CHARTER TOWNSHIP OF ORION
PLANNING COMMISSION REGULAR MEETING AGENDA
WEDNESDAY, NOVEMBER 16, 2022 - 7:00 PM
ORION TOWNSHIP MUNICIPAL COMPLEX BOARD ROOM
2323 JOSLYN ROAD
LAKE ORION, MI 48360

Joint Public Hearing with the Board of Trustees at 7:05 p.m. for PC-22-39, Hudson Square Planned Unit Development (PUD), located at 3030 S. Lapeer Road, (sidwell #09-26-101-021). The applicant, Dr. John Canine, is proposing to rezone the property from Single Family Residential-2 (R-2), and Conditional General Business (SB) to Planned Unit Development (PUD) to construct a mixed-use development with a freestanding drive-thru coffee shop, sit-down restaurant attached to a classic car club, and multi-family residential in 6 buildings with a total of 24 units.

In the spirit of compliance with the Americans with Disabilities Act, individuals with a disability should feel free to contact Penny S. Shults, Clerk, at (248) 391-0304, ext. 4001, at least seventy-two hours in advance of the meeting to request accommodations.

CHARTER TOWNSHIP OF ORION PLANNING COMMISSION
*** * * * * A G E N D A * * * * ***
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1. OPEN MEETING

2. ROLL CALL

3. MINUTES

A. 10-19-22, Planning Commission Regular Meeting Minutes
B. 10-19-22, Planning Commission Public Hearing Minutes PC-22-35, Township Initiated Text Amendment – Performance Guarantees

4. AGENDA REVIEW AND APPROVAL

5. BRIEF PUBLIC COMMENT – NON-AGENDA ITEMS ONLY

6. CONSENT AGENDA

7. NEW BUSINESS

A. PC-2019-06, Silverbell Pointe PUD Site Plan Extension, located on 4 vacant parcels S. of Silverbell Rd. on the east side of Joslyn Rd. (Sidwell #09-33-201-001, 09-33-128-001, 09-28-379-001, & 09-28-451-001).

B. PPC-22-16, Lava Mountain Special Land Use and Site Plan Postponement Extension, located at 1472 S. Lapeer Rd. 09-14-100-074.

C. PC-22-39, Hudson Square Planned Unit Development (PUD) Concept Plan, located at 3030 S. Lapeer Rd. (Sidwell #09-26-101-021).

D. 2023 Planning Commission Meeting Dates.

8. UNFINISHED BUSINESS

9. PUBLIC COMMENTS

10. COMMUNICATIONS

11. PLANNERS REPORT/EDUCATION

A. The Future of Transportation – Electronic Vehicles Part 2

12. COMMITTEE REPORTS

13. FUTURE PUBLIC HEARINGS

14. CHAIRMAN'S COMMENTS

15. COMMISSIONERS' COMMENTS

16. ADJOURNMENT

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CHARTER TOWNSHIP OF ORION PLANNING COMMISSION
******** MINUTES ********
REGULAR MEETING, WEDNESDAY, OCTOBER 19, 2022

The Charter Township of Orion Planning Commission held a regular meeting on Wednesday, October 19, 2022, at 7:00 p.m. at the Orion Township Municipality Complex Board Room, 2323 Joslyn Road, Lake Orion, Michigan 48360.

PLANNING COMMISSION MEMBERS PRESENT:

Scott Reynolds, Chairman
Don Gross, Vice Chairman
Kim Urbanowski, BOT Rep to PC
Don Walker, PC Rep to ZBA
Joe St. Henry, Secretary
Jessica Gingell, Commissioner

PLANNING COMMISSION MEMBERS ABSENT:

Derek Brackon, Commissioner

1. OPEN MEETING

Chairman Reynolds opened the meeting at 7:00 p.m.

2. ROLL CALL

As noted above.

CONSULTANT'S PRESENT:

Tammy Girling, Township Planning & Zoning Director

OTHERS PRESENT:

None.

3. MINUTES

A. 10-5-22, Planning Commission Regular Meeting Minutes

Moved by Secretary St. Henry, seconded by Commissioner Walker to **approve the** minutes as presented. **Motion carried**

4. AGENDA REVIEW AND APPROVAL

Moved by Vice-Chairman Gross, seconded by Secretary St. Henry, to **approve** the agenda as presented. **Motion carried**

5. BRIEF PUBLIC COMMENT – NON-AGENDA ITEMS ONLY

None.

6. CONSENT AGENDA

None.

7. NEW BUSINESS

None.

Chairman Reynolds recessed the regular meeting at 7:03 p.m. and opened the public hearing for PC-22-35, Township Initiated Text Amendment to Zoning Ord. #78, Article XXX, Section 30.09, Performance Guarantees at 7:05 p.m.

Chairman Reynolds closed the public hearing for PC-22-35 at 7:07 p.m. and reconvened the regular Planning Commission meeting.

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8. UNFINISHED BUSINESS

A. PC-22-35, Township Initiated Text Amendment to Zoning Ord. #78, Article XXX, Section 30.09, Performance Guarantees

Chairman Reynolds said that there was a motion in front of them to recommend to the Board of Trustees to move forward on the text amendment.

Chairman Reynolds stated that everything that they have seen here tonight was discussed over the last year. He was comfortable and he thought that if anything this is a benefit to anyone that was proposing a project within the Township, it gives them another opportunity to keep the project moving forward without tying up cash dollars or lines of credit. It was something that they had heard from small and large projects throughout the Township, so he was in full support of this and looked forward to having it as part of their ordinance.

Secretary St. Henry asked how often do developers typically use bonds as their preferred choice when they are proposing development, projects outside of Orion Township? Chairman Reynolds replied probably three-quarters or better than half will start to use the bond process. It is essentially the insurance policy against their asks. It is going to be a popular take because it is more of a fee ask from the developer versus them tying up cash dollars.

Secretary St. Henry said he was assuming they were treating this as a best practice that they picked up from other communities. Chairman Reynolds stated without divulging specific projects they have had small projects throughout the year of longtime resident business owners that had a small addition on their project. They had to come up with tens of thousands of dollars in a credit line or cash that would potentially sideways their project for the time being versus a bond which would be a fee amount that would cover their asking and cover their ask for essentially the project to still be completed. There is some verbiage in here that obviously still allows them to protect them and still allow it.

Trustee Urbanowski thanked Chairman Reynolds for being thorough over the last year and doing this, and whoever else was on the committee as well.

Moved by Trustee Urbanowski, seconded by Commissioner Gingell, that the Planning Commission **forwards a recommendation** to the Township Board to **approve and adopt** PC-22-35, Township Initiated Text Amendment to Zoning Ordinance #78, Article XXX, Section 30.09, Performance Guarantees, for the following reasons: it took a year to do, they all researched it well, and it will be a good best practice for them moving forward.

Discussion on the motion:

> Chairman Reynolds said this is a common practice it is not an off-the-beaten-path ask. If anything, they are just bringing themselves up to date with similar communities around them.

Roll call vote was as follows: Gingell, yes; St. Henry, yes; Urbanowski, yes; Walker, yes; Gross, yes; Reynolds, yes. **Motion carried 6-0. (Brackon absent)**

B. PC-21-65, Township Initiated Text Amendment to Zoning Ord. #78, 2021-2022 Ordinance Updates.

Planning & Zoning Director Girling stated that some of these they have seen already, they started this PC project in 2021. Working through the discussed changes didn't

necessarily happen rapidly. With a little bit of decline in the work she felt they needed to get this wrapped up even if there are some things that they say that they are still not 100% happy with, they could exclude that and go with what they have. She wanted to present to them what they had discussed before with the tweaks. She had given them the minutes in their packet in case they wanted to read what was discussed.

Planning & Zoning Director Girling added that in addition, there was a Fence Committee that was created at the same time as the Performance Guarantee Committee. The committee wants the attorney to make sure they are good with the language but as long as they were already talking about other text amendments and the fact that even if they like this language the attorney has to review it, she went ahead and incorporated it. Anything related to fences even if they liked it, if the attorney likes it. It has to take a quick trip back to the committee to make sure that they are ready to sign off on it. She has been instructed in the past whenever they are doing a text amendment this elaborate to please give them a hard copy of everything they are discussing so they do have in front of them each of the sections they are talking about, and only the pages that it has redlines for the changes. It might have a page before if it was the beginning of the section or a page after.

Planning & Zoning Director Girling stated that they are going to go section by section.

Planning & Zoning Director Girling said related to, they are talking about the definition of a lot, double frontage. This came about related to fences. On a double frontage lot, meaning they have a road in front and a road in back the ordinance had said they are held to a front setback for a structure off of both roads. This created a problem when people want to put in a 6-ft. fence. If they wanted to, for instance, they have a number of homes that back up to Waldon in the Keatington sub, so their home is held to a front setback off of Orbit, then they would be held to a 35-ft. or 30-ft. for the front setback off from Waldon. If they wanted to put up a 6-ft. fence they were having to come in, 30-35-ft. or go for a variance. When they looked at it all districts in single-family residential, most of them have the same front setback as the rear setback. Some of them have where the rear setback is more than the front setback. This double frontage was really serving no purpose. If you are building a home you are held to a front setback off of Orbit, and you are held to a rear setback off of Waldon, why bother talking about having two front setbacks just because they have two roads. It wasn't really accomplishing anything, but it was hurting those people because a detached accessory can be 10-ft. from the rear. This double front setback was hurting unnecessarily, the committee thought, those properties that have double frontage. They have proposed that they change that definition.

Planning & Zoning Director Girling said then they get into the definition of lot lines. You have the definition of double frontage and then when it gets into lot lines, they talk about the front lot line and that is where it is talking about your front lot line where you are in front of a road however if you are a double frontage that is where you are held to having the front setback on both. This verbiage has changed to incorporate fixing that issue. When we finish up Article II, looking to have any discussions or whether they like the way that it is presented.

Planning & Zoning Director Girling stated the only other change in Article II, they discussed this the last time they talked about this in 2021, they used the definition of other communities use for mezzanine and they had a problem with theirs it was like they almost had a double negative how they stated it. They fixed their definition to be similar to other communities. She added that was it for Article II and asked if there was any constructive criticism, likes, dislikes, or changes. Chairman Reynolds stated he was in support of the changes as proposed.

Planning & Zoning Director Girling said what she will do when they get through all of these, she will present it to the attorney, if the attorney is good with it then she will go ahead and set the public hearing for it.

Planning & Zoning Director Girling stated that Section III, in their list of zoning districts never had BIZ, and BIZ is not an overlay it is an actual district so adding that.

Planning & Zoning Director Girling said Article IX, they had a case that was the self-storage being built off of Clarkston Rd. that in their setbacks for greenbelts they had a list of what the width was from a greenbelt if they are not adjacent to residential. Actually, it wasn't non-residential it actually listed everything, industrial, office commercial, and they actually had an attorney challenge it, and our attorney said he was right. They can't, just because you left it out say that it applies. So, they really had no width for that landscape greenbelt necessary for any property that was adjacent that is zoned Recreational. She made the assumption that they would want it to be equal to the residential, meaning that the greenbelt had to be 30-ft. versus being similar to office or commercial. Chairman Reynolds and Trustee Urbanowski both supported this.

Planning & Zoning Director Girling stated that they will see that change that they just discussed in all of their districts so she will just say ditto, they discussed it once.

Planning & Zoning Director Girling said the same with the next clause, which is getting into, they discussed it before, covered trash areas which are now titled Trash Enclosures that title she will be using in all districts. They were talking about the fact that they were calling it an enclosed trash area and they are correcting the terms, they want the trash receptacle to be covered but then they have to have the walls around it. They had said it had to be a brick type and there was a discussion of something similar to the materials of the building so that is what they are proposing, something more not so stringent as long as it is in the character of the area. Chairman Reynolds replied in support.

Planning & Zoning Director Girling said regarding Articles XIV & XVI, she said ditto adding recreationally there were two sections that they didn't mention setbacks when they listed the districts, so she added Recreation. Letter I. Trash Enclosures same thing she just carried everything over into all of those districts.

Planning & Zoning Director Girling said Article XVIII she had presented to them the last time they discussed it. They have a situation where they have a district called Industrial Park. Looking at the preamble it was talking about trying to create a park-like atmosphere for industrial buildings. They do have a number of parcels in the Township

that are zoned Industrial Park that are going to be one single owner of that land and maybe that owner would have two buildings that they own. A prime example is Ashley Commerce Center southwest side of Lapeer and Silverbell. There are two buildings there and they are owned by the same party. Well, that is not a park. There were restrictions in (IP) that if you were in an industrial park you had to have a 60-ft. private road that came in. If they were owned by the same entity, then really it is just a drive coming in. They created a difference that both could exist in an Industrial Park in spite of calling it, Industrial Park in all instances it is not necessarily a "park". From the notes from that meeting she tried to decipher the many ideas that were suggested but she realized that their input, and that there might be a little bit of a tweak that they might what to make on this. Chairman Reynolds said that he had one proposed tweak. His thought was that he liked the verbiage as it stands except for whether it is comprised of 2 or more parcels or a stand-alone parcel. He asked don't they all need to consist of a provision of roads, utilities, adequate setbacks, greenbelts, and landscaping? So, essentially moving the "or stand-along industrial users on 1 parcel with 2 or more principal buildings", move that after the first revision comprised of 2 or more parcels. Moving that revision up because don't the statements that follow, follow both of those? He stated his proposed amendment would be to strike or stand-alone industrial users on one parcel with 2 or more principal buildings, and they are going to paste it after "comprised of 2 or more parcels". So, his amendment would be "or stand-alone industrial users on 1 parcel with 2 or more principal buildings with full previsions of roads utilities with adequate setbacks, greenbelt, and landscaping. This district is intended to provide locations for similar activities that are permitted in limited industrial use. Just moving it around.

Planning & Zoning Director Girling said going to page number 18-3 under #7 they changed all of the districts to not say churches they have made them places of worship. On page 18-4 they are going with a theme of calling it a subdivision/condominium versus a park even though the district is an industrial park that is how they are differentiating between one owner with multiple buildings versus multiple owners in a subdivision/condominium. This was the language she came up with based on again, the conversation.

Planning & Zoning Director Girling said ditto again on #3 recreationally; #4 differentiating a neighborhood/condominium and not with the neighborhood or condominium. Page 18-5 ditto on recreationally. Letter J ditto on trash enclosure. Page 18-6 is just a continuation of the trash enclosure.

Planning & Zoning Director Girling stated Article XIX ditto on recreationally. Next Page 19-3 ditto on trash enclosures.

Planning & Zoning Director Girling said Article XX ditto on trash enclosures.

Planning & Zoning Director Girling stated that Article XXI #3, they are Special Purpose 1 (SP-1) they have one Special Purpose 1 (SP-1) and one Special Purpose 2 (SP-2) in the Township. Special Purpose 1 (SP-1) is up on Clarkston Rd. west of Baldwin the farm building. They had it on the PC at one point and time to turn it into a wedding venue. With that special purpose, if they look at the uses, which are not given to them,

they have a big array. To have that narrow of parking or drive close proximity to an adjacent property, knowing that all of the other districts that they look at, kind of say well if it is adjacent to residential it should be 30 if it is not, it should be 20 why would they only have 20 here so she copied what other districts had. Chairman Reynolds and Trustee Urbanowski agreed with that.

Planning & Zoning Director Girling said landscaping 2, same thing why would they just say 10-ft. in landscaping when everything else is the 20 and 30 so she just copied other districts. She added that "I" ditto on trash enclosures.

Planning & Zoning Director Girling said SP-2, Article XXII ditto on recreationally the same thing on #2 why did they have it that narrow and made a common to other districts. "I" trash enclosure ditto.

Planning & Zoning Director Girling stated Article XXIII #3-D-2 ditto on recreationally. I ditto on trash enclosures.

Planning & Zoning Director Girling said Article XXIV Recreation 2 (REC-2) #3 recreational ditto, number 5 recreation ditto, and I ditto on Trash Enclosures.

Planning & Zoning Director Girling stated Schedule of Regulations Article XXVI when they recently did a text amendment for our (IC) district they changed the maximum height in (IC) to 120-ft. but never updated our Schedule of Regulations, so this is just getting that to coincide with that.

Planning & Zoning Director said Article XXVII General Provisions. This does get into where they start talking about fences. She was hesitant to just read everything, but she thought they really needed to discuss it. There will be a little bit of reading out loud on her part just so they can have that discussion. She then asked if they just wanted to read it and then just discuss it? Chairman Reynolds replied go with the latter, he had read through all of these. He wanted to talk high-level on a couple of them of where their points of concern are. In (A4) it kind of goes back to the double lot revisions. Planning & Zoning Director Girling said it was putting in what was discussed by the Fence Committee and what she is now struggling with. They used to say any detached structure and it gave the setbacks. A fence is a structure by the definition in the ordinance and they want to handle fences differently than detached accessory structures. So, they incorporated taking care of that double frontage so that is what all that language is.

Planning & Zoning Director stated on page 27-11 within their charts for detached accessory buildings it says the square footage they can have based on acre size. They had one that was up to ½ acre and the next one started with a ½ acre so what does someone do if they are exactly ½ acre, so they changed that, so they didn't have the exact same numbers.

Planning & Zoning Director Girling said on page 27-15 G3 per building code that is the size that residential addresses have to be, they can't have something different than building code, so she was correcting that. The Fire Protection Water Supply Standards,

this was the verbiage they came up with when they last talked about it which is basically talking about per adopted fire code. That way no matter what code they have adopted it covers it.

Planning & Zoning Director Girling said on page 27-16, they get a number of questions on setbacks for generators. They are in section C which is projections. If somebody has a side yard setback of 10-ft. projection section would say if you had a bay window you can project two feet into that setback, if you have a fireplace, it can project 2-ft. into that. One of the questions that they had gotten was mostly generators. There was another section that says that a generator or any mechanical equipment can't be adjacent to a habitable window or a window in a habitable space. It can't be adjacent to a bedroom or a living room. This goes on further to say if they meet that that if my house is at 10-ft. how can they have their generator at 10-ft. It is now saying that in all yard's mechanical equipment can project 5-ft. into whatever the required setback is. She added that they also discussed at the last meeting on window wells. Just because it is below grade it is still a question they get, and it is still considered a structure, so they are allowing those, after talking to the Building Official to go 3.5-ft. into the yard. The window wells can be in rear or side yards.

Planning & Zoning Director Girling stated page 27-36 this is where they get into the fences. They have two types of fences they have a lot line fence or a wall. She keeps saying fences because that was what the Fence Committee was created to work on, but walls are following the same criteria. Basically, if you have a 4-ft. fence you can be on the property line. However, it does get into if they are not going to put it right on the property line then they need to meet the setback. Because if you have a fence between you and your neighbor on the side and they put it on the lot line you are able to use the weedwhacker and maintain it. If you come in 2-ft., 2-ft. is not enough to go on the other side of the fence and maintain it. You have two choices you take that 4-ft. you put it right on the property line, or you meet whatever your district's setback is.

Planning & Zoning Director Girling said then they get into a privacy decorative fence or walls. Which is anything taller than 4-ft. no taller than 6-ft. They used to say that they had to meet the setbacks. So, they could have Suburban Farms (SF) that has a side setback, and they would have to have 20-ft. She suspects that the reason it said the setbacks were for maintenance. Well, you don't need 20-ft. just because you are an (SF) zoning 10-ft. is ample. They are saying that they need to have the 10-ft. on all sides including the rear. If they are backing up to a road, then that 10-ft. has to have some type of landscape. She left a question mark about what they would want. She put in what the Fence Committee discussed. As she typed it up and was explaining it to staff saying they are the ones that communicate to citizens does this make sense. If they visualize it they got a lot, and they have a fence at 10-ft., the Waldon situation, and your neighbor wants a fence at 10-ft. and then the next neighbor wants a fence at 10-ft. She heard the Planning Commission say, and she has heard many people say they don't want to be a Fort Knox. Although they changed the ordinance to say you don't have double frontage so you don't have to have 35-ft. they will let them be at 10-ft. what is the difference between Fort Knox on the property line and Fort Know coming in 10-ft. They are still creating Fort Knox by allowing it by right. The one thing that makes it more palatable is possibly saying in that situation they have to have the landscape in

that 10-ft. She wanted to point that out because when she first wrote it, it didn't dawn on her until she started talking to staff about it that they still end up with what they have heard they don't want in the Township which is fence after fence after fence completely surrounding that is 6-ft. in height.

Chairman Reynolds said he was in support of this 10-ft. off the property line with landscaping. The reason for it would be is it supports what they have kind of talked positively about in their Master Plan about landscape corridors and having buffers. He thought this was a good solution to maybe promote the landscape buffer over the fence and if they still want the fence, they are seeing the landscape buffer that they desire to see. Planning & Zoning Director Girling asked if he was talking when it backs on a road? Chairman Reynolds replied correct. He added that like a corridor they are talking about down a corridor they would love to see plantings and not understand that there is development right there. He thought that is what this accomplishes, and it is a decent compromise of some of the ins and outs of this topic that they have been struggling with for many years. It provides them with at least one solution that they commit to that might lead them in the right direction. He said that he had some actual text amendment stuff but a discussion of being in support of the verbiage as they see it here doesn't fit or any disagreement with it? Vice-Chairman Gross said it should just say it shall be landscape period. Planning & Zoning Director Girling said if they are backing up to a road and somebody puts a hedge that is not tall, do they not still look like Fort Knox with 6-ft. tall fences?

Chairman Reynolds said there are two amendments that he would propose (H-2). One of which was when the second line item of when they start talking about the fence/wall shall meet the same front yard setback as a principal structure, but he was changing "at no time can it be closer". He was saying but in no instance, he thought that was more of a technical or legal response. He said at the end of this where there is a question mark his purposed verbiage was on a double frontage or corner lot, the 10-ft. area between the fence and the property line abuts a road shall be landscaped with natural plantings 4-6-ft. in height to obscure direct visibility of the fence from the right-of-way, coniferous plantings are suggested but are not the sole plantings allowable. What he means by that would be that there are of some sort of height to block the majority of the fence and he was suggesting essentially pines, arborvitaes, or something of that nature but not saying that is the only thing they would allow. He would be open to changing that language, but they want to block the visibility is really what they are trying to say. Trustee Urbanowski thought that the height requirement was important because they could just put in holly bushes or something like that. Something a little higher to obstruct the fence itself. Commissioner Gingell asked if it needed to block the entire fence? Planning & Zoning Director Girling said for example one every 3 linear feet. Chairman Reynolds said that he was saying natural plantings 4-6-ft. in height to obscure the direct visibility of the fence. Planning & Zoning Director Girling asked who determines that? At the discretion of? Chairman Reynolds said he would be fine with putting a percentage or something like that. Commissioner Walker said he didn't think they could put a percentage he thought the language is ambiguous enough that it would work. Chairman Reynolds said he was trying to point it in a direction but was also saying it is not. Commissioner Walker said having heard at least 500 people demand a 6-ft. fence on the property line over the last 5 to 10 years, even though they have the

option of moving it in 10-ft. they don't'. Nobody wants to give up 10-ft. of their property for this fence. He didn't think that it wasn't necessary, but it is better because they won't do. Chairman Reynolds said his immediate desire would be to address it with landscaping. He thought that was what they were trying to encourage. To him, if they indeed what the fence they still got to put what their desire is first. Planning & Zoning Director Girling said they lose their 10-ft. and they put what our desire is. Commissioner Walker said it is a compromise and he can hear the Zoning Board of Appeals saying to the next generation of people that want this, look the Township took into consideration all of this stuff, and here is what the compromise that they decided to enforce. You can make a logical argument for that. Chairman Reynolds said he thought they all encourage natural buffers. If there was anything that needed to be added it would be that, but they are talking about the strict rules of a fence. He was trying to say here is our groundwork. That was the verbiage that he came up with. He didn't know if anybody else had any thoughts. He was ok with it being partial visibility, he was ok with seeing part of the fence it was more about setting a priority of what is more important in this matter. Commissioner Walker said it is not the starkness of a naked fence it is broken up by stuff with growing things.

Planning & Zoning Director Girling said if they are not backing to a road, and they set their rear fence back 10-ft. they have to be able to get back there so if they don't have a fence on a side, they would have to ability to get back there to maintain it. She just envisioned an older neighborhood with back-to-back houses that somebody puts up a 6-ft. fence with a 10-ft. on the other side, and she knew that it says they are responsible for the maintenance of it, that 10-ft. on the other side of that 6-ft. fence is going to be long forgotten. Chairman Reynolds said he thought they were, especially talking about double frontage and corner lots. He thought it pointed them in a better direction, maybe it doesn't solve all of their issues but at least they created some options and if they need to go back. Planning & Zoning Director Girling said the problem with coming back is it is a hot issue. It is a very hot issue so she thought that they opened up a can of worms. She really liked what they had come up with on the double frontage. She thought it left a question on by saying a fence that is 6-ft. tall can be 10-ft. from the rear lot line. They don't say that anything has to be in there because it is not backing to a road. Chairman Reynolds said the only other solution that he foresaw was a fence on the property line that was agreeable to both adjoining property owners that would be the only other thing that he sees adding this would fix that. Planning & Zoning Director Girling said then you get into recording the document because then when you have a change of ownership. Chairman Reynolds said to him this is verbiage that points them in the right direction and then hopefully it would cut down on the number of variances that they see. It might not eliminate all of the instances in which someone would say, that doesn't make sense here. That is how he was looking at it, here is a step in the right direction, it should cut back on a number of them. He asked if they see a lot of them in the discussion of if they pull it back what is going to happen behind it? Commissioner Walker said that occurs occasionally but that is not the driving force, the driving force reason they won't do it is that they don't want to give up the 10-ft. of property. He added that they have denied fences because of that very issue because they can't get back in there. Somehow this was going to create a one- or two-foot alleyway between two fences so they would say no they can't because who is going to decide whose property is that who is going to take care of that, you just can't let that go.

Chairman Reynolds said that in general, he was not making this an easy topic. They really don't want to see it in the first place. They want to see natural buffers they don't necessarily want to see fences. When there are they create an avenue for it. Without hearing every specific case in which they are not addressing that has been vocalized, he liked what they had here as a step in the right direction.

Secretary St. Henry said in general if they don't like a fence, they have to find some middle ground that they are comfortable with, they have to live with that, that is the bottom line. Planning & Zoning Director Girling said that the goal was to cut down the number of cases going to the ZBA. If they are not wanting to lose any, it is not going to, and if they are happy with only losing 10-ft. then it should cut back the number of cases. That was the biggest thing, it came from the ZBA saying they are getting so many cases and anytime you get that many cases it is supposed to come to the Planning Commission to look at a text amendment. Chairman Reynolds said he thought that they have looked at it and have said they are still going to allow fences but with compromise. Planning & Zoning Director Girling said OK they will give that a try and the attorney might say that there is an issue.

Planning & Zoning Director Girling said line #4 used to say that large acreage was excluded from all of these specifications, and they saw no reason to exclude large acreage, so they are deleting that.

Chairman Reynolds said in line #6, he thought instead of saying the good side, a technical side would be the finished face. Planning & Zoning Director Girling said thanks, got it.

Planning & Zoning Director Girling stated on line #7, this was a recommendation from the Building Official, that fences don't require any building permit. How do they know that they are only doing 4-ft., how do they know where they are going to put it. So, they were saying they would have to do a zoning compliance letter, they would come into Planning & Zoning with just a simple diagram, here is my property lines put xx's on it and they are putting the 4-ft. fence right here. Or they are putting a 6-ft. and they are reflecting that they are putting it in 10-ft. here 10-ft. here and then we sign off on it and then they sign that it is the proper reflection of what they are going to do, and it goes on record within our systems.

Planning & Zoning Director Girling said that Article XXIX, Chairman Reynolds was not here for this, but she had brought it up at the last meeting to make sure that everyone wasn't strongly opposed to it. It has been suggested that the ZBA variances are good for one year from the date they were given. With the state of things, that year goes really fast. Instead of having to get on a ZBA agenda and prepare for it a month ahead of time, it was suggested that staff or the Planning & Zoning Director be able to issue a one-year extension for the first year and then anything after that would have to return to the ZBA. Chairman Reynolds supported. Planning & Zoning Director Girling said it must be in another section that they would get into doing the same thing with site plans.

Planning & Zoning Director Girling stated in Article XXX, she changed a number of

places where, Planning & Zoning used to be within the Building Department, and then Planning & Zoning became its own department. Looking at areas saying that the Building Department determines if the site plan is an administrative review, it is not the Building Department it is Planning & Zoning Department. So, for a number of areas, she changed it to Planning & Zoning. She added page 30-5 #10 getting with the times why kill trees, why incur postage, applicants typically don't want a hard copy of their approved site plans so they will be ordinance provide them with an electronic set with the approval stamp. If they want to give us a paper copy and come in, they can do it but the only commitment they have is electronic. There is no need for it to be forwarded to the Building Department they get one but by ordinance, there is no need. So, basically saying one copy is retained in the Planning Commission files.

Chairman Reynolds asked if they could back up to 6B page 30-4. His question was is there a reason that they are not submitting to these departments electronically or outside agencies? That would be a recommendation he would make. Planning & Zoning Director Girling said it is actually within the application which ones are electronic and which ones take electronic and which ones don't. This saying two copies is a wrong reflection because if they are doing it electronically there is technically not two copies. The Road Commission and MDOT take it electronically, Water Resource takes it electronically, Health Department does, and utility departments don't. They could add in there please refer to the application for the proper delivery method. Chairman Reynolds said he would like that; he thought the applicant shall be responsible to submit a physical electronic copy to the following agencies as required. Some sort of verbiage. Planning & Zoning Director Girling said by having it in their application and referring them to their application it gives them the ability to modify their application whatever the trend is. Chairman Reynolds said he was in support of that. This is like one of those things where they are mailing in applications and then they are like why are you mailing it versus emailing it. Plus, they don't always get responses back.

Planning & Zoning Director Girling said that page 30-6 is talking about site plan completion, and this is again the suggestion, that they see on a regular basis, her sending them cases that have hit the one-year mark, and there has been no change in the text, and they just can't get all the way through where they need to get to and have the building permit within one year. She was suggesting that they have one year to complete it she is able to look to see if there has been a text amendment and if there have been any changes. She is able to give them the first extension, and then anything after that they would have to come to the Planning Commission. Chairman Reynolds said support.

Planning & Zoning Director Girling said the same page just changing Building Official to Planning & Zoning Director. Chairman Reynolds said support.

Planning & Zoning Director Girling stated page 30-7 is the same thing. Page 30-13 same thing; Page 30-14 same thing. Page 30-17 again says that they are going to get an electronic copy of the approval. Completion of site design is on Special Land Use, and she is able to give them the extension. Chairman Reynolds replied support.

Planning & Zoning Director Girling stated Article XXXIV #3 ditto on recreationally, and

ditto on trash enclosures.

Planning & Zoning Director Girling said Article XXXV ditto on trash enclosures.

Moved by Chairman Reynolds seconded by Trustee Urbanowski, that they proceed with these amendments as discussed and proposed in tonight's meeting at the discretion of their Planning & Zoning Director. **Motion carried.**

Discussion on the motion:

> Chairman Reynolds said that might mean it comes back right away or it ends up coming back in a couple of parts based on the fence discussion. He thought that could be at the discretion of Planning & Zoning Director Girling and her team. If they see fit or what is the best fit for them and their agenda.

9. PUBLIC COMMENTS
None.

10. COMMUNICATIONS
None.

11. PLANNERS REPORTS
None.

12. COMMITTEE REPORTS
None.

13. PUBLIC HEARINGS
None.

14. CHAIRMAN'S COMMENTS
None.

15. COMMISSIONERS' COMMENTS
Secretary St. Henry said he wanted to provide a quick summary of a very successful event that Oakland County Work Force Development completed a couple weeks ago. For the first time in three years, they held an in-person manufacturing day across the County. They had 765 students visit 32 manufacturing facilities around Oakland County including a couple here in Orion. Lake Orion High School participated by sending a class. This was the first time they have been back in person since 2019. The schools were very excited to send kids back in person and so were all of the employers that participated, and they got strong sponsorship support to help pay for some of the costs involved. It was a huge success. He tipped his hat to Ascent Aerospace on Indianwood they participated in, and they really appreciated it and he was looking forward to it again. A lot of people are asking in the community if they are going to be hosting his Career Quest which is a huge career exploration event for high school students around southeast Michigan. Just for the record, they will be bringing it back in November 2023 and the planning is already started.

Trustee Urbanowski asked if that was the one with the 4-quardrants? Secretary St. Henry replied yeah. He added that the event will feature a construction quadrant, an advanced

manufacturing quadrant, a healthcare quadrant, and an information technology quadrant. They expect between 6,000-8,000 students in one day at the Suburban Collection Showplace, three sessions. They typically have about 125-150 employers between the four sections from all over southeast Michigan. Over 1,000 employee volunteers work with the kids in a variety of hands-on activities to teach them about the different occupations and skillsets needed and educational backgrounds. If they have a chance, go to oaklandcountyworks.com and go to the Michigan Career Quest. They held two events in 2018 and 2019 and because the pandemic hasn't had one, they are bringing it back in 2023 it takes a year and a half to plan.

16. ADJOURNMENT

Moved by Chairman Reynolds, seconded by Trustee Urbanowski, to adjourn the meeting at 7:54 p.m. **Motion carried.**

Respectfully submitted,

Debra Walton
PC/ZBA Recording Secretary
Charter Township of Orion

_____
Planning Commission Approval Date

CHARTER TOWNSHIP OF ORION PLANNING COMMISSION MINUTES
PC-22-35, TOWNSHIP INITIATED TEXT AMENDMENT TO ZONING ORDINANCE #78, ARTICLE XXX, SECTION 30.09, PERFORMANCE GUARANTEES
PUBLIC HEARING – WEDNESDAY, OCTOBER 19, 2022

The Charter Township of Orion Planning Commission held a Public Hearing on Wednesday, October 19, 2022, at 7:05 p.m. at the Orion Township Municipal Complex Board Room 2323 Joslyn Road, Lake Orion, MI 48360.

PLANNING COMMISSION MEMBERS PRESENT:

Scott Reynolds, Chairman
Don Gross, Vice Chairman
Kim Urbanowski, BOT Rep to PC
Don Walker, PC Rep to ZBA
Joe St. Henry, Secretary
Jessica Gingell, Commissioner

PLANNING COMMISSION MEMBERS ABSENT:

Derek Brackon, Commissioner

CONSULTANTS PRESENT:

Tammy Girling, Township Planning & Zoning Director

OTHERS PRESENT:

None.

PC-22-35, Township Initiated Text Amendment to Zoning Ord. #78, Article XXX, Section 30.09, Performance Guarantees.

Planning & Zoning Director Girling said they had before them a text amendment to the section of the ordinance that goes over Performance Guarantees, which is a guarantee they take in when a project comes in, to guarantee the completion of the project.

Planning & Zoning Director Girling said prior to this text amendment they accepted cash or an irrevocable letter of credit. They have heard, over the years, from a number of developers that many other communities accept a bond. So, they created a sub-committee at the joint annual meeting over a year ago and that sub-committee came up with the text in front of them, pretty much written by the attorney. It has been reviewed by the attorney. There are a couple of little tweaks here and there but the main change to it is that they would now accept a bond. The major difference between accepting a bond and an irrevocable letter of credit is during the construction of the project when major things are completed, they are able to get a reduction in their letter of credit or refund on the amount of cash they are holding. If they use a bond there is no reduction, that bond is kept in hand for the entire length of the project until everything is completed.

Chairman Reynolds stated that a handful of them including himself was on that committee. It was comprised of a number of citizens and fellow board members, and this was based on research they compiled from the region and developed a similar language to that. So, there is no kind of out of the norm for what other municipalities offer developers.

Chairman Reynolds asked if there were any public comments. There were none.

Chairman Reynolds asked if there were any citizen's letters received regarding this project. There were none. He asked the Planning Commissioners if they had any comments during the public hearing process for this case. There was none.

Chairman Reynolds closed the public hearing at 7:07 p.m.

Respectfully submitted,

Debra Walton
PC/ZBA Clerk
Charter Township of Orion

_____
Planning Commission Approval Date

Charter Township of Orion

2323 Joslyn Rd., Lake Orion MI 48360
www.oriontownship.org

Planning & Zoning Department
Phone: (248) 391-0304, ext. 5000

TO: The Charter Township of Orion Planning Commission

FROM: Tammy Girling, Planning & Zoning Director

DATE: November 9, 2022

RE: PC-2019-06, Silverbell Pointe PUD Site Plan Extension

This PUD received the Board of Trustees' approval late in 2020 with the conditions listed by the Planning Commission in their recommendation of approval. On November 17, 2021, the Planning Commission approved the site plan extension for one year.

At the October 5, 2022, Planning Commission meeting, the applicant proposed a revised PUD site plan amending the ingress and egress. The Planning Commission denied that amendment. However, they conditionally approved the concept of a bypass lane. Although the Planning Commission just discussed this case on October 5, 2022, there still exists an issue of the expiration of the original PUD plan. The last extension was for one year and an additional extension is necessary to prevent the expiration of the original PUD plan approval.

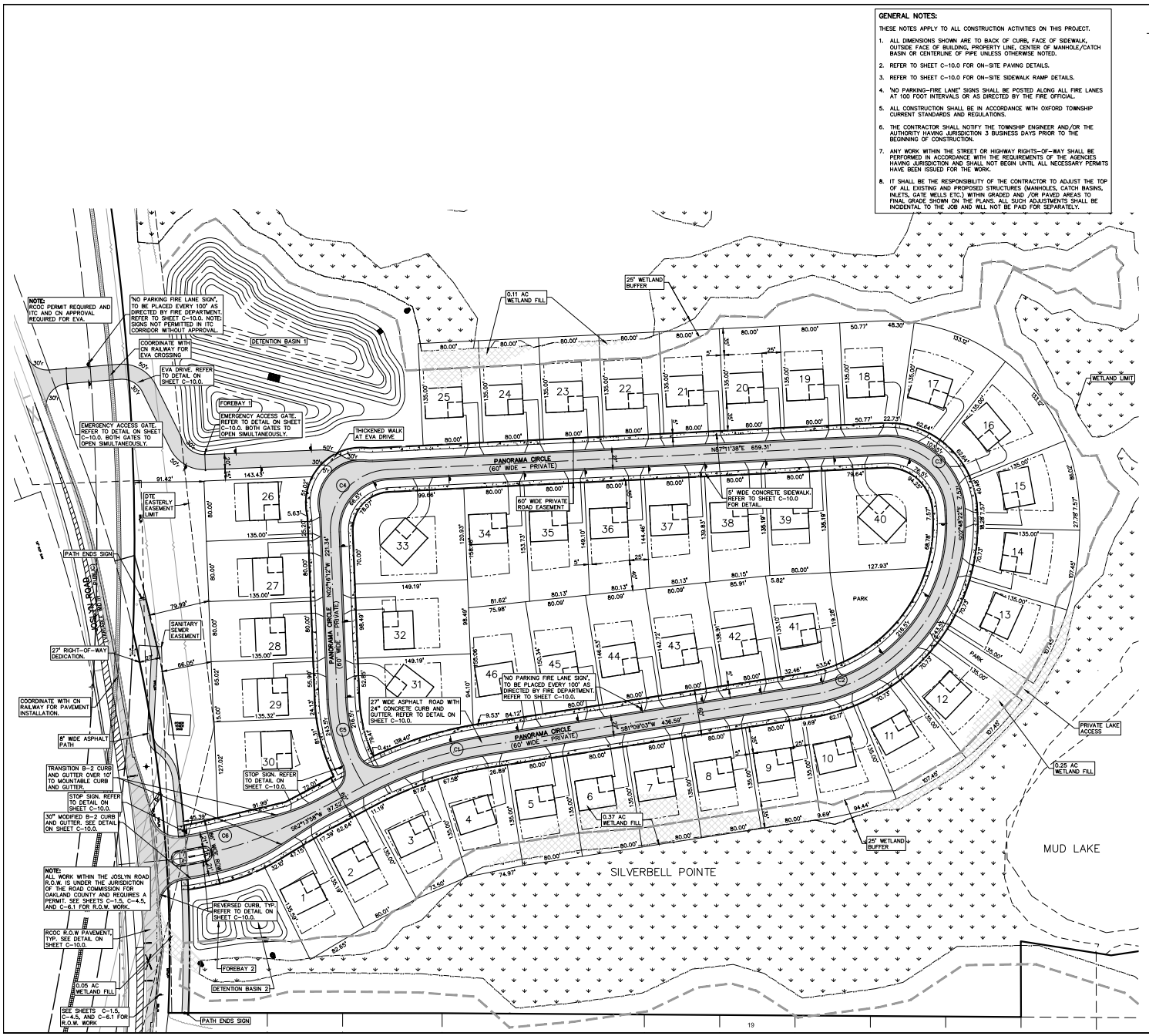
Attached please find minutes from the October 5, 2022, PC meeting and a page from the currently conditionally approved plan from 2020.

