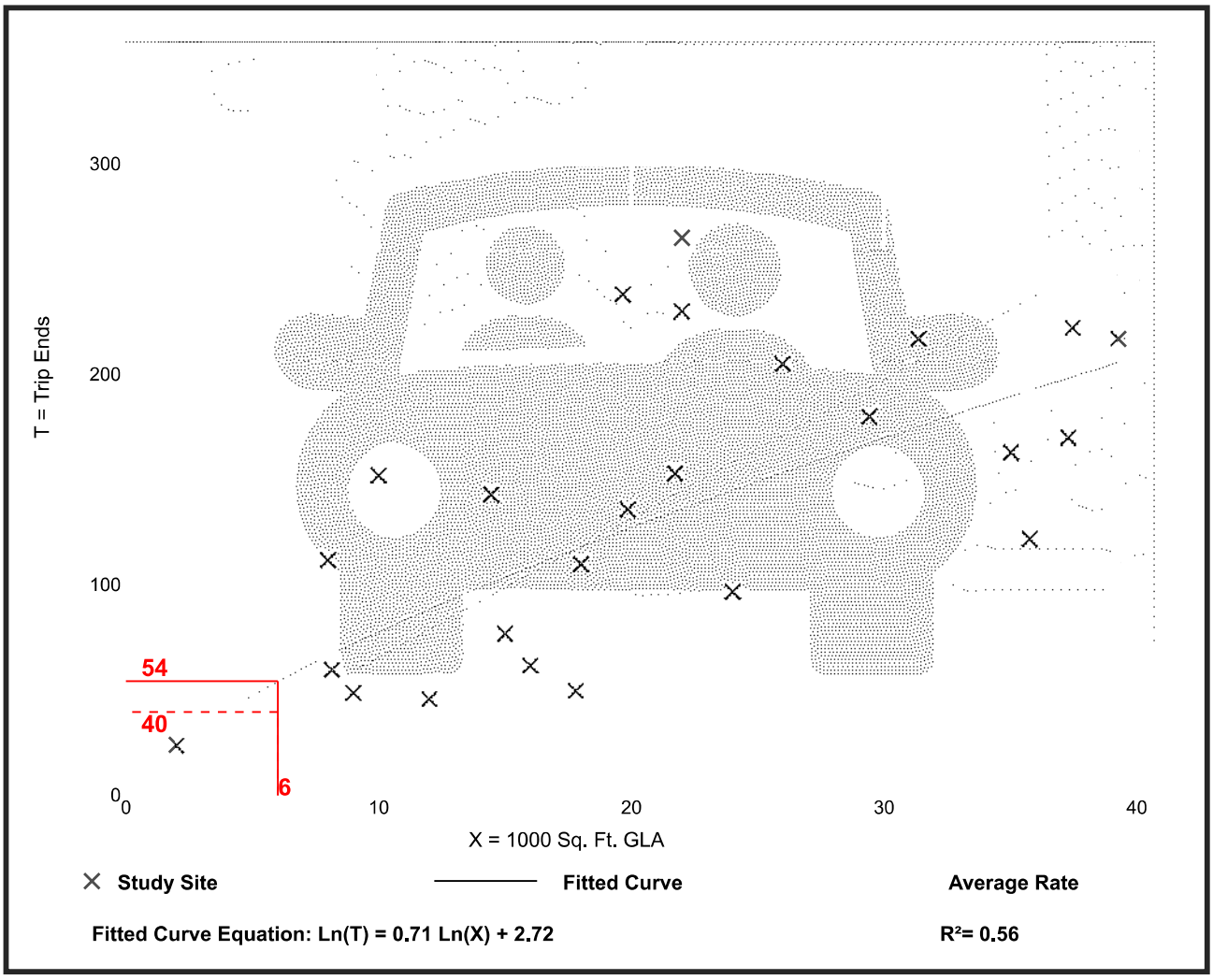
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 25
Avg. 1000 Sq. Ft. GLA: 21
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.59	2.81 - 15.20	2.94

Data Plot and Equation



Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday**

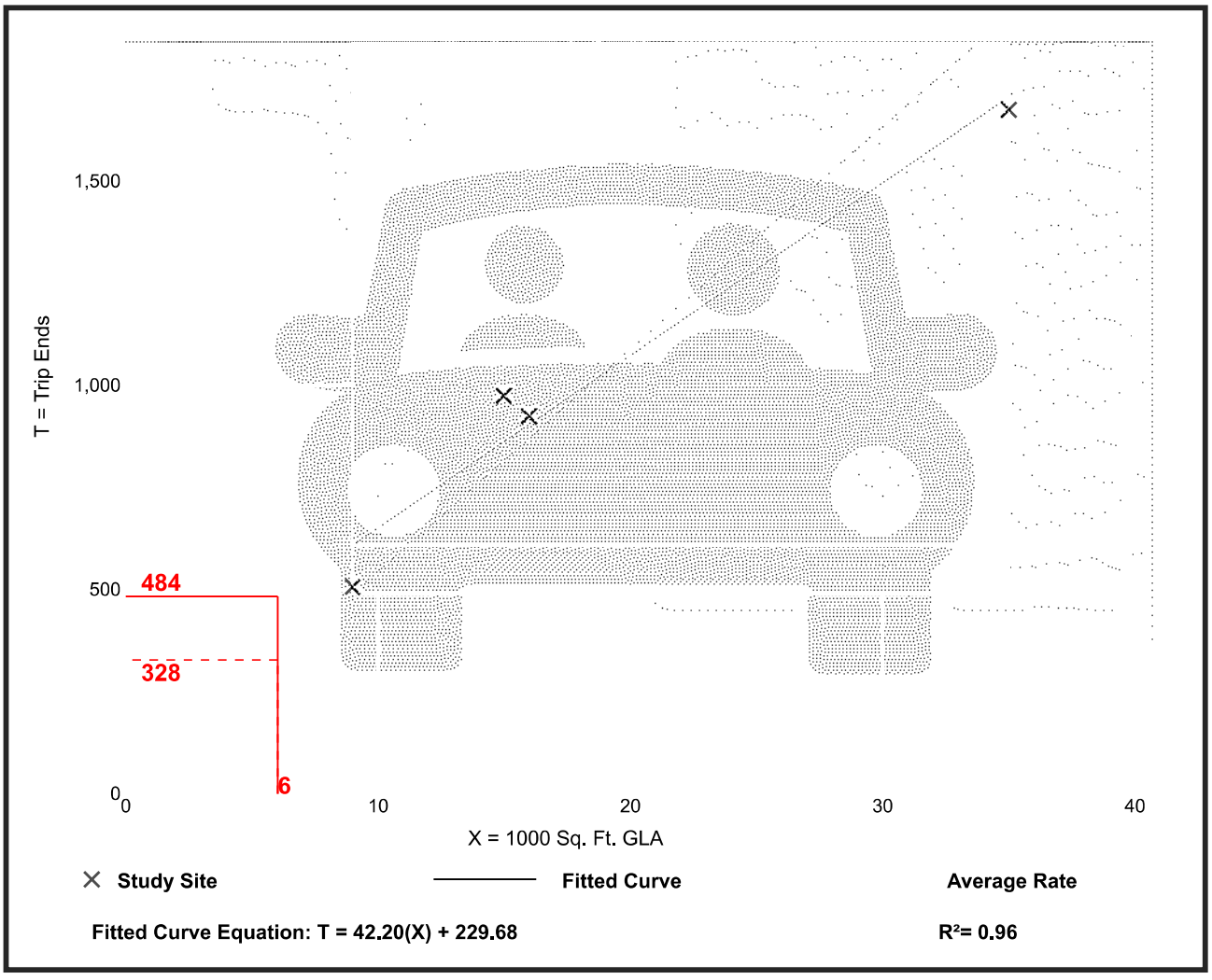
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. 1000 Sq. Ft. GLA: 19
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
54.45	47.86 - 65.07	7.81

Data Plot and Equation

Caution – Small Sample Size



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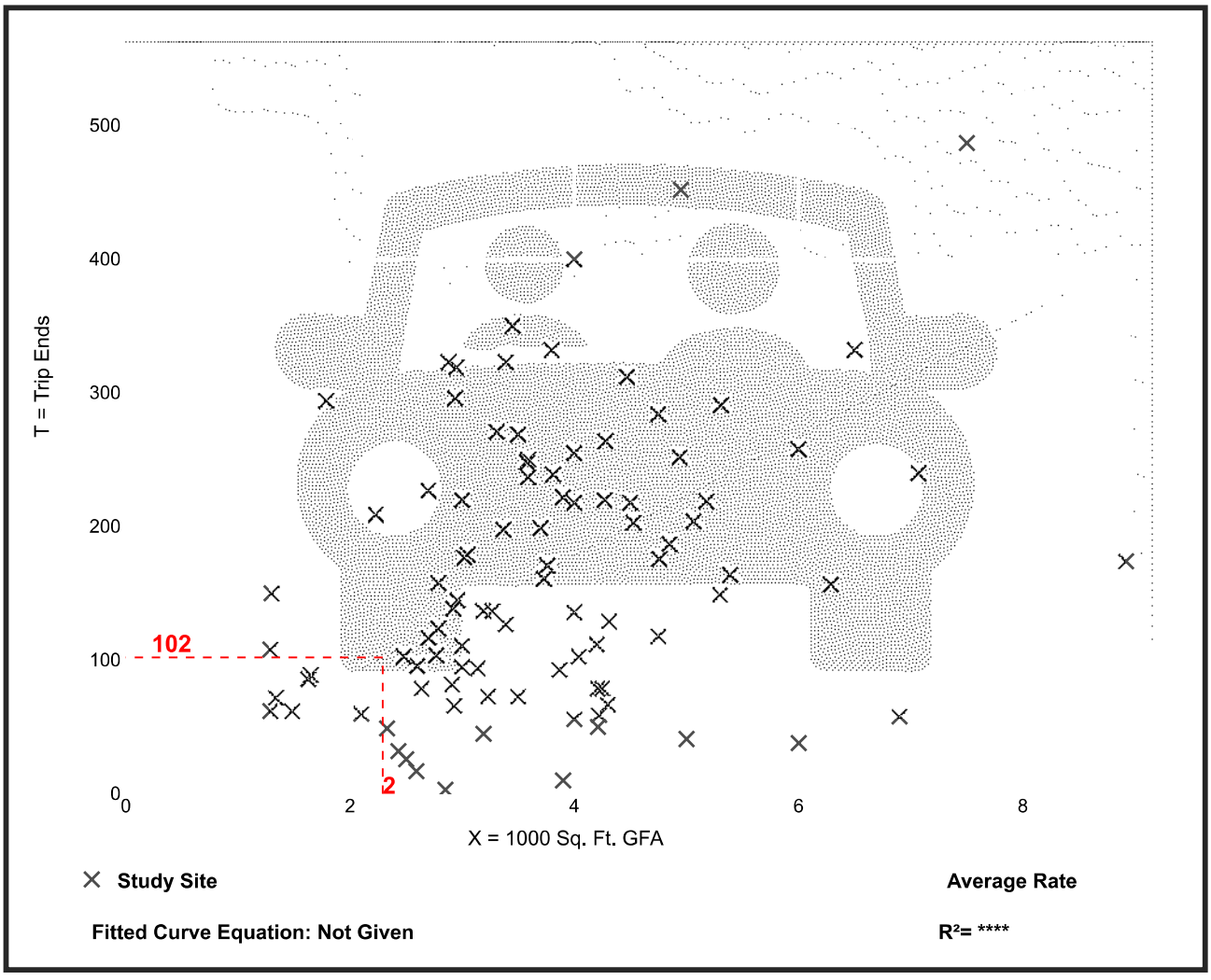
Fast-Food Restaurant with Drive-Through Window
(934)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 96
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
44.61	1.05 - 164.25	27.14

Data Plot and Equation



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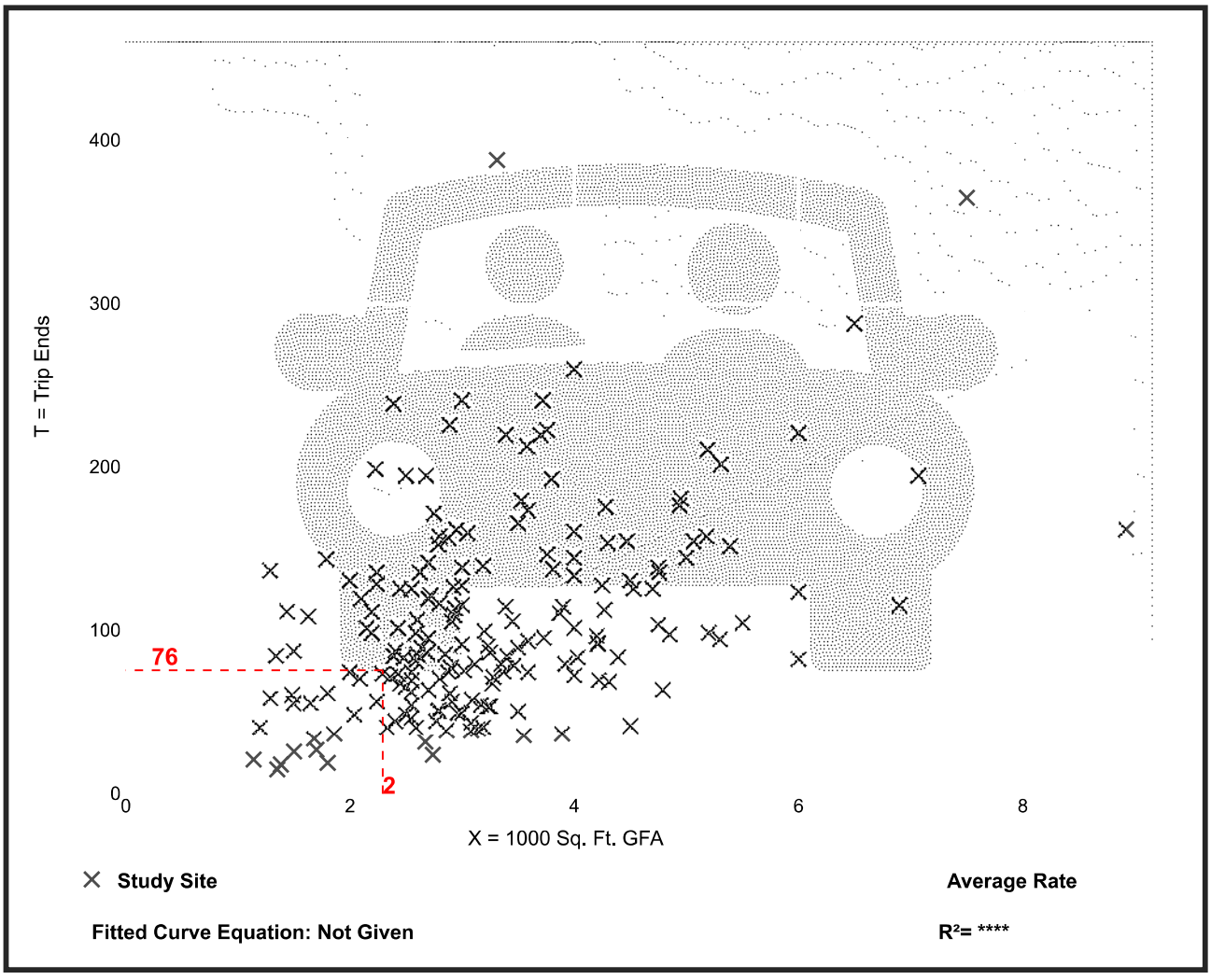
Fast-Food Restaurant with Drive-Through Window
(934)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 190
Avg. 1000 Sq. Ft. GFA: 3
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
33.03	8.77 - 117.22	17.59

Data Plot and Equation



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Fast-Food Restaurant with Drive-Through Window
(934)

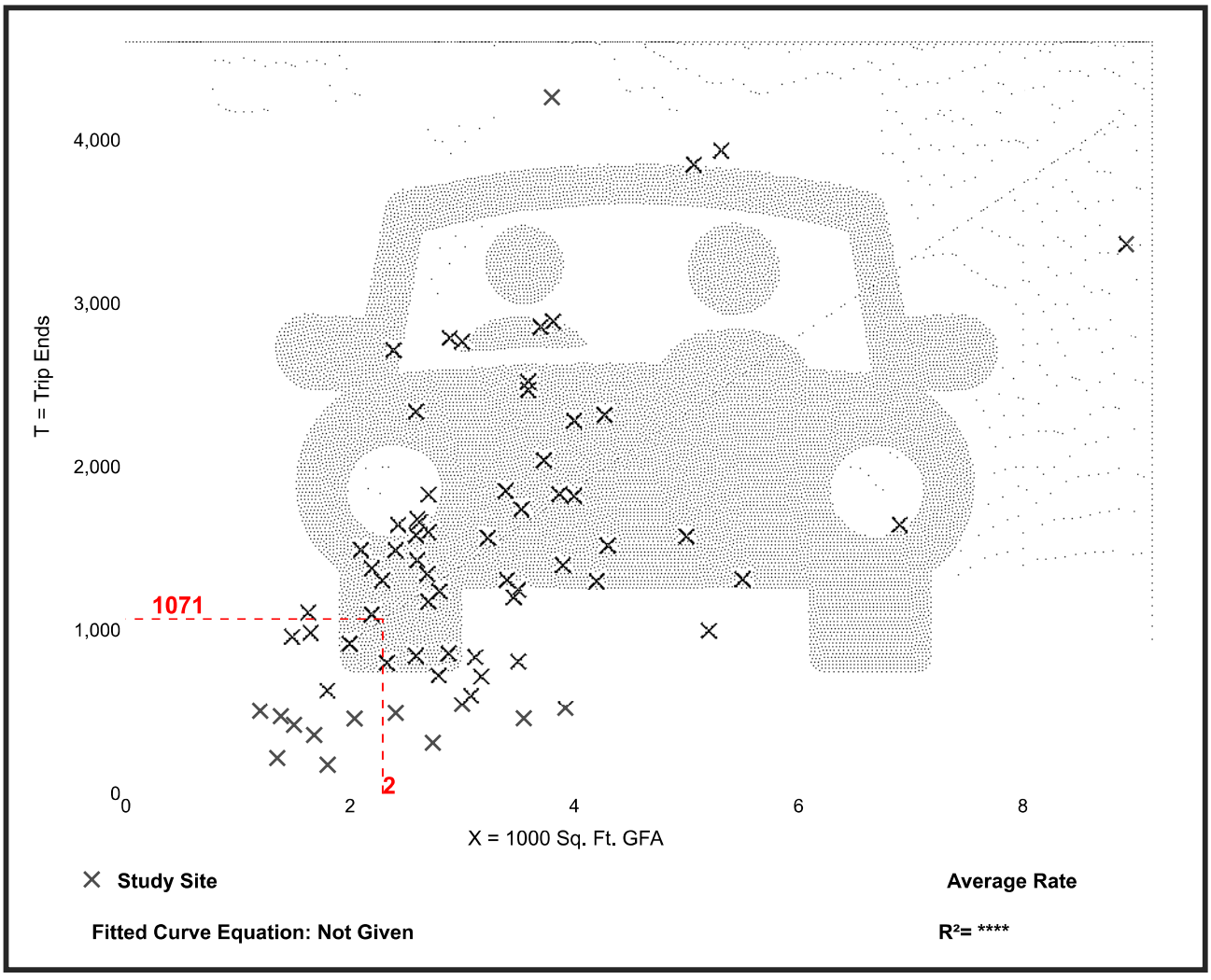
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 71
Avg. 1000 Sq. Ft. GFA: 3
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
467.48	98.89 - 1137.66	238.62

Data Plot and Equation



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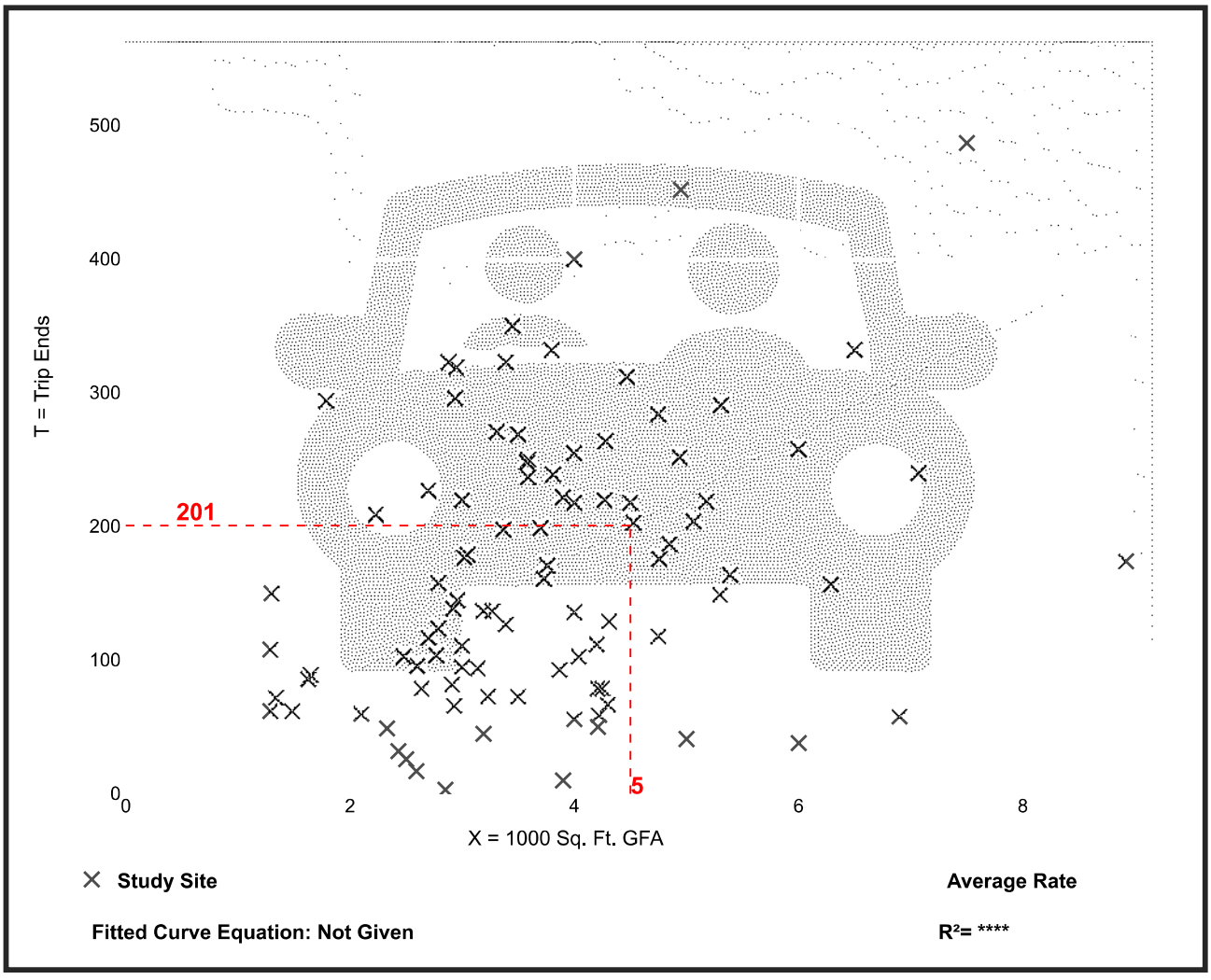
Fast-Food Restaurant with Drive-Through Window
(934)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 96
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
44.61	1.05 - 164.25	27.14

Data Plot and Equation



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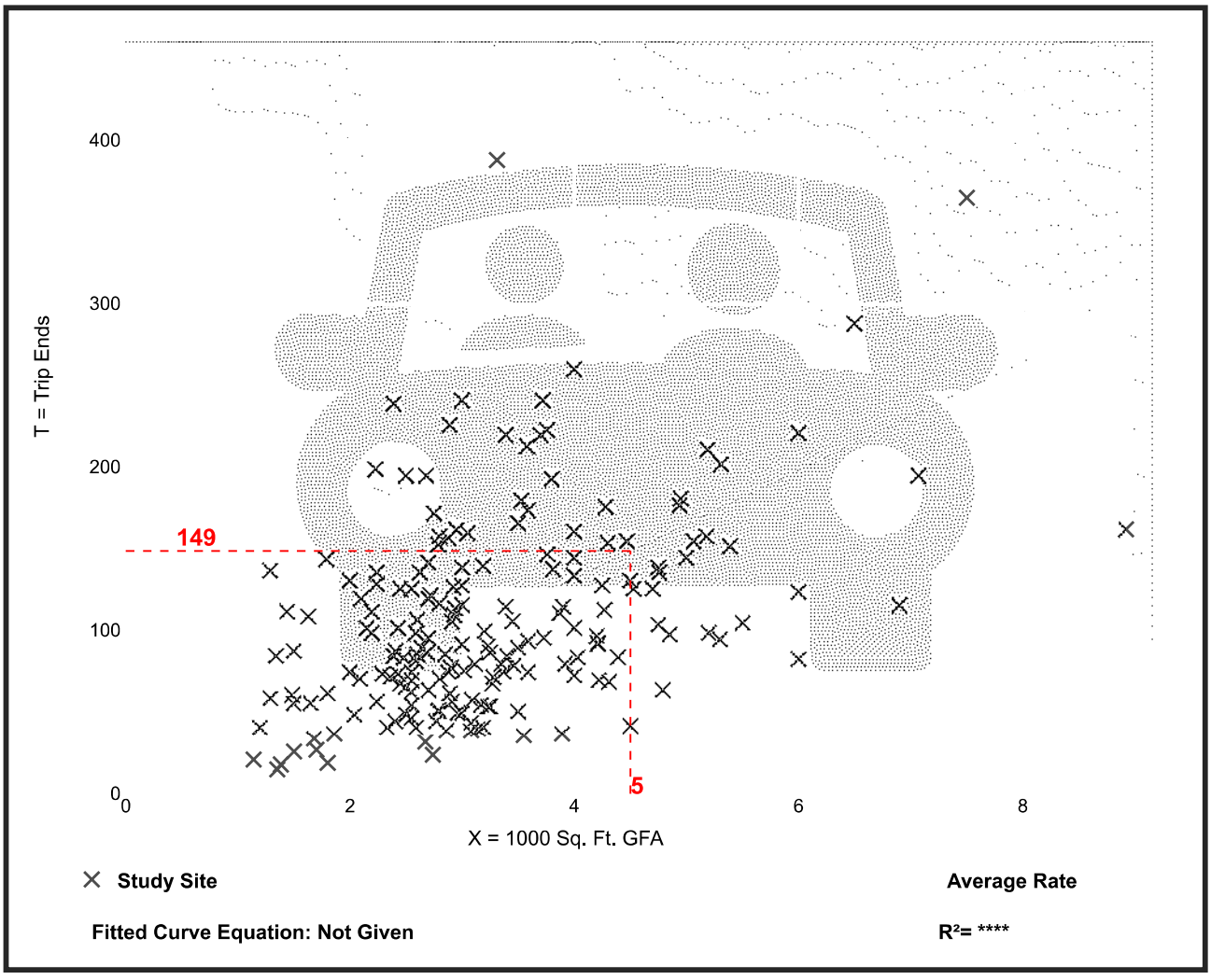
Fast-Food Restaurant with Drive-Through Window
(934)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 190
Avg. 1000 Sq. Ft. GFA: 3
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
33.03	8.77 - 117.22	17.59

Data Plot and Equation



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Fast-Food Restaurant with Drive-Through Window
(934)

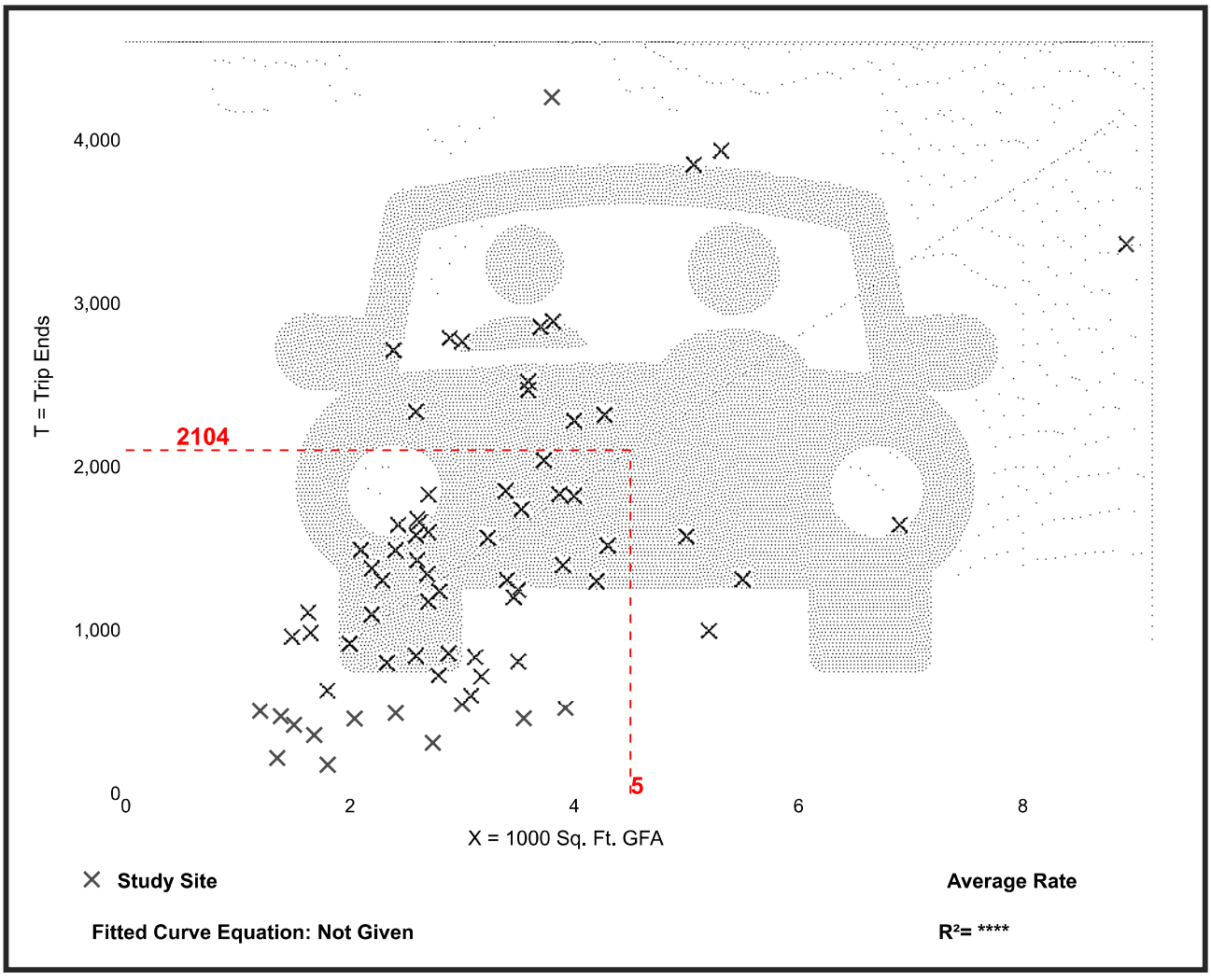
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 71
Avg. 1000 Sq. Ft. GFA: 3
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
467.48	98.89 - 1137.66	238.62

Data Plot and Equation



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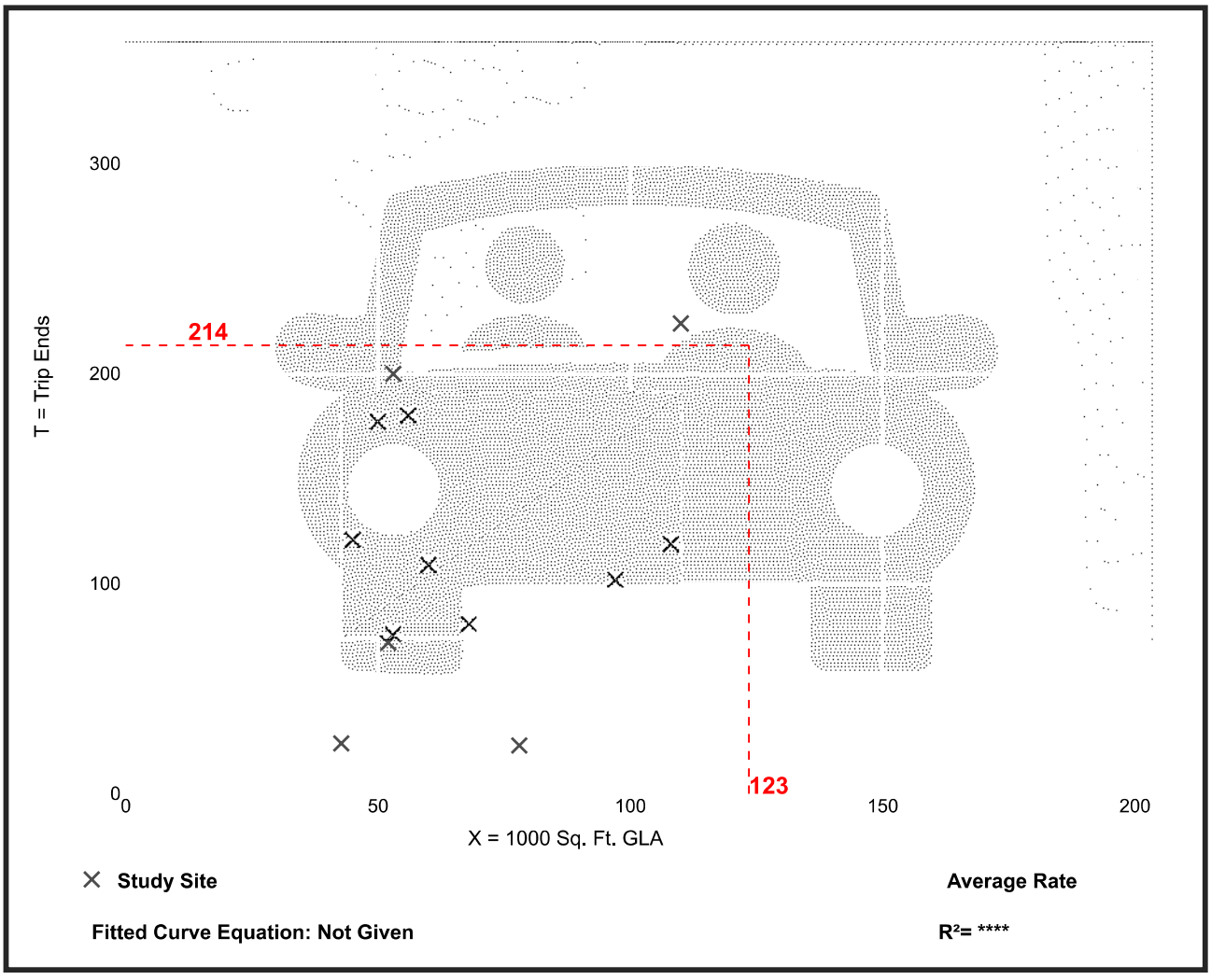
Shopping Plaza (40-150k) - Supermarket - No (821)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 13
Avg. 1000 Sq. Ft. GLA: 67
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
1.73	0.29 - 3.77	1.06

Data Plot and Equation



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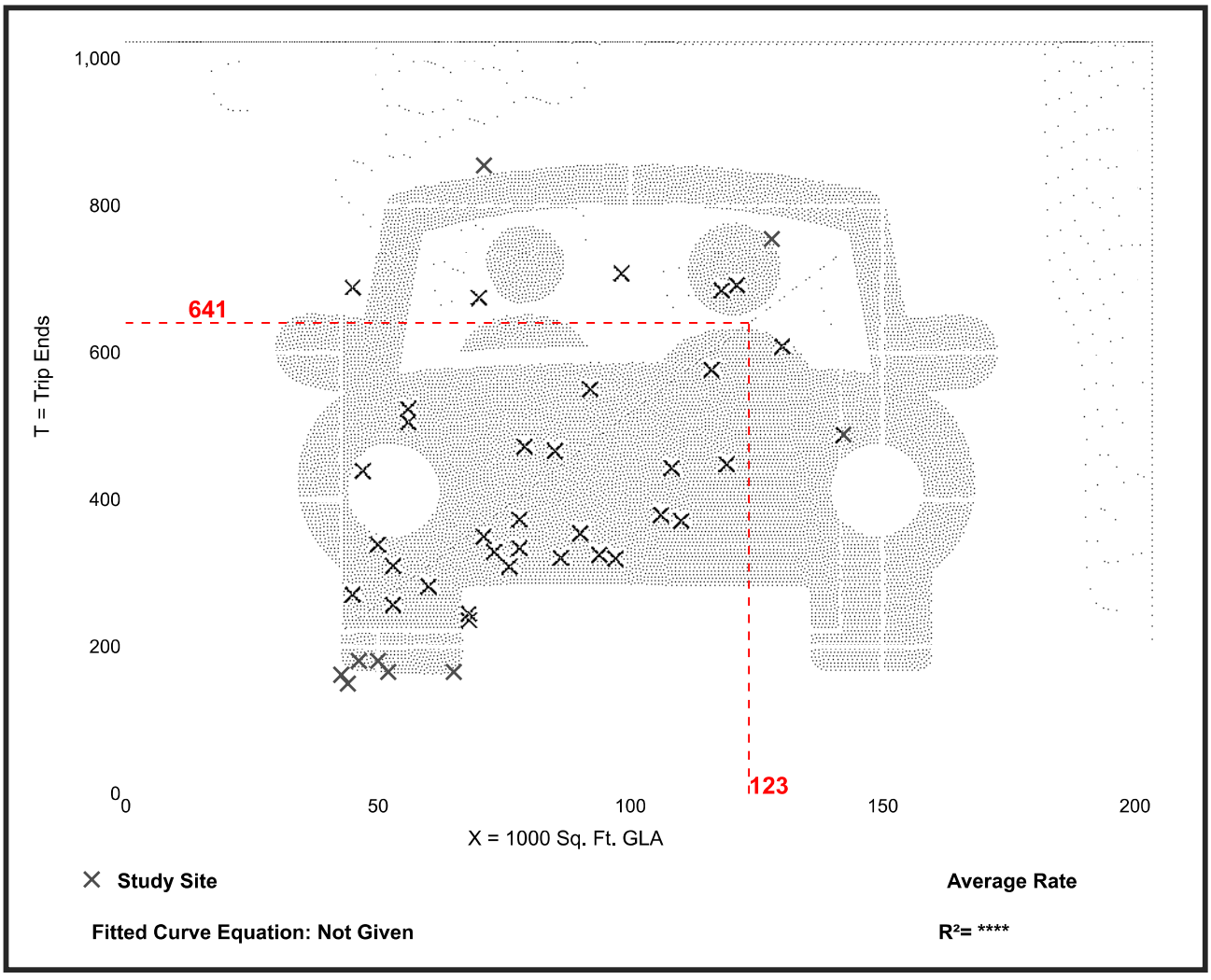
Shopping Plaza (40-150k) - Supermarket - No (821)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 42
Avg. 1000 Sq. Ft. GLA: 79
Directional Distribution: 49% entering, 51% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
5.19	2.55 - 15.31	2.28

Data Plot and Equation



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Shopping Plaza (40-150k) - Supermarket - No
(821)

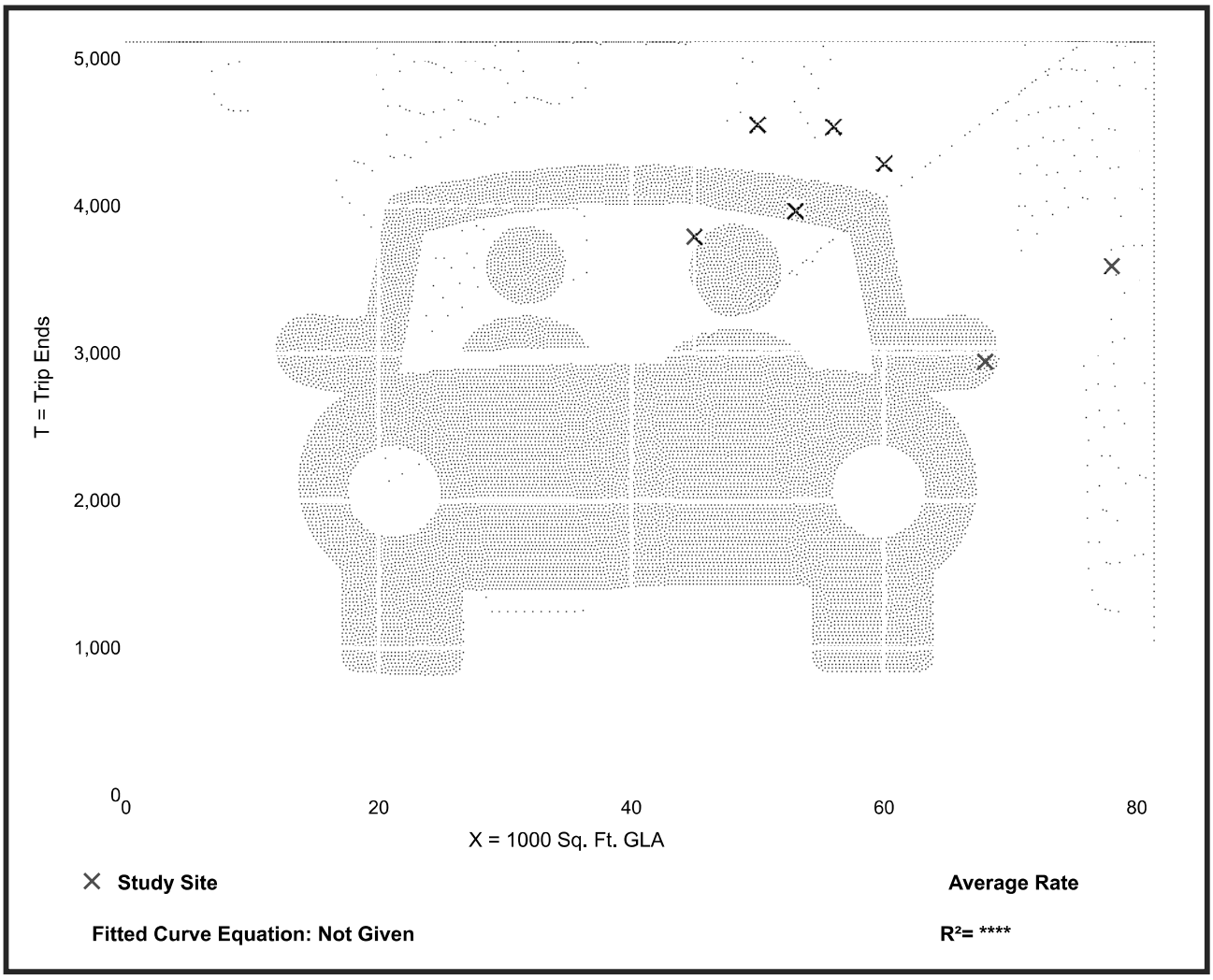
Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 7
Avg. 1000 Sq. Ft. GLA: 59
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
67.52	43.29 - 91.06	19.25

Data Plot and Equation



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NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Multi Use Dev - Ionia, MI TIS	**Organization:**	CESO, Inc.
Project Location:	Ionia, MI	**Performed By:**	DMB
Scenario Description:	Build Traffic Scenarios	**Date:**	9/27/2023
Analysis Year:	2024	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				14	9	5
Restaurant				102	52	50
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				116	61	55

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		1	0	0	0
Restaurant	0	1		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	116	61	55
Internal Capture Percentage	3%	3%	4%
External Vehicle-Trips[5]	112	59	53
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	11%	20%
Restaurant	2%	2%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Multi Use Dev- Ionia, MI TIS	**Organization:**	CESO, Inc.
Project Location:	Ionia, MI	**Performed By:**	DMB
Scenario Description:	Build Traffic Scenarios	**Date:**	9/27/2023
Analysis Year:	2024	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				40	20	20
Restaurant				76	39	37
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				116	59	57

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		6	0	0	0
Restaurant	0	10		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	116	59	57
Internal Capture Percentage	28%	27%	28%
External Vehicle-Trips[5]	84	43	41
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	50%	30%
Restaurant	15%	27%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Multi Use Dev - Ionia, MI TIS	**Organization:**	CESO, Inc.
Project Location:	Ionia, MI	**Performed By:**	DMB
Scenario Description:	Build Traffic Scenarios	**Date:**	9/27/2023
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				14	9	5
Restaurant				303	154	149
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				317	163	154

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		1	0	0	0
Restaurant	0	1		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	317	163	154
Internal Capture Percentage	1%	1%	1%
External Vehicle-Trips[5]	313	161	152
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	11%	20%
Restaurant	1%	1%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Multi Use Dev- Ionia, MI TIS	**Organization:**	CESO, Inc.
Project Location:	Ionia, MI	**Performed By:**	DMB
Scenario Description:	Build Traffic Scenarios	**Date:**	9/27/2023
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				40	20	20
Restaurant				225	115	110
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				265	135	130

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		6	0	0	0
Restaurant	0	10		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	265	135	130
Internal Capture Percentage	12%	12%	12%
External Vehicle-Trips[5]	233	119	114
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	50%	30%
Restaurant	5%	9%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

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NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Multi Use Dev - Ionia, MI TIS	**Organization:**	CESO, Inc.
Project Location:	Ionia, MI	**Performed By:**	DMB
Scenario Description:	Build Traffic Scenarios	**Date:**	9/27/2023
Analysis Year:	2029	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				228	141	87
Restaurant				303	154	149
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				531	295	236

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		11	0	0	0
Restaurant	0	11		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	531	295	236
Internal Capture Percentage	8%	7%	9%
External Vehicle-Trips[5]	487	273	214
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	8%	13%
Restaurant	7%	7%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Multi Use Dev- Ionia, MI TIS	**Organization:**	CESO, Inc.
Project Location:	Ionia, MI	**Performed By:**	DMB
Scenario Description:	Build Traffic Scenarios	**Date:**	9/27/2023
Analysis Year:	2029	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				681	334	347
Restaurant				225	115	110
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]				0		
				906	449	457

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		33	0	0	0
Restaurant	0	45		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	906	449	457
Internal Capture Percentage	17%	17%	17%
External Vehicle-Trips[5]	750	371	379
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	13%	10%
Restaurant	29%	41%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

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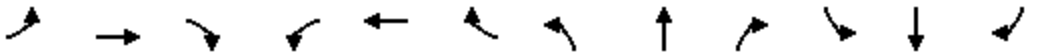
APPENDIX E
2024 Build Traffic Scenario
Capacity Analysis Summary Sheets

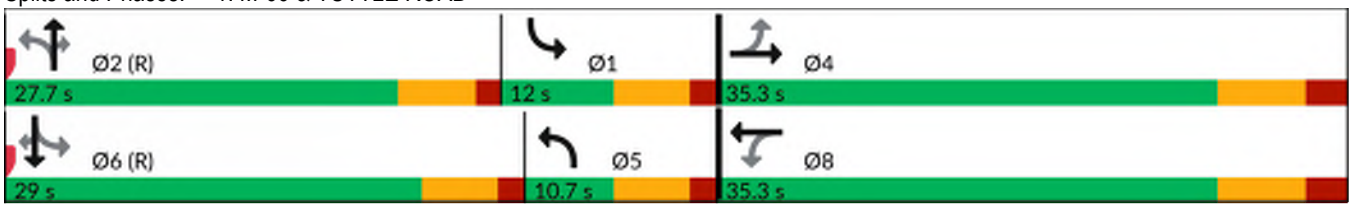


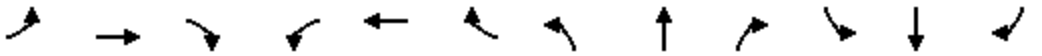
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	43	15	147	44	143	20	348	91	218	443	34
Future Volume (vph)	44	43	15	147	44	143	20	348	91	218	443	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960			0.885				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1775	0	1736	1590	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.562			0.710			0.304			0.395		
Satd. Flow (perm)	980	1775	0	1297	1590	0	566	1759	1553	701	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			177				145			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	54	53	19	181	54	177	25	430	112	269	547	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	72	0	181	231	0	25	430	112	269	547	42
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	12.0	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	36.9%	36.9%	16.0%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	22.0	22.0	6.3	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	16.1	16.1		16.1	16.1		38.9	33.9	33.9	44.1	41.6	41.6
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.52	0.45	0.45	0.59	0.55	0.55
v/c Ratio	0.25	0.18		0.65	0.48		0.06	0.54	0.14	0.54	0.54	0.04
Control Delay (s/veh)	25.2	17.8		36.9	10.0		7.8	18.7	1.4	17.3	17.2	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	25.2	17.8		36.9	10.0		7.8	18.7	1.4	17.3	17.2	0.0
LOS	C	B		D	B		A	B	A	B	B	A
Approach Delay (s/veh)		21.0			21.8			14.8			16.4	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 40 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay (s/veh): 17.4		Intersection LOS: B	
Intersection Capacity Utilization 67.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





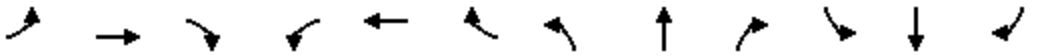
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	43	15	147	44	143	20	348	91	218	443	34
Future Volume (veh/h)	44	43	15	147	44	143	20	348	91	218	443	34
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	54	53	19	181	54	177	25	430	112	269	547	42
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	184	279	100	332	80	263	499	523	458	570	567	492
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.23	0.29	0.29	0.24	0.31	0.31
Sat Flow, veh/h	1086	1304	467	1307	375	1229	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	54	0	72	181	0	231	25	430	112	269	547	42
Grp Sat Flow(s),veh/h/ln	1086	0	1771	1307	0	1605	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	3.6	0.0	2.5	9.9	0.0	9.9	0.0	16.9	4.1	2.6	22.1	1.4
Cycle Q Clear(g_c), s	13.5	0.0	2.5	12.4	0.0	9.9	0.0	16.9	4.1	2.6	22.1	1.4
Prop In Lane	1.00		0.26	1.00		0.77	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	184	0	379	332	0	343	499	523	458	570	567	492
V/C Ratio(X)	0.29	0.00	0.19	0.55	0.00	0.67	0.05	0.82	0.24	0.47	0.96	0.09
Avail Cap(c_a), veh/h	358	0	661	540	0	599	499	523	458	570	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.3	0.0	24.2	29.2	0.0	27.1	22.5	24.7	20.2	21.2	25.4	18.3
Incr Delay (d2), s/veh	0.9	0.0	0.2	1.4	0.0	2.3	0.0	13.7	1.3	0.6	29.9	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	1.0	0.0	1.0	3.1	0.0	3.8	0.3	8.3	1.5	3.4	13.1	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.2	0.0	24.4	30.6	0.0	29.4	22.5	38.3	21.4	21.8	55.4	18.6
LnGrp LOS	C		C	C		C	C	D	C	C	E	B
Approach Vol, veh/h		126			412			567			858	
Approach Delay, s/veh		28.6			29.9			34.3			43.0	
Approach LOS		C			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	24.0	27.7		23.3	22.7	29.0		23.3				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 6.3	* 22		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	4.6	18.9		15.5	2.0	24.1		14.4				
Green Ext Time (p_c), s	0.1	0.9		0.4	0.0	0.0		1.7				

Intersection Summary		
HCM 7th Control Delay, s/veh	36.8	
HCM 7th LOS	D	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	14	16	0	37	32	443	19	40	461	73
Future Volume (vph)	5	0	14	16	0	37	32	443	19	40	461	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		100	100		115
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.994				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1752	0	1770	1792	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1417	0	1770	1583	0	1770	1752	0	1770	1792	1583
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			385			1828			1569	
Travel Time (s)		7.1			0.0			27.7			23.8	
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	6	0	17	17	0	40	38	527	21	43	549	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	17	0	17	40	0	38	548	0	43	549	87
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.4%		ICU Level of Service A	
Analysis Period (min) 15			

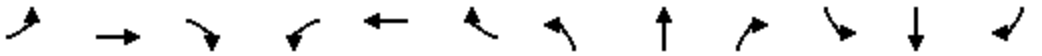
Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	14	16	0	37	32	443	19	40	461	73
Future Vol, veh/h	5	0	14	16	0	37	32	443	19	40	461	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	92	84	92	92	92	84	84	92	92	84	84
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	6	0	17	17	0	40	38	527	21	43	549	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1239	1260	549	1250	1337	538	636	0	0	548	0	0
Stage 1	636	636	-	614	614	-	-	-	-	-	-	-
Stage 2	604	624	-	636	723	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	152	170	513	150	153	543	948	-	-	1021	-	-
Stage 1	466	472	-	479	483	-	-	-	-	-	-	-
Stage 2	486	478	-	466	431	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	129	157	513	133	141	543	948	-	-	1021	-	-
Mov Cap-2 Maneuver	129	157	-	133	141	-	-	-	-	-	-	-
Stage 1	446	452	-	460	463	-	-	-	-	-	-	-
Stage 2	431	458	-	432	413	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	18.01	19.38	0.58	0.56
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	948	-	-	129	513	133	543	1021	-	-
HCM Lane V/C Ratio	0.04	-	-	0.046	0.032	0.131	0.074	0.043	-	-
HCM Control Delay (s/veh)	9	-	-	34.1	12.3	36.1	12.2	8.7	-	-
HCM Lane LOS	A	-	-	D	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.4	0.2	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	341	19	7	345	0	14	0	4	0	0	1
Future Volume (vph)	0	341	19	7	345	0	14	0	4	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	487	27	10	493	0	20	0	6	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	514	0	10	493	0	0	20	6	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.8%		ICU Level of Service A	
Analysis Period (min) 15			

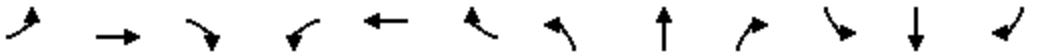
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	341	19	7	345	0	14	0	4	0	0	1
Future Vol, veh/h	0	341	19	7	345	0	14	0	4	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	487	27	10	493	0	20	0	6	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	493	0	0	514	0	0	1014	1014	501	1000	1027	493
Stage 1	-	-	-	-	-	-	501	501	-	513	513	-
Stage 2	-	-	-	-	-	-	513	513	-	487	514	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1071	-	-	1051	-	-	217	239	570	222	234	576
Stage 1	-	-	-	-	-	-	552	543	-	544	536	-
Stage 2	-	-	-	-	-	-	544	536	-	562	535	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1071	-	-	1051	-	-	215	236	570	218	232	576
Mov Cap-2 Maneuver	-	-	-	-	-	-	215	236	-	218	232	-
Stage 1	-	-	-	-	-	-	552	543	-	539	531	-
Stage 2	-	-	-	-	-	-	538	531	-	556	535	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.17	20.8	11.26
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	215	570	1071	-	-	1051	-	-	576
HCM Lane V/C Ratio	0.093	0.01	-	-	-	0.01	-	-	0.002
HCM Control Delay (s/veh)	23.5	11.4	0	-	-	8.5	-	-	11.3
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	0	-	-	0	-	-	0

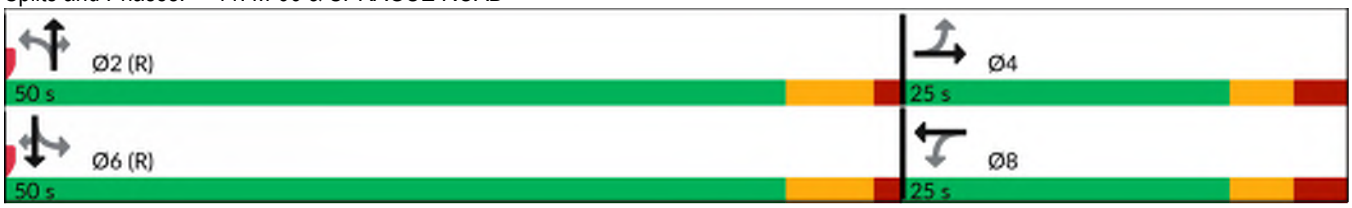


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1	4	6	0	4	19	470	13	33	448	18
Future Volume (vph)	9	1	4	6	0	4	19	470	13	33	448	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.486			0.475		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	897	1845	1568	876	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			350				52			52
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	10	1	4	7	0	4	21	511	14	36	487	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	5	0	7	4	0	21	511	14	36	487	20
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	18.4	18.4		18.4	18.4		43.6	43.6	43.6	43.6	43.6	43.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.2	6.2		6.1	6.1		70.9	70.9	70.9	70.9	70.9	70.9
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.95	0.95	0.95	0.95	0.95	0.95
v/c Ratio	0.06	0.03		0.04	0.00		0.02	0.29	0.00	0.04	0.27	0.01
Control Delay (s/veh)	32.2	22.8		32.0	0.0		1.5	1.6	0.0	0.2	0.5	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.2	22.8		32.0	0.0		1.5	1.6	0.0	0.2	0.5	0.0
LOS	C	C		C	A		A	A	A	A	A	A
Approach Delay (s/veh)		29.1			20.4			1.6			0.5	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 72 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.29			
Intersection Signal Delay (s/veh): 1.6		Intersection LOS: A	
Intersection Capacity Utilization 45.4%		ICU Level of Service A	
Analysis Period (min) 15			

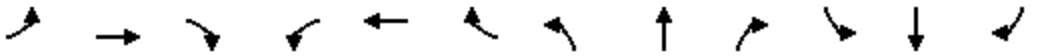
Splits and Phases: 11: M-66 & SPRAGUE ROAD



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1	4	6	0	4	19	470	13	33	448	18
Future Volume (veh/h)	9	1	4	6	0	4	19	470	13	33	448	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	10	1	4	7	0	4	21	511	14	36	487	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	132	9	36	131	0	44	740	1482	1256	725	1482	1256
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.80	0.80	0.80	0.80	0.80	0.80
Sat Flow, veh/h	1401	324	1298	1400	0	1572	885	1856	1572	871	1856	1572
Grp Volume(v), veh/h	10	0	5	7	0	4	21	511	14	36	487	20
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	885	1856	1572	871	1856	1572
Q Serve(g_s), s	0.5	0.0	0.2	0.4	0.0	0.2	0.5	5.7	0.1	0.9	5.4	0.2
Cycle Q Clear(g_c), s	0.7	0.0	0.2	0.6	0.0	0.2	5.9	5.7	0.1	6.6	5.4	0.2
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	0	45	131	0	44	740	1482	1256	725	1482	1256
V/C Ratio(X)	0.08	0.00	0.11	0.05	0.00	0.09	0.03	0.34	0.01	0.05	0.33	0.02
Avail Cap(c_a), veh/h	436	0	398	435	0	386	740	1482	1256	725	1482	1256
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	35.5	35.8	0.0	35.5	2.9	2.1	1.5	3.0	2.1	1.5
Incr Delay (d2), s/veh	0.2	0.0	1.1	0.2	0.0	0.9	0.1	0.6	0.0	0.1	0.6	0.0
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	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.7	0.0	0.1	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.1	0.0	36.6	36.0	0.0	36.4	2.9	2.7	1.5	3.1	2.7	1.6
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		15			11			546			543	
Approach Delay, s/veh		36.3			36.2			2.7			2.6	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		66.3		8.7		66.3		8.7				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		43.6		18.4		43.6		18.4				
Max Q Clear Time (g_c+I1), s		7.9		2.7		8.6		2.6				
Green Ext Time (p_c), s		3.4		0.0		3.3		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			3.5									
HCM 7th LOS			A									

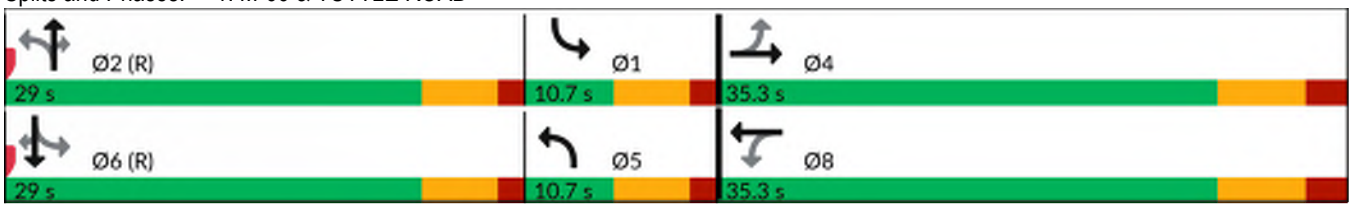


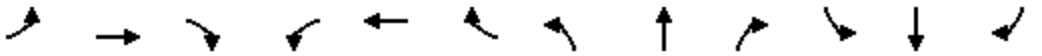
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	219	101	38	122	49	92	28	567	163	131	579	66
Future Volume (vph)	219	101	38	122	49	92	28	567	163	131	579	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.959			0.902				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1774	0	1736	1622	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.664			0.666			0.212			0.220		
Satd. Flow (perm)	1157	1774	0	1217	1622	0	395	1759	1553	391	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			95				168			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	226	104	39	126	51	95	29	585	168	135	597	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	226	143	0	126	146	0	29	585	168	135	597	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	29.0	29.0	10.7	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	38.7%	38.7%	14.3%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	23.3	23.3	5.0	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	19.9	19.9		19.9	19.9		36.4	31.4	31.4	39.9	37.9	37.9
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.49	0.42	0.42	0.53	0.51	0.51
v/c Ratio	0.73	0.29		0.39	0.29		0.10	0.79	0.22	0.45	0.65	0.07
Control Delay (s/veh)	38.8	17.0		24.4	9.1		9.8	28.9	2.7	21.9	23.3	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.8	17.0		24.4	9.1		9.8	28.9	2.7	21.9	23.3	0.1
LOS	D	B		C	A		A	C	A	C	C	A
Approach Delay (s/veh)		30.4			16.2			22.6			21.1	
Approach LOS		C			B			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 66 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay (s/veh): 22.6		Intersection LOS: C	
Intersection Capacity Utilization 79.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





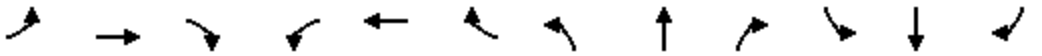
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	219	101	38	122	49	92	28	567	163	131	579	66
Future Volume (veh/h)	219	101	38	122	49	92	28	567	163	131	579	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	226	104	39	126	51	95	29	585	168	135	597	68
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	359	378	142	380	168	312	357	553	485	346	567	492
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.15	0.31	0.31	0.15	0.31	0.31
Sat Flow, veh/h	1173	1286	482	1226	571	1064	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	226	0	143	126	0	146	29	585	168	135	597	68
Grp Sat Flow(s),veh/h/ln	1173	0	1769	1226	0	1634	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	13.9	0.0	4.7	6.6	0.0	5.2	0.0	23.3	6.2	0.9	23.3	2.3
Cycle Q Clear(g_c), s	19.1	0.0	4.7	11.3	0.0	5.2	0.0	23.3	6.2	0.9	23.3	2.3
Prop In Lane	1.00		0.27	1.00		0.65	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	359	0	519	380	0	480	357	553	485	346	567	492
V/C Ratio(X)	0.63	0.00	0.28	0.33	0.00	0.30	0.08	1.06	0.35	0.39	1.05	0.14
Avail Cap(c_a), veh/h	453	0	660	477	0	610	357	553	485	346	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	20.4	24.7	0.0	20.5	27.3	25.8	20.0	27.4	25.8	18.6
Incr Delay (d2), s/veh	1.8	0.0	0.3	0.5	0.0	0.4	0.1	54.2	2.0	0.7	52.3	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	1.8	1.9	0.0	1.9	0.4	17.0	2.3	2.0	17.1	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.8	0.0	20.6	25.2	0.0	20.9	27.4	80.1	21.9	28.1	78.2	19.2
LnGrp LOS	C		C	C		C	C	F	C	C	F	B
Approach Vol, veh/h		369			272			782			800	
Approach Delay, s/veh		26.2			22.9			65.6			64.7	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.7	29.0		29.3	16.7	29.0		29.3				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5	* 23		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	2.9	25.3		21.1	2.0	25.3		13.3				
Green Ext Time (p_c), s	0.1	0.0		0.9	0.0	0.0		1.1				

Intersection Summary	
HCM 7th Control Delay, s/veh	53.5
HCM 7th LOS	D

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	27	14	0	29	53	780	13	28	642	48
Future Volume (vph)	8	0	27	14	0	29	53	780	13	28	642	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		100	100		115
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1756	0	1770	1792	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1417	0	1770	1583	0	1770	1756	0	1770	1792	1583
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			387			1828			1569	
Travel Time (s)		7.1			0.0			27.7			23.8	
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	8	0	28	15	0	32	55	813	14	30	669	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	28	0	15	32	0	55	827	0	30	669	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.2%		ICU Level of Service B	
Analysis Period (min) 15			

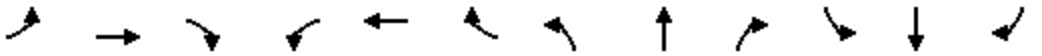
Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	27	14	0	29	53	780	13	28	642	48
Future Vol, veh/h	8	0	27	14	0	29	53	780	13	28	642	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	8	0	28	15	0	32	55	813	14	30	669	50

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1653	1667	669	1660	1710	820	719	0	0	827	0	0
Stage 1	730	730	-	930	930	-	-	-	-	-	-	-
Stage 2	923	937	-	730	780	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	79	96	437	78	91	375	883	-	-	804	-	-
Stage 1	414	428	-	321	346	-	-	-	-	-	-	-
Stage 2	323	343	-	414	406	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	65	87	437	66	82	375	883	-	-	804	-	-
Mov Cap-2 Maneuver	65	87	-	66	82	-	-	-	-	-	-	-
Stage 1	398	412	-	300	324	-	-	-	-	-	-	-
Stage 2	278	322	-	373	391	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	26.3	35.12	0.59	0.39
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	883	-	-	65	437	66	375	804	-	-
HCM Lane V/C Ratio	0.063	-	-	0.128	0.064	0.232	0.084	0.038	-	-
HCM Control Delay (s/veh)	9.4	-	-	68.5	13.8	75.8	15.5	9.7	-	-
HCM Lane LOS	A	-	-	F	B	F	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.2	0.8	0.3	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	382	21	4	221	6	30	0	5	0	0	3
Future Volume (vph)	9	382	21	4	221	6	30	0	5	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	546	30	6	316	9	43	0	7	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	576	0	6	325	0	0	43	7	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.0%		ICU Level of Service A	
Analysis Period (min) 15			

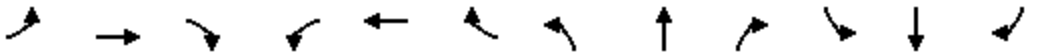
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	382	21	4	221	6	30	0	5	0	0	3
Future Vol, veh/h	9	382	21	4	221	6	30	0	5	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	546	30	6	316	9	43	0	7	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	324	0	0	576	0	0	914	922	561	903	933	320
Stage 1	-	-	-	-	-	-	586	586	-	331	331	-
Stage 2	-	-	-	-	-	-	327	336	-	571	601	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1235	-	-	998	-	-	254	270	527	258	266	721
Stage 1	-	-	-	-	-	-	496	497	-	682	645	-
Stage 2	-	-	-	-	-	-	686	642	-	506	489	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1235	-	-	998	-	-	248	266	527	251	262	721
Mov Cap-2 Maneuver	-	-	-	-	-	-	248	266	-	251	262	-
Stage 1	-	-	-	-	-	-	491	492	-	678	641	-
Stage 2	-	-	-	-	-	-	678	638	-	493	484	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.17	0.15	20.98	10.02
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	248	527	1235	-	-	998	-	-	721
HCM Lane V/C Ratio	0.173	0.014	0.01	-	-	0.006	-	-	0.006
HCM Control Delay (s/veh)	22.5	11.9	7.9	-	-	8.6	-	-	10
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0	-	-	0

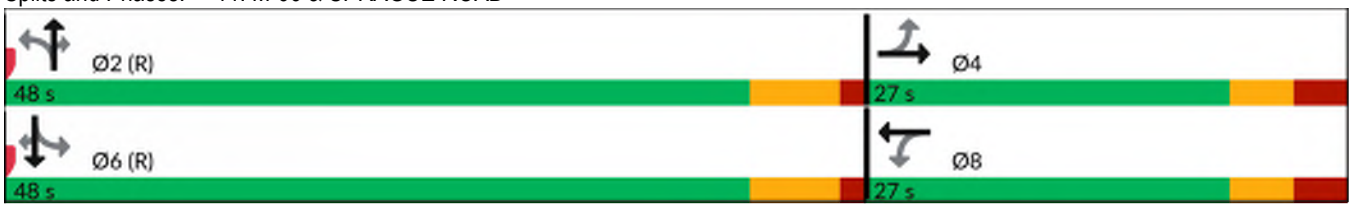


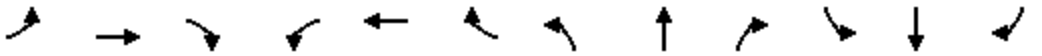
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	15	53	23	8	16	57	495	20	47	472	56
Future Volume (vph)	92	15	53	23	8	16	57	495	20	47	472	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.902				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1664	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.451			0.435		
Satd. Flow (perm)	1365	1627	0	1308	1664	0	832	1845	1568	802	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				52			61
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	100	16	58	25	9	17	62	538	22	51	513	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	74	0	25	26	0	62	538	22	51	513	61
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		41.6	41.6	41.6	41.6	41.6	41.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.8	10.8		10.7	10.7		55.0	55.0	55.0	55.0	55.0	55.0
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.51	0.26		0.13	0.10		0.10	0.39	0.01	0.08	0.37	0.05
Control Delay (s/veh)	37.8	12.9		27.6	16.2		5.5	6.7	0.5	2.2	3.0	0.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.8	12.9		27.6	16.2		5.5	6.7	0.5	2.2	3.0	0.6
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		27.3			21.8			6.4			2.7	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 24 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay (s/veh): 7.8		Intersection LOS: A	
Intersection Capacity Utilization 58.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	92	15	53	23	8	16	57	495	20	47	472	56
Future Volume (veh/h)	92	15	53	23	8	16	57	495	20	47	472	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	100	16	58	25	9	17	62	538	22	51	513	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	237	41	149	194	67	127	595	1317	1116	595	1317	1116
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.71	0.71	0.71	0.71	0.71	0.71
Sat Flow, veh/h	1374	352	1275	1315	575	1085	832	1856	1572	843	1856	1572
Grp Volume(v), veh/h	100	0	74	25	0	26	62	538	22	51	513	61
Grp Sat Flow(s),veh/h/ln	1374	0	1626	1315	0	1660	832	1856	1572	843	1856	1572
Q Serve(g_s), s	5.3	0.0	3.2	1.3	0.0	1.1	2.4	8.9	0.3	2.0	8.3	0.9
Cycle Q Clear(g_c), s	6.3	0.0	3.2	4.5	0.0	1.1	10.7	8.9	0.3	10.9	8.3	0.9
Prop In Lane	1.00		0.78	1.00		0.65	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	237	0	190	194	0	194	595	1317	1116	595	1317	1116
V/C Ratio(X)	0.42	0.00	0.39	0.13	0.00	0.13	0.10	0.41	0.02	0.09	0.39	0.05
Avail Cap(c_a), veh/h	450	0	442	398	0	452	595	1317	1116	595	1317	1116
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.6	0.0	30.7	32.7	0.0	29.7	6.5	4.4	3.2	6.7	4.4	3.3
Incr Delay (d2), s/veh	1.2	0.0	1.3	0.3	0.0	0.3	0.4	0.9	0.0	0.3	0.9	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	1.8	0.0	1.3	0.4	0.0	0.4	0.4	2.2	0.1	0.3	2.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.8	0.0	32.0	33.0	0.0	30.0	6.9	5.4	3.2	6.9	5.2	3.4
LnGrp LOS	C		C	C		C	A	A	A	A	A	A
Approach Vol, veh/h		174			51			622			625	
Approach Delay, s/veh		33.0			31.5			5.5			5.2	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		59.6		15.4		59.6		15.4				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		41.6		20.4		41.6		20.4				
Max Q Clear Time (g_c+I1), s		12.7		8.3		12.9		6.5				
Green Ext Time (p_c), s		3.8		0.5		3.7		0.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			9.5									
HCM 7th LOS			A									

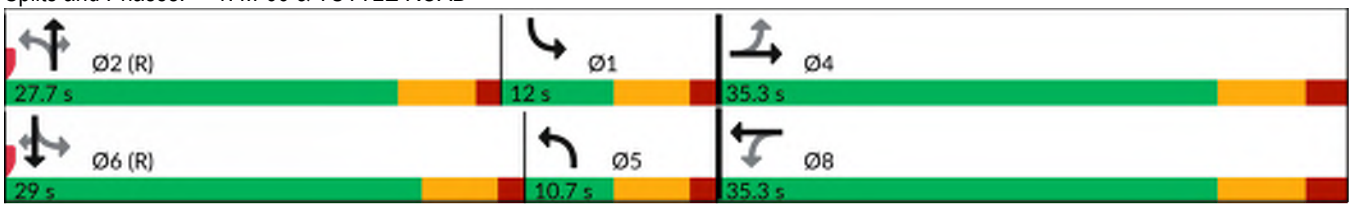
APPENDIX F
2026 No-Build Traffic Scenario
Capacity Analysis Summary Sheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	48	6	139	49	144	12	339	84	220	433	35
Future Volume (vph)	45	48	6	139	49	144	12	339	84	220	433	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.888				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1817	0	1736	1595	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.542			0.714			0.321			0.401		
Satd. Flow (perm)	945	1817	0	1304	1595	0	598	1759	1553	712	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			178				145			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	56	59	7	172	60	178	15	419	104	272	535	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	66	0	172	238	0	15	419	104	272	535	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	12.0	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	36.9%	36.9%	16.0%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	22.0	22.0	6.3	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	15.6	15.6		15.6	15.6		39.4	34.4	34.4	45.6	44.3	44.3
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.53	0.46	0.46	0.61	0.59	0.59
v/c Ratio	0.28	0.17		0.63	0.50		0.03	0.51	0.13	0.52	0.50	0.04
Control Delay (s/veh)	26.6	21.1		36.9	10.9		7.3	17.7	1.1	16.2	14.0	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	26.6	21.1		36.9	10.9		7.3	17.7	1.1	16.2	14.0	0.0
LOS	C	C		D	B		A	B	A	B	B	A
Approach Delay (s/veh)		23.7			21.8			14.3			14.0	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 40 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay (s/veh): 16.4		Intersection LOS: B	
Intersection Capacity Utilization 67.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD



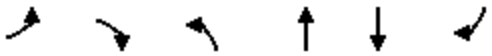
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	48	6	139	49	144	12	339	84	220	433	35
Future Volume (veh/h)	45	48	6	139	49	144	12	339	84	220	433	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	56	59	7	172	60	178	15	419	104	272	535	43
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	184	354	42	343	88	262	499	523	458	571	567	492
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.29	0.29	0.24	0.31	0.31
Sat Flow, veh/h	1079	1628	193	1314	406	1204	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	56	0	66	172	0	238	15	419	104	272	535	43
Grp Sat Flow(s),veh/h/ln	1079	0	1821	1314	0	1609	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	3.8	0.0	2.2	9.2	0.0	10.2	0.0	16.3	3.8	2.4	21.4	1.4
Cycle Q Clear(g_c), s	14.0	0.0	2.2	11.4	0.0	10.2	0.0	16.3	3.8	2.4	21.4	1.4
Prop In Lane	1.00		0.11	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	184	0	396	343	0	350	499	523	458	571	567	492
V/C Ratio(X)	0.30	0.00	0.17	0.50	0.00	0.68	0.03	0.80	0.23	0.48	0.94	0.09
Avail Cap(c_a), veh/h	352	0	680	548	0	601	499	523	458	571	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	23.8	28.4	0.0	27.0	22.5	24.5	20.1	21.2	25.2	18.3
Incr Delay (d2), s/veh	0.9	0.0	0.2	1.1	0.0	2.3	0.0	12.3	1.2	0.6	26.1	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	1.0	0.0	0.9	2.8	0.0	3.9	0.2	7.9	1.4	3.4	12.3	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.3	0.0	24.0	29.6	0.0	29.3	22.6	36.7	21.2	21.8	51.3	18.7
LnGrp LOS	C		C	C		C	C	D	C	C	D	B
Approach Vol, veh/h		122			410			538			850	
Approach Delay, s/veh		28.7			29.4			33.3			40.2	
Approach LOS		C			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	23.7	27.7		23.6	22.4	29.0		23.6				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 6.3	* 22		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	4.4	18.3		16.0	2.0	23.4		13.4				
Green Ext Time (p_c), s	0.2	1.0		0.4	0.0	0.0		1.7				

Intersection Summary		
HCM 7th Control Delay, s/veh	35.2	
HCM 7th LOS	D	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	14	32	457	474	73
Future Volume (vph)	5	14	32	457	474	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85	0	100			115
Storage Lanes	1	0	1			0
Taper Length (ft)	65		60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1417	1770	1759	1792	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1417	1770	1759	1792	1583
Link Speed (mph)	30			45	45	
Link Distance (ft)	311			1828	1569	
Travel Time (s)	7.1			27.7	23.8	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	14%	2%	8%	6%	2%
Adj. Flow (vph)	6	17	38	544	564	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	6	17	38	544	564	87
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

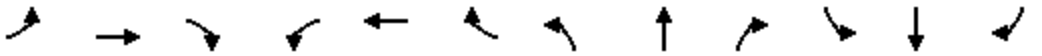
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	14	32	457	474	73
Future Vol, veh/h	5	14	32	457	474	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	6	17	38	544	564	87

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1185	564	651	0	-	0
Stage 1	564	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	209	503	935	-	-	-
Stage 1	569	-	-	-	-	-
Stage 2	536	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	200	503	935	-	-	-
Mov Cap-2 Maneuver	338	-	-	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	536	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	13.31	0.59	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	935	-	338	503	-	-
HCM Lane V/C Ratio	0.041	-	0.018	0.033	-	-
HCM Control Delay (s/veh)	9	-	15.8	12.4	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	340	19	7	343	0	14	0	4	0	0	1
Future Volume (vph)	0	340	19	7	343	0	14	0	4	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	486	27	10	490	0	20	0	6	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	513	0	10	490	0	0	20	6	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 35.7%		ICU Level of Service A	
Analysis Period (min) 15			

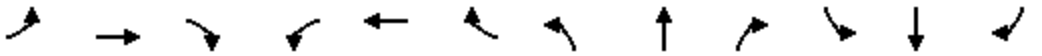
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	340	19	7	343	0	14	0	4	0	0	1
Future Vol, veh/h	0	340	19	7	343	0	14	0	4	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	486	27	10	490	0	20	0	6	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	490	0	0	513	0	0	1009	1009	499	996	1023	490
Stage 1	-	-	-	-	-	-	499	499	-	510	510	-
Stage 2	-	-	-	-	-	-	510	510	-	486	513	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1073	-	-	1053	-	-	219	240	571	223	236	578
Stage 1	-	-	-	-	-	-	553	544	-	546	538	-
Stage 2	-	-	-	-	-	-	546	538	-	563	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1073	-	-	1053	-	-	216	238	571	219	233	578
Mov Cap-2 Maneuver	-	-	-	-	-	-	216	238	-	219	233	-
Stage 1	-	-	-	-	-	-	553	544	-	541	532	-
Stage 2	-	-	-	-	-	-	539	532	-	557	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.17	20.69	11.24
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	216	571	1073	-	-	1053	-	-	578
HCM Lane V/C Ratio	0.093	0.01	-	-	-	0.01	-	-	0.002
HCM Control Delay (s/veh)	23.4	11.4	0	-	-	8.5	-	-	11.2
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	0	-	-	0	-	-	0

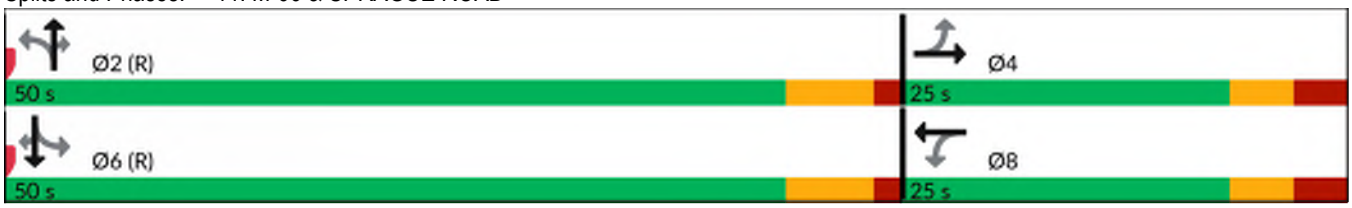


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1	4	6	0	4	19	467	13	33	445	17
Future Volume (vph)	7	1	4	6	0	4	19	467	13	33	445	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.487			0.477		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	898	1845	1568	880	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			352				52			52
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	8	1	4	7	0	4	21	508	14	36	484	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	5	0	7	4	0	21	508	14	36	484	18
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	18.4	18.4		18.4	18.4		43.6	43.6	43.6	43.6	43.6	43.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.1	6.1		6.1	6.1		71.0	71.0	71.0	71.0	71.0	71.0
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.95	0.95	0.95	0.95	0.95	0.95
v/c Ratio	0.05	0.03		0.04	0.00		0.02	0.29	0.00	0.04	0.27	0.01
Control Delay (s/veh)	32.1	23.0		32.0	0.0		1.4	1.6	0.0	0.2	0.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.1	23.0		32.0	0.0		1.4	1.6	0.0	0.2	0.4	0.0
LOS	C	C		C	A		A	A	A	A	A	A
Approach Delay (s/veh)		28.6			20.4			1.6			0.4	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 72 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.29			
Intersection Signal Delay (s/veh): 1.5		Intersection LOS: A	
Intersection Capacity Utilization 44.1%		ICU Level of Service A	
Analysis Period (min) 15			

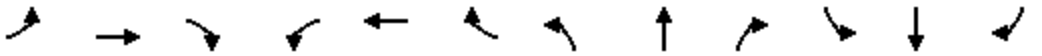
Splits and Phases: 11: M-66 & SPRAGUE ROAD



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1	4	6	0	4	19	467	13	33	445	17
Future Volume (veh/h)	7	1	4	6	0	4	19	467	13	33	445	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	8	1	4	7	0	4	21	508	14	36	484	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	129	9	34	129	0	41	745	1485	1259	729	1485	1259
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.80	0.80	0.80	0.80	0.80	0.80
Sat Flow, veh/h	1401	324	1298	1400	0	1572	889	1856	1572	873	1856	1572
Grp Volume(v), veh/h	8	0	5	7	0	4	21	508	14	36	484	18
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	889	1856	1572	873	1856	1572
Q Serve(g_s), s	0.4	0.0	0.2	0.4	0.0	0.2	0.5	5.6	0.1	0.9	5.3	0.2
Cycle Q Clear(g_c), s	0.6	0.0	0.2	0.6	0.0	0.2	5.8	5.6	0.1	6.5	5.3	0.2
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	0	43	129	0	41	745	1485	1259	729	1485	1259
V/C Ratio(X)	0.06	0.00	0.12	0.05	0.00	0.10	0.03	0.34	0.01	0.05	0.33	0.01
Avail Cap(c_a), veh/h	436	0	398	435	0	386	745	1485	1259	729	1485	1259
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	35.7	36.0	0.0	35.6	2.8	2.1	1.5	3.0	2.0	1.5
Incr Delay (d2), s/veh	0.2	0.0	1.2	0.2	0.0	1.0	0.1	0.6	0.0	0.1	0.6	0.0
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	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.7	0.0	0.1	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.1	0.0	36.9	36.1	0.0	36.7	2.9	2.7	1.5	3.1	2.6	1.5
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		13			11			543			538	
Approach Delay, s/veh		36.4			36.3			2.7			2.6	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	66.4	8.6	66.4	8.6
Change Period (Y+Rc), s	6.4	6.6	6.4	6.6
Max Green Setting (Gmax), s	43.6	18.4	43.6	18.4
Max Q Clear Time (g_c+I1), s	7.8	2.6	8.5	2.6
Green Ext Time (p_c), s	3.3	0.0	3.3	0.0

Intersection Summary	
HCM 7th Control Delay, s/veh	3.4
HCM 7th LOS	A

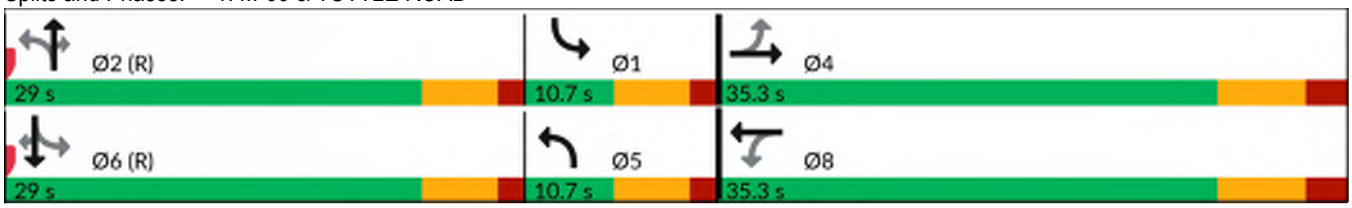


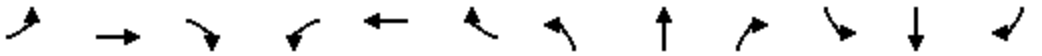
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	105	31	117	52	93	22	562	157	132	575	66
Future Volume (vph)	221	105	31	117	52	93	22	562	157	132	575	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.966			0.904				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1786	0	1736	1626	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.662			0.668			0.215			0.225		
Satd. Flow (perm)	1154	1786	0	1220	1626	0	400	1759	1553	400	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			96				162			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	228	108	32	121	54	96	23	579	162	136	593	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	140	0	121	150	0	23	579	162	136	593	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	29.0	29.0	10.7	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	38.7%	38.7%	14.3%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	23.3	23.3	5.0	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	20.0	20.0		20.0	20.0		36.3	31.3	31.3	39.7	37.7	37.7
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.48	0.42	0.42	0.53	0.50	0.50
v/c Ratio	0.74	0.28		0.37	0.29		0.08	0.78	0.21	0.45	0.65	0.07
Control Delay (s/veh)	39.0	17.7		23.8	9.3		9.5	28.5	2.7	21.6	23.3	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.0	17.7		23.8	9.3		9.5	28.5	2.7	21.6	23.3	0.1
LOS	D	B		C	A		A	C	A	C	C	A
Approach Delay (s/veh)		31.0			15.8			22.5			21.1	
Approach LOS		C			B			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 66 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay (s/veh): 22.6		Intersection LOS: C	
Intersection Capacity Utilization 79.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





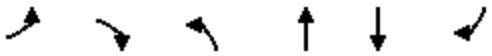
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	221	105	31	117	52	93	22	562	157	132	575	66
Future Volume (veh/h)	221	105	31	117	52	93	22	562	157	132	575	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	228	108	32	121	54	96	23	579	162	136	593	68
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	361	409	121	388	175	311	350	553	485	340	567	492
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.14	0.31	0.31	0.14	0.31	0.31
Sat Flow, veh/h	1169	1375	407	1229	589	1048	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	228	0	140	121	0	150	23	579	162	136	593	68
Grp Sat Flow(s),veh/h/ln	1169	0	1782	1229	0	1637	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	14.1	0.0	4.5	6.2	0.0	5.3	0.0	23.3	6.0	1.0	23.3	2.3
Cycle Q Clear(g_c), s	19.4	0.0	4.5	10.7	0.0	5.3	0.0	23.3	6.0	1.0	23.3	2.3
Prop In Lane	1.00		0.23	1.00		0.64	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	361	0	530	388	0	487	350	553	485	340	567	492
V/C Ratio(X)	0.63	0.00	0.26	0.31	0.00	0.31	0.07	1.05	0.33	0.40	1.05	0.14
Avail Cap(c_a), veh/h	450	0	665	481	0	611	350	553	485	340	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	20.1	24.2	0.0	20.4	27.6	25.8	19.9	27.6	25.8	18.6
Incr Delay (d2), s/veh	1.9	0.0	0.3	0.5	0.0	0.4	0.1	50.9	1.9	0.8	50.2	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	1.8	1.8	0.0	2.0	0.3	16.5	2.2	2.0	16.8	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.8	0.0	20.4	24.7	0.0	20.7	27.6	76.7	21.7	28.4	76.0	19.2
LnGrp LOS	C		C	C		C	C	F	C	C	F	B
Approach Vol, veh/h		368			271			764			797	
Approach Delay, s/veh		26.2			22.5			63.6			63.1	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.4	29.0		29.6	16.4	29.0		29.6				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5	* 23		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	3.0	25.3		21.4	2.0	25.3		12.7				
Green Ext Time (p_c), s	0.1	0.0		0.9	0.0	0.0		1.1				

Intersection Summary		
HCM 7th Control Delay, s/veh	52.1	
HCM 7th LOS	D	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	27	54	793	654	49
Future Volume (vph)	8	27	54	793	654	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85	0	100			115
Storage Lanes	1	0	1			0
Taper Length (ft)	65		60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1417	1770	1759	1792	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1417	1770	1759	1792	1583
Link Speed (mph)	30			45	45	
Link Distance (ft)	311			1828	1569	
Travel Time (s)	7.1			27.7	23.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	14%	2%	8%	6%	2%
Adj. Flow (vph)	8	28	56	826	681	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	28	56	826	681	51
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.7%		ICU Level of Service A	
Analysis Period (min) 15			

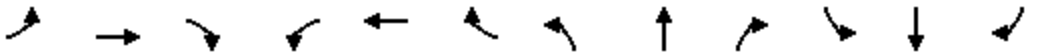
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	27	54	793	654	49
Future Vol, veh/h	8	27	54	793	654	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	8	28	56	826	681	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1620	681	732	0	-	0
Stage 1	681	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	113	430	872	-	-	-
Stage 1	503	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	106	430	872	-	-	-
Mov Cap-2 Maneuver	240	-	-	-	-	-
Stage 1	470	-	-	-	-	-
Stage 2	381	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.46	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	872	-	240	430	-	-
HCM Lane V/C Ratio	0.064	-	0.035	0.065	-	-
HCM Control Delay (s/veh)	9.4	-	20.6	14	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	378	21	4	217	6	30	0	5	0	0	3
Future Volume (vph)	9	378	21	4	217	6	30	0	5	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	540	30	6	310	9	43	0	7	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	570	0	6	319	0	0	43	7	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.8%		ICU Level of Service A	
Analysis Period (min) 15			

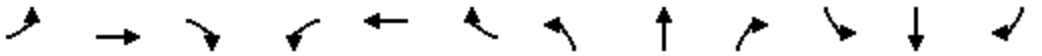
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	378	21	4	217	6	30	0	5	0	0	3
Future Vol, veh/h	9	378	21	4	217	6	30	0	5	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	540	30	6	310	9	43	0	7	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	319	0	0	570	0	0	902	911	555	891	921	314
Stage 1	-	-	-	-	-	-	581	581	-	326	326	-
Stage 2	-	-	-	-	-	-	321	330	-	566	596	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1241	-	-	1002	-	-	259	274	531	263	270	726
Stage 1	-	-	-	-	-	-	500	500	-	687	649	-
Stage 2	-	-	-	-	-	-	690	646	-	509	492	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1241	-	-	1002	-	-	253	270	531	255	266	726
Mov Cap-2 Maneuver	-	-	-	-	-	-	253	270	-	255	266	-
Stage 1	-	-	-	-	-	-	494	495	-	683	645	-
Stage 2	-	-	-	-	-	-	682	642	-	497	487	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.17	0.15	20.65	9.99
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	253	531	1241	-	-	1002	-	-	726
HCM Lane V/C Ratio	0.169	0.013	0.01	-	-	0.006	-	-	0.006
HCM Control Delay (s/veh)	22.1	11.9	7.9	-	-	8.6	-	-	10
HCM Lane LOS	C	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0	-	-	0