As requested, I am providing a suggested motion for the matter mentioned above. Please feel free to modify the language. The verbiage below could change based on the Planning Commission's findings of facts:

Site Plan Extension (Ord. 78, Article XXX, Section 30.01, C,11)
Motion 1: I move that the Planning Commission **approves** the site plan extension request for PC-2019-06, Silverbell Pointe PUD Site Plan for _____(insert time frame). This **approval** is based on the following findings of facts: (insert findings of facts).

Or

I move that the Planning Commission **denies** the site plan extension request for PC-2019-06, Silverbell Pointe PUD Site Plan. This **denial** is based on the following findings of facts: (insert findings of facts).



Parcel Area Table		Parcel Area Table	
PARCEL NO.	AREA (S.F.)	PARCEL NO.	AREA (S.F.)
1	10,908	24	10,800
2	10,840	25	10,800
3	11,732	26	10,848
4	11,518	27	10,800
5	10,800	28	10,800
6	10,800	29	10,803
7	10,800	30	15,831
8	10,800	31	16,198
9	10,800	32	14,695
10	11,880	33	17,413
11	12,027	34	12,601
12	12,027	35	12,113
13	12,027	36	11,742
14	12,027	37	11,372
15	12,670	38	11,001
16	13,214	39	10,815
17	13,214	40	17,832
18	11,648	41	11,050
19	10,800	42	10,960
20	10,800	43	11,265
21	10,800	44	11,570
22	10,800	45	11,875
23	10,800	46	12,913

Curve Table					
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	165.09	500.00	18°55'05"	S71° 41' 31"W	164.34
C2	337.03	230.00	83°57'25"	S39° 10' 20"W	307.67
C3	141.37	90.00	90°00'00"	S47° 48' 22"E	127.28
C4	124.91	80.00	89°27'49"	N42° 27' 43"E	112.61
C5	122.12	230.00	30°25'18"	N17° 28' 51"W	120.69
C6	160.89	500.00	18°26'10"	S71° 27' 03"W	160.19

XREF: S:\PROJECTS\2018\2018150\DWG\18150-TOPOBASE.DWG
XREF: S:\PROJECTS\2018\2018150\DWG\FINAL PUD\V-BASE-18150.DWG
XREF: S:\PROJECTS\2018\2018150\DWG\FINAL PUD\V-TRLC-18150.DWG

REVISIONS			
No.	BY	DESCRIPTION	DATE
1.	TMK	REVISIONS PER NOVEMBER 13, 2020 TWP REVIEW	12-03-20
2.	TMK	REVISIONS PER JANUARY 8, 2021 TWP REVIEW	01-13-21
3.	TMK	JBT	REVISIONS PER NOVEMBER 13, 2020 TWP REVIEW	10-30-20
4.	TMK	JBT	REVISIONS PER MAY 6, 2020 PC MEETING	05-13-20

CAUTION!!
THE LOCATIONS AND ELEVATIONS OF EXISTING UTILITIES SHOWN ON THIS PLAN ARE APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT UTILITY LOCATIONS AND ELEVATIONS PRIOR TO THE START OF CONSTRUCTION.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR JOB SITE AND CONPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; CONSTRUCTION CONTRACTOR AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

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30180 ORCHARD LAKE ROAD, SUITE 150
FARMINGTON HILLS, MICHIGAN 48334

DIMENSION AND PAVING PLAN
SILVERBELL POINTE
PART OF THE SE1/4, OF SECTION 28, & NE 1/4, SECTION 33, T04N, R10E
ORION TOWNSHIP, OAKLAND COUNTY, MICHIGAN

DES. TMK | DN. TMK | SUR. KTR | P.M. JBT
S:\PROJECTS\2018\2018150\DWG\FINAL PUD\C-2.1 DIM-18150.dwg

ORIGINAL ISSUE DATE: MARCH 17, 2020
PEA JOB NO. 2018-150
SCALE: 1" = 60'
DRAWING NUMBER: C-2.1

CHARTER TOWNSHIP OF ORION PLANNING COMMISSION
****** MINUTES ******
REGULAR MEETING, WEDNESDAY, OCTOBER 5, 2022

The Charter Township of Orion Planning Commission held a regular meeting on Wednesday, October 5, 2022, at 7:00 p.m. at the Orion Township Municipality Complex Board Room, 2323 Joslyn Road, Lake Orion, Michigan 48360.

PLANNING COMMISSION MEMBERS PRESENT:

Don Walker, PC Rep to ZBA
Don Gross, Vice Chairman
Kim Urbanowski, BOT Rep to PC
Derek Brackon, Commissioner
Joe St. Henry, Secretary
Jessica Gingell, Commissioner

PLANNING COMMISSION MEMBERS ABSENT:

Scott Reynolds, Chairman

1. OPEN MEETING

Acting Chairman Gross opened the meeting at 7:00 p.m.

2. ROLL CALL

As noted above.

CONSULTANTS PRESENT:

Mark Landis (Township Engineer) of Orchard, Hiltz, and McCliment, Inc.
Tammy Girling, Township Planning & Zoning Director

OTHERS PRESENT:

None.

3. MINUTES

A. 9-7-22, Planning Commission Regular Meeting Minutes

Moved by Commissioner Gingell, seconded by Commissioner Walker to **approve the** minutes as presented. **Motion carried**

4. AGENDA REVIEW AND APPROVAL

Moved by Trustee Urbanowski, seconded by Commissioner Gingell, to **approve** the agenda as presented. **Motion carried**

5. BRIEF PUBLIC COMMENT – NON-AGENDA ITEMS ONLY

None.

6. CONSENT AGENDA

None.

7. NEW BUSINESS

A. PC-2019-06, Silverbell Pointe, amendment to the final PUD plan, located on 4 vacant parcels south of Silverbell Rd. on the east side of Joslyn Rd. (Sidwell #'s 09-33-201-001, 09-33-128-001, 09-28-379-001, & 09-28-451-001).

Acting Chairman Gross said since this is new business it is a reflection of an amendment to a previously approved PUD which goes back a couple of years. The Planning Commission reviewed it, and the Township Board approved the PUD in 2021. This is a proposed amendment to that plan. He asked if the applicant would like to make a presentation.

Mr. John Thompson with the PEA group presented.

Mr. Thompson stated that he was representing Franklin Ridge Homes. Unfortunately, Mr. Steuer could not attend. They came in 2019 and went through several versions of their plan, eventually having preliminary PUD approval and then the final PUD approval. They have since been working on engineering drawings. That little causeway between Mud Lake and Judah Lake on Joslyn has about every single agency you can think of within that intersection or that causeway area. They have had to work with EGLE, MDOT Rail, CN Rail, ITC, RCOC, and every other acronym that they could think of to get their approvals.

Mr. Thompson said as they ventured through those approvals, they found they had some difficulties. Some of the items that the RCOC wanted, Township Engineer didn't want, and MDOT didn't like the way that was going. They have just been back and forth with probably six different versions of the approach.

Mr. Thompson stated that the plan they have today is essentially the same plan that was previously approved. He showed the Board the originally overall site plan. There are 46 lots on 28 acres, 42 acres of preserved wetland and lake area, and a 4-acre donation to the Township for a future park. As far as the site itself goes, when they had it approved, they had a boulevard entrance, they had a left-hand center turn lane that was going to feed that new approach, and they had an emergency vehicle access that was adjacent to the pond. That was for providing the second point of access to the subdivision. They were unable to get EVA access. The CN Rail said that if they wanted to put in a new crossing, they had to remove two other ones. They worked with the Supervisor, County, and State to see if there was anything else that they could close a road, and everyone said no, you are not closing an intersection that has a railroad track across it. They eventually had to stop that and pursue other avenues. Their biggest issue is because the railroad track is so close to the entrance, how do they get that geometry to work?

Mr. Thompson said they came back in with an alternative plan that they resubmitted recently. From the subdivision perspective, it is the exact same plan. The EVA is gone, and the approach has a pork chop on it which means on the boulevard entrance it flares out to prevent left-hand turns. That was a condition of RCOC, they said if they can't get enough stacking at the railroad tracks, because the lefthand center lane turn was $750,000 worth of improvements through CN Rail because of all the equipment that they had to move, and the project just couldn't take that type of cost. So, they went back RCOC to and got their approval they started getting the MDOT approvals, and they resubmitted back to the Township and the Township said that they don't want to have a restricted turn, they wanted them to have full access turn.

Mr. Thompson showed the Board what they did. Their original plan they could see the stripe out for the left-hand center turn lane, that is what they were originally proposing. What they see tonight in the current plans is what they call a pork chop or a half pork chop and showed them how the boulevard instead of having just a round corner now has a small little bump out, it is slight but the purpose of that is to help restrict, help visually impede people who would be wanting to turn left despite the fact that it would be signed as no left. That was the proposal that they see tonight.

Mr. Thompson stated that based on the reviews from the Township consultants and Planning Supervisor, and a recommendation that they want unrestricted access they changed gears again and are looking at the option of a bypass lane. Their original left-hand center lane was all on the east side of the existing road, happens to be that the road itself is literally on the west side of the right-of-way, so building on that west side was never an option. Based on conversations they have had with the RCOC and the Township Engineer they think there is potential as the piece of property that is there that they would have to cross is ITC's property. What they would like to do is pursue a highway easement from ITC, CN has already indicated

that they could expand into their property. This would allow them an option that he thought would be cost-effective or at least absorb the cost to do this improvement, and it would give them full unrestricted access.

Mr. Thompson said what he is asking tonight if they are willing to vote, is that they would get conditional approval on the amended final PUD with the understanding that they still need to get the bypass approved, RCOC permit, MDOT permit, and everybody else's permitted approval and of course, the Township Engineers approval, if they would be willing to vote on having that as a condition of an administrative approval, for review.

Acting Chairman Gross asked if there were any questions from the Planning Commissioners. There was none.

Engineer Landis noted that the letter that was in front of them was of course the review of the originally submitted plan which had restricted access. They are not in favor of that because it introduces difficulties for enforcement. They have spoken with the Fire Marshal it increases their response time, also creates safety concerns, and having residents that are traveling south or deliveries having to go past their entrance and then circle back and come back is very inconvenient. They were not in favor as the applicant had indicated for that restricted access.

Engineer Landis said that the emergency vehicle access that was at the north end of the site has been removed and the applicant has added a note to the plans that they will suppress all of the units. That was his understanding that the original requirement for that EVA was of the Fire Marshal since the plan now includes the suppression that that EVA is no longer needed.

Engineer Landis stated that in regard to the plan that was just presented, they haven't seen it yet, but they would find that acceptable in concept. It would not be a dedicated center left turn lane which obviously would be better and safer instead they are going to have southbound traffic basically stopped to turn left but they would have that bypass lane on the right-hand side to get around that person that is turning left. He noted that it is not a huge subdivision so the amount of left-hand turns is probably on the low side. In their opinion, he thought it would be acceptable. Obviously, it would be subject to RCOC approval, and then their review as well.

Trustee Urbanowski said they would still need to submit these new plans with the bypass, and it would have to go through engineering, fire, MDOT, and RCOC. She asked if it still needed to get CN approval as well. Engineer Landis replied that he believed that there would be some work done in their right-of-way, so that was his understanding, yes. Trustee Urbanowski said and also ITC, so they have a lot of people that need to say yes.

Trustee Urbanowski asked Engineer Landis if he thought it was acceptable to do a bypass. Engineer Landis replied in leu of the center left turn lane, yes. He said it is a very challenging location, there is a lot of grade change, so there is going to be a need for culvert extensions, guardrails, etc.

Trustee Urbanowski asked how many units are in this again. Mr. Thompson replied 46. Trustee Urbanowski asked how far south from the elementary school is this. Acting Chairman Gross replied, a quarter to a half mile.

Acting Chairman Gross asked if the Fire Department reviewed this plan that was presented tonight yet. Engineer Landis replied not to his knowledge. Engineer Landis asked for clarification on which plan. Acting Chairman Gross said the one that was presented here tonight. Engineer Landis said the new plan with the bypass lane. Trustee Urbanowski replied, no. Acting Chairman Gross said although it appears that it satisfies their concerns. Engineer

Landis stated that his understanding was yes it would be because they have taken care of the suppression of the units. In regard to the Fire Marshall's denial of the original plan that was presented that was because the left-hand turns were prohibited into the site. This would give them full access, so he would not foresee any reason why he would object.

Trustee Urbanowski said that 46 units are not that much, if they are comfortable with it in terms of engineering, the units will be suppressed. They knew it was a challenging site but as long as they get all of these approvals, which will be a lot.

Secretary St. Henry asked if the rail line is used currently. Mr. Thompson said it is currently paved over at Silverbell. He thought the last time that this rail was used was for a traveling carnival that came to town that was 20-something years ago. Planning & Zoning Director Girling said that there was definitely discussion with the expansion of GM of this running again. Secretary St. Henry said he read that from multiple sources, so that is still a possibility. Planning & Zoning Director Girling said it was still a possibility that is what she would label it.

Secretary St. Henry asked why the left-hand turn lane was rejected. Everybody agreed that that would work it was just a money issue. Mr. Thompson replied that from the Township to the County to the State the geometry work for a left-hand turn. It was the fact that ITC has a ton of equipment that is all on that side of the road and it was literally ¾ of a million dollars just for ITC to do the improved track that they have to do for special tracks when they cross roadways. Plus, their huge equipment cabinets and their other signalization, so by the time they got done with their other improvements that had to go in that intersection it was close to one million dollars. ITC is now saying with the bypass it would be around $55,000, 10% of the cost to just shift to the other side of the road.

Acting Chairman Gross stated that it appears that this is a solution to a difficult site and still accomplishes what they as a Commission wants. They expressed from the very beginning that there be continued access to the site for all movements, left turns in left turn out, right turns in, and right turns out, this accomplishes that. Then with the note of the units being fire suppressed, he made the assumption that that satisfies the Fire Departments' concern as well. He added that they have a number of options before them, they can postpone any action on this plan until they receive final acceptance of all parties, or they can recommend to the Township Board that the plan be amended as suggested this evening with various conditions such as final review by the Engineer, Fire Department, and the obtaining of the necessary permits from the various agencies. Planning & Zoning Director Girling wanted to clarify that this does not go to the Board of Trustees. She added that this is considered minor, so it does not, they are the deciding Board. Acting Chairman Gross asked even though they approved the original plan, the amendments can be done by the Planning Commission. Planning & Zoning Director Girling replied, correct.

Secretary St. Henry asked what the rationale of getting their conditional approval before they get any of the other reviews. Mr. Thompsons replied, primarily time and money. They have to go out and do a topo survey, they have to redo the design, they have to get a wetland delineation, so they have a ton of more work to do in order to get in front of the agencies and to make sure that this works. The idea is if they had their approval to move forward then the owner feels comfortable with granting the time and money that it costs to do it.

Trustee Urbanowski asked if the plans that are date stamped received on September 14th are with the pork chop. So, do they still have to submit a whole new drawing for this? Planning & Zoning Director Girling replied that the one that is here tonight, the favorable one, is the first that anyone has seen it. It has not been submitted to anyone at the Township with the bypass lane. Trustee Urbanowski stated that they couldn't approve the plans that are in front of them.

Planning & Zoning Director Girling said a motion would be to deny the plans date stamped September 14th however conditionally approve the one presented tonight with the bypass with the condition that it is resubmitted and rereviewed to the satisfaction of the Township Engineer, Township Fire Department, and all other approving entities. She added that if one of those doesn't, then it is not approved, and they have to come back with something else.

Secretary St. Henry asked Township Engineer Landis if he felt based on his experience and review of what is being discussed tonight that these other agencies will approve this. Do you see any in there that could be a red flag to any of those agencies? Engineer Landis replied that that is a difficult question to answer. He said to be honest he doesn't know. All he did know is that they saw correspondence with the applicant and RCOC saying that without full access they were going to prohibit left turns into the site. He added that creating this bypass lane that would seem to satisfy that requirement. They haven't had any discussions with RCOC relative to that, he didn't know if the applicant had. He assumed that if they hadn't heard anything negative otherwise, he didn't feel they would be before them tonight asking for such approval. Mr. Thompson said the previous plan they were at 90% approvals, they already had an RCOC permit, they were on their second review for final engineering with the Township, they formally had their DSTR meeting with MDOT Rail to go through the last steps with that, and then CN was in the process of starting their design plan for final approval. He didn't see any red flags to get another approval or to get all the agencies for their approval. Various agencies have different requirements and different things they want to see so, it is a matter of negotiating back and forth to come up with a happy medium between them. They floated the bypass in front of the Township, RCOC, and CN and everybody was in agreement with that.

Secretary St. Henry asked if he had any concerns that GM fires up the rail system again, and how will that impact this development. Mr. Thompson replied he didn't think so, they know that they have a fire route from Kinmount that should a rail get stopped in the middle of Joslyn through this intersection they have fire access that they have identified through Kinmount if north is blocked, they have access from the south. They have conducted a traffic study, the traffic study said that the a.m. p.m. peak hours maximum on the stacking would be four cars. They have 100-ft. to the rail so they have room to stack four cars in the left-hand turn, so he didn't see any downfalls in the bypass option should that rail become active again.

Planning & Zoning Director Girling said she was not giving them a motion just a sample motion. She asked them to keep in mind that the plans that they received in the packet dated September 14th also eliminated the emergency vehicle access and added the note suppression. If was a conditional approval and they were going to be resubmitting with this bypass lane that plan should also have the elimination of the road and the note on the suppression. In addition, based on something the applicant said about needing to look at the wetlands when he looks at perhaps it is going to impact something, and he might have to come back for a wetland permit. It should be noted that if something is found in looking at how they are configuring this that impacts the wetland that they might have to come back for that as a separate application.

Moved by Trustee Urbanowski, seconded by Commissioner Walker, that the Planning Commission denies the amendment to the previously presented and conditionally approved final PUD plan for PC-2019-06, Silverbell Pointe located on 4 vacant parcels south of Silverbell Rd. on the east side of Joslyn (Sidwell's 09-33-201-001, 09-33-128-001, 09-28-379-001, & 09-28-451-001) for the plans date stamped received September 14, 2022, because that was not approved. We would conditional approve the concept of the bypass that was presented tonight conditioned upon: to submit and rereview to OHM and the Fire Department and then also approvals from RCOC, MDOT, CN, and ITC; as well as the changes that occurred in terms of the emergency vehicle assess removal, that road removal needs to be on the new plans as well, and then indicate that the units will be suppressed in leu of that emergency vehicle access road;

also conditional approval based upon the wetland survey that will be done, and if they need to come back for a wetland permit then they would have to come back for that.

Roll call vote was as follows: Gross, yes; St. Henry, yes; Urbanowski, yes; Walker, yes; Gingell, yes; Brackon, yes. **Motion carried 6-0 (Reynolds absent)**

B. Discussion on possible text amendments

Planning & Zoning Director Girling stated that when she has free time, she tries to work on text amendments. She put her mind to what is on her list, for instance, running two concepts past them. It has been proposed in the ordinance it does say that a ZBA variance is good for one year to pull a building permit. That is not State regulation that is their ordinance. It has been suggested that perhaps the ordinance be modified to say that the first year it can be extended by staff versus having to apply to the ZBA and go back. So, they would basically get after two years they would have to back to the ZBA. She added similarly to the site plans that they see. They see many of them, she knows if they had a change in the text that would affect the site plan. So, would they be open to the concept of not only the ZBA variance being extended for the first year by staff but a site plan approval one year by staff then after that it would have to come to PC or ZBA?

Trustee Urbanowski said they have seen a lot of extensions because of a lot of issues in the last two years and she didn't think that they denied any of them and they have all been understandable. She was ok with the idea of that.

Planning & Zoning Director Girling asked if anyone was strongly opposed. Obviously, they have to have a public hearing, and it goes to the Township Board, but is there anybody that is opposed to that concept? There was not.

Planning & Zoning Director Girling stated that she did a quote from the planner to work on their PUD section and tree preservation. Obviously, he can't work on two at the same time, is there one that they would like to have him tackle sooner than the other, both need a lot of work.

Trustee Urbanowski said just last week Trustee Dalrymple and Sam Timko and herself went to St. Louis for the American in Bloom Symposium and they were connected with a lot of really good experts in terms of trees, ordinances, and language, and things like that that would benefit them, she thought and could pull from some of their expertise because now there are experts and that is what they are supposed to use them for. That being said she thought that there were some other things that they want to talk about in terms of trees. She thought that could come later in her opinion, and she thought the PUD would take precedence because they are seeing a lot of that lately.

Secretary St. Henry said one of the two projects they want to work on is updating the PUD section. Planning & Zoning Director Girling said that the PUD section does read poorly. If they read it from start to finish, she herself says, how do I educate somebody on what this says besides what she has interpreted it to be, it does not read well. It looks like it has been put together in different steps and maybe parts were missed when they fixed another part, and it is pretty rough. Considering the number of PUDs, they get it is definitely something that they need to work on the language, in addition to the fact that they have within the Master Plan to discuss PUDs, looking at that and how they look at them. PUDs are allowed via the Zoning Enabling Act so it is something that is there it is just the language that they have drafted that is a little bit choppy.

Charter Township of Orion

2323 Joslyn Rd., Lake Orion MI 48360
www.oriontownship.org

Planning & Zoning Department
Phone: (248) 391-0304, ext. 5000

TO: The Charter Township of Orion Planning Commission

FROM: Tammy Girling, Planning & Zoning Director

DATE: November 9, 2022

RE: PC-2022-16 Lava Mountain SLU and Site Plan Postponement Extension

The Planning Commission postponed PC-2022-16, Lava Mountain Coffee Special Land Use for a Drive-Thru and Site Plan on May 4, 2022. The applicant is now requesting an additional 6-month extension to figure out the drive-thru configuration. Attached are the minutes from the May 4, 2022, Planning Commission meeting and one page of the pending plan.

As requested, I am providing a suggested motion for the matter mentioned above. Please feel free to modify the language. The verbiage below could change based on the Planning Commission's findings of facts:

I move that the Planning Commission **approves** the postponement extension request for PC-2022-16, Lava Mountain Special Land Use and Site Plan for (insert time frame). This **approval** is based on the following findings of facts: (insert findings of facts).

Or

I move that the Planning Commission **denies** the postponement extension request for PC-2022-16, Lava Mountain Special Land Use and Site Plan. This **denial** is based on the following findings of facts: (insert findings of facts).

Site Plan for one year, until April 26, 2023. This approval is based on the following findings of fact: that they are in need of extra time due to Covid and cost constraints.

Discussion on the motion:

> Chairman Reynolds asked if the motion maker could add the condition of submitting the revised site plan drawings to the motion. He didn't know if they wanted to put a timeline on that or if they are comfortable with the larger window? Even 6-months, something that makes a motion on it, it seems that there were site plans drawings that the previous approval was approved conditional upon addressing some items. That was what he was looking for, he didn't want to leave the site plan condition out there, he would like to button that up.

Trustee Urbanowski amended her motion, and Commissioner Gingell re-supported to add that within 6-months they need to submit the conditions of the previous approval with a one-year extension.

Roll call vote was as follows: Gross, yes; St. Henry, yes; Urbanowski, yes; Walker, yes; Gingell, yes; Brackon, yes; Reynolds, yes. **Motion carried 7-0**

B. PC-2022-16, Lava Mountain Coffee Site Plan & Special Land use for a Drive-Thru, 100 Casemer Road, 1472 S. Lapeer Rd., 1480 S. Lapeer Rd., 1488 S. Lapeer Rd. parcel 09-14-100-074, and 1476 S. Lapeer Rd., 09-14-100-073.

Chairman Reynolds asked the applicant if they would like to add anything to their presentation? If not, they will hand it over to their consultants for their reviews.

Mr. Mitchell Harvey Stonefield Engineering 607 Shelby St. Detroit, MI.

Mr. Harvey said what they are looking to do here is to reconfigure the parking area to add the drive-thru lane. He showed the Planning Commission how the drive-thru lane was configured. The majority of traffic would come off of Lapeer Rd. and circle around the coney island and then enter the drive-thru lane and turn and pick up their coffee. Beyond that there will be some minor pavement changes, adding a curbed island, stripping the area out to kind of further define traffic, and doing some minor ADA improvements to the sidewalk to make sure everything is up to code.

Mr. Harvey wanted to briefly respond to the review letter prepared by Giffels Webster and OHM. He stated that in the Giffels Webster review letter comments 1-3 they are agreeable to they will seal the plans, provide a tree survey, and will be providing the maximum speaker decibel volume on the plans. No changes are being made to the site lighting so they would like to keep it the way it is but if a photometric plan is required, they can provide that. Parking waiver, they are proposing 53 parking spaces where 59 are required. This was largely a result of some of the changes that they made to reconfigure the parking lot and make it compliant. The one thing that they wanted to talk about the site as an overall view is the northern tenant is the Orion Coney Island and then in the southern building they have three tenants, they have the Lava Mountain Office Company, they have Golden Paws, it is a pet groomer, and then the southern tenant is a Chicago Brothers Pizza. Really what they are anticipating is these users peak at a different time for parking demand. Generally, the coffee shop will be most busy in the morning times, people are on their way to work so around that 8:30-10 a.m. timeframe, where the coney island and the pizza place are going to be busier at their lunch and dinner times. The dog groomer in the middle is a very low traffic generator and parking demand generator but is pretty

steady throughout the day. They feel that the six spaces that they are short will not hinder the site from a functionality standpoint.

Mr. Harvey said in comment number seven the maximum height of the building will be included. Just a point of clarification under comment number seven both parcels are under the same ownership so they will be able to set the easement for the cross-access for the southern property to circulate through the northern property and vice versa.

Mr. Harvey stated that the truck turning exhibit was one that came up on both the Giffels Webster and the OHM review letter. He wanted to point out a few things, he showed them a truck circulation exhibit for an F150 Super Cab, so the largest F150 that they make. There is a slight overhang for the truck to make that turn. They would like to keep it the way it is because it would eat into their parking if they had to reconfigure this and push the stripping further south. He showed them a Ford Escape and thought it was a representation of the typical car that they will see there. There will be some people that have the larger pick-up trucks, but they wouldn't consider that the norm, that was their justification there.

Mr. Harvey said the last comment is regarding adding a landscape island to prevent vehicles from coming straight into the drive-thru lane as well as prevent vehicle headlights shining out onto Lapeer Rd., as well as screen the drive-thru from Lapeer Rd. He added that speaking with the operator of the site they really want to keep that area open and not put a curbed island there for vehicle circulation and they feel that stripping will be sufficient to kind of direct traffic. They would be agreeable to putting some sort of hedgerow or some type of vegetative screening in that area and felt it would accomplish the same intent of screening those headlights as well as screening the drive-thru lane itself.

Mr. Harvey stated that was the Gifflels Webster letter, he will spare going through the OHM letter in detail but comment number one refers to the truck turning exhibit so that was kind of the same answer. All the other comments they are agreeable to and will include them on the plan and felt they were straightforward and thought they could work together to get those accomplished. They humbly request a conditional approval as well as special land use approval on the condition that they work through the comments with not only Township staff but OHM and Gifflels Webster. They would like to exclude the inclusion of the landscaped island.

Planner Arroyo read through his review date stamped April 28, 2022.

Engineer Landis read through his review date stamped April 27, 2022.

Chairman Reynolds stated that going through the other reviews, the Fire Marshal did review the plan and had no additional comments. The Public Services did a review same thing with WRC, there was a site walk that was completed by the Site Walk Committee.

Vice-Chairman Gross asked what were the hours of operation for Lava Mountain? Mr. Harvey replied that Monday – Saturday they are 7 a.m. to 6 p.m. and Sunday they are 7 a.m. to 4 p.m.

Chairman Reynolds asked if they foresee maintaining those hours of operation? Mr. Harvey replied no change.

Vice-Chairman Gross thought there must have been some idea as to how many cars are going to be required at any one time for the drive-thru, and the stacking needs. He asked if they had any ideas of what that is based upon the current volume? Mr. Harvey stated it was kind of difficult to speculate because this isn't a Starbucks or a Duncan Donuts, this is their location, and they have clients that are very loyal to them. When they designed this, they wanted to have

plenty of room for overflow stacking but thought that the number they were throwing around that they would see would be 4-6 car stacking. Do they have any data that says that is going to be the number, no, but it is not going to be 15-16 like they see with a Starbucks.

Vice-Chairman Gross asked if this would be considered fast-food coffee versus the Starbucks specialty coffee? Mr. Harvey replied that they do have some specialty items but didn't know their menu in-depth but thought they could get a latte there he didn't think they had as big of a menu as Starbucks. Vice-Chairman Gross said his concern was the wait time of somebody getting coffee is it going to be a minute or ten minutes? Mr. Harvey replied that he thought they shoot for two minutes of turnover time for each customer.

Vice-Chairman Gross said he was not crazy about the existing stacking arrangement; in fact, he would prefer it just go back to drive-in and pull up and get your coffee and go. This would require extensive signing to identify where the stacking would take place because someone entering the site, as the Planner indicated, is going to go for the shortest distance. To try to direct that person around circumventing the entire site he thought it was going to be a challenge to the customer as opposed to just driving up and placing your order.

Vice-Chairman Gross asked if there was a drop-off window and a pick-up window? Mr. Harvey replied no there is a menu board with a voice-box where they order, and then a pick-up window. Vice-Chairman Gross said and then it goes to a different window. Mr. Harvey said there are not two windows there is just an order point and then the pick-up window.

Mr. Harvey said to answer the question on the traffic circulation, they did identify that early on as something people would likely do so they included some on-site wayfinding via small signs that they post, along with some pavement markings, and directional flow arrows to move customers in the right direction.

Vice-Chairman Gross asked regarding exiting it is around the back of the building and then back to Casemer or out to Lapeer? Mr. Harvey said they would exit around the back and circulate around. It kind of keeps the traffic away from the main entrance of that building either entering or exiting. Vice-Chairman Gross said there is not going to be a reverse u-turn for people wanting to go back into the coney. Mr. Harvey said if they wanted to back into the coney from there they would head down and then shoot up and then they are back into it.

Commissioner Brackon asked on the order board and the menu is that on the north side of the island or the south side? Mr. Harvey replied that is on the south side, it is actually mounted to the building. They would be right where the building ends, they would be able to see it sticking out that would be the menu and order location.

Commissioner Brackon said what his thinking was to avoid the situation where people just driving straight through is if they had the voice-box on the island and they could only order on the northside of that island it would prevent people from driving straight in because they wouldn't have the opportunity to order.

Commissioner Brackon asked what is the objective of the island? Mr. Harvey said that the developer felt really strongly about it, he does anticipate coming directly in because there is not going to be a significant amount of stacking, and he doesn't want to force everybody to go around if there are one or two cars in the lane. There is room for four right along the building and that is what he felt would be fairly sufficient for most times. When customers coming in recognize it is full then they would circulate around and go into the additional stacking area. That is why he feels strongly and wants to keep that open.

Commissioner Brackon said even with the signs telling them to turn right at that entrance he still wants to encourage people to go straight through? Mr. Harvey stated that he wants to keep it as an option. In theory, they are supposed to go all the way around enter the lane and go around but if there are two cars in the lane, he would like to keep that open.

Trustee Urbanowski said it doesn't account for people who might be on the far end who may have driven up. She thought it was a conflict, it might not look like someone is queuing in the line if they are not that close to the building but there could be someone on the other side. She thought that there needed to be some sort of island separation there for sure. If she is going in for coffee that means that she is not already caffeinated, it is confusing.

Secretary St. Henry stated that he agreed with Trustee Urbanowski. People just are not bright enough sometimes to navigate that, he has never seen anything like this before. If they are expecting drivers to know inherently that they are supposed to go to the right around another building or restaurant to get to a drive-thru lane he just didn't see that working. If they are looking at 4 – 6 cars stacking at any one time, that is what they are expecting, why do they have this routing around the other building? That would accommodate 20 cars or more. It seemed much more complicated than it needs to be. Mr. Harvey said that was the initial idea was if they could make that area a lane, the problem is if they get 6-7 cars now, they have cars stacking as they are trying to get in, and they didn't want to spill over into Lapeer Rd. at all. Secretary St. Henry appreciated that because they see that as an issue in other places in the town. He thought it seemed very complex for a cup of coffee.

Commissioner Brackon asked why couldn't they stay to the north when they came in and wrap around and come back toward Lapeer Rd? Mr. Harvey replied he thought it would be going against the natural traffic pattern for the coney island, he thought it was one-way around there. He said they could look at that to see if that was an option, but they would still run into that same u shape.

Chairman Reynolds said that he echoed a similar concern about the current traffic flow traffic pattern around the building. He understood it was an existing location and obviously everyone here including the developer and the occupant is trying to look at the least impactful improvement to add a drive-thru. Although he still finds it necessary to provide similar stacking to all other drive-thru's that they have in the Township because although there are no traffic data specifically for Lava Mountain Coffee, they have seen plenty of other locations that stacking even when addressed creates really detrimental traffic patterns and issues that they want to avoid. That is kind of a huge issue he would much rather see the permanent island be provided and at least that way they gain some additional stacking spaces that provide the opportunity for the proposed signage to be moved out a little bit further to create some more wait time between wait time and service if that was so desired. He thought that since the traffic patterns already on that site kind of go to the right to support the coney island he didn't see a major issue with having it be in the same sequence with the coffee area and then provide an adequate turning radius. He didn't foresee the factious stacking that is being provided was going to meet the need of the traffic patterns and having a drive-thru. That is why there is special land uses for that.

Chairman Reynolds said he also has a concern with the fact that even the current area of defining the road versus the landscaping, from his understanding, proposed flush curb, not an actual rolled curb or having height. He thought it leads to this very ambiguous traffic pattern around this proposed use.

Chairman Reynolds thought that Lava Mountain is great he understood it was an existing building it is a tricky traffic flow but thought that if this was to be added to this proposed use it

needs to be in compliance with the ordinance and address similar traffic patterns that they ask of other proposed projects.

Chairman Reynolds added that he was ok with the parking calculation waiver that they are requesting just in the sense of he agrees with not overparking something in the sense of parking it smart. With morning coffee and evening pizza, he was fine with that. He didn't feel a photometric is needed unless there is proposed lighting that is going to be added and anything that is modified, he would want to make sure is spoken to meeting the ordinance. Seeing that he is on the Site Walk Committee the other question is that being the landscaping on this parcel is very minimal, it is an existing building, and it is an existing development, it would be nice to see some additional plantings be provided if they were provided initially a lot of them have died off or not been maintained. Just another talking point he knew that was in Giffels review to just talk about the landscaping improvement.

Trustee Urbanowski said she wanted to point out number two in the OHM review about the connection between the internal site sidewalk and the public pathway. That is something that they have been focusing on a lot lately she would like to see that as well for those people who might be walking. Chairman Reynolds said he believed that was something that they were willing to address. Mr. Harvey replied yes of course.

Planning & Zoning Director Girling questioned the tree survey. This is an existing site having been on the site she asked if there was anything coming out from the middle where this is going? So, a discussion on is it a full tree survey. Chairman Reynolds replied that his belief would be if they could get identification of what those trees are and the estimated size so if they are landmarked that they essentially adhere to their Tree Ordinance he would be fine with that. He would be willing to kind of push and pull since it is an additional or expansion of use on an existing facility. Being on site it didn't appear that may be some of the evergreens that are proposed adjacent to the building maybe removed if he was correct, where the drive-thru lane would be, but it didn't seem like many other trees would be affected. There is some landscaping as it was required for the coney island or previously the Checkers and some of these other landscape items are a little bit barren and he hates to add all of these conditions but that is why they are here with the site plan reviewing it and considering what is a reasonable request.

Trustee Urbanowski said she agrees with the parking calculation, and she wouldn't be too concerned. People are dropping off their dogs they are not staying for very long. She thought that Lava Mountain would be the only place that they will sit and stay for a while.

Secretary St. Henry said he has never seen that parking lot very full. He thought that those three businesses were very compatible when it comes to that.

Secretary St. Henry said they have three motions in front of them, one for the Special Land Use, which is straightforward. Chairman Reynolds said he believed the way it was proposed right now there is a detrimental to traffic based on stacking. Although in a general sense he was ok with the special land use he was reluctant to proceed with a special land use approval based on what they are seeing here right now.

Trustee Urbanowski felt that they should wait on the other waiver too if they are going to reconfigure the site plan.

Chairman Reynolds said as a general discussion item leaning toward postponement and asking for revisions to be addressed. If there isn't a comfort level with the special land use, and the parking calculation waiver, if someone is willing to make that motion to postpone and provide

some feedback based on some of the comments. Obviously, if a motion is made, they can further discuss it to clarify some of these things.

Trustee Urbanowski asked if it would be appropriate just to do a postponement on the site plan and just address the other two? Planning & Zoning Director Girling said they can't give a site plan approval if they haven't granted the Special Land Use. If she was hearing them correctly a motion could be that they are postponing deliberation on the special land use and site plan and they don't have to mention the parking calculation waiver.

Chairman Reynolds thought that it would be appropriate just to make sure that the motion covers both items if there is a special land use, and a site plan approval.

Secretary St. Henry said for them to come back with all three again with a new site plan.

Moved by Trustee Urbanowski seconded by Commissioner Walker, that the Planning Commission **postpones** PC-2022-16, Lava Mountain Coffee Special Land Use for a Drive-Thru, 100 Casemer Road, 1472 S. Lapeer Rd., 1480 S. Lapeer Rd., 1488 S. Lapeer Rd. parcel #09-14-100-074, and 1476 S. Lapeer Rd. 09-14-100-073 for plans date stamped received April 13, 2022. This postponement is based on the following findings of facts: they need to see a different site plan addressing the turning radius of the drive-thru, the addition of some landscaping along the front side, addressing some pathway from the internal parking lot to the pathway on Lapeer; they can address the Parking Calculation Waiver once there is a site plan resubmitted.

Discussion on the motion:

> Chairman Reynolds wanted clarification in regard to whether it was their intent for the applicant to address all the Planner's comments and all the Engineer's comments. He thought it would be helpful to provide direction on the tree survey and lighting regarding the photometric.