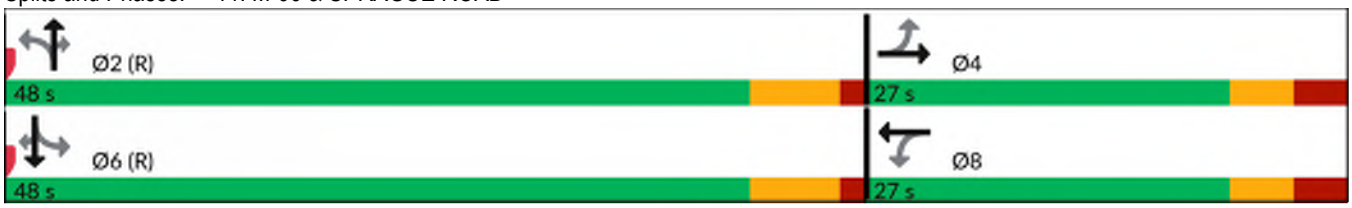


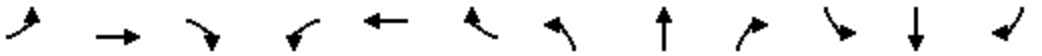
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	15	53	24	9	16	58	494	20	47	470	56
Future Volume (vph)	92	15	53	24	9	16	58	494	20	47	470	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.906				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1671	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.452			0.436		
Satd. Flow (perm)	1365	1627	0	1308	1671	0	834	1845	1568	804	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				52			61
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	100	16	58	26	10	17	63	537	22	51	511	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	74	0	26	27	0	63	537	22	51	511	61
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		41.6	41.6	41.6	41.6	41.6	41.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.8	10.8		10.7	10.7		55.0	55.0	55.0	55.0	55.0	55.0
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.51	0.26		0.13	0.10		0.10	0.39	0.01	0.08	0.37	0.05
Control Delay (s/veh)	37.8	12.9		27.7	16.4		5.5	6.7	0.5	2.1	2.8	0.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.8	12.9		27.7	16.4		5.5	6.7	0.5	2.1	2.8	0.5
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		27.3			22.0			6.4			2.6	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 24 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay (s/veh): 7.8		Intersection LOS: A	
Intersection Capacity Utilization 58.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD



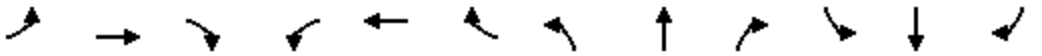


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	92	15	53	24	9	16	58	494	20	47	470	56
Future Volume (veh/h)	92	15	53	24	9	16	58	494	20	47	470	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	100	16	58	26	10	17	63	537	22	51	511	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	237	41	149	195	72	123	595	1316	1116	595	1316	1116
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.71	0.71	0.71	0.71	0.71	0.71
Sat Flow, veh/h	1372	352	1275	1315	617	1049	834	1856	1572	844	1856	1572
Grp Volume(v), veh/h	100	0	74	26	0	27	63	537	22	51	511	61
Grp Sat Flow(s),veh/h/ln	1372	0	1626	1315	0	1667	834	1856	1572	844	1856	1572
Q Serve(g_s), s	5.3	0.0	3.2	1.4	0.0	1.1	2.5	8.9	0.3	2.0	8.3	0.9
Cycle Q Clear(g_c), s	6.4	0.0	3.2	4.6	0.0	1.1	10.7	8.9	0.3	10.8	8.3	0.9
Prop In Lane	1.00		0.78	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	237	0	191	195	0	195	595	1316	1116	595	1316	1116
V/C Ratio(X)	0.42	0.00	0.39	0.13	0.00	0.14	0.11	0.41	0.02	0.09	0.39	0.05
Avail Cap(c_a), veh/h	449	0	442	398	0	453	595	1316	1116	595	1316	1116
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.6	0.0	30.6	32.7	0.0	29.7	6.5	4.5	3.2	6.7	4.4	3.3
Incr Delay (d2), s/veh	1.2	0.0	1.3	0.3	0.0	0.3	0.4	0.9	0.0	0.3	0.9	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	1.8	0.0	1.3	0.5	0.0	0.4	0.4	2.2	0.1	0.3	2.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.8	0.0	31.9	33.0	0.0	30.0	6.9	5.4	3.2	7.0	5.2	3.4
LnGrp LOS	C		C	C		C	A	A	A	A	A	A
Approach Vol, veh/h		174			53			622			623	
Approach Delay, s/veh		33.0			31.5			5.5			5.2	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		59.6		15.4		59.6		15.4				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		41.6		20.4		41.6		20.4				
Max Q Clear Time (g_c+I1), s		12.7		8.4		12.8		6.6				
Green Ext Time (p_c), s		3.8		0.5		3.6		0.1				

Intersection Summary	
HCM 7th Control Delay, s/veh	9.5
HCM 7th LOS	A

APPENDIX G
2026 Build Year Traffic Scenario
Capacity Analysis Summary Sheets

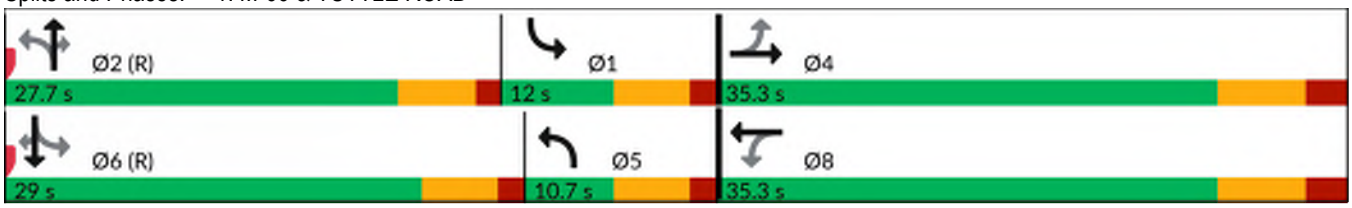


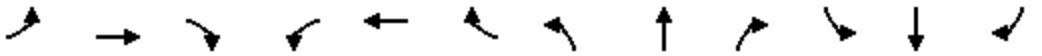
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	37	30	163	38	144	34	370	106	220	467	35
Future Volume (vph)	45	37	30	163	38	144	34	370	106	220	467	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.933			0.881				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1729	0	1736	1582	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.584			0.703			0.261			0.369		
Satd. Flow (perm)	1018	1729	0	1284	1582	0	486	1759	1553	655	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			178				145			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	56	46	37	201	47	178	42	457	131	272	577	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	83	0	201	225	0	42	457	131	272	577	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	12.0	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	36.9%	36.9%	16.0%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	22.0	22.0	6.3	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	17.3	17.3		17.3	17.3		37.7	32.7	32.7	42.0	38.2	38.2
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.50	0.44	0.44	0.56	0.51	0.51
v/c Ratio	0.23	0.19		0.67	0.44		0.12	0.59	0.17	0.60	0.62	0.04
Control Delay (s/veh)	23.5	13.7		36.9	8.8		8.8	21.0	2.3	21.1	21.4	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.5	13.7		36.9	8.8		8.8	21.0	2.3	21.1	21.4	0.1
LOS	C	B		D	A		A	C	A	C	C	A
Approach Delay (s/veh)		17.7			22.1			16.3			20.4	
Approach LOS		B			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 40 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay (s/veh): 19.3		Intersection LOS: B	
Intersection Capacity Utilization 68.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





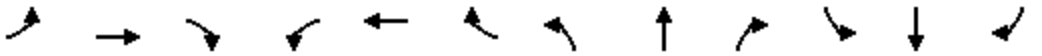
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	37	30	163	38	144	34	370	106	220	467	35
Future Volume (veh/h)	45	37	30	163	38	144	34	370	106	220	467	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	56	46	37	201	47	178	42	457	131	272	577	43
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	215	223	180	349	78	297	462	523	458	516	567	492
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.21	0.29	0.29	0.22	0.31	0.31
Sat Flow, veh/h	1092	952	766	1294	334	1264	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	56	0	83	201	0	225	42	457	131	272	577	43
Grp Sat Flow(s),veh/h/ln	1092	0	1718	1294	0	1598	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	3.6	0.0	2.9	11.1	0.0	9.4	0.0	18.3	4.9	4.0	23.3	1.4
Cycle Q Clear(g_c), s	13.0	0.0	2.9	14.0	0.0	9.4	0.0	18.3	4.9	4.0	23.3	1.4
Prop In Lane	1.00		0.45	1.00		0.79	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	215	0	403	349	0	375	462	523	458	516	567	492
V/C Ratio(X)	0.26	0.00	0.21	0.58	0.00	0.60	0.09	0.87	0.29	0.53	1.02	0.09
Avail Cap(c_a), veh/h	367	0	641	529	0	597	462	523	458	516	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	0.0	23.1	28.7	0.0	25.6	23.7	25.2	20.4	22.9	25.8	18.3
Incr Delay (d2), s/veh	0.6	0.0	0.2	1.5	0.0	1.5	0.1	18.2	1.6	1.0	42.2	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	1.0	0.0	1.1	3.4	0.0	3.5	0.6	9.5	1.8	3.7	15.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	32.0	0.0	23.3	30.2	0.0	27.1	23.8	43.4	22.0	23.9	68.0	18.7
LnGrp LOS	C		C	C		C	C	D	C	C	F	B
Approach Vol, veh/h		139			426			630			892	
Approach Delay, s/veh		26.8			28.6			37.6			52.2	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.4	27.7		24.9	21.1	29.0		24.9				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 6.3	* 22		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	6.0	20.3		15.0	2.0	25.3		16.0				
Green Ext Time (p_c), s	0.0	0.6		0.5	0.0	0.0		1.6				

Intersection Summary		
HCM 7th Control Delay, s/veh	41.3	
HCM 7th LOS	D	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	14	49	0	102	32	430	52	108	448	73
Future Volume (vph)	5	0	14	49	0	102	32	430	52	108	448	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		100	100		115
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1743	0	1770	1792	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1417	0	1770	1583	0	1770	1743	0	1770	1792	1583
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			385			1828			1569	
Travel Time (s)		7.1			0.0			27.7			23.8	
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	6	0	17	53	0	111	38	512	57	117	533	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	17	0	53	111	0	38	569	0	117	533	87
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.2%		ICU Level of Service A	
Analysis Period (min) 15			

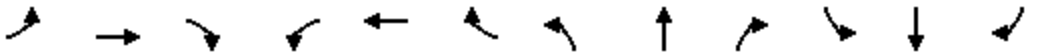
Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	14	49	0	102	32	430	52	108	448	73
Future Vol, veh/h	5	0	14	49	0	102	32	430	52	108	448	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	92	84	92	92	92	84	84	92	92	84	84
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	6	0	17	53	0	111	38	512	57	117	533	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1356	1413	533	1384	1471	540	620	0	0	568	0	0
Stage 1	768	768	-	616	616	-	-	-	-	-	-	-
Stage 2	588	645	-	768	855	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	126	138	524	121	127	542	960	-	-	1004	-	-
Stage 1	394	411	-	478	482	-	-	-	-	-	-	-
Stage 2	495	468	-	394	375	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	85	117	524	99	108	542	960	-	-	1004	-	-
Mov Cap-2 Maneuver	85	117	-	99	108	-	-	-	-	-	-	-
Stage 1	348	363	-	459	463	-	-	-	-	-	-	-
Stage 2	378	449	-	337	331	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	22.18	34.08	0.56	1.44
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	960	-	-	85	524	99	542	1004	-	-
HCM Lane V/C Ratio	0.04	-	-	0.07	0.032	0.537	0.205	0.117	-	-
HCM Control Delay (s/veh)	8.9	-	-	50.4	12.1	77.2	13.3	9.1	-	-
HCM Lane LOS	A	-	-	F	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	2.4	0.8	0.4	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	351	19	7	356	0	14	0	4	0	0	1
Future Volume (vph)	0	351	19	7	356	0	14	0	4	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	501	27	10	509	0	20	0	6	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	528	0	10	509	0	0	20	6	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.3%		ICU Level of Service A	
Analysis Period (min) 15			

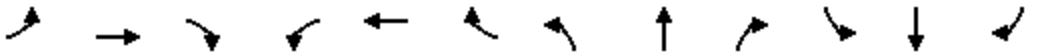
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	351	19	7	356	0	14	0	4	0	0	1
Future Vol, veh/h	0	351	19	7	356	0	14	0	4	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	501	27	10	509	0	20	0	6	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	509	0	0	529	0	0	1044	1044	515	1030	1057	509
Stage 1	-	-	-	-	-	-	515	515	-	529	529	-
Stage 2	-	-	-	-	-	-	529	529	-	501	529	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1056	-	-	1039	-	-	207	229	560	212	225	564
Stage 1	-	-	-	-	-	-	543	535	-	533	527	-
Stage 2	-	-	-	-	-	-	533	527	-	552	527	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1056	-	-	1039	-	-	205	227	560	208	223	564
Mov Cap-2 Maneuver	-	-	-	-	-	-	205	227	-	208	223	-
Stage 1	-	-	-	-	-	-	543	535	-	528	522	-
Stage 2	-	-	-	-	-	-	527	522	-	546	527	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.16	21.6	11.39
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	205	560	1056	-	-	1039	-	-	564
HCM Lane V/C Ratio	0.098	0.01	-	-	-	0.01	-	-	0.003
HCM Control Delay (s/veh)	24.5	11.5	0	-	-	8.5	-	-	11.4
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	0	-	-	0	-	-	0

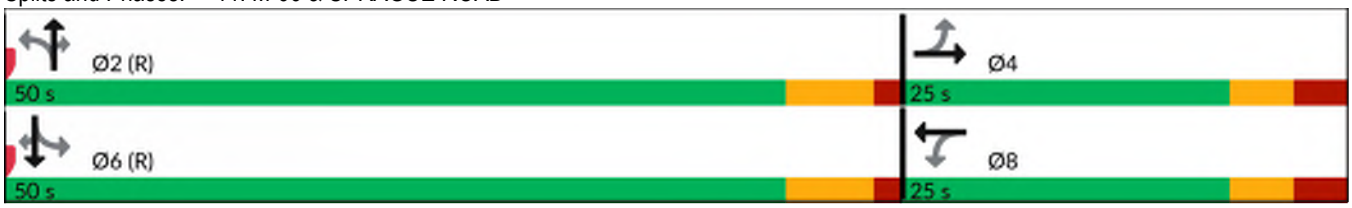


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	1	4	6	0	4	19	488	13	33	464	21
Future Volume (vph)	11	1	4	6	0	4	19	488	13	33	464	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.478			0.465		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	882	1845	1568	858	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			335				52			52
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	12	1	4	7	0	4	21	530	14	36	504	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	5	0	7	4	0	21	530	14	36	504	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	18.4	18.4		18.4	18.4		43.6	43.6	43.6	43.6	43.6	43.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.3	6.3		6.2	6.2		66.9	66.9	66.9	66.9	66.9	66.9
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.89	0.89	0.89	0.89	0.89	0.89
v/c Ratio	0.07	0.03		0.04	0.00		0.02	0.32	0.00	0.04	0.30	0.01
Control Delay (s/veh)	32.1	22.6		31.6	0.0		2.4	2.7	0.0	0.5	0.8	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.1	22.6		31.6	0.0		2.4	2.7	0.0	0.5	0.8	0.0
LOS	C	C		C	A		A	A	A	A	A	A
Approach Delay (s/veh)		29.4			20.2			2.6			0.8	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 72 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay (s/veh): 2.3		Intersection LOS: A	
Intersection Capacity Utilization 45.5%		ICU Level of Service A	
Analysis Period (min) 15			

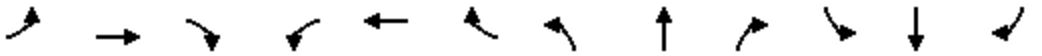
Splits and Phases: 11: M-66 & SPRAGUE ROAD



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	1	4	6	0	4	19	488	13	33	464	21
Future Volume (veh/h)	11	1	4	6	0	4	19	488	13	33	464	21
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	12	1	4	7	0	4	21	530	14	36	504	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	134	10	38	133	0	46	723	1479	1254	709	1479	1254
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.80	0.80	0.80	0.80	0.80	0.80
Sat Flow, veh/h	1401	324	1298	1400	0	1572	869	1856	1572	855	1856	1572
Grp Volume(v), veh/h	12	0	5	7	0	4	21	530	14	36	504	23
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	869	1856	1572	855	1856	1572
Q Serve(g_s), s	0.6	0.0	0.2	0.4	0.0	0.2	0.5	6.1	0.1	0.9	5.7	0.2
Cycle Q Clear(g_c), s	0.8	0.0	0.2	0.6	0.0	0.2	6.2	6.1	0.1	7.0	5.7	0.2
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	134	0	48	133	0	46	723	1479	1254	709	1479	1254
V/C Ratio(X)	0.09	0.00	0.10	0.05	0.00	0.09	0.03	0.36	0.01	0.05	0.34	0.02
Avail Cap(c_a), veh/h	436	0	398	435	0	386	723	1479	1254	709	1479	1254
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	35.4	35.7	0.0	35.4	3.0	2.2	1.6	3.2	2.1	1.6
Incr Delay (d2), s/veh	0.3	0.0	0.9	0.2	0.0	0.8	0.1	0.7	0.0	0.1	0.6	0.0
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	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.8	0.0	0.1	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.1	0.0	36.4	35.9	0.0	36.2	3.1	2.8	1.6	3.3	2.7	1.6
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		17			11			565			563	
Approach Delay, s/veh		36.2			36.0			2.8			2.7	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		66.2		8.8		66.2		8.8				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		43.6		18.4		43.6		18.4				
Max Q Clear Time (g_c+I1), s		8.2		2.8		9.0		2.6				
Green Ext Time (p_c), s		3.5		0.0		3.4		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			3.6									
HCM 7th LOS			A									

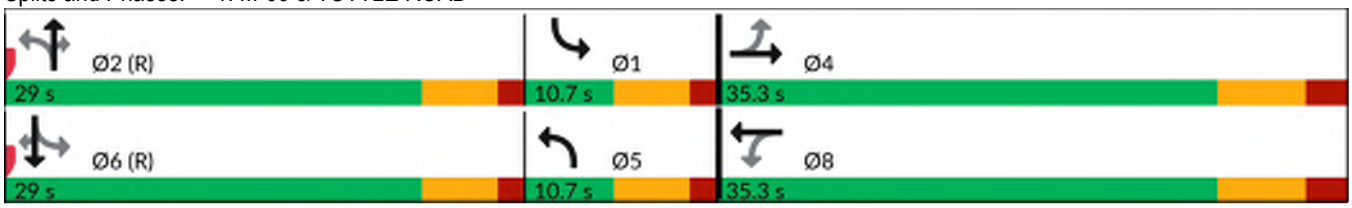


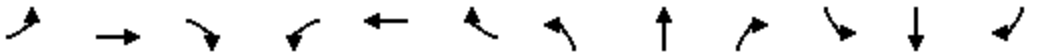
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	96	49	135	43	93	40	584	175	132	599	66
Future Volume (vph)	221	96	49	135	43	93	40	584	175	132	599	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.897				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1756	0	1736	1613	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.668			0.662			0.193			0.210		
Satd. Flow (perm)	1164	1756	0	1209	1613	0	360	1759	1553	373	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			96				180			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	228	99	51	139	44	96	41	602	180	136	618	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	150	0	139	140	0	41	602	180	136	618	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	29.0	29.0	10.7	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	38.7%	38.7%	14.3%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	23.3	23.3	5.0	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	19.9	19.9		19.9	19.9		36.4	31.4	31.4	38.7	35.7	35.7
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.49	0.42	0.42	0.52	0.48	0.48
v/c Ratio	0.74	0.30		0.43	0.28		0.15	0.81	0.23	0.48	0.71	0.08
Control Delay (s/veh)	38.8	15.9		25.4	8.5		10.8	30.8	2.9	23.5	26.9	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.8	15.9		25.4	8.5		10.8	30.8	2.9	23.5	26.9	0.1
LOS	D	B		C	A		B	C	A	C	C	A
Approach Delay (s/veh)		29.7			17.0			23.8			24.2	
Approach LOS		C			B			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 66 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay (s/veh): 24.1		Intersection LOS: C	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





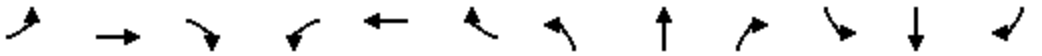
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	221	96	49	135	43	93	40	584	175	132	599	66
Future Volume (veh/h)	221	96	49	135	43	93	40	584	175	132	599	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	228	99	51	139	44	96	41	602	180	136	618	68
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	362	337	174	371	149	326	359	553	485	349	567	492
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.15	0.31	0.31	0.15	0.31	0.31
Sat Flow, veh/h	1179	1154	595	1218	511	1114	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	228	0	150	139	0	140	41	602	180	136	618	68
Grp Sat Flow(s),veh/h/ln	1179	0	1749	1218	0	1625	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	13.9	0.0	5.0	7.5	0.0	5.0	0.0	23.3	6.7	0.9	23.3	2.3
Cycle Q Clear(g_c), s	18.9	0.0	5.0	12.5	0.0	5.0	0.0	23.3	6.7	0.9	23.3	2.3
Prop In Lane	1.00		0.34	1.00		0.69	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	362	0	511	371	0	475	359	553	485	349	567	492
V/C Ratio(X)	0.63	0.00	0.29	0.37	0.00	0.29	0.11	1.09	0.37	0.39	1.09	0.14
Avail Cap(c_a), veh/h	458	0	653	470	0	607	359	553	485	349	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	20.6	25.4	0.0	20.6	27.2	25.8	20.1	27.3	25.8	18.6
Incr Delay (d2), s/veh	1.8	0.0	0.3	0.6	0.0	0.3	0.1	64.3	2.2	0.7	64.4	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	2.0	2.1	0.0	1.8	0.6	18.5	2.5	2.0	19.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.7	0.0	20.9	26.0	0.0	20.9	27.4	90.1	22.3	28.0	90.3	19.2
LnGrp LOS	C		C	C		C	C	F	C	C	F	B
Approach Vol, veh/h		378			279			823			822	
Approach Delay, s/veh		26.2			23.4			72.2			74.1	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.8	29.0		29.2	16.8	29.0		29.2				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5	* 23		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	2.9	25.3		20.9	2.0	25.3		14.5				
Green Ext Time (p_c), s	0.1	0.0		1.0	0.0	0.0		1.0				

Intersection Summary	
HCM 7th Control Delay, s/veh	59.4
HCM 7th LOS	E

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	27	37	0	78	53	773	38	80	634	48
Future Volume (vph)	8	0	27	37	0	78	53	773	38	80	634	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		100	100		115
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.993				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1752	0	1770	1792	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1417	0	1770	1583	0	1770	1752	0	1770	1792	1583
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			387			1828			1569	
Travel Time (s)		7.1			0.0			27.7			23.8	
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	8	0	28	40	0	85	55	805	41	87	660	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	28	0	40	85	0	55	846	0	87	660	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 66.1%		ICU Level of Service C	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	27	37	0	78	53	773	38	80	634	48
Future Vol, veh/h	8	0	27	37	0	78	53	773	38	80	634	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	8	0	28	40	0	85	55	805	41	87	660	50

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1750	1791	660	1771	1821	826	710	0	0	847	0	0
Stage 1	834	834	-	936	936	-	-	-	-	-	-	-
Stage 2	916	957	-	834	884	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	67	81	442	65	77	372	889	-	-	791	-	-
Stage 1	362	383	-	318	344	-	-	-	-	-	-	-
Stage 2	327	336	-	362	363	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	43	67	442	51	65	372	889	-	-	791	-	-
Mov Cap-2 Maneuver	43	67	-	51	65	-	-	-	-	-	-	-
Stage 1	322	341	-	298	322	-	-	-	-	-	-	-
Stage 2	236	315	-	302	323	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	35.06	74.72	0.57	1.1
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	889	-	-	43	442	51	372	791	-	-
HCM Lane V/C Ratio	0.062	-	-	0.193	0.064	0.793	0.228	0.11	-	-
HCM Control Delay (s/veh)	9.3	-	-	107.2	13.7	195.3	17.5	10.1	-	-
HCM Lane LOS	A	-	-	F	B	F	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.2	3.3	0.9	0.4	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	391	21	4	228	6	30	0	5	0	0	3
Future Volume (vph)	9	391	21	4	228	6	30	0	5	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	559	30	6	326	9	43	0	7	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	589	0	6	335	0	0	43	7	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.5%		ICU Level of Service A	
Analysis Period (min) 15			

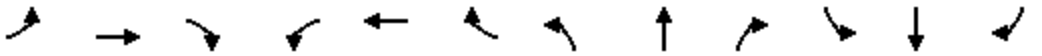
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	391	21	4	228	6	30	0	5	0	0	3
Future Vol, veh/h	9	391	21	4	228	6	30	0	5	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	559	30	6	326	9	43	0	7	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	334	0	0	589	0	0	936	945	574	926	956	330
Stage 1	-	-	-	-	-	-	599	599	-	341	341	-
Stage 2	-	-	-	-	-	-	337	346	-	584	614	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1225	-	-	987	-	-	245	262	519	249	258	712
Stage 1	-	-	-	-	-	-	488	490	-	674	638	-
Stage 2	-	-	-	-	-	-	677	636	-	497	483	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1225	-	-	987	-	-	240	258	519	242	254	712
Mov Cap-2 Maneuver	-	-	-	-	-	-	240	258	-	242	254	-
Stage 1	-	-	-	-	-	-	483	485	-	670	635	-
Stage 2	-	-	-	-	-	-	669	632	-	485	478	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.17	0.15	21.66	10.09
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	240	519	1225	-	-	987	-	-	712
HCM Lane V/C Ratio	0.179	0.014	0.01	-	-	0.006	-	-	0.006
HCM Control Delay (s/veh)	23.3	12	8	-	-	8.7	-	-	10.1
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0	-	-	0

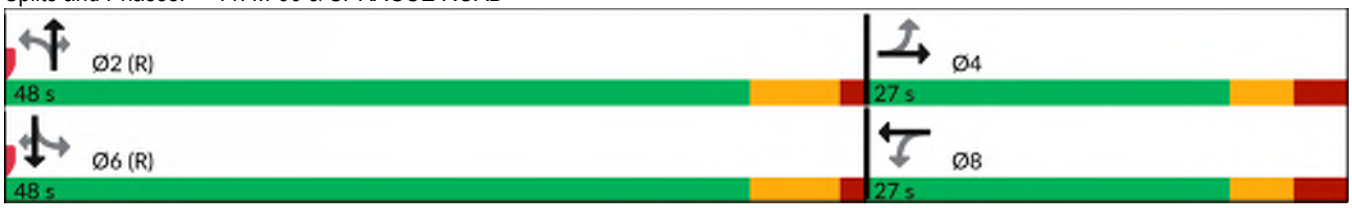


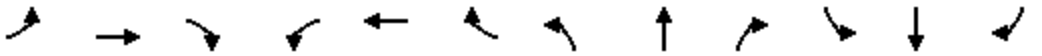
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	15	53	24	9	16	58	509	20	47	484	59
Future Volume (vph)	95	15	53	24	9	16	58	509	20	47	484	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.906				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1671	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.442			0.425		
Satd. Flow (perm)	1365	1627	0	1308	1671	0	815	1845	1568	784	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				52			64
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	103	16	58	26	10	17	63	553	22	51	526	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	74	0	26	27	0	63	553	22	51	526	64
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		41.6	41.6	41.6	41.6	41.6	41.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.0	11.0		10.8	10.8		54.9	54.9	54.9	54.9	54.9	54.9
Actuated g/C Ratio	0.15	0.15		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.51	0.25		0.13	0.10		0.10	0.40	0.01	0.08	0.38	0.05
Control Delay (s/veh)	37.8	12.8		27.5	16.3		5.6	6.9	0.5	2.0	2.7	0.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.8	12.8		27.5	16.3		5.6	6.9	0.5	2.0	2.7	0.6
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		27.4			21.8			6.6			2.5	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 24 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay (s/veh): 7.8		Intersection LOS: A	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD

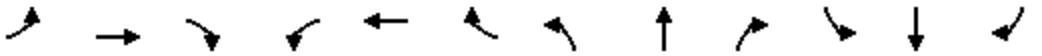




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	15	53	24	9	16	58	509	20	47	484	59
Future Volume (veh/h)	95	15	53	24	9	16	58	509	20	47	484	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	103	16	58	26	10	17	63	553	22	51	526	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	240	42	152	198	74	125	581	1312	1112	581	1312	1112
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.71	0.71	0.71	0.71	0.71	0.71
Sat Flow, veh/h	1372	352	1275	1315	617	1049	820	1856	1572	831	1856	1572
Grp Volume(v), veh/h	103	0	74	26	0	27	63	553	22	51	526	64
Grp Sat Flow(s),veh/h/ln	1372	0	1626	1315	0	1667	820	1856	1572	831	1856	1572
Q Serve(g_s), s	5.4	0.0	3.1	1.4	0.0	1.1	2.6	9.3	0.3	2.0	8.7	0.9
Cycle Q Clear(g_c), s	6.5	0.0	3.1	4.5	0.0	1.1	11.2	9.3	0.3	11.4	8.7	0.9
Prop In Lane	1.00		0.78	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	240	0	194	198	0	199	581	1312	1112	581	1312	1112
V/C Ratio(X)	0.43	0.00	0.38	0.13	0.00	0.14	0.11	0.42	0.02	0.09	0.40	0.06
Avail Cap(c_a), veh/h	449	0	442	399	0	453	581	1312	1112	581	1312	1112
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	30.5	32.6	0.0	29.6	6.8	4.6	3.3	6.9	4.5	3.4
Incr Delay (d2), s/veh	1.2	0.0	1.2	0.3	0.0	0.3	0.4	1.0	0.0	0.3	0.9	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	1.8	0.0	1.3	0.4	0.0	0.4	0.4	2.4	0.1	0.3	2.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.7	0.0	31.7	32.9	0.0	29.9	7.2	5.6	3.3	7.2	5.4	3.4
LnGrp LOS	C		C	C		C	A	A	A	A	A	A
Approach Vol, veh/h		177			53			638			641	
Approach Delay, s/veh		32.9			31.3			5.7			5.4	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		59.4		15.6		59.4		15.6				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		41.6		20.4		41.6		20.4				
Max Q Clear Time (g_c+I1), s		13.2		8.5		13.4		6.5				
Green Ext Time (p_c), s		4.0		0.5		3.8		0.1				

Intersection Summary	
HCM 7th Control Delay, s/veh	9.6
HCM 7th LOS	A

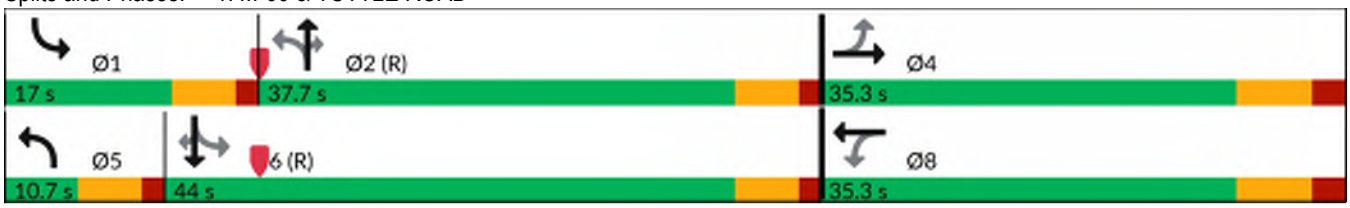


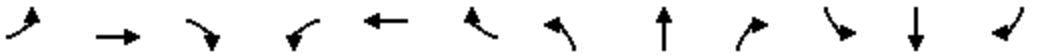
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	37	30	163	38	144	34	370	106	220	467	35
Future Volume (vph)	45	37	30	163	38	144	34	370	106	220	467	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.933			0.881				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1729	0	1736	1582	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.531			0.703			0.374			0.317		
Satd. Flow (perm)	926	1729	0	1284	1582	0	697	1759	1553	563	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			178				190			121
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	56	46	37	201	47	178	42	457	131	272	577	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	83	0	201	225	0	42	457	131	272	577	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	37.7	37.7	17.0	44.0	44.0
Total Split (%)	39.2%	39.2%		39.2%	39.2%		11.9%	41.9%	41.9%	18.9%	48.9%	48.9%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	32.0	32.0	11.3	38.3	38.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	19.6	19.6		19.6	19.6		46.4	40.5	40.5	57.4	50.3	50.3
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.52	0.45	0.45	0.64	0.56	0.56
v/c Ratio	0.27	0.20		0.72	0.46		0.09	0.57	0.16	0.54	0.57	0.04
Control Delay (s/veh)	30.4	16.9		46.3	10.3		3.5	17.6	3.5	12.7	18.8	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	30.4	16.9		46.3	10.3		3.5	17.6	3.5	12.7	18.8	0.0
LOS	C	B		D	B		A	B	A	B	B	A
Approach Delay (s/veh)		22.3			27.4			13.8			16.1	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 24 (27%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay (s/veh): 18.1		Intersection LOS: B	
Intersection Capacity Utilization 68.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





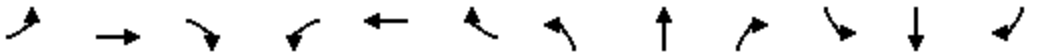
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	37	30	163	38	144	34	370	106	220	467	35
Future Volume (veh/h)	45	37	30	163	38	144	34	370	106	220	467	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	56	46	37	201	47	178	42	457	131	272	577	43
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	189	215	173	322	76	286	396	827	724	435	967	840
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.01	0.15	0.15	0.10	0.53	0.53
Sat Flow, veh/h	1092	952	766	1294	334	1264	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	56	0	83	201	0	225	42	457	131	272	577	43
Grp Sat Flow(s),veh/h/ln	1092	0	1718	1294	0	1598	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	4.4	0.0	3.5	13.5	0.0	11.4	1.1	21.4	6.6	7.0	19.5	1.2
Cycle Q Clear(g_c), s	15.8	0.0	3.5	17.0	0.0	11.4	1.1	21.4	6.6	7.0	19.5	1.2
Prop In Lane	1.00		0.45	1.00		0.79	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	0	389	322	0	362	396	827	724	435	967	840
V/C Ratio(X)	0.30	0.00	0.21	0.62	0.00	0.62	0.11	0.55	0.18	0.63	0.60	0.05
Avail Cap(c_a), veh/h	281	0	534	432	0	497	430	827	724	475	967	840
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.5	0.0	28.3	35.2	0.0	31.4	12.9	29.5	23.2	13.7	14.5	10.2
Incr Delay (d2), s/veh	0.9	0.0	0.3	2.0	0.0	1.8	0.1	2.4	0.5	2.3	2.7	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	1.2	0.0	1.4	4.3	0.0	4.4	0.4	10.6	2.5	2.4	7.6	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	39.3	0.0	28.6	37.2	0.0	33.1	13.0	31.9	23.7	15.9	17.3	10.3
LnGrp LOS	D		C	D		C	B	C	C	B	B	B
Approach Vol, veh/h		139			426			630			892	
Approach Delay, s/veh		32.9			35.0			29.0			16.5	
Approach LOS		C			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.9	47.5		27.7	9.0	53.4		27.7				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 11	* 32		28.0	* 5	* 38		28.0				
Max Q Clear Time (g_c+I1), s	9.0	23.4		17.8	3.1	21.5		19.0				
Green Ext Time (p_c), s	0.2	2.0		0.4	0.0	3.3		1.4				

Intersection Summary		
HCM 7th Control Delay, s/veh	25.1	
HCM 7th LOS	C	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

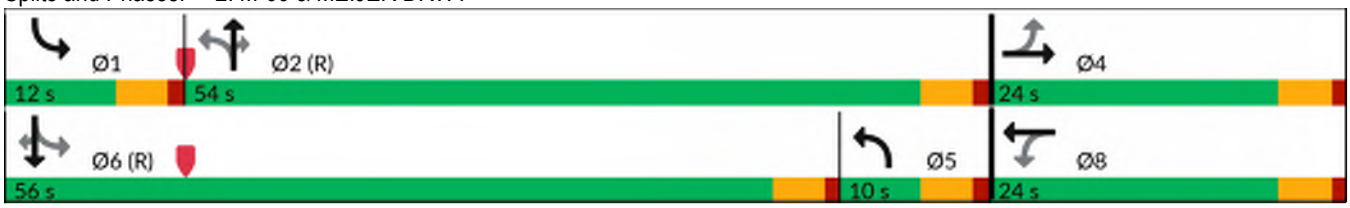


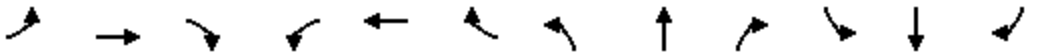
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	14	49	0	102	32	430	52	108	448	73
Future Volume (vph)	5	0	14	49	0	102	32	430	52	108	448	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		175	100		115
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1759	1583	1770	1792	1583
Flt Permitted	0.606			0.746			0.466			0.387		
Satd. Flow (perm)	1129	1417	0	1390	1583	0	868	1759	1583	721	1792	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		406			436				73			85
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			385			1828			1569	
Travel Time (s)		7.1			8.8			27.7			23.8	
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	6	0	17	53	0	111	38	512	57	117	533	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	17	0	53	111	0	38	512	57	117	533	87
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	24.0	24.0		24.0	24.0		10.0	54.0	54.0	12.0	56.0	56.0
Total Split (%)	26.7%	26.7%		26.7%	26.7%		11.1%	60.0%	60.0%	13.3%	62.2%	62.2%
Maximum Green (s)	19.5	19.5		19.5	19.5		5.5	49.5	49.5	7.5	51.5	51.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	8.9	8.9		8.9	8.9		64.2	65.1	65.1	68.1	69.0	69.0
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.71	0.72	0.72	0.76	0.77	0.77
v/c Ratio	0.05	0.03		0.38	0.20		0.05	0.40	0.04	0.18	0.38	0.07
Control Delay (s/veh)	36.0	0.1		45.3	0.8		6.5	7.8	1.3	2.5	4.4	1.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	36.0	0.1		45.3	0.8		6.5	7.8	1.3	2.5	4.4	1.1
LOS	D	A		D	A		A	A	A	A	A	A
Approach Delay (s/veh)		9.5			15.2			7.2			3.8	
Approach LOS		A			B			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 72 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.40			
Intersection Signal Delay (s/veh): 6.4		Intersection LOS: A	
Intersection Capacity Utilization 49.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: M-66 & MEIJER DRWY

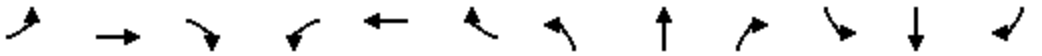




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	14	49	0	102	32	430	52	108	448	73
Future Volume (veh/h)	5	0	14	49	0	102	32	430	52	108	448	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1870	1870	1693	1870	1870	1870	1870	1781	1870	1870	1811	1870
Adj Flow Rate, veh/h	6	0	17	53	0	111	38	512	57	117	533	87
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Percent Heavy Veh, %	2	2	14	2	2	2	2	8	2	2	6	2
Cap, veh/h	115	0	151	199	0	151	765	1251	1113	569	1036	907
Arrive On Green	0.10	0.00	0.10	0.10	0.00	0.10	0.36	1.00	1.00	0.11	1.00	1.00
Sat Flow, veh/h	1282	0	1585	1396	0	1585	1781	1781	1585	1781	1811	1585
Grp Volume(v), veh/h	6	0	17	53	0	111	38	512	57	117	533	87
Grp Sat Flow(s),veh/h/ln	1282	0	1585	1396	0	1585	1781	1781	1585	1781	1811	1585
Q Serve(g_s), s	0.4	0.0	0.9	3.2	0.0	6.1	0.0	0.0	0.0	2.9	0.0	0.0
Cycle Q Clear(g_c), s	6.5	0.0	0.9	4.1	0.0	6.1	0.0	0.0	0.0	2.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	115	0	151	199	0	151	765	1251	1113	569	1036	907
V/C Ratio(X)	0.05	0.00	0.11	0.27	0.00	0.73	0.05	0.41	0.05	0.21	0.51	0.10
Avail Cap(c_a), veh/h	270	0	343	369	0	343	765	1251	1113	624	1036	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.96	0.96	0.96	0.76	0.76	0.76
Uniform Delay (d), s/veh	42.8	0.0	37.2	39.1	0.0	39.6	5.0	0.0	0.0	9.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.3	0.7	0.0	6.7	0.0	1.0	0.1	0.1	1.4	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	0.1	0.0	0.4	1.1	0.0	2.6	0.2	0.3	0.0	0.9	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.0	0.0	37.6	39.8	0.0	46.3	5.0	1.0	0.1	9.6	1.4	0.2
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		23			164			607			737	
Approach Delay, s/veh		39.0			44.2			1.1			2.5	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.2	67.7		13.1	20.9	56.0		13.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	7.5	49.5		19.5	5.5	51.5		19.5				
Max Q Clear Time (g_c+I1), s	4.9	2.0		8.5	2.0	2.0		8.1				
Green Ext Time (p_c), s	0.1	3.5		0.0	0.0	3.7		0.5				

Intersection Summary	
HCM 7th Control Delay, s/veh	7.0
HCM 7th LOS	A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	351	19	7	356	0	14	0	4	0	0	1
Future Volume (vph)	0	351	19	7	356	0	14	0	4	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	501	27	10	509	0	20	0	6	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	528	0	10	509	0	0	20	6	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.3%		ICU Level of Service A	
Analysis Period (min) 15			

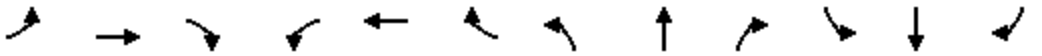
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	351	19	7	356	0	14	0	4	0	0	1
Future Vol, veh/h	0	351	19	7	356	0	14	0	4	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	501	27	10	509	0	20	0	6	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	509	0	0	529	0	0	1044	1044	515	1030	1057	509
Stage 1	-	-	-	-	-	-	515	515	-	529	529	-
Stage 2	-	-	-	-	-	-	529	529	-	501	529	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1056	-	-	1039	-	-	207	229	560	212	225	564
Stage 1	-	-	-	-	-	-	543	535	-	533	527	-
Stage 2	-	-	-	-	-	-	533	527	-	552	527	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1056	-	-	1039	-	-	205	227	560	208	223	564
Mov Cap-2 Maneuver	-	-	-	-	-	-	205	227	-	208	223	-
Stage 1	-	-	-	-	-	-	543	535	-	528	522	-
Stage 2	-	-	-	-	-	-	527	522	-	546	527	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.16	21.6	11.39
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	205	560	1056	-	-	1039	-	-	564
HCM Lane V/C Ratio	0.098	0.01	-	-	-	0.01	-	-	0.003
HCM Control Delay (s/veh)	24.5	11.5	0	-	-	8.5	-	-	11.4
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	0	-	-	0	-	-	0

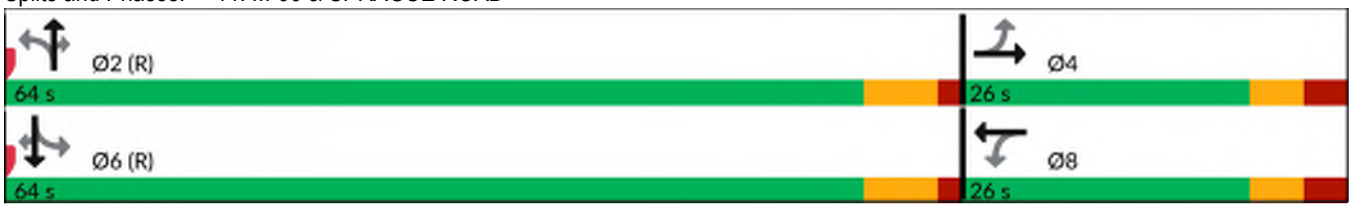


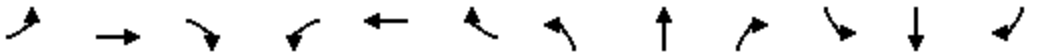
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	1	4	6	0	4	19	488	13	33	464	21
Future Volume (vph)	11	1	4	6	0	4	19	488	13	33	464	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.478			0.465		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	882	1845	1568	858	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			374				44			44
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	12	1	4	7	0	4	21	530	14	36	504	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	5	0	7	4	0	21	530	14	36	504	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	26.0	26.0		26.0	26.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	28.9%	28.9%		28.9%	28.9%		71.1%	71.1%	71.1%	71.1%	71.1%	71.1%
Maximum Green (s)	19.4	19.4		19.4	19.4		57.6	57.6	57.6	57.6	57.6	57.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.4	6.4		6.4	6.4		81.8	81.8	81.8	81.8	81.8	81.8
Actuated g/C Ratio	0.07	0.07		0.07	0.07		0.91	0.91	0.91	0.91	0.91	0.91
v/c Ratio	0.09	0.04		0.05	0.00		0.02	0.31	0.00	0.04	0.30	0.01
Control Delay (s/veh)	39.9	27.2		39.1	0.0		2.0	2.3	0.0	0.3	0.5	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.9	27.2		39.1	0.0		2.0	2.3	0.0	0.3	0.5	0.0
LOS	D	C		D	A		A	A	A	A	A	A
Approach Delay (s/veh)		36.2			24.9			2.3			0.6	
Approach LOS		D			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 76 (84%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay (s/veh): 2.1		Intersection LOS: A	
Intersection Capacity Utilization 45.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD

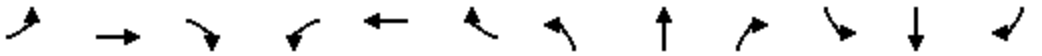




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	1	4	6	0	4	19	488	13	33	464	21
Future Volume (veh/h)	11	1	4	6	0	4	19	488	13	33	464	21
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	12	1	4	7	0	4	21	530	14	36	504	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	116	9	36	115	0	44	799	1536	1301	729	1536	1301
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.83	0.83	0.83	1.00	1.00	1.00
Sat Flow, veh/h	1401	324	1298	1400	0	1572	869	1856	1572	855	1856	1572
Grp Volume(v), veh/h	12	0	5	7	0	4	21	530	14	36	504	23
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	869	1856	1572	855	1856	1572
Q Serve(g_s), s	0.8	0.0	0.3	0.4	0.0	0.2	0.4	6.2	0.1	0.3	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	0.3	0.7	0.0	0.2	0.4	6.2	0.1	6.5	0.0	0.0
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	116	0	45	115	0	44	799	1536	1301	729	1536	1301
V/C Ratio(X)	0.10	0.00	0.11	0.06	0.00	0.09	0.03	0.35	0.01	0.05	0.33	0.02
Avail Cap(c_a), veh/h	379	0	350	378	0	339	799	1536	1301	729	1536	1301
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	43.1	0.0	42.6	43.0	0.0	42.6	1.4	1.9	1.3	0.3	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	1.1	0.2	0.0	0.9	0.1	0.6	0.0	0.1	0.5	0.0
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	0.3	0.0	0.1	0.2	0.0	0.1	0.0	0.8	0.0	0.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.5	0.0	43.7	43.2	0.0	43.5	1.4	2.5	1.4	0.4	0.5	0.0
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		17			11			565			563	
Approach Delay, s/veh		43.6			43.3			2.4			0.5	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		80.9		9.1		80.9		9.1				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		57.6		19.4		57.6		19.4				
Max Q Clear Time (g_c+I1), s		8.2		3.0		8.5		2.7				
Green Ext Time (p_c), s		3.6		0.0		3.5		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			2.5									
HCM 7th LOS			A									

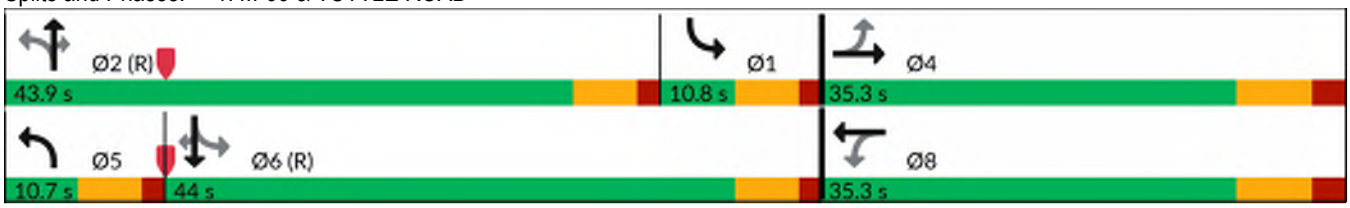


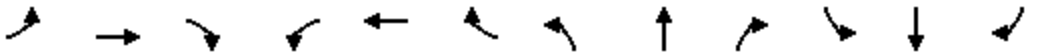
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	96	49	135	43	93	40	584	175	132	599	66
Future Volume (vph)	221	96	49	135	43	93	40	584	175	132	599	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.897				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1756	0	1736	1613	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.668			0.662			0.170			0.332		
Satd. Flow (perm)	1164	1756	0	1209	1613	0	317	1759	1553	590	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30			96				180			121
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	228	99	51	139	44	96	41	602	180	136	618	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	150	0	139	140	0	41	602	180	136	618	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	43.9	43.9	10.8	44.0	44.0
Total Split (%)	39.2%	39.2%		39.2%	39.2%		11.9%	48.8%	48.8%	12.0%	48.9%	48.9%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	38.2	38.2	5.1	38.3	38.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	22.0	22.0		22.0	22.0		44.2	44.2	44.2	48.0	48.0	48.0
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.49	0.49	0.49	0.53	0.53	0.53
v/c Ratio	0.80	0.33		0.47	0.30		0.16	0.69	0.21	0.36	0.64	0.07
Control Delay (s/veh)	52.2	22.7		33.1	11.0		6.6	15.0	2.3	20.9	22.1	0.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	52.2	22.7		33.1	11.0		6.6	15.0	2.3	20.9	22.1	0.7
LOS	D	C		C	B		A	B	A	C	C	A
Approach Delay (s/veh)		40.6			22.0			11.8			20.2	
Approach LOS		D			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 48 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay (s/veh): 20.8		Intersection LOS: C	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





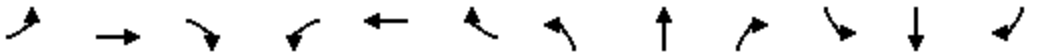
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	221	96	49	135	43	93	40	584	175	132	599	66
Future Volume (veh/h)	221	96	49	135	43	93	40	584	175	132	599	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	228	99	51	139	44	96	41	602	180	136	618	68
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	335	327	168	343	145	316	186	756	662	274	864	750
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.01	0.14	0.14	0.08	0.47	0.47
Sat Flow, veh/h	1179	1154	595	1218	511	1114	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	228	0	150	139	0	140	41	602	180	136	618	68
Grp Sat Flow(s),veh/h/ln	1179	0	1749	1218	0	1625	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	16.9	0.0	6.1	9.1	0.0	6.1	1.3	29.4	9.3	0.0	24.3	2.1
Cycle Q Clear(g_c), s	23.0	0.0	6.1	15.1	0.0	6.1	1.3	29.4	9.3	0.0	24.3	2.1
Prop In Lane	1.00		0.34	1.00		0.69	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	335	0	496	343	0	461	186	756	662	274	864	750
V/C Ratio(X)	0.68	0.00	0.30	0.40	0.00	0.30	0.22	0.80	0.27	0.50	0.72	0.09
Avail Cap(c_a), veh/h	367	0	544	377	0	506	221	756	662	274	864	750
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.75	0.75	0.75	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.3	0.0	25.3	31.2	0.0	25.3	22.1	34.9	26.3	36.5	18.9	13.0
Incr Delay (d2), s/veh	4.5	0.0	0.3	0.8	0.0	0.4	0.4	6.5	0.8	1.4	5.0	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	5.1	0.0	2.5	2.7	0.0	2.3	0.5	15.1	3.7	2.7	10.2	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.8	0.0	25.6	32.0	0.0	25.7	22.6	41.4	27.0	37.9	23.9	13.3
LnGrp LOS	D		C	C		C	C	D	C	D	C	B
Approach Vol, veh/h		378			279			823			822	
Approach Delay, s/veh		33.6			28.8			37.3			25.3	
Approach LOS		C			C			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.3	43.9		32.8	8.9	48.3		32.8				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5.1	* 38		28.0	* 5	* 38		28.0				
Max Q Clear Time (g_c+I1), s	2.0	31.4		25.0	3.3	26.3		17.1				
Green Ext Time (p_c), s	0.1	2.4		0.5	0.0	3.1		0.9				

Intersection Summary		
HCM 7th Control Delay, s/veh		31.4
HCM 7th LOS		C

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

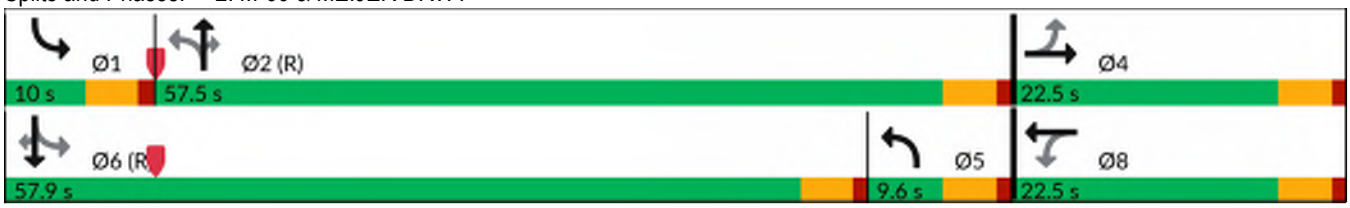


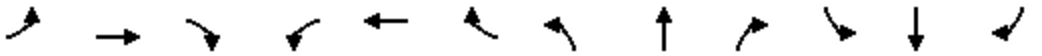
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	27	37	0	78	54	773	38	80	634	49
Future Volume (vph)	8	0	27	37	0	78	54	773	38	80	634	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		175	100		115
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1759	1583	1770	1792	1583
Flt Permitted	0.702			0.739			0.414			0.233		
Satd. Flow (perm)	1308	1417	0	1377	1583	0	771	1759	1583	434	1792	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		335			274				73			73
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			387			1828			1569	
Travel Time (s)		7.1			8.8			27.7			23.8	
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	8	0	28	40	0	85	56	805	41	87	660	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	28	0	40	85	0	56	805	41	87	660	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	22.5	22.5		22.5	22.5		9.6	57.5	57.5	10.0	57.9	57.9
Total Split (%)	25.0%	25.0%		25.0%	25.0%		10.7%	63.9%	63.9%	11.1%	64.3%	64.3%
Maximum Green (s)	18.0	18.0		18.0	18.0		5.1	53.0	53.0	5.5	53.4	53.4
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	8.1	8.1		8.1	8.1		65.5	66.4	66.4	67.2	68.1	68.1
Actuated g/C Ratio	0.09	0.09		0.09	0.09		0.73	0.74	0.74	0.75	0.76	0.76
v/c Ratio	0.06	0.06		0.32	0.21		0.09	0.62	0.03	0.20	0.48	0.04
Control Delay (s/veh)	37.1	0.2		44.4	1.2		5.4	8.9	0.2	1.9	2.9	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.1	0.2		44.4	1.2		5.4	8.9	0.2	1.9	2.9	0.0
LOS	D	A		D	A		A	A	A	A	A	A
Approach Delay (s/veh)		8.5			15.1			8.4			2.7	
Approach LOS		A			B			A			A	

Intersection Summary		
Area Type:	Other	
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 75		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.62		
Intersection Signal Delay (s/veh): 6.4	Intersection LOS: A	
Intersection Capacity Utilization 65.1%	ICU Level of Service C	
Analysis Period (min) 15		

Splits and Phases: 2: M-66 & MEIJER DRWY

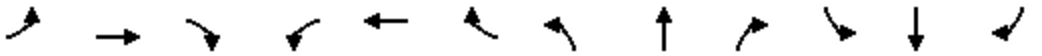




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	27	37	0	78	54	773	38	80	634	49
Future Volume (veh/h)	8	0	27	37	0	78	54	773	38	80	634	49
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1870	1870	1693	1870	1870	1870	1870	1781	1870	1870	1811	1870
Adj Flow Rate, veh/h	8	0	28	40	0	85	56	805	41	87	660	51
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Percent Heavy Veh, %	2	2	14	2	2	2	2	8	2	2	6	2
Cap, veh/h	116	0	126	167	0	126	707	1285	1143	489	1075	940
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.35	1.00	1.00	0.07	0.79	0.79
Sat Flow, veh/h	1313	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Grp Volume(v), veh/h	8	0	28	40	0	85	56	805	41	87	660	51
Grp Sat Flow(s),veh/h/ln	1313	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Q Serve(g_s), s	0.5	0.0	1.5	2.5	0.0	4.7	0.0	0.0	0.0	2.0	13.4	0.6
Cycle Q Clear(g_c), s	5.2	0.0	1.5	4.0	0.0	4.7	0.0	0.0	0.0	2.0	13.4	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	116	0	126	167	0	126	707	1285	1143	489	1075	940
V/C Ratio(X)	0.07	0.00	0.22	0.24	0.00	0.67	0.08	0.63	0.04	0.18	0.61	0.05
Avail Cap(c_a), veh/h	274	0	317	334	0	317	707	1285	1143	511	1075	940
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.91	0.91	0.91	0.76	0.76	0.76
Uniform Delay (d), s/veh	42.8	0.0	38.8	40.7	0.0	40.3	6.0	0.0	0.0	8.8	5.3	3.9
Incr Delay (d2), s/veh	0.2	0.0	0.9	0.7	0.0	6.1	0.0	2.1	0.1	0.1	2.0	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	0.2	0.0	0.6	0.9	0.0	2.0	0.3	0.8	0.0	0.7	3.4	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.1	0.0	39.7	41.4	0.0	46.4	6.1	2.1	0.1	8.9	7.3	4.0
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		36			125			902			798	
Approach Delay, s/veh		40.4			44.8			2.3			7.2	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	69.4		11.7	20.4	57.9		11.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	53.0		18.0	5.1	53.4		18.0				
Max Q Clear Time (g_c+I1), s	4.0	2.0		7.2	2.0	15.4		6.7				
Green Ext Time (p_c), s	0.0	6.6		0.1	0.0	4.7		0.4				

Intersection Summary			
HCM 7th Control Delay, s/veh		8.0	
HCM 7th LOS		A	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	391	21	4	228	6	30	0	5	0	0	3
Future Volume (vph)	9	391	21	4	228	6	30	0	5	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	559	30	6	326	9	43	0	7	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	589	0	6	335	0	0	43	7	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.5%		ICU Level of Service A	
Analysis Period (min) 15			

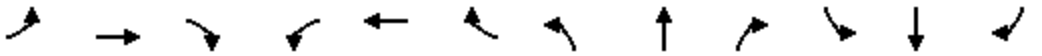
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	391	21	4	228	6	30	0	5	0	0	3
Future Vol, veh/h	9	391	21	4	228	6	30	0	5	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	559	30	6	326	9	43	0	7	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	334	0	0	589	0	0	936	945	574	926	956	330
Stage 1	-	-	-	-	-	-	599	599	-	341	341	-
Stage 2	-	-	-	-	-	-	337	346	-	584	614	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1225	-	-	987	-	-	245	262	519	249	258	712
Stage 1	-	-	-	-	-	-	488	490	-	674	638	-
Stage 2	-	-	-	-	-	-	677	636	-	497	483	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1225	-	-	987	-	-	240	258	519	242	254	712
Mov Cap-2 Maneuver	-	-	-	-	-	-	240	258	-	242	254	-
Stage 1	-	-	-	-	-	-	483	485	-	670	635	-
Stage 2	-	-	-	-	-	-	669	632	-	485	478	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.17	0.15	21.66	10.09
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	240	519	1225	-	-	987	-	-	712
HCM Lane V/C Ratio	0.179	0.014	0.01	-	-	0.006	-	-	0.006
HCM Control Delay (s/veh)	23.3	12	8	-	-	8.7	-	-	10.1
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0	-	-	0

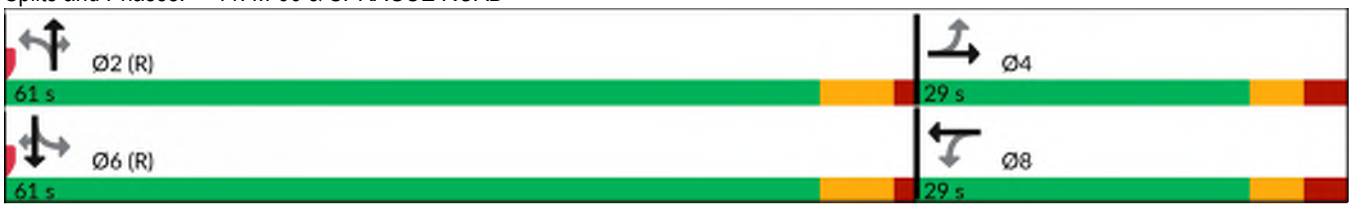


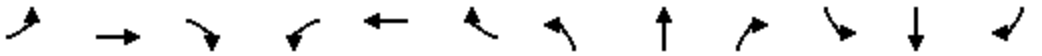
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	15	53	24	9	16	58	509	20	47	484	59
Future Volume (vph)	95	15	53	24	9	16	58	509	20	47	484	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.906				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1671	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.445			0.429		
Satd. Flow (perm)	1365	1627	0	1308	1671	0	821	1845	1568	791	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				44			64
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	103	16	58	26	10	17	63	553	22	51	526	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	74	0	26	27	0	63	553	22	51	526	64
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	29.0	29.0		29.0	29.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.2%	32.2%		32.2%	32.2%		67.8%	67.8%	67.8%	67.8%	67.8%	67.8%
Maximum Green (s)	22.4	22.4		22.4	22.4		54.6	54.6	54.6	54.6	54.6	54.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	12.1	12.1		11.8	11.8		68.9	68.9	68.9	68.9	68.9	68.9
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.77	0.77	0.77	0.77	0.77	0.77
v/c Ratio	0.56	0.27		0.15	0.11		0.10	0.39	0.01	0.08	0.37	0.05
Control Delay (s/veh)	47.4	15.1		34.2	19.5		5.1	6.2	0.7	1.7	1.9	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	47.4	15.1		34.2	19.5		5.1	6.2	0.7	1.7	1.9	0.2
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		33.9			26.8			5.9			1.7	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 8 (9%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay (s/veh): 8.2		Intersection LOS: A	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD



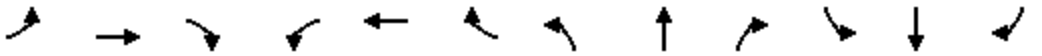


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	15	53	24	9	16	58	509	20	47	484	59
Future Volume (veh/h)	95	15	53	24	9	16	58	509	20	47	484	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	103	16	58	26	10	17	63	553	22	51	526	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	218	40	147	176	71	121	687	1374	1164	604	1374	1164
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.74	0.74	0.74	1.00	1.00	1.00
Sat Flow, veh/h	1372	352	1275	1315	617	1049	820	1856	1572	831	1856	1572
Grp Volume(v), veh/h	103	0	74	26	0	27	63	553	22	51	526	64
Grp Sat Flow(s),veh/h/ln	1372	0	1626	1315	0	1667	820	1856	1572	831	1856	1572
Q Serve(g_s), s	6.6	0.0	3.8	1.7	0.0	1.3	1.9	9.9	0.3	0.9	0.0	0.0
Cycle Q Clear(g_c), s	7.9	0.0	3.8	5.5	0.0	1.3	1.9	9.9	0.3	10.8	0.0	0.0
Prop In Lane	1.00		0.78	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	218	0	187	176	0	192	687	1374	1164	604	1374	1164
V/C Ratio(X)	0.47	0.00	0.40	0.15	0.00	0.14	0.09	0.40	0.02	0.08	0.38	0.05
Avail Cap(c_a), veh/h	402	0	405	352	0	415	687	1374	1164	604	1374	1164
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	39.4	0.0	36.9	39.5	0.0	35.8	3.3	4.3	3.1	0.8	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	1.4	0.4	0.0	0.3	0.3	0.9	0.0	0.2	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	2.3	0.0	1.6	0.6	0.0	0.5	0.2	2.6	0.1	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	40.9	0.0	38.3	39.8	0.0	36.1	3.5	5.2	3.1	1.0	0.7	0.1
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		177			53			638			641	
Approach Delay, s/veh		39.8			38.0			5.0			0.7	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		73.0		17.0		73.0		17.0				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		54.6		22.4		54.6		22.4				
Max Q Clear Time (g_c+I1), s		11.9		9.9		12.8		7.5				
Green Ext Time (p_c), s		4.1		0.5		3.9		0.1				

Intersection Summary												
HCM 7th Control Delay, s/veh		8.4										
HCM 7th LOS		A										

APPENDIX H
2029 No-Build Traffic Scenario
Capacity Analysis Summary Sheets

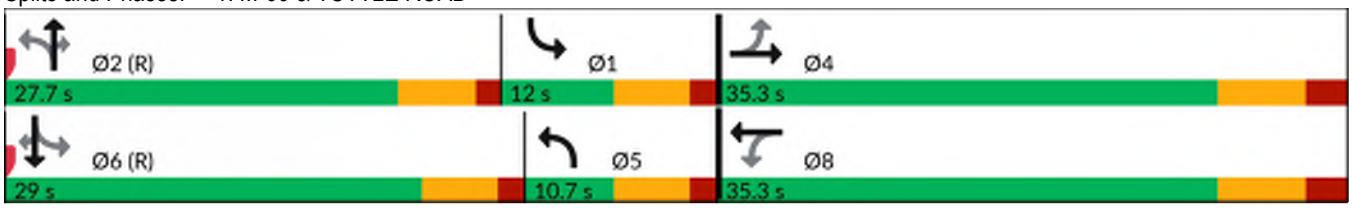


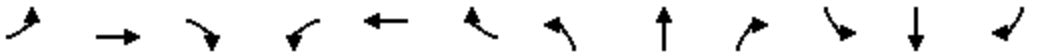
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	48	6	141	49	146	12	344	85	223	440	35
Future Volume (vph)	45	48	6	141	49	146	12	344	85	223	440	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.887				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1817	0	1736	1594	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.539			0.714			0.312			0.394		
Satd. Flow (perm)	940	1817	0	1304	1594	0	581	1759	1553	700	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			180				145			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	56	59	7	174	60	180	15	425	105	275	543	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	66	0	174	240	0	15	425	105	275	543	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	12.0	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	36.9%	36.9%	16.0%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	22.0	22.0	6.3	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	15.7	15.7		15.7	15.7		39.3	34.3	34.3	45.5	44.2	44.2
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.52	0.46	0.46	0.61	0.59	0.59
v/c Ratio	0.28	0.17		0.63	0.50		0.03	0.52	0.13	0.54	0.50	0.04
Control Delay (s/veh)	26.5	21.0		36.9	10.8		7.4	18.0	1.1	17.0	14.3	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	26.5	21.0		36.9	10.8		7.4	18.0	1.1	17.0	14.3	0.0
LOS	C	C		D	B		A	B	A	B	B	A
Approach Delay (s/veh)		23.6			21.8			14.5			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 40 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay (s/veh): 16.6		Intersection LOS: B	
Intersection Capacity Utilization 67.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





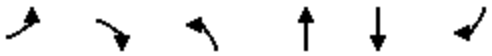
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	48	6	141	49	146	12	344	85	223	440	35
Future Volume (veh/h)	45	48	6	141	49	146	12	344	85	223	440	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	56	59	7	174	60	180	15	425	105	275	543	43
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	184	356	42	345	88	264	492	523	458	565	567	492
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.29	0.29	0.24	0.31	0.31
Sat Flow, veh/h	1077	1628	193	1314	402	1207	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	56	0	66	174	0	240	15	425	105	275	543	43
Grp Sat Flow(s),veh/h/ln	1077	0	1821	1314	0	1609	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	3.8	0.0	2.2	9.3	0.0	10.3	0.0	16.6	3.8	2.8	21.9	1.4
Cycle Q Clear(g_c), s	14.1	0.0	2.2	11.5	0.0	10.3	0.0	16.6	3.8	2.8	21.9	1.4
Prop In Lane	1.00		0.11	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	184	0	398	345	0	352	492	523	458	565	567	492
V/C Ratio(X)	0.30	0.00	0.17	0.50	0.00	0.68	0.03	0.81	0.23	0.49	0.96	0.09
Avail Cap(c_a), veh/h	350	0	680	548	0	601	492	523	458	565	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	23.8	28.4	0.0	26.9	22.7	24.6	20.1	21.4	25.4	18.3
Incr Delay (d2), s/veh	0.9	0.0	0.2	1.1	0.0	2.3	0.0	13.0	1.2	0.7	28.6	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	1.0	0.0	0.9	2.9	0.0	3.9	0.2	8.1	1.4	3.5	12.8	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.3	0.0	23.9	29.5	0.0	29.2	22.8	37.6	21.2	22.1	53.9	18.7
LnGrp LOS	C		C	C		C	C	D	C	C	D	B
Approach Vol, veh/h		122			414			545			861	
Approach Delay, s/veh		28.7			29.4			34.0			42.0	
Approach LOS		C			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	23.6	27.7		23.7	22.3	29.0		23.7				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 6.3	* 22		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	4.8	18.6		16.1	2.0	23.9		13.5				
Green Ext Time (p_c), s	0.1	0.9		0.3	0.0	0.0		1.7				

Intersection Summary		
HCM 7th Control Delay, s/veh	36.2	
HCM 7th LOS	D	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	14	33	463	481	74
Future Volume (vph)	5	14	33	463	481	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85	0	100			115
Storage Lanes	1	0	1			0
Taper Length (ft)	65		60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1417	1770	1759	1792	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1417	1770	1759	1792	1583
Link Speed (mph)	30			45	45	
Link Distance (ft)	311			1828	1569	
Travel Time (s)	7.1			27.7	23.8	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	14%	2%	8%	6%	2%
Adj. Flow (vph)	6	17	39	551	573	88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	6	17	39	551	573	88
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.4%		ICU Level of Service A	
Analysis Period (min) 15			

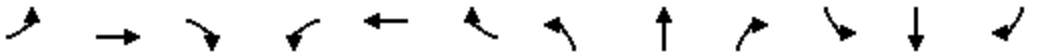
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	14	33	463	481	74
Future Vol, veh/h	5	14	33	463	481	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	6	17	39	551	573	88

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1202	573	661	0	-	0
Stage 1	573	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	204	497	928	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	195	497	928	-	-	-
Mov Cap-2 Maneuver	334	-	-	-	-	-
Stage 1	540	-	-	-	-	-
Stage 2	531	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	13.41	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	928	-	334	497	-	-
HCM Lane V/C Ratio	0.042	-	0.018	0.034	-	-
HCM Control Delay (s/veh)	9.1	-	16	12.5	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	345	20	7	348	0	14	0	4	0	0	1
Future Volume (vph)	0	345	20	7	348	0	14	0	4	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1766	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	493	29	10	497	0	20	0	6	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	522	0	10	497	0	0	20	6	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.0%		ICU Level of Service A	
Analysis Period (min) 15			

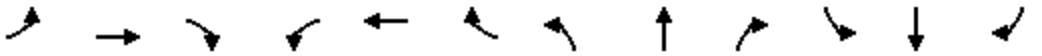
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	345	20	7	348	0	14	0	4	0	0	1
Future Vol, veh/h	0	345	20	7	348	0	14	0	4	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	493	29	10	497	0	20	0	6	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	497	0	0	521	0	0	1024	1024	507	1010	1039	497
Stage 1	-	-	-	-	-	-	507	507	-	517	517	-
Stage 2	-	-	-	-	-	-	517	517	-	493	521	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1067	-	-	1045	-	-	214	235	566	218	231	573
Stage 1	-	-	-	-	-	-	548	539	-	541	534	-
Stage 2	-	-	-	-	-	-	541	534	-	558	531	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1067	-	-	1045	-	-	211	233	566	214	228	573
Mov Cap-2 Maneuver	-	-	-	-	-	-	211	233	-	214	228	-
Stage 1	-	-	-	-	-	-	548	539	-	536	529	-
Stage 2	-	-	-	-	-	-	535	529	-	552	531	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.17	21.08	11.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	211	566	1067	-	-	1045	-	-	573
HCM Lane V/C Ratio	0.095	0.01	-	-	-	0.01	-	-	0.002
HCM Control Delay (s/veh)	23.8	11.4	0	-	-	8.5	-	-	11.3
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	0	-	-	0	-	-	0

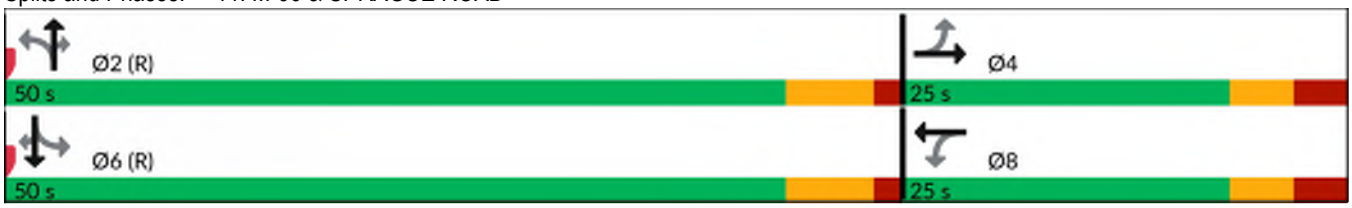


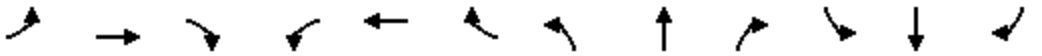
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1	4	7	0	4	20	474	13	34	452	17
Future Volume (vph)	8	1	4	7	0	4	20	474	13	34	452	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.484			0.474		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	893	1845	1568	874	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			346				52			52
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	9	1	4	8	0	4	22	515	14	37	491	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	5	0	8	4	0	22	515	14	37	491	18
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	18.4	18.4		18.4	18.4		43.6	43.6	43.6	43.6	43.6	43.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.1	6.1		6.1	6.1		70.9	70.9	70.9	70.9	70.9	70.9
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.95	0.95	0.95	0.95	0.95	0.95
v/c Ratio	0.05	0.03		0.05	0.00		0.02	0.29	0.00	0.04	0.28	0.01
Control Delay (s/veh)	32.1	23.0		32.0	0.0		1.5	1.6	0.0	0.2	0.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.1	23.0		32.0	0.0		1.5	1.6	0.0	0.2	0.4	0.0
LOS	C	C		C	A		A	A	A	A	A	A
Approach Delay (s/veh)		28.9			21.3			1.6			0.4	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 72 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.30			
Intersection Signal Delay (s/veh): 1.6		Intersection LOS: A	
Intersection Capacity Utilization 45.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD

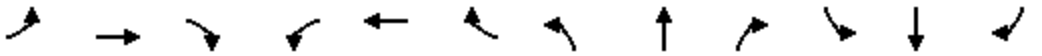




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1	4	7	0	4	20	474	13	34	452	17
Future Volume (veh/h)	8	1	4	7	0	4	20	474	13	34	452	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	9	1	4	8	0	4	22	515	14	37	491	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	132	9	36	131	0	44	738	1482	1256	722	1482	1256
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.80	0.80	0.80	0.80	0.80	0.80
Sat Flow, veh/h	1401	324	1298	1400	0	1572	884	1856	1572	867	1856	1572
Grp Volume(v), veh/h	9	0	5	8	0	4	22	515	14	37	491	18
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	884	1856	1572	867	1856	1572
Q Serve(g_s), s	0.5	0.0	0.2	0.4	0.0	0.2	0.5	5.8	0.1	0.9	5.4	0.2
Cycle Q Clear(g_c), s	0.7	0.0	0.2	0.6	0.0	0.2	6.0	5.8	0.1	6.7	5.4	0.2
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	0	45	131	0	44	738	1482	1256	722	1482	1256
V/C Ratio(X)	0.07	0.00	0.11	0.06	0.00	0.09	0.03	0.35	0.01	0.05	0.33	0.01
Avail Cap(c_a), veh/h	436	0	398	435	0	386	738	1482	1256	722	1482	1256
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	35.5	35.9	0.0	35.5	2.9	2.1	1.5	3.0	2.1	1.5
Incr Delay (d2), s/veh	0.2	0.0	1.1	0.2	0.0	0.9	0.1	0.6	0.0	0.1	0.6	0.0
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	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.7	0.0	0.1	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.1	0.0	36.6	36.1	0.0	36.4	3.0	2.7	1.5	3.2	2.7	1.6
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		14			12			551			546	
Approach Delay, s/veh		36.3			36.2			2.7			2.7	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	66.3	8.7	66.3	8.7
Change Period (Y+Rc), s	6.4	6.6	6.4	6.6
Max Green Setting (Gmax), s	43.6	18.4	43.6	18.4
Max Q Clear Time (g_c+I1), s	8.0	2.7	8.7	2.6
Green Ext Time (p_c), s	3.4	0.0	3.3	0.0

Intersection Summary	
HCM 7th Control Delay, s/veh	3.5
HCM 7th LOS	A

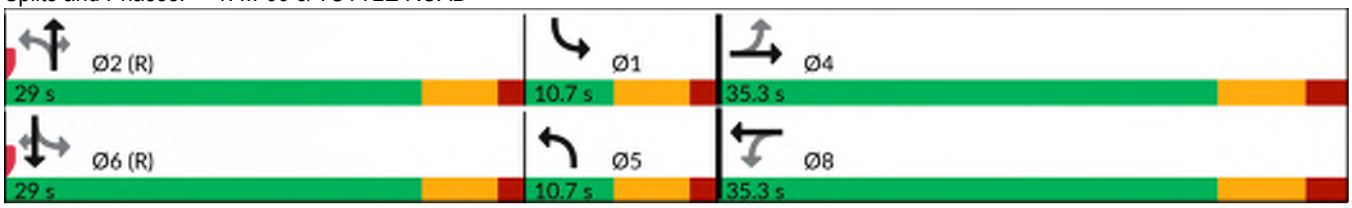


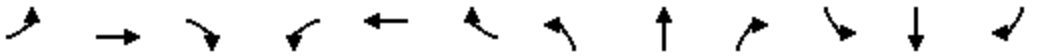
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	106	32	118	53	95	23	570	160	134	584	67
Future Volume (vph)	225	106	32	118	53	95	23	570	160	134	584	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.965			0.904				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1784	0	1736	1626	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.660			0.666			0.203			0.214		
Satd. Flow (perm)	1150	1784	0	1217	1626	0	378	1759	1553	380	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			98				165			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	232	109	33	122	55	98	24	588	165	138	602	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	142	0	122	153	0	24	588	165	138	602	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	29.0	29.0	10.7	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	38.7%	38.7%	14.3%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	23.3	23.3	5.0	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	20.2	20.2		20.2	20.2		36.1	31.1	31.1	39.5	37.5	37.5
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.48	0.41	0.41	0.53	0.50	0.50
v/c Ratio	0.75	0.28		0.37	0.30		0.08	0.80	0.22	0.48	0.66	0.07
Control Delay (s/veh)	39.3	17.7		23.7	9.2		9.7	30.0	2.8	23.3	23.9	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.3	17.7		23.7	9.2		9.7	30.0	2.8	23.3	23.9	0.1
LOS	D	B		C	A		A	C	A	C	C	A
Approach Delay (s/veh)		31.1			15.7			23.6			21.8	
Approach LOS		C			B			C			C	

Intersection Summary		
Area Type:	Other	
Cycle Length: 75		
Actuated Cycle Length: 75		
Offset: 66 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 80		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.81		
Intersection Signal Delay (s/veh): 23.2	Intersection LOS: C	
Intersection Capacity Utilization 80.2%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: M-66 & TUTTLE ROAD





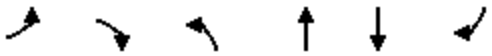
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	225	106	32	118	53	95	23	570	160	134	584	67
Future Volume (veh/h)	225	106	32	118	53	95	23	570	160	134	584	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	232	109	33	122	55	98	24	588	165	138	602	69
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	364	413	125	392	178	317	342	553	485	332	567	492
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.14	0.31	0.31	0.14	0.31	0.31
Sat Flow, veh/h	1166	1367	414	1227	589	1049	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	232	0	142	122	0	153	24	588	165	138	602	69
Grp Sat Flow(s),veh/h/ln	1166	0	1781	1227	0	1637	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	14.4	0.0	4.5	6.3	0.0	5.4	0.0	23.3	6.1	1.1	23.3	2.4
Cycle Q Clear(g_c), s	19.7	0.0	4.5	10.8	0.0	5.4	0.0	23.3	6.1	1.1	23.3	2.4
Prop In Lane	1.00		0.23	1.00		0.64	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	364	0	538	392	0	494	342	553	485	332	567	492
V/C Ratio(X)	0.64	0.00	0.26	0.31	0.00	0.31	0.07	1.06	0.34	0.42	1.06	0.14
Avail Cap(c_a), veh/h	447	0	665	480	0	611	342	553	485	332	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.8	0.0	19.9	24.0	0.0	20.2	27.9	25.8	19.9	28.0	25.8	18.6
Incr Delay (d2), s/veh	2.1	0.0	0.3	0.4	0.0	0.4	0.1	55.9	1.9	0.8	55.1	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	1.8	1.8	0.0	2.0	0.4	17.3	2.3	2.1	17.6	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.9	0.0	20.1	24.4	0.0	20.5	27.9	81.8	21.8	28.8	80.9	19.2
LnGrp LOS	C		C	C		C	C	F	C	C	F	B
Approach Vol, veh/h		374			275			777			809	
Approach Delay, s/veh		26.2			22.2			67.4			66.8	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.1	29.0		29.9	16.1	29.0		29.9				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5	* 23		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	3.1	25.3		21.7	2.0	25.3		12.8				
Green Ext Time (p_c), s	0.1	0.0		0.9	0.0	0.0		1.1				

Intersection Summary			
HCM 7th Control Delay, s/veh		54.7	
HCM 7th LOS		D	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	8	27	55	806	665	49
Future Volume (vph)	8	27	55	806	665	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85	0	100			115
Storage Lanes	1	0	1			0
Taper Length (ft)	65		60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1417	1770	1759	1792	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1417	1770	1759	1792	1583
Link Speed (mph)	30			45	45	
Link Distance (ft)	311			1828	1569	
Travel Time (s)	7.1			27.7	23.8	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	14%	2%	8%	6%	2%
Adj. Flow (vph)	8	28	57	840	693	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	28	57	840	693	51
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.4%		ICU Level of Service A	
Analysis Period (min) 15			

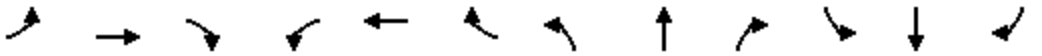
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	27	55	806	665	49
Future Vol, veh/h	8	27	55	806	665	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	8	28	57	840	693	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1647	693	744	0	-	0
Stage 1	693	-	-	-	-	-
Stage 2	954	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	109	424	864	-	-	-
Stage 1	496	-	-	-	-	-
Stage 2	374	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	102	424	864	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	374	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.65	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	864	-	235	424	-	-
HCM Lane V/C Ratio	0.066	-	0.035	0.066	-	-
HCM Control Delay (s/veh)	9.5	-	20.9	14.1	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	387	22	4	222	6	30	0	5	0	0	3
Future Volume (vph)	9	387	22	4	222	6	30	0	5	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1766	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	553	31	6	317	9	43	0	7	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	584	0	6	326	0	0	43	7	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.4%		ICU Level of Service A	
Analysis Period (min) 15			

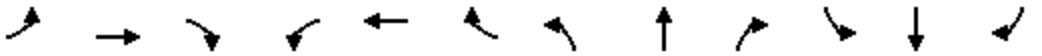
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	387	22	4	222	6	30	0	5	0	0	3
Future Vol, veh/h	9	387	22	4	222	6	30	0	5	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	553	31	6	317	9	43	0	7	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	326	0	0	584	0	0	923	931	569	911	943	321
Stage 1	-	-	-	-	-	-	594	594	-	333	333	-
Stage 2	-	-	-	-	-	-	329	337	-	579	610	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1234	-	-	990	-	-	250	267	522	255	263	719
Stage 1	-	-	-	-	-	-	491	493	-	681	644	-
Stage 2	-	-	-	-	-	-	684	641	-	501	485	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1234	-	-	990	-	-	245	262	522	247	258	719
Mov Cap-2 Maneuver	-	-	-	-	-	-	245	262	-	247	258	-
Stage 1	-	-	-	-	-	-	486	488	-	677	640	-
Stage 2	-	-	-	-	-	-	676	637	-	489	480	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.17	0.15	21.25	10.03
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	245	522	1234	-	-	990	-	-	719
HCM Lane V/C Ratio	0.175	0.014	0.01	-	-	0.006	-	-	0.006
HCM Control Delay (s/veh)	22.8	12	7.9	-	-	8.7	-	-	10
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0	-	-	0

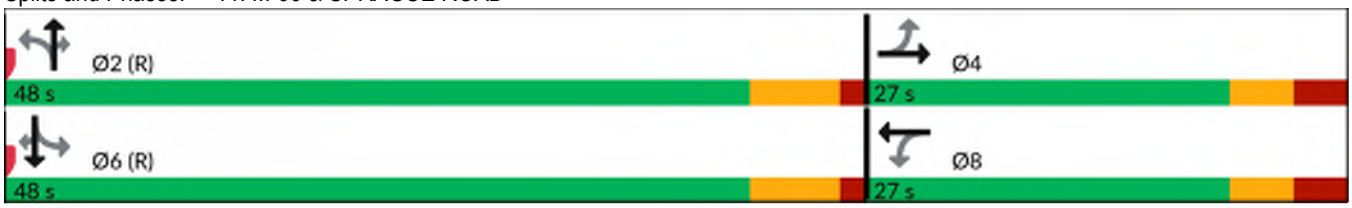


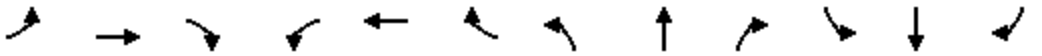
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	15	53	24	9	16	59	501	21	48	477	57
Future Volume (vph)	93	15	53	24	9	16	59	501	21	48	477	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.906				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1671	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.448			0.431		
Satd. Flow (perm)	1365	1627	0	1308	1671	0	826	1845	1568	795	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				52			62
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	101	16	58	26	10	17	64	545	23	52	518	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	101	74	0	26	27	0	64	545	23	52	518	62
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		41.6	41.6	41.6	41.6	41.6	41.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.8	10.8		10.7	10.7		55.0	55.0	55.0	55.0	55.0	55.0
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.51	0.26		0.13	0.10		0.10	0.40	0.01	0.08	0.38	0.05
Control Delay (s/veh)	37.9	12.9		27.7	16.4		5.6	6.7	0.6	2.1	2.8	0.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.9	12.9		27.7	16.4		5.6	6.7	0.6	2.1	2.8	0.5
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		27.4			22.0			6.4			2.6	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 24 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay (s/veh): 7.8		Intersection LOS: A	
Intersection Capacity Utilization 58.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD



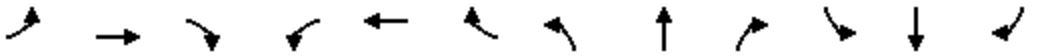


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	93	15	53	24	9	16	59	501	21	48	477	57
Future Volume (veh/h)	93	15	53	24	9	16	59	501	21	48	477	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	101	16	58	26	10	17	64	545	23	52	518	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	238	41	150	196	73	124	589	1315	1114	588	1315	1114
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.71	0.71	0.71	0.71	0.71	0.71
Sat Flow, veh/h	1372	352	1275	1315	617	1049	827	1856	1572	837	1856	1572
Grp Volume(v), veh/h	101	0	74	26	0	27	64	545	23	52	518	62
Grp Sat Flow(s),veh/h/ln	1372	0	1626	1315	0	1667	827	1856	1572	837	1856	1572
Q Serve(g_s), s	5.3	0.0	3.2	1.4	0.0	1.1	2.5	9.1	0.3	2.0	8.5	0.9
Cycle Q Clear(g_c), s	6.4	0.0	3.2	4.6	0.0	1.1	11.0	9.1	0.3	11.1	8.5	0.9
Prop In Lane	1.00		0.78	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	238	0	192	196	0	197	589	1315	1114	588	1315	1114
V/C Ratio(X)	0.42	0.00	0.39	0.13	0.00	0.14	0.11	0.41	0.02	0.09	0.39	0.06
Avail Cap(c_a), veh/h	449	0	442	398	0	453	589	1315	1114	588	1315	1114
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	0.0	30.6	32.7	0.0	29.7	6.6	4.5	3.2	6.8	4.4	3.3
Incr Delay (d2), s/veh	1.2	0.0	1.3	0.3	0.0	0.3	0.4	1.0	0.0	0.3	0.9	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	1.8	0.0	1.3	0.5	0.0	0.4	0.4	2.3	0.1	0.3	2.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.7	0.0	31.8	33.0	0.0	30.0	7.0	5.5	3.3	7.1	5.3	3.4
LnGrp LOS	C		C	C		C	A	A	A	A	A	A
Approach Vol, veh/h		175			53			632			632	
Approach Delay, s/veh		32.9			31.4			5.5			5.3	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		59.6		15.4		59.6		15.4				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		41.6		20.4		41.6		20.4				
Max Q Clear Time (g_c+I1), s		13.0		8.4		13.1		6.6				
Green Ext Time (p_c), s		3.9		0.5		3.7		0.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			9.6									
HCM 7th LOS			A									

APPENDIX I
2029 Design Year Traffic Scenario
Capacity Analysis Summary Sheets

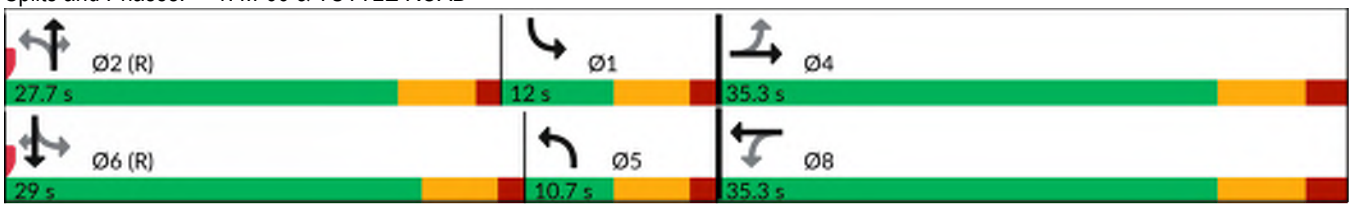


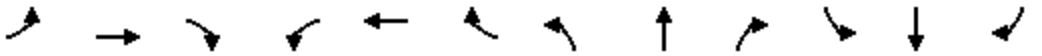
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	58	26	151	57	146	27	401	92	223	520	35
Future Volume (vph)	45	58	26	151	57	146	27	401	92	223	520	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954			0.892				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1765	0	1736	1603	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.529			0.690			0.208			0.327		
Satd. Flow (perm)	922	1765	0	1261	1603	0	387	1759	1553	581	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			180				145			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	56	72	32	186	70	180	33	495	114	275	642	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	104	0	186	250	0	33	495	114	275	642	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	12.0	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	36.9%	36.9%	16.0%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	22.0	22.0	6.3	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	16.8	16.8		16.8	16.8		38.2	33.2	33.2	43.4	40.9	40.9
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.51	0.44	0.44	0.58	0.55	0.55
v/c Ratio	0.27	0.24		0.65	0.50		0.11	0.63	0.14	0.64	0.65	0.04
Control Delay (s/veh)	24.9	16.7		36.6	10.7		8.8	21.9	1.6	24.0	20.8	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.9	16.7		36.6	10.7		8.8	21.9	1.6	24.0	20.8	0.0
LOS	C	B		D	B		A	C	A	C	C	A
Approach Delay (s/veh)		19.6			21.8			17.6			20.8	
Approach LOS		B			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 40 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay (s/veh): 20.0		Intersection LOS: C	
Intersection Capacity Utilization 71.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





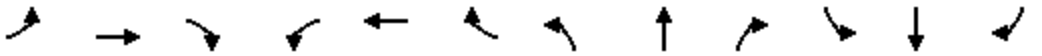
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	58	26	151	57	146	27	401	92	223	520	35
Future Volume (veh/h)	45	58	26	151	57	146	27	401	92	223	520	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	56	72	32	186	70	180	33	495	114	275	642	43
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	199	288	128	335	107	275	458	523	458	490	567	492
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.20	0.29	0.29	0.22	0.31	0.31
Sat Flow, veh/h	1067	1217	541	1270	453	1164	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	56	0	104	186	0	250	33	495	114	275	642	43
Grp Sat Flow(s),veh/h/ln	1067	0	1758	1270	0	1616	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	3.8	0.0	3.6	10.4	0.0	10.5	0.0	20.4	4.2	5.3	23.3	1.4
Cycle Q Clear(g_c), s	14.2	0.0	3.6	14.0	0.0	10.5	0.0	20.4	4.2	5.3	23.3	1.4
Prop In Lane	1.00		0.31	1.00		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	0	416	335	0	382	458	523	458	490	567	492
V/C Ratio(X)	0.28	0.00	0.25	0.55	0.00	0.65	0.07	0.95	0.25	0.56	1.13	0.09
Avail Cap(c_a), veh/h	345	0	656	509	0	603	458	523	458	490	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.3	0.0	23.2	28.9	0.0	25.9	23.8	25.9	20.2	23.7	25.8	18.3
Incr Delay (d2), s/veh	0.8	0.0	0.3	1.4	0.0	1.9	0.1	28.2	1.3	1.4	79.6	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	1.0	0.0	1.4	3.1	0.0	4.0	0.4	11.7	1.5	3.9	21.4	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.0	0.0	23.5	30.4	0.0	27.8	23.9	54.2	21.5	25.1	105.5	18.7
LnGrp LOS	C		C	C		C	C	D	C	C	F	B
Approach Vol, veh/h		160			436			642			960	
Approach Delay, s/veh		26.9			28.9			46.8			78.6	
Approach LOS		C			C			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.3	27.7		25.0	21.0	29.0		25.0				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 6.3	* 22		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	7.3	22.4		16.2	2.0	25.3		16.0				
Green Ext Time (p_c), s	0.0	0.0		0.5	0.0	0.0		1.7				