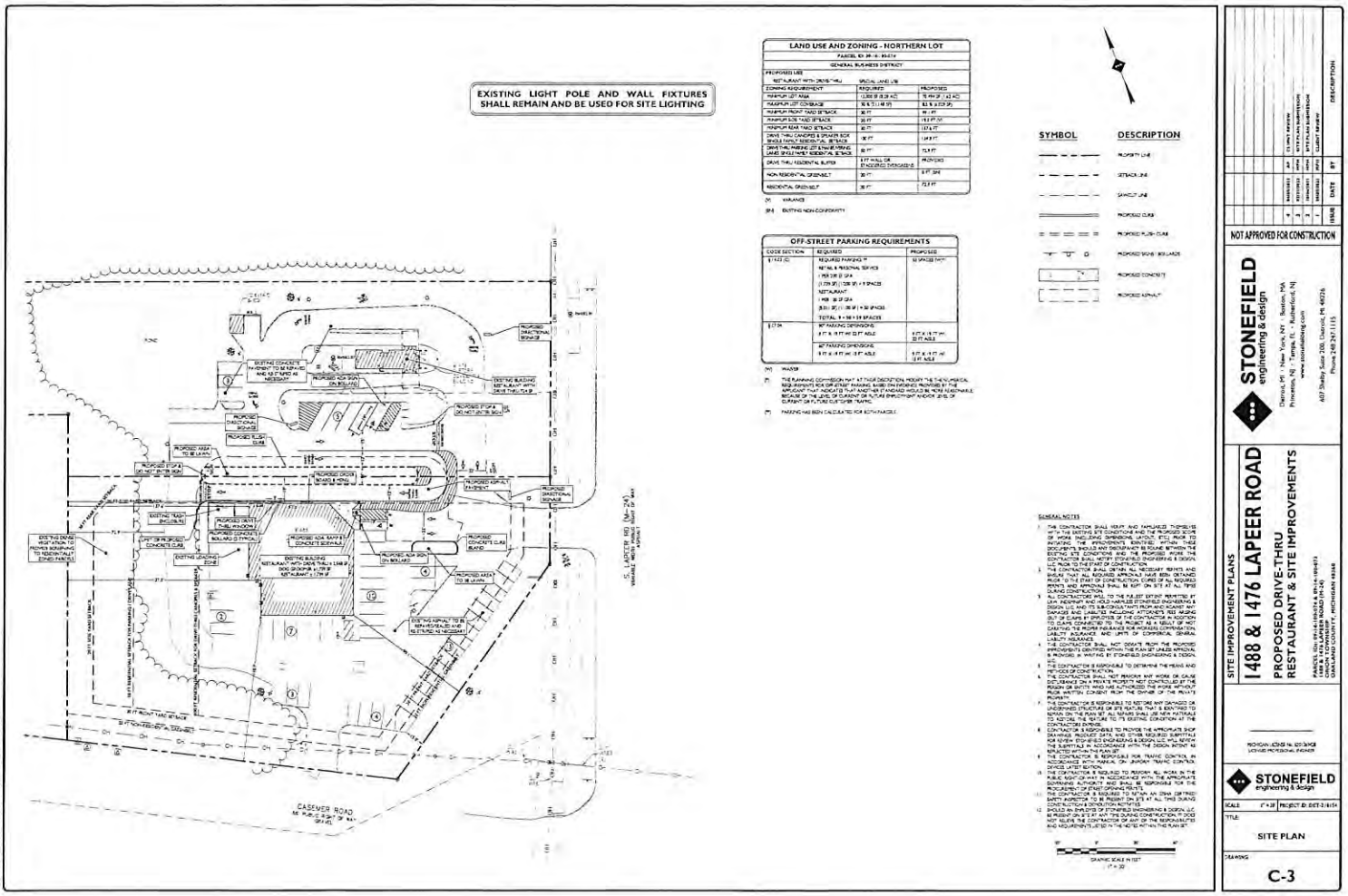
Trustee Urbanowski amended her motion, and Commissioner Walker re-supported that all of the things in the OHM letter, and the Giffel Webster letter be addressed. A tree survey was not required due to the limited removal of trees. The same with the photometrics because no new lighting was proposed they are not requesting a photometric. This is for both the Special Land Use and the Site Plan are both being **postponed** for 6-months.

Roll call vote was as follows: Walker, yes; St. Henry, yes; Gross, yes; Gingell, yes; Brackon, yes; Urbanowski, yes; Reynolds, yes. **Motion carried 7-0**

8. UNFINISHED BUSINESS

A. PC-2021-78, The Woodlands Planned Unit Development (PUD) Concept Plan, located on a vacant parcel located east of 310 Waldon Road, (Sidwell #09-23-351-024) and 3030 S. Lapeer Road, (Sidwell #09-26-101-021).

Chairman Reynolds stated that the Planning Commission is a recommending body. Their previous recommendation was to deny. With a PUD it is a multi-step process that also engages the Township Board. That recommendation to deny went to the Board of Trustees and there were discussions and a proposal made for the Planning Commission to consider the revised site plan that was discussed and presented to the Board of Trustees. He added that with a PUD process that is an opportunity and an option for the Board of Trustees to push it back to the Planning Commission. This is not a public hearing, which has occurred in the past so there will not be a public hearing this evening. There will be further deliberation on the PUD Concept


EXISTING LIGHT POLE AND WALL FIXTURES SHALL REMAIN AND BE USED FOR SITE LIGHTING
LAND USE AND ZONING - NORTHERN LOT
OFF-STREET PARKING REQUIREMENTS
SYMBOL
DESCRIPTION
GENERAL NOTES
S. LAPEER RD (M-24)
CASEMER ROAD
NOT APPROVED FOR CONSTRUCTION
STONEFIELD engineering & design
SITE IMPROVEMENT PLANS
1488 & 1476 LAPEER ROAD
PROPOSED DRIVE-THRU RESTAURANT & SITE IMPROVEMENTS
SITE PLAN
C-3

Tammy Girling

From: Ziad S. Kassab <z@lavamountaincoffee.com>
Sent: Monday, October 24, 2022 11:45 AM
To: Tammy Girling
Subject: RE: Lava Mountain Coffee - Proposed Design Concept

Hi Tammy,

We haven't figured out the drive thru extension project for Lava Mountain Coffee. I would like to request another 6 months extension.
Z

Ziad S. Kassab
https://ovou.me/zskassab
#bethemiracle

Charter Township of Orion
Planning & Zoning Department
2323 Joslyn Rd., Lake Orion MI 48360
P: (248) 391-0304 ext. 5000

TO: The Charter Township of Orion Planning Commission

FROM: Tammy Girling, Planning & Zoning Director

DATE: November 10, 2022

RE: PC-22-39, Hudson Square PUD Concept and Eligibility Plan

As requested, I am providing a suggested motion for the matter mentioned above. Please feel free to modify the language. The verbiage below could change based upon the Planning Commissions' findings of facts. Any additional findings of facts should be added to the motion below. Please note that it was suggested to me that on matters that involve rezonings, PUD's, Special Land Uses, or variances, that I provide language indicating that the matter can be **approved, denied, or postponed**.

Planned Unit Development (Ordinance #78, Section 30.03)

Motion 1: I move that the Planning Commission forwards a recommendation to the Township Board to **approve/deny** PC-22-39, Hudson Square Planned Unit Development Concept and Eligibility plan, located at 3030 S. Lapeer Rd. (Sidwell #09-26-101-021) for plans date stamped received October 20, 2022. This recommendation to **approve/deny** is based on the following findings of facts:

That the applicant **has/has not** met the following eligibility criteria of Section 30.03(B) of the Township Zoning Ordinance and **has/has not** met the intent of a PUD as stated in 30.03A of the Township Zoning Ordinance:

A. Recognizable Benefit
* How will a PUD approval result in a recognizable and substantial benefit to the ultimate users of the project and the community (insert findings of fact)
* How would such benefit otherwise be unfeasible or unlikely to be achieved (Insert findings of facts),

B Density Impact
* Will the proposed type and density of use result in a material increase in the use of public services, facilities, and utilities, in relation to what would be permitted if the property were developed without using the PUD (Insert findings of facts),
* Will the proposed PUD place an unreasonable burden upon the subject and/or surrounding land and/or property owners and occupants/or the natural features (Insert findings of facts),

C. Township Master Plan
* Will the proposed development be consistent with the intent and spirit of the Master Plan and community (Insert finding of facts),

D. Economic Impact
* Will the proposed PUD result in an unreasonable negative economic impact upon surrounding properties in relation to the economic impact that would occur from a more traditional development (Insert finding of facts),

E. Guaranteed Open Space

* Does the proposed PUD contain at least as much usable open space as would be required in the Ordinance for the most dominant use in the development (Insert findings of facts),

F. Unified Control

* Is the proposed PUD under single ownership or control such that there is a single person or entity having responsibility for completing the project with this Ordinance (insert findings of facts)

If Recommendation to Approve:

This recommendation is subject to the following conditions:

A. (Motion maker to list any unresolved issues related to the Township Planner's review letter).
B. (Motion maker to list any unresolved issues related to the Township Engineer's review letter).
C. (Motion maker to list any unresolved issues related to the Fire Marshal's review letter).
D. (Motion maker to list any additional conditions).

Or

I move that the Planning Commission **postpone** action on PC-22-39, Planned Unit Development Concept and Eligibility plan, 3030 S. Lapeer Rd. (Sidwell #09-26-101-021) for plans date stamped received October 20, 2022, for the following reasons (insert findings of facts).

November 10, 2022

Orion Township Planning Commission
2525 Joslyn Road
Lake Orion, MI, 48360

Site Plan Review no. 1
Hudson Square PUD Concept

Case Number:	PC-2022-39	**Zoning**:	R-2 – Single-Family Residential GB – General Business, Conditional Rezoning / Special Circumstances
Address:	3030 S. Lapeer Road		
Parcel ID:	09-26-101-021		
Area:	7.07 acres		
Applicant:	Detroit Riverside Capital	**Reviewer**:	Eric Pietsch Rod Arroyo, AICP
Plan Date:	10/20/2022		

Dear Planning Commission Members:

We have reviewed the above application and PUD Concept Plan, and a summary of our findings is below. Items in **bold** require specific action by the Planning Commission. Items in *italics* can be addressed administratively.

PROJECT SUMMARY

The proposed Planned Unit Development (PUD) is located at the northwest corner of S. Lapeer and Waldon Roads. The 7.07-acre parcel consists of two underlying zoning districts, R-2 Single-family residential and GB General Business. Sole vehicular access to the commercial and residential development is provided along the east boundary via S. Lapeer Road. An existing wetland, largely within the southwest quadrant of the site, will serve as a protected natural feature, incorporating open space and a pedestrian pathway from Waldon Road into the residential area of the development. A drive-through restaurant and classic car club, with attached sit-down restaurant are planned for the eastern half of the site, within the underlying General Business zoning district. The 24 residential apartment units are proposed within the northwest quadrant of the development which consists of the R-2 zoning district.

SUMMARY OF REVIEW

1. **Intent.** The applicant is proposing a Mixed PUD with 24 multi-family dwelling units, a drive-thru only coffee shop, a sit-down restaurant, and a classic car club. Such a mix of uses may be permitted in a PUD subject to Section 30.03.C.3 of the zoning ordinance.
2. **Land Use.** The PUD concept provides for a more appropriate transition from commercial development along Lapeer Road to the higher density, multi-family residential and single family (existing) to the west. The density plan alternative would result in a more abrupt transition between single-family lots and the commercial uses. The new Master Plan reflects a desire for more attached dwelling units, including duplex, quadplex, and other missing middle housing units in appropriate locations. The proposed residential uses are attached multi-family quadplex units.
3. **Conditional Rezone.** In 2019, a conditional rezone allowed for the site for the southeast quadrant of the site to rezoned from R-2 to GB. The rezoning was conditioned upon the preclusion of a number of uses, one of which was drive-thru restaurants. The applicant intends to amend this restriction by way of the rezone to a PUD, and thus allow for the drive-thru restaurant to be considered as a special land use in the GB district.
4. **Off-street Parking.** The residential apartment units satisfy the parking requirements with 2-car, attached garages. An additional 9 on-street, visitor parking spaces are provided. The surface parking spaces provided in the GB zone satisfy the requirement of all proposed uses.
5. **Loading & Unloading.** The plans shall indicate the number of designated loading spaces, with full dimensions that demonstrate there is no interference or obstruction of the functionality and vehicular circulation of the proposed site layout.
6. **Preservation of natural features.** The central-west portion of the site contains wetland / natural features and is proposed to be preserved. A tree survey for the entire site has not yet occurred and is noted to occur at site plan review and Final PUD. The applicant should address any existing trees that are intended to be preserved and those intended for removal.
7. **Landscaping.** A landscape plan is required for a full review at the final plan review stage in order to demonstrate street & parking lot landscaping standards are met.
8. **Lighting.** A lighting plan is required at final plan approval for a full review of overall lighting standards.
9. **Building Height.** The height of the proposed buildings in the GB District (25 ft.) and R-2 District (30 ft.) complies with the ordinance standards.

10. **Improvements in traffic patterns.** The applicant should address how the project was designed to minimize the impact of traffic generated by the proposed development on surrounding uses, as outlined in 30.03.C.7. *We defer to the Township Engineer for further comment*.
11. **Pedestrian access.** The applicant emphasizes the desire to propose building and connecting the safety path network adjacent to the subject site. Internal pedestrian connections from all safety paths to the residential and commercial uses is shown. The applicant should consider an additional safety path link within the public right-of-way to the proposed public amenity, which is currently only accessible via internal private sidewalk links.
12. **Density plan submittal.** The applicant shall specifically state the proposed density of the development. Review and analysis indicate the residential density is approximately 6.52 dwelling units per acre which is higher than the Future Density Plan designation of 3-5 dwelling units per acre. The applicant has provided a parallel plan for comparison.
13. **Building materials.** Conceptual building elevations have been provided, but detailed building material documentation has not yet been submitted. The residential units will be of a modern farmhouse style and material.
14. **PUD Eligibility.** Planning Commission should review the PUD Eligibility Requirements following the waivers section below, and in the ordinance as part of this process. Public benefits proposed by the Applicant include preservation of wetland and wooded areas (28% of site preserved), safety path enhancements, aesthetic site elements, and a public art feature at the corner of Lapeer and Waldon Roads.

Waivers

1. A waiver to allow reduced setbacks of the drive-thru restaurant and its parking facilities to the north property line. Refer to plans and table below.
2. A waiver to allow the three multi-family residential buildings to encroach 5 ft. into the required 35-ft. setback along the north property line.
3. A waiver request to allow portions of the two eastern-most multi-family buildings to cross into the GB zoning district.
4. A waiver request to allow a reduction in width of the drive-thru maneuvering lanes to have adequate width that permit safe one-way traffic movement.
5. A waiver request to allow for one loading facility for the overall commercial development. A secondary loading area is substandard in length and would obstruct a dumpster enclosure.
6. A waiver to allow the internal roadway width, from Lapeer Rd. to the west termination, to be less than 60 feet with 30-foot paving section.

PUD Criteria

The Planning Commission should carefully review the PUD Criteria in Section 30.03. In general, the Planning Commission may recommend variations from PUD guidelines. By doing so, the intent is for the development to result in a corresponding benefit to the community.

The following are some highlighted areas:

Recognizable Benefit.

a. Preservation of natural features. A tree survey for the entire site has not yet occurred. Some wetland and natural areas are being preserved.
b. Preservation of cultural, architectural, or historic buildings. N/A
c. Improvements in traffic patterns. The PUD Intent section states that enhanced traffic circulation should be provided, and a less sprawling form of development should be encouraged. Limiting access to the development to a single point along Lapeer Road will preserve the existing natural features along the Waldon Road right-of-way. The applicant should consider a westward extension of the internal street to tie into a future street network. Refer to additional comment by the Township Engineer.
d. Improvements in public safety or welfare. Defer to Township engineer regarding traffic safety and public facilities. See letters from other departments for additional input.
e. High-quality architectural design. The applicant has indicated that attention has been given to enhanced, high quality design. Color renderings have not yet been provided, but elevations with listed materials are included in the plans.

See applicant submittal packet for additional information.

Density impact. The applicant has submitted a parallel subdivision plan. We note that it appears that the plan is not feasible under existing zoning, as access would be directly from a public street that connects to a private drive.

The applicant provided a density plan which compares the site with existing zoning. Maximizing the commercial square footages requires a significant coverage of surface parking. The parking lot is accessible from both Lapeer and Waldon Roads creating a second traffic conflict point. The R-2 district can accommodate 6 single-family homes with the density and natural features limitations, which is the same number of multi-family buildings proposed with the PUD. The applicant acknowledges the increased demand in public services but believes the overall impact is appropriate and in line with the township Master Plan.

Note: The ultimate density shall be recommended by the Planning Commission and determined by the Twp. Board and shall be based upon the underlying zoning or a density as designated by the Master Plan.

Township Master Plan. The Future Land Use map in the new Master Plan is generally consistent with the proposal. The Future Land Use category is High Density Residential, which designates 3-5 dwelling units per acre and encourages the clustering of units around natural features to encourage open space. The portion of the site that fronts S. Lapeer Road is categorized Special Circumstance from when the parcel was rezoned to GB.

Economic impact. This section states that the Planning Commission should determine that in relation to the existing zoning, the proposed development shall not result in a material negative economic impact upon surrounding properties.

Guaranteed open space. Section 30.03.B.5. states that 15% of the site shall be guaranteed open space including usable active and passive upland spaces and trails. Park-like amenities may be provided, and open space shall be equally available to all residents of the development with maintenance and ownership documentation shall be submitted. The plan reflects compliance with the percentages.

Unified control. This is a coordinated and interconnected development under the control of the applicant as outlined in the packet.

OTHER KEY PUD ISSUES.

Compatibility with adjacent uses.

Consideration shall be given to:

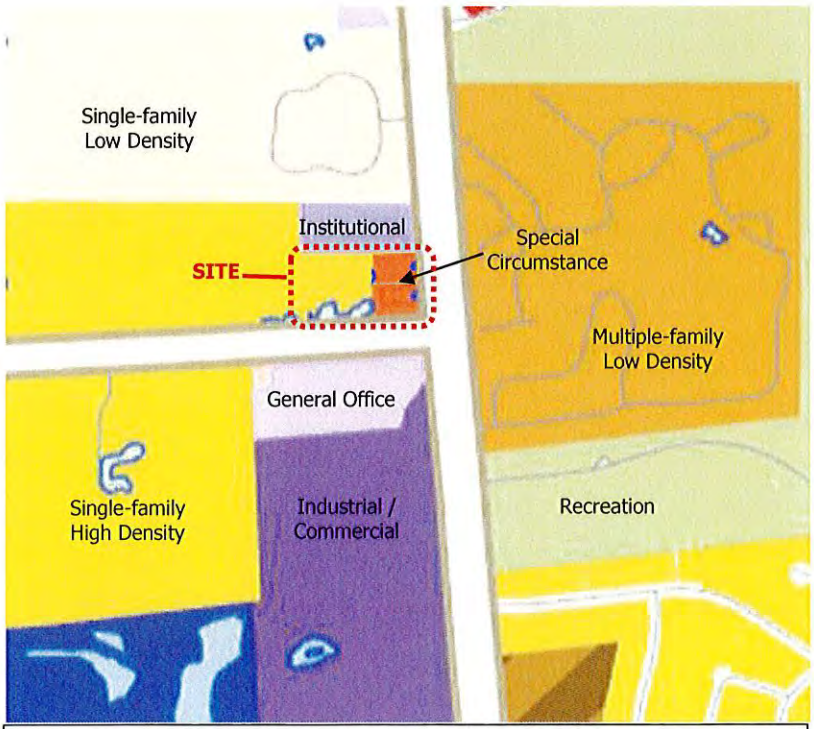
a. The bulk, placement, and materials of construction of proposed structures.
b. The location and screening of vehicular circulation and parking areas in relation to surrounding development.
c. The location and screening of outdoor storage, outdoor activity or work areas, and mechanical equipment in relation to surrounding development.
d. The hours of operation of the proposed uses.
e. The provision of landscaping and other site amenities.

Transition areas. The applicant is proposing open space and tree preservation as a transition area abutting single-family residential districts to the west and north of the site. Planning Commission should review these transitions with the applicant. The Zoning Ordinance requires that if the grade change adjacent to a single-family residential area is to be varied by more than three feet, the site plan shall include cross sections illustrating existing and proposed grades in relation to existing and proposed building heights.

Architectural and site element design. Residential facades should not be dominated by garages. Where attached garages are proposed, at least 50% of the garages should be side-entry or recessed, where the front of the garage is at least five feet behind the front line of the living portion of the principal dwelling. The intent of encouraging recessed or side entry garages is to enhance the aesthetic appearance of the development and minimize the visual impact resulting from the close clustering of units allowed under these regulations. Some additional detail will be needed to review. The proposed site design features side entry garages, which is consistent with this requirement.

Direction	Zoning	Use
North	R-2 – Single-Family Residential	Divine Grace Church & school
South	OP – Office & Professional	Orion Animal Care Center & Vacant
East	RM-1 – Multi-Family Residential	Indian Lake Village Apartments
West	R-2 – Single-family Residential	Single-family Residential & Vacant

Zoning Map



Future Land Use Map

Zoning Ordinance Compliance Tables

1. **Underlying District Standards.** General Business (GB)

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: GENERAL BUSINESS (GB)		
PROPOSED USE		
RESTAURANT WITH DRIVE-THRU SIT DOWN RESTAURANT CLASSIC CAR CLUB		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	12,000 SF (0.275 AC)	163,195 SF (3.75 AC)
MAXIMUM LOT COVERAGE	30%	5.4% (8,754 SF)
MAXIMUM BUILDING HEIGHT	25 FT	< 25 FT
MINIMUM FRONT YARD SETBACK	30 FT	56.0 FT
MINIMUM SIDE YARD SETBACK	20 FT	N / A
MINIMUM REAR YARD SETBACK	30 FT	52.8 FT
MINIMUM BUILDING CLEAR SPACE	20 FT	PROVIDED
MINIMUM R.O.W. GREENBELT BUFFER	20 FT	52.7 FT
MINIMUM SINGLE-FAMILY GREENBELT BUFFER	30 FT	30.0 FT
MINIMUM OPEN SPACE	10%	PROVIDED
DRIVE-THRU / SINGLE FAMILY SETBACK	100 FT	52.8 FT (M)

(M) MODIFICATION

	GB
Front Yard Setback	30 ft.
Rear Yard Setback	30 ft.
Side Yard Setback	20 ft. on each side
Minimum Lot Area	12,000 sq. ft.
Maximum Lot Coverage	30%
Maximum Heights of All Structures	25 ft.
Minimum Clear Space Around Structures	20 ft.

General Business (GB) Standards (Article XIV)			
Section	**Requirement**		**Comment**
14.01 Permitted Uses		All uses within the General Business District shall be restricted to those listed as either permitted principal uses and/or special uses in the underlying zoning district. Single-tenant space shall not exceed 55,000 square feet of GFA.	Restaurant (no drive-thru): Permitted by Right **Restaurant (drive-thru): Special Use** Car Club (automobile): Permitted by Right
14.02 Conditions for Drive-Thru Special Use	A.	1. Setback. All buildings, drive-thru canopies, or speaker boxes shall be set back no less than 100 ft. from the lot line of a single-fam. or multi-fam. zoned and/or used parcel. Associated parking lots, maneuvering lanes, drive-thru lanes (if applicable) shall be set back no less than 50 ft. from the lot line of single-fam. or multi-fam. zoned and/or used parcels.	**Setbacks from North PL** **Building: 52.8'** **Drive-thru lane: 30'** **Menu board: 77'** **A PC Waiver is required for these standards.**
		2. Buffering. All parcel perimeters which abut a single-fam. zoned and/or used parcel shall have no less than a 6 ft. continuous buffer. The buffer may consist of a solid fence or wall, a double staggered row of evergreens, and/or a combination of each.	*The final plans shall show compliance of this requirement within the 30' setback from the north PL abutting an R-2 zone.*
		3. Noise. Any noise associated with an extended hour use shall not exceed 60 decibels when measured at the property line. The noise shall also not be intermittent in nature, high frequency, or that which causes vibration.	*The plans shall demonstrate compliance.*
		4. Lighting. Any operation or activity which produces glare shall not cause illumination in excess of 0.3 foot-candles when measured along the lot line of a single-fam. zoned and/or used parcel. Btw. dusk and dawn, the light levels shall be further reduced to 0.0 foot-candles when measured at the same property lines.	*The final plans shall include a photometric plan that demonstrates compliance of all lighting standards.*
	I.	Drive thru facilities as permitted in this Sect. shall be subject to the landscaping and screening wall requirements of Sec. 27.05	See General Provisions section below.
14.03 Required Conditions	Minimum Parcel Size		
	B.	The minimum lot area shall be 12,000 square feet.	163,195 sq. ft. of the parcel is zoned GB.
	Off-Street Parking		
	C.	1.B. One (1) parking space per 100 sq. ft. of GFA for restaurants.	Drive-thru restaurant: 17 sp. req., 17 sp. provided Sit-down restaurant: 40 sp. req., 40 sp. provided
		1.D. Parking requirements for all other uses in the GB district shall be based upon 1 parking space per 200 sq. ft. of GFA.	Classic Car Club: 15 sp. req., 15 sp. provided
		3. No parking area or driveway shall be closer than 30 ft. to the adj. property lines when the parcel abuts residential zoned or used property. When the parcel abuts commercial/office or	This standard is met.

		industrial zoned property, no parking area or driveway shall be closer than 20 ft. to the adj. property lines.	
		2. Driveways & parking areas shall be curbed & consist of hard surfaced concrete, blacktop, or equiv. as approved. by the PC.	This standard is met.
		3. All off-street parking shall conform to the standards set forth in Sect. 27.04 of this Ordinance.	See General Provisions section below.
		4. The required setback for parking may be reduced in width or waived by the PC when the parcel abuts commercial/office, or industrial zoned property, & when existing off-street parking, drives, and/or structures are located within the setback area.	This standard is not applicable.
	Landscaping		
	D.	1. A landscape plan shall be submitted to the PC for approval. The landscape plan shall specify plant materials & landscape treatment, based on the requirements of Sect. 27.05 of this Ord. for such items. This landscape plan shall be part of, or accompany, the site plan.	*A landscape plan is required to further demonstrate these design standards, as well as street & parking lot landscaping standards.* *To be reviewed at final.*
		2. A landscaped greenbelt at least 20 ft. in width shall be provided along the entire perimeter of a GB District, except where ingress or egress drives are located when the parcel abuts commercial/office or industrially zoned property. However, when the parcel abuts residentially used or zoned property, the landscape greenbelt shall be at least 30 ft. in width except where ingress or egress drives are located.	This standard is met.
		3. The off-street parking areas & access driveways shall be screened from view from any adjoining residential property. Such screening shall consist of earth berms, permanent walls, or evergreen landscaping subject to approval of the PC.	*The landscape plan, once provided, shall demonstrate compliance.*
		4. All landscaping & screening shall be maintained in an attractive, litter-free, safe & healthy condition. Maintenance of all landscaping shall be of sufficient frequency to prevent overgrowth & deterioration from the original condition.	*The landscape plan, once provided, shall comply.*
		5. The landscaped greenbelt required along with the perimeter of the parcel may be reduced in width or waived by the PC when the parcel abuts commercial/office or industrially zoned property. The PC may, at their discretion, modify or waive certain landscaping requirements in accordance with the considerations outlined in Sect. 27.05.	Not applicable. The subject parcel does not abut commercial, office, or industrial zoned property.
		6. Where comm. uses abut res. uses, the PC may req. a greenbelt buffer, berm, or obscuring wall or combination of these methods of screening in accord. with Sect. 27.05 (A)(5).	*Staggered evergreen screening is proposed as a buffer btw. the eastern commercial facilities & the western res. facilities.*
	Sign Regulation		
	E.	All signs shall comply with the standards set forth in Orion Twp. Sign Ordinance No. 153.	*Signage will be reviewed at final submittal.*

	Lighting Regulations		
	F.	1. A lighting plan shall be submitted with all site plans as set forth in Sect. 27.11 of this Ord. All other Zoning Ord. regulations shall apply unless otherwise noted in this Ord.	*A photometric plan is required for review of ordinance standards at final.*
		2. Exterior site lighting shall be fully shielded and directed downward to prevent off-site glare.	
		3. Site illumination on properties adj. to res. properties shall not exceed 0.3 foot-candle along property lines, or 1.0 foot-candle along non-residential property lines. Parking lot lighting shall be governed by Sect. 27.11.	
	Public Road Access		
	G.	Any use developed or proposed within this district shall have direct access to a dedicated public road having an existing or proposed right-of-way of at least 120 ft.	The proposed commercial development has direct access to S. Lapeer Rd., a public right-of-way of 180 ft. wide.
	Utilities		
	H.	All utilities servicing the bldgs. or structures shall be buried underground.	*The plans shall comply.*
	Covered Trash Areas		
	I.	1. Covered trash receptacles, surrounded on 3 sides by masonry brick-type walls 1 ft. higher than the receptacle shall be provided in the rear yard of the bldg. or principal use struct.	*The commercial conceptual PUD plans appear to comply. The final plans shall provide greater detail of the covered trash areas.* *The plans shall indicate how the multi-family portion will dispose of solid waste.*
		2. The fourth side of the trash receptacle enclosure shall be equipped with an opaque lockable gate that is the same height as the brick-type wall.	
		3. The PC may, at their discretion, waive the req. for a covered trash receptacle as described herein, if, after considering the nature of the operation being proposed, the PC determines that the amount of trash generated can be adequately disposed of without use of an outside trash receptacle.	
	Loading & Unloading		
	J.	1. Loading and unloading areas shall be located in the rear or side yard of a non-residential district.	These standards appear to be met.
		2. Loading and unloading areas shall not be located where they will interfere with parking or obstruct ingress and egress.	
		3. All loading and unloading areas shall be in conformance with the requirements set forth in Sect. 27.04.	*Refer to the General Provisions sect.*
	Performance Guarantee Requirement		
	K.	The PC shall require a performance guarantee to be deposited with the Twp. Clerk in accordance with the provisions set forth in Sect. 30.09, to ensure that necessary and required improvements proposed on the site plan will be completed.	*Applicant to confirm.*
	Safety Paths		
	L.	Construction of safety paths for pedestrian use & use by non-motorized vehicles shall be required in conjunction with the	*See General Provisions section below.*

		development of all parcels in this zoning district. The safety paths shall conform to the specs. outlined in Section 27.06 & Ord. No. 97.	
	Tree Preservation Regulations		
	M.	The tree permit requirements apply to developments in this District, according to the terms of Sect. 27.12.	*See General Provisions section below.*
	Wetlands Setbacks		
	N.	The wetland setback requirements apply to all developments in this District, according to the terms of Section 27.17.	*See General Provisions section below.*
	Noise		
	H.	Regulations regarding the abatement & control of excessive noise are found w/i the Chrtr. Twp. of Orion Noise Ord. No. 135.	*The applicant shall comply.*

2. **Underlying District Standards.** R-2 Single-Family Residential

	R-1	R-2	R-3
Minimum Lot Area	14,000 sq. ft.	10,800 sq. ft.*	8,400 sq. ft.*
Minimum Width of Lot	100 ft.	80 ft.	70 ft.
Minimum Lot Setbacks (in feet) Front Yard** Each Side Yard*** Rear Yard	 40 ft. 10 ft. 35 ft.	 35 ft. 10 ft. 35 ft.	 30 ft. 10 ft. 35 ft.
Minimum Floor Area/Unit	1,320 sq. ft.	1,080 sq. ft.	960 sq. ft.
Maximum Lot Coverage	25%		
Total Maximum Floor Area of All Accessory Buildings	See Section 27.02, A, 8		
Height of Structures	30 ft.	30 ft.	30 ft.

*In those instances where public sewers are not provided, a minimum lot area of 12,500 sq. ft. shall be provided.
** Where the front setbacks of two (2) or more principal structures in any block (in the case of platted properties) or within three hundred (300) feet (in the case of unplatted properties) in existence at the time of passage of this Ordinance, within the district zoned and on the same side of the street, are less than the minimum front setbacks required herein, then any building subsequently erected within said block (or three hundred (300) feet) shall not be less and not be greater than the average depth of the front setbacks of the existing structures.
*** Where a garage door or opening faces a side lot line, said side lot setback shall be thirty (30) feet.

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: SINGLE-FAMILY (R-2)		
PROPOSED USE		
MULTIPLE-FAMILY RESIDENTIAL		
ZONING REQUIREMENT	REQUIRED	PROPOSED
MINIMUM LOT SIZE	10,800 SF	N / A
MINIMUM LOT WIDTH	80 FT	N / A
MAXIMUM LOT COVERAGE	25%	N / A
MAXIMUM BUILDING HEIGHT	30 FT	< 30 FT
MINIMUM FRONT YARD SETBACK	25 FT	248.0 FT
MINIMUM SIDE YARD SETBACK	35 FT	65.8 FT
MINIMUM REAR YARD SETBACK	35 FT	30.3 FT (M)
MINIMUM BUILDING CLEAR SPACE	20 FT	30.0 FT
MINIMUM FLOOR AREA / UNIT	1,080 SF	N / A
MINIMUM OPEN SPACE	15%	PROVIDED

(M) MODIFICATION

3. **General Provisions**. The standards in the table below are a summary of the applicable Zoning Ordinance standards in Article XXVI; please refer to the individual sections referenced herein for the full Zoning Ordinance text.

General Provisions (Article 27)			
Condition	**Requirement**		**Comment**
27.03 Yard & Bulk Requirements	Projections Into Required Yards		
	C.	1) In all yards. Awnings and canopies; steps 4 ft. or less above grade which are necessary for access to a permitted bldg. or for access to a zoning lot from a street or alley; chimneys projecting 24 in. or less into the yard; approved free-standing signs; arbors and trellises; flagpoles; window unit air conditioners projecting not more than 18 in. into the req. yard; & fences or walls, subject to applicable ht. restrictions.	***The 3 multi-fam. apartment bldgs. closest to the north prop. line encroach into the req. setback by 5'. See section "F" below.*** ***PC Waiver / Modification required.***
		2) In front yards. Open, paved terraces not over 3 ft. above the avg. grade of the adjoining ground & not projecting farther than 10 ft. beyond the bldg., but not including roofed-over terraces or porches; 1-story bay windows & other architectural features projecting 3 ft. or less into the yards; & overhanging eaves & gutters proj. 3 ft. or less into the yard.	This standard appears to be met.
		3a) In rear yards. Balconies; fallout shelters; breezeways; open porches; one-story bay windows, & other architectural features projecting 3 ft. or less into the yard; & overhanging eaves or gutters projecting 3 ft. or less into the yard.	This standard does not apply. The north prop. line is the side yard from Lapeer Rd. frontage.
		3b) In rear yards. Decks may be permitted to project into a required rear yard when the following conditions are met...	Decks are not proposed with this development.
		4) In side yards. 1-story bay windows and other architectural features projecting into the required yard by not more than 2 in. for each 1 ft. width of side yard; and overhanging eaves and gutters projecting 18 in. or less into the yard.	This standard does not appear to apply.
	Location of Required Open Space.		
	E.	All yards & other open spaces allocated to a bldg. or group of bldgs. shall be located on the same zoning lot as such bldg. or group of bldgs.	***The 2 eastern-most multi-fam. bldgs. cross into the GB zoning dist.***
	Variances to Yard Regulations.		
	F.	The ZBA or PUD process may modify yard regulations by granting a variance for individual cases where literal enforcement of the provisions of the Ord. would not be reasonably possible or would result in unnecessary hardship. Examples where such variances from yard regulations would be appropriate include:	***See section "C" above. The encroachment into the req. yard necessitates a PUD PC Waiver from 35 ft. R-2 Dist. side yard min.***
		1) A planned development in a multiple-family district;	

		2) Cases where the applicability of the regulations on lots existing & of record at the time this Ord. became effective cannot be determined.	
		3) Lots that are peculiar in shape, topography, or site configuration.	
	Corner Clearance.		
	G.	No fence, wall, structure, or planting shall be erected, established, or maintained on any corner lot which will obstruct the view of drivers in vehicles approaching the intersection. Fences, walls, structures, or plantings located in the triangular area described below shall not be permitted to exceed a height of 30 in. above the lowest point of the intersecting road. The unobstructed triangular area referred to above may consist of either:	These standards appear to be met.
		1) The area formed at the corner intersection of 2 public ROW lines, the 2 sides of the triangular area being 30 ft. in length measured along abutting public rights-of-way lines, and the 3rd side being a line connecting these 2 sides, or	
		2) The area formed at the corner intersection of a public right-of-way and a driveway, 2 sides of a triangular area being 10 ft. in length measured along the ROW & driveway lines and the 3rd side being a line connecting these 2 sides.	
27.04 Parking and Loading	Off-Street Parking		
	A.	1a) Scope of Requirements.	
		i.) For all bldgs. & structures erected & all uses of land established after the effective date of this Ord., off-street parking shall be provided as required by the regulations of the districts in which such bldgs. or uses are located.	*The provided off-street parking shall comply with the parking standards required by the ord.*
		ii) If the intensity of use of any bldg., structure, or premises is increased through the addition of dwelling units, GFA, seating capacity, or other units of measurement specified herein for req. parking, additional off-street parking shall be provided for such increase in intensity of use.	The site consists of no existing bldgs. proposing additions.
		iii) Whenever the existing use of a bldg. or structure is changed to a new use, parking facilities shall be provided as req. by this Ord. for the new use, regardless of any variance which might have been in effect prior to the change of use.	
		1c) Additional Off-Street Parking. Nothing in this Ord. shall be deemed to prevent voluntary establishment of off-street parking facilities to serve any existing use or land or bldgs., provided that all regulations herein governing the location, design, & operation of such facilities are adhered to.	*The off-street parking spaces in excess of the ord. requirements must comply with all parking design standards.*
		1f) Electric Vehicle Charging Stations.	*Due to the foreseeable increase in electric vehicle demand, the PC may consider a*
		i) Permitted Locations. When accessory to a principal permitted use, electric vehicle charging stations are permitted in all zoning districts.	

		2a) Electric vehicle charging stations located within parking lots or garages may be included in the calculation of minimum required off-street parking spaces.	*percentage of EV parking spaces as a condition of PUD and site plan approval.*
		2b) Public electric vehicle charging stations are reserved for parking and charging electric vehicles only. Electric vehicles may be parked in any space designated for public parking subject to the restrictions that would apply to any other vehicle that would park in that space.	
		2c) Electric vehicle charging stations shall be sized the same as a standard parking space as required in the Off-Street Parking Chart herein.	
		2. General Requirements	
		a) Location. Off-street parking for other than residential uses shall be either on the same lot, or within 300 ft. of the bldg. or use it is intended to serve, if said spaces & uses are located in the same zoning district or zoned Parking District measured from the nearest point of the bldg. or use & the nearest point of the off-street parking lot.	This standard is met.
		Unless otherwise specified in the regulations for each dist., a min. setback of 20 ft. shall be maintained btw. any off-street parking area & adj. property lines. Enclosed bldgs. & carports containing off-street parking shall be subject to applicable yard requirements for the dist. in which they are located.	This standard is met.
		b) Residential Parking. Off-street parking spaces in single-family res. districts shall consist of a parking strip, driveway, garage, or combination thereof & shall be located on the premises they are intended to serve.	This standard is not applicable for this development.
		d) Access. Except on lots accommodating single-fam. dwellings, each off-street parking space shall open directly onto an aisle or driveway of sufficient width & design as to provide safe & efficient means of vehicular access. All off-street parking facilities shall be designed with appropriate means of vehicular access to a street or alley in a manner which will least interfere with traffic movement. Backing directly onto a street shall be prohibited. Ingress and egress to an off-street parking area lying in the area zoned for other than res. use shall not be across land zoned for res. use.	This standard appears to be met.
27.04 Parking & Loading	A.	e) Collective Use of Off-Street Parking. Off-street parking space for separate buildings or uses may be provided collectively. If parking facilities for separate buildings or uses are provided collectively, the total number of spaces so provided shall not be less than the number which would be required if the spaces were provided separately. The ZBA may reduce the total number of spaces provided collectively by up to 25% if such reduction is specifically approval as part of the required site plan approval process. Such approval shall be granted only on a showing that the parking demands of the 2 uses do not overlap.	This standard is met. 8 of the 17 req. parking spaces for the drive-thru. restaurant are provided in the surface lot south of the access drive. The number of collective spaces satisfies the ord. requirements.

		h) Parking Space for Physically Handicap	*Pertaining to h.3 & h.4, the 73-space surface parking facility, collectively servicing 3 separate establishments, shall improve pedestrian & ADA accessibility & connection btw. all bldgs.* ***Details can be addressed at the final plan review phase***
		1) Number. Each parking lot that services a bldg. entrance, except single or two-family residential or temporary structures, shall have a number of level parking spaces as set forth in the following table, and identified by above grade signs as reserved for physically handicapped persons.	
		2) Size. Accessible Parking Spaces for cars shall be a minimum of 13 ft. wide (8' wide parking space plus a 5' wide marked access aisle). Van-Accessible Parking Spaces shall be a minimum of 16 ft. wide (8' wide parking space plus an 8' wide marked access aisle).	
		3) Location. Parking spaces for the physically handicapped shall be located as close as possible to elevators, ramps, walkways, and entrances. Parking spaces shall be located so that the physically handicapped persons are not compelled to wheel or walk behind parking cars to reach entrances, ramps, walkways, or elevators.	
		4) Curbs. Where a curb exists btw. a parking lot surface & a sidewalk surface, an inclined curb approach or a curb cut with a gradient of not more than 1 ft. in 12 ft. & a width of not less than 4 ft. shall be provided for wheelchair access.	
		5) (See, also, State of Michigan Barrier-Free Rules.) The State rules, if they are more restrictive, shall apply in place of the Charter Twp. of Orion Ordinance provisions.	
		6) Number of Required Off-Street Spaces. Off-street parking spaces shall be provided in the quantities req. by the regulations for the districts in which the bldgs. or uses are located. For the purposes of computing the number of parking spaces required, the definition of "Structure Area" as set forth in Article II shall govern.	
		3. Layout and Construction	These standards appear to be met. *Detailed final site plans shall incl. all dimensional components of the pr. parking facilities.*
		a) Dimensions. Plans for the layout of off-street parking facilities shall be in accord with the requirements set forth in the Off-Street Parking Chart contained herein.	
		b) Maneuvering Lanes. Maneuvering lanes shall have adequate width to permit safe one-way traffic movement, with the exception of the 90 pattern, which shall provide for safe 2-way traffic movement. Each entrance and exit to & from a parking lot shall be at least 25 ft. from the nearest point of any property zoned for res. use.	**The one-way drive aisle adj. to the dumpster encl. of the drive-thru rest. appears to consist of an insufficient width. Applicant to confirm compliance during final review.**
		c) Surfacing and Drainage. Unless otherwise specified in the regulations for each dist., all off-street parking areas, access lanes, & driveways required under this section shall be surfaced with concrete, asphalt, or an equivalent hard,	These standards appear to comply.

		dustless surface as approved by the PC. Off-street parking areas, except those serving single or 2-family res. & railroad freight yards, shall also be curbed. Off-street parking areas, access lanes, & driveways shall be graded & drained so as to not drain onto adjacent property or toward bldgs. The grading, surfacing, & drainage plans shall be in conformance with the specifications of the Twp. Surfacing of all parking areas, access lanes, & driveways must be completed within 1 year of the date the permit is issued.	*Grading & drainage review is completed by the Township Engineer.*
27.04 Parking & Loading	A.	d) Lighting. Any lighting used to illuminate off-street parking areas shall be directed on the parking area only and away from nearby res. properties & public streets. In no case shall lighting exceed 3 foot-candles measured at the lot line.	*A lighting plan that meets all applicable standards shall be provided.*
		e) Screening and Landscaping. Except for those serving single and 2-family dwellings, all off-street parking areas shall be screened from view from any adjoining residential property. Such screening shall consist of earth berms, permanent walls, or evergreen landscaping, subject to approval of the PC & in accordance with the provisions set forth in Sect. 27.05. In cases where a wall extends to any alley which serves as a means of ingress & egress to a parking area, the wall may be ended within 10 ft. from the nearest edge of the alley so as to provide a wider access route to the parking area.	*A landscape plan is required at final to demonstrate compliance of all detailed landscaping standards.*
		f) Wheel Stops. Except for those serving single & 2-family dwellings, all parking lots shall be provided w/ wheel stops or bumper guards so located that no part of parked vehicles will ext. beyond the prop. line or into req. landscaped areas.	*The final plans shall comply with these standards.*
		h) Signs. Accessory signs shall be permitted in parking areas in accordance with the provisions set forth in the Orion Twp. Sign Ord. No. 153.	
	Off-Street Loading and Unloading		
	B.	1. Scope and Application	*Details of loading & unloading areas shall be represented on the final site plan(s) for each facility.*
		a) For all bldgs. & structures erected & all uses of land established after the effective date of this Ord., off-street loading and unloading space shall be provided as required by the provisions set forth in this sec. and by the regulations of the districts in which such bldgs. or uses are located.	
		2. General Requirements	*Circulation to be reviewed by Township engineer.*
		a) Location. Permitted and req. loading berths shall be located as provided in the regulations for each zoning district. Except as provided under Central Loading below, all req. loading berths shall be located on the same zoning lot as the use served. No permitted or req. loading berth shall be located within 30 ft. of the nearest intersect. of any 2 streets. Loading and unloading facilities shall not be so located as to interfere with ingress or egress or off-street parking.	
27.04		b) Size. Unless otherwise specified, any required off-street loading berth shall be at least 10 ft. in width by at least 50 ft.	