Intersection Summary		
HCM 7th Control Delay, s/veh	55.7	
HCM 7th LOS	E	

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	14	71	0	107	33	435	88	138	453	74
Future Volume (vph)	5	0	14	71	0	107	33	435	88	138	453	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		100	100		115
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.977				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1734	0	1770	1792	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1417	0	1770	1583	0	1770	1734	0	1770	1792	1583
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			370			1828			1569	
Travel Time (s)		7.1			0.0			27.7			23.8	
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	6	0	17	77	0	116	39	518	96	150	539	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	17	0	77	116	0	39	614	0	150	539	88
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.5%		ICU Level of Service B	
Analysis Period (min) 15			

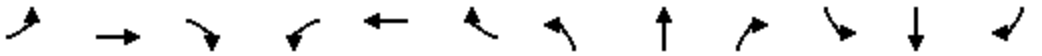
Intersection	
Int Delay, s/veh	10.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	14	71	0	107	33	435	88	138	453	74
Future Vol, veh/h	5	0	14	71	0	107	33	435	88	138	453	74
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	92	84	92	92	92	84	84	92	92	84	84
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	6	0	17	77	0	116	39	518	96	150	539	88

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1436	1531	539	1484	1572	566	627	0	0	614	0	0
Stage 1	839	839	-	644	644	-	-	-	-	-	-	-
Stage 2	596	692	-	839	927	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	111	117	520	103	110	524	954	-	-	966	-	-
Stage 1	360	381	-	461	468	-	-	-	-	-	-	-
Stage 2	490	445	-	360	347	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	70	95	520	81	89	524	954	-	-	966	-	-
Mov Cap-2 Maneuver	70	95	-	81	89	-	-	-	-	-	-	-
Stage 1	304	322	-	442	449	-	-	-	-	-	-	-
Stage 2	365	427	-	294	293	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	25.02	79.38	0.54	1.82
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	954	-	-	70	520	81	524	966	-	-
HCM Lane V/C Ratio	0.041	-	-	0.085	0.032	0.955	0.222	0.155	-	-
HCM Control Delay (s/veh)	8.9	-	-	61	12.2	178.2	13.8	9.4	-	-
HCM Lane LOS	A	-	-	F	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.1	5.2	0.8	0.5	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	344	38	34	351	0	29	0	27	0	0	1
Future Volume (vph)	0	344	38	34	351	0	29	0	27	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1757	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1757	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	491	54	49	501	0	41	0	39	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	545	0	49	501	0	0	41	39	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

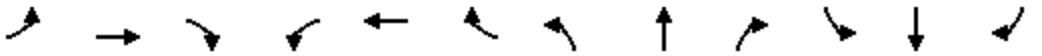
Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	344	38	34	351	0	29	0	27	0	0	1
Future Vol, veh/h	0	344	38	34	351	0	29	0	27	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	491	54	49	501	0	41	0	39	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	501	0	0	546	0	0	1117	1117	519	1090	1144	501
Stage 1	-	-	-	-	-	-	519	519	-	599	599	-
Stage 2	-	-	-	-	-	-	599	599	-	491	546	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1063	-	-	1023	-	-	185	207	557	193	200	570
Stage 1	-	-	-	-	-	-	540	533	-	489	491	-
Stage 2	-	-	-	-	-	-	489	491	-	559	518	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1063	-	-	1023	-	-	175	197	557	171	190	570
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	197	-	171	190	-
Stage 1	-	-	-	-	-	-	540	533	-	465	467	-
Stage 2	-	-	-	-	-	-	464	467	-	520	518	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.77	22.21	11.33
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	175	557	1063	-	-	1023	-	-	570
HCM Lane V/C Ratio	0.236	0.069	-	-	-	0.047	-	-	0.003
HCM Control Delay (s/veh)	31.8	11.9	0	-	-	8.7	-	-	11.3
HCM Lane LOS	D	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.9	0.2	0	-	-	0.1	-	-	0

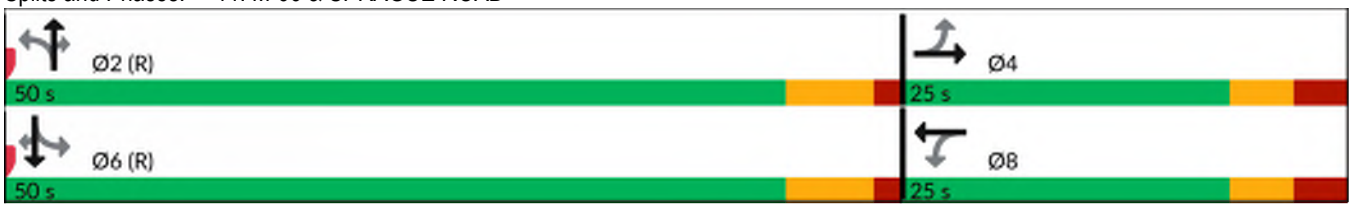


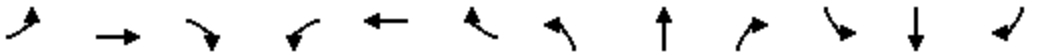
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1	4	7	0	4	20	524	13	34	488	27
Future Volume (vph)	18	1	4	7	0	4	20	524	13	34	488	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.464			0.442		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	856	1845	1568	815	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			305				52			52
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	20	1	4	8	0	4	22	570	14	37	530	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	5	0	8	4	0	22	570	14	37	530	29
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	18.4	18.4		18.4	18.4		43.6	43.6	43.6	43.6	43.6	43.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.7	6.7		6.6	6.6		66.6	66.6	66.6	66.6	66.6	66.6
Actuated g/C Ratio	0.09	0.09		0.09	0.09		0.89	0.89	0.89	0.89	0.89	0.89
v/c Ratio	0.12	0.03		0.04	0.00		0.02	0.34	0.01	0.05	0.32	0.02
Control Delay (s/veh)	32.3	22.0		31.1	0.0		2.6	3.0	0.0	0.6	0.9	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.3	22.0		31.1	0.0		2.6	3.0	0.0	0.6	0.9	0.1
LOS	C	C		C	A		A	A	A	A	A	A
Approach Delay (s/veh)		30.3			20.8			3.0			0.9	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 72 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.35			
Intersection Signal Delay (s/veh): 2.7		Intersection LOS: A	
Intersection Capacity Utilization 46.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD

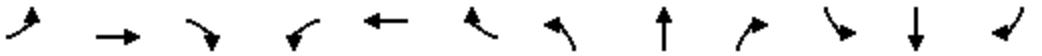




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1	4	7	0	4	20	524	13	34	488	27
Future Volume (veh/h)	18	1	4	7	0	4	20	524	13	34	488	27
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	20	1	4	8	0	4	22	570	14	37	530	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	143	12	46	142	0	56	693	1467	1244	672	1467	1244
Arrive On Green	0.04	0.04	0.04	0.04	0.00	0.04	0.79	0.79	0.79	0.79	0.79	0.79
Sat Flow, veh/h	1401	324	1298	1400	0	1572	844	1856	1572	824	1856	1572
Grp Volume(v), veh/h	20	0	5	8	0	4	22	570	14	37	530	29
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	844	1856	1572	824	1856	1572
Q Serve(g_s), s	1.0	0.0	0.2	0.4	0.0	0.2	0.6	7.0	0.1	1.1	6.3	0.3
Cycle Q Clear(g_c), s	1.2	0.0	0.2	0.6	0.0	0.2	6.9	7.0	0.1	8.0	6.3	0.3
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	143	0	58	142	0	56	693	1467	1244	672	1467	1244
V/C Ratio(X)	0.14	0.00	0.09	0.06	0.00	0.07	0.03	0.39	0.01	0.06	0.36	0.02
Avail Cap(c_a), veh/h	436	0	398	435	0	386	693	1467	1244	672	1467	1244
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.5	0.0	35.0	35.3	0.0	35.0	3.3	2.4	1.7	3.6	2.3	1.7
Incr Delay (d2), s/veh	0.4	0.0	0.6	0.2	0.0	0.5	0.1	0.8	0.0	0.2	0.7	0.0
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	0.0	0.1	0.1	0.0	0.1	0.1	1.0	0.0	0.1	0.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.0	0.0	35.6	35.4	0.0	35.5	3.4	3.1	1.7	3.7	3.0	1.7
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		25			12			606			596	
Approach Delay, s/veh		35.9			35.5			3.1			3.0	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	65.7	9.3	65.7	9.3
Change Period (Y+Rc), s	6.4	6.6	6.4	6.6
Max Green Setting (Gmax), s	43.6	18.4	43.6	18.4
Max Q Clear Time (g_c+I1), s	9.0	3.2	10.0	2.6
Green Ext Time (p_c), s	3.9	0.0	3.7	0.0

Intersection Summary	
HCM 7th Control Delay, s/veh	4.0
HCM 7th LOS	A

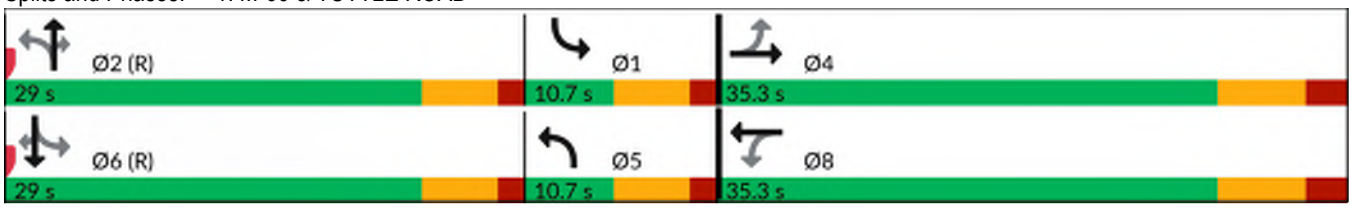


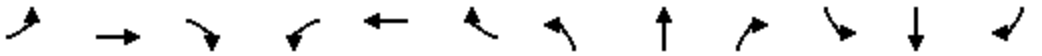
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	117	54	128	64	95	45	659	172	134	671	67
Future Volume (vph)	225	117	54	128	64	95	45	659	172	134	671	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.953			0.910				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1763	0	1736	1637	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.653			0.646			0.139			0.131		
Satd. Flow (perm)	1138	1763	0	1180	1637	0	259	1759	1553	233	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		35			98				177			145
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	232	121	56	132	66	98	46	679	177	138	692	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	177	0	132	164	0	46	679	177	138	692	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	29.0	29.0	10.7	29.0	29.0
Total Split (%)	47.1%	47.1%		47.1%	47.1%		14.3%	38.7%	38.7%	14.3%	38.7%	38.7%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	23.3	23.3	5.0	23.3	23.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lag	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	20.4	20.4		20.4	20.4		35.9	30.9	30.9	38.1	35.1	35.1
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.48	0.41	0.41	0.51	0.47	0.47
v/c Ratio	0.74	0.35		0.41	0.31		0.20	0.93	0.23	0.64	0.81	0.08
Control Delay (s/veh)	39.1	17.7		24.5	9.9		13.8	45.5	3.6	38.0	32.6	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.1	17.7		24.5	9.9		13.8	45.5	3.6	38.0	32.6	0.2
LOS	D	B		C	A		B	D	A	D	C	A
Approach Delay (s/veh)		29.9			16.4			35.7			31.0	
Approach LOS		C			B			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 66 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay (s/veh): 30.8		Intersection LOS: C	
Intersection Capacity Utilization 85.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





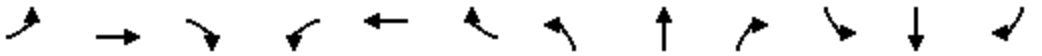
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	225	117	54	128	64	95	45	659	172	134	671	67
Future Volume (veh/h)	225	117	54	128	64	95	45	659	172	134	671	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	232	121	56	132	66	98	46	679	177	138	692	69
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	365	371	172	371	205	304	329	553	485	320	567	492
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.13	0.31	0.31	0.13	0.31	0.31
Sat Flow, veh/h	1154	1200	555	1188	663	985	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	232	0	177	132	0	164	46	679	177	138	692	69
Grp Sat Flow(s),veh/h/ln	1154	0	1756	1188	0	1649	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	14.5	0.0	5.8	7.2	0.0	5.7	0.0	23.3	6.6	1.1	23.3	2.4
Cycle Q Clear(g_c), s	20.2	0.0	5.8	13.0	0.0	5.7	0.0	23.3	6.6	1.1	23.3	2.4
Prop In Lane	1.00		0.32	1.00		0.60	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	365	0	543	371	0	510	329	553	485	320	567	492
V/C Ratio(X)	0.64	0.00	0.33	0.36	0.00	0.32	0.14	1.23	0.37	0.43	1.22	0.14
Avail Cap(c_a), veh/h	439	0	655	448	0	615	329	553	485	320	567	492
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	19.9	24.9	0.0	19.9	28.3	25.8	20.1	28.4	25.8	18.6
Incr Delay (d2), s/veh	2.2	0.0	0.3	0.6	0.0	0.4	0.2	117.4	2.1	0.9	114.2	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	2.3	2.0	0.0	2.1	0.7	26.7	2.4	2.1	26.9	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.9	0.0	20.3	25.5	0.0	20.2	28.5	143.2	22.2	29.3	140.1	19.2
LnGrp LOS	C		C	C		C	C	F	C	C	F	B
Approach Vol, veh/h		409			296			902			899	
Approach Delay, s/veh		25.7			22.6			113.6			113.8	
Approach LOS		C			C			F			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.5	29.0		30.5	15.5	29.0		30.5				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5	* 23		28.0	* 5	* 23		28.0				
Max Q Clear Time (g_c+I1), s	3.1	25.3		22.2	2.0	25.3		15.0				
Green Ext Time (p_c), s	0.1	0.0		1.0	0.0	0.0		1.1				

Intersection Summary	
HCM 7th Control Delay, s/veh	88.6
HCM 7th LOS	F

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	27	129	0	185	55	744	127	181	603	49
Future Volume (vph)	8	0	27	129	0	185	55	744	127	181	603	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		100	100		115
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.977				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1733	0	1770	1792	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1417	0	1770	1583	0	1770	1733	0	1770	1792	1583
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			374			1828			1569	
Travel Time (s)		7.1			0.0			27.7			23.8	
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	8	0	28	140	0	201	57	775	138	197	628	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	28	0	140	201	0	57	913	0	197	628	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 80.7%		ICU Level of Service D	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	126.9

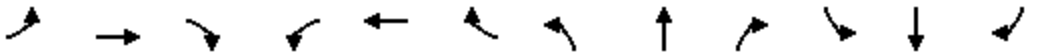
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	27	129	0	185	55	744	127	181	603	49
Future Vol, veh/h	8	0	27	129	0	185	55	744	127	181	603	49
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	8	0	28	140	0	201	57	775	138	197	628	51

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1911	2049	628	1980	2031	844	679	0	0	913	0	0
Stage 1	1022	1022	-	959	959	-	-	-	-	-	-	-
Stage 2	890	1028	-	1022	1073	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	52	56	462	~ 46	57	363	913	-	-	746	-	-
Stage 1	285	314	-	309	336	-	-	-	-	-	-	-
Stage 2	338	312	-	285	297	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	16	38	462	~ 30	39	363	913	-	-	746	-	-
Mov Cap-2 Maneuver	16	38	-	~ 30	39	-	-	-	-	-	-	-
Stage 1	210	231	-	290	314	-	-	-	-	-	-	-
Stage 2	141	292	-	197	219	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	96.94	$ 808.11	0.54	2.59
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	913	-	-	16	462	30	363	746	-	-
HCM Lane V/C Ratio	0.063	-	-	0.524	0.061	4.694	0.554	0.264	-	-
HCM Control Delay (s/veh)	9.2	-	-	-$ 379.2	13.3	$ 1929	26.5	11.5	-	-
HCM Lane LOS	A	-	-	F	B	F	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.4	0.2	16.9	3.2	1.1	-	-

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



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	383	49	41	217	6	56	0	43	0	0	3
Future Volume (vph)	9	383	49	41	217	6	56	0	43	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.983			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1755	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1755	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	547	70	59	310	9	80	0	61	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	617	0	59	319	0	0	80	61	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

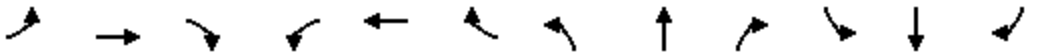
Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	383	49	41	217	6	56	0	43	0	0	3
Future Vol, veh/h	9	383	49	41	217	6	56	0	43	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	547	70	59	310	9	80	0	61	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	319	0	0	617	0	0	1035	1044	582	1004	1074	314
Stage 1	-	-	-	-	-	-	608	608	-	431	431	-
Stage 2	-	-	-	-	-	-	427	436	-	573	643	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1241	-	-	963	-	-	210	229	513	220	220	726
Stage 1	-	-	-	-	-	-	483	486	-	602	583	-
Stage 2	-	-	-	-	-	-	606	580	-	505	469	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1241	-	-	963	-	-	194	213	513	180	204	726
Mov Cap-2 Maneuver	-	-	-	-	-	-	194	213	-	180	204	-
Stage 1	-	-	-	-	-	-	478	481	-	566	547	-
Stage 2	-	-	-	-	-	-	565	545	-	440	464	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.16	1.39	25.99	9.99
HCM LOS			D	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	194	513	1241	-	-	963	-	-	726
HCM Lane V/C Ratio	0.412	0.12	0.01	-	-	0.061	-	-	0.006
HCM Control Delay (s/veh)	36	13	7.9	-	-	9	-	-	10
HCM Lane LOS	E	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	1.9	0.4	0	-	-	0.2	-	-	0

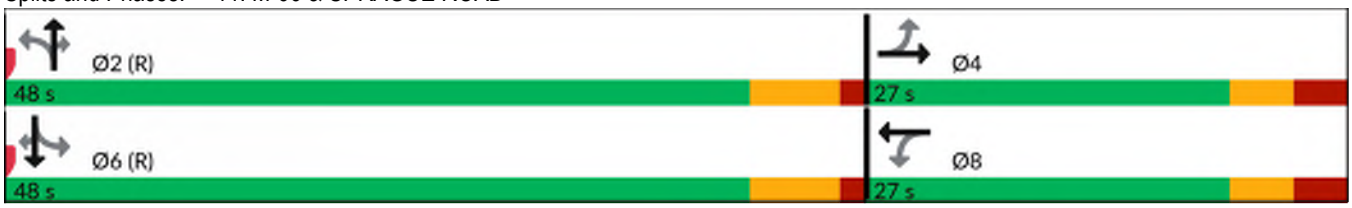


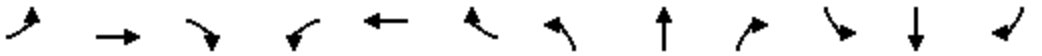
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	15	53	24	9	16	59	555	21	48	533	68
Future Volume (vph)	104	15	53	24	9	16	59	555	21	48	533	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.906				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1671	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.407			0.392		
Satd. Flow (perm)	1365	1627	0	1308	1671	0	751	1845	1568	723	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				52			72
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	113	16	58	26	10	17	64	603	23	52	579	74
Shared Lane Traffic (%)												
Lane Group Flow (vph)	113	74	0	26	27	0	64	603	23	52	579	74
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		41.6	41.6	41.6	41.6	41.6	41.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.5	11.5		11.3	11.3		54.4	54.4	54.4	54.4	54.4	54.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.54	0.24		0.13	0.10		0.11	0.45	0.01	0.09	0.43	0.06
Control Delay (s/veh)	38.0	12.4		26.8	15.9		6.1	7.6	0.6	2.6	3.3	0.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.0	12.4		26.8	15.9		6.1	7.6	0.6	2.6	3.3	0.5
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		27.9			21.3			7.3			3.0	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 24 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay (s/veh): 8.3		Intersection LOS: A	
Intersection Capacity Utilization 62.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD

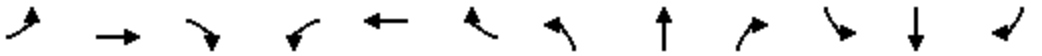




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	15	53	24	9	16	59	555	21	48	533	68
Future Volume (veh/h)	104	15	53	24	9	16	59	555	21	48	533	68
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	113	16	58	26	10	17	64	603	23	52	579	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	250	45	161	208	78	133	532	1299	1101	537	1299	1101
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.70	0.70	0.70	0.70	0.70	0.70
Sat Flow, veh/h	1372	352	1275	1315	617	1049	773	1856	1572	793	1856	1572
Grp Volume(v), veh/h	113	0	74	26	0	27	64	603	23	52	579	74
Grp Sat Flow(s),veh/h/ln	1372	0	1626	1315	0	1667	773	1856	1572	793	1856	1572
Q Serve(g_s), s	6.0	0.0	3.1	1.4	0.0	1.1	3.0	10.8	0.3	2.3	10.2	1.1
Cycle Q Clear(g_c), s	7.1	0.0	3.1	4.5	0.0	1.1	13.2	10.8	0.3	13.2	10.2	1.1
Prop In Lane	1.00		0.78	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	250	0	206	208	0	211	532	1299	1101	537	1299	1101
V/C Ratio(X)	0.45	0.00	0.36	0.13	0.00	0.13	0.12	0.46	0.02	0.10	0.45	0.07
Avail Cap(c_a), veh/h	450	0	442	399	0	453	532	1299	1101	537	1299	1101
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	0.0	30.0	32.0	0.0	29.1	7.8	5.0	3.4	7.9	4.9	3.5
Incr Delay (d2), s/veh	1.3	0.0	1.1	0.3	0.0	0.3	0.5	1.2	0.0	0.4	1.1	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	2.0	0.0	1.2	0.4	0.0	0.4	0.5	2.9	0.1	0.4	2.7	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.5	0.0	31.0	32.3	0.0	29.3	8.2	6.2	3.5	8.3	6.0	3.7
LnGrp LOS	C		C	C		C	A	A	A	A	A	A
Approach Vol, veh/h		187			53			690			705	
Approach Delay, s/veh		32.5			30.8			6.3			5.9	
Approach LOS		C			C			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		58.9		16.1		58.9		16.1				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		41.6		20.4		41.6		20.4				
Max Q Clear Time (g_c+I1), s		15.2		9.1		15.2		6.5				
Green Ext Time (p_c), s		4.4		0.5		4.2		0.1				

Intersection Summary												
HCM 7th Control Delay, s/veh		9.9										
HCM 7th LOS		A										

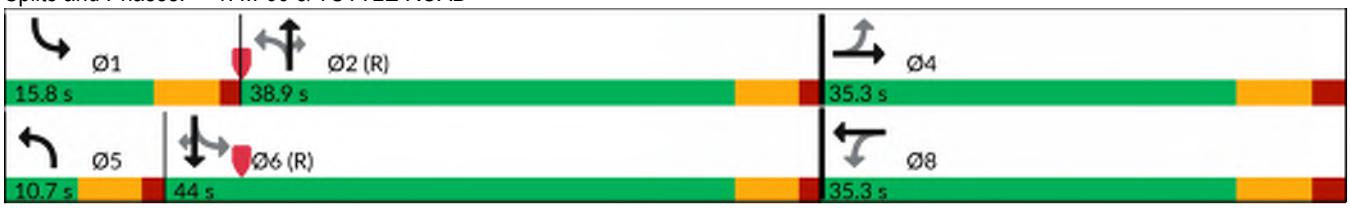


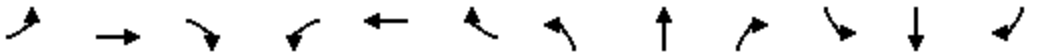
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	58	26	151	57	146	27	401	92	223	520	35
Future Volume (vph)	45	58	26	151	57	146	27	401	92	223	520	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954			0.892				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1765	0	1736	1603	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.470			0.690			0.324			0.290		
Satd. Flow (perm)	819	1765	0	1261	1603	0	604	1759	1553	515	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			149				121			121
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	56	72	32	186	70	180	33	495	114	275	642	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	104	0	186	250	0	33	495	114	275	642	43
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	38.9	38.9	15.8	44.0	44.0
Total Split (%)	39.2%	39.2%		39.2%	39.2%		11.9%	43.2%	43.2%	17.6%	48.9%	48.9%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	33.2	33.2	10.1	38.3	38.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	18.8	18.8		18.8	18.8		46.9	40.9	40.9	58.1	51.0	51.0
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.52	0.45	0.45	0.65	0.57	0.57
v/c Ratio	0.32	0.26		0.70	0.55		0.08	0.61	0.14	0.57	0.62	0.04
Control Delay (s/veh)	33.1	22.2		46.7	16.8		3.7	18.4	4.3	13.0	20.2	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.1	22.2		46.7	16.8		3.7	18.4	4.3	13.0	20.2	0.0
LOS	C	C		D	B		A	B	A	B	C	A
Approach Delay (s/veh)		26.0			29.6			15.2			17.3	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 38 (42%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay (s/veh): 19.7		Intersection LOS: B	
Intersection Capacity Utilization 71.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





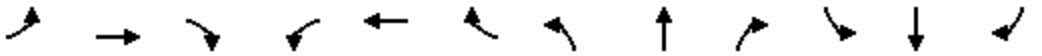
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	58	26	151	57	146	27	401	92	223	520	35
Future Volume (veh/h)	45	58	26	151	57	146	27	401	92	223	520	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	56	72	32	186	70	180	33	495	114	275	642	43
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	172	277	123	308	103	265	348	823	721	413	974	845
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.01	0.15	0.15	0.10	0.53	0.53
Sat Flow, veh/h	1067	1217	541	1270	453	1164	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	56	0	104	186	0	250	33	495	114	275	642	43
Grp Sat Flow(s),veh/h/ln	1067	0	1758	1270	0	1616	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	4.6	0.0	4.4	12.7	0.0	12.7	0.9	23.3	5.7	7.1	22.8	1.2
Cycle Q Clear(g_c), s	17.3	0.0	4.4	17.0	0.0	12.7	0.9	23.3	5.7	7.1	22.8	1.2
Prop In Lane	1.00		0.31	1.00		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	0	400	308	0	368	348	823	721	413	974	845
V/C Ratio(X)	0.33	0.00	0.26	0.60	0.00	0.68	0.09	0.60	0.16	0.67	0.66	0.05
Avail Cap(c_a), veh/h	261	0	547	413	0	503	391	823	721	430	974	845
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.89	0.89	0.89	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.6	0.0	28.5	35.5	0.0	31.7	13.6	30.4	22.9	14.7	15.1	10.1
Incr Delay (d2), s/veh	1.1	0.0	0.3	1.9	0.0	2.2	0.1	2.9	0.4	3.7	3.5	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	1.2	0.0	1.8	4.0	0.0	5.0	0.3	11.6	2.1	2.6	9.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	40.7	0.0	28.9	37.4	0.0	33.9	13.7	33.3	23.3	18.3	18.6	10.2
LnGrp LOS	D		C	D		C	B	C	C	B	B	B
Approach Vol, veh/h		160			436			642			960	
Approach Delay, s/veh		33.0			35.4			30.5			18.2	
Approach LOS		C			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.9	47.3		27.8	8.5	53.7		27.8				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 10	* 33		28.0	* 5	* 38		28.0				
Max Q Clear Time (g_c+I1), s	9.1	25.3		19.3	2.9	24.8		19.0				
Green Ext Time (p_c), s	0.1	2.0		0.4	0.0	3.4		1.4				

Intersection Summary		
HCM 7th Control Delay, s/veh		26.3
HCM 7th LOS		C

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

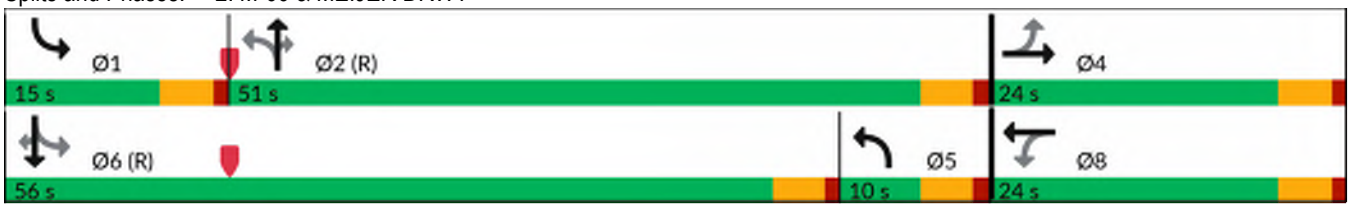


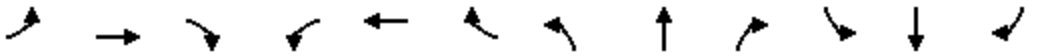
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	14	71	0	107	33	435	88	138	453	74
Future Volume (vph)	5	0	14	71	0	107	33	435	88	138	453	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		175	100		115
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1759	1583	1770	1792	1583
Flt Permitted	0.617			0.746			0.463			0.361		
Satd. Flow (perm)	1149	1417	0	1390	1583	0	862	1759	1583	672	1792	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		402			455				96			85
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			370			1828			1569	
Travel Time (s)		7.1			8.4			27.7			23.8	
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	6	0	17	77	0	116	39	518	96	150	539	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	17	0	77	116	0	39	518	96	150	539	88
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	24.0	24.0		24.0	24.0		10.0	51.0	51.0	15.0	56.0	56.0
Total Split (%)	26.7%	26.7%		26.7%	26.7%		11.1%	56.7%	56.7%	16.7%	62.2%	62.2%
Maximum Green (s)	19.5	19.5		19.5	19.5		5.5	46.5	46.5	10.5	51.5	51.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	10.3	10.3		10.3	10.3		58.0	58.0	58.0	64.7	64.7	64.7
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.64	0.64	0.64	0.72	0.72	0.72
v/c Ratio	0.04	0.03		0.48	0.19		0.06	0.45	0.09	0.25	0.41	0.07
Control Delay (s/veh)	33.8	0.1		46.6	0.7		7.7	9.8	1.9	3.1	5.1	1.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.8	0.1		46.6	0.7		7.7	9.8	1.9	3.1	5.1	1.1
LOS	C	A		D	A		A	A	A	A	A	A
Approach Delay (s/veh)		8.9			19.1			8.6			4.3	
Approach LOS		A			B			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 88 (98%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay (s/veh): 7.8		Intersection LOS: A	
Intersection Capacity Utilization 52.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: M-66 & MEIJER DRWY

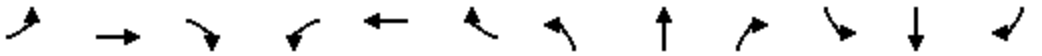




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	14	71	0	107	33	435	88	138	453	74
Future Volume (veh/h)	5	0	14	71	0	107	33	435	88	138	453	74
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1870	1870	1693	1870	1870	1870	1870	1781	1870	1870	1811	1870
Adj Flow Rate, veh/h	6	0	17	77	0	116	39	518	96	150	539	88
Peak Hour Factor	0.84	0.92	0.84	0.92	0.92	0.92	0.84	0.84	0.92	0.92	0.84	0.84
Percent Heavy Veh, %	2	2	14	2	2	2	2	8	2	2	6	2
Cap, veh/h	116	0	158	206	0	158	744	1221	1086	565	1036	907
Arrive On Green	0.10	0.00	0.10	0.10	0.00	0.10	0.36	1.00	1.00	0.13	1.00	1.00
Sat Flow, veh/h	1276	0	1585	1396	0	1585	1781	1781	1585	1781	1811	1585
Grp Volume(v), veh/h	6	0	17	77	0	116	39	518	96	150	539	88
Grp Sat Flow(s),veh/h/ln	1276	0	1585	1396	0	1585	1781	1781	1585	1781	1811	1585
Q Serve(g_s), s	0.4	0.0	0.9	4.8	0.0	6.4	0.0	0.0	0.0	3.9	0.0	0.0
Cycle Q Clear(g_c), s	6.8	0.0	0.9	5.7	0.0	6.4	0.0	0.0	0.0	3.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	116	0	158	206	0	158	744	1221	1086	565	1036	907
V/C Ratio(X)	0.05	0.00	0.11	0.37	0.00	0.73	0.05	0.42	0.09	0.27	0.52	0.10
Avail Cap(c_a), veh/h	266	0	343	369	0	343	744	1221	1086	657	1036	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.95	0.95	0.95	0.72	0.72	0.72
Uniform Delay (d), s/veh	42.7	0.0	36.9	39.4	0.0	39.4	5.5	0.0	0.0	9.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.3	1.1	0.0	6.4	0.0	1.0	0.2	0.2	1.3	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	0.1	0.0	0.4	1.7	0.0	2.7	0.2	0.3	0.0	1.2	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.8	0.0	37.2	40.6	0.0	45.8	5.5	1.0	0.2	9.7	1.3	0.2
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		23			193			653			777	
Approach Delay, s/veh		38.6			43.7			1.2			2.8	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.4	66.2		13.5	20.5	56.0		13.5				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	10.5	46.5		19.5	5.5	51.5		19.5				
Max Q Clear Time (g_c+I1), s	5.9	2.0		8.8	2.0	2.0		8.4				
Green Ext Time (p_c), s	0.1	3.6		0.0	0.0	3.8		0.6				

Intersection Summary			
HCM 7th Control Delay, s/veh		7.5	
HCM 7th LOS		A	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	344	38	34	351	0	29	0	27	0	0	1
Future Volume (vph)	0	344	38	34	351	0	29	0	27	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985							0.850		0.865	
Flt Protected				0.950				0.950				
Satd. Flow (prot)	1863	1757	0	1770	1759	0	0	1770	1583	0	1611	0
Flt Permitted				0.950				0.950				
Satd. Flow (perm)	1863	1757	0	1770	1759	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	491	54	49	501	0	41	0	39	0	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	545	0	49	501	0	0	41	39	0	1	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	344	38	34	351	0	29	0	27	0	0	1
Future Vol, veh/h	0	344	38	34	351	0	29	0	27	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	0	491	54	49	501	0	41	0	39	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	501	0	0	546	0	0	1117	1117	519	1090	1144	501
Stage 1	-	-	-	-	-	-	519	519	-	599	599	-
Stage 2	-	-	-	-	-	-	599	599	-	491	546	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1063	-	-	1023	-	-	185	207	557	193	200	570
Stage 1	-	-	-	-	-	-	540	533	-	489	491	-
Stage 2	-	-	-	-	-	-	489	491	-	559	518	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1063	-	-	1023	-	-	175	197	557	171	190	570
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	197	-	171	190	-
Stage 1	-	-	-	-	-	-	540	533	-	465	467	-
Stage 2	-	-	-	-	-	-	464	467	-	520	518	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.77	22.21	11.33
HCM LOS			C	B

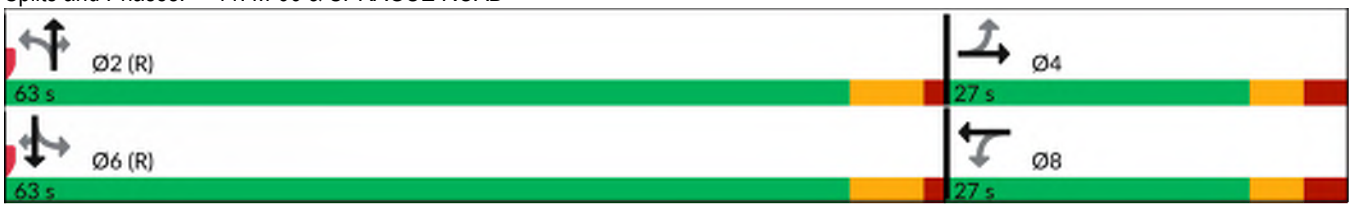
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	175	557	1063	-	-	1023	-	-	570
HCM Lane V/C Ratio	0.236	0.069	-	-	-	0.047	-	-	0.003
HCM Control Delay (s/veh)	31.8	11.9	0	-	-	8.7	-	-	11.3
HCM Lane LOS	D	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.9	0.2	0	-	-	0.1	-	-	0

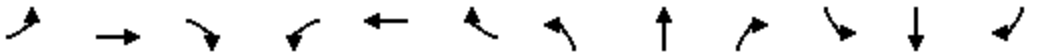
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1	4	7	0	4	20	524	13	34	488	27
Future Volume (vph)	18	1	4	7	0	4	20	524	13	34	488	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1623	0	1752	1568	0	1752	1845	1568	1752	1845	1568
Flt Permitted							0.464			0.443		
Satd. Flow (perm)	1845	1623	0	1845	1568	0	856	1845	1568	817	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			337				44			44
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	20	1	4	8	0	4	22	570	14	37	530	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	5	0	8	4	0	22	570	14	37	530	29
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	27.0	27.0		27.0	27.0		63.0	63.0	63.0	63.0	63.0	63.0
Total Split (%)	30.0%	30.0%		30.0%	30.0%		70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	20.4	20.4		20.4	20.4		56.6	56.6	56.6	56.6	56.6	56.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	6.9	6.9		6.7	6.7		81.5	81.5	81.5	81.5	81.5	81.5
Actuated g/C Ratio	0.08	0.08		0.07	0.07		0.91	0.91	0.91	0.91	0.91	0.91
v/c Ratio	0.14	0.03		0.05	0.00		0.02	0.34	0.00	0.05	0.31	0.02
Control Delay (s/veh)	40.2	26.6		38.4	0.0		2.2	2.6	0.0	0.3	0.6	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.2	26.6		38.4	0.0		2.2	2.6	0.0	0.3	0.6	0.0
LOS	D	C		D	A		A	A	A	A	A	A
Approach Delay (s/veh)		37.5			25.6			2.5			0.6	
Approach LOS		D			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.34			
Intersection Signal Delay (s/veh): 2.6		Intersection LOS: A	
Intersection Capacity Utilization 46.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD

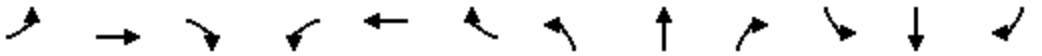




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1	4	7	0	4	20	524	13	34	488	27
Future Volume (veh/h)	18	1	4	7	0	4	20	524	13	34	488	27
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	20	1	4	8	0	4	22	570	14	37	530	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	124	11	44	123	0	53	774	1525	1293	693	1525	1293
Arrive On Green	0.03	0.03	0.03	0.03	0.00	0.03	0.82	0.82	0.82	1.00	1.00	1.00
Sat Flow, veh/h	1401	324	1298	1400	0	1572	844	1856	1572	824	1856	1572
Grp Volume(v), veh/h	20	0	5	8	0	4	22	570	14	37	530	29
Grp Sat Flow(s),veh/h/ln	1401	0	1622	1400	0	1572	844	1856	1572	824	1856	1572
Q Serve(g_s), s	1.3	0.0	0.3	0.5	0.0	0.2	0.4	7.1	0.1	0.4	0.0	0.0
Cycle Q Clear(g_c), s	1.5	0.0	0.3	0.8	0.0	0.2	0.4	7.1	0.1	7.5	0.0	0.0
Prop In Lane	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	124	0	54	123	0	53	774	1525	1293	693	1525	1293
V/C Ratio(X)	0.16	0.00	0.09	0.07	0.00	0.08	0.03	0.37	0.01	0.05	0.35	0.02
Avail Cap(c_a), veh/h	394	0	368	393	0	356	774	1525	1293	693	1525	1293
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	42.9	0.0	42.2	42.5	0.0	42.1	1.5	2.1	1.4	0.4	0.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.7	0.2	0.0	0.6	0.1	0.7	0.0	0.1	0.6	0.0
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	0.5	0.0	0.1	0.2	0.0	0.1	0.0	1.0	0.0	0.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.5	0.0	42.9	42.8	0.0	42.7	1.5	2.8	1.5	0.5	0.6	0.0
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		25			12			606			596	
Approach Delay, s/veh		43.4			42.8			2.7			0.5	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		80.4		9.6		80.4		9.6				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		56.6		20.4		56.6		20.4				
Max Q Clear Time (g_c+I1), s		9.1		3.5		9.5		2.8				
Green Ext Time (p_c), s		4.0		0.0		3.8		0.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			2.9									
HCM 7th LOS			A									

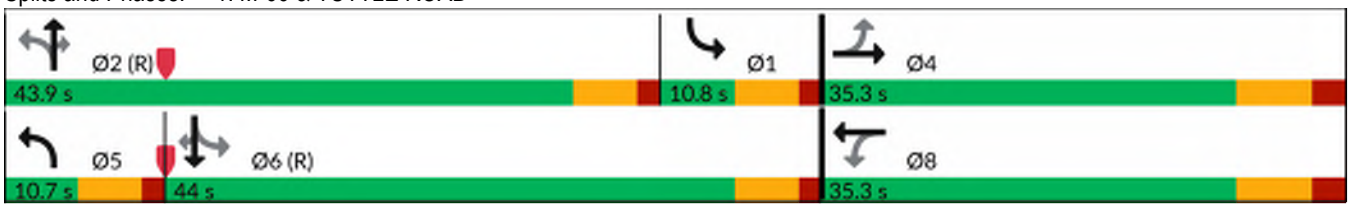


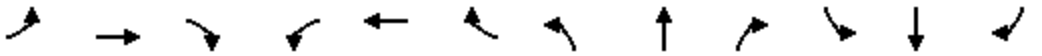
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	117	54	128	64	95	45	659	172	134	671	67
Future Volume (vph)	225	117	54	128	64	95	45	659	172	134	671	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	270		0	110		0	180		325	180		235
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			60			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.953			0.910				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1763	0	1736	1637	0	1770	1759	1553	1687	1810	1583
Flt Permitted	0.653			0.644			0.106			0.251		
Satd. Flow (perm)	1138	1763	0	1177	1637	0	197	1759	1553	446	1810	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			86				177			121
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5269			518			1569			2112	
Travel Time (s)		102.6			10.1			23.8			32.0	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	9%	3%	2%	4%	5%	6%	2%	8%	4%	7%	5%	2%
Adj. Flow (vph)	232	121	56	132	66	98	46	679	177	138	692	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	177	0	132	164	0	46	679	177	138	692	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	35.3	35.3		35.3	35.3		10.7	27.7	27.7	10.7	27.7	27.7
Total Split (s)	35.3	35.3		35.3	35.3		10.7	43.9	43.9	10.8	44.0	44.0
Total Split (%)	39.2%	39.2%		39.2%	39.2%		11.9%	48.8%	48.8%	12.0%	48.9%	48.9%
Maximum Green (s)	28.0	28.0		28.0	28.0		5.0	38.2	38.2	5.1	38.3	38.3
Yellow Time (s)	5.0	5.0		5.0	5.0		4.3	4.3	4.3	4.3	4.3	4.3
All-Red Time (s)	2.3	2.3		2.3	2.3		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag							Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0			15.0	15.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	22.5	22.5		22.5	22.5		43.7	43.7	43.7	47.6	47.6	47.6
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.49	0.49	0.49	0.53	0.53	0.53
v/c Ratio	0.81	0.38		0.45	0.34		0.23	0.79	0.20	0.45	0.72	0.07
Control Delay (s/veh)	53.6	24.7		32.2	14.5		6.6	16.7	0.9	25.9	25.3	0.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	53.6	24.7		32.2	14.5		6.6	16.7	0.9	25.9	25.3	0.8
LOS	D	C		C	B		A	B	A	C	C	A
Approach Delay (s/veh)		41.1			22.4			13.1			23.5	
Approach LOS		D			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 42 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay (s/veh): 22.5		Intersection LOS: C	
Intersection Capacity Utilization 85.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: M-66 & TUTTLE ROAD





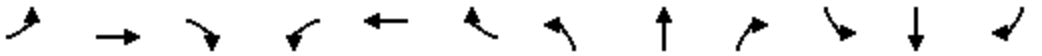
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	225	117	54	128	64	95	45	659	172	134	671	67
Future Volume (veh/h)	225	117	54	128	64	95	45	659	172	134	671	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	1767	1856	1870	1841	1826	1811	1870	1781	1841	1796	1826	1870
Adj Flow Rate, veh/h	232	121	56	132	66	98	46	679	177	138	692	69
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	9	3	2	4	5	6	2	8	4	7	5	2
Cap, veh/h	336	359	166	342	198	294	148	756	662	215	832	722
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.01	0.14	0.14	0.07	0.46	0.46
Sat Flow, veh/h	1154	1200	555	1188	663	985	1781	1781	1560	1711	1826	1585
Grp Volume(v), veh/h	232	0	177	132	0	164	46	679	177	138	692	69
Grp Sat Flow(s),veh/h/ln	1154	0	1756	1188	0	1649	1781	1781	1560	1711	1826	1585
Q Serve(g_s), s	17.6	0.0	7.1	8.8	0.0	7.0	1.5	33.7	9.1	1.8	29.9	2.2
Cycle Q Clear(g_c), s	24.6	0.0	7.1	15.8	0.0	7.0	1.5	33.7	9.1	1.8	29.9	2.2
Prop In Lane	1.00		0.32	1.00		0.60	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	336	0	525	342	0	493	148	756	662	215	832	722
V/C Ratio(X)	0.69	0.00	0.34	0.39	0.00	0.33	0.31	0.90	0.27	0.64	0.83	0.10
Avail Cap(c_a), veh/h	350	0	546	356	0	513	179	756	662	215	832	722
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.60	0.60	0.60	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.1	0.0	24.6	30.8	0.0	24.6	23.5	36.8	26.2	39.1	21.5	14.0
Incr Delay (d2), s/veh	5.5	0.0	0.4	0.7	0.0	0.4	0.7	10.3	0.6	6.4	9.5	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	5.3	0.0	2.9	2.5	0.0	2.7	0.6	17.9	3.6	3.1	13.4	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	39.6	0.0	25.0	31.5	0.0	25.0	24.3	47.1	26.8	45.4	31.0	14.2
LnGrp LOS	D		C	C		C	C	D	C	D	C	B
Approach Vol, veh/h		409			296			902			899	
Approach Delay, s/veh		33.3			27.9			41.9			31.9	
Approach LOS		C			C			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.9	43.9		34.2	9.1	46.7		34.2				
Change Period (Y+Rc), s	* 5.7	* 5.7		7.3	* 5.7	* 5.7		7.3				
Max Green Setting (Gmax), s	* 5.1	* 38		28.0	* 5	* 38		28.0				
Max Q Clear Time (g_c+I1), s	3.8	35.7		26.6	3.5	31.9		17.8				
Green Ext Time (p_c), s	0.0	1.2		0.3	0.0	2.4		1.0				