Parking & Loading		in length, exclusive of aisle and maneuvering space, and shall have a vertical clearance of at least 14 ft.	
		c) Access. Each required off-street loading berth shall be designed with appropriate means of vehicular access to a street or alley in a manner which will least interfere with traffic movement. A determination that this standard has been met shall be made by the PC during site plan review.	
		d) Surfacing. All off-street loading berths & loading dock approaches shall be surfaced with a permanent, durable surface, such as concrete, asphalt, or an equivalent material as approved by the PC. The grading, drainage, & surfacing plans for the loading area shall be in conformance with the specifications of the Twp. Engineer.	
		3. Specific Requirements	These standards do not apply to the multi-fam. units in the underlying R-2 zoning district.
		a) Residence Districts. Off-street loading facilities accessory to uses allowed in districts zoned for res. use shall be provided in accordance w/ the following min. requirements:	
		a1) For the uses listed hereunder, 1 loading berth shall be provided for bldgs. containing 10,000 to 100,000 sq. ft. of GFA, plus 1 additional loading berth for each additional 100,000 sq. ft. of GFA or fraction thereof: "All other non-residential uses in a residentially zoned dist.".	
		b) Business Districts (OP, RB, GB, SP-1, SP-2, REC-1, REC-2)	*Subject to further review at final plan stage.*
		b) i) Establishments containing less than 10,000 sq. ft. of GFA shall be provided with adequate [loading] facilities, accessible by motor vehicle off any adj. alley, service drive, or designated delivery area on the same zoning lot.	
	Restriction of Open Parking and/or Storage in All Districts Except Where Permitted; Regulation in Single-Family Residential Districts.		
	C.	1) These regulations are intended to control the open parking & storage of trailers, boats, & similar recreational vehicles so as to maintain the orderly appearance of the Twp.'s single-fam. neighborhoods.	The plans do not indicate the standards of this section apply to the proposed developments.
27.05 Landscaping, Fences, & Walls	**Landscaping**		
	A.	**3. Landscaping Design Standards**	
		Landscape Plan Submittal Requirements to be reviewed a final plan stage.	
27.06 Streets, Roads, and Other Means of Access	**Access Across Residential District Land**		
	B.	No land which is located in a residential district shall be used for a driveway, walkway, or access purposes to any land which is located in a non-residential district, unless such access shall be by a public street.	**If approved, this standard would not be applicable under the PUD rezone.**

27.06 Streets, Roads, and Other Means of Access	**Acceleration/Deceleration/Passing Lanes**		
	C.	1) Driveways providing ingress and egress to all 2-lane, paved major thoroughfares or collector streets shall be provided with paved acceleration and deceleration & passing lanes.	*These standards are subject to review & approval by the Township Engineer.*
		2) Driveways providing ingress and egress to roads of 4 or more lanes in width shall be provided with paved tapers for traffic entering the site.	
		3) Driveways providing ingress and egress to any gravel major thoroughfare or collector street shall be provided with tapers for traffic entering the site.	
		4) Required lanes or tapers shall be indicated schematically on the site plan and shall be constructed in accordance with the current standards for such facilities as est. by the RCOC.	
		5) Where it can be shown that such lanes or tapers already exist, the requirement may be waived or modified by the PC when site plan review is required by said body or by the Board of Appeals in all other instances.	
	Internal Roadways		
	D.	1) Width. Unless otherwise specified in Ordinance No. 60, Land Division and Private Roads, an internal or on-site roadway shall be at least 18 ft. in width.	This standard is met.
		a) For any zoning district other than single-fam. res. that has 3 or more structures proposed to front on an internal road, the ROW shall be 60 ft., with an improved surface of 30 ft.	**The internal roadway width, from Lapeer Rd. to the west termination, does not meet these standards. See eng. rev. A PUD Waiver is req.**
		b) For any zoning district other than single-fam. res. that has a single structure served by a driveway, the right-of-way shall be a minimum of 30 ft. with an improved surface of 18 ft.	
		2) Surfacing and Drainage. Unless otherwise specified, all internal or on-site roadways shall be surfaced with concrete, asphalt or an equivalent hard, dustless surface as approved by the PC. Roadways shall be graded & drained so as to not drain onto adjacent property or toward bldgs. The grading, surface, & drainage plans shall be in conformance with the specifications of the Twp. & approved by the Twp. Engineer.	*This standard appears to be met.*
	Service Roads		
	E.	If the PC determines that proposed or anticipated development will result in an excessive number of entrance or exit drives onto a major thoroughfare, thereby creating potentially hazardous traffic conditions and diminishing the carrying capacity of the thoroughfare, the Commission may require construction of service roads on abutting parcels to allow traffic circulation from 1 parcel to another without re-entering the public thoroughfare. Such service roads shall conform to the following standards:	
		1) Location and Dimensions. The front edge of the service road shall be located no closer than the future right-of-way line of the thoroughfare & shall be at least 24 ft. in width.	**May require PUD waiver. See engineer review.**
		2) Easement. Use of the service road shall be secured through an easement permitting the use of the service road for traffic circulation from 1 parcel to another. Said easement	*The applicant shall provide all required,*

27.06 Streets, Roads, and Other Means of Access		shall be in written form acceptable to the Commission and adopted by the Twp. Board prior to issuance of a building permit. No permanent structures other than the service road shall be permitted within the easement. Said easement shall be recorded with the Oakland County Register of Deeds.	*recorded documentation pertaining to the cross-access easement(s) if applicable.*
		3) Surfacing and Drainage. Service roads shall be surfaced with concrete, asphalt or an equivalent hard, dustless surface as approved by the PC. Roadways shall be graded & drained so as not to drain toward bldgs. The grading, surfacing, & drainage plans shall be in conformance with the specifications of the Twp. & approved by the Twp. Engineer.	This standard appears to be met.
		4) Maintenance. Each property owner shall be responsible for maint. of the easement & service road so that it remains usable as a means of circulating from 1 parcel to another.	
	Safety Pathways		
	F.	1) Location and Width. Req. pathways shall be 8 ft. in width & shall be located in the road ROW, with a setback of 1 ft. from the property line. The PC may modify this req. in consideration for the location of utilities, existing landscaping, or other site improvements.	*The plans (site & landscape) should indicate the path along Waldon Rd. is in the future ROW. The 1 ft. setback from the property lines should be shown throughout.*
		2) Design Standards. Required pathways shall be constructed of asphalt or concrete in accordance with adopted engineering standards for the Twp.	
		3) Alignment with Adj. Pathways. Req. pathways shall be aligned horizontally & vertically with existing pathways or sidewalks on adj. properties. The PC may waive this req. if existing adjacent pathways or sidewalks are not constructed in conformance with the standards set forth herein.	
		4) Signage. The PC may require installation of signage for the purposes of safety where it is necessary to separate vehicular traffic from ped. and bicycle traffic, or where it is necessary to alert vehicular traffic of the presence of the pathways.	
		5) Maintenance. The owner of the property which fronts on the required pathway shall be responsible for maintenance of the pathway, including patching cracked or deteriorated pavement and removal of glass and other debris.	
		6) Permits. It shall be the responsibility of the owner or developer to secure any required permits from the RCOC or MDOT to allow pathway construction in the road ROW.	
27.11 Lighting Regs.	**Lighting Plan Submittal Requirements to be reviewed a final plan stage.**		

Staff will be available to discuss this review at the next Planning Commission meeting.

Respectfully,
Giffels Webster

Rodney L. Arroyo, AICP
Partner Emeritus

Eric Pietsch
Senior Planner

November 9, 2022

Scott Reynolds, Planning Commission Chairperson
CHARTER TOWNSHIP OF ORION
2323 Joslyn Road
Lake Orion, MI 48360

RE: Hudson Square PUD, PC-22-39
Concept PUD Review #1

Received: October 20, 2022, by Orion Township

Dear Mr. Reynolds:

We have completed our review of the Hudson Square Concept PUD plan set. The plans, dated October 10, 2022, were prepared by Stonefield Engineering & Design, and were reviewed with respect to the Township's Zoning Ordinance, No. 78, Stormwater Management and Soil Erosion & Sedimentation Control Ordinance, No. 139, and the Township's Engineering Standards.

EXISTING SITE CONDITIONS:

The site is located on the west side of M-24 on the north side of Waldon Rd., within the northwest 1/4 of Section 26 of the Charter Township of Orion. The site has two different zonings. The eastern half is Conditionally zoned General Business (GB) and the western half is Single-Family Residential (R-2). The site is bound by parcels to the north and west zoned Single-Family Residential (R-2), to the south by parcels zoned Office and Professional (OP-1). The parcels east of the site across M-24 are zoned Multi-Family Residential (RM-1).

The site is a single parcel with split zoning. The General Business zoned parcel is 3.41 acres and the Single-Family Residential parcel is 3.66 acres, totaling 7.07 acres combined. The site was previously used as a flower shop and landscape supplier. The Existing Conditions Plan shows a parking lot, garage, green houses, storefront, and house that were used by the previous business owner. The majority of these buildings have been recently demolished. The Existing Conditions Plan shall be updated to provide the actual existing conditions of the site. The site is heavily wooded and contains a water course featuring a man-made pond in line with an existing stream and wetlands. The applicant is proposing to construct six (6), two-story, four-unit apartment buildings, two (2) restaurants (one drive-thru), and a Classic Car Club attached to the restaurant that does not include a drive-thru. It should be noted that the Classic Car Club and restaurant were previously approved under a separate submittal but has not yet been constructed.

The proposed development appears to protect the pond on site but encloses the existing stream that is considered a linear wetland and is part of an existing drainage course and stormwater network that affects several parcels east and west of this site. The applicant needs to show the relocated stream on the Site and Density Plan. Currently, the relocated stream is only shown on the proposed Grading Plan.

DENSITY PLAN:

A Density Plan was included and shows larger versions of the proposed Car Club and restaurant along with six (6) Single-Family units west of the Car Club and restaurant. Additionally, the Density Plan includes significantly more parking than the proposed Concept Plan. Impacts to the pond are proposed but do not appear necessary to facilitate building and parking lot construction. Enclosure of the stream and wetland appear to still be proposed in the Density Plan; however, no stormwater network features were included. It should also be noted that enclosing the stream and wetland that connect the pond to the ultimate outlet for the site may require mitigation and replacement of those wetland areas by both EGLE and Orion Township. Channel Protection is required as part of the new Oakland County Stormwater Management requirements and was not included in the plans. Including these storm and wetland features within the proposed project may not reduce the number of units proposed in the Density Plan but would likely reduce the available parking area and building footprints of the Car Club and/or restaurant. These features need to be included in the Density Plan to accurately assess the available constructable area onsite.

WATER MAIN & SANITARY SEWER:

There is existing 16-inch water main along the west side of M-24 that also extends westward down the center of Waldon Rd. Existing water main was included in the plans, however proposed water main was not included in the submittal. Preliminary water main layout shall be included in the Final PUD plans. Preliminary Basis of Design, pipe size, and material type will be required at Final PUD. A 12-foot-wide easement will be required, centered along all proposed water main onsite.

If a single water service is proposed for each of the residential buildings, meter rooms with Knox boxes accessible by the Township shall be provided. The meter room requirements and Knox box access needs to be coordinated with the Township DPW.

There is existing 10-inch sanitary sewer along the west side of M-24 and along the north side of Waldon Rd. Existing sanitary sewer appears to have accurately been represented in the plans, however proposed sanitary sewer was not included in the submittal. Preliminary sanitary sewer layout shall be included in the Final PUD plans. Preliminary Basis of Design, pipe size, and material type will be required at Final PUD. A 20-foot-wide easement will be required, centered along all proposed water main onsite.

Preliminary franchise utility locations and easements shall be included at Final PUD. The franchise utility easement shall not overlap proposed water main and sanitary sewer easements except at perpendicular crossings and other infeasible locations.

Per Township sanitary sewer and water main modeling systems, sufficient sanitary capacity and water main flow is available to serve the proposed development.

STORMWATER MANAGEMENT:

The existing site drains inward toward the existing pond and stream prior to discharging into a 60-inch storm sewer that conveys drainage across M-24 and ultimately drains to Lower Trout Lake. The onsite drainage features handle significant amount of upstream flow from wetland areas that is routed through the pond, stream, and culvert. The stream is weir controlled and ends with a small pooling location at the 60-inch pipe inlet.

The proposed stormwater management plan appears to include a series of catch basins that connect to a 'potential' water quality unit and underground detention area prior to discharging into the 60-inch pipe that crosses M-24. MDOT approval for modifications to the storm sewer crossing M-24 will be required. Channel protection does not appear to be provided in the plans. NRCS Soil Maps indicate that onsite soils are suitable for infiltration and drainage (loamy sands) and no information to the opposite affect was provided. Therefore, CPVC should be assumed necessary until infiltration testing is complete. Relocating the stream will not count towards the Channel Protection Volume for this site as it is a key feature in a much larger existing stormwater management network.

Protecting the existing stream could be considered a BMP if Channel Protection is not viable based on future infiltration tests. Overall, the proposed system appears to follow the existing drainage pattern for the stormwater runoff onsite.

Preliminary detention volume and composite site C-value calculations shall be provided at Final PUD per Township Standards for the improvements to the site. A drainage area map for the upstream conveyance and flow calculations provided to support the design of the relocated stream will be required at engineering.

TRAFFIC & CIRCULATION:

A Traffic Impact Study (TIS) was not provided at the time of our review. We understand the applicant is in the process of preparing a TIS for review and approval.

Sidewalk adjacent parking spaces needs to be 7-feet wide to account for vehicle overhang. Please widen the sidewalk along the east side of the parcel and any other spaces that need to meet this condition. An ADA compliant crossing will be required at the approach. Please show ramps/landings at Final PUD. Detailed corner grades will be required at Engineering to assess compliance.

A sidewalk directly adjacent to the back of curb (carriage walk) is proposed in the Concept Plan. It is recommended that the carriage walk be relocated to be a minimum of 5 feet off the back of curb within the General Business portion of the site.

The applicant appears to be tying into the existing asphalt on the west side of the site via internal site sidewalk. The removal for the asphalt approach is shown on the Existing Conditions Plan but does not appear to indicate connection to the proposed public pathway. Please alter the limits of removal or the Site Plan to show the existing asphalt connecting to the public pathway with the approach onto Waldon Rd. removed.

The multi-family portion of the development is more than 150 feet in length and requires an approved turnaround for fire safety access. Please refer to the Fire Department for additional comment on fire truck access.

PAVING & GRADING:

Existing grades were provided via 2-foot contours and spot grades along pavement areas and natural water features. The high-point onsite is at approximately 990 along the northern border of the site, with the low-point being at approximately 968 where the existing stream outlets. Proposed grades were provided via mostly 2-foot contours with some 1-foot contours included along with spot grades at top-of-curb and bottom-of-curb. Finish floor grades for each building were also included. Contours near the existing pond and northern property border appear to indicate maximum site slopes of 1:3 which is higher than the recommended maximum allowable slope per Township Standards. The site grading shall be revised to meet the Township recommended maximum allowable slope of 1:4.

Pavement slopes appear to be acceptable for Concept PUD review and will be reviewed in greater detail at Engineering. In general, pavement slopes are to remain between 1 and 4% in parking areas and 1 and 6% in drive aisles. Ramp and landing corner grades will be required at Engineering to assess ADA compliance. Pavement sections for the sidewalk, public pathway, MDOT approach, drive aisles, and dumpster pads will be required at Final PUD.

NATURAL FEATURES:

WOODLANDS

There is a large quantity of existing trees onsite. The highest concentration appears to be in the southeast corner of the site. A tree survey identifying landmark trees and tabulating the necessary tree removals and replacement trees will be required at Final PUD.

WETLANDS

There are wetlands located in the southern half of the site. There is currently sheet piling and a weir on the east side of the wetlands which allows controlled drainage to flow down an existing stream prior to entering a small pond that has a secondary weir which allows water into the 60-inch storm sewer that conveys the water east across M-24. The applicant is proposing to remove the stream, small pond, and both weirs from the site, in favor of a new drainage course using a proposed swale-drain along the south side of the site. Other wetland impacts include proposed storm sewer, water main, paving and retaining walls within the 25-foot wetland buffer. It should be noted that the Classic Car Club site originally included some of the impacts to these wetlands and was approved for wetland impact activities. The EGLE Wetland Impact Permit was included with the application and is valid until May 12, 2025. An additional or amended permit from EGLE and Orion Township will be required for the stream removal and other impacts to the wetland including the 25-foot buffer. The permit application to Orion Township will be required at Final PUD.

LANDSCAPING:

A Landscape Plan was not included in the plans and will be required at Final PUD. The applicant shall provide sufficient separation between public utilities (water main and sanitary sewer), and trees.

CONCLUSION:

In our opinion, the Concept PUD is not in substantial compliance with the Township's ordinances and engineering standards. We ask that the following comments be addressed:

1. A Traffic Impact Study (TIS) should be provided for review and approval.
2. Stream relocation, Channel Protection, and stormwater detention need to be included in the Density Plan.
3. Channel Protection will be required for this site and should be shown in the Concept plan.
4. The relocated stream needs to be reflected on all sheets within the set.
5. An approved turnaround needs to be provided at the end of the multi-family portion of the development.
6. Site grading shall be revised to meet the Township recommended maximum allowable slope of 1:4.
7. The existing survey should be updated to reflect the current parcel configuration and provide a legal description.
8. The Sheet Index on the cover sheet needs to be revised to match the plan set.

Please feel free to contact us with any questions at (248) 751-3108 or joseph.lehman@ohm-advisors.com.

Sincerely,
OHM Advisors

Joe Lehman, PE
Project Engineer

Mark A. Landis, PE
Project Manager

cc: Chris Barnett, Township Supervisor
David Goodloe, Building Official
Bill Basigkow, Director of Public Services
Tammy Girling, Director of Planning and Zoning
Lynn Harrison, Planning and Zoning Coordinator
Jeff Williams, Township Fire Marshal
Rod Arroyo, Township Planning Consultant
John Canine, Applicant
Michael Wayne, Detroit Riverside Capital
File

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Charter Township of Orion

3365 Gregory Rd., Lake Orion MI 48359
www.oriontownship.org

Fire Department
Phone: (248) 391-0304, ext. 2000
Fax: (248) 309-6993

To: Planning Commission/Planning & Zoning Director
From: Jeff Williams, Fire Marshal
Re: PC-222-39, Hudson Square PUD Concept Plan
Date: 10/31/2022

The Orion Township Fire Department has completed its review of Application PC-22-39 for the limited purpose of compliance with Charter Township of Orion Ordinance's, Michigan Building Code, and all applicable Fire Codes.

Based upon the application and documentation provided, the Fire Department has the following concerns regarding the concept plan.

Concerns:

- The access drive that leads to the multifamily development is more than 150' in length and does not have an approved turn around. This item must be addressed before the fire department can give final approval. Please be advised that a future cross connection to a possible development located to the West of this property will not be considered and or approved.

If there are any questions, the Fire Department may be reached at 248-391-0304 ext. 2004.

Sincerely,

Jeffrey Williams

Jeff Williams, Fire Marshal
Orion Township Fire Department

WRC
WATER RESOURCES COMMISSIONER
Jim Nash

October 21, 2022

Lynn Harrison
Orion Township
Planning & Zoning
2323 Joslyn Road
Lake Orion, MI 48360

Reference: **Hudson Square - CAMS #202200828**
Part of the NW ¼ of Section 26, Orion Township

Dear Ms. Harrison,

This office has received one set of plans for the Hudson Square Project to be developed in the Northwest ¼ of Section 26, Orion Township.

Our stormwater system review indicates that the proposed project has no direct involvement with any legally established County Drain under the jurisdiction of this office. Therefore, a storm drainage permit will not be required from this office.

The water system is operated and maintained by Orion Township and plans must be submitted to Orion Township for review.

The sanitary sewer is within the Clinton-Oakland Sewage Disposal System. Any proposed sewers of 8" or larger may require a permit through this office.

Please note that all applicable permits and approvals from federal, state or local authorities, public utilities and private property owners must be obtained.

Any related earth disruption must conform to applicable requirements of Part 91, Soil Erosion and Sedimentation Control of the Natural Resource and Environmental Protection Act, Act 451 of the Public Acts of 1994. An application should be made to Orion Township for the required soil erosion permit.

If there are any questions regarding this matter, please contact Dan Butkus at 248-897-2744.

Sincerely,

Brian Bennett, P.E.
Civil Engineer III

A site walk was conducted on November2, 2022. The site has been reviewed at least 2 other times within the last 3 years. The site is located at the northwest corner of Lapeer Road and Waldon Road. The previous building has been demolished and the property is vacant. It is heavily wooded with a pond and stream along the southern property. There is dense foliage along the Waldon Road property line.
The property abuts a church to the north. To the south is a veterinary office building and dog kennel.
Previous requests included a 2 story car club and restaurant and a multistory apartment complex.

Respectfully submitted,

Donald Gross, Planning Commissioner

Donald Gross, Planning Commissioner
Charter Township of Orion
2525 Joslyn Rd., Lake Orion MI 48360
dgross@oriontownship.org
http://www.oriontownship.org

254 Four Seasons Drive
Lake Orion, MI 48360

October 31, 2022

Planning Commission
Orion Township Hall
2323 Joslyn Road
Lake Orion, MI 48360

To: Lake Orion Township

re: PC-22-39, Hudson Square Planned Unit Development
3030 S. Lapeer Road, (Sidwell #09-26-101-021)

I oppose the rezone of this property from single family residential and conditional general business to planned unit development w/mixed use . . . drive up coffee shop and sit down restaurant w/attached car club and 6 building multi-family residential.

My reason for my objection is the additional vehicle traffic that will be brought on by the drive thru coffee shop and restaurant on this intersection. The traffic is always backed up on Waldon Road turning right on Lapeer - this is just not acceptable as there is no light or ?? to help the traffic flow. I can just see the line up of vehicles for coffee which will interfere with the Church, condo complex, Animal Hospital, and those turning right on to Waldon Road, along with the walkers and bike riders. The traffic speed is 55 mph+ - having this congestion at this site is many accidents waiting to happen. I've seen the back up of traffic from the Starbucks in town. Do we really another situation like that in this area?

Please reject this proposal, please!

Sincerely,

Cheryl Querro

Cheryl Querro

Objection to rezoning of 3030 S. Lapeer Rd, Sidwell #09-26-101-021. PC-22-39, Hudson Square Planned Unit Development

I would like to voice my objection to the rezoning of property at 3030 S. Lapeer Rd PC-22-39.

A free standing drive-thru coffee shop, a car club with sit down restaurant and multi family homes, wow that's a lot going on ..it is too much for this corner of Lapeer and Waldon in my opinion.

I feel as if the developer is pushing the envelope to see where the line will be in regards to how much they can pack into this area …this is just "scope creep" pain and simple.

I urge the Planning commission to reject this request for rezoning and to find a development that "fits" the area in regards to the master plan and the surrounding community.

Thank you for your time and consideration,

Michael Caldwell
336 Four Seasons Dr
Lake Orion, MI 48360

October 31, 2022

Mr. Scott Reynolds
Orion Township Planning Commission
2323 Joslyn Rd.
Lake Orion, MI., 48360

Dear Mr. Reynolds,

I am writing this letter in response to the recently proposed development at 3030 S. Lapeer Rd. Like many in our community, my Husband and I moved to this area after many years working in a congested urban environment. We chose this community because of the amenities it offered, but most importantly the slower pace and peaceful lifestyle that this community afforded. In addition to our fellow retirees, we have encountered many young families who chose to raise their children away from the chaos of urban life. We felt we had it all, a slower simpler lifestyle, reasonable traffic, the absence of noise and all the negative aspects of densely populated areas. Through the years development, both commercial and residential have fundamentally changed the landscape of this once laid-back community. Navigating the roads at certain times of the day is virtually impossible. Simple trips must now be timed to avoid endless gridlock. Traffic noise and pollution are drowning out a once peaceful existence. Crime, although still relatively low, is sure to follow unchecked expansion. This can only further drain limited resources, the cost of which will far outstrip the limited tax revenue generated by this reckless development. The true cost will be borne by hardworking residents and retirees with limited resources. It won't be long before the taxpayers are asked to approve tax mileages to widen roads and install infrastructure to support a system not originally intended for its current use. None of this is in keeping with the nature of the community or the desires of those who moved here to escape that toxic lifestyle. My Husband and I made great sacrifices during our working years to be able to live in a place where we could enjoy the peace and quite of our golden years. We are not however possessed with infinite resources that allow us to pick up and go elsewhere. In our vulnerable years we are at the mercy of those tasked with maintaining the dignity of this community and the essence of a lifestyle we worked very hard to obtain. How many coffee shops, restaurants, car clubs, strip malls, and gas stations do we really need? Respectfully, we must ask you and your colleagues to reject this further development, lest the damage already done become unreversible.

Sincerely
Beverly Walton

From: Linda Martin-Seng <lindamartinseng77@gmail.com>
Sent: Tuesday, November 15, 2022 6:57 AM
To: Tammy Girling <tgirling@oriontownship.org>; Lynn Harrison <lharrison@oriontownship.org>
Cc: info@sweetamyseatinghouse.com
Subject: New restaurant/coffee shop approval!

Good morning,

I am writing to express my excitement for a new Sweet Amy's restaurant in Orion Township! Although we are from Clarkston, we frequented the previous facility often (at least once a week) because it was good, clean food with options for people with food sensitivities and allergies. We eat very clean- generally organic, and definitely never fast food! Sweet Amy's has always provided a great source of excellent options for food.

Last year when I had a difficult diagnosis and was fasting once a month for 3 days during my treatments, Sweet Amy's was our go to place to break my fast and enjoy healthy food. The people there were always so kind and the atmosphere was very enjoyable.

I have taken countless friends to that establishment from many different communities. We ended up shopping in Lake Orion and visiting other places in the area.We even celebrated Mother's Day two years ago with 15 people at the previous Sweet Amy's and the entire family loved it and went back several times afterward from all over the metro Detroit area.
We are hoping you will approve these new plans as this looks to be a perfect spot and opportunity for a very beneficial restaurant in the area.

My go to coffee is Biggby as opposed to any other big brand. So I hope that will also be approved as there are few Biggby's in the northern area of the Detroit Metro region.

Thank you for your consideration. This place means so much to so many. I truly hope you will approve this wonderful project and support this fantastic family business!

Linda and Michael Seng
6625 Shelley Drive
Clarkston, MI 48348
(248) 910-1198

943 Watersmeet Drive Oxford, MI 48371 248.515.7364

November 15, 2022

Dear Tammy Girling,

Attached are Sweet Amy's Eating House recent Facebook posts regarding the potential new Sweet Amy's development, and a portion is reflective of the community feedback of the overall Hudson Square parcel. I am attaching below the number of likes, loves, comments, etc. that we received. If we purely evaluate the comments received, the ratio of negative is 4% and positive is 96%. This feedback represents an overwhelming broad support for this project.

I am requesting that you include these statistics as positive support in the Hudson Square file.

Feel free to contact me with any questions you may have.

Kind regards,

Amy Harris

Amy Harris, Proprietor
Sweet Amy's Eating House (legal name- Honest to Goodness Breakfast & Smoothies, LLC)

Facebook Post General Feedback

- 494 overall post likes
- 151 overall post loves
- 8 overall post "wow" face (shock)
- 1 overall post sad face
- 2 overall care face (emoji w/ heart)
- 249 positive comments
- 11 negative comments
- 191 positive likes to comments
- 17 positive loves to comments
- 3 positive care to comments
- 8 negative likes to comments
- 27 shares
- 6 individuals provided negative comments (included in 11 negative comments above)

From: Rilee Harris <rilharris@gmail.com>
Sent: Tuesday, November 15, 2022 11:37 AM
To: Tammy Girling <tgirling@oriontownship.org>
Cc: Lynn Harrison <lharrison@oriontownship.org>; Amy Work (HTG Breakfast) (info@htgbreakfast.com) <info@htgbreakfast.com>
Subject: Letter of Support: Sweet Amy's Eating House

Dear Orion Township offices and residents,

I am writing in support of the proposed development that will make possible the opening of Sweet Amy's Eating House and a Biggby Coffee location in Lake Orion. The addition of these two businesses will provide a dining solution and jobs for a variety of individuals. Biggby fills a need for the hurried school goer, business professional, and commuters. Whereas Sweet Amy's Eating House provides a unique scratch kitchen alternative, that expands dining options for those with dietary restrictions.

As some of you may know, Amy and Scott Harris are my parents. Since beginning their venture in 2016, I have watched them pour their time, money, and energy into making their vision to provide a healthy and distinct eating option in Lake Orion a reality. I worked as a server and was a frequent dine-in guest over the six year span Sweet Amy's was open previously. During this time, I heard firsthand the positive feedback and gratitude for having their restaurant available in Lake Orion.

Every business owner is presented with challenges, I can attest Amy and Scott experienced their fair share too. For example, the very first day the restaurant was open for business our head chef injured himself and couldn't work that day. Instead of shutting down on opening day, the kitchen crew adapted their approach and Scott, my dad, rolled up his sleeves and assisted the team to the best of his ability. Additionally, they weathered the uncertainty of the COVID-19 pandemic. Adapting their service models and menus to combat the ever changing staff availability and supply chain issues. Overall, if grit could be defined by people, I would immediately point you in the direction of Amy and Scott.

The community would be remiss to lose out on the opportunity to have another business supported by Amy and Scott in the area. Please feel welcome to contact me with any questions. I can be reached at rilharris@gmail.com or (248) 842-2389.

Thank you,

--
Rilee Harris
(248) 842-2389

DETROIT RIVERSIDE CAPITAL

OCTOBER 19, 2022

HUDSON SQUARE

APPLICATION FOR PLANNED UNIT DEVELOPMENT (1ST SUBMISSION)

DETROIT RIVERSIDE CAPITAL
ATTN: MICHAEL WAYNE
3300 Auburn Rd. Suite 300 Auburn Hills, Mi 48326

General Information

Applicant Name: John & Nanci, LLC.

Applicant Contact: Dr. John Canine – (248) 396-4793; jdcanine@comcast.net

Plan Preparer: Detroit Riverside Capital

Plan Preparer Contact: Michael Wayne – (248) 953-4891; Michael@DetroitRiversideCapital.com

Project Name: Hudson Square

Subject Parcel ID(s): 09-26-101-021

Subject Parcel Address: 3030 S. Lapeer Rd. Orion Township, MI 48359

Common Description of Parcel: The subject parcel is at the corner of Lapeer Rd. and Waldon Rd. in Orion Township, MI. The parcel totals 7.07 acres. The current parcel is partially wooded and contains an existing wetland near the southwest quadrant of the site.

Legal Description of Parcel: Attached to application package as *Exhibit A*, titled Legal Description

Comprehensive Statement of Intent

Hudson Square is a mixed-use development featuring 24 residential units for lease, 5,700 SF of retail, and a 3,000 SF classic car club facility. The residential component will feature both 2- and 3-bedroom dwelling units. These will range in size from 1,200 SF to 1,600 SF and will each be serviced by an attached two car garage. The two-bedroom units will each feature a 190 SF outdoor patio and the three-bedroom units will feature a 400 SF outdoor patio. The residential component will be spread across 6 separate two-story buildings, each containing four dwelling units. Each two-story building is approximately 7,400 SF in total.

The retail space is divided between two independent users. Approximately 1,700 SF will be occupied by Biggby Coffee in a freestanding drive-through building in the Northeast quadrant of the site. The remaining 4,000 SF will be a sit-down, upscale restaurant occupied by Sweet Amy's Eating House, a former Orion Township staple restaurant that will relocate and revamp their offerings in this new facility.

The 3,000 SF classic car facility will be attached to the restaurant space to form one 7,000 SF building. This is done deliberately to allow the classic cars to be a showpiece for restaurant-goers. The spaces will be separated from one another, except for the visual connection created by certain windows within the demising wall that separates the two spaces.

Hudson Square is a phenomenal addition to the current landscape of Orion Township, delivering much needed residential for-lease housing options to existing and future Orion Township residents. These residential dwellings will attract and service the existing Orion Township demographic of "empty nesters" looking to relieve themselves of maintenance responsibilities, or young families looking for a transitional residential option before investing in their dream home. These dwellings will also attract

new residents to the Township, who may not be able to find accommodation within the existing residential landscape of Orion Township to fill this need.

The commercial component of the project will also address a tremendous need for both quick-service retail by way of Biggby Coffee, as well as a sit-down, upscale dining establishment like Sweet Amy's Eating House. This fills a vast unmet need in the township and does so in an area of the township that is particularly lacking existing dining options.

Market Concept

Detroit Riverside Capital's analysis of the existing multi-family market in Orion Township and the surrounding area indicates that there is significant demand for additional multi-family dwellings. The following is a list of existing multi-family properties within the surrounding area and their respective current occupancy:

1. Heron Springs Townhomes & Apartments - 99%
2. Indian Lake Village Apartments (immediately adjacent to proposed development) - 100%
3. Abbey Ridge Apartments - 100%
4. Parkways of Auburn Hills - 100%
5. Redwood Lake Orion Apartment Homes - 100%

These occupancy rates indicate that the existing supply of apartments within Orion Township and the surrounding area has been fully absorbed and additional supply of multi-family dwellings are needed to sustain community growth.

Additionally, the population within a 5-mile-radius of the proposed site is expected to grow by more than 2,300 by 2025, or 2.5%. For Orion Township to capture their share of this growing population, with the existing supply fully occupied, additional dwellings must be built to support the growing demand.

With respect to the proposed Biggby Coffee, the existing supply of comparable offerings to Biggby Coffee are sparce. There is one existing coffee shop almost 2 miles north on Lapeer Rd., however it currently does not offer a drive through. There are no comparable coffee shop locations south on Lapeer Rd. of the proposed Biggby location.

With respect to the proposed Sweet Amy's Eating House, the existing supply of comparable offerings is practically non-existent. There are a few existing sit-down, upscale dining establishments in the Township, however, none are equivalent to the market offering of Sweet Amy's. Sweet Amy's will bring a unique dining option through their natural-based menu, which provides strict accommodations for common dietary restrictions. This type of offering is currently unavailable anywhere in the Township.

With respect to the proposed Orion Classic Car Club, this is truly a one-of-a-kind destination. This 3,000 SF facility will be a place for car enthusiasts to gather and socialize over a shared love of the automobile. This space will function as a unique showpiece feature for Sweet Amy's clientele.

The inherent lack of supply of existing comparable offerings directly highlights the demand for the proposed commercial elements of Hudson Square. With a growing population and other residential

development in the area, it is critical to provide additional commercial dining options to satisfy the needs of existing and future Orion Township community members.

Superiority of PUD Plan

The Proposed PUD plan is superior to a plan that complies with the existing zoning. The Density plan included in the PUD application reflects a site plan that is compliant with existing zoning. The PUD plan is superior because it is less intense than the density plan. The density plan provides for over 20,000 SF of commercial space, while the PUD plan only proposes 8,700 SF. The density plan also co-mingles heavy commercial with high density single-family residential on the same parcel. The single-family homes access from the back parking lot of the commercial. This is not desirable for single family homeowners. The PUD plan provides a gentle transition from the commercial uses on the East half of the subject parcel to the multi-family use on the West half of the subject parcel to the adjacent parcel zoned single-family. This transition is more desirable than heavy commercial transitioning directly to single-family residential. The proposed PUD also only requires access from Lapeer Rd., while the Density plan has access to both Lapeer Rd. and Waldon Rd. This creates additional, undesired traffic congestion on Waldron Rd., while the PUD plan avoids this.

PUD Eligibility Criteria – Zoning Ordinance Section 30.03 (B)

1. **Recognizable Benefit** - *How will a PUD approval result in a recognizable and substantial benefit to the ultimate users of the project and the community?*

   Lapeer & Waldon has been specifically designed with the preservation of natural features in mind. The site currently features a beautiful wetland feature roughly half an acre in size in the Southwest quadrant of the site. This feature will be preserved in full and accented through the proposed PUD site plan. The site also features beautiful, well-aged trees near the North property line. These will all be preserved within the 30-foot landscape buffer along the North property line. The remainder of the site features other existing natural features. Once a tree survey is prepared during the Final PUD phase, we will be able to provide additional details about how tree/natural feature preservation was prioritized in site design. Under the current proposed PUD site plan, roughly 28% of the existing site has been preserved in its natural condition.

   Hudson Square will be a direct improvement to the aesthetic qualities of the existing site and surrounding area. The existing site is currently unusable and inaccessible to the community. Hudson Square will turn the existing, underutilized site into a beautiful mixed-use development, introducing needed housing and commercial elements to the community. Per the ordinance, Hudson Square will provide safety path connection to the surrounding area of the Township. Currently, the existing safety path runs roughly 2,500 feet to the north of the subject parcel, but it does not currently connect to Waldon Rd. or the existing 500 feet of safety path that exists to the south of Waldon Rd. along Lapeer Rd. Hudson Square will provide for the connection of these two existing paths to create a total of 3,600 feet of connection from North to South along Lapeer Rd.