Intersection Summary												
HCM 7th Control Delay, s/veh			35.3									
HCM 7th LOS			D									

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

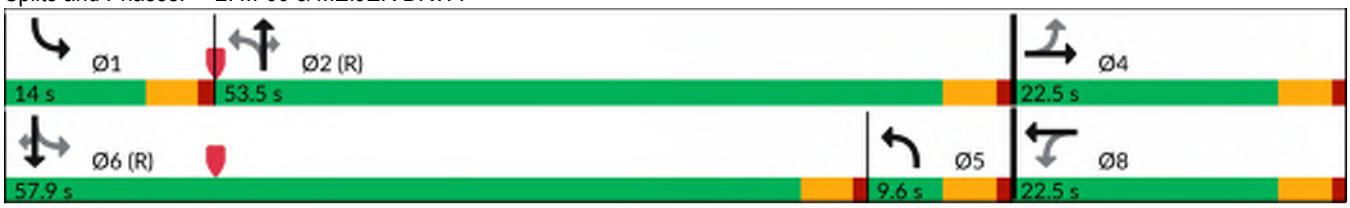


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	27	129	0	185	55	744	127	181	603	49
Future Volume (vph)	8	0	27	129	0	185	55	744	127	181	603	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	0		0	100		175	100		115
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	65			25			60			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1417	0	1770	1583	0	1770	1759	1583	1770	1792	1583
Flt Permitted	0.399			0.739			0.427			0.165		
Satd. Flow (perm)	743	1417	0	1377	1583	0	795	1759	1583	307	1792	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		352			331				125			73
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		311			374			1828			1569	
Travel Time (s)		7.1			8.5			27.7			23.8	
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Heavy Vehicles (%)	2%	2%	14%	2%	2%	2%	2%	8%	2%	2%	6%	2%
Adj. Flow (vph)	8	0	28	140	0	201	57	775	138	197	628	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	28	0	140	201	0	57	775	138	197	628	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	22.5	22.5		22.5	22.5		9.6	53.5	53.5	14.0	57.9	57.9
Total Split (%)	25.0%	25.0%		25.0%	25.0%		10.7%	59.4%	59.4%	15.6%	64.3%	64.3%
Maximum Green (s)	18.0	18.0		18.0	18.0		5.1	49.0	49.0	9.5	53.4	53.4
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	0
Act Effct Green (s)	13.8	13.8		13.8	13.8		53.6	53.6	53.6	59.5	59.5	59.5
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.60	0.60	0.60	0.66	0.66	0.66
v/c Ratio	0.07	0.05		0.66	0.38		0.10	0.74	0.13	0.56	0.53	0.04
Control Delay (s/veh)	31.6	0.1		50.4	2.1		9.0	16.5	1.8	11.9	6.4	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.6	0.1		50.4	2.1		9.0	16.5	1.8	11.9	6.4	0.3
LOS	C	A		D	A		A	B	A	B	A	A
Approach Delay (s/veh)		7.2			21.9			14.0			7.3	
Approach LOS		A			C			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 88 (98%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay (s/veh): 12.5		Intersection LOS: B	
Intersection Capacity Utilization 74.2%		ICU Level of Service D	
Analysis Period (min) 15			

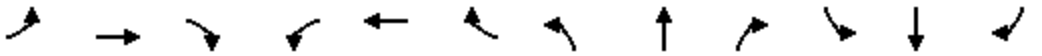
Splits and Phases: 2: M-66 & MEIJER DRWY



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	27	129	0	185	55	744	127	181	603	49
Future Volume (veh/h)	8	0	27	129	0	185	55	744	127	181	603	49
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1870	1870	1693	1870	1870	1870	1870	1781	1870	1870	1811	1870
Adj Flow Rate, veh/h	8	0	28	140	0	201	57	775	138	197	628	51
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Percent Heavy Veh, %	2	2	14	2	2	2	2	8	2	2	6	2
Cap, veh/h	116	0	243	271	0	243	595	1103	981	324	1075	940
Arrive On Green	0.15	0.00	0.15	0.15	0.00	0.15	0.10	0.62	0.62	0.10	0.79	0.79
Sat Flow, veh/h	1181	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Grp Volume(v), veh/h	8	0	28	140	0	201	57	775	138	197	628	51
Grp Sat Flow(s),veh/h/ln	1181	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Q Serve(g_s), s	0.6	0.0	1.4	8.7	0.0	11.1	0.0	26.4	3.3	4.9	12.2	0.6
Cycle Q Clear(g_c), s	11.7	0.0	1.4	10.1	0.0	11.1	0.0	26.4	3.3	4.9	12.2	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	116	0	243	271	0	243	595	1103	981	324	1075	940
V/C Ratio(X)	0.07	0.00	0.12	0.52	0.00	0.83	0.10	0.70	0.14	0.61	0.58	0.05
Avail Cap(c_a), veh/h	171	0	317	335	0	317	595	1103	981	373	1075	940
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.87	0.87	0.87	0.68	0.68	0.68
Uniform Delay (d), s/veh	42.6	0.0	32.8	37.2	0.0	36.9	10.3	11.6	7.2	15.6	5.1	3.9
Incr Delay (d2), s/veh	0.2	0.0	0.2	1.5	0.0	13.0	0.1	3.3	0.3	1.5	1.6	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	0.2	0.0	0.5	3.0	0.0	5.1	0.5	9.2	1.0	1.7	3.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.9	0.0	33.1	38.7	0.0	49.9	10.4	14.8	7.4	17.2	6.7	4.0
LnGrp LOS	D		C	D		D	B	B	A	B	A	A
Approach Vol, veh/h		36			341			970			876	
Approach Delay, s/veh		35.2			45.3			13.5			8.9	
Approach LOS		D			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.5	60.2		18.3	13.8	57.9		18.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	9.5	49.0		18.0	5.1	53.4		18.0				
Max Q Clear Time (g_c+I1), s	6.9	28.4		13.7	2.0	14.2		13.1				
Green Ext Time (p_c), s	0.1	5.6		0.0	0.0	4.4		0.7				

Intersection Summary			
HCM 7th Control Delay, s/veh		16.9	
HCM 7th LOS		B	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	383	49	41	217	6	56	0	43	0	0	3
Future Volume (vph)	9	383	49	41	217	6	56	0	43	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	50		0	0		100	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	60			60			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.983			0.996				0.850		0.865	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1770	1755	0	1770	1755	0	0	1770	1583	0	1611	0
Flt Permitted	0.950			0.950				0.950				
Satd. Flow (perm)	1770	1755	0	1770	1755	0	0	1770	1583	0	1611	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		518			5008			396			302	
Travel Time (s)		11.8			113.8			9.0			6.9	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	7%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	547	70	59	310	9	80	0	61	0	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	617	0	59	319	0	0	80	61	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	383	49	41	217	6	56	0	43	0	0	3
Future Vol, veh/h	9	383	49	41	217	6	56	0	43	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	70	70	70	70	70	70	70	70	70
Heavy Vehicles, %	2	7	2	2	8	2	2	2	2	2	2	2
Mvmt Flow	13	547	70	59	310	9	80	0	61	0	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	319	0	0	617	0	0	1035	1044	582	1004	1074	314
Stage 1	-	-	-	-	-	-	608	608	-	431	431	-
Stage 2	-	-	-	-	-	-	427	436	-	573	643	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1241	-	-	963	-	-	210	229	513	220	220	726
Stage 1	-	-	-	-	-	-	483	486	-	602	583	-
Stage 2	-	-	-	-	-	-	606	580	-	505	469	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1241	-	-	963	-	-	194	213	513	180	204	726
Mov Cap-2 Maneuver	-	-	-	-	-	-	194	213	-	180	204	-
Stage 1	-	-	-	-	-	-	478	481	-	566	547	-
Stage 2	-	-	-	-	-	-	565	545	-	440	464	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.16	1.39	25.99	9.99
HCM LOS			D	A

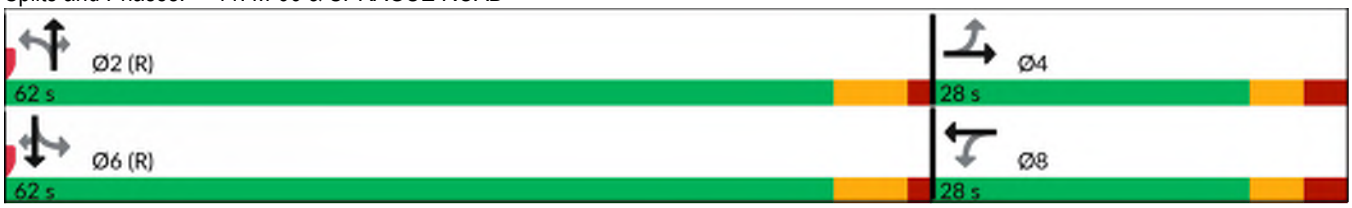
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	194	513	1241	-	-	963	-	-	726
HCM Lane V/C Ratio	0.412	0.12	0.01	-	-	0.061	-	-	0.006
HCM Control Delay (s/veh)	36	13	7.9	-	-	9	-	-	10
HCM Lane LOS	E	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	1.9	0.4	0	-	-	0.2	-	-	0

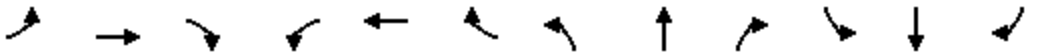
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	15	53	24	9	16	59	555	21	48	533	68
Future Volume (vph)	104	15	53	24	9	16	59	555	21	48	533	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	155		0	140		0	215		115	90		105
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	60			100			245			70		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.882			0.906				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1627	0	1752	1671	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.740			0.709			0.406			0.392		
Satd. Flow (perm)	1365	1627	0	1308	1671	0	749	1845	1568	723	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58			17				44			70
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		689			430			673			1828	
Travel Time (s)		15.7			9.8			10.2			27.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	113	16	58	26	10	17	64	603	23	52	579	74
Shared Lane Traffic (%)												
Lane Group Flow (vph)	113	74	0	26	27	0	64	603	23	52	579	74
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes			Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.6	24.6		24.6	24.6		24.4	24.4	24.4	24.4	24.4	24.4
Total Split (s)	28.0	28.0		28.0	28.0		62.0	62.0	62.0	62.0	62.0	62.0
Total Split (%)	31.1%	31.1%		31.1%	31.1%		68.9%	68.9%	68.9%	68.9%	68.9%	68.9%
Maximum Green (s)	21.4	21.4		21.4	21.4		55.6	55.6	55.6	55.6	55.6	55.6
Yellow Time (s)	3.6	3.6		3.6	3.6		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0		1.4	1.4	1.4	1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	12.7	12.7		12.7	12.7		64.3	64.3	64.3	64.3	64.3	64.3
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.71	0.71	0.71	0.71	0.71	0.71
v/c Ratio	0.58	0.26		0.14	0.10		0.11	0.45	0.02	0.10	0.43	0.06
Control Delay (s/veh)	47.6	14.7		33.3	19.0		5.6	7.4	0.7	1.9	2.5	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	47.6	14.7		33.3	19.0		5.6	7.4	0.7	1.9	2.5	0.2
LOS	D	B		C	B		A	A	A	A	A	A
Approach Delay (s/veh)		34.6			26.1			7.1			2.3	
Approach LOS		C			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay (s/veh): 8.8		Intersection LOS: A	
Intersection Capacity Utilization 62.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 11: M-66 & SPRAGUE ROAD





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	15	53	24	9	16	59	555	21	48	533	68
Future Volume (veh/h)	104	15	53	24	9	16	59	555	21	48	533	68
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	113	16	58	26	10	17	64	603	23	52	579	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	228	43	156	185	75	128	647	1361	1154	560	1361	1154
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.73	0.73	0.73	1.00	1.00	1.00
Sat Flow, veh/h	1372	352	1275	1315	617	1049	773	1856	1572	793	1856	1572
Grp Volume(v), veh/h	113	0	74	26	0	27	64	603	23	52	579	74
Grp Sat Flow(s),veh/h/ln	1372	0	1626	1315	0	1667	773	1856	1572	793	1856	1572
Q Serve(g_s), s	7.2	0.0	3.8	1.7	0.0	1.3	2.2	11.5	0.4	1.1	0.0	0.0
Cycle Q Clear(g_c), s	8.5	0.0	3.8	5.4	0.0	1.3	2.2	11.5	0.4	12.7	0.0	0.0
Prop In Lane	1.00		0.78	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	228	0	198	185	0	203	647	1361	1154	560	1361	1154
V/C Ratio(X)	0.50	0.00	0.37	0.14	0.00	0.13	0.10	0.44	0.02	0.09	0.43	0.06
Avail Cap(c_a), veh/h	386	0	387	338	0	396	647	1361	1154	560	1361	1154
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.81	0.81	0.81
Uniform Delay (d), s/veh	39.1	0.0	36.3	38.8	0.0	35.3	3.5	4.7	3.2	1.1	0.0	0.0
Incr Delay (d2), s/veh	1.7	0.0	1.2	0.3	0.0	0.3	0.3	1.0	0.0	0.3	0.8	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	2.5	0.0	1.5	0.6	0.0	0.5	0.3	3.2	0.1	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	40.7	0.0	37.5	39.2	0.0	35.6	3.8	5.8	3.3	1.4	0.8	0.1
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		187			53			690			705	
Approach Delay, s/veh		39.5			37.3			5.5			0.8	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		72.4		17.6		72.4		17.6				
Change Period (Y+Rc), s		6.4		6.6		6.4		6.6				
Max Green Setting (Gmax), s		55.6		21.4		55.6		21.4				
Max Q Clear Time (g_c+I1), s		13.5		10.5		14.7		7.4				
Green Ext Time (p_c), s		4.7		0.5		4.5		0.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			8.4									
HCM 7th LOS			A									

APPENDIX J
MDOT Turn Lane Warrant Charts

TRAFFIC AND SAFETY NOTE 604A

SUBJECT: **Traffic Volume Guidelines for Right-Turn Lanes and Tapers**

PURPOSE: **To Promote a Uniform System of Determining When Right-Turn Lanes or Tapers Should be Constructed**

COORDINATING UNIT: Geometric Design Unit

INFORMATION: The addition of right-turn lanes or tapers at intersections should be considered to enhance the traffic movement and improve operations. Exclusive right-turn lanes should be considered. The following traffic volume guidelines have been established and are outlined below.

Guidelines for Right-Turn Lanes and Tapers

The use of right-turn lanes should be considered in the following conditions:

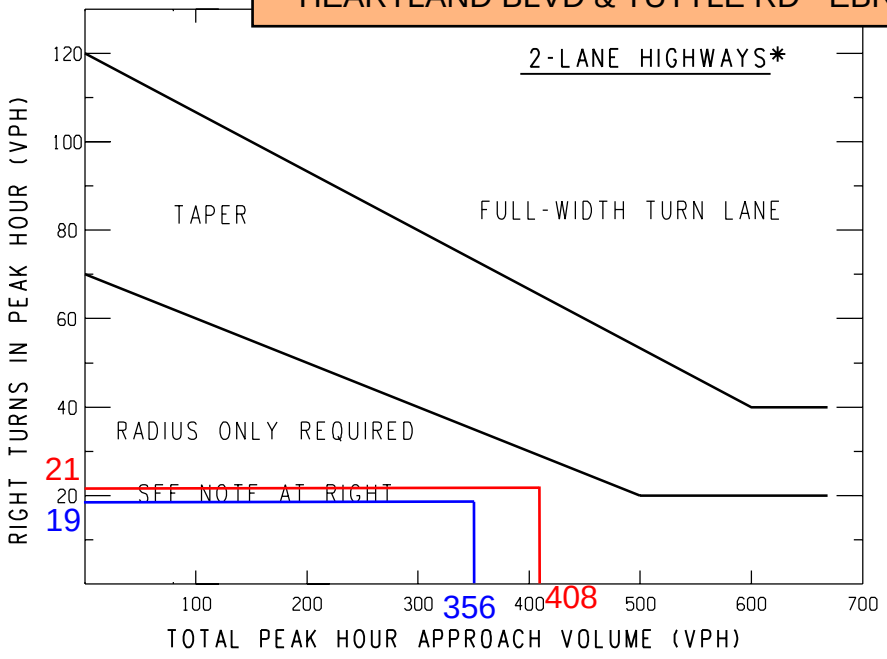
1. At any intersection where a capacity analysis determines a right-turn lane is necessary to meet a desired level of service.

2. At any intersection where the crash experience, existing traffic operations or engineering judgment indicates that a right-turn lane will significantly improve operations.

3. At any unsignalized intersection which satisfies the criteria on the charts on page two.

The two charts (from the NCHRP Report #279, Intersection Channelization Design Guide) on page two show the relationship between peak hour approach volumes and peak hour right-turns. When the intersection peak hour approach volume and peak hour right-turns fall below the lower trend line, radius improvements may be required. If the intersection falls between the two trend lines, taper improvements are recommended. For flare and intersection details, see the Geometric Design Guide VII-650 series.

2024 NO-BUILD
HEARTLAND BLVD & TUTTLE RD - EBR

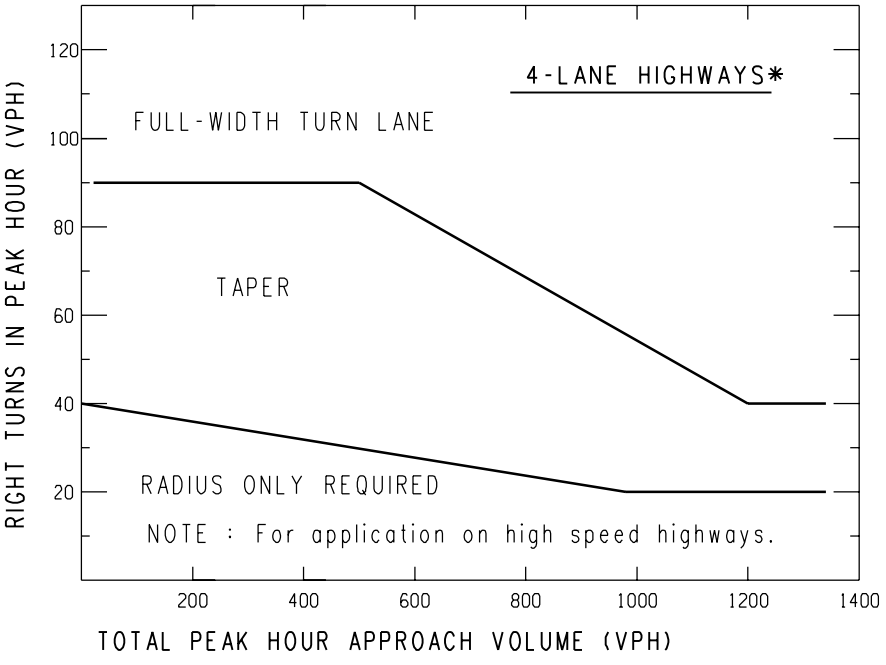


NOTE:
For posted speeds at or under 45 mph, peak hour right turns greater than 40 vph, and total peak hour approach less than 300 vph, adjust right turn volumes.

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

AM

PM



*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.

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

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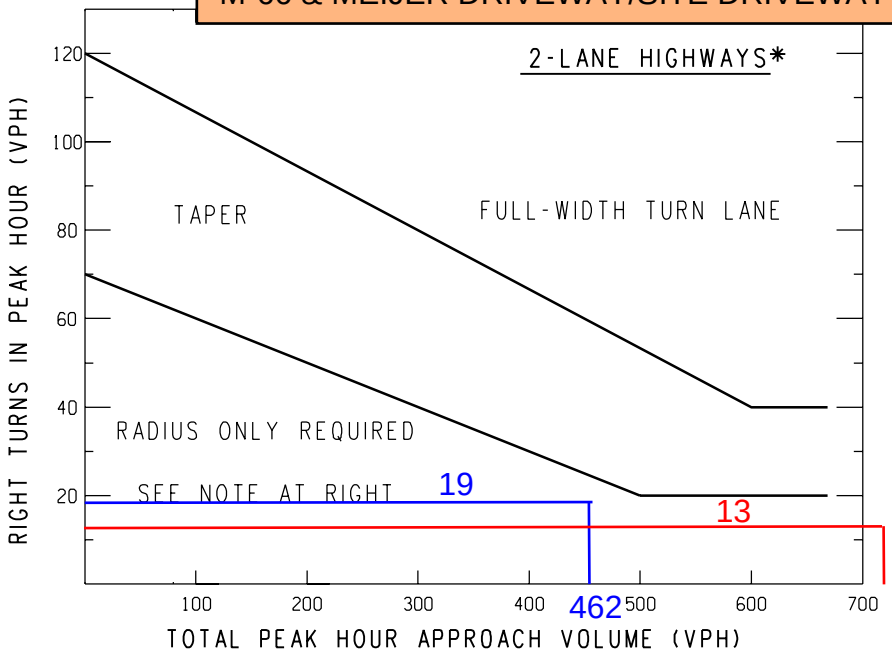
2024 BUILD
M-66 & MEIJER DRIVEWAY/SITE DRIVEWAY - NBR



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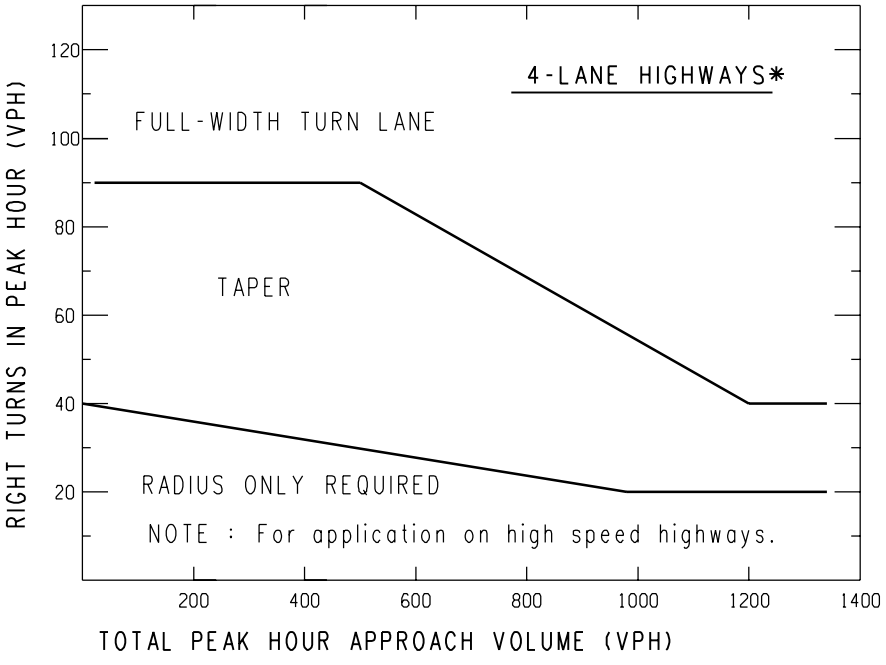

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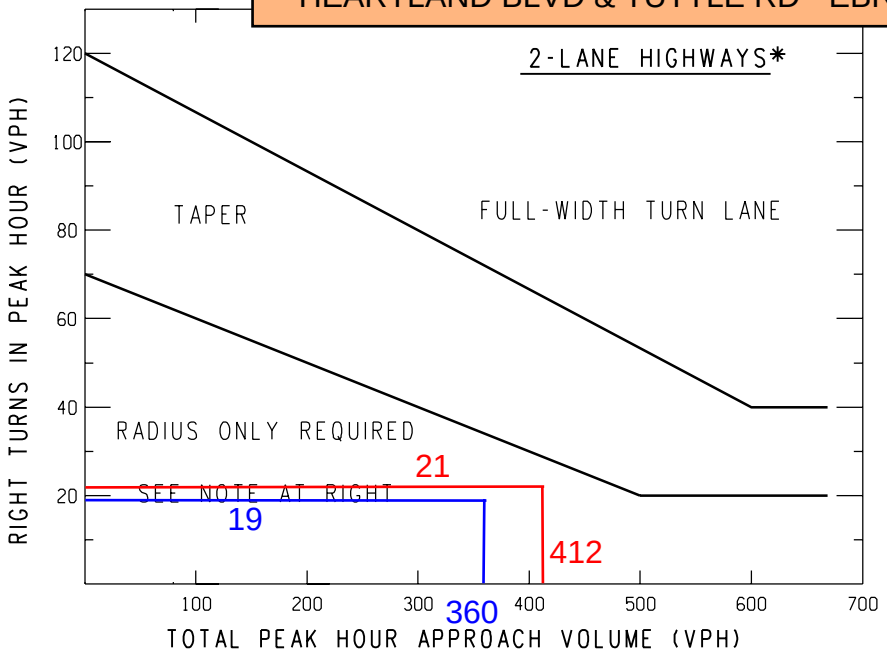
2024 BUILD
HEARTLAND BLVD & TUTTLE RD - EBR



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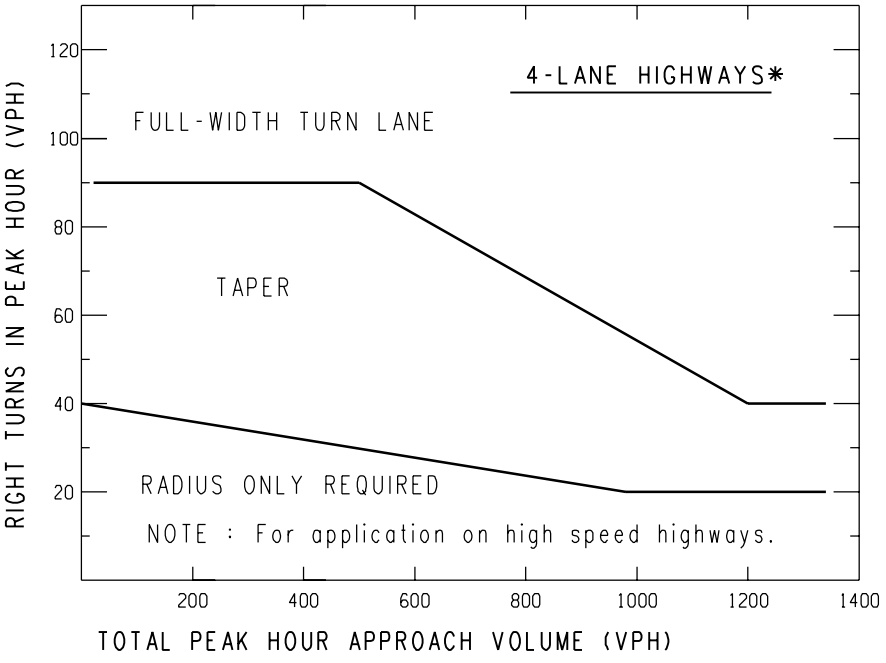

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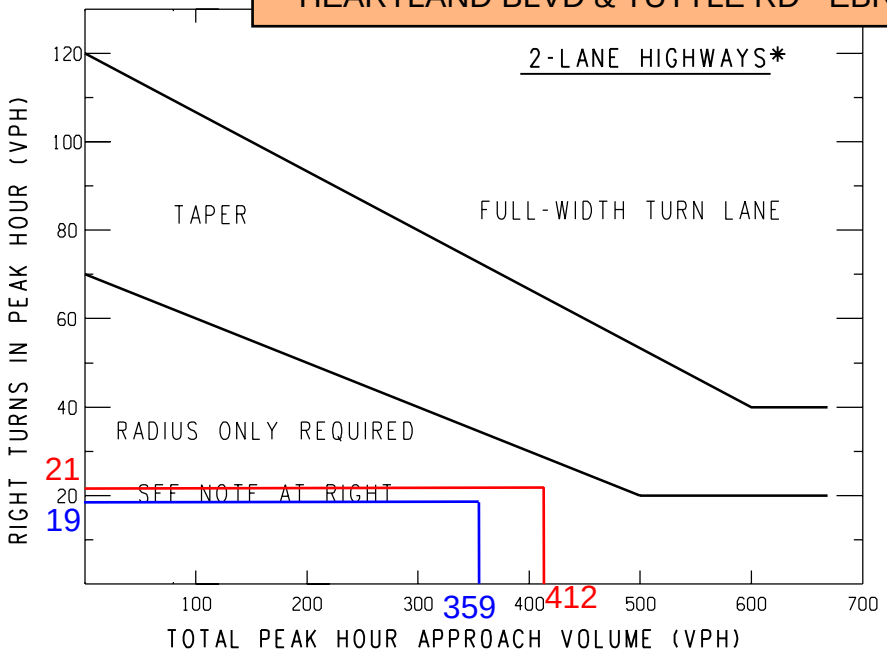
2026 NO-BUILD
HEARTLAND BLVD & TUTTLE RD - EBR



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AM

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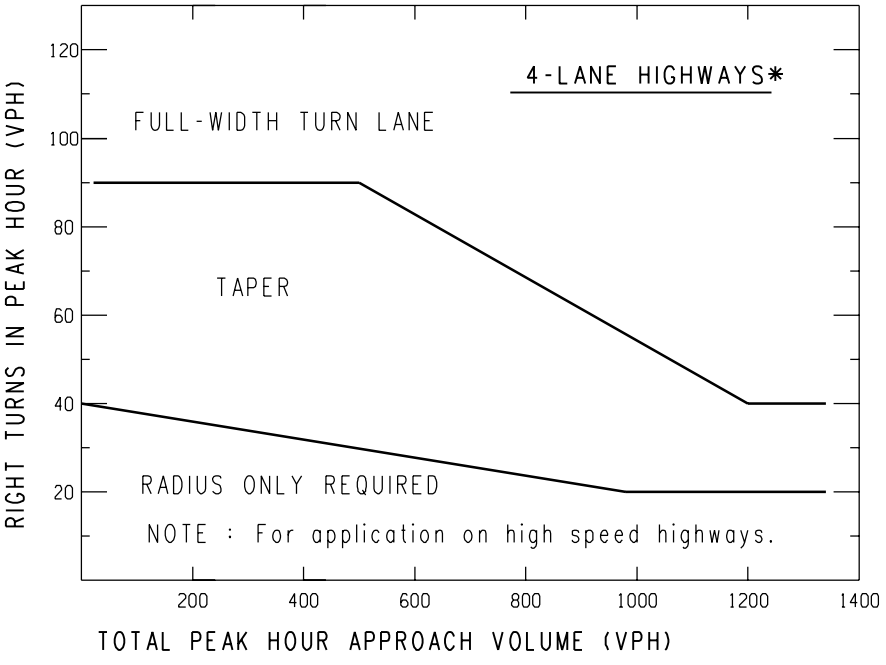

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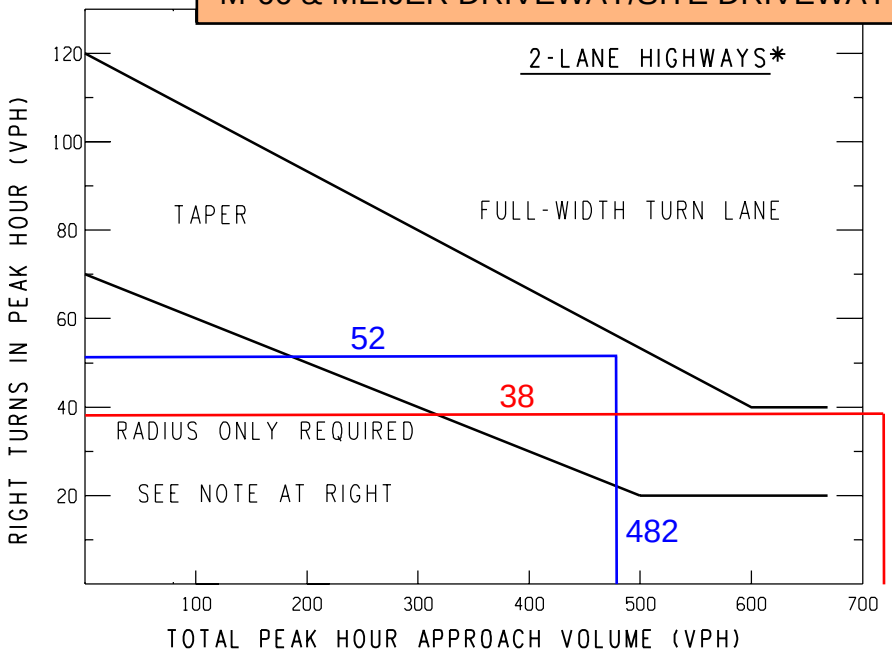
2026 BUILD
M-66 & MEIJER DRIVEWAY/SITE DRIVEWAY - NBR



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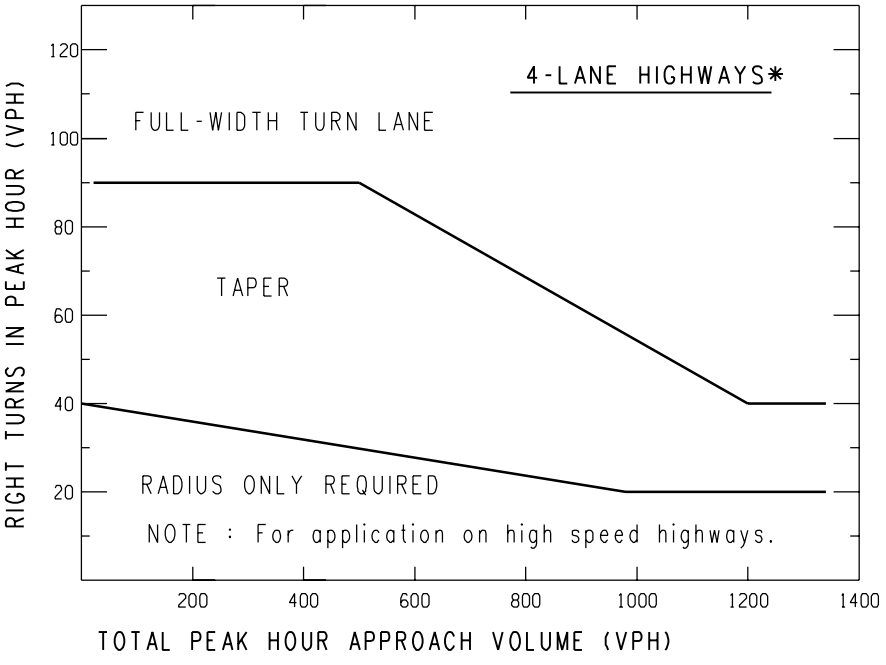

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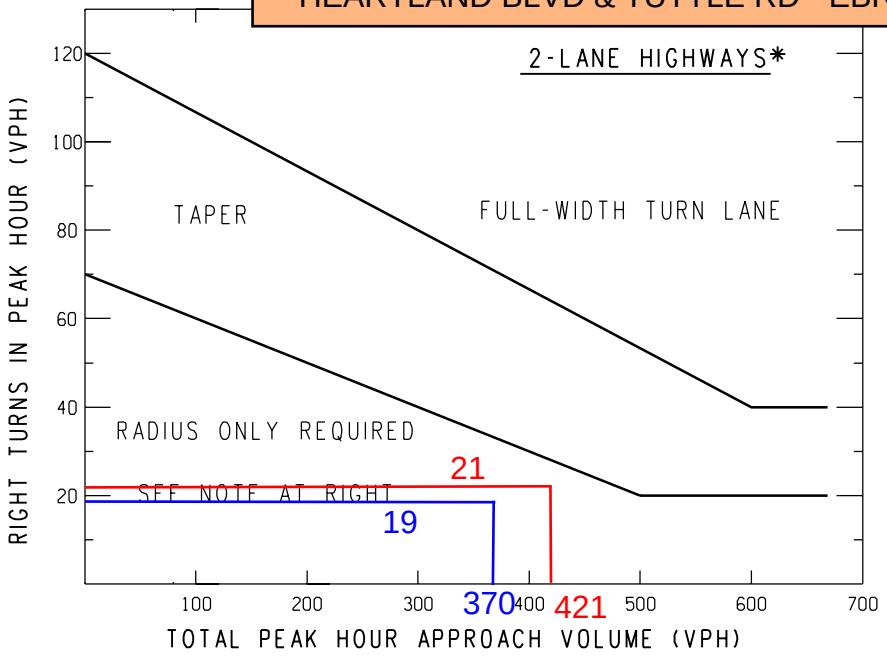
2026 BUILD
HEARTLAND BLVD & TUTTLE RD - EBR



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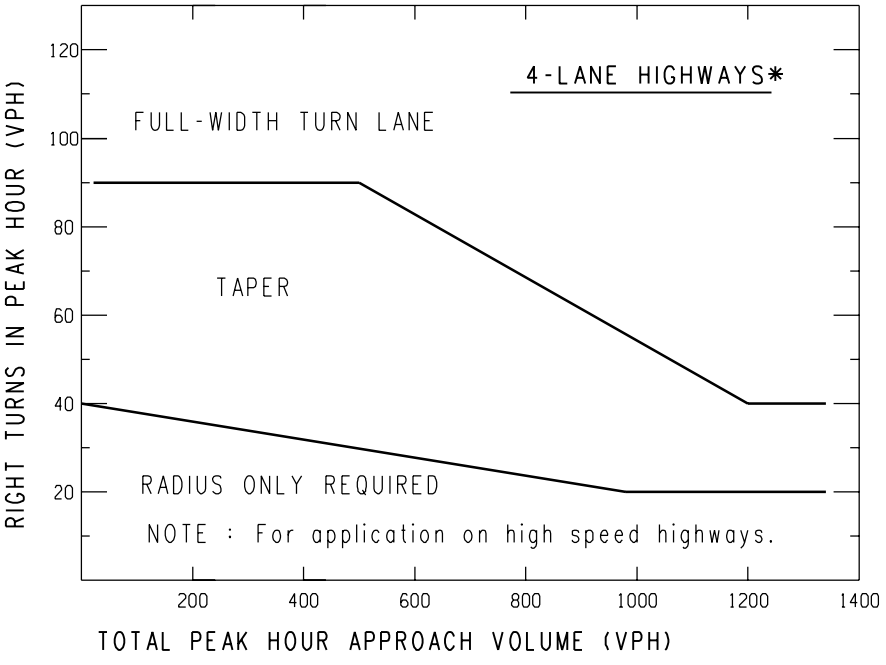

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TRAFFIC AND SAFETY NOTE

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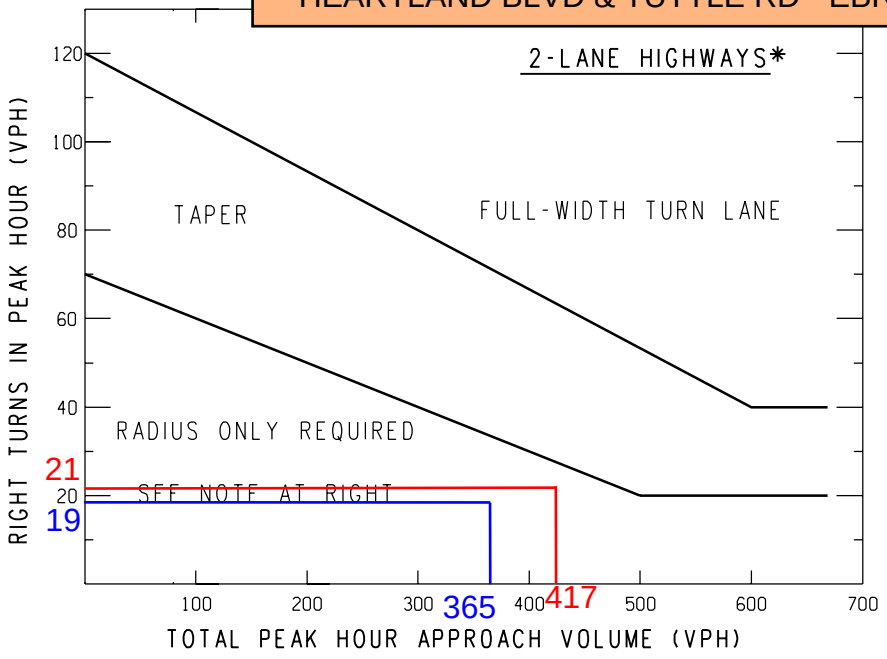
2029 NO-BUILD
HEARTLAND BLVD & TUTTLE RD - EBR



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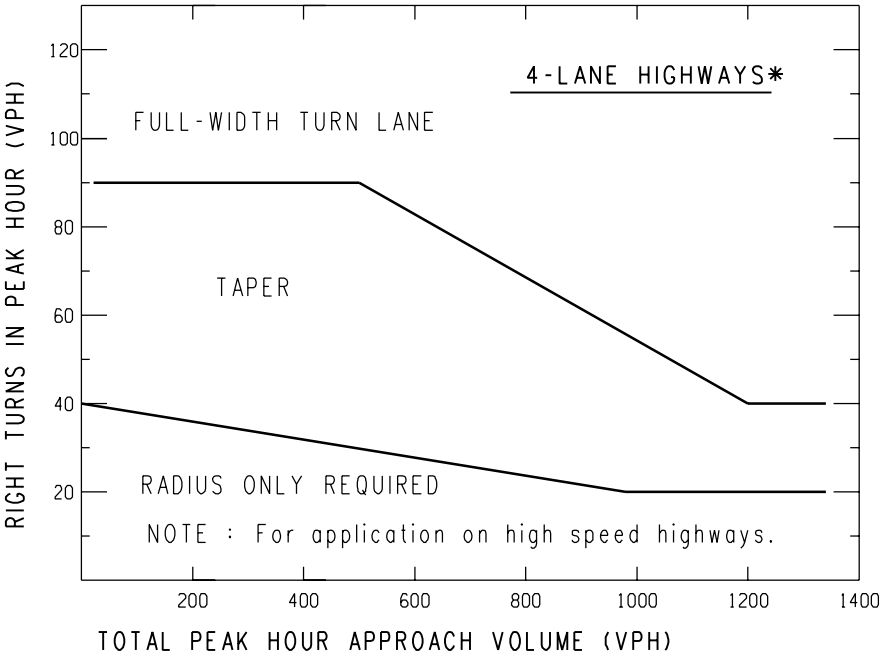
AM

PM



*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.

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.

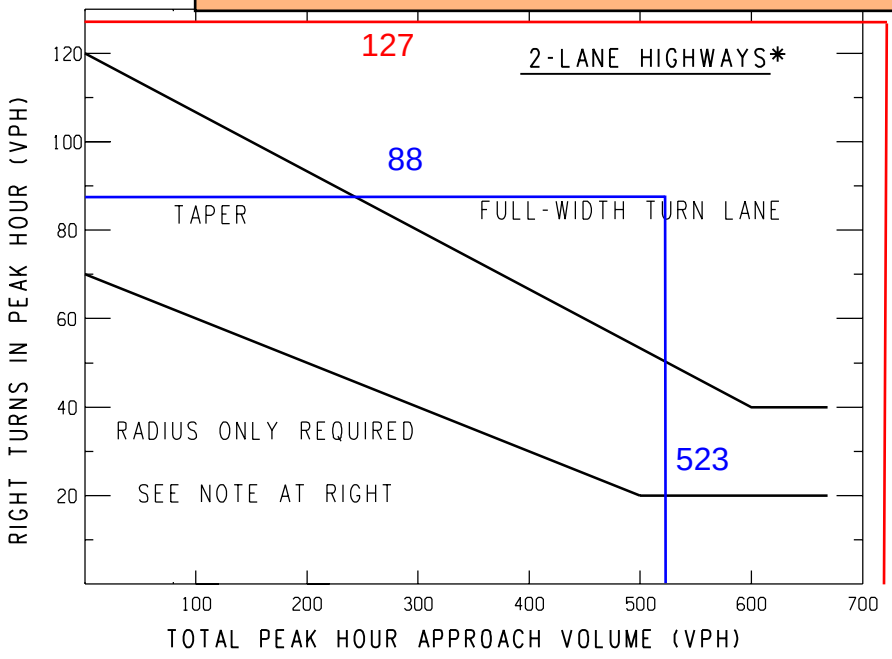
MDOT Michigan Department of Transportation

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	

2029 DESIGN
M-66 & MEIJER DRIVEWAY/SITE DRIVEWAY - NBR



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

AM

PM

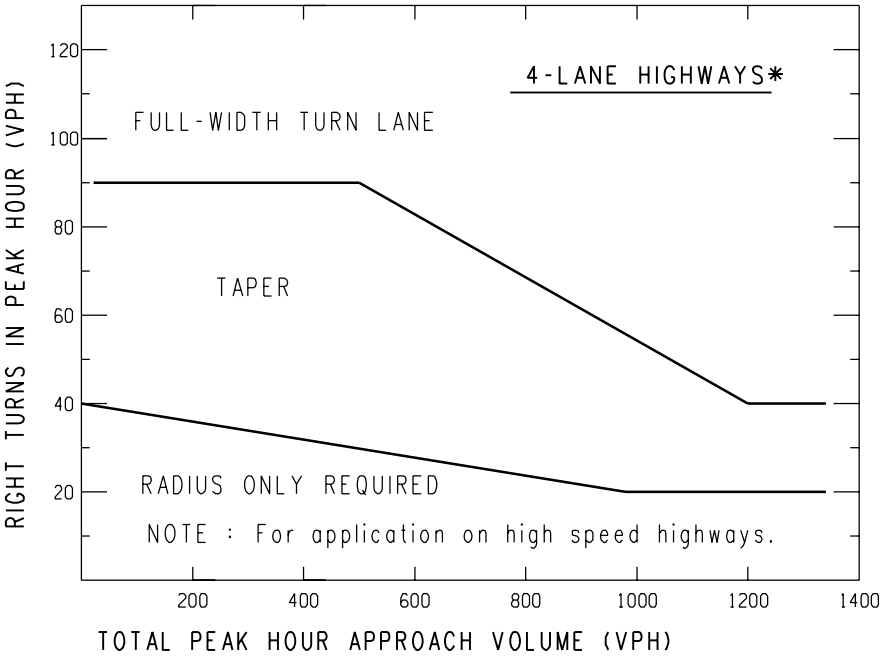


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Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus,a right-turn lane may be recommended.

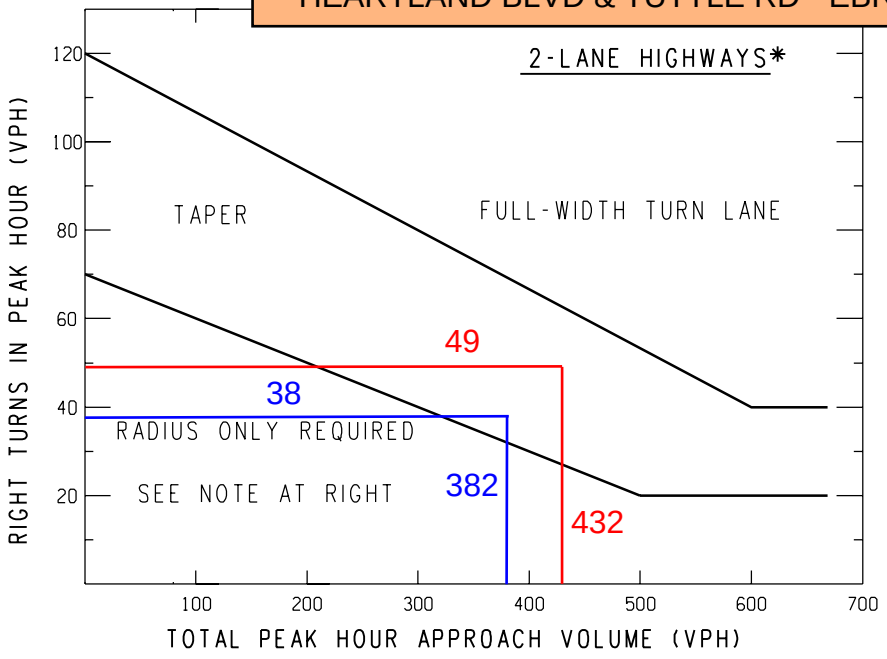
MDOT Michigan Department of Transportation

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	

2029 DESIGN
HEARTLAND BLVD & TUTTLE RD - EBR

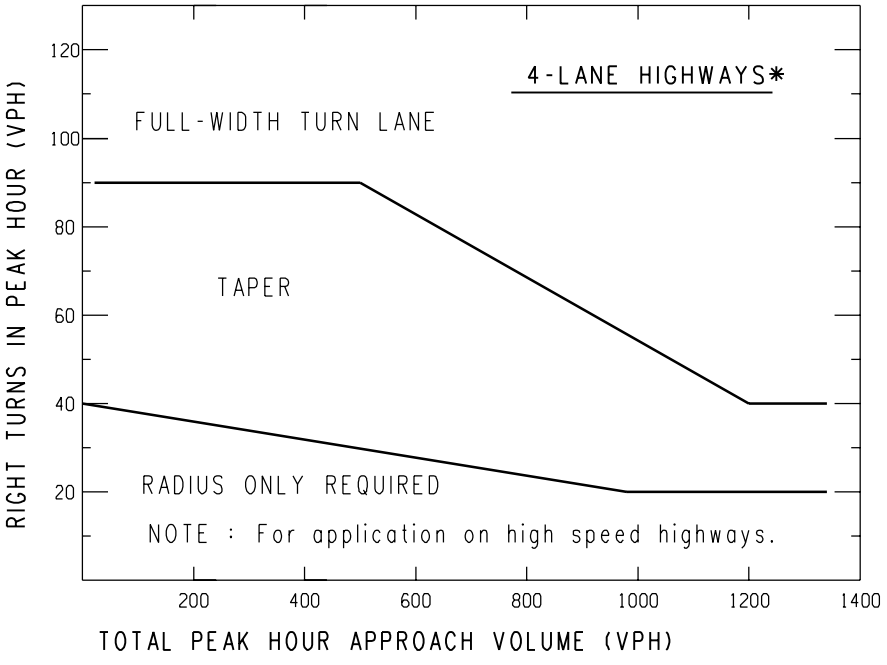


NOTE:
For posted speeds at or under 45 mph, peak hour right turns greater than 40 vph, and total peak hour approach less than 300 vph, adjust right turn volumes.

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

AM

PM



*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.

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	

APPENDIX K
SimTraffic Queue Length Reports

Intersection: 1: M-66 & TUTTLE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	99	80	156	188	67	237	56	194	326	67
Average Queue (ft)	30	25	75	74	9	96	23	86	103	10
95th Queue (ft)	73	62	136	146	43	189	50	159	227	35
Link Distance (ft)		5222		439		1501			2078	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	270		110		180		325	180		235
Storage Blk Time (%)			4	3		1		1	1	
Queuing Penalty (veh)			7	4		2		3	3	

Intersection: 2: M-66 & MEIJER DRWY

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	26	51	38	4
Average Queue (ft)	3	10	11	0
95th Queue (ft)	16	33	35	3
Link Distance (ft)		264		1501
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	85		100	
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 3: HEARTLAND BLVD & TUTTLE ROAD

Movement	EB	WB	NB	NB	SB
Directions Served	TR	L	LT	R	LTR
Maximum Queue (ft)	2	25	35	29	23
Average Queue (ft)	0	2	11	3	1
95th Queue (ft)	2	14	35	18	11
Link Distance (ft)	439		357		265
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50		100	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: M-66 & SPRAGUE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	33	21	32	25	36	94	11	36	85	15
Average Queue (ft)	5	2	5	3	8	15	1	10	11	1
95th Queue (ft)	22	13	22	14	29	60	7	33	51	7
Link Distance (ft)		640		383		639			1759	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	155		140		215		115	90		105
Storage Blk Time (%)						0			0	
Queuing Penalty (veh)						0			0	

Network Summary

Network wide Queuing Penalty: 19

Intersection: 1: M-66 & TUTTLE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	257	137	131	175	239	536	264	239	383	166
Average Queue (ft)	125	54	62	61	31	246	58	91	171	25
95th Queue (ft)	221	109	113	130	116	459	206	183	319	93
Link Distance (ft)		5222		439		1501			2078	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	270		110		180		325	180		235
Storage Blk Time (%)	0		2	1		20		0	6	
Queuing Penalty (veh)	1		3	2		38		3	13	

Intersection: 2: M-66 & MEIJER DRWY

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	27	53	53	4	21
Average Queue (ft)	6	16	17	0	1
95th Queue (ft)	22	42	45	4	10
Link Distance (ft)		264			1501
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	85		100	100	
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Intersection: 3: HEARTLAND BLVD & TUTTLE ROAD

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	L	LT	R	LTR
Maximum Queue (ft)	25	2	26	52	31	29
Average Queue (ft)	1	0	1	19	5	3
95th Queue (ft)	11	0	12	46	23	18
Link Distance (ft)		439		357		265
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	50		50		100	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: M-66 & SPRAGUE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	128	81	68	52	84	183	34	90	182	72
Average Queue (ft)	54	26	19	12	26	65	4	23	80	14
95th Queue (ft)	106	60	52	36	63	133	20	61	155	49
Link Distance (ft)		640		383		639			1759	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	155		140		215		115	90		105
Storage Blk Time (%)	0					1		0	4	
Queuing Penalty (veh)	0					1		1	5	

Network Summary

Network wide Queuing Penalty: 65

Intersection: 1: M-66 & TUTTLE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	102	110	162	187	104	279	60	239	446	92
Average Queue (ft)	37	44	79	74	20	123	24	111	154	13
95th Queue (ft)	80	87	136	145	64	229	51	209	382	58
Link Distance (ft)		5223		439		1500			2078	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	270		110		180		325	180		235
Storage Blk Time (%)			4	3		3		2	4	
Queuing Penalty (veh)			9	4		4		12	12	

Intersection: 2: M-66 & MEIJER DRWY

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	R
Maximum Queue (ft)	24	45	98	77	48	25	80	6
Average Queue (ft)	3	9	42	39	14	2	35	0
95th Queue (ft)	15	31	81	64	40	12	67	3
Link Distance (ft)		264	336	336		1758		1500
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	85				100		100	
Storage Blk Time (%)		0					0	
Queuing Penalty (veh)		0					0	

Intersection: 3: HEARTLAND BLVD & TUTTLE ROAD

Movement	EB	WB	WB	NB	NB	SB
Directions Served	TR	L	TR	LT	R	LTR
Maximum Queue (ft)	9	44	13	53	47	17
Average Queue (ft)	0	11	0	18	16	1
95th Queue (ft)	4	36	13	45	42	9
Link Distance (ft)	439		4964	357		265
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		50			100	
Storage Blk Time (%)		0				
Queuing Penalty (veh)		1				

Intersection: 11: M-66 & SPRAGUE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	55	17	29	18	43	115	10	40	120	24
Average Queue (ft)	15	3	5	3	9	25	1	12	25	2
95th Queue (ft)	44	14	21	14	32	80	8	35	82	13
Link Distance (ft)		640		383		639			1758	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	155		140		215		115	90		105
Storage Blk Time (%)						0			1	
Queuing Penalty (veh)						0			0	

Network Summary

Network wide Queuing Penalty: 43

Intersection: 1: M-66 & TUTTLE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	104	114	165	225	117	320	63	214	353	142
Average Queue (ft)	35	40	89	87	19	126	24	88	135	13
95th Queue (ft)	79	86	153	175	70	244	54	174	291	71
Link Distance (ft)		5222		439		1500			2078	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	270		110		180		325	180		235
Storage Blk Time (%)			7	5		3		1	3	
Queuing Penalty (veh)			15	7		5		4	10	

Intersection: 2: M-66 & MEIJER DRWY

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	31	42	113	62	80	190	96	100	194	42
Average Queue (ft)	3	8	47	31	18	61	17	44	55	10
95th Queue (ft)	17	29	92	55	55	140	58	81	138	33
Link Distance (ft)		264	323	323		1758			1500	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	85				100		175	100		115
Storage Blk Time (%)		0				3		0	2	
Queuing Penalty (veh)		0				3		0	3	

Intersection: 3: HEARTLAND BLVD & TUTTLE ROAD

Movement	EB	WB	NB	NB	SB
Directions Served	TR	L	LT	R	LTR
Maximum Queue (ft)	3	50	53	40	17
Average Queue (ft)	0	11	18	16	1
95th Queue (ft)	2	38	45	41	9
Link Distance (ft)	439		357		265
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50		100	
Storage Blk Time (%)		0			
Queuing Penalty (veh)		1			

Intersection: 11: M-66 & SPRAGUE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	63	19	31	19	46	105	16	44	97	24
Average Queue (ft)	16	3	5	3	8	24	1	13	19	1
95th Queue (ft)	47	13	22	14	31	77	10	37	67	11
Link Distance (ft)		640		383		639			1758	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	155		140		215		115	90		105
Storage Blk Time (%)						0			0	
Queuing Penalty (veh)						0			0	

Network Summary

Network wide Queuing Penalty: 48

Intersection: 1: M-66 & TUTTLE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	266	157	151	164	239	732	438	240	750	262
Average Queue (ft)	135	69	69	63	56	339	98	131	332	61
95th Queue (ft)	225	125	120	124	175	679	360	264	696	218
Link Distance (ft)		5223		439		1501			2078	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	270		110		180		325	180		235
Storage Blk Time (%)	0		2	2		31		2	23	
Queuing Penalty (veh)	0		3	2		67		16	47	

Intersection: 2: M-66 & MEIJER DRWY

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	T	R
Maximum Queue (ft)	39	58	376	374	57	52	149	245	11
Average Queue (ft)	7	17	345	312	21	10	68	23	0
95th Queue (ft)	28	43	392	478	48	36	128	144	5
Link Distance (ft)	264	264	340	340		1758		1501	1501
Upstream Blk Time (%)			86	75					
Queuing Penalty (veh)			0	0					
Storage Bay Dist (ft)					100		100		
Storage Blk Time (%)							6	0	
Queuing Penalty (veh)							37	1	

Intersection: 3: HEARTLAND BLVD & TUTTLE ROAD

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	L	LT	R	LTR
Maximum Queue (ft)	22	13	46	81	65	28
Average Queue (ft)	2	1	13	30	24	3
95th Queue (ft)	12	7	39	59	51	16
Link Distance (ft)		439		357		265
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	50		50		100	
Storage Blk Time (%)		0	0	0	0	
Queuing Penalty (veh)		0	1	0	0	

Intersection: 11: M-66 & SPRAGUE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	140	85	57	48	76	185	34	69	181	50
Average Queue (ft)	59	26	17	12	26	75	4	22	86	15
95th Queue (ft)	111	62	46	33	58	148	22	54	158	42
Link Distance (ft)		640		383		639			1758	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	155		140		215		115	90		105
Storage Blk Time (%)	0					1			5	
Queuing Penalty (veh)	0					1			5	

Network Summary

Network wide Queuing Penalty: 181

Intersection: 1: M-66 & TUTTLE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	293	276	156	204	196	595	306	239	543	261
Average Queue (ft)	159	87	79	78	38	228	57	122	255	49
95th Queue (ft)	267	209	135	158	111	492	227	242	473	186
Link Distance (ft)		5222		439		1501			2078	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	270		110		180		325	180		235
Storage Blk Time (%)	2	0	4	3		14		2	16	
Queuing Penalty (veh)	4	0	7	4		30		15	32	

Intersection: 2: M-66 & MEIJER DRWY

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	30	53	169	157	150	518	225	148	220	32
Average Queue (ft)	5	14	76	64	37	191	47	74	61	5
95th Queue (ft)	23	38	137	121	103	391	155	129	159	23
Link Distance (ft)	264	264	327	327		1758			1501	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)					100		175	100		115
Storage Blk Time (%)						16		5	2	
Queuing Penalty (veh)						30		35	4	

Intersection: 3: HEARTLAND BLVD & TUTTLE ROAD

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	L	LT	R	LTR
Maximum Queue (ft)	22	5	54	82	69	28
Average Queue (ft)	1	0	14	30	24	3
95th Queue (ft)	12	3	41	61	53	16
Link Distance (ft)		439		357		265
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	50		50		100	
Storage Blk Time (%)			0	0	0	
Queuing Penalty (veh)			1	0	0	

Intersection: 11: M-66 & SPRAGUE ROAD

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	156	90	61	61	72	196	30	62	144	37
Average Queue (ft)	68	29	18	13	26	70	4	22	51	9
95th Queue (ft)	128	67	48	39	58	147	19	49	116	30
Link Distance (ft)		640		383		639			1758	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	155		140		215		115	90		105
Storage Blk Time (%)	1					1		0	2	
Queuing Penalty (veh)	0					1		0	2	

Network Summary

Network wide Queuing Penalty: 165

APPENDIX L
Sight Distance Calculations

Table 9-7. Design Intersection Sight Distance—Case B1, Left Turn from Stop

U.S. Customary			
Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (ft)	Design (ft)
15	80	165.4	170
20	115	220.5	225
25	155	275.6	280
30	200	330.8	335
35	250	385.9	390
40	305	441.0	445
45	360	496.1	500
50	425	551.3	555
55	495	606.4	610
60	570	661.5	665
65	645	716.6	720
70	730	771.8	775
75	820	826.9	830
80	910	882.0	885

Metric			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	41.7	45
30	35	62.6	65
40	50	83.4	85
50	65	104.3	105
60	85	125.1	130
70	105	146.0	150
80	130	166.8	170
90	160	187.7	190
100	185	208.5	210
110	220	229.4	230
120	250	250.2	255
130	285	271.1	275

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Table 9-9. Design Intersection Sight Distance—Case B2, Right Turn from Stop

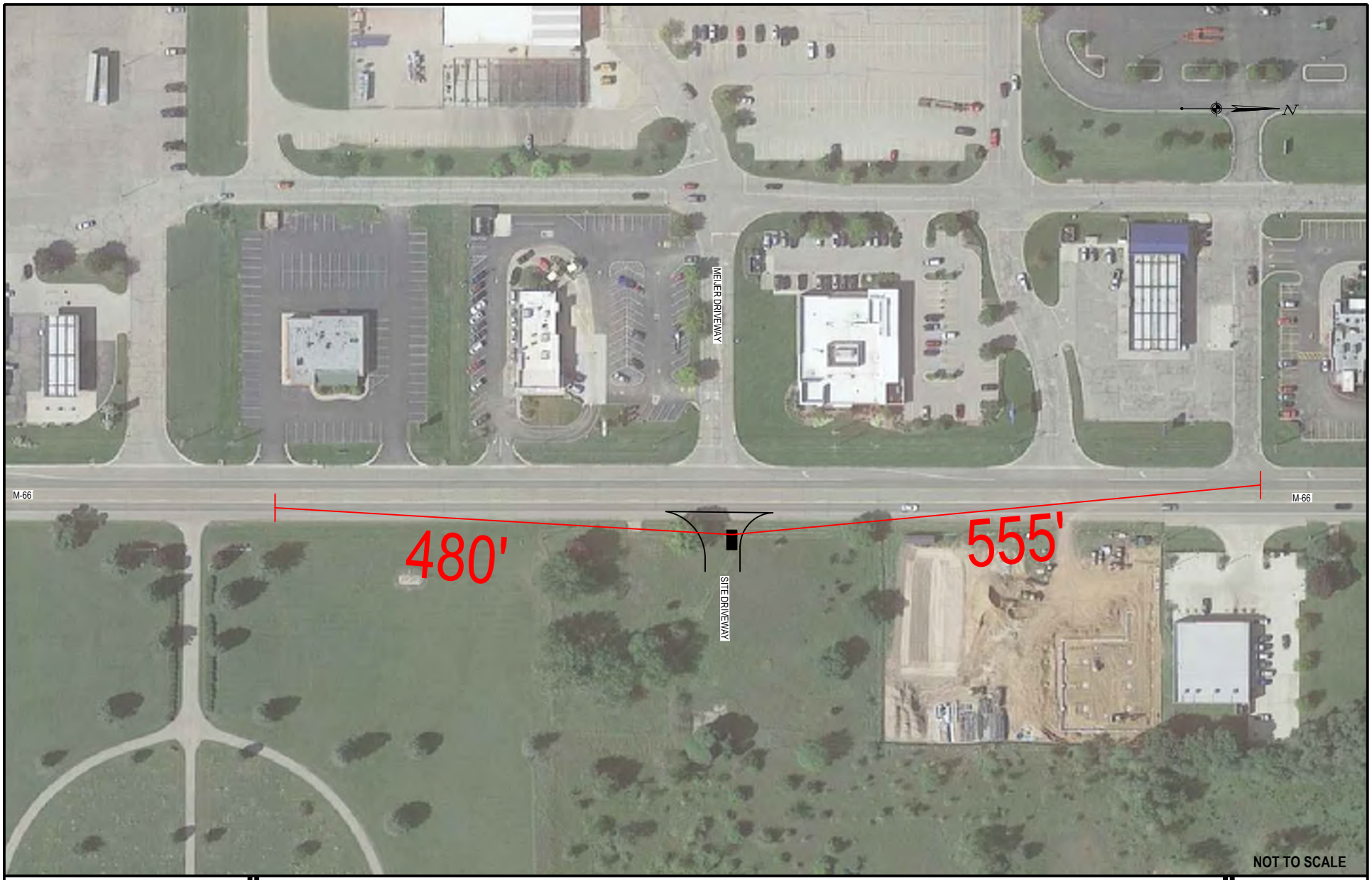
U.S. Customary			
Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (ft)	Design (ft)
15	80	143.3	145
20	115	191.1	195
25	155	238.9	240
30	200	286.7	290
35	250	334.4	335
40	305	382.2	385
45	360	430.0	430
50	425	477.8	480
55	495	525.5	530
60	570	573.3	575
65	645	621.1	625
70	730	668.9	670
75	820	716.6	720
80	910	764.4	765

Metric			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	36.1	40
30	35	54.2	55
40	50	72.3	75
50	65	90.4	95
60	85	108.4	110
70	105	126.5	130
80	130	144.6	145
90	160	162.6	165
100	185	180.7	185
110	220	198.8	200
120	250	216.8	220
130	285	234.9	235

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane roadway with no median and with grades of 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

M-66 (Looking North)

M-66 (Looking South)



CESO
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SIGHT DISTANCE MEASUREMENTS

MULTI USE DEVELOPMENT

CITY OF IONIA IONIA COUNTY, MI

EXHIBIT	
DATE:	10/30/23
JOB NO.:	763233
DESIGNED BY:	DMB
DRAWN BY:	DMB
CHECKED BY:	REM
PAGE:	XX

APPENDIX M
Detailed Signal Warrant Study Calculations

2024 Build Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St?**
2	**: No. of Lanes on Minor St?**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: if answer 4 is Yes, then what is the of the population isolated community?**
NO	**: Have other remedial measures been tried?**

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
Time	**N-S**	E-W											
00:01 - 01:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
01:00 - 02:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
02:00 - 03:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
03:00 - 04:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
04:00 - 05:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
05:00 - 06:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
06:00 - 07:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
07:00 - 08:00	1041	20	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
08:00 - 09:00	910	26	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
09:00 - 10:00	1034	30	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
10:00 - 11:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
11:00 - 12:00	1287	51	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
12:00 - 13:00	1448	74	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
13:00 - 14:00	1405	58	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
14:00 - 15:00	1494	45	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
15:00 - 16:00	1464	43	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
16:00 - 17:00	1486	43	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
17:00 - 18:00	1453	48	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
18:00 - 19:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
19:00 - 20:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
20:00 - 21:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
21:00 - 22:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
22:00 - 23:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
23:00 - 00:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**

Number of Hours that met the warrant 1A =	**0**
Number of Hours that met the warrant 1B =	**1**
Number of Hours that met the warrant 1 A & B =	**0**

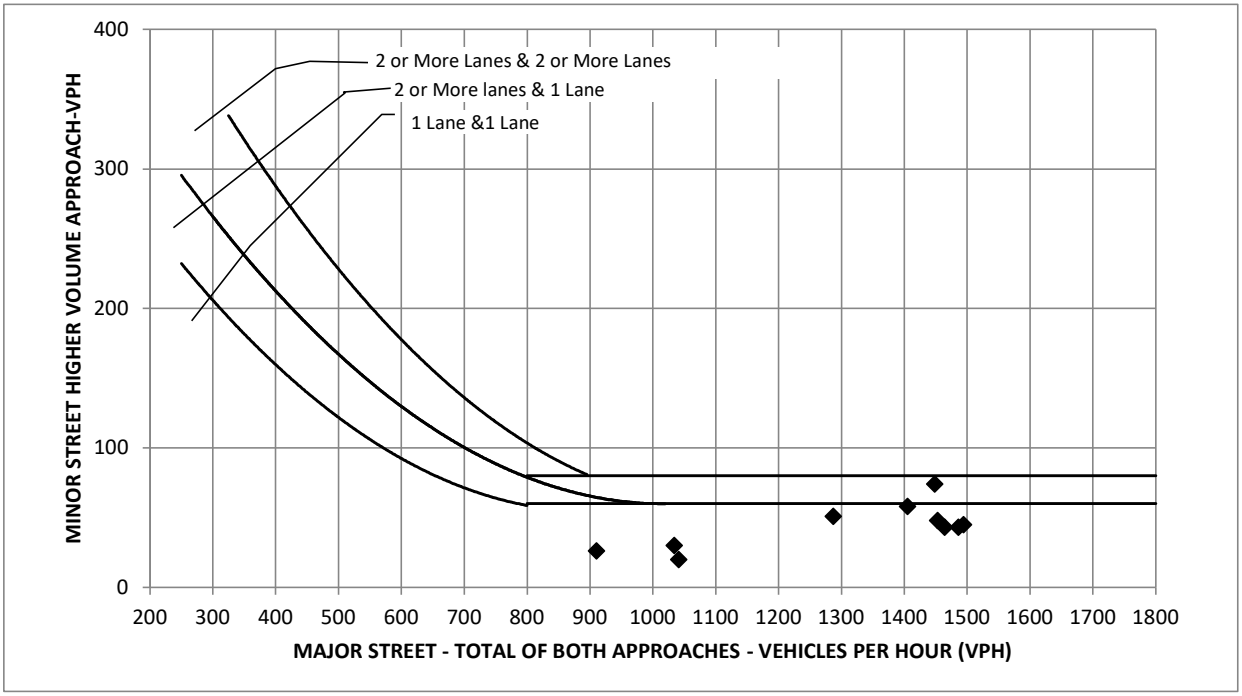
A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	**NO**
B. Is the Interruption of Continuous Traffic Met? (Condition B)	**NO**
C. Combination of Warrants A and B Criteria Met?	**N/A**

2024 Build Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



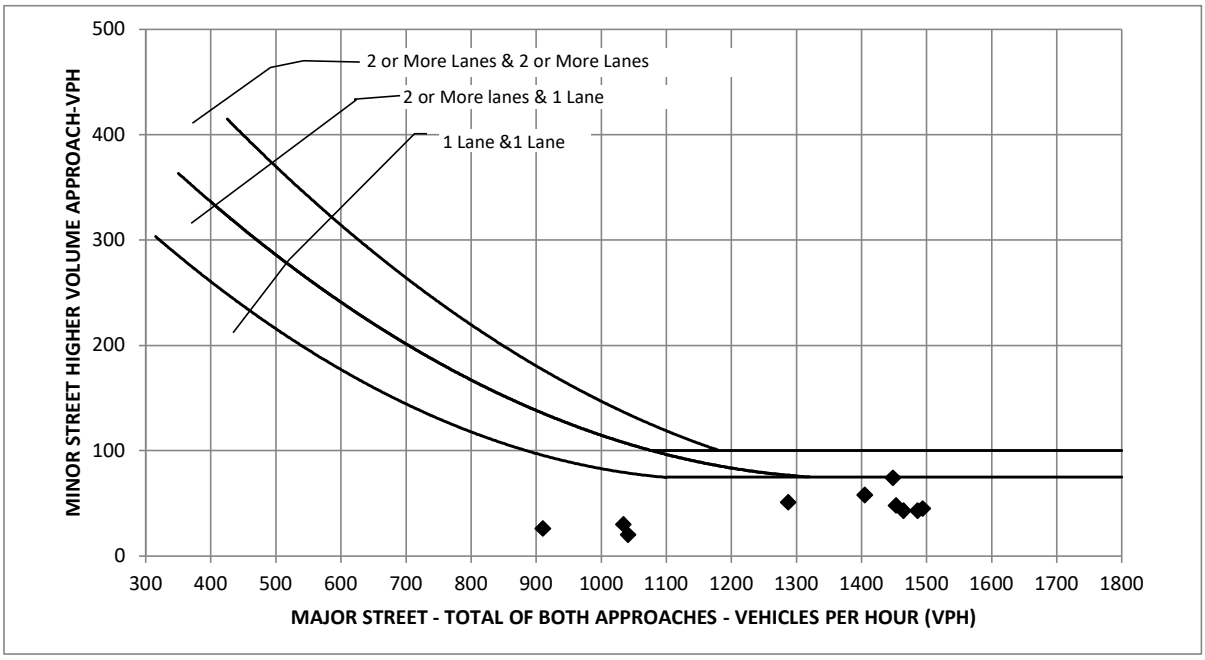
How Many Hours Are Met	0
Is Warrant (70%) Met?	NO

2024 Build Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St.**
2	**: No. of Lanes on Minor St.**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**



How Many Hours Are Met	**0**
Is Warrant (70%) Met?	**NO**

2026 Build Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St?**
2	**: No. of Lanes on Minor St?**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: if answer 4 is Yes, then what is the of the population isolated community?**
NO	**: Have other remedial measures been tried?**

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
Time	**N-S**	E-W											
00:01 - 01:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
01:00 - 02:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
02:00 - 03:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
03:00 - 04:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
04:00 - 05:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
05:00 - 06:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
06:00 - 07:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
07:00 - 08:00	1074	53	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
08:00 - 09:00	942	62	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
09:00 - 10:00	1065	61	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
10:00 - 11:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
11:00 - 12:00	1358	132	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
12:00 - 13:00	1539	200	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
13:00 - 14:00	1469	150	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
14:00 - 15:00	1546	113	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
15:00 - 16:00	1515	103	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
16:00 - 17:00	1538	101	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
17:00 - 18:00	1512	117	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
18:00 - 19:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
19:00 - 20:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
20:00 - 21:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
21:00 - 22:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
22:00 - 23:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
23:00 - 00:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**

Number of Hours that met the warrant 1A =	**2**
Number of Hours that met the warrant 1B =	**7**
Number of Hours that met the warrant 1 A & B =	**0**

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	**NO**
B. Is the Interruption of Continuous Traffic Met? (Condition B)	**NO**
C. Combination of Warrants A and B Criteria Met?	**N/A**

2026 Build Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

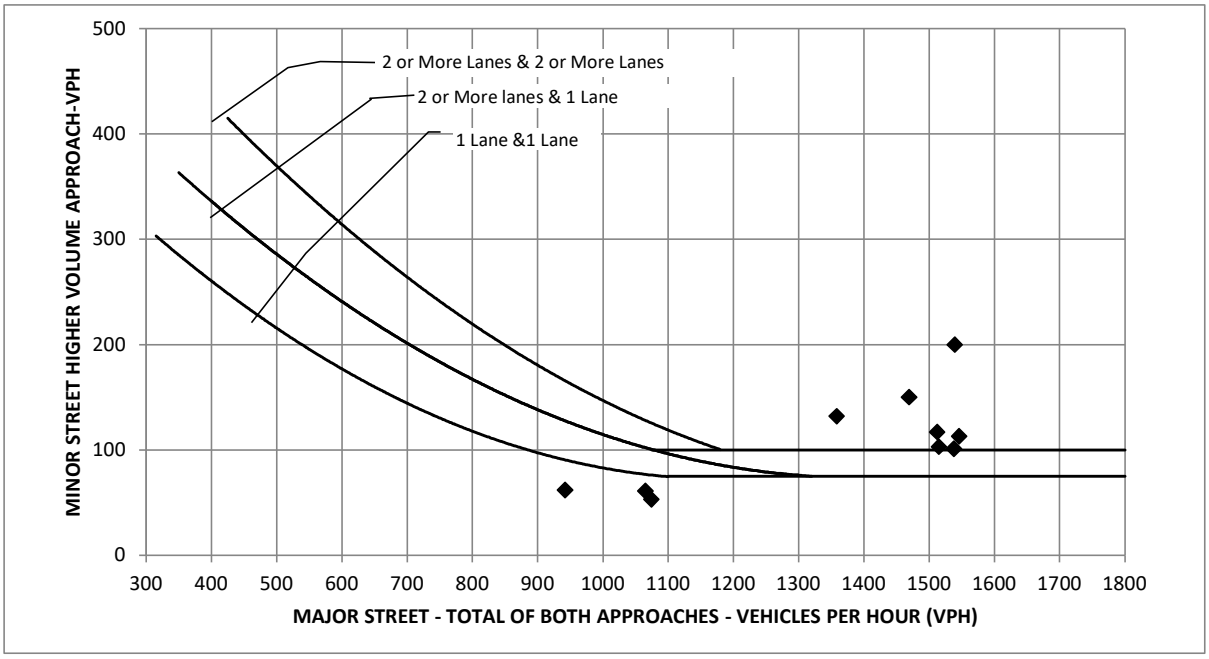
How Many Hours Are Met	7
Is Warrant (70%) Met?	YES

2026 Build Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St.**
2	**: No. of Lanes on Minor St.**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**



How Many Hours Are Met	**7**
Is Warrant (70%) Met?	**YES**

2029 Design Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St?**
2	**: No. of Lanes on Minor St?**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: if answer 4 is Yes, then what is the of the population isolated community?**
NO	**: Have other remedial measures been tried?**

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
Time	**N-S**	E-W											
00:01 - 01:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
01:00 - 02:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
02:00 - 03:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
03:00 - 04:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
04:00 - 05:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
05:00 - 06:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
06:00 - 07:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
07:00 - 08:00	1113	104	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
08:00 - 09:00	1010	164	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
09:00 - 10:00	1175	227	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
10:00 - 11:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
11:00 - 12:00	1500	366	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
12:00 - 13:00	1697	462	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
13:00 - 14:00	1636	410	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
14:00 - 15:00	1698	343	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
15:00 - 16:00	1667	334	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
16:00 - 17:00	1690	335	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
17:00 - 18:00	1675	372	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**
18:00 - 19:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
19:00 - 20:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
20:00 - 21:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
21:00 - 22:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
22:00 - 23:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**
23:00 - 00:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**

Number of Hours that met the warrant 1A =	**9**
Number of Hours that met the warrant 1B =	**10**
Number of Hours that met the warrant 1 A & B =	**0**

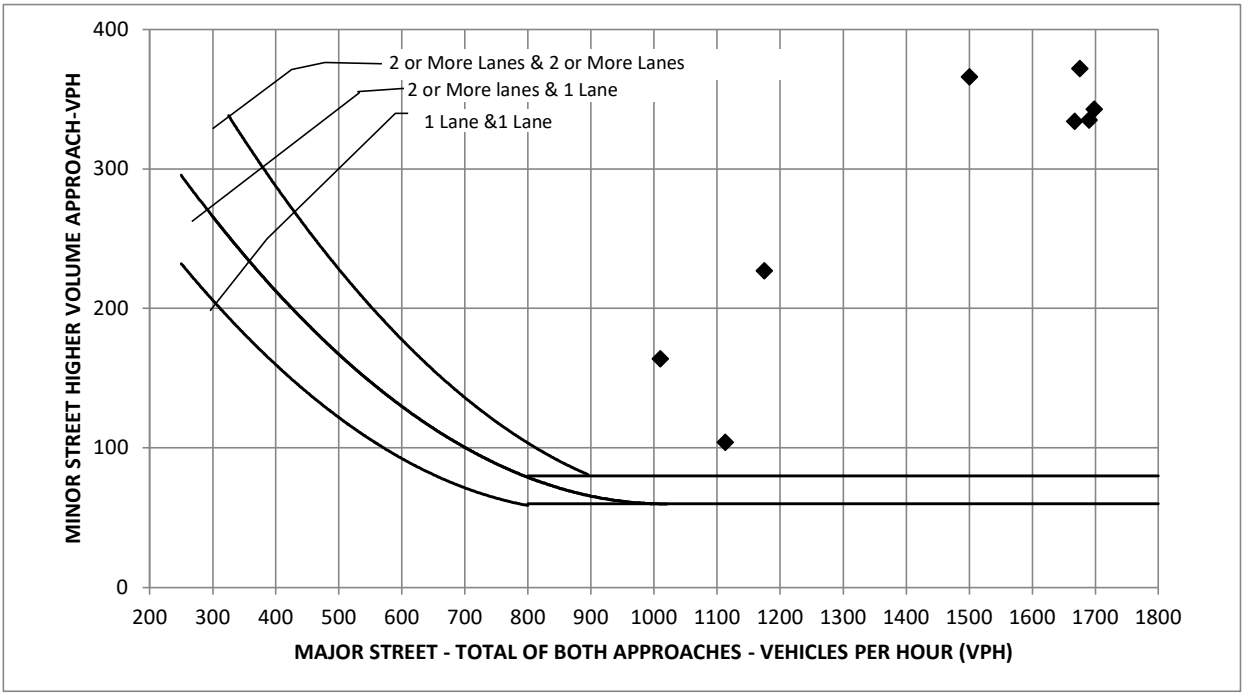
A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	**YES**
B. Is the Interruption of Continuous Traffic Met? (Condition B)	**YES**
C. Combination of Warrants A and B Criteria Met?	**N/A**

2029 Design Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



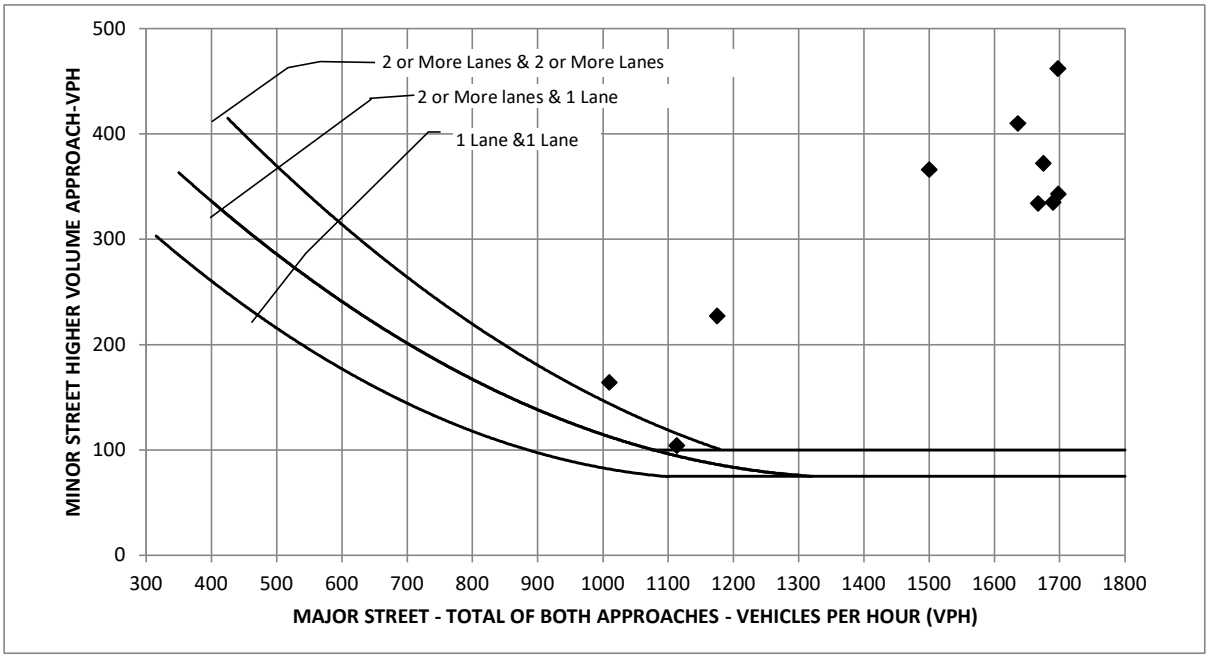
How Many Hours Are Met	10
Is Warrant (70%) Met?	YES

2029 Design Year

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St.**
2	**: No. of Lanes on Minor St.**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**



How Many Hours Are Met	**9**
Is Warrant (70%) Met?	**YES**

MDOT
Michigan Department of Transportation

OFFICE MEMORANDUM

DATE: November 12, 2024 **FILE:** 34032-011

TO: Art Green, Manager
Grand Rapids TSC

FROM: Douglas Adelman, Signals Operations Engineer Manager
Transportation Systems Management Operations Division

SUBJECT: **New Signal Study**
M-66 (State) @Meijer Drive/Proposed Development Drive
City of Ionia, Ionia County

It was requested that the subject intersection be studied for signalization as part of a proposed multi-use development by the Gillespie Group in the City of Ionia, Ionia County. According to the traffic impact study (TIS) submitted, this development will be completed in three phases. Phase one will consist of a 16,014-square-foot retail plaza and a 2,289 square-foot fast food restaurant with a drive-through window. Phase one is anticipated to start construction in 2024. Phase two will consist of a 4,500 square-foot fast food restaurant with a drive-through window. Phase two is anticipated to start construction in 2026. Phase three will consist of 123,840 square-foot shopping plaza and is anticipated to be completed by 2029. Based on the proposed site plan submitted, the primary entrance/exit for the development will be located along M-66 directly across from a Meijer store driveway. There will also be a secondary entrance/exit that connects to Heartland Blvd. The attached traffic impact study, warrant graphs, left-turn phasing graphs and Synchro results were used in our analysis.

The proposed intersection geometry is a four-legged intersection. The northbound approach of M-66 will consist of a left-turn lane, a through lane and a right-turn lane. The southbound approach or M-66 will consist of a left-turn lane, a through lane and a right-turn lane. The proposed westbound site driveway will consist of a left-turn lane and a through/right-turn lane. The Meijer Drive will consist of a left-turn lane and through/right-turn lane. The posted speed limit for M-66 is 45 mph. The speed limits for the Meijer Drive and Proposed development will be unposted.

As part of the TIS a warrant analysis was performed for phases one, two and three of the development. For phase one of the development the attached warrant graphs show minimum warranting volumes are not met for any of the warrants. For phase two of the development the attached warrant graphs show minimum warranting volumes are met for seven of the required eight hours for *Warrant 1B, Interruption of Continuous Traffic.* The eighth hour is within 11% of meeting Warrant 1B, and the ninth hour is within 13%. This is considered within the margin of error for projected volumes, so Warrant 1B is considered to be substantially met. Warrants 2 and 3B are met. For Phase three of the development the attached warrant graphs show minimum warranting volumes are met for nine of the required eight hours for *Warrant 1A, Minimum Vehicular Volume* and *Warrant 1B, Interruption of Continuous Traffic* is met for 10 of the required eight hours. Warrants 2 and 3B are also met.

Left turn phasing thresholds were evaluated by MDOT Lansing Signals Unit staff using 2029 projected count data for the p.m. and a.m. peak hours. The left turns on M-66 were evaluated and were found to warrant permissive protected left-turn phasing.

Synchro analyses were performed by MDOT staff using models submitted by the developer's

consultant. The overall peak hour of the day (4:30 p.m. – 5:30 p.m.) was analyzed. This analysis evaluated eight scenarios: The unsignalized no build 2024 scenario, the unsignalized build 2024 scenario, the unsignalized no build 2026 scenario, the unsignalized build 2026 scenario, the signalized build 2026 scenario with northbound & southbound permissive protected left-turn phasing, the unsignalized no build 2029 scenario, the unsignalized build 2029 scenario, the signalized build 2029 scenario with northbound & southbound permissive protected left-turn phasing. Results for the peak hour periods are included in the following tables with each approach's level-of-service (LOS) and corresponding delay in seconds.

Synchro Results- Level of Service (Delay in seconds/vehicle) PM Peak hour 2024		
Movement	**2024 No Build Scenario Unsignalized**	**2024 Build Scenario Unsignalized**
Eastbound Meijer Drive	**15.4 (C)**	**26.3 (D)**
Westbound Meijer Drive	**-**	**39.0 (E)**
Northbound M-66	**0.6 (A)**	**0.6 (A)**
Southbound M-66	**0.0 (A)**	**0.4 (A)**
Overall	**0.7 (A)**	**2.2 (A)**

Synchro Results- Level of Service (Delay in seconds/vehicle) PM Peak hour 2026			
Movement	**2026 No Build Scenario Unsignalized**	**2026 Build Scenario Unsignalized**	**2026 Build Scenario Signalized N/S FYA LT phasing**
Eastbound Meijer Drive	**15.5 (C)**	**35.0 (E)**	40.5 (D)
Westbound Meijer Drive	**-**	**74.7 (F)**	44.9 (D)
Northbound M-66	**0.6 (A)**	**0.6 (A)**	3.0 (A)
Southbound M-66	**0.0 (A)**	**1.1 (A)**	1.5 (A)
Overall	**0.7 (A)**	**6.5 (A)**	5.9 (A)

Synchro Results- Level of Service (Delay in seconds/vehicle) PM Peak hour 2029			
Movement	**2029 No Build Scenario Unsignalized**	**2029 Build Scenario Unsignalized**	**2029 Build Scenario Signalized N/S FYA LT Phasing**
Eastbound Meijer Drive	**15.7 (C)**	**96.9 (F)**	35.3 (D)
Westbound Meijer Drive	**-**	**808.1 (F)**	46.0 (D)
Northbound M-66	**0.6 (A)**	**0.5 (A)**	4.5 (A)
Southbound M-66	**0.0 (A)**	**2.6 (A)**	12.4 (B)
Overall	**0.7 (A)**	**126.9 (F)**	14.5 (B)

For the Phase 1 2024 No Build unsignalized Scenario the eastbound Meijer Drive approach operates at a level of service (LOS) C and the overall intersection operates at LOS A. The Phase 1 2024 Build unsignalized scenario shows the eastbound Meijer Drive approach operates at LOS D, the westbound site drive operates at LOS E and the overall intersection operate at LOS A. For the Phase 2 2026 No Build unsignalized Scenario the eastbound Meijer Drive approach operates at a level of service (LOS) C and the overall intersection operates at LOS A. The Phase 2 2026 Build unsignalized scenario shows the eastbound Meijer Drive approach operates at LOS E, the westbound site drive operates at LOS F and the overall intersection operate at LOS A. The Phase 2 2026 Build signalized scenario shows the eastbound Meijer Drive approach operates at a LOS D, the westbound site drive operates at a LOS D and the overall intersection operates at LOS A. The 2029 Synchro results are also displayed. These results show that without signalization the overall intersection delay becomes an F due to the amount of traffic generated by all phases of the development. According to the TIS signalization of this intersection is recommended upon completion of phase two.

We recommend traffic signal installation at the intersection of M-66 (State) and Meijer Drive/Proposed Site Drive upon completion of phase 2 for the following reasons:

1. Traffic signal warrants are met, and the 8-hour warrant is substantially met
2. Signalization significantly reduces delay for both driveway approaches without significantly increasing delay for M-66 (State)

This traffic signal will be installed via permit upon completion of phase two of the development and be paid for by the developer. Please inform local officials and those concerned with the result of our study. If you have any questions, please contact the Signal Operations Unit.

APPROVED
By Douglas Adelman at 3:49 pm, 11/12/24

Signals Operations Engineer Manager

Attachment(s)

BOFS:OFD:HLO:DJA:JAM

cc: E. Kind, Grand Region Engineer
S. Peplinski, Grand Region
T. Holbert, Grand Region
M. Craigmile, Grand Rapids TSC
J. Cole, Grand Rapids TSC
H. Owen, ITS Operations Engineer
J. McAttee, Signal Operations Engineer

08.07.2024

Traffic Impact Study

Multi-use Development

On behalf of:

Contact:

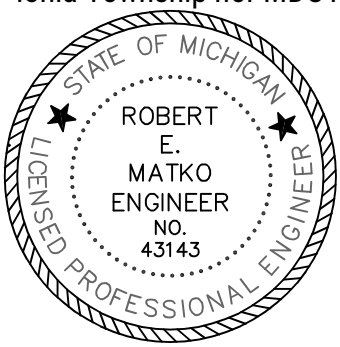
Gillespie Group
Jason Kildea
330 Marshall Street Suite 100
Lansing, MI 48912

Preparation Date:

Original: 01/30/2024
Revised: 08/07/2024

Traffic Impact Study Disclaimer

The findings and conclusions expressed in this TIA are those of the authors and not necessarily those of Ionia Township nor MDOT



Sincerely,

CESO, INC.