Hudson Square also provides the connection to a tremendous, 3.3-mile section of safety path that exists to the West of the subject parcel along Waldon Rd. This existing safety path runs all the way from the intersection of Waldon & Lapeer Roads to Waldon and Baldwin Roads. This path is currently not accessible from the existing 2,500 feet of safety path to the north of the subject parcel. As a result of the proposed PUD plan, the safety path from the north end of Home Depot will connect all the way to Baldwin Rd., a section of safety path totaling 3.85 miles.

Hudson Square will feature gorgeous high-end architectural design throughout the development. The residential dwellings will feature a modern farmhouse style exterior façade, complete with traditional and board and batten siding, stone accents, and architectural details. The 400 SF outdoor patios will be accessible from the second floor, three-bedroom dwellings, providing a tremendously unique architectural feature not available in any existing residential dwellings within the Township (See elevations of residential dwellings within PUD plan for reference). This architectural detail will give interest to the site lines of the residential components from neighboring properties. The residential dwellings will blend with the existing surrounding area in mass, scale, height, and aesthetic.

The interior of the units would be equally high-end, complete with stainless steel appliances, quartz countertops, soft-close cabinetry, name-brand plumbing and lighting fixtures, and smart-home elements such as electronic access system and smart thermostats.

The commercial elements of Hudson Square are designed with high-quality architecture to mirror that of the residential component. The elevations, including anticipated façade materials, of the restaurant and car club building are included in the PUD plan for reference. The buildings provide for a unique visual connection between the two uses, as well as a largely glass façade on the West and south portions of the restaurant façade to highlight the beautiful adjacent wetland and other natural features surrounding the building.

A final recognized community benefit of Hudson Square is the public art feature proposed near the Southeast corner of the site that is visible at the intersection of Waldon and Lapeer Roads. This art feature will be built with a grade-level 10-foot in diameter concrete pad and a 3-foot in diameter pedestal centered within the grade-level pad to display the art feature. The area will include seating and lighting to accent the art feature. The art feature will be developed in collaboration with the Detroit Institute of Art and will be subject to final approval by the Township.

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2. **Density Impact** - *Will the proposed type and density of use result in a material increase in the use of public services, facilities, and utilities, in relation to what would be permitted if the property were developed without using the PUD?*

   The subject parcel is currently split between two zoning categories, general business (GB) on the Eastern portion of the site and high-density single family residential (R2) on

the West portion of the site. Per the provided density plan in the PUD application, the R-2 portion of the site could accept roughly 6 single family houses in accordance with the R-2 zoning ordinance. Assuming an average of 3 occupants per single family dwelling and 6 single family dwellings, that would indicate 18 total occupants. By comparison, assuming an average of 2 occupants per multi-family dwelling unit and 24 multi-family dwellings, would indicate 48 total occupants. So, while the number of dwelling units of the proposed is 4x greater than what the density plan supports, the number of occupants living in the proposed units are only 2.6x greater, or 30 people greater in total.

As a result, the development as proposed will increase the use of public services, facilities, and utilities compared to what is provided by the existing zoning. However, the impact on public services will be negligible when viewed in relation to the township overall. The additional 30 people in the proposed residential dwellings will provide zero material impact to public services like roads, facilities, police, fire, and EMS.

DRC commissioned a traffic study with Feliz & Vanderbrink to highlight the negligible impact Hudson Square has on existing traffic congestion. This study will be available for submission and review on 10/31/22.

From the perspective of water and sewer utilities, there is sufficient existing capacity in Orion Township to service the proposed development. The addition of the 18 dwelling units (30 people) does not cause an adverse, or even material effect to the water and sewer capacity in the township.

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3. **Township Master Plan** - *Will the proposed development be consistent with the intent and spirit of the Master Plan and community?*

The current zoning for this parcel is split between Single-Family Residential (R2) to the West and General Business (GB) to the East. The future land use map also shows a split between single-family residential (R2) and Special Circumstance indicating the conditional rezoning to General Business (GB). Therefore, the intent and spirit of the proposed development is to provide a development with both residential and commercial elements that aligns with the future land use of each parcel. Lapeer & Waldon will provide additional residential housing for the Township on the West parcel and a commercial development comprised of retail and a classic car club facility on the East parcel.

The future land use designation of the updated masterplan calls for multi-family low density residential in areas along Lapeer Rd. to function as a buffer for the more rural residential neighborhoods to the East/West of the corridor. This description is a direct representation of Hudson Square, as it does exactly that to the existing residential neighborhoods to the West.

In addition, Hudson Square was designed specifically to comply with the goals and objectives presented in the 2022 Orion Township Master Plan. Examples of compatibility include the following:

1. High-Quality & Diverse Housing Options Zoning Action 1a: *Develop zoning standards for "missing middle" housing, including but not limited to duplex, triplex, quadplex and cottage court bungalow dwellings in multiple family districts.*

   Lapeer & Waldon will provide a Missing Middle housing type that provides a high-quality, marketable option between the scales of single-family homes and mid-rise flats for walkable urban living. It is designed to meet the specific needs of shifting demographics and a new market demand, which are key components for diverse housing, which aligns with the Township's Master Plan.

2. Economic Development Objective 1: *Achieve a balanced variety of neighborhood-, community-, and regionally oriented facilities that will meet the shopping and service needs of the community and nearby metropolitan area populations without unnecessary duplication.*

   The subject parcel is located along the Lapeer Road corridor where the Townships Master Plan designates commercial and mixed-use developments should be located. Direct access to a major thoroughfare is key to the viability of this use. The master plans future land use references Neighborhood Commercial zoning should be located in close proximity to residential neighborhoods which will help meet the day-to-day shopping needs of nearby Township residents. The subject parcel is compatible with the adjacent parcel uses given that the future land use map calls out for General Commercial to the south, Neighborhood Commercial to the north and Residential to the East and West.

3. Section IV. Environmental Resources Goal A: *To Preserve the Natural Resources of Orion Township*

   Hudson Square was created with nature preservation at the forefront of the site design. The half-acre of existing wetland will be surrounded by an additional 1.2 acres of preserved natural/open space. It was imperative to our design that we did not eliminate, restrict or reduce the size of this wonderful natural feature. Hudson Square, as proposed, does not do so.

In addition to Hudson Square being compliant with the intent and spirit of the master plan, it is also perfectly blends and is compliant with the existing land uses of adjacent parcels. To the north is an existing church, or institutional use. Church-goers will benefit from the adjacent Biggby coffee and Sweet Amy's Eatery for before and after services. To the south is an existing veterinary clinic and a commercial/office use. Customers and employees alike can benefit from both the commercial and residential elements of Hudson Square. To the East, across Lapeer Rd. is a multi-family residential community. This is an identical use with the proposed residential component of Hudson Square.

Finally, to the West is an existing single-family home and a vacant parcel zoned high density single-family residential. The residential component of Hudson Square is of single-family residential height, scale, mass, and character. Therefore, it complies with the adjacent single-family use.

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4. **Economic Impact** - *Will the proposed PUD have a material negative economic impact upon surrounding properties?*

   The proposed PUD places no negative economic impact on the surrounding land or other property owners. Hudson Square acts as a gentle transition between the high-trafficked Lapeer Rd. corridor and the single-family residential land to the West on Waldon Rd.

   The residential units in the proposed development are two-story with a height of 30 feet. From the perspective of these two elements of the existing zoning ordinance, the proposed residential is compliant. Therefore, the proposed residential dwellings will be of similar height, mass, and character to the residential dwellings of the surrounding parcels. Furthermore, the proposed residential dwellings are configured in six separate structures, the same number of structures that are permitted in the Density plan based on underlying single-family zoning. From the exterior, the proposed residential dwellings appear more like six large single-family dwellings than they do a single 24-unit multi-family structure.

   The commercial component of the proposed development is compliant with the general business zoning district of Orion Township. While the subject parcel is conditionally rezoned to general business for a specific use, the conditional zoning could be amended to allow for the proposed development within the general business zoning category. Given that the proposed commercial uses are in the same general character as the conditionally rezoned use, the proposed commercial component provides zero adverse economic impact to surrounding land or property owners. On the contrary, the proposed provides an economic benefit to the surrounding property owners and the community by providing for two new commercial users to serve the community.

---

5. **Guaranteed Open Space** - *Does the proposed PUD contain at least as much usable open space as would be required in the Ordinance for the existing zoning?*

   The proposed development contains both a residential use and a non-residential use. On the residential portion of the proposed PUD plan, the proposed development provides for roughly 35% open space compared to the minimum threshold of 15% required open space for residential uses. This open space will be preserved in its natural habitat. In areas where development requires removal of existing landscape, those areas will be compensated through added landscaping in other places throughout Hudson Square.

On the commercial portion of the proposed PUD plan, the proposed development provides for roughly 15% open space compared to the minimum threshold of 10% required open space for non-residential uses.

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6. **Unified Control** - *Is the proposed PUD under single ownership or control such that there is a single person or entity having responsibility for completing the project with this Ordinance?*

   The subject parcel is currently owned by the applicant, Dr. John Canine (John and Nanci, LLC.), therefore demonstrating unified control of the subject parcel.

Charter Township of Orion
Planning & Zoning Department
2323 Joslyn Rd., Lake Orion MI 48360
P: (248) 391-0304 ext. 5000

Case #

Meeting Date: _

Charter Township of Orion Planning Commission
Planned Unit Development (PUD) Application

Project Name: Hudson Square

Applicant

Name: Dr. John Canine

Address: 3604 Clarkston Rd. City: Clarkston State: MI Zip: 483248

Phone: 248-595-9969 Cell: 248-396-4793 Fax: _____

Email: jdcanine@comcast.net

***Property Owner(s)**

Name: Same as above

Address: _____ City: _____ State: _____ Zip: _____

Phone: _____ Cell: _____ Fax: _____

Email: _____

* If the name on the deed does not match the name of the property owner on this application, documentation showing the individual is the same as the company name must be provided.

Plan Preparer Firm/Person

Name: Detroit Riverside Capital

Address: 3300 Auburn Rd. Suite 300 City: Auburn Hills State: MI Zip: 48326

Phone: _____ Cell: 248-953-4891 Fax: _____

Email: Michael@DetroitRiversideCapital.com

Project Contact Person

Name: Same as plan preparer

Address: _____ City: _____ State: _____ Zip: _____

Phone: _____ Cell: _____ Fax: _____

Email: _____

Property Description

Sidwell Number(s): 09-26-101-021

Location or Address of Property: 3030 S. Lapeer Rd.

Side of Street: West Nearest Intersection: Lapeer & Waldon

Acreage: 7.07 Current Use of Property: Vacant

Frontage (in feet): 441' Depth (in feet): 708'

Subject Property Zoning: R2/GB Adjacent Zoning: N. Institutional S. OP E. RM-1 W. R-2

Is the complete legal description printed on the site plan? ☐ Yes ☐ No (if no please attach to the application)

Included in application as Exhibit A

Intent/Eligibility/Design Standards

Comprehensive Statement of Intent: Give a detailed description of the proposed development (refer to Ord. 78, Section 30.03(A)). Please indicate the number and size of the buildings or units be proposed (attach a separate sheet).

Narrative Description of Project: Provide info of the market concept of the project, and explaining the manner in which the criteria set forth for eligibility (Ord. 78, Section 30.03(B)) and design (Ord. 78, Section 30.03(C)-(E)) have been met (attach a separate sheet detailing each criteria).

Per Ord. 78, 30.03(C)(6), all Zoning Ordinance requirements for the underlying zoning district shall remain in full force unless waived or modified by the Planning Commission and Township Board. Below is a list of requirements, please list the current zoning requirement and what is being proposed. Please also detail how the specific design criteria listed is being met.

	Per Zoning Ordinance	Proposed
Lot size and width		
Lot coverage		
Min floor area		
Front, side, and rear setbacks		
Height		
Parking and loading	See sheet C-2 of PUD plan	
Fencing		
Landscaping		
Setback for side entry garage		
Other		

Does the project have adequate:

Perimeter setback and berming? Yes

Thoroughfare design? Yes

Drainage design? Preliminary

Utility design? Preliminary

Underground utilities? Preliminary

Pedestrian circulation system from vehicular thoroughfares and ways? Yes

Achievement of an integrated development with respect to signage, lighting, landscaping, and building materials? Yes

Noise reduction and visual screening mechanisms (particularly where nonresidential uses adjoin off-site residentially zonedproperty)? Yes

Outside Agencies

Per Ord. 78, Section 30.01(C), a copy of this application and two (2) copies of the site plan must be submitted to each of thefollowing agencies. Please provide the Township with a copy of each transmittal as proof of delivery.

AT&T
54 Mill St.
Pontiac, MI 48342

Consumers Power Company
530 W. Willow St.
Lansing, MI 48906

DTE Energy Co.
ATTENTION: NW Planning & Design
1970 Orchard Lake Rd.
Sylvan Lake, MI 48320

Michigan Department of Transportation (if applicable)
800 Vanguard Dr.
Pontiac, MI 48341

Oakland County Water Resources Commission
(To be submitted by the Township)

Oakland County Health Department
Building 34 East
1200 N. Telegraph Rd.
Pontiac, MI 48341

Road Commission of Oakland County (if applicable)
ssintkowski@rcoc.org
(Electronic submittal only)

Required Signage

Per Ord. 78, Section 30.04(H), a sign indicating the requested rezone shall be installed on the parcels(s) no less than 15 days prior to the scheduled public Hearing. Please check one:

☐ I will install the sign(s) as required (see below for specifications).

● I would like to lease signage from the Township (including installation).
(please complete attached Sign Request Form).

The sign shall have the following wording (see Ord. 78, Section 30.04(H) for additional requirements):

ZONING CHANGE PROPOSED	- (min 8" high letters)
For more information call:	- (min 3" high letters)
Charter Township of Orion	- (min 4" high letters)
Planning and Zoning Department	- (min 4" high letters)
248-391-0304 ext. 5002	- (min 4" high letters)

*Please note, the Township does offer the ability to rent the required signage (see attached form). Please contact the Planning and Zoning Department with any questions.

I/We, the undersigned, do hereby submit this application for Rezoning, pursuant to the provisions of the Charter Township of Orion Zoning Ordinance No. 78, Sections 30.03 and 30.01 and any other applicable ordinance requirements. In support of this request, the above facts are provided. I hereby certify that the information provided is accurate and the application that has beenprovided is complete.

Signature of Applicant:
(must be original ink signature) _____ Date: 10/19/22

Print Name: Dr. John Canine

I, the property owner, hereby give permission to the applicant listed above to act as my agent in submitting applications, correspondence and to represent me at all meetings. I also grant permission to the Planning Commission members to visit the property, without prior notification, as is deemed necessary.

Signature of Owner*:
(mustbe original ink signature) _____ Date: 10/19/22

Print Name: Dr. John Canine

*If the deed of ownership does not show an individual, ie a corporation, partnership, etc,, documentation must be provided showing theindividual signing this application has signing rights for the entity.

Exhibit A

Legal Description

First American Title™	ALTA Commitment for Title Insurance
	ISSUED BY **First American Title Insurance Company**
Schedule C	

Commitment No.: A-6930

The land is described as follows:

Parcel 1:
Part of the Northwest 1/4 of Section 26, Town 4 North, Range 10 East, Orion Township, Oakland County, Michigan, described as follows: Beginning at a point on the West line of Lapeer Road (M-24) distant South 88 degrees 31 minutes 30 seconds West 119.70 feet, South 6 degrees 30 minutes 36 seconds East 214.15 feet and South 6 degrees 43 minutes 26 seconds East 204.25 feet from the North 1/4 corner of said Section 26; thence Southerly along the said West line of Lapeer Road, South 6 degrees 43 minutes 26 seconds East 300.00 feet to the center line of Waldon Road; thence Westerly along the center line of Waldon Road, South 84 degrees 41 minutes 30 seconds West 1007.28 feet; thence North 4 degrees 00 minutes 30 seconds West 300.00 feet; thence North 84 degrees 41 minutes 30 seconds East 993.05 feet to the point of beginning EXCEPT the West 300 feet of said parcel.

Parcel 2:
Part of the Northwest 1/4 of Section 26, Town 4 North, Range 10 East, Orion Township, Oakland County, Michigan described as follows: Beginning at a point distant South 88 degrees 31 minutes 30 seconds West 119.70 feet and South 06 degrees 30 minutes 36 seconds East 214.15 feet and South 06 degrees 43 minutes 26 seconds East 64.25 feet from the North 1/4 corner, thence South 06 degrees 43 minutes 26 seconds East 140.00 feet; thence South 84 degrees 41 minutes 30 seconds West 693.05 feet, thence North 04 degrees 00 minutes 30 seconds West 185.92 feet; thence North 88 degrees 31 minutes 30 seconds East 686.92 feet to the point of beginning.

Parcel ID: 09-26-101-021

Exhibit B

EGLE Permit

EGLE

NOTICE OF AUTHORIZATION

Permit Number: WRP022393 v. 1 **Issued Date: May 12, 2020**
Site Name: 63-3030 South Lapeer Road-Orion Township **Expiration Date: May 12, 2025**

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division, P.O. Box 30458, Lansing, Michigan 48909-7958, under provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended; specifically:

☒ Part 301, Inland Lakes and Streams.

☒ Part 303, Wetlands Protection.

Authorized activity:

Impact 0.06 acres of wetland and 230 feet of open stream and 34 feet of enclosed stream with a total of 239 cubic yards of clean fill and riprap in wetland , and excavation of 9 cubic yards of fill in wetland, for the purposes of constructing a parking lot and a portion of a commercial building. Install 20 linear feet of 2-inch diameter watermain, 20 linear feet of 4-inch diameter watermain, 160 linear feet of 8-inch diameter watermain, 20 linear feet of 8-inch sanitary sewer line, and 34-linear feet of 18-inch diameter storm sewer line as depicted in the attached approved plans.

Relocate 230 linear feet of existing stream to 425 linear feet of new stream, which includes a 275 linear foot-long two-stage channel and a 150 linear foot-long portion enclosed in a 42-inch corrugated metal pipe. Restore 0.05 acres within the two-stage channel with a shrub and wetland mix seed mix as specified in the approved attached plans. Plant remaining riprap within the two-stage channel with live stakes as indicated in the approved attached plans. Remove an unregulated water control structure connecting the existing stream to an upstream in-line pond and construct a new water outflow to the relocated stream as described in the attached approved plans.

Construct a stormwater detention pond and install a stormwater overflow connection from the stormwater detention pond to the existing in-line pond as described in the approved attached plans.
All work shall be in accordance with the attached approved plans and the specific terms and conditions of the permit.

To be conducted at property located in: Oakland County, Waterbody: Unnamed stream, unnamed wetland Section 26, Town 04N, Range 10E, Orion Township

Permittee:

John Canine
936 Baldwin Road
Clarkston, MI 48348

Robert Primeau
Warren District Office
Water Resources Division
586-256-7274

This notice must be displayed at the site of work.
Laminating this notice or utilizing sheet protectors is recommended.
Please refer to the above permit number with any questions or concerns.

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
WATER RESOURCES DIVISION
PERMIT

Issued To:

John Canine
936 Baldwin Road
Clarkston, MI 48348

Permit No:	**WRP022393 v.1**
Submission No.:	**HNV-VAKH-QM75C**
Site Name:	**63-3030 South Lapeer Road-Orion Township**
Issued:	**May 12, 2020**
Revised:	
Expires:	**May 12, 2025**

This permit is being issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division, under the provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); specifically:

☒ **Part 301, Inland Lakes and Streams**

☒ **Part 303, Wetlands Protection**

Permission is hereby granted, based on permittee assurance of adherence to State of Michigan requirements and permit conditions, to:

Authorized Activity:

Impact 0.06 acres of wetland and 230 feet of open stream and 34 feet of enclosed stream with a total of 239 cubic yards of clean fill and riprap in wetland , and excavation of 9 cubic yards of fill in wetland, for the purposes of constructing a parking lot and a portion of a commercial building. Install 20 linear feet of 2-inch diameter watermain, 20 linear feet of 4-inch diameter watermain, 160 linear feet of 8-inch diameter watermain, 20 linear feet of 8-inch sanitary sewer line, and 34-linear feet of 18-inch diameter storm sewer line as depicted in the attached approved plans.

Relocate 230 linear feet of existing stream to 425 linear feet of new stream, which includes a 275 linear foot-long two-stage channel and a 150 linear foot-long portion enclosed in a 42-inch corrugated metal pipe. Restore 0.05 acres within the two-stage channel with a shrub and wetland mix seed mix as specified in the approved attached plans. Plant remaining riprap within the two-stage channel with live stakes as indicated in the approved attached plans. Remove an unregulated water control structure connecting the existing stream to an upstream in-line pond and construct a new water outflow to the relocated stream as described in the attached approved plans.

Construct a stormwater detention pond and install a stormwater overflow connection from the stormwater detention pond to the existing in-line pond as described in the approved attached plans.

All work shall be in accordance with the attached approved plans and the specific terms and conditions of the permit.

Waterbody Affected: Unnamed stream, unnamed wetland
Property Location: Oakland County, Orion Township, Town/Range/Section 04N10E26, Property Tax No. 09-26-101-009, 09-26-101-015

Authority granted by this permit is subject to the following limitations:

A. Initiation of any work on the permitted project confirms the permittee's acceptance and agreement to comply with all terms and conditions of this permit.
B. The permittee, in exercising the authority granted by this permit, shall not cause unlawful pollution as defined by Part 31 of the NREPA.
C. This permit shall be kept at the site of the work and available for inspection at all times during the duration of the project or until its date of expiration.
D. All work shall be completed in accordance with the approved plans and specifications submitted with the application and/or plans and specifications attached to this permit.
E. No attempt shall be made by the permittee to forbid the full and free use by the public of public waters at or adjacent to the structure or work approved.
F. It is made a requirement of this permit that the permittee give notice to public utilities in accordance with 2013 PA 174 (Act 174) and comply with each of the requirements of Act 174.
G. This permit does not convey property rights in either real estate or material, nor does it authorize any injury to private property or invasion of public or private rights, nor does it waive the necessity of seeking federal assent, all local permits, or complying with other state statutes.
H. This permit does not prejudice or limit the right of a riparian owner or other person to institute proceedings in any circuit court of this state when necessary to protect his rights.
I. Permittee shall notify EGLE within one week after the completion of the activity authorized by this permit by completing and forwarding the attached preaddressed postcard to the office addressed thereon.
J. This permit shall not be assigned or transferred without the written approval of EGLE.
K. Failure to comply with conditions of this permit may subject the permittee to revocation of permit and criminal and/or civil action as cited by the specific state act, federal act, and/or rule under which this permit is granted.
L. All dredged or excavated materials shall be disposed of in an upland site (outside of floodplains, unless exempt under Part 31 of the NREPA, and wetlands).
M. In issuing this permit, EGLE has relied on the information and data that the permittee has provided in connection with the submitted application for permit. If, subsequent to the issuance of a permit, such information and data prove to be false, incomplete, or inaccurate, EGLE may modify, revoke, or suspend the permit, in whole or in part, in accordance with the new information.
N. The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents, and representatives for any and all claims or causes of action arising from acts or omissions of the permittee, or employees, agents, or representative of the permittee, undertaken in connection with this permit. The permittee's obligation to indemnify the State of Michigan applies only if the state: (1) provides the permittee or its designated representative written notice of the claim or cause of action within 30 days after it is received by the state, and (2) consents to the permittee's participation in the proceeding on the claim or cause of action. It does not apply to contested case proceedings under the Administrative Procedures Act, 1969 PA 306, as amended, challenging the permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.
O. Noncompliance with these terms and conditions and/or the initiation of other regulated activities not specifically authorized shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, EGLE may initiate criminal and/or civil proceedings as may be deemed necessary to correct project deficiencies, protect natural resource values, and secure compliance with statutes.
P. If any change or deviation from the permitted activity becomes necessary, the permittee shall request, in writing, a revision of the permitted activity from EGLE. Such revision request shall include complete documentation supporting the modification and revised plans detailing the proposed modification. Proposed modifications must be approved, in writing, by EGLE prior to being implemented.
Q. This permit may be transferred to another person upon written approval of EGLE. The permittee must submit a written request to EGLE to transfer the permit to the new owner. The new owner must also submit a written request to EGLE to accept transfer. The new owner must agree, in writing, to accept all conditions of the permit. A single letter signed by both parties that includes all the above information may be provided to EGLE. EGLE will review the request and, if approved, will provide written notification to the new owner.

R. Prior to initiating permitted construction, the permittee is required to provide a copy of the permit to the contractor(s) for review. The property owner, contractor(s), and any agent involved in exercising the permit are held responsible to ensure that the project is constructed in accordance with all drawings and specifications. The contractor is required to provide a copy of the permit to all subcontractors doing work authorized by the permit.

S. Construction must be undertaken and completed during the dry period of the wetland. If the area does not dry out, construction shall be done on equipment mats to prevent compaction of the soil.

T. Authority granted by this permit does not waive permit requirements under Part 91, Soil Erosion and Sedimentation Control, of the NREPA, or the need to acquire applicable permits from the County Enforcing Agent (CEA).

U. Authority granted by this permit does not waive permit requirements under the authority of Part 305, Natural Rivers, of the NREPA. A Natural Rivers Zoning Permit may be required for construction, land alteration, streambank stabilization, or vegetation removal along or near a natural river.

V. The permittee is cautioned that grade changes resulting in increased runoff onto adjacent property is subject to civil damage litigation.

W. Unless specifically stated in this permit, construction pads, haul roads, temporary structures, or other structural appurtenances to be placed in a wetland or on bottomland of the water body are not authorized and shall not be constructed unless authorized by a separate permit or permit revision granted in accordance with the applicable law.

X. For projects with potential impacts to fish spawning or migration, no work shall occur within fish spawning or migration timelines (i.e., windows) unless otherwise approved in writing by the Michigan Department of Natural Resources, Fisheries Division.

Y. Work to be done under authority of this permit is further subject to the following special instructions and specifications:

1. Authority granted by this permit does not waive permit or program requirements under Part 91 of the NREPA or the need to acquire applicable permits from the CEA. To locate the Soil Erosion Program Administrator for your county, visit www.mi.gov/eglestormwater and select "Soil Erosion and Sedimentation Control Program" under "Related Links."

2. The authority to conduct the activity as authorized by this permit is granted solely under the provisions of the governing act as identified above. This permit does not convey, provide, or otherwise imply approval of any other governing act, ordinance, or regulation, nor does it waive the permittee's obligation to acquire any local, county, state, or federal approval or authorization necessary to conduct the activity.

3. No fill, excess soil, or other material shall be placed in any wetland, floodplain, or surface water area not specifically authorized by this permit, its plans, and specifications.

4. This permit does not authorize or sanction work that has been completed in violation of applicable federal, state, or local statutes.

5. The permit placard shall be kept posted at the work site in a prominent location at all times for the duration of the project or until permit expiration.

6. This permit is being issued for the maximum time allowed and no extensions of this permit will be granted. Initiation of the construction work authorized by this permit indicates the permittee's acceptance of this condition. The permit, when signed by EGLE, will be for a five-year period beginning on the date of issuance. If the project is not completed by the expiration date, a new permit must be sought.

7. The proposed channel relocation shall be constructed in the dry. Upstream and downstream plugs shall remain in place until the new channel is capable of handling flows without causing erosion.

8. The project is limited to area of permittee's ownership and riparian interest. All spoils, including organic and inorganic soils, vegetation, and debris, shall be placed above the ordinary high water mark, leveled, and stabilized with sod and/or seed and mulch in such a manner as not to erode into any waterbody or wetland.

9. All upland excavation shall be completed prior to connection with an existing lake or stream. The water in the authorized channel or canal shall be open to the public.

10. Prior to the initiation of any permitted construction activities, a sedimentation barrier shall be constructed immediately down gradient of the construction site. Sedimentation barriers shall be specifically designed to handle the sediment type, load, water depth, and flow conditions of each construction site throughout the anticipated time of construction and unstable site conditions. The sedimentation barrier shall be maintained in good working order throughout the duration of the project. Upon project completion, the accumulated materials shall be removed and disposed of at an upland (non-wetland, non-floodplain) site and stabilized with seed and mulch. The sedimentation barrier shall then be removed in its entirety and the area restored to its original configuration and cover.

11. All raw areas in uplands resulting from the permitted construction activity shall be effectively stabilized with sod and/or seed and mulch (or other technology specified by this permit or project plans) in a sufficient quantity and manner to prevent erosion and any potential siltation to surface waters or wetlands. Temporary stabilization measures shall be installed before or upon commencement of the permitted activity, and shall be maintained until permanent measures are in place. Permanent measures shall be in place within five (5) days of achieving final grade.

12. All dredge spoils not used for berm construction shall be placed on the adjacent uplands.

13. If the project, or any portion of the project, is stopped and lies incomplete for any length of time other than that encountered in a normal work week, every precaution shall be taken to protect the incomplete work from erosion, including the placement of temporary gravel bag riprap, temporary seed and mulch, or other acceptable temporary protection.

14. The unenclosed portion of the channel relocation described in the approved attached plans as the two-stage channel shall be restored with the approved attached specified seed mix and live stake and planting plan as a condition of this permit.

15. Installation of riprap shall be limited to the areas specified in the approved attached plans, specifically in the two-stage channel, the stormwater outfall structure, and the outfall area linking the in-line pond to the two-stage channel.

16. All work shall be in accordance with the approved attached plans and the specific terms and conditions of this permit.

17. The restoration of the two-stage channel shall be completed with the correct wetland seed mix and planting plan as described in the approved and attached plans before the removal of temporary erosion control devices. The permittee shall submit photographs of the two-stage channel once such activities have been completed and upload them to the site's permit details documents section of MiWaters within 30 days of complete of the project, or to primeaur@michigan.gov. Staff will use such pictures for monitoring compliance with your permit. Failure to submit these photos is an event of noncompliance.

Issued By: Robert Primeau

Robert Primeau
Warren District Office
Water Resources Division
586-256-7274

cc: Orion Township Clerk
Orion Township - MEA
Oakland County Water Resources Commission
Oakland County
Matt Carmer, Land Planning Solutions, LLC

SITE DEVELOPMENT PLAN
FOR
HUDSON SQUARE
3030 SOUTH LAPEER ROAD
PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT
DEVELOPMENT

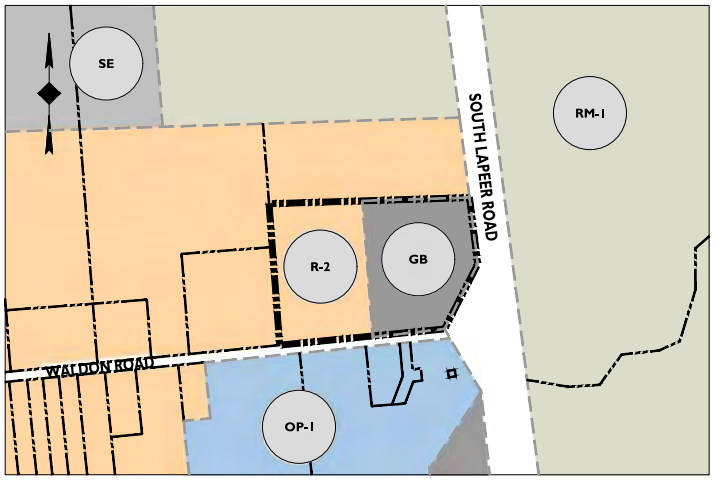
PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
ORION TOWNSHIP, OAKLAND COUNTY, MICHIGAN

SOURCE: USGS MAPS, DATE RETRIEVED 10/11/2022

LOCATION MAP
SCALE: 1" = 800'±

SOURCE: NEARMAP DATE RETRIEVED, 10/11/2022

AERIAL MAP
SCALE: 1" = 200'±



SOURCE: OAKLAND COUNTY PROPERTY GATEWAY & ORION TOWNSHIP ZONING MAP, DATE RETRIEVED 10/11/2022

ZONING MAP
SCALE: 1" = 200'±

APPLICANT

DETROIT RIVERSIDE CAPITAL
3300 AUBURN ROAD
AUBURN HILLS, MI 48326
313-964-5552
MICHAEL.WAYNE@DETROITRIVERSIDECAPITAL.COM

PLANS PREPARED BY:

STONEFIELD engineering & design
Detroit, MI · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Rutherford, NJ
www.stonefieldeng.com

607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

811 Know what's **below** **Call** before you dig.

PLAN REFERENCE MATERIALS:

1. THIS PLAN SET REFERENCES THE FOLLOWING DOCUMENTS INCLUDING, BUT NOT LIMITED TO:
   - SURVEY PROVIDED BY KEIFT ENGINEERING, INC.
   - ARCHITECTURAL PLANS PROVIDED BY DEISNGHAUS ARCHITECTURE
   - AERIAL MAP FROM NEARMAPS ONLINE MAPPING SYSTEM, DATE RETRIEVED 10/11/2022
   - LOCATION MAP FROM USGS ONLINE MAPPING SYSTEM, DATE RETRIEVED 10/11/2022
2. ALL REFERENCE MATERIAL LISTED ABOVE SHALL BE CONSIDERED A PART OF THIS PLAN SET AND ALL INFORMATION CONTAINED WITHIN THESE MATERIALS SHALL BE UTILIZED IN CONJUNCTION WITH THIS PLAN SET. THE CONTRACTOR IS RESPONSIBLE TO OBTAIN A COPY OF EACH REFERENCE AND REVIEW IT THOROUGHLY PRIOR TO THE START OF CONSTRUCTION.

RECEIVED
October 20, 2022
Orion Township
Planning & Zoning

SHEET INDEX

DRAWING TITLE	SHEET #
COVER SHEET	C-1
SITE PLAN	C-2
AERIAL OVERLAY PLAN	C-3
DENSITY PLAN	C-4
GRADING PLAN	C-5

ADDITIONAL SHEETS

DRAWING TITLE	SHEET #
EXISTING CONDITIONS PLAN	1 OF 1

ISSUE	DATE	BY	DESCRIPTION
1	10/18/2022	KTH	FOR PUD APPROVAL

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Detroit, MI · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Rutherford, NJ
www.stonefieldeng.com
607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

SITE DEVELOPMENT PLAN
HUDSON SQUARE
3030 S. LAPEER ROAD
PROPOSED MULTI-USE
PLANNED UNIT DEVELOPMENT
PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
ORION TOWNSHIP
OAKLAND COUNTY, MICHIGAN

KEITH BROOKS, P.E.
NO. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: AS SHOWN | PROJECT ID: DET-210193.01

TITLE: COVER SHEET

DRAWING: C-1

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
STORAGE		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	435,600 SF (10 AC)	307,766 SF (7.07 AC) (M)
MAXIMUM LOT COVERAGE	30% (92,330 SF)	17.4% (53,460 SF)

(M) MODIFICATION

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: GENERAL BUSINESS (GB)		
PROPOSED USE		
RESTAURANT WITH DRIVE-THRU		
SIT DOWN RESTAURANT		
CLASSIC CAR CLUB		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	12,000 SF (0.275 AC)	163,195 SF (3.75 AC)
MAXIMUM LOT COVERAGE	30%	5.4% (8,754 SF)
MAXIMUM BUILDING HEIGHT	25 FT	< 25 FT
MINIMUM FRONT YARD SETBACK	30 FT	56.0 FT
MINIMUM SIDE YARD SETBACK	20 FT	N / A
MINIMUM REAR YARD SETBACK	30 FT	52.8 FT
MINIMUM BUILDING CLEAR SPACE	20 FT	PROVIDED
MINIMUM R.O.W. GREENBELT BUFFER	20 FT	52.7 FT
MINIMUM SINGLE-FAMILY GREENBELT BUFFER	30 FT	30.0 FT
MINIMUM OPEN SPACE	10%	PROVIDED
DRIVE-THRU / SINGLE FAMILY SETBACK	100 FT	52.8 FT (M)

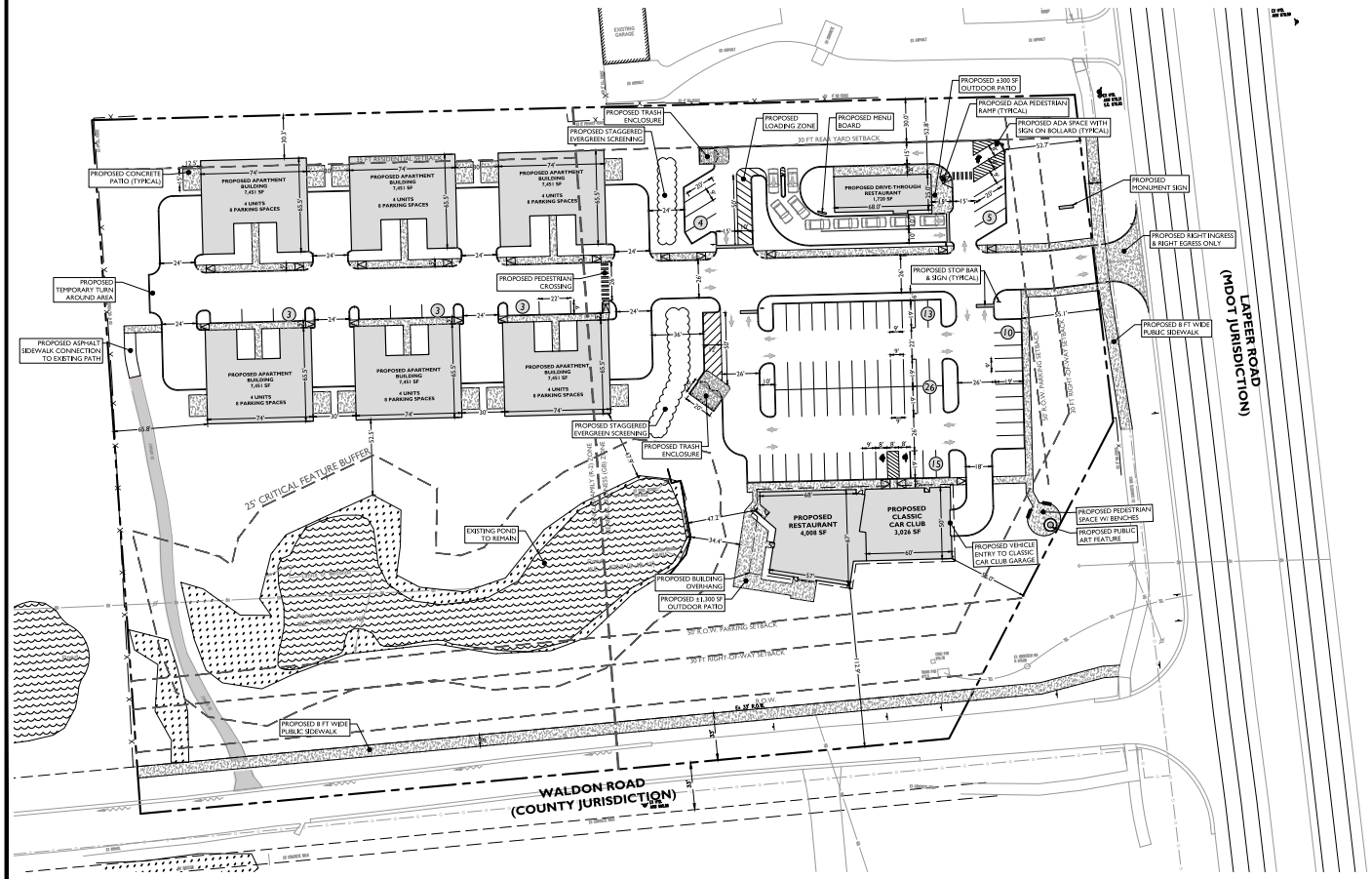
(M) MODIFICATION

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: SINGLE-FAMILY (R-2)		
PROPOSED USE		
MULTIPLE-FAMILY RESIDENTIAL		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT SIZE	10,800 SF	N / A
MINIMUM LOT WIDTH	80 FT	N / A
MAXIMUM LOT COVERAGE	25%	N / A
MAXIMUM BUILDING HEIGHT	30 FT	< 30 FT
MINIMUM FRONT YARD SETBACK	25 FT	248.0 FT
MINIMUM SIDE YARD SETBACK	35 FT	65.8 FT
MINIMUM REAR YARD SETBACK	35 FT	30.3 FT (M)
MINIMUM BUILDING CLEAR SPACE	20 FT	30.0 FT
MINIMUM FLOOR AREA / UNIT	1,080 SF	N / A
MINIMUM OPEN SPACE	15%	PROVIDED

(M) MODIFICATION

OFF-STREET PARKING REQUIREMENTS		
CODE SECTION	**REQUIRED**	**PROPOSED**
§ 14.03.C	**DRIVE-THROUGH RESTAURANT:** 1 SPACE PER 100 SF OF GFA * (1,720 SF)/(1 SPACE/100 SF) = 17 SPACES	73 SPACES
	RESTAURANT (SIT DOWN): 1 SPACE PER 100 SF * (4,008 SF)/(1 SPACE / 100 SF) = 40 SPACES	
	CLASSIC CAR CLUB: 1 SPACE PER 200 SF OF GFA * (3,026 SF)/(1 SPACE / 200 SF) = 15 SPACES	
	TOTAL: 17 + 40 + 15 SPACES = **72 SPACES**	
	MULTI-FAMILY APARTMENT: 2 SPACES PER UNIT (24 UNITS)x2 SPACES/UNIT) = 48 SPACES	48 SPACES
	APARTMENT GUEST PARKING: 1 SPACE PER 3 UNITS (24 UNITS)/(1 SPACE / 3 UNITS) = 8 SPACES	9 SPACES
§ 27.04.A	**90° PARKING:** 9 FT X 19 FT WITH 22 FT ABLE	9 FT X 19 FT WITH 22 FT ABLE
§ 14.04.A	**PARALLEL PARKING:** 9 FT X 22 FT	9 FT X 22 FT
§ 27.04.A	**OFF STREET LOADING:** 10 FT X 50 FT	10 FT X 50 FT

* OFF-STREET PARKING DETERMINED USING GENERAL BUSINESS DISTRICT REQUIREMENTS



SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE PAVEMENT
	PROPOSED WALL
	PROPOSED BUILDING DOORS
	PROPOSED EVERGREEN LANDSCAPING SCREEN

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND ITS SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHTS-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

40' 0' 40' 80'
GRAPHIC SCALE IN FEET
1" = 40'

ISSUE	DATE	BY	DESCRIPTION
1	10/18/2023	KTH	FOR PUD APPROVAL

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Detroit, MI · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Rutherford, NJ
www.stonefieldeng.com
607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

SITE DEVELOPMENT PLAN

HUDSON SQUARE
3030 S. LAPEER ROAD
PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT

PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
OAKLAND TOWNSHIP
OAKLAND COUNTY, MICHIGAN

REID COOKSEY, P.E.
MICHIGAN LICENSE NO. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' | PROJECT ID: DET-210193.01

TITLE: SITE PLAN

DRAWING: C-2

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE PAVEMENT
	PROPOSED WALL
	PROPOSED BUILDING DOORS
	PROPOSED EVERGREEN LANDSCAPING SCREEN

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
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SITE DEVELOPMENT PLAN

HUDSON SQUARE
3030 S. LAPEER ROAD
PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT

PID: 09-26-401-021
3030 SOUTH LAPEER ROAD
OAKLAND TOWNSHIP
OAKLAND COUNTY, MICHIGAN

JARED COOKSEY, P.E.
MICHIGAN LICENSE NO. 6201069028
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' PROJECT ID: DET-210193.01

TITLE: AERIAL OVERLAY PLAN

DRAWING: C-3

TABLE OF LAND USE AND ZONING

PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: GENERAL BUSINESS (GB)		
PROPOSED USE		
RESTAURANT WITH DRIVE-THRU		
SIT DOWN RESTAURANT		
CLASSIC CAR CLUB		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	12,000 SF (0.275 AC)	144,570 SF (3.32 AC)
MAXIMUM LOT COVERAGE	30% (43,371 SF)	14.5% (20,985 SF)
MAXIMUM BUILDING HEIGHT	25 FT	25 FT
MINIMUM FRONT YARD SETBACK	30 FT	47.3 FT
MINIMUM SIDE YARD SETBACK	20 FT	N/A
MINIMUM REAR YARD SETBACK	30 FT	43.3 FT
MINIMUM BUILDING CLEAR SPACE	20 FT	50.0 FT
MINIMUM R.O.W. GREENBELT BUFFER	30 FT	30.0 FT
MINIMUM OPEN SPACE	10%	PROVIDED

TABLE OF LAND USE AND ZONING

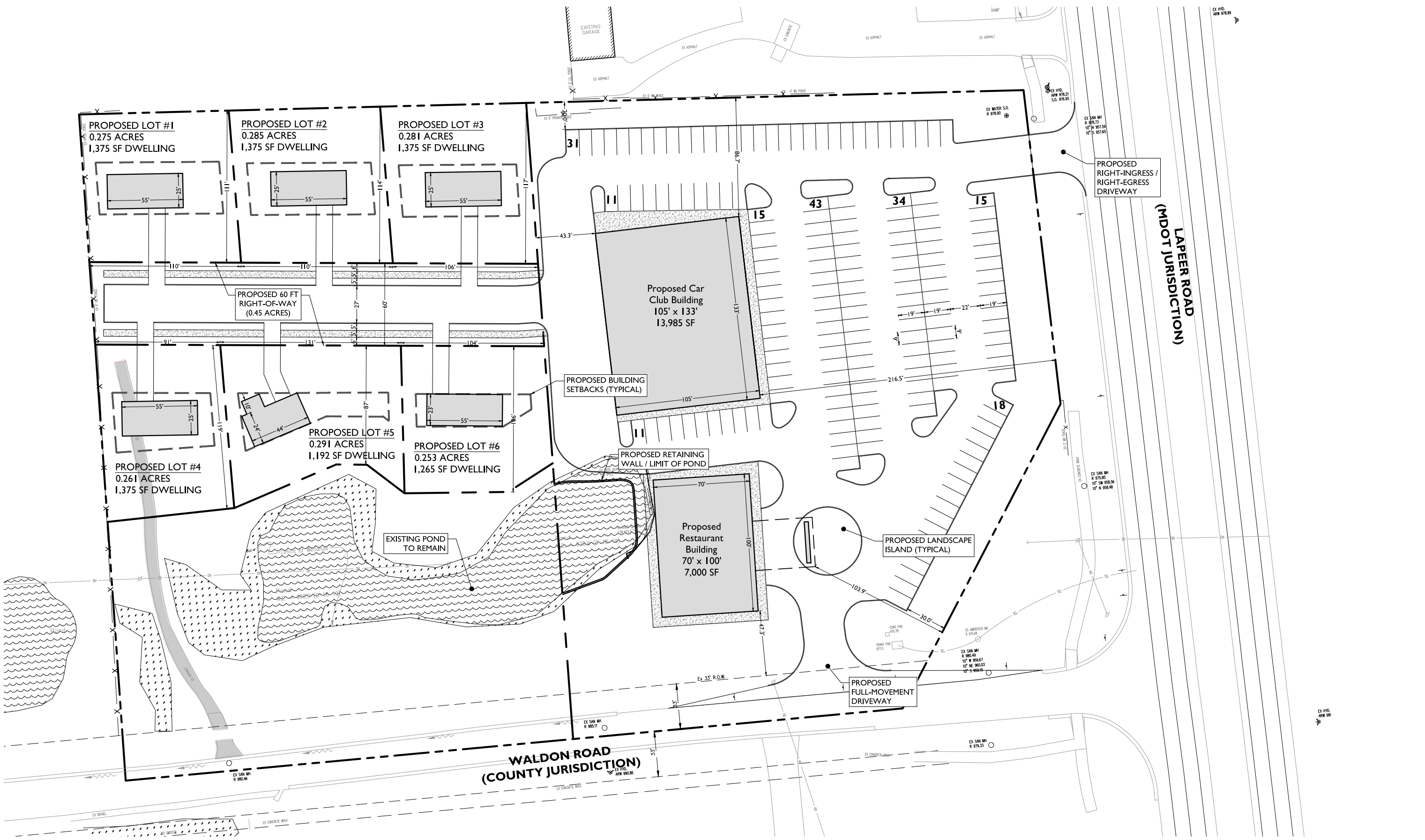
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: SINGLE-FAMILY (R-2)		
PROPOSED USE		
MULTIPLE-FAMILY RESIDENTIAL		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT SIZE	10,800 SF (0.250 AC)	11,020 SF (0.253 AC)
MINIMUM LOT WIDTH	80 FT	91 FT (LOT #4)
MAXIMUM LOT COVERAGE	25%	11.5% (LOT #6)
MAXIMUM BUILDING HEIGHT	30 FT	< 30 FT
MAXIMUM DENSITY	4 UNITS / ACRE	3 UNITS / ACRE
MINIMUM FRONT YARD SETBACK	35 FT	PROVIDED
MINIMUM SIDE YARD SETBACK	10 FT	PROVIDED
MINIMUM REAR YARD SETBACK	35 FT	PROVIDED
MINIMUM BUILDING CLEAR SPACE	20 FT	PROVIDED
MINIMUM FLOOR AREA / UNIT	1,080 SF	1,192 SF
MINIMUM OPEN SPACE	15%	PROVIDED

OFF-STREET PARKING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 14.03.C	**RESTAURANT (SIT DOWN):** 1 SPACE PER 100 SF * (7,000 SF)(1 SPACE / 100 SF) = 70 SPACES **CLASSIC CAR CLUB:** 1 SPACE PER 200 SF OF GFA * (13,985 SF)(1 SPACE / 200 SF) = 70 SPACES TOTAL: 70 + 70 SPACES= **140 SPACES**	178 SPACES
	SINGLE FAMILY: N /A	2 SPACES PER DWELLING
§ 27.04.A	**90° PARKING:** 9 FT X 19 FT WITH 22 FT AISLE	9 FT X 19 FT WITH 22 FT AISLE
§ 27.04.A	**OFF STREET LOADING:** 10 FT X 50 FT	10 FT X 50 FT

* OFF-STREET PARKING DETERMINED USING GENERAL BUSINESS DISTRICT REQUIREMENTS

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED BUILDING
	PROPOSED CONCRETE PAVEMENT
	PROPOSED BUILDING DOORS



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SITE DEVELOPMENT PLAN

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PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT

PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
ORION TOWNSHIP
OAKLAND COUNTY, MICHIGAN

J. REID COOKSEY, P.E.
MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD
engineering & design

SCALE: 1" = 40' PROJECT ID: DET-210193.01

TITLE: DENSITY PLAN

DRAWING: C-4

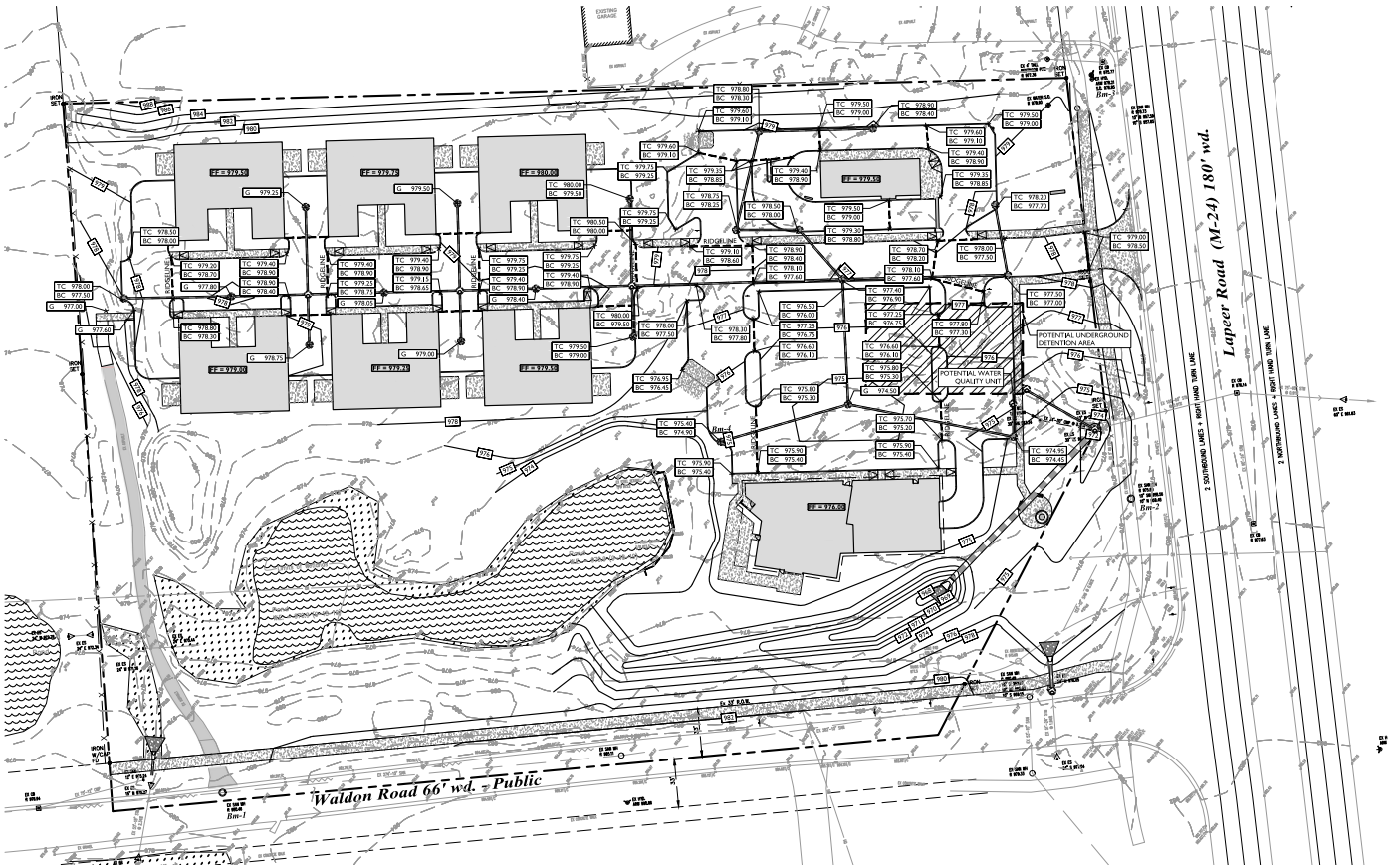
BENCHMARKS (NAVD 88)

BM# 1
RIM OF EXISTING SANITARY MANHOLE LOCATED NEAR THE SW CORNER OF PROPERTY.
ELEVATION = 980.46

BM# 2
RIM OF EXISTING SANITARY MANHOLE LOCATED ON THE WEST SIDE OF LAPEER ROAD, 840 FT ± NORTH OF WALDON ROAD.
ELEVATION = 975.80

BM# 3
ARROW OF EXISTING HYDRANT LOCATED NEAR THE NE PROPERTY CORNER.
ELEVATION = 978.21

BM# 4
MAG NAIL SET IN TEH NORTH FACE OF POWER POLE LOCATED ON THE SOUTH SIDE OF THE DOUBLE GREENHOUSES.
ELEVATION = 972.52



SYMBOL	DESCRIPTION
	PROPERTY LINE
100	PROPOSED GRADING CONTOUR
RIDGELINE	PROPOSED GRADING RIDGELINE
	PROPOSED DIRECTION OF DRAINAGE FLOW
G 100.00	PROPOSED GRADE SPOT SHOT
TC 100.50 BC 100.00	PROPOSED TOP OF CURB / BOTTOM OF CURB SPOT SHOT
	PROPOSED STORMWATER STRUCTURES
	PROPOSED STORMWATER PIPING

GRADING NOTES

1. ALL SOIL AND MATERIAL REMOVED FROM THE SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS. ANY GROUNDWATER DE-WATERING PRACTICES SHALL BE PERFORMED UNDER THE SUPERVISION OF A QUALIFIED PROFESSIONAL. THE CONTRACTOR IS REQUIRED TO OBTAIN ALL NECESSARY PERMITS FOR THE DISCHARGE OF DE-WATERED GROUNDWATER. ALL SOIL IMPORTED TO THE SITE SHALL BE CERTIFIED CLEAN FILL. CONTRACTOR SHALL MAINTAIN RECORDS OF ALL FILL MATERIALS BROUGHT TO THE SITE.
2. THE CONTRACTOR IS REQUIRED TO PROVIDE TEMPORARY AND/OR PERMANENT SHORING WHERE REQUIRED DURING EXCAVATION ACTIVITIES, INCLUDING BUT NOT LIMITED TO UTILITY TRENCHES, TO ENSURE THE STRUCTURAL INTEGRITY OF NEARBY STRUCTURES AND STABILITY OF THE SURROUNDING SOILS.
3. PROPOSED TOP OF CURB ELEVATIONS ARE GENERALLY 4 INCHES TO 7 INCHES ABOVE EXISTING GRADES UNLESS OTHERWISE NOTED. THE CONTRACTOR WILL SUPPLY ALL STAKEOUT CURB GRADE SHEETS TO STONEFIELD ENGINEERING & DESIGN, LLC. FOR REVIEW AND APPROVAL PRIOR TO POURING CURBS.
4. THE CONTRACTOR IS RESPONSIBLE TO SET ALL PROPOSED UTILITY COVERS AND RESET ALL EXISTING UTILITY COVERS WITHIN THE PROJECT LIMITS TO PROPOSED GRADE IN ACCORDANCE WITH ANY APPLICABLE MUNICIPAL, COUNTY, STATE AND/OR UTILITY AUTHORITY REGULATIONS.
5. MINIMUM SLOPE REQUIREMENTS TO PREVENT PONDING SHALL BE AS FOLLOWS:
   - CURB GUTTER: 0.50%
   - CONCRETE SURFACES: 1.00%
   - ASPHALT SURFACES: 1.00%
6. A MINIMUM SLOPE OF 1.00% SHALL BE PROVIDED AWAY FROM ALL BUILDINGS. THE CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE FROM THE BUILDING IS ACHIEVED AND SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IF THIS CONDITION CANNOT BE MET.
7. FOR PROJECTS WHERE BASEMENTS ARE PROPOSED, THE DEVELOPER IS RESPONSIBLE TO DETERMINE THE DEPTH TO GROUNDWATER AT THE LOCATION OF THE PROPOSED STRUCTURE. IF GROUNDWATER IS ENCOUNTERED WITHIN THE BASEMENT AREA, SPECIAL CONSTRUCTION METHODS SHALL BE UTILIZED AND REVIEWED/APPROVED BY THE CONSTRUCTION CODE OFFICIAL. IF SUMP PUMPS ARE UTILIZED, ALL DISCHARGES SHALL BE CONNECTED DIRECTLY TO THE PUBLIC STORM SEWER SYSTEM WITH APPROVAL FROM THE GOVERNING STORM SEWER SYSTEM AUTHORITY.

ADA NOTES

1. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 2.00% SLOPE IN ANY DIRECTION WITHIN THE ADA PARKING SPACES AND ACCESS AISLES.
2. THE CONTRACTOR SHALL PROVIDE COMPLIANT SIGNAGE AT ALL ADA PARKING AREAS IN ACCORDANCE WITH STATE GUIDELINES.
3. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 5.00% RUNNING SLOPE AND A MAXIMUM OF 2.00% CROSS SLOPE ALONG WALKWAYS WITHIN THE ACCESSIBLE PATH OF TRAVEL (SEE THE SITE PLAN FOR THE LOCATION OF THE ACCESSIBLE PATH). THE CONTRACTOR IS RESPONSIBLE TO ENSURE THE ACCESSIBLE PATH OF TRAVEL IS 36 INCHES WIDE OR GREATER, UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
4. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 2.00% SLOPE IN ANY DIRECTION AT ALL LANDINGS. LANDINGS INCLUDE, BUT ARE NOT LIMITED TO, THE TOP AND BOTTOM OF AN ACCESSIBLE RAMP, AT ACCESSIBLE BUILDING ENTRANCES, AT AN AREA IN FRONT OF A WALK-UP ATM, AND AT TURNING SPACES ALONG THE ACCESSIBLE PATH OF TRAVEL. THE LANDING AREA SHALL HAVE A MINIMUM CLEAR AREA OF 60 INCHES BY 60 INCHES UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
5. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 8.33% RUNNING SLOPE AND A MAXIMUM 2.00% CROSS SLOPE ON ANY CURB RAMPS ALONG THE ACCESSIBLE PATH OF TRAVEL. WHERE PROVIDED, CURB RAMP FLARES SHALL NOT HAVE A SLOPE GREATER THAN 10.00% IF A LANDING AREA IS PROVIDED AT THE TOP OF THE RAMP. FOR ALTERATIONS, A CURB RAMP FLARES SHALL NOT HAVE A SLOPE GREATER THAN 8.33% IF A LANDING AREA IS NOT PROVIDED AT THE TOP OF THE RAMP. CURBS RAMPS SHALL NOT RISE MORE THAN 6 INCHES IN ELEVATION WITHOUT A HANDRAIL. THE CLEAR WIDTH OF A CURB RAMP SHALL BE NO LESS THAN 36 INCHES WIDE.
6. ACCESSIBLE RAMPS WITH A RISE GREATER THAN 6 INCHES SHALL CONTAIN COMPLIANT HANDRAILS ON BOTH SIDES OF THE RAMP AND SHALL NOT RISE MORE THAN 30" IN ELEVATION WITHOUT A LANDING AREA IN BETWEEN RAMP RUNS. LANDING AREAS SHALL ALSO BE PROVIDED AT THE TOP AND BOTTOM OF THE RAMP.
7. A SLIP RESISTANT SURFACE SHALL BE CONSTRUCTED ALONG THE ACCESSIBLE PATH AND WITHIN ADA PARKING AREAS.
8. THE CONTRACTOR SHALL ENSURE A MAXIMUM OF ¼ INCHES VERTICAL CHANGE IN LEVEL ALONG THE ACCESSIBLE PATH. WHERE A CHANGE IN LEVEL BETWEEN ¼ INCHES AND ½ INCHES EXISTS, CONTRACTOR SHALL ENSURE THAT THE TOP ¼ INCH CHANGE IN LEVEL IS BEVELED WITH A SLOPE NOT STEEPER THAN 1 UNIT VERTICAL AND 2 UNITS HORIZONTAL (2:1 SLOPE).
9. THE CONTRACTOR SHALL ENSURE THAT ANY OPENINGS (GAPS OR HORIZONTAL SEPARATION) ALONG THE ACCESSIBLE PATH SHALL NOT ALLOW PASSAGE OF A SPHERE GREATER THAN ½ INCH.

40' 0' 40' 80'
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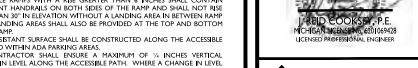


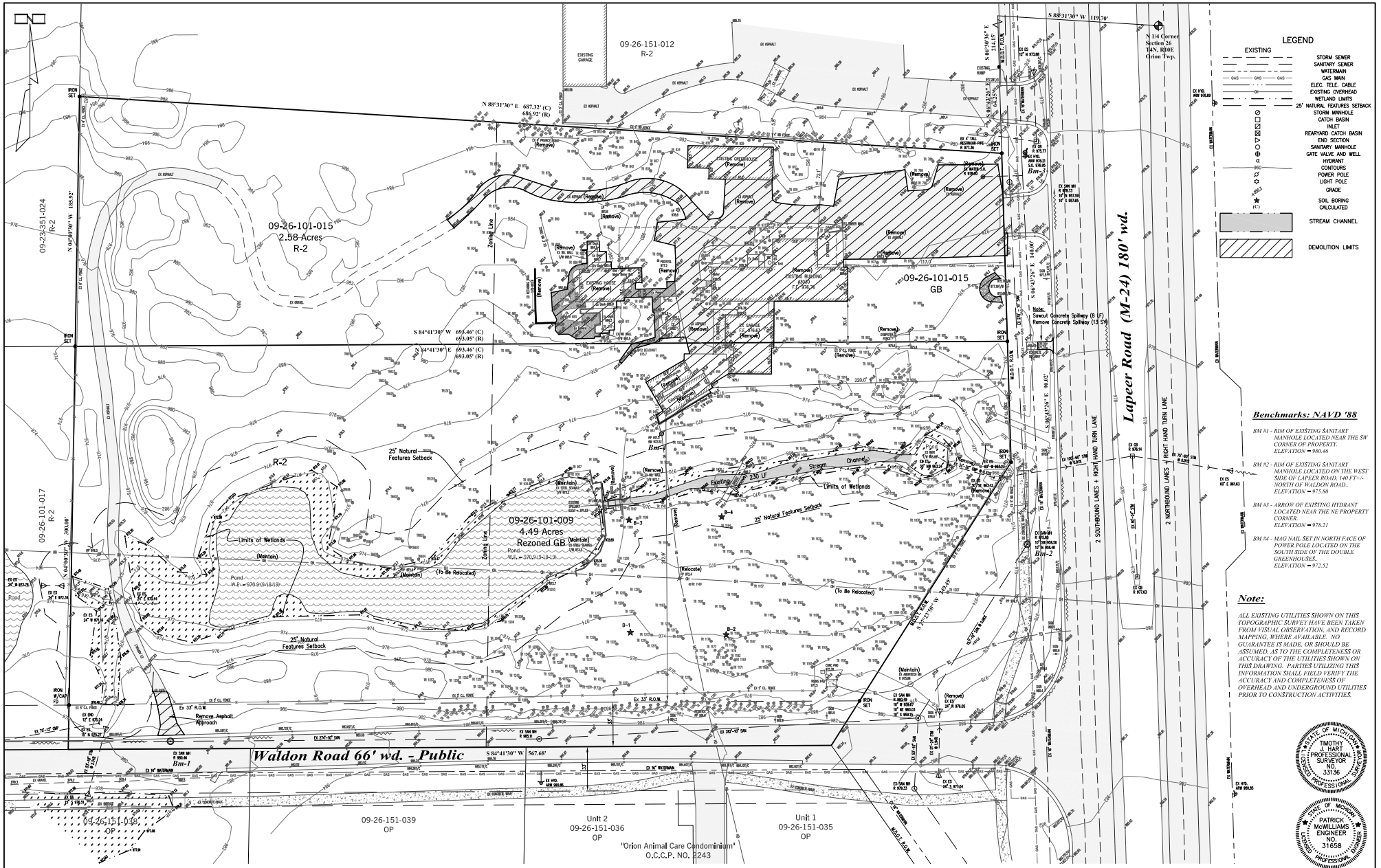
TODD BOOKSTEIN, P.E.
MICHIGAN LICENSE NO. 6201069028
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' PROJECT ID: DET-210193.01

TITLE: GRADING PLAN

DRAWING: C-5



DATE	ISSUE

PROPRIETOR:
CONSTRUCTION DESIGN SERVICE
2867 GLENWOOD COURT
LAKE ORION, MICHIGAN 48360
(586) 216-5953

KIEFT ENGINEERING, INC.
PROFESSIONAL ENGINEERS AND PROFESSIONAL SURVEYORS
5852 SOUTH MAIN STREET, SUITE C CLARKSTON, MICHIGAN 48346
PHONE (248) 625-5251 www.kieftmg.com FAX (248) 625-7110

DATE	6-17-2020	CKD. BY	DATE
DRAWN	GF		
DESIGN	TJH/PCM		
SECTION	26	T- 4 -N, R- 10 -E	

72 HOURS (3 WORKING DAYS) BEFORE YOU DIG CALL MISS DIG 800-482-7171 (TOLL FREE)

Existing Conditions Plan
Orion Classic Car Club
PART OF THE E 1/2 OF THE NW 1/4 OF SECTION 26, T4N, R10E, ORION TOWNSHIP, OAKLAND COUNTY, MICHIGAN

SCALE	1" = 30'
SHEET	2 OF 21
KE	2019.139

G:\2019\139\Survey\Construction Plans\dwg, Ex2, 6/17/2020 10:57:37 AM

Hudson Square

3030 S Lapeer Rd.

Orion Township, MI 48360

PROJECT TEAM

OWNER
DETROIT RIVERSIDE CAPITAL, LLC
1251 INDIAN MOUND RD.
BLOOMFIELD TOWNSHIP, MI 48301
MICHAEL WAYNE
ALEC HARRIS

ARCHITECT
DESIGNHAUS ARCHITECTURE
3300 AUBURN RD.
AUBURN HILLS, MI 48326
T: 248.601.4422
F: 248.453.5854
PROJECT MANAGER: JOE LATOZAS
PROJECT ARCHITECT:
PETER STUHLREYER, A.I.A

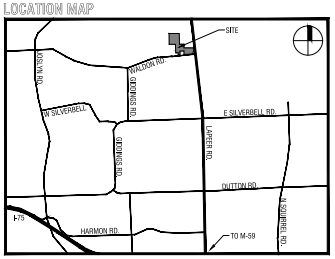
CIVIL ENGINEER
STONEFIELD
607 SHELBY ST, SUITE 200
DETROIT, MI 48226
T.248.247.1115
C.734.546.4941
CONTACT: ERIC WILLIAMS

STATEMENT OF SELECTED DESIGN PROFESSIONAL

THESE CONSTRUCTION DOCUMENTS WERE PREPARED FOR COMPLIANCE WITH THE MICHIGAN CONSTRUCTION CODES IN EFFECT AT THE TIME OF PERMIT SUBMITTAL. ALL ENGINEERS, CONTRACTORS AND SUPPLIERS INVOLVED WITH THIS PROJECT SHALL COMPLY WITH THE SAME CODES ISSUED AND APPROVED CODE MODIFICATIONS AND/OR MUNICIPAL CONSTRUCTION BOARDS OF APPEALS RULINGS AND WHENEVER REQUIRED SHALL PROVIDE SHOP DRAWINGS AND SUBMITTALS CLEARLY DESCRIBING COMPLIANCE TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE FOR REVIEW AND APPROVAL.

REGISTERED DESIGN PROFESSIONAL IN CHARGE:
PETER STUHLREYER, A.I.A.
MICHIGAN IDENTIFICATION # 44668
DESIGNHAUS ARCHITECTURE

LOCATION MAP



INDEX OF DRAWINGS

SHEET ISSUED
REVISED
SHEET REISSUED

P.U.D. SUBMITTAL 10.20.22

SHEET NO:	DRAWING NAME
GENERAL	
G1.1	Title Sheet and Index
ARCHITECTURAL	
A1.00	Floor Plan
A2.00	Building Elevations
A-001	First Floor Plan
A-002	Second Floor Plan
A-003	Elevations
A-004	Elevations Bigby Elevation Reference

3300 AUBURN RD. SUITE 300
AUBURN HILLS, MI 48326
T:248.601.4422 F:248.453.5854
WWW.DESIGNHAUS.COM
INFO@DESIGNHAUS.COM

DESIGNHAUS ARCHITECTURE EST 1998

P.U.D. SUBMITTAL	10.20.22
Revision/Issue	Date

Hudson Square
3030 S Lapeer Rd.
Orion Township, MI 48360

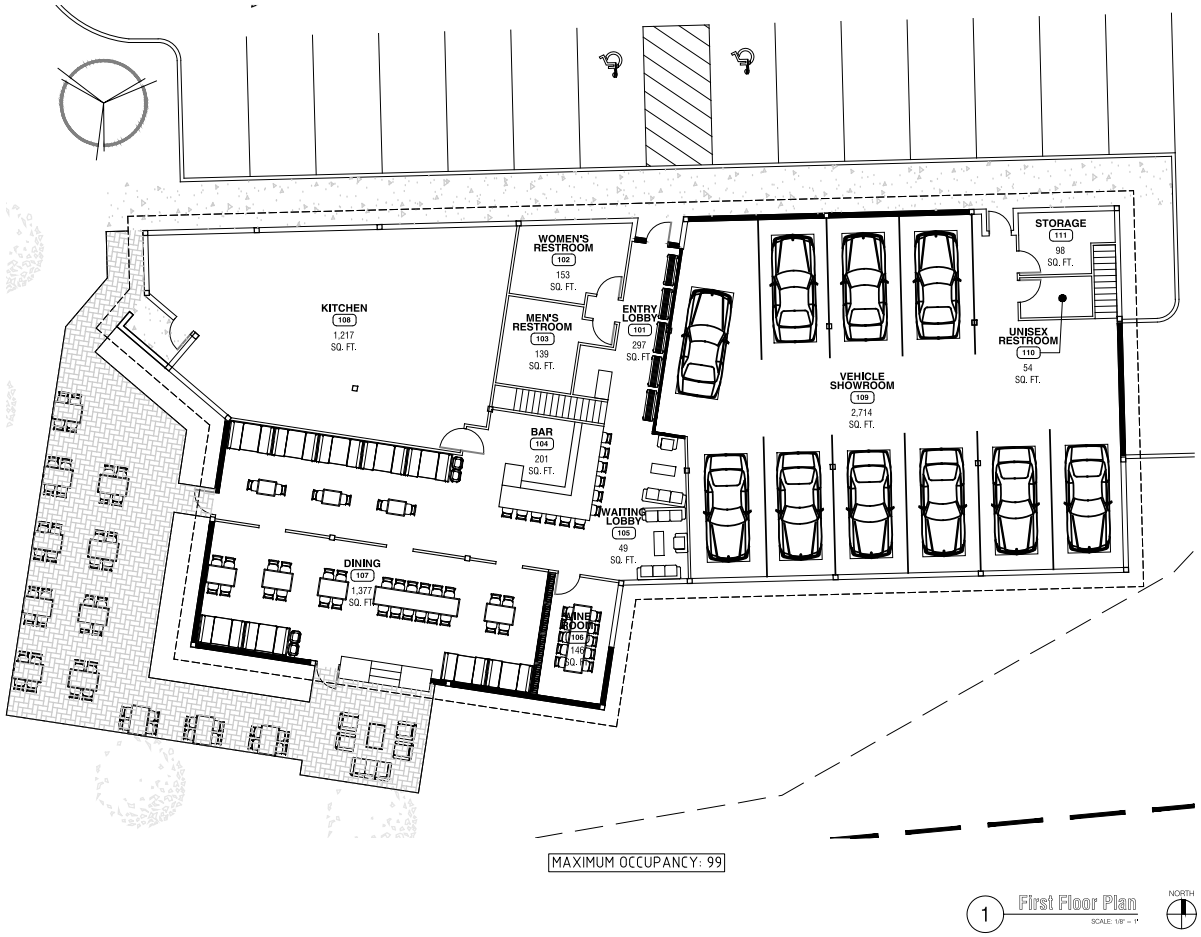
Cover Sheet & Index

022165

G0.01

G0.01 Cover Sheet & Index.dwg
10/19/2022
DH—32

SEATING:
INDOOR SEATING: 80 SEATS DINING, 12 @ BAR
OUTDOOR SEATING: 48
TOTAL: 140



1 First Floor Plan
SCALE: 1/8" = 1'

NORTH

DESIGNHAUS ARCHITECTURE EST 1998
3300 AUBURN RD. SUITE 300
AUBURN HILLS, MI 48326
T:248.601.4422 F:248.453.5854
WWW.DESIGNHAUS.COM
INFO@DESIGNHAUS.COM

Revision/Issue	Date
P.U.D. SUBMITTAL	10.20.22

Hudson Square
3030 S Lapeer Rd.
Orion Township, MI 48360

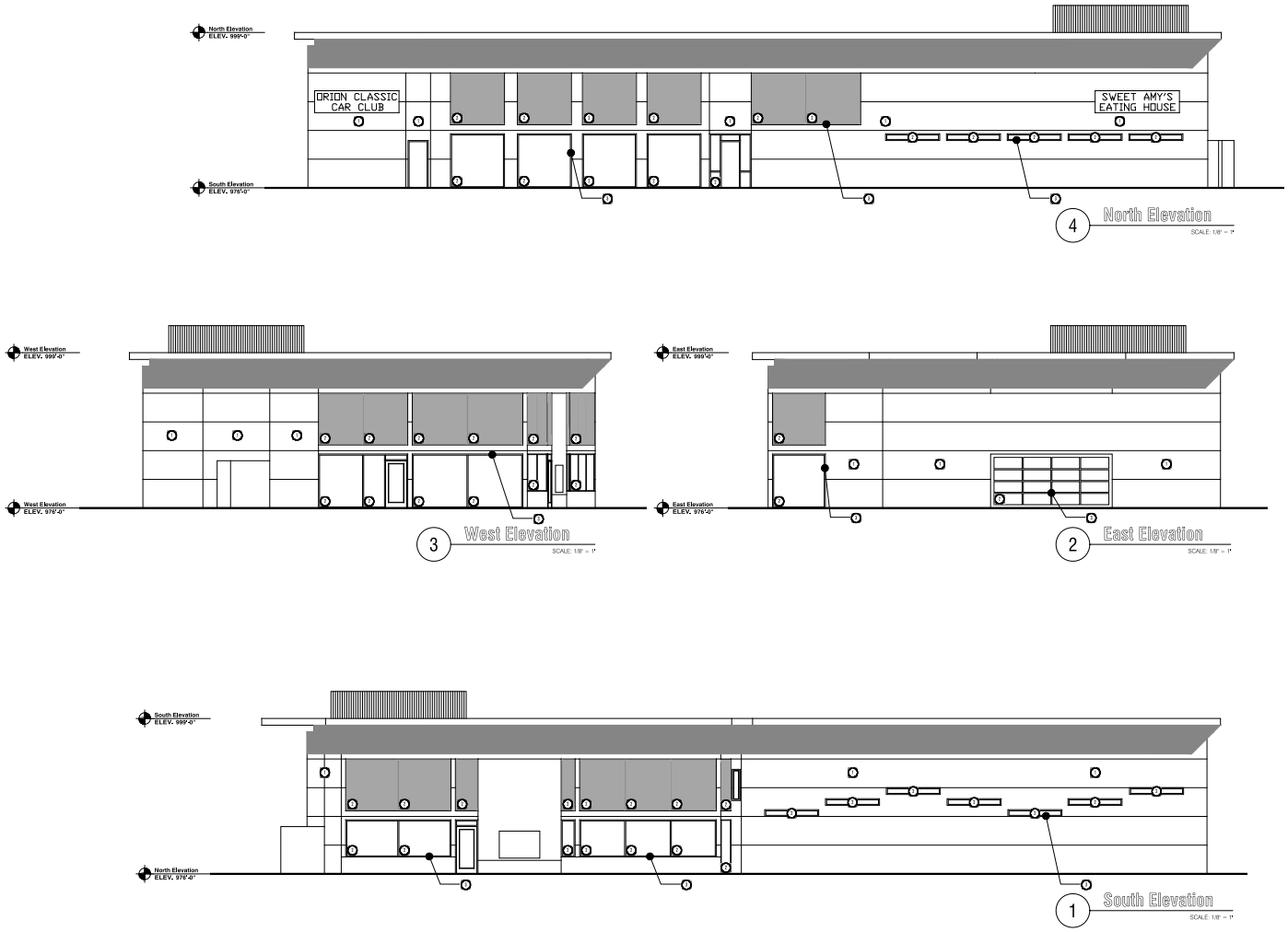
Floor Plan

022165

A1.00

A1.00 Floor Plan.dwg
10/19/2022
DH-32

MATERIAL LEGEND		
IMAGE	MARK	DESCRIPTION
	1	STUCCO
	2	CLEAR GLASS
	3	DARK BRONZE FRAMING



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P.U.D. SUBMITTAL	10.20.22
Revision/Issue	Date

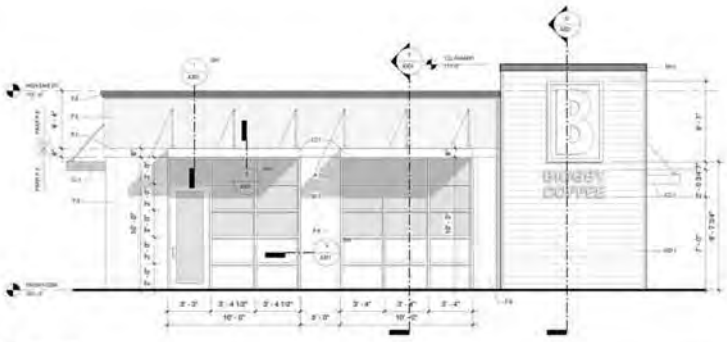
Hudson Square
3030 S Lapeer Rd.
Orion Township, MI 48360

Building Elevations

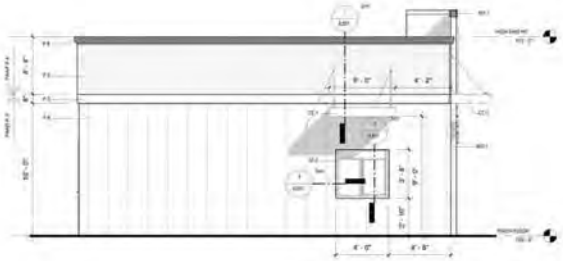
022165

A2.00

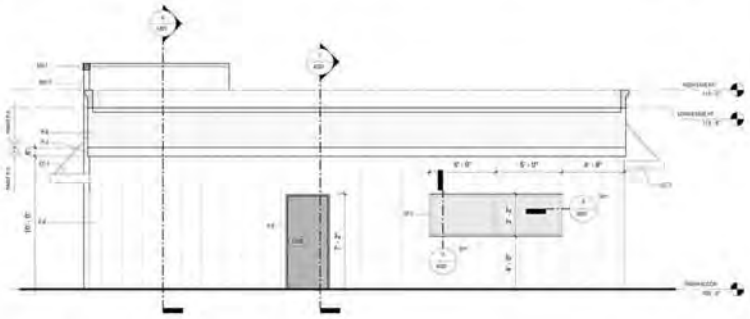
A2.00 Building Elevations.dwg
10/19/2022
DH-32



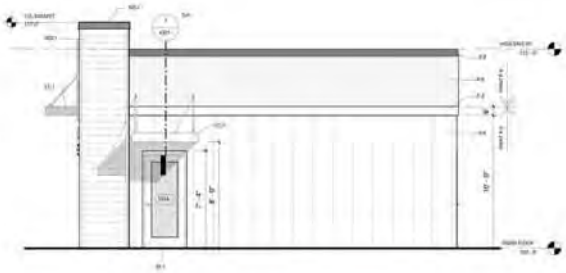
1 WEST ELEVATION



2 NORTH ELEVATION



3 EAST ELEVATION



4 SOUTH ELEVATION

EXTERIOR FINISH SCHEDULE

TAG	DESCRIPTION	SPEC SECTION	FINISH / COLOR	MANUFACTURER	ASSEMBLY
PAINT					
P-8	PAINT	09 91 13	DARK GREY	SHERWIN WILLIAMS SW 6006 BLACK BEAN	N/A
CANOPY					
CC-1	METAL CANOPY	10 73 16	RAL 2003 49/24540	MASA ARCHITECTURAL CANOPIES OR EQUAL	N/A
METAL SIDING					
MS-1	METAL CAP	13 34 19	MATCH P-8		N/A
STORE FRONT					
SF-1	ALUMINUM STORE FRONT WINDOWS	08 51 13	DARK BRONZE	TUBELITE	N/A
SF-2	DRIVE THROUGH WINDOW	08 56 53	DARK BRONZE	READY ACCESS OR EQUAL	N/A
WOOD					
WD-1	CEDAR RENDITIONS ALUMINUM SIDING	07 46 33	TBD	ROYAL BUILDING PRODUCTS	P4

Note: The pictured elevations are from an existing Biggby Coffee location and provided to serve as a reference for the general character of the proposed Biggby Coffee location. The proposed building size is roughly 500 SF larger than the reference. The dimensions of the proposed are 25' (w) x 68' (L), as provided on the PUD site plan. The proposed will contain similar façade design and materials.