Robert E. Matko, P.E., P.S., PTOE
Engineering Manager

Traffic Study

CLIENT	Gillespie Group
LOCATION:	Ionia Township, Michigan
ADDRESS	2776 S. State Road (M-66)
COUNTY	Ionia
CITY, STATE	Ionia Township, MI

PREPARED BY	David Borja
	CESO Inc
ADDRESS	13060 S. US Highway 27, Suite D
CITY, STATE	DeWitt, MI 48820
PHONE	517.212.4229
DATE	August 7, 2024

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1. Executive Summary

1.1. Summary

Recommendations are listed in Section 1.3 – Summary of Recommendations.

This report is submitted on behalf of The Gillespie Group in connection with its application to the Michigan Department of Transportation (MDOT) for access permit approval. The Traffic Impact Study (TIS) conducted by CESO, Inc. identifies the traffic related impacts, if any, associated with the proposed Multi-use Development; referred to herein as "Multi-use Development."

The proposed Multi-use Development is to be constructed on the east side of M-66 across from Meijer within Ionia County, MI. The proposed Multi-use Development will consist of three phases:

2024 Build Year – Phase I
- 16,014 square-foot strip retail plaza.
- 2,289 square-foot fast food restaurant with a drive-through window.

2026 Build Year – Phase II
- Phase I
- 4,500 square foot fast food restaurant with a drive-through window

2029 Design Year – Phase III
- Phase II
- 123,840 square-foot shopping plaza.

The Gillespie Group retained CESO, Inc. to prepare the Traffic Impact Study for the Multi-use Development and present the details of a safe and efficient access system relating to Gillespie Group's application for approval of the following:

- Site driveways connecting to M-66 and Heartland Boulevard.
- Work within the right-of-way for construction of any necessary improvements.

The Traffic Impact Study focused on evaluating the 2024 No-Build, 2024 Build Year, 2026 No-Build, 2026 Build Year, 2029 No-Build, and 2029 Design Year Traffic conditions near the site.

1.2. Conclusions

In 2024, the proposed Multi-use Development (Phase I) is anticipated to generate 1,400 trips per day on a typical weekday (700 inbound and 700 outbound), of which 112 total trips will be generated during the weekday AM peak hour (59 inbound and 53 outbound) and 84 total trips during the weekday PM peak hour (41 inbound and 43 outbound). The generated trips in 2024 for the proposed Multi-use Development are anticipated to approach and depart the Site following the distribution patterns illustrated on Figures 6.A-6.B.

In 2026, the proposed Multi-use Development (Phase II) is anticipated to generate 3,504 trips per day on a typical weekday (1,752 inbound and 1,752 outbound), of which 311 total trips will be generated during the weekday AM peak hour (160 inbound and 151 outbound) and 233 total trips during the weekday PM peak hour (118 inbound and 115 outbound). The generated trips in 2026 for the proposed Multi-use Development are anticipated to approach and depart the Site following the distribution patterns illustrated on Figures 6.C-6.D.

In 2029, the proposed Multi-use Development (Phase III) is anticipated to generate 11,842 trips per day on a typical weekday (5,921 inbound and 5,921 outbound), of which 486 total trips will be generated during the weekday AM peak hour (271 inbound and 216 outbound) and 750 total trips during the weekday PM peak hour (372 inbound and 378 outbound). The generated trips in 2029 for the proposed Multi-use Development are anticipated to approach and depart the Site following the distribution patterns illustrated on Figures 6.E-6.F.

Highway Capacity Manual/Synchro V.12 methodology was used to analyze the level of service at the key study intersections and site driveways.

Under the **2024 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "C" and "D" in the AM and PM Peak Hours. All individual movements at the stop-controlled intersections operate at LOS "C" or better in the AM and PM Peak Hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM Peak Hours.

Under the **2024 Build Year Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "D" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "D" or better in the AM and PM peak hours except the following movements:

- EBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the PM peak hour).
- WBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "E" and "F" in the AM and PM peak hours).

Under the **2026 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "D" in the AM and PM Peak Hours. All individual movements at the stop-controlled intersections operate at LOS "C" or better in the AM and PM Peak Hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM Peak Hours.

Under the **2026 Build Year Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "D" and "E" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. All individual movements at the stop-controlled intersections operate at LOS "D" or better in the AM and PM peak hours except the following movements:

- EBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the AM and PM peak hours).
- WBL movement at the M-66 and Meijer Driveway/Site Driveway (LOS "F" in the AM and PM peak hours).

With the recommended improvements implemented, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "C" in the AM and PM peak hours. The M-66 and Meijer Driveway signalized intersection operates at an overall LOS "A" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours.

Under the **2029 No-Build Traffic Scenario**, the M-66 and Tuttle Road signalized intersection operate at an overall LOS "D" in the AM and PM Peak Hours. All individual movements at the stop-controlled intersections operate at

LOS "C" or better in the AM and PM Peak Hours. The M-66 and Sprague Road signalized intersection operate at an overall LOS "A" in the AM and PM Peak Hours.

Under the **2029 Design Year Traffic Scenario** with the recommended improvements implemented, the M-66 and Tuttle Road signalized intersection operates at an overall LOS "C" and "D" in the AM and PM peak hours. The M-66 and Meijer Driveway signalized intersection operates at an overall LOS "A" and "B" in the AM and PM peak hours. The M-66 and Sprague Road signalized intersection operates at an overall LOS "A" in the AM and PM peak hours.

CESO conducted turn lane analyses for the study network and concluded the following:

According to MDOT *Traffic & Safety Note 604A (July 2022)*, a right-turn lane **is warranted** at the M-66 and Meijer Driveway/Site driveway intersection under the 2026 Build Year traffic scenario.

CESO conducted a queue length analyses for the study network and verified the following:

The westbound left-turn movement at the M-66 and Tuttle Road intersection exceeds the existing storage length under the 2029 No-Build and 2029 Design Year traffic scenarios during the AM and PM peak hours.

The southbound left-turn movement at the M-66 and Tuttle Road intersection exceeds the existing storage length under the 2029 No-Build and 2029 Design Year traffic scenarios during the PM peak hours.

CESO conducted an intersection sight distance analysis for the M-66 and Meijer Driveway/Site Driveway and verified the following:

MDOT Intersection Sight Distance (ISD) requirements are satisfied for the intersection of M-66 and Meijer Driveway/Site Driveway.

CESO conducted a signal warrant analysis for the M-66 and Meijer Driveway/Site Driveway and verified the following:

Warrant 1 – Eight-Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2029 Design Year Traffic Scenario.

Warrant 2 – Four-Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2026 Build and 2029 Design Year Traffic Scenarios.

Warrant 3 – Peak Hour Vehicular Volume **is satisfied** at the intersection of M-66 and Meijer Driveway under the 2026 Build and 2029 Design Year Traffic Scenarios.

Based on satisfying Warrants 1, 2, and 3, CESO recommends that a traffic signal be installed at the intersection of M-66 and Meijer Driveway upon completion of Phase II construction.

1.3. Summary of Recommendations

The following summary of recommendations was generated based upon the findings in the Traffic Impact Study.

2024 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2024 Build Year Traffic Scenario (Responsibility – Gillespie Group):

M-66 and Meijer Driveway/Site Driveway

Construct Site Driveway connecting to M-66 with two (2) egress lanes (one (1) dedicated left-turn lane and one (1) dedicated through-right lane).

2026 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2026 Build Year Traffic Scenario (Responsibility – Gillespie Group):

M-66 and Meijer Driveway/Site Driveway

Install a traffic signal. Coordinate signal timing with the traffic signals along M-66 at Tuttle Road and Sprague Road.
Restripe the existing two-way left-turn lane to show dedicated 150-foot northbound and southbound turn lanes.
Construct 175' northbound right-turn lane with a 50-foot taper.

2029 No-Build Traffic Scenario (Responsibility – Others):

No improvements are recommended or required.

2029 Design Year Traffic Scenario (Responsibility – Gillespie Group):

No improvements are recommended or required.

Full TIS Available in signal spot file in Projectwise

Phase 1 2024 Build Warrant Analysis

USE RESTRICTED

23 USC 407

Nov 12,2024

Summary of Warrants

Spot Number:	0		
Major Street:	M-66	Minor Street:	Meijer Driveway
Intersection:	M-66 at Meijer Driveway		
City/Twp:	Ionia		
Date Performed:	1/23/2024	Performed By:	DMB
Date Volumes Collected:	10/3/2023		

Warrant	Condition	Is Warrant Met
Data Has Been Validated		**YES**
WARRANT 1: Eight-Hour Vehicular Volume		**NO**
	Condition A	NO
	Condition B	NO
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**NO**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**NO**
	Condition A	**NO**
	Condition B	**NO**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	NO
	Peak Hour	NO
(Threshold)	HAWK	NO
(Threshold)	RRFB	NO
WARRANT 5: School Crossing		**NO**
WARRANT 6: Coordinated Signal System		**NO**
WARRANT 7: Crash Experience		**NO**
	Condition A	NO
	Condition B	NO
WARRANT 8: Roadway Network		**NO**
WARRANT 9: Intersection Near a Grade Crossing		**#N/A**

Issue to Be Addressed by Signalization:

0

Phase 2 2026 Build Warrant 1 Summary

W1

USE RESTRICTED

23 USC 407

Nov 12,2024

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St?**
2	**: No. of Lanes on Minor St?**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: if answer 4 is Yes, then what is the of the population isolated community?**
NO	**: Have other remedial measures been tried?**

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?	
Time	**N-S**	E-W												
00:01 - 01:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	1074	53	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	942	62	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	1065	61	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1358	132	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1539	200	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	1469	150	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1546	113	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1515	103	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1538	101	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1512	117	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	

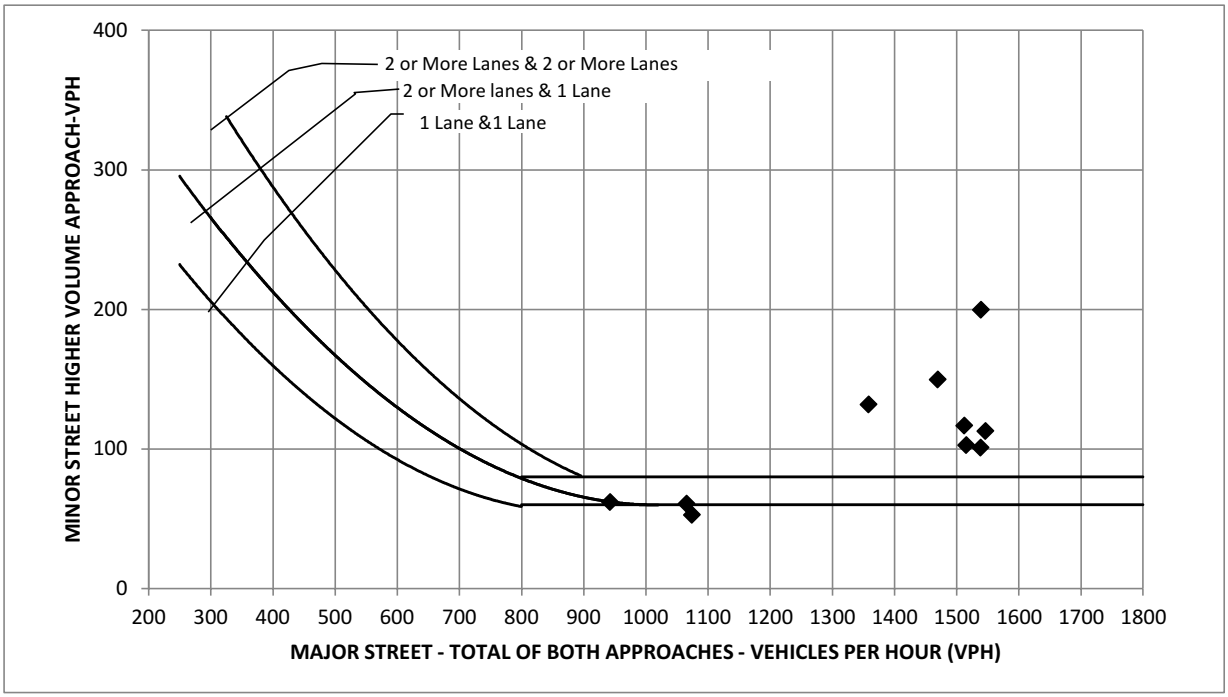
Number of Hours that met the warrant 1A =	**2**
Number of Hours that met the warrant 1B =	**7**
Number of Hours that met the warrant 1 A & B =	**0**

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	**NO**
B. Is the Interruption of Continuous Traffic Met? (Condition B)	**NO**
C. Combination of Warrants A and B Criteria Met?	**N/A**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

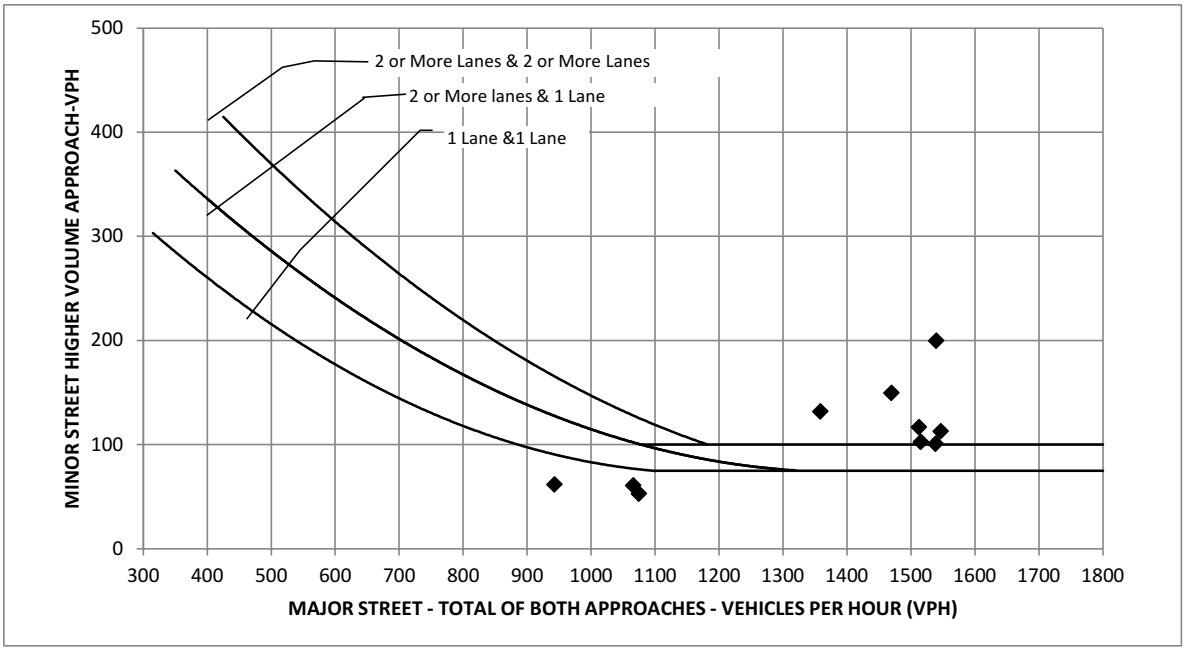


How Many Hours Are Met	7
Is Warrant (70%) Met?	YES

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met	**7**
Is Warrant (70%) Met?	**YES**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	**: No. of Lanes on Major St?**
2	**: No. of Lanes on Minor St?**
45	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: if answer 4 is Yes, then what is the of the population isolated community?**
NO	**: Have other remedial measures been tried?**

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?	
Time	**N-S**	E-W												
00:01 - 01:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	1113	104	420	140	**NO**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	1010	164	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	1175	227	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1500	366	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1697	462	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	1636	410	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1698	343	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1667	334	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1690	335	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1675	372	420	140	**YES**	630	70	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	140	**NO**	630	70	**NO**	N/A	N/A	N/A	N/A	**N/A**	

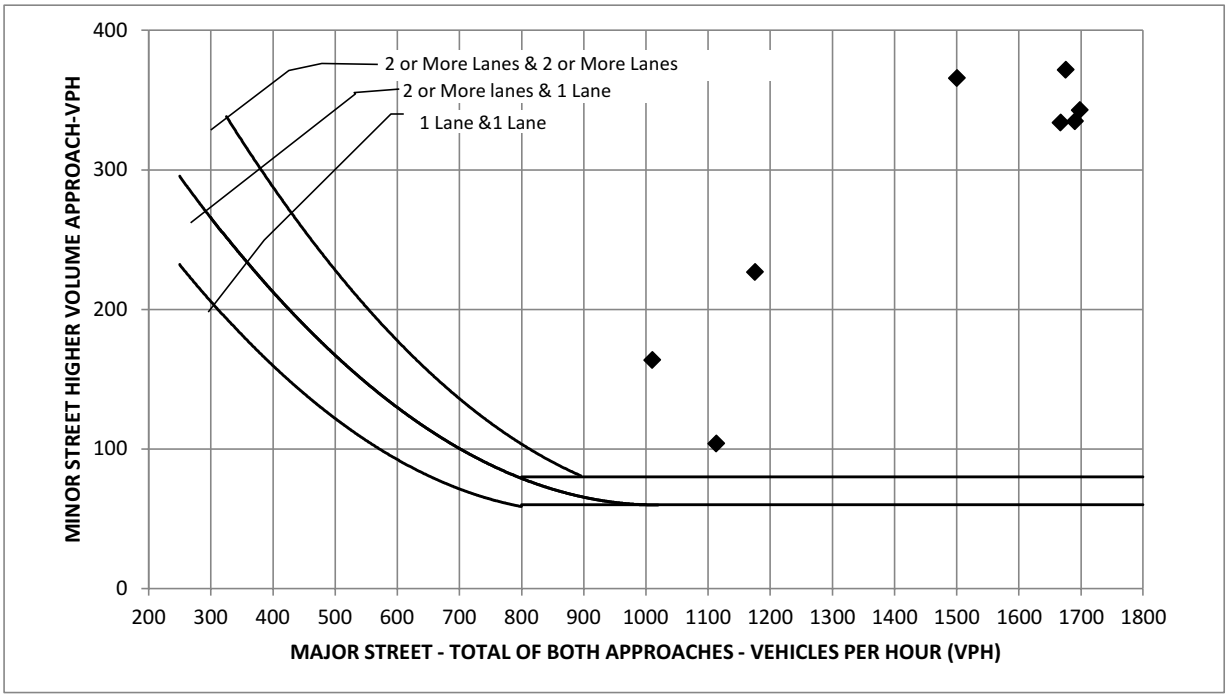
Number of Hours that met the warrant 1A =	**9**
Number of Hours that met the warrant 1B =	**10**
Number of Hours that met the warrant 1 A & B =	**0**

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	**YES**
B. Is the Interruption of Continuous Traffic Met? (Condition B)	**YES**
C. Combination of Warrants A and B Criteria Met?	**N/A**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

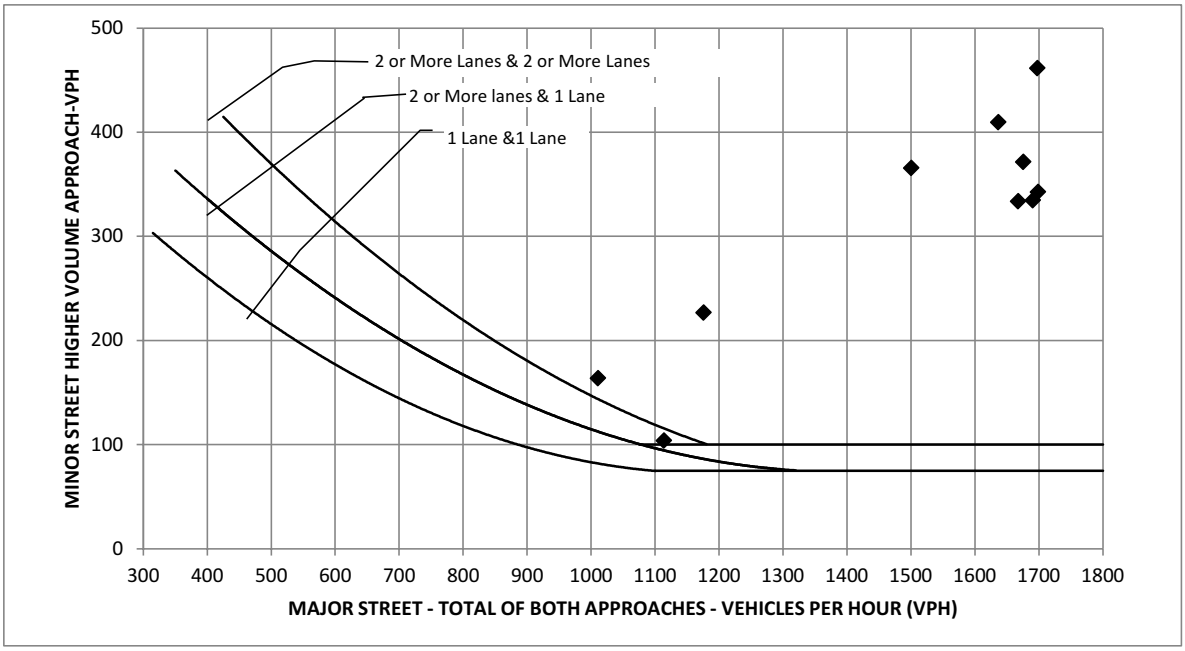


How Many Hours Are Met	10
Is Warrant (70%) Met?	YES

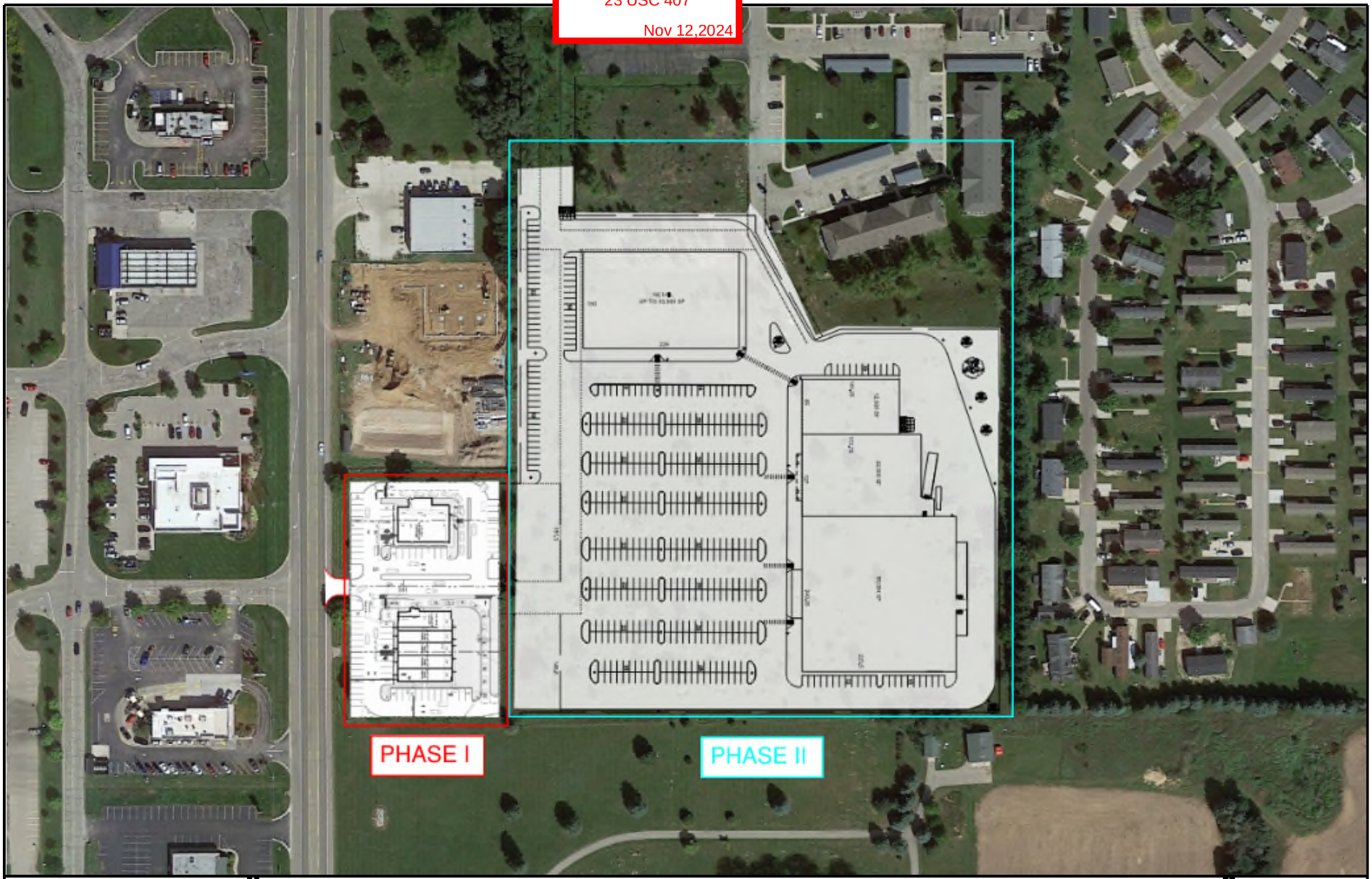
Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	0		
Intersection:	M-66 @ Meijer Driveway		
Date	1/23/2024	by	DMB

3	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met	9
Is Warrant (70%) Met?	YES



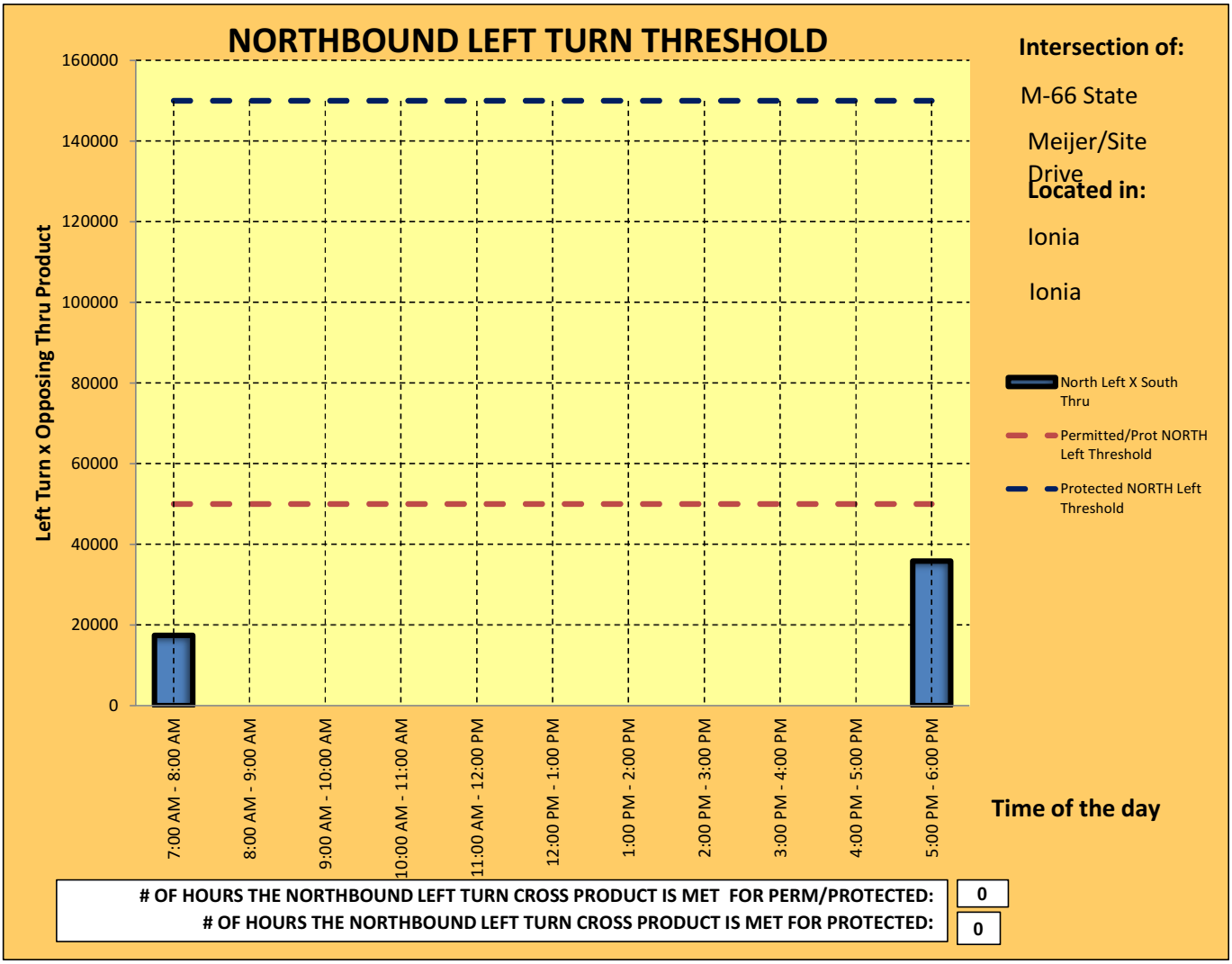
CESO
WWW.CESOINC.COM

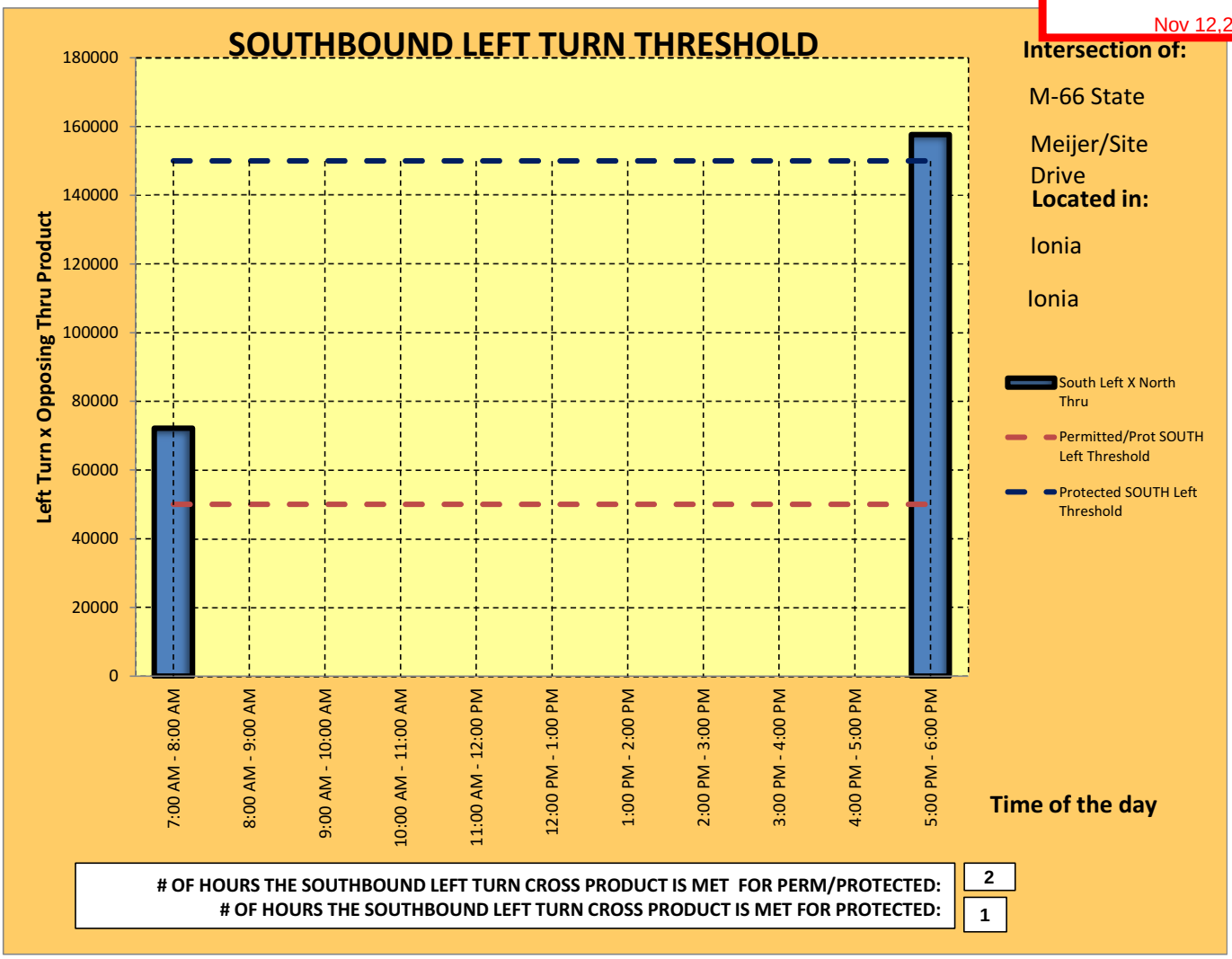
SITE PLAN

MULTI USE DEVELOPMENT

CITY OF IONIA — IONIA COUNTY, MI

FIGURE 2	
DATE:	10/30/23
JOB NO.:	763233
DESIGNED BY:	DMB
DRAWN BY:	DMB
CHECKED BY:	REM
PAGE:	8





# 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 PROTECTED:	1

HCM 7th TWSC
2: M-66 & MEIJER DRWY

09/18/2024

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	27	53	786	648	48
Future Vol, veh/h	8	27	53	786	648	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	8	28	55	819	675	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1604	675	725	0	-	0
Stage 1	675	-	-	-	-	-
Stage 2	929	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	116	434	878	-	-	-
Stage 1	506	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	109	434	878	-	-	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	474	-	-	-	-	-
Stage 2	384	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.36	0.59	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	878	-	243	434	-	-
HCM Lane V/C Ratio	0.063	-	0.034	0.065	-	-
HCM Control Delay (s/veh)	9.4	-	20.4	13.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.2	-	-

HCM 7th TWSC
2: M-66 & MEIJER DRWY

09/18/2024

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	27	17	0	29	53	780	13	28	642	48
Future Vol, veh/h	8	0	27	17	0	29	53	780	13	28	642	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	8	0	28	18	0	32	55	813	14	30	669	50

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1653	1667	669	1660	1710	820	719	0	0	827	0	0
Stage 1	730	730	-	930	930	-	-	-	-	-	-	-
Stage 2	923	937	-	730	780	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	79	96	437	78	91	375	883	-	-	804	-	-
Stage 1	414	428	-	321	346	-	-	-	-	-	-	-
Stage 2	323	343	-	414	406	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	65	87	437	66	82	375	883	-	-	804	-	-
Mov Cap-2 Maneuver	65	87	-	66	82	-	-	-	-	-	-	-
Stage 1	398	412	-	300	324	-	-	-	-	-	-	-
Stage 2	278	322	-	373	391	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	26.3	39.41	0.59	0.39
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	883	-	-	65	437	66	375	804	-	-
HCM Lane V/C Ratio	0.063	-	-	0.128	0.064	0.282	0.084	0.038	-	-
HCM Control Delay (s/veh)	9.4	-	-	68.5	13.8	80.2	15.5	9.7	-	-
HCM Lane LOS	A	-	-	F	B	F	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.2	1	0.3	0.1	-	-

HCM 7th TWSC
2: M-66 & MEIJER DRWY

09/18/2024

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	27	54	793	654	49
Future Vol, veh/h	8	27	54	793	654	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	8	28	56	826	681	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1620	681	732	0	-	0
Stage 1	681	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	113	430	872	-	-	-
Stage 1	503	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	106	430	872	-	-	-
Mov Cap-2 Maneuver	240	-	-	-	-	-
Stage 1	470	-	-	-	-	-
Stage 2	381	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.46	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	872	-	240	430	-	-
HCM Lane V/C Ratio	0.064	-	0.035	0.065	-	-
HCM Control Delay (s/veh)	9.4	-	20.6	14	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.2	-	-

HCM 7th TWSC
2: M-66 & MEIJER DRWY

09/18/2024

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	27	37	0	78	53	773	38	80	634	48
Future Vol, veh/h	8	0	27	37	0	78	53	773	38	80	634	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	8	0	28	40	0	85	55	805	41	87	660	50

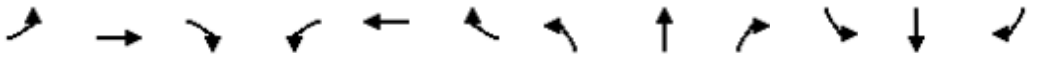
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1750	1791	660	1771	1821	826	710	0	0	847	0	0
Stage 1	834	834	-	936	936	-	-	-	-	-	-	-
Stage 2	916	957	-	834	884	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	67	81	442	65	77	372	889	-	-	791	-	-
Stage 1	362	383	-	318	344	-	-	-	-	-	-	-
Stage 2	327	336	-	362	363	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	43	67	442	51	65	372	889	-	-	791	-	-
Mov Cap-2 Maneuver	43	67	-	51	65	-	-	-	-	-	-	-
Stage 1	322	341	-	298	322	-	-	-	-	-	-	-
Stage 2	236	315	-	302	323	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	35.06	74.72	0.57	1.1
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	889	-	-	43	442	51	372	791	-	-
HCM Lane V/C Ratio	0.062	-	-	0.193	0.064	0.793	0.228	0.11	-	-
HCM Control Delay (s/veh)	9.3	-	-	107.2	13.7	195.3	17.5	10.1	-	-
HCM Lane LOS	A	-	-	F	B	F	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.2	3.3	0.9	0.4	-	-

HCM 7th Signalized Intersection Summary
2: M-66 & MEIJER DRWY

09/24/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	27	37	0	78	54	773	38	80	634	49
Future Volume (veh/h)	8	0	27	37	0	78	54	773	38	80	634	49
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	1870	1870	1693	1870	1870	1870	1870	1781	1870	1870	1811	1870
Adj Flow Rate, veh/h	8	0	28	40	0	85	56	805	41	87	660	51
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Percent Heavy Veh, %	2	2	14	2	2	2	2	8	2	2	6	2
Cap, veh/h	115	0	125	167	0	125	775	1158	1030	718	1177	1030
Arrive On Green	0.08	0.00	0.08	0.08	0.00	0.08	0.24	1.00	1.00	0.24	1.00	1.00
Sat Flow, veh/h	1313	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Grp Volume(v), veh/h	8	0	28	40	0	85	56	805	41	87	660	51
Grp Sat Flow(s),veh/h/ln	1313	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Q Serve(g_s), s	0.5	0.0	1.5	2.5	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.2	0.0	1.5	4.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	115	0	125	167	0	125	775	1158	1030	718	1177	1030
V/C Ratio(X)	0.07	0.00	0.22	0.24	0.00	0.68	0.07	0.70	0.04	0.12	0.56	0.05
Avail Cap(c_a), veh/h	165	0	185	218	0	185	775	1158	1030	718	1177	1030
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.91	0.91	0.91	0.77	0.77	0.77
Uniform Delay (d), s/veh	42.9	0.0	38.8	40.7	0.0	40.3	2.2	0.0	0.0	2.3	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.9	0.7	0.0	6.2	0.0	3.2	0.1	0.1	1.5	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	0.2	0.0	0.6	0.9	0.0	2.0	0.1	1.0	0.0	0.2	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.1	0.0	39.7	41.5	0.0	46.6	2.2	3.2	0.1	2.4	1.5	0.1
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		36			125			902			798	
Approach Delay, s/veh		40.5			44.9			3.0			1.5	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.4	63.0		11.6	15.4	63.0		11.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	7.5	58.5		10.5	7.5	58.5		10.5				
Max Q Clear Time (g_c+I1), s	2.0	2.0		7.2	2.0	2.0		6.7				
Green Ext Time (p_c), s	0.1	6.6		0.0	0.0	4.8		0.2				

Intersection Summary	
HCM 7th Control Delay, s/veh	5.9
HCM 7th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 7th TWSC
2: M-66 & MEIJER DRWY

09/18/2024

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	27	55	806	665	49
Future Vol, veh/h	8	27	55	806	665	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	85	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	14	2	8	6	2
Mvmt Flow	8	28	57	840	693	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1647	693	744	0	-	0
Stage 1	693	-	-	-	-	-
Stage 2	954	-	-	-	-	-
Critical Hdwy	6.42	6.34	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.426	2.218	-	-	-
Pot Cap-1 Maneuver	109	424	864	-	-	-
Stage 1	496	-	-	-	-	-
Stage 2	374	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	102	424	864	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	374	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.65	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	864	-	235	424	-	-
HCM Lane V/C Ratio	0.066	-	0.035	0.066	-	-
HCM Control Delay (s/veh)	9.5	-	20.9	14.1	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.2	-	-

Intersection	
Int Delay, s/veh	126.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	27	129	0	185	55	744	127	181	603	49
Future Vol, veh/h	8	0	27	129	0	185	55	744	127	181	603	49
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	2	2	14	2	2	2	2	8	2	2	6	2
Mvmt Flow	8	0	28	140	0	201	57	775	138	197	628	51

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1911	2049	628	1980	2031	844	679	0	0	913	0	0
Stage 1	1022	1022	-	959	959	-	-	-	-	-	-	-
Stage 2	890	1028	-	1022	1073	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.34	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.426	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	52	56	462	~ 46	57	363	913	-	-	746	-	-
Stage 1	285	314	-	309	336	-	-	-	-	-	-	-
Stage 2	338	312	-	285	297	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	16	38	462	~ 30	39	363	913	-	-	746	-	-
Mov Cap-2 Maneuver	16	38	-	~ 30	39	-	-	-	-	-	-	-
Stage 1	210	231	-	290	314	-	-	-	-	-	-	-
Stage 2	141	292	-	197	219	-	-	-	-	-	-	-

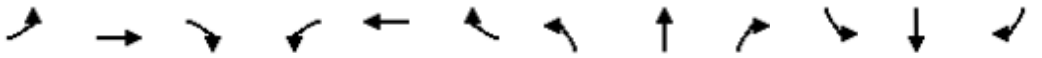
Approach	EB	WB	NB	SB
HCM Control Delay, s/v	96.94	$ 808.11	0.54	2.59
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	913	-	-	16	462	30	363	746	-	-
HCM Lane V/C Ratio	0.063	-	-	0.524	0.061	4.694	0.554	0.264	-	-
HCM Control Delay (s/veh)	9.2	-	-	-$ 379.2	13.3	$ 1929	26.5	11.5	-	-
HCM Lane LOS	A	-	-	F	B	F	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.4	0.2	16.9	3.2	1.1	-	-

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

HCM 7th Signalized Intersection Summary
2: M-66 & MEIJER DRWY

09/24/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	27	129	0	185	55	744	127	181	603	49
Future Volume (veh/h)	8	0	27	129	0	185	55	744	127	181	603	49
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0		
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.0		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0		
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	1693	1870	1870	1870	1870	1781	1870	1870	1811	1870
Adj Flow Rate, veh/h	8	0	28	140	0	201	57	775	138	197	628	51
Peak Hour Factor	0.96	0.92	0.96	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96
Percent Heavy Veh, %	2	2	14	2	2	2	2	8	2	2	6	2
Cap, veh/h	115	0	242	270	0	242	560	1019	907	650	1028	900
Arrive On Green	0.15	0.00	0.15	0.15	0.00	0.15	0.25	1.00	1.00	0.13	0.57	0.57
Sat Flow, veh/h	1181	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Grp Volume(v), veh/h	8	0	28	140	0	201	57	775	138	197	628	51
Grp Sat Flow(s),veh/h/ln	1181	0	1585	1382	0	1585	1781	1781	1585	1781	1811	1585
Q Serve(g_s), s	0.6	0.0	1.4	8.7	0.0	11.1	0.0	0.0	0.0	0.0	20.6	1.3
Cycle Q Clear(g_c), s	11.7	0.0	1.4	10.1	0.0	11.1	0.0	0.0	0.0	0.0	20.6	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	115	0	242	270	0	242	560	1019	907	650	1028	900
V/C Ratio(X)	0.07	0.00	0.12	0.52	0.00	0.83	0.10	0.76	0.15	0.30	0.61	0.06
Avail Cap(c_a), veh/h	164	0	308	328	0	308	560	1019	907	650	1028	900
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.87	0.87	0.87	0.64	0.64	0.64
Uniform Delay (d), s/veh	42.7	0.0	32.9	37.3	0.0	37.0	11.9	0.0	0.0	6.3	12.9	8.7
Incr Delay (d2), s/veh	0.3	0.0	0.2	1.5	0.0	14.0	0.1	4.7	0.3	0.2	1.7	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	0.2	0.0	0.5	3.0	0.0	5.2	0.5	1.3	0.1	1.2	7.5	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.9	0.0	33.1	38.8	0.0	51.0	11.9	4.7	0.3	6.4	14.6	8.8
LnGrp LOS	D		C	D		D	B	A	A	A	B	A
Approach Vol, veh/h		36			341			970			876	
Approach Delay, s/veh		35.3			46.0			4.5			12.4	
Approach LOS		D			D			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.8	56.0		18.2	15.8	56.0		18.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.9		4.5				
Max Green Setting (Gmax), s	7.5	51.5		17.5	7.5	51.1		17.5				
Max Q Clear Time (g_c+I1), s	2.0	2.0		13.7	2.0	22.6		13.1				
Green Ext Time (p_c), s	0.2	6.6		0.0	0.0	4.3		0.7				

Intersection Summary			
HCM 7th Control Delay, s/veh		14.5	
HCM 7th LOS		B	

Notes

User approved pedestrian interval to be less than phase max green.

CITY OF IONIA

Corland J McDiarmid
Director

IONIA DEPARTMENT OF
PUBLIC SAFETY

239 East Adams Street, Ionia Michigan, 48846
616-527-4431

Kevin C Heinlein
Deputy Director

PLAN REVIEW – 90 E Tuttle Rd

On 02/09/2026, I reviewed the site plan for the property of 90 E Tuttle Rd, property within the City of Ionia.

According to the site plans provided, they meet the International Fire Code of 2012.

Brian Vos

PSO1/Inspector Brian Vos 49-26
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CITY OF IONIA

STAFF REPORT FOR PLANNING COMMISSION AGENDA ITEM

Agenda Item: VIII.1

TO: Planning Commissioners

FROM: Jonathan Bowman, Assistant City Manager

DATE: March 11, 2026

RE: Reschedule April Planning Commission Meeting

Background:

Due to quorum concerns for the regularly scheduled April 8 Planning Commission meeting, staff requests that Planning Commission consider rescheduling the April meeting for April 1 at 4:30 PM. This date will avoid the Ionia Public Schools spring break scheduled for the second week of April. It is anticipated that Allen Edwin Homes will be prepared to present an updated preliminary plan for their housing concept at this meeting. If the Planning Commission determines the project to be ready, a special Planning Commission meeting will be requested for the end of April to conduct the necessary public hearing and keep the project on schedule.

Requested Action / Motion:

It is requested that the Ionia Planning Commission consider a motion to reschedule its April 8 regular meeting to April 1, 2026.

Motion By: **Seconded By:**