Note: This is a photo of an existing Biggby Coffee location provided to serve as a reference for the general character of the proposed Biggby Coffee.

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3300 AUBURN RD. SUITE 300
AUBURN HILLS, MI 48326
T:248.601.4422 F:248.453.5854
WWW.DESIGNHAUS.COM
INFO@DESIGNHAUS.COM

Reference Material	22.10.18
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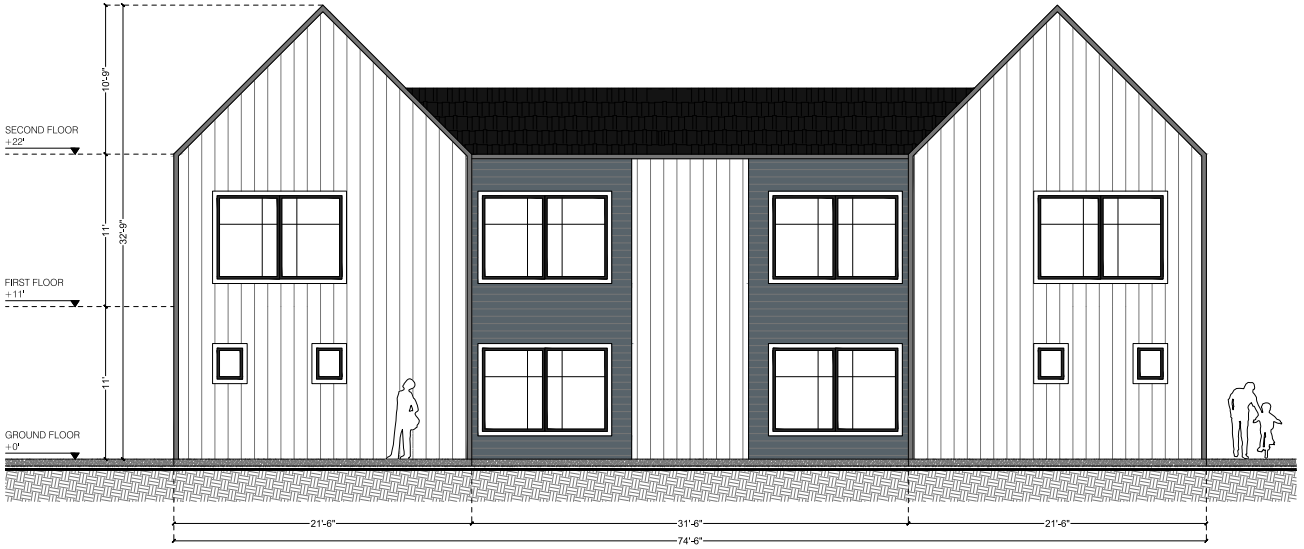
—	—
—	—
—	—
—	—
—	—
Revision/Issue	Date

Biggby Coffee
Lapeer & Waldon
Orion Twp, MI 48359

22.10.18

1 ELEVATION 1
6" = 1'0"



2 ELEVATION 2
6" = 1'0"

GENERAL NOTES: THIS SET OF DRAWINGS IS INTENDED AS A GUIDE.
THE CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING AND FOLLOWING ALL APPLICABLE BUILDING CODES, LAWS, AND REGULATIONS WHICH ARE TO SUPERCEDE ANY INFORMATION IN THESE DRAWINGS.
ALL CONSTRUCTION IS TO MEET CURRENT STANDARDS OF CRAFTSMANSHIP AND CARE. ALL PRODUCTS ARE TO BE INSTALLED PER MANUFACTURER'S WRITTEN INSTRUCTIONS. STRUCTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS ARE TO BE DESIGNED AND INSTALLED BY OTHERS AND ARE OUTSIDE THE SCOPE OF THESE DRAWINGS.

SEAL:

SIGNATURE:

102

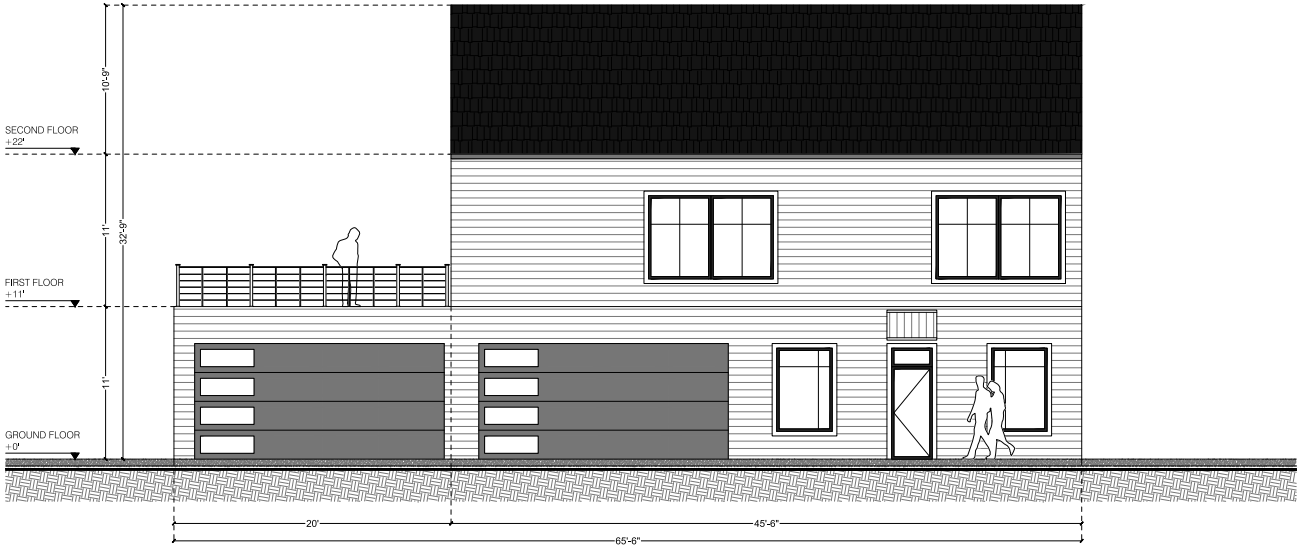
CONTENT: ARCHITECTURE

SHEET TITLE: ELEVATIONS

DATE: AUGUST 2022

SHEET NO: A-003

3 ELEVATION 3
6" = 1'0"



4 ELEVATION 4
6" = 1'0"

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SEAL:

SIGNATURE:

103

CONTENT: ARCHITECTURE

SHEET TITLE: ELEVATIONS

DATE: AUGUST 2022

SHEET NO: A-004

1 FIRST FLOOR PLAN
6" = 1'0"

GENERAL NOTES: THIS SET OF DRAWINGS IS INTENDED AS A GUIDE.
THE CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING AND FOLLOWING ALL APPLICABLE BUILDING CODES, LAWS, AND REGULATIONS WHICH ARE TO SUPERCEDE ANY INFORMATION IN THESE DRAWINGS.
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SEAL:

SIGNATURE:

CONTENT: ARCHITECTURE

SHEET TITLE: FIRST FLOOR PLAN

DATE: MAY 2022

SHEET NO: A-001

1 SECOND FLOOR PLAN
6" = 1'0"

GENERAL NOTES: THIS SET OF DRAWINGS IS INTENDED AS A GUIDE.
THE CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING AND FOLLOWING ALL APPLICABLE BUILDING CODES, LAWS, AND REGULATIONS WHICH ARE TO SUPERCEDE ANY INFORMATION IN THESE DRAWINGS.
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SEAL:

SIGNATURE:

CONTENT: ARCHITECTURE

SHEET TITLE: SECOND FLOOR PLAN

DATE: JULY 2022

SHEET NO: A-002

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

MEMO

VIA EMAIL michael.wayne@detroitriversidecapital.com

To:	**John and Nancy, LLC.**
From:	**Jacob Swanson, PE** **Fleis & VandenBrink**
Date:	**November 9, 2022**
Re:	**Hudson Square Planned Unit Development (PUD)** **Orion Township, Michigan** **Traffic Impact Study**

1 INTRODUCTION

This memorandum presents the results of a Traffic Impact Study (TIS) for the proposed Hudson Square Planned Unit Development (PUD) located in Orion Township, Michigan. The project site is located at 3030 S. Lapeer Road (M-24) on approximately 7 acres, in the northwest quadrant of the SB Lapeer Road (M-24) & Waldon Road intersection, as shown on the attached **Figure 1**. The project includes a mixed-use development, with the construction of restaurant and residential land uses. Site access is proposed via one (1) driveway on SB Lapeer Road (M-24), which is under the jurisdiction of the Michigan Department of Transportation (MDOT).

The lane use and traffic control at the study intersections are shown on the attached **Figure 2** and the study roadways characteristics are summarized in **Table 1**. For the purposes of this study, site driveways, median U-turns (crossovers), and residential streets were assumed to have an operating speed of 25 miles per hour (mph), unless otherwise noted.

Table 1: Roadway Information

Roadway	Lapeer Road (M-24)	Waldon Road
Number of Lanes	4 lanes (2 lanes each direction, median divided)	2 lanes (1 lanes each direction)
National Functional Classification	Other Principal Arterial	Major Collector
Speed Limit	55 mph	40 mph
AADT	43,400 vpd (SEMCOG 2016)	4,300 (SEMCOG 2018)

The scope of the study was developed based on Fleis & VandenBrink's (F&V) understanding of the development program, accepted traffic engineering practice, and methodologies published by the Institute of Transportation Engineers (ITE). In addition, Orion Township and MDOT provided input regarding the scope of work for this traffic impact study. The study analyses were completed using Synchro/SimTraffic (Version 11) traffic analysis software. Sources of data for this study include F&V subconsultant Quality Counts, LLC. (QC), information published by the Institute of Transportation Engineers (ITE), RCOC, and MDOT.

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

2 DATA COLLECTION

F&V subconsultant Quality Counts, LLC. (QC) collected existing Turning Movement Count (TMC) data on Thursday October 13th, 2022, and Tuesday October 18th, 2022, while school was in session. Eight hours of existing TMC data was collected during the AM (7:00 AM to 9:00 AM), MD (11:00 AM to 1:00 PM), and PM (2:00 PM to 6:00 PM) peak periods, at the following study intersections:

- SB Lapeer Road (M-24) & NB-to-SB Crossover, North of Waldon Road
- SB Lapeer Road (M-24) & Waldon Road
- NB Lapeer Road (M-24) & SB-to-NB Crossover, South of Waldon Road / Eagle Ridge Road

During collection of the turning movement counts, Peak Hour Factors (PHFs), pedestrian and bike volumes, and commercial truck percentages were recorded and used in the traffic analysis. The AM and PM peak hours for the adjacent roadway network were generally observed to occur on weekdays between 7:45 AM to 8:45 AM and 5:00 PM to 6:00 PM, respectively. F&V collected an inventory of existing lane use and traffic controls, as shown on the attached **Figure 2**.

Additionally, F&V obtained the current signal timing permits from MDOT for the upstream signalized intersections and included these signalized intersections within the Synchro Model to appropriately reflect the platooning and progression of vehicles along Lapeer Road (M-24). Data collection previously performed by F&V subconsultant Traffic Data Collection, Inc. (TDC) at the Silverbell intersection was utilized in the model and traffic volumes were balanced upward through the network at the study intersections. Therefore, the raw traffic volumes shown on the attached data collection summaries may not match the traffic volumes utilized in the study. The existing 2022 peak hour traffic volumes used in the analysis are shown on the attached **Figure 3**. All applicable background data referenced in this memorandum is attached.

3 EXISTING CONDITIONS

Existing peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro (Version 11) traffic analysis software. The study analyses were based on the existing lane use and traffic control shown on the attached **Figure 2**, the existing peak hour traffic volumes shown on the attached **Figure 3**, and the methodologies presented in the *Highway Capacity Manual 6th, Edition* (HCM).

Descriptions of LOS "A" through "F" as defined in the HCM6, are attached. Typically, LOS D is considered acceptable, with LOS A representing minimal delay, and LOS F indicating failing conditions. Additionally, SimTraffic network simulations were reviewed to evaluate network operations and vehicle queues. The results for the existing conditions analysis are attached and shown in **Table 2**.

Table 2: Existing Intersection Operations

Intersection		Control	Approach	Existing Conditions			
				AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS
10	SB Lapeer Road (M-24) & NB-to-SB Crossover, North of Waldon Road	Stop (Minor)	WBL	54.3	F	23.8	C
			SB	Free			
20	SB Lapeer Road (M-24) & Waldon Road	Stop (Minor)	EBR	54.3	F	23.3	C
			SB	Free			
30	NB Lapeer Road (M-24) & SB-to-NB Crossover, South of Waldon Road	Stop (Minor)	EBTL	22.9	C	580.1	F
			WBR	13.3	B	26.3	D
			NB	Free			

The result of the existing conditions analysis indicates that all approaches and movements and the study intersections are currently operating acceptably, at LOS D or better, during both the AM and the PM peak hours, with the exception of the following:

(INT #10) – SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon Road

- During the AM peak hour: The northbound to southbound U-turn movement is currently operating at LOS F.

(INT #20) – SB Lapeer Road (M-24) & Waldon Road

- During the AM peak hour: The eastbound right-turn movement currently operates at LOS F.

(INT #30) – NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Road / Eagle Ridge Road

- During the PM peak hour: The southbound to northbound U-turn movement is currently operating at LOS F.

Review of SimTraffic network simulations during the AM peak hour indicates generally acceptable operations. Occasional periods of vehicle queues were observed along the eastbound Waldon Road approach and the northbound to southbound U-turn movement at the crossover (INT #10); however, these vehicle queues were observed to dissipate and were not present throughout the AM peak hour.

Review of SimTraffic microsimulations indicates long vehicle queues for the southbound to northbound U-turn movement at the crossover (INT #30) during the PM peak hour; these queues were occasionally observed to exceed the available storage area and block the southbound through traffic. Review of the data collection videos confirms periods of long vehicle queues resulting from vehicles struggling to find adequate gaps within the NB Lapeer Road (M-24) through traffic. Additionally, when the available SB-to-NB crossover storage area becomes blocked, vehicles along eastbound Waldon Road desiring to travel north on Lapeer Road (M-24) were observed to not progress through the intersection of SB Lapeer Road (M-24) & Waldon Road, even when adequate gaps were present within the southbound traffic flow. This issue was observed to create increased delays and longer vehicle queues for all traffic along eastbound Waldon Road, especially vehicles attempting to travel south.

3.1 Existing Conditions with Improvements

In order to improve the existing traffic operations to a LOS D or better, during all peak periods, for all intersection approaches and movements, mitigation measures were investigated. These mitigation measures include geometric improvements and traffic control modifications. The proposed improvements and their impact on intersection operations are discussed below.

3.1.1 Traffic Signal Warrant Analysis

A signal warrant analysis was conducted at each of the stop-controlled study intersections. The *2011 Michigan Manual on Uniform Traffic Control Devices* (MMUTCD) documents the guidelines by which traffic signal control may or should be considered. F&V collected 8 hours of turning movement traffic volume data for use in the study. F&V evaluated Warrant 1 (8-Hour Vehicular Volume), Warrant 2 (4-Hour Vehicular Volume), and Warrant 3 (Peak-Hour) for this study. The existing MMUTCD signal warrant chart outputs are attached and summarized below in **Table 3**.

Warrant 1

According to the MMUTCD, Warrant 1, Condition A is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. Condition B is intended for application where Condition A is not satisfied, and where the traffic volume on the 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, where Warrant 1 is satisfied if either Conditions A or B are met.

Warrant 2

The Four-Hour signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The need for a traffic signal shall be considered if, for each of any four hours of an average day, the intersection approach volumes fall above the applicable curve on Figure 4C-1.

Warrant 3

The Peak Hour signal warrant conditions 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. The need for a signal shall be considered if on any hour of an average day, the approach volumes fall above the applicable curve line shown on Figure 4C-3.

Table 3: Existing Signal Warrant Analysis Summary

Warrant		SB Lapeer Road (M-24) & NB-to-SB X/O	SB Lapeer Road (M-24) & Waldon Road	NB Lapeer Road (M-24) & SB-to-NB X/O
Warrant 1: Eight-Hour		YES	YES	YES
Condition A	*Hours Met*	3	8	8
	Warrant Met	NO	YES	YES
Condition B	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 2: Four-Hour	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 3: Peak-Hour	*Hours Met*	5	8	8
	Warrant Met	YES	YES	YES

The results of the signal warrant analyses indicate that traffic signals are warranted at all study intersections, based on the existing traffic volumes. The study intersections currently meet all of the volume thresholds for Warrant 1A, Warrant 1B, Warrant 2, and Warrant 3; with the exception of the intersection of SB Lapper Road (M-24) & NB-to-SB Crossover, which does not meet Warrant 1A. Additionally, a review of SimTraffic network simulations for the intersection of SB Lapper Road (M-24) & NB-to-SB Crossover does not indicate that the minor-street (median crossover) traffic suffers undue delay and during the field review, any vehicle queues present were observed to quickly dissipate within the peak periods.

3.1.2 SUMMARY

Traffic signals are warranted at all of the study intersections; however, field reviews indicate that traffic at the SB Lapeer Road (M-24) & NB-to-SB Crossover intersection does not experience undue delay. Therefore, in order to improve the existing intersection operations, the following mitigation measures are recommended:

Recommendations

Install a fully actuated/coordinated (SCATS) traffic signal at the following intersection to accommodate the existing traffic volumes:

- SB Lapeer Road (M-24) & Waldon Road (INT #20)
- NB Lapeer Road (M-24) & SB-to-NB Crossover, South of Waldon Road (INT #30)

The results of the existing improvements analysis are attached and summarized in **Table 4**. With the implementation of the recommended mitigation measures, all approaches and movements at the study intersections are expected to operate acceptably, at LOS D or better during both peak periods, with the exception of the following:

(INT #20) – SB Lapeer Road (M-24) & Waldon Road

- During the AM peak hour: The eastbound right-turn movement is expected to *improve* to LOS E.
- During the PM peak hour: The eastbound right-turn movement is expected to operate at LOS E.

(INT #30) – NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Road / Eagle Ridge Road

- During the AM peak hour: The westbound right-turn movement is expected to operate at LOS E.

The LOS and delay at these intersections are due to moderately low volumes of vehicles on the minor street approaches and the random arrival of vehicles, in conjunction with the long cycle length (130 seconds) along the Lapeer Road (M-24) corridor. The consequence of this is that vehicles will often arrive at the intersection on a red signal and have to wait throughout the majority of the cycle length to receive a green signal. A reduction in cycle length at these intersections would improve operations for the minor street approaches and movements; however, this would impact the major street movements at this intersection, as well as the adjacent signalized intersections that are coordinated along the Lapeer Road (M-24) corridor.

Table 4: Existing Intersection Operations with Improvements

Intersection		Approach	Existing Conditions (STOP Control)				Existing IMP Conditions (Signalized)				Difference			
			AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
20	SB Lapeer Road (M-24) & Waldon Road	EBR	54.3	F	23.3	C	63.0	E	62.8	E	8.7	F→E	39.5	C→E
		SBT	Free				6.0	A	4.9	A	N/A			
		SBR	Free				1.2	A	8.3	A	N/A			
		Overall	**N/A**				**8.8**	**A**	**11.3**	**B**	**N/A**			
30	NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Rd.	EBTL	22.9	C	580.1	F	45.8	D	54.8	D	22.9	C→D	-525.3	F→D
		WBR	13.3	B	26.3	D	55.8	E	49.0	D	42.5	B→E	22.7	-
		NBT	Free				2.8	A	10.4	B	N/A			
		NBR	Free				1.7	A	3.1	A	N/A			
		Overall	**N/A**				**9.5**	**A**	**13.6**	**B**	**N/A**			

The eastbound right-turn movement at the SB Lapeer Road (M-24) & Waldon Road intersection is expected to experience an increased delay; however, the LOS is expected to improve. This is the result of the different range of delays that equate to the LOS descriptions for unsignalized and signalized intersection. Motorists at a signalized intersection are more comfortable waiting longer for a green light indication, as opposed to having to be constantly watching for gaps within the through traffic at a stop-controlled intersection.

Additionally, although the Synchro LOS analysis indicates poor operations for the eastbound right-turn movement at Waldon Road and the westbound right-turn movement at Eagle Ridge Road, a review of SimTraffic network simulations indicates acceptable operations; all vehicle queueing was observed to be processed through the signalized intersections within each cycle length, leaving no residual vehicle queueing.

4 BACKGROUND (2025) CONDITIONS

Population and economic growth profile data was obtained for Orion Township from the Southeast Michigan Council of Governments (SEMCOG) database to calculate a background growth rate for the 2022 peak hour traffic volumes in order to calculate the 2025 site buildout year traffic volumes. Population and employment projections from 2015 to 2045 were reviewed and showed an average annual growth of 0.19% and 0.08%, respectively. Therefore, a conservative annual background growth rate of **0.5%** per year was applied to the existing peak hour traffic volumes to forecast the background 2025 peak hour traffic volumes ***without the proposed development***, as shown on the attached **Figure 4**. Additionally, it is important to account for developments within the study network, which will be constructed prior to the site buildout year of 2025; however, no planned background developments were identified within the study network.

The background peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersection based on the existing lane use and traffic control shown on the attached **Figure 2**, the background peak hour traffic volumes shown on the attached **Figure 4**, and the methodologies presented in the HCM 6th Edition**.** The results of the background conditions analysis are attached and summarized in **Table 5.**

The results of the background conditions analysis indicates that all study intersection approaches and movements are expected to continue operating in a manner similar to the existing conditions analysis. Review of SimTraffic microsimulations also indicates operations similar to those observed under existing conditions.

Table 5: Background Intersection Operations

Intersection		Control	Approach	Existing Conditions				Background Conditions				Difference			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
10	SB Lapeer Road & NB-to-SB X/O, N. of Waldon Rd.	Stop (Minor)	WBL	54.3	F	23.8	C	58.7	F	24.4	C	4.4	-	0.6	-
			SB	Free				Free				N/A			
20	SB Lapeer Road & Waldon Road	Stop (Minor)	EBR	54.3	F	23.3	C	59.4	F	24.1	C	5.1	-	0.8	-
			SB	Free				Free				N/A			
30	NB Lapeer Road & SB-to-NB X/O, S. of Waldon Rd.	Stop (Minor)	EBTL	22.9	C	580.1	F	23.5	C	616.1	F	0.6	-	36.0	-
			WBR	13.3	B	26.3	D	13.4	B	26.8	D	0.1	-	0.5	-
			NB	Free				Free				N/A			

4.1 Background Conditions with Improvements

In order to improve the background traffic operations at the study intersections, the mitigation measures evaluated to improve existing conditions were re-evaluated:

4.1.1 Traffic Signal Warrant Analysis

A signal warrant analysis was again conducted at each of the stop-controlled study intersections, after applying the background growth rate to the buildout year of 2025, in order to reflect the background traffic volumes. The background signal warrant charts are summarized in **Table 6** below and are attached for reference.

Table 6: Background Signal Warrant Analysis Summary

Warrant		SB Lapeer Road (M-24) & NB-to-SB X/O	SB Lapeer Road (M-24) & Waldon Road	NB Lapeer Road (M-24) & SB-to-NB X/O
Warrant 1: Eight-Hour		YES	YES	YES
Condition A	*Hours Met*	4	8	8
	Warrant Met	NO	YES	YES
Condition B	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 2: Four-Hour	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 3: Peak-Hour	*Hours Met*	5	8	8
	Warrant Met	YES	YES	YES

The results of the signal warrant analyses indicates that traffic signals are warranted at all study intersections, based on the background traffic volumes. The study intersections are expected to meet all of the volume thresholds for Warrant 1A, Warrant 1B, Warrant 2, and Warrant 3; with the exception of the intersection of SB Lapper Road (M-24) & NB-to-SB Crossover, which does not meet Warrant 1A. Additionally, a review of SimTraffic network simulations for the intersection of SB Lapper Road (M-24) & NB-to-SB Crossover does not indicate that the minor-street (median crossover) traffic suffers undue delay and during the field review, any vehicle queues present were observed to quickly dissipate within the peak periods.

4.1.2 SUMMARY

Traffic signals are warranted at all of the study intersections; however, reviews indicate that traffic at the SB Lapeer Road (M-24) & NB-to-SB Crossover intersection does not experience undue delay. Therefore, in order to improve the background intersection operations, the following mitigation measures are recommended:

Recommendations
Install a fully actuated/coordinated (SCATS) traffic signal at the following intersection to accommodate the existing and background traffic volumes:

- SB Lapeer Road (M-24) & Waldon Road (INT #20)
- NB Lapeer Road (M-24) & SB-to-NB Crossover, South of Waldon Road (INT #30)

The results of the background improvements analysis are attached and summarized in **Table 7**. With the implementation of the recommended mitigation measures, all approaches and movements at the study intersections are expected to operate acceptably, at LOS D or better during both peak periods, with the exception of the following:

(INT #20) – SB Lapeer Road (M-24) & Waldon Road

- During the AM peak hour: The eastbound right-turn movement is expected to *improve* to LOS E.
- During the PM peak hour: The eastbound right-turn movement is expected to operate at LOS E.

(INT #30) – NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Road / Eagle Ridge Road

- During the AM peak hour: The westbound right-turn movement is expected to operate at LOS E.

Table 7: Background Intersection Operations with Improvements

Intersection		Approach	Background Conditions (STOP Control)				Background IMP Conditions (Signalized)				Difference			
			AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
20	SB Lapeer Road (M-24) & Waldon Road	EBR	59.4	F	24.1	C	62.8	E	63.0	E	3.4	F→E	38.9	C→E
		SBT	Free				6.3	A	5.1	A	N/A			
		SBR	Free				1.2	A	8.5	A	N/A			
		Overall	**N/A**				**9.0**	**A**	**11.6**	**B**	**N/A**			
30	NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Rd.	EBTL	23.5	C	616.1	F	46.1	D	54.5	D	22.6	C→D	-561.6	F→D
		WBR	13.4	B	26.8	D	55.4	E	48.9	D	42.0	B→E	22.1	-
		NBT	Free				2.9	A	10.8	B	N/A			
		NBR	Free				1.7	A	3.1	A	N/A			
		Overall	**N/A**				**9.6**	**A**	**13.9**	**B**	**N/A**			

Although the Synchro LOS analysis indicates poor operations for the minor street movements, due to the long cycle length, a review of SimTraffic network simulations indicates acceptable operations. All vehicle queueing was observed to be processed through the signalized intersections within each cycle length, leaving no residual vehicle queueing during either peak period.

5 SITE TRIP GENERATION

The number of weekday peak hour (AM and PM) and daily vehicle trips that would be generated by the proposed development were forecast based on data published by ITE in the *Trip Generation Manual, 11th Edition.* Through discussion with the Township Engineer, the ITE standard methods of evaluation were utilized in this study. The proposed development includes the construction of a coffee shop with drive-through, a sit-down restaurant, a car storage club, and 24 multi-family units. The trip generation utilized for this study is summarized in **Table 8.**

Table 8: Site Trip Generation

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Mini-Storage	151	3,026	SF	4	1	0	1	1	0	1
Multi-Family Housing (Low-Rise)	220	24	DU	229	7	23	30	20	11	31
High Turnover (Sit-down) Restaurant	932	4,008	SF	430	21	17	38	22	14	36
Coffee Shop with Drive-Through	937	1,720	SF	918	75	73	148	34	33	67
Pass-By (50% AM, 55% PM)				*482*	*37*	*37*	*74*	*18*	*18*	*36*
Total Trips				**1,581**	**104**	**113**	**217**	**77**	**58**	**135**
Total Pass-By				*482*	*37*	*37*	*74*	*18*	*18*	*36*
Total New Trips				**1,099**	**67**	**76**	**143**	**59**	**40**	**99**

As is typical of commercial developments, a portion of the trips generated by the development are from vehicles already on the adjacent roadway network that will pass the site on their way from an origin to their ultimate destination. Therefore, not all traffic at the site driveways is necessarily new traffic added to the street system. This percentage of the trips generated by the development are considered “pass-by” trips and do not add new traffic to the adjacent street system. Through discussion with the Township engineer pass-by trips were only considered for the coffee-shop land use. These trips are reduced from the total external trips generated by a study site. The percentage of pass-by trips used in this analysis was determined based on the rates published by ITE in the *Trip Generation Manual, 11th Edition.* However, ITE does not provide pass-by data for LUC 937: Coffee Shop with Drive-Through; therefore, the pass-by data for LUC 934: Fast-Food Restaurant with Drive-Through was conservatively utilized for this analysis.

6 Site Trip Distribution

The vehicular trips that would be generated by the proposed development were assigned to the study roadway network based on the proposed site access plan and driveway configurations, the existing peak hour traffic patterns in the adjacent roadway network, and the methodologies published by ITE. The ITE trip distribution methodology assumes that new trips will enter the network and access the development, then leave the development and return to their direction of origin, whereas pass-by trips will enter and exit the development, then continue on their original direction of travel. The site trip distributions utilized in this analysis are summarized in **Table 9**.

Table 9: Site Trip Distribution

To/From	Via	New Commercial		Pass-By		Residential	
		AM	PM	AM	PM	AM	PM
North	Lapeer Road (M-24)	65%	36%	31% (NB)	61% (NB)	31%	36%
South	Lapeer Road (M-24)	31%	60%	69% (SB)	39% (SB)	65%	60%
West	Waldon Road	4%	4%			4%	4%
Total		**100%**	**100%**		**100%**	**100%**	**100%**

The vehicular traffic volumes shown in **Table 8** were distributed to the study network according to the distribution shown in **Table 9**. The site-generated trips shown on the attached **Figure 5** were added to the background peak hour traffic volumes shown on the attached **Figure 4**, in order to calculate the future peak hour traffic volumes with the addition of the proposed development. Future peak hour traffic volumes are shown on the attached **Figure 6**.

7 Future (2025) Conditions

The future peak hour vehicle delays and LOS ***with the proposed development*** were calculated based on the future lane use and traffic control shown on the attached **Figure 2**, the proposed site access, the future traffic volumes shown on the attached **Figure 6**, and the methodologies presented in the HCM 6th Edition. The results of the future conditions analysis are attached and summarized in **Table 10**.

Table 10: FUTURE INTERSECTION OPERATIONS

Intersection		Control	Approach	Background Conditions				Future Conditions				Difference			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
10	SB Lapeer Road & NB-to-SB X/O, N. of Waldon Rd.	Stop (Minor)	WBL	58.7	F	24.4	C	102.8	F	36.2	E	44.1	-	11.8	C→E
			SB	Free				Free				N/A			
20	SB Lapeer Road & Waldon Road	Stop (Minor)	EBR	59.4	F	24.1	C	71.6	F	26.3	D	12.2	-	2.2	C→D
			SB	Free				Free				N/A			
30	NB Lapeer Road & SB-to-NB X/O, S. of Waldon Rd.	Stop (Minor)	EBTL	23.5	C	616.1	F	33.4	D	780.4	F	9.9	C→D	164.3	-
			WBR	13.4	B	26.8	D	13.6	B	27.5	D	0.2	-	0.7	-
			NB	Free				Free				N/A			
40	SB Lapeer Road & Site Driveway	Stop (Minor)	EBR	N/A				100.3	F	25.3	D	N/A			
			SB					Free							

The results of the future conditions analysis indicates that the study intersections are expected to continue operating in a manner similar to the background conditions analysis, with the following additional impacts anticipated to intersection LOS:

(INT #10) – SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon Road

- During the PM peak hour: The northbound to southbound U-turn movement is expected to operate at LOS E.

(INT #40) – SB Lapeer Road (M-24) & Site Driveway

- During the AM peak hour: The eastbound right-turn movement is expected to operate at LOS F.

Review of SimTraffic network simulations during the AM peak hour indicates generally acceptable operations, similar to those observed during the background conditions analysis. Occasional periods of vehicle queues were observed along the eastbound Waldon Road approach (INT #20) and the northbound to southbound U-turn movement at the crossover (INT #10); however, these vehicle queues were typically observed to dissipate and were not present throughout the AM peak hour. Additionally, although the LOS analysis indicates poor operations at the proposed site driveway, review of SimTraffic network simulations indicates a 95th percentile queue length of approximately 95-feet (3-4 vehicles), which is not significant.

Review of SimTraffic network simulations during the PM peak hour indicates long vehicle queues for the southbound to northbound U-turn movement at the crossover (INT #30). These vehicle queues were often observed to exceed the available storage area, resulting in southbound traffic spilling back into and blocking the other study intersections along SB Lapeer Road (M-24). As a result, when the available SB-to-NB crossover storage area becomes blocked, increased delays and longer vehicle queues are experienced for all traffic on the eastbound Waldon Road approach and on the eastbound site driveway approach, especially for vehicles attempting to travel south.

7.1 FUTURE CONDITIONS WITH IMPROVEMENTS

In order to improve the future traffic operations at the study intersections, the mitigation measures evaluated to improve existing conditions were re-evaluated.

7.1.1 TRAFFIC SIGNAL WARRANT ANALYSIS

A signal warrant analysis was again conducted at all the stop-controlled study intersections. The site generated hourly traffic volumes utilized in this analysis were determined based on hourly variations in daily traffic data published by the ITE in *Trip Generation, 11th Edition*. The corresponding hourly traffic volumes generated by the proposed development were projected for the eight hours of TMC data collected and combined with the background traffic volumes to provide eight-hour traffic volume data for the signal warrant evaluation. The future signal warrant charts are summarized in **Table 11** below and are attached for reference.

The results of the signal warrant analyses indicate that the study intersections are expected to meet all of the warrant volume thresholds, based on the future traffic volumes. However, a review of SimTraffic network simulations for the intersection of SB Lapper Road (M-24) & NB-to-SB Crossover does not indicate that the minor-street (median crossover) traffic suffers undue delay and during the field review, any vehicle queues present were observed to quickly dissipate within the peak periods.

Table 11: Future Signal Warrant Analysis Summary

Warrant		SB Lapeer Road (M-24) & NB-to-SB X/O	SB Lapeer Road (M-24) & Waldon Road	NB Lapeer Road (M-24) & SB-to-NB X/O
Warrant 1: Eight-Hour		YES	YES	YES
Condition A	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Condition B	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 2: Four-Hour	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 3: Peak-Hour	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES

7.1.2 SUMMARY

Traffic signals are warranted at all of the study intersections; however, reviews indicate that traffic at the SB Lapeer Road (M-24) & NB-to-SB Crossover intersection does not experience undue delay. Therefore, in order to improve the future intersection operations, the following mitigation measures are recommended:

Recommendations

Install a fully actuated/coordinated (SCATS) traffic signal at the following intersection to accommodate the existing, background, and future traffic volumes:

- SB Lapeer Road (M-24) & Waldon Road (INT #20)
- NB Lapeer Road (M-24) & SB-to-NB Crossover, South of Waldon Road (INT #30)

The results of the future improvements analysis are attached and summarized in **Table 12**. With the implementation of the recommended mitigation measures, all approaches and movements at the study intersections are expected to operate acceptably, at LOS D or better during both peak periods, with the exception of the following:

(INT #20) – SB Lapeer Road (M-24) & Waldon Road

- During the AM peak hour: The eastbound right-turn movement is expected to *improve* to LOS E.
- During the PM peak hour: The eastbound right-turn movement is expected to operate at LOS E.

Although the Synchro LOS analysis indicates poor operations for the minor street movements, due to the long cycle length, a review of SimTraffic network simulations indicates acceptable operations. All vehicle queueing was observed to be processed through the signalized intersections within each cycle length, leaving no residual vehicle queueing during either peak period.

Table 12: Future Intersection Operations with Improvements

Intersection		Approach	Future Conditions (STOP Control)				Future IMP Conditions (Signalized)				Difference			
			AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
20	SB Lapeer Road (M-24) & Waldon Road	EBR	71.6	F	26.3	D	63.0	E	63.1	E	-8.6	F→E	36.8	D→E
		SBT	Free				7.4	A	5.5	A	N/A			
		SBR	Free				1.1	A	8.0	A	N/A			
		Overall	**N/A**				**10.0**	**A**	**11.7**	**B**	**N/A**			
30	NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Rd.	EBTL	33.4	D	780.4	F	45.7	D	54.3	D	12.3	-	-726.1	F→D
		WBR	13.6	B	27.5	D	51.0	D	46.9	D	37.4	B→D	19.4	-
		NBT	Free				4.4	A	13.1	B	N/A			
		NBR	Free				2.6	A	3.7	A	N/A			
		Overall	**N/A**				**12.3**	**B**	**16.4**	**B**	**N/A**			

8 CRASH ANALYSIS

A crash analysis was conducted at the study intersections. F&V obtained the crash data used in the analysis from the Michigan Traffic Crash Facts (MTCF) historical crash database, for the most recent **three years** (January 1, 2019, to December 31, 2021) of available data at the study intersections. The results of the crash analysis are summarized in **Table 13**.

Table 13: Crash Analysis Summary

Crash Type	Description	SB Lapeer (M-24) Road & NB-to-SB Crossover		SB Lapeer (M-24) Road & Waldon Road		NB Lapeer (M-24) Road & SB-to-NB Crossover	
		Total Crashes	Percentage	Total Crashes	Percentage	Total Crashes	Percentage
1	Single Motor Vehicle Crash	0	0%	1	3%	0	0%
2	Head On	0	0%	0	0%	0	0%
3	Head On Left-Turn	0	0%	0	0%	0	0%
4	Angle	0	0%	2	5%	0	0%
5	Rear-End (Straight)	0	0%	0	0%	0	0%
6	Rear-End (Left-Turn)	0	0%	0	0%	0	0%
7	Rear-End (Right-Turn)	0	0%	32	87%	0	0%
8	Sideswipe-Same	0	0%	2	5%	0	0%
9	Sideswipe-Opposite	0	0%	0	0%	0	0%
10	Other/Unknown	0	0%	0	0%	0	0%
Total		**0**	**0%**	**37**	**100%**	**0**	**0%**

SB Lapeer Road (M-24) & NB-to-SB Crossover, N. of Waldon Road: Zero (0) crashes reported at this intersection between 2019 and 2021.

NB Lapeer Road (M-24) & SB-to-NB Crossover, S. of Waldon Road / Eagle Ridge Road: Zero (0) crashes reported at this intersection between 2019 and 2021.

SB Lapeer Road (M-24) & Waldon Road: There were 37 crashes reported between 2019 and 2021. The majority of crashes (32 reports) at the study intersection were Rear-End Right-Turn (86%) crashes; the remaining five (5) crashes (14%) were Sideswipe (5%), Angle (5%), and Single Motor Vehicle (3%) crash types.

The majority of crashes at this intersection are a result of vehicles traversing from Waldon Road to the southbound-to-northbound crossover. Drivers are looking north for gaps in southbound traffic and are not paying attention to the vehicle in front of them, are misjudging the available gap, or are not aware of backups in the crossover lane. Further details of the existing crash patterns are summarized below.

- Detailed review of the crash reports (UD-10s) indicates that the rear-end crashes were primarily resulting from motorist on the stop-controlled Waldon Road approach watching for gaps within the through traffic along SB Lapeer Road (M-24) traffic. These drivers were noted to rear-end the vehicle in front of them on Waldon Road, thinking the vehicle had already turned onto SB Lapeer Road (M-24). Therefore, creating controlled gaps in traffic with intersection signalization would mitigate the existing rear-end crashes associated with the existing conditions.
- Similar to the rear-end crashes, the sideswipe crashes occurred as a result of inattentive drivers believing the vehicle in front of them had already made their turn from Waldon Road onto SB Lapeer Road (M-24). The angle crashes occurred as a result of vehicles turning out onto SB Lapeer Road (M-24) without having an adequate gap within the southbound through traffic.
- The Single Motor Vehicle crash occurred when a vehicle was driving too fast for conditions, due to ice on the roadway, and lost control, striking the stop sign on Waldon Road.
- Three (3) Type-C injury crashes were reported; no fatal or Type-A injury crashes were reported within the most recent three years of available data.

The SEMCOG Crash Analysis Process *Regional Critical Intersection Crash Rates, Frequencies, and Casualty Ratios: By Presence or Absence of Signalization* was used to compare the actual crash rates and frequencies to the regional rates for similar intersection operations. Using methodology from the SEMCOG Crash Analysis Process, the intersections were further analyzed and compared to the SEMCOG regional crash frequency for signalized and unsignalized intersections. The results of this analysis are summarized in **Table 14**. The results of the SEMCOG analysis indicates that the crash rates and frequencies for the study intersection of SB Lapeer Road (M-24) & Waldon Road are greater than the SEMCOG averages for similar types of intersections.

Table 14: Study Network Intersection Crash Analysis Summary

Intersection	Average ADT (Entering Volume vpd)	Crash Frequency (crashes/year)			Crash Rate (crashes per MEV)		
		Intersection Annual Crash Frequency	SEMCOG Average Annual Crash Frequency	Difference	Intersection Annual Crash Rate	SEMCOG Average Annual Crash Rate	Difference
SB Lapeer Road (M-24) & Waldon Road	24,335	12.33	3.32	9.01	1.39	0.37	1.02
SB Lapeer Rd. (M-24) & NB-to-SB X/O, N. of Waldon	23,735	0	3.32	-3.32	0	0.37	-0.37
NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon	24,955	0	3.32	-3.32	0	0.37	-0.37

9 ACCESS MANAGEMENT

9.1 AUXILIARY LANES

The MDOT auxiliary turn lane treatment warrants were evaluated at the proposed site driveway; Lapeer Road (M-24) is a median divided roadway; therefore, the left-turn warrants were not evaluated. This analysis was based on the future peak hour traffic volumes shown on the attached **Figure 6**. The results of the analysis are shown on the attached MDOT warranting charts and summarized in **Table 15**.

Table 15: Auxiliary Turn Lane Summary

Intersection	AM Peak	PM Peak	Recommendation
SB Lapeer Road (M-24) & Site Drive	Right-Turn Lane	Right-Turn Lane	**Right-Turn Lane**

The results of the MDOT auxiliary turn lane evaluation indicates that a full-width southbound right-turn deceleration lane is warranted on SB Lapeer Road (M-45) at the proposed site driveway. However, the proposed driveway will be located within the existing right-turn lane at Waldon Road; therefore, no changes are recommended to the existing roadway configuration.

9.2 DRIVEWAY SPACING

The MDOT Geometric Design Guidance (section 1.2.2) was utilized to evaluate the location of the proposed site driveways in relation to nearby intersections and driveways within close proximity to the project site. The AASHTO desirable unsignalized access spacing and intersection corner clearance criteria were evaluated for the 55-mph section of SB Lapeer Road (M-24). The distance of the proposed site driveways from nearby access points and the warranting criteria are summarized in **Table 15** and displayed in **Exhibit 1**.

Table 16: Desirable Corner Clearance Summary

Adjacent Driveways & Intersections			Distance	Criteria (45 mph)	Meets
Site Driveway	To	Waldon Road	300 feet	230 feet	**YES**
Site Driveway	To	Church Driveway	140 feet	455 feet	**NO**
Site Driveway	To	NB-to-SB Crossover	600 feet	150 feet	**YES**

Exhibit 1: Driveway Spacing

The results of the driveway spacing analysis indicates that the proposed site driveway location is expected to meet the desirable corner clearance criteria, in relation to the nearby roadway and median crossover. The proposed access point will be located within close proximity (~140-ft) to the existing Divine Grace Lutheran Church and School driveway; however, the proposed driveway is located on the northern portion of the site in order to provide sufficient spacing from Waldon Road. Additionally, the existing church driveway is not expected to be a high trip generator; therefore, the potential conflicts between the adjacent access points is minimal.

10 SITE CIRCULATION

The projected drive-through vehicle queuing was reviewed to determine if the proposed on-site queue length for the drive-through is adequate to accommodate the projected operations. Hourly drive-through market average data for similar Biggby restaurants indicates an average service rate of approximately 60 vehicles/hour. Additionally, the dataset indicates that approximately 67% of customers at Biggby will utilize a drive-through. Therefore, based on these averages, assumptions and the conservative ITE trip generation projections, it is estimated that approximately 50 vehicles per hour will use the proposed Biggby drive-through facility during the AM peak hour. The evaluation of the queue length included two criteria:

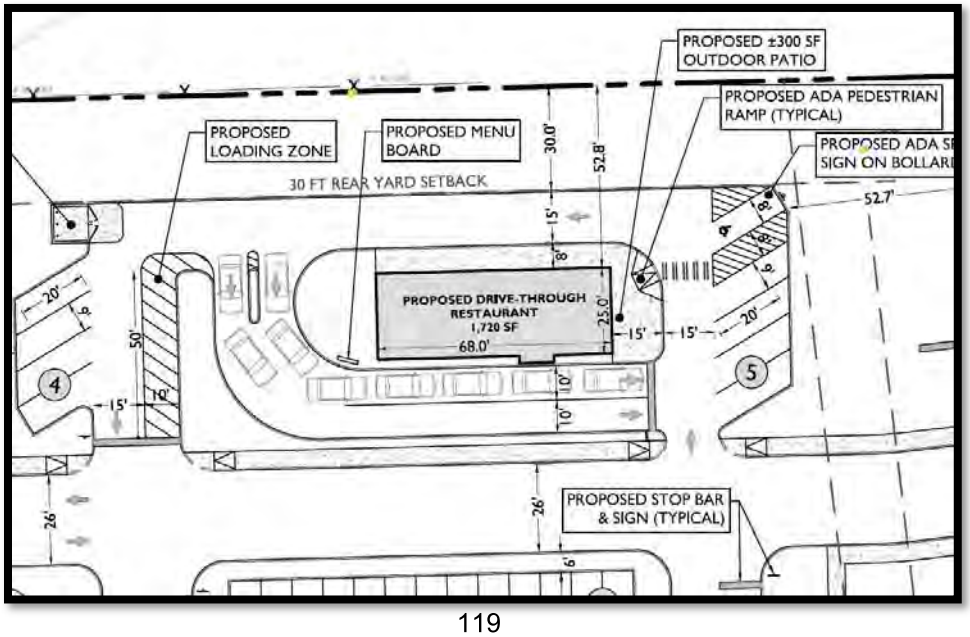
1) A queuing analysis was performed to determine if the projected demand exceeds the service rate and calculate the projected queuing.
2) Since the peak demand for the proposed drive-through is less than the available capacity, a Poisson Distribution was performed to determine the probability of random arrivals; the results indicate a maximum potential of 5 vehicles arriving at one time.

Therefore, providing queueing on site for 5 random arrival vehicles (125 feet) past the order board will adequately accommodate the peak demands for this site. The projected maximum vehicle queueing is summarized in **Table 17** and is shown on **Exhibit 2**; showing that the projected maximum vehicle queueing will not impact internal traffic operations and/or the site driveway connection to SB Lapeer Road (M-24).

Table 17: Vehicle Queuing Analysis

Biggby Drive-Through Stacking Space	
Number of Arrivals	50
Time per Vehicle (s)	60
Service Rate (veh/hr)	60
Drive-through Queue (veh)	**0**
Random Arrival (veh)	**5**
Vehicle Length	25
TOTAL QUEUE LENGTH (ft)	**125**

Exhibit 2: Vehicle Queueing



11 CONCLUSIONS

The conclusions of this TIS are as follows:

11.1 EXISTING CONDITIONS (2022)

The results of the existing conditions analysis indicates that all approaches and movements at the study intersections are currently operate acceptably, at LOS D or better during both peak periods, with the exception of the following:

- **(INT #10) – SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon Road:** During the AM peak hour, the northbound to southbound U-turn movement currently operates at LOS F.

- **(INT #20) – SB Lapeer Road (M-24) & Waldon Road:** During the AM peak hour, the eastbound right-turn movement currently operates at LOS F.

- **(INT #30) – NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Road / Eagle Ridge Road:** During the PM peak hour, the southbound to northbound U-turn movement is currently operating at LOS F. Review of SimTraffic network indicates long vehicle queues which were observed to exceed the available storage area and block the southbound through traffic. Review of the data collection videos confirms periods of long vehicle queues resulting from vehicles struggling to find adequate gaps within the NB Lapeer Road (M-24) through traffic.

11.2 BACKGROUND CONDITIONS (2025)

- The results of the background conditions analysis indicate that all study intersections are expected to continue to operate in a manner similar to the existing conditions analysis. Review of SimTraffic network simulations indicates operations similar to those observed under existing conditions.

11.3 FUTURE CONDITIONS (2025)

The results of the future conditions analysis indicates that the study intersections are expected to continue operating in a manner similar to the background conditions analysis, with the following additional impacts to LOS:

- **(INT #10) – SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon Road:** During the PM peak hour, the northbound to southbound U-turn movement is expected to operate at LOS E.

- **(INT #40) – SB Lapeer Road (M-24) & Site Driveway:** During the AM peak hour, the eastbound right-turn movement is expected to operate at LOS F. Although the LOS analysis indicates poor operations at the proposed site driveway, review of SimTraffic network simulations indicates a 95th percentile queue length of approximately 95-feet (3-4 vehicles), which is not significant.

11.4 Signal Warrant Analysis

- Traffic signals are currently warranted at all of the study intersections as summarized in the table below and shown on the attached tables.

Existing Conditions Signal Warrant Analysis Summary

Warrant		SB Lapeer Road (M-24) & NB-to-SB X/O	SB Lapeer Road (M-24) & Waldon Road	NB Lapeer Road (M-24) & SB-to-NB X/O
Warrant 1: Eight-Hour		YES	YES	YES
Condition A	*Hours Met*	3	8	8
	Warrant Met	NO	YES	YES
Condition B	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 2: Four-Hour	*Hours Met*	8	8	8
	Warrant Met	YES	YES	YES
Warrant 3: Peak-Hour	*Hours Met*	5	8	8
	Warrant Met	YES	YES	YES

11.5 Crash Analysis

- **SB Lapeer Road (M-24) & NB-to-SB Crossover**: Zero (0) crashes reported at this intersection between 2019 and 2021.
- **NB Lapeer Road (M-24) & SB-to-NB Crossover**: Zero (0) crashes reported at this intersection between 2019 and 2021.
- **SB Lapeer Road (M-24) & Waldon Road**: There were 37 crashes reported between 2019 and 2021. The majority of crashes (32 reports) at the study intersection were Rear-End Right-Turn (86%) crashes; the remaining five (5) crashes (14%) were Sideswipe (5%), Angle (5%), and Single Motor Vehicle (3%) crash types.

  The majority of crashes at this intersection are a result of vehicles traversing from Waldon Road to the southbound-to-northbound crossover. Drivers are looking north for gaps in southbound traffic and are not paying attention to the vehicle in front or misjudge the available gap, or backups in the crossover lane. Therefore, creating controlled gaps in traffic with intersection signalization would mitigate the existing rear-end crashes associated with the existing conditions.

11.6 Access Management

- The results of the driveway spacing evaluation indicates that the location of the proposed site driveway is expected to meet the desirable MDOT spacing criteria, in relation to nearby roadway intersection and median crossover.
- The proposed site driveway is within close proximity (~140-feet) from an existing church driveway; however, the proposed driveway is located on the northern portion of the site in order to provide sufficient spacing from Waldon Road. Additionally, the church driveway is not expected to be a high trip generator; therefore, the potential conflicts between the adjacent access points is minimal.

11.7 Site Circulation Review

- The results of the drive-through queueing evaluation indicates that the proposed site plan can adequately accommodate the projected vehicle queueing generated by the drive-through operations without impacting the internal site circulation or the adjacent roadway network.

12 RECOMMENDATIONS

The recommendations of this TIS are summarized as follows:

Recommended Improvements	Existing	Background	Future
(INT #20) – SB Lapeer Road (M-24) & Waldon Road			
Install a fully actuated/coordinated (SCATS) traffic signal at the following intersection to accommodate the existing traffic volumes.	✓		
(INT #30) – NB Lapeer Road (M-24) & SB-to-NB X/O, S. of Waldon Road / Eagle Ridge Road			
Install a fully actuated/coordinated (SCATS) traffic signal at the following intersection to accommodate the existing traffic volumes	✓		

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

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

Digitally signed by Jacob Swanson
Date: 2022.11.09 13:50:03 -05'00'

Attached:
Figures 1-6
Proposed Site Plan
Traffic Volume Data
SEMCOG Data
Synchro / SimTraffic Results
MDOT Auxiliary Turn Lane Warrants
MMUTCD Signal Warrants
Drive-Through Poisson Distribution

F&V

FIGURE 1

SITE LOCATION MAP

HUDSON SQUARE TIS - ORION TOWNSHIP, MI

LEGEND

SITE SITE LOCATION

NORTH

SCALE: NOT TO SCALE

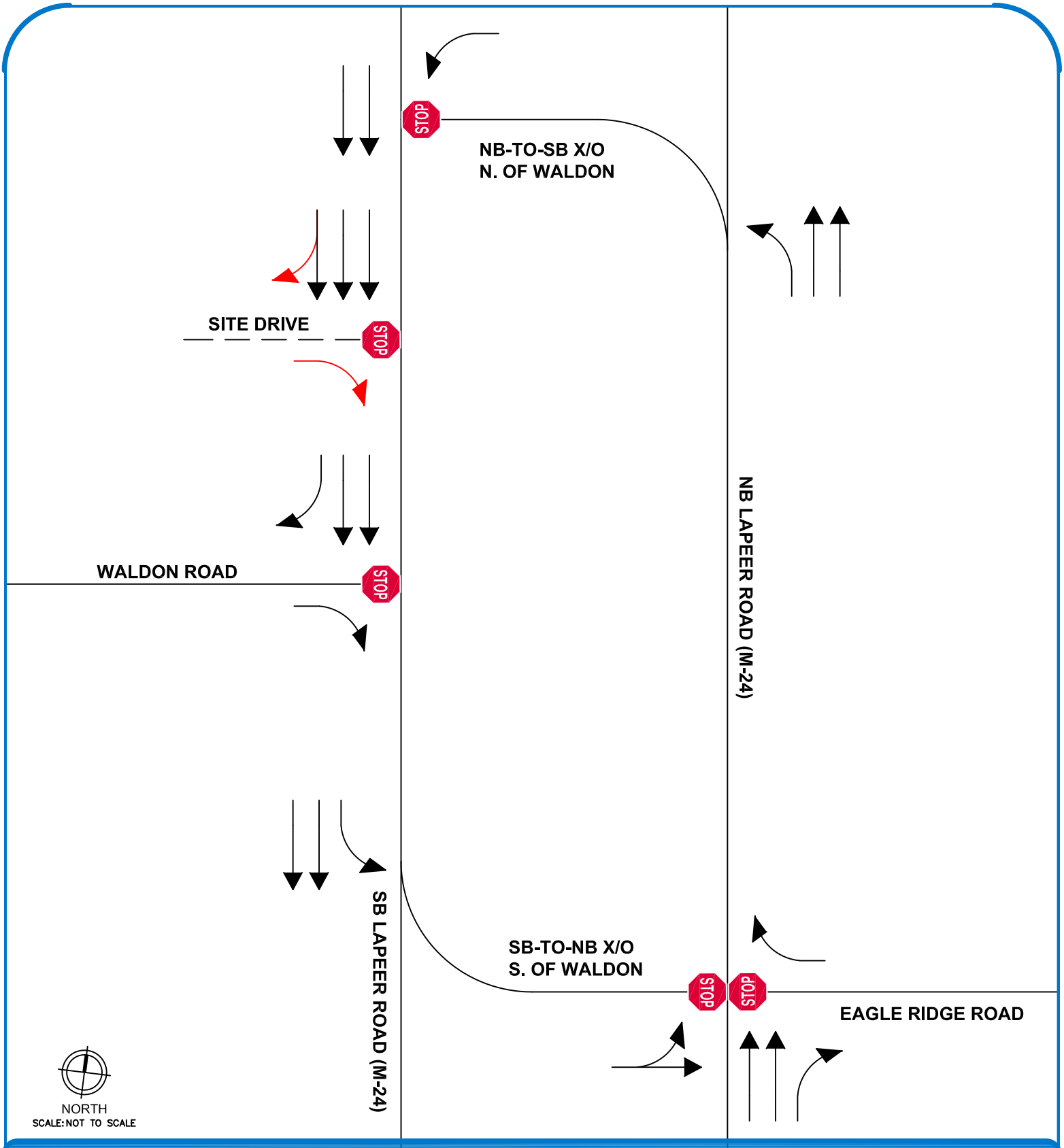


FIGURE 2

LANE USE AND TRAFFIC CONTROL

HUDSON SQUARE TIS - ORION TOWNSHIP, MI

LEGEND

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

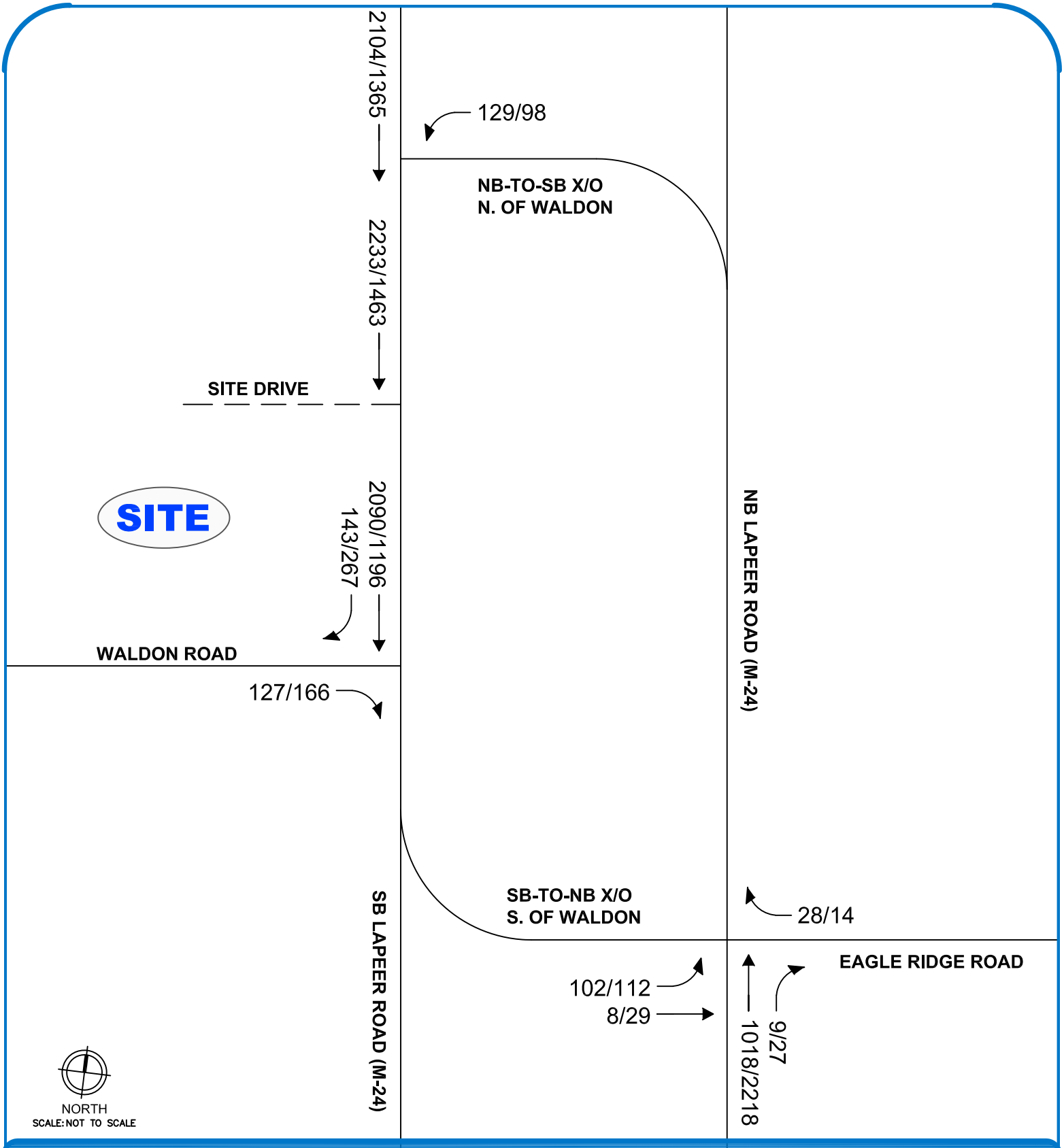


FIGURE 3
EXISTING TRAFFIC VOLUMES

HUDSON SQUARE TIS - ORION TOWNSHIP, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

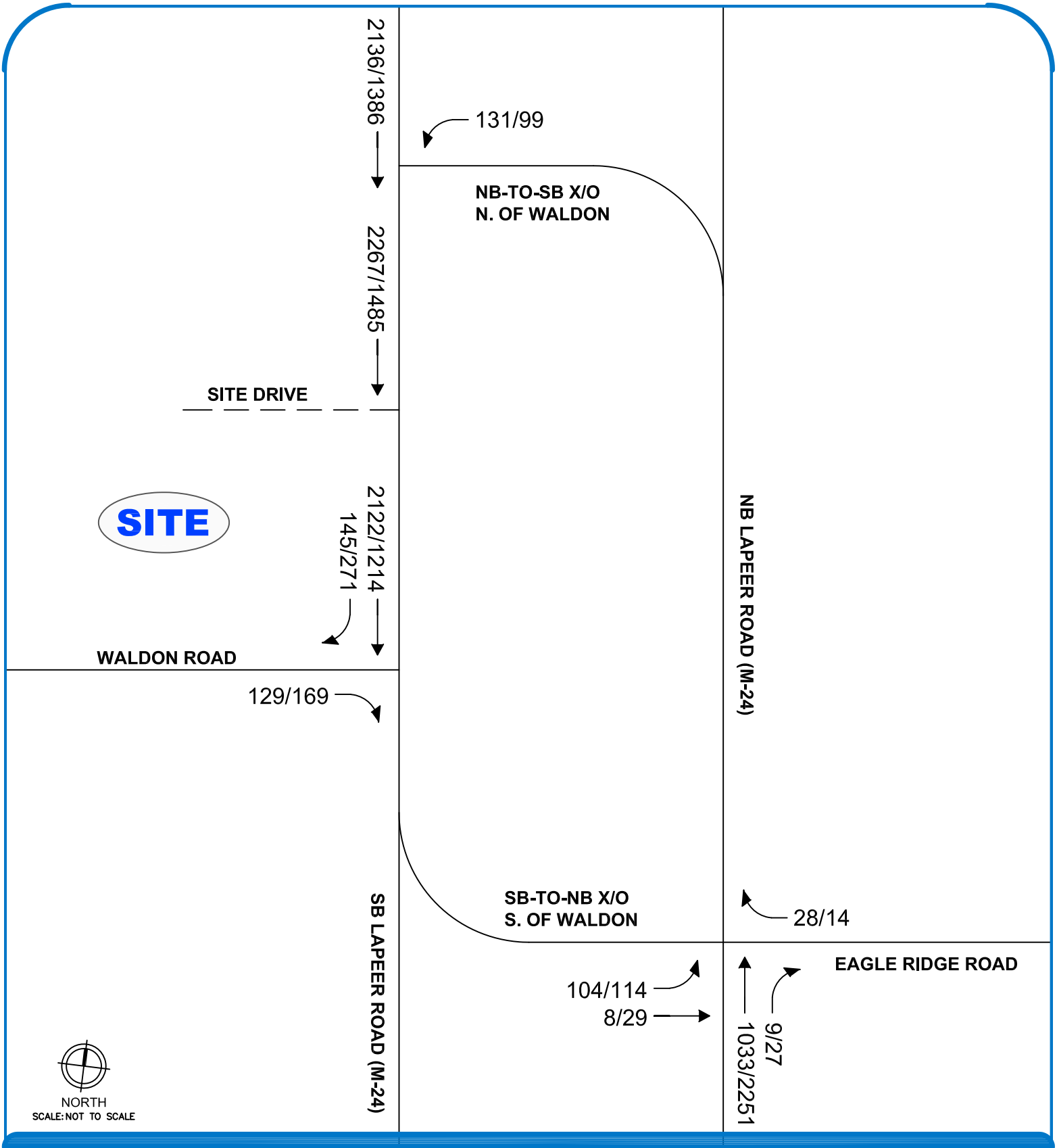


FIGURE 4
BACKGROUND TRAFFIC VOLUMES

HUDSON SQUARE TIS - ORION TOWNSHIP, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

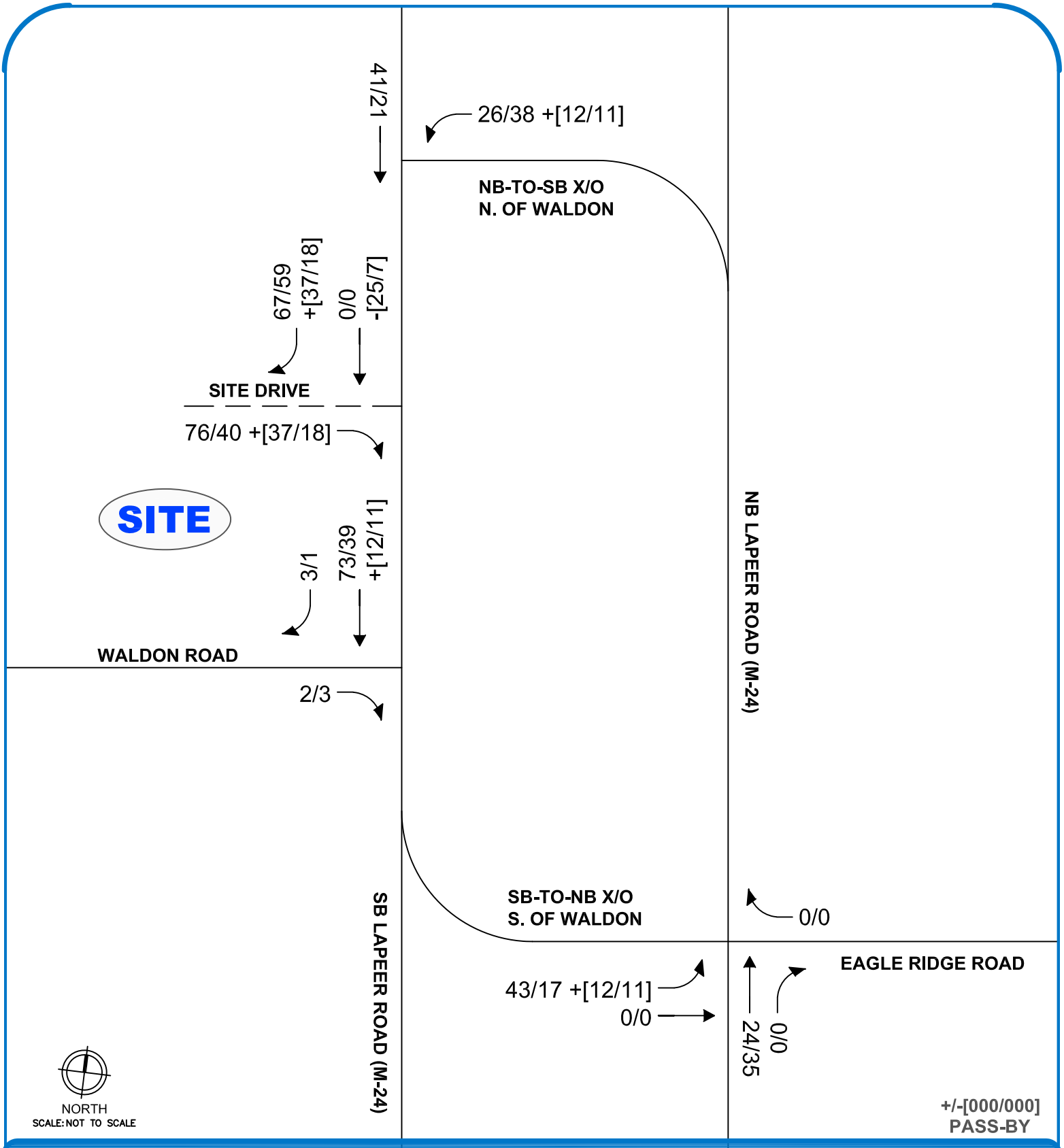


FIGURE 5
SITE-GENERATED TRAFFIC VOLUMES

HUDSON SQUARE TIS - ORION TOWNSHIP, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

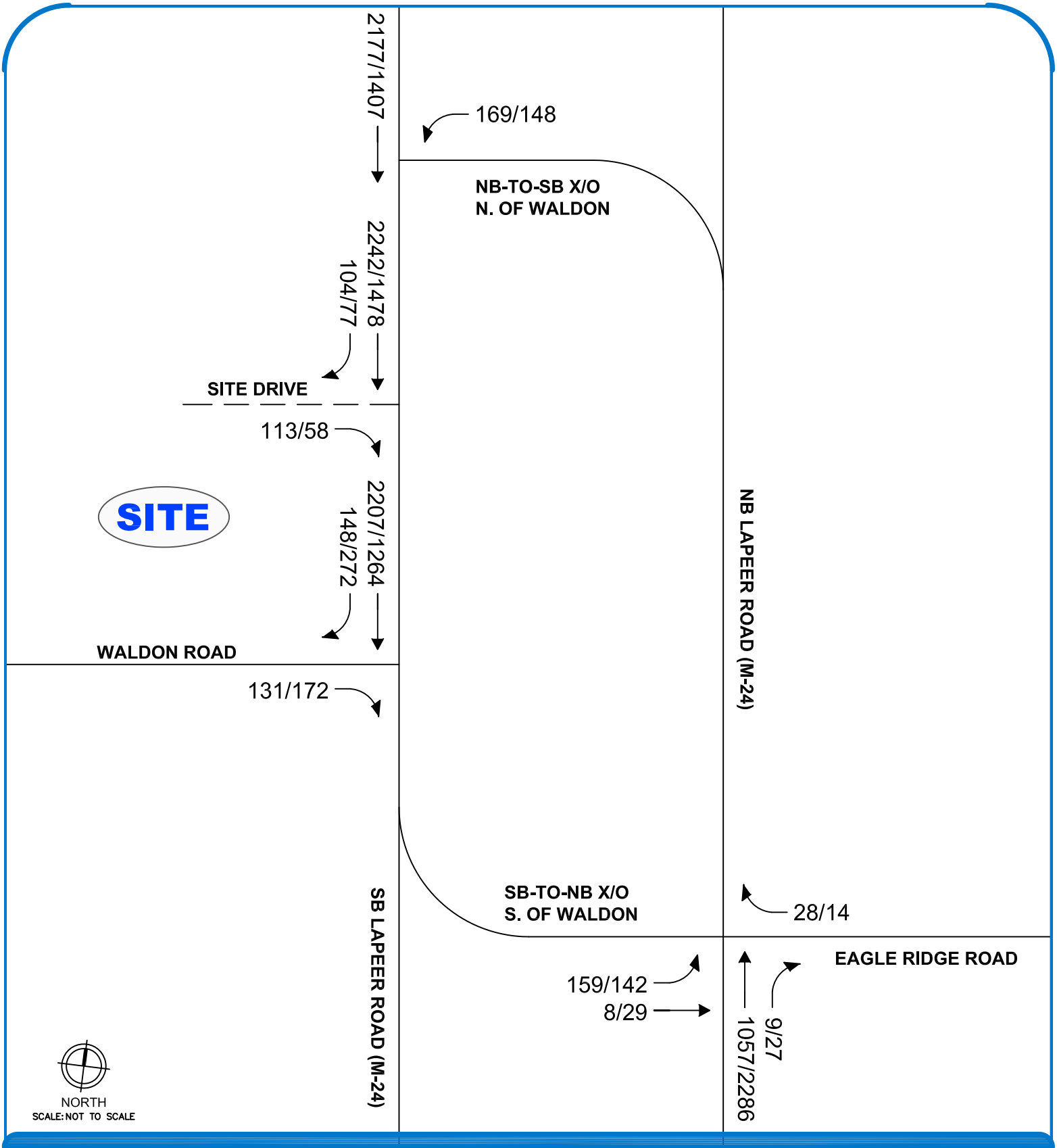


FIGURE 6

FUTURE TRAFFIC VOLUMES

HUDSON SQUARE TIS - ORION TOWNSHIP, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

SITE DEVELOPMENT PLAN
FOR
HUDSON SQUARE
3030 SOUTH LAPEER ROAD
PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT

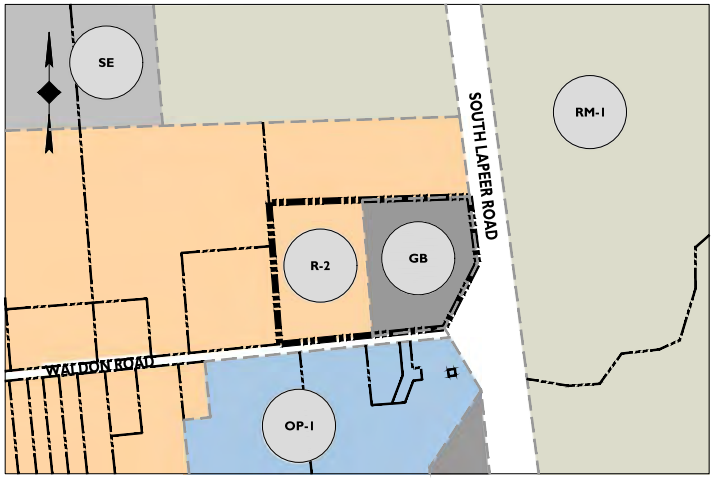
PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
ORION TOWNSHIP, OAKLAND COUNTY, MICHIGAN

SOURCE: USGS MAPS, DATE RETRIEVED 10/11/2022

LOCATION MAP
SCALE: 1" = 800'±

SOURCE: NEARMAP DATE RETRIEVED, 10/11/2022

AERIAL MAP
SCALE: 1" = 200'±



SOURCE: OAKLAND COUNTY PROPERTY GATEWAY & ORION TOWNSHIP ZONING MAP, DATE RETRIEVED 10/11/2022

ZONING MAP
SCALE: 1" = 200'±

PLANS PREPARED BY:

811
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Phone 248.247.1115

PLAN REFERENCE MATERIALS:

1. THIS PLAN SET REFERENCES THE FOLLOWING DOCUMENTS INCLUDING, BUT NOT LIMITED TO:
   - SURVEY PROVIDED BY KEIFT ENGINEERING, INC.
   - ARCHITECTURAL PLANS PROVIDED BY DEISNGHAUS ARCHITECTURE
   - AERIAL MAP FROM NEARMAPS ONLINE MAPPING SYSTEM, DATE RETRIEVED 10/11/2022
   - LOCATION MAP FROM USGS ONLINE MAPPING SYSTEM, DATE RETRIEVED 10/11/2022
2. ALL REFERENCE MATERIAL LISTED ABOVE SHALL BE CONSIDERED A PART OF THIS PLAN SET AND ALL INFORMATION CONTAINED WITHIN THESE MATERIALS SHALL BE UTILIZED IN CONJUNCTION WITH THIS PLAN SET. THE CONTRACTOR IS RESPONSIBLE TO OBTAIN A COPY OF EACH REFERENCE AND REVIEW IT THOROUGHLY PRIOR TO THE START OF CONSTRUCTION.

SHEET INDEX

DRAWING TITLE	SHEET #
COVER SHEET	C-1
SITE PLAN	C-2
AERIAL OVERLAY PLAN	C-3
DENSITY PLAN	C-4
GRADING PLAN	C-5

ADDITIONAL SHEETS

DRAWING TITLE	SHEET #
EXISTING CONDITIONS PLAN	1 OF 1

APPLICANT

DETROIT RIVERSIDE CAPITAL
3300 AUBURN ROAD
AUBURN HILLS, MI 48326
313-964-5552
MICHAEL.WAYNE@DETROITRIVERSIDECAPITAL.COM

ISSUE	DATE	BY	DESCRIPTION
1	10/18/2022	KTH	FOR PUD APPROVAL

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SITE DEVELOPMENT PLAN
HUDSON SQUARE
3030 S. LAPEER ROAD
PROPOSED MULTI-USE
PLANNED UNIT DEVELOPMENT
PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
ORION TOWNSHIP
OAKLAND COUNTY, MICHIGAN

JARED COOKSEY, P.E.
MICHIGAN LICENSE NO. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: AS SHOWN | PROJECT ID: DET-210193.01

TITLE: COVER SHEET

DRAWING: C-1

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
STORAGE		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	435,600 SF (10 AC)	307,766 SF (7.07 AC) (M)
MAXIMUM LOT COVERAGE	30% (92,330 SF)	17.4% (53,460 SF)

(M) MODIFICATION

TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: GENERAL BUSINESS (GB)		
PROPOSED USE		
RESTAURANT WITH DRIVE-THRU		
SIT DOWN RESTAURANT		
CLASSIC CAR CLUB		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	12,000 SF (0.275 AC)	163,195 SF (3.75 AC)
MAXIMUM LOT COVERAGE	30%	5.4% (8,754 SF)
MAXIMUM BUILDING HEIGHT	25 FT	< 25 FT
MINIMUM FRONT YARD SETBACK	30 FT	56.0 FT
MINIMUM SIDE YARD SETBACK	20 FT	N / A
MINIMUM REAR YARD SETBACK	30 FT	52.8 FT
MINIMUM BUILDING CLEAR SPACE	20 FT	PROVIDED
MINIMUM R.O.W. GREENBELT BUFFER	20 FT	52.7 FT
MINIMUM SINGLE-FAMILY GREENBELT BUFFER	30 FT	30.0 FT
MINIMUM OPEN SPACE	10%	PROVIDED
DRIVE-THRU / SINGLE FAMILY SETBACK	100 FT	52.8 FT (M)

(M) MODIFICATION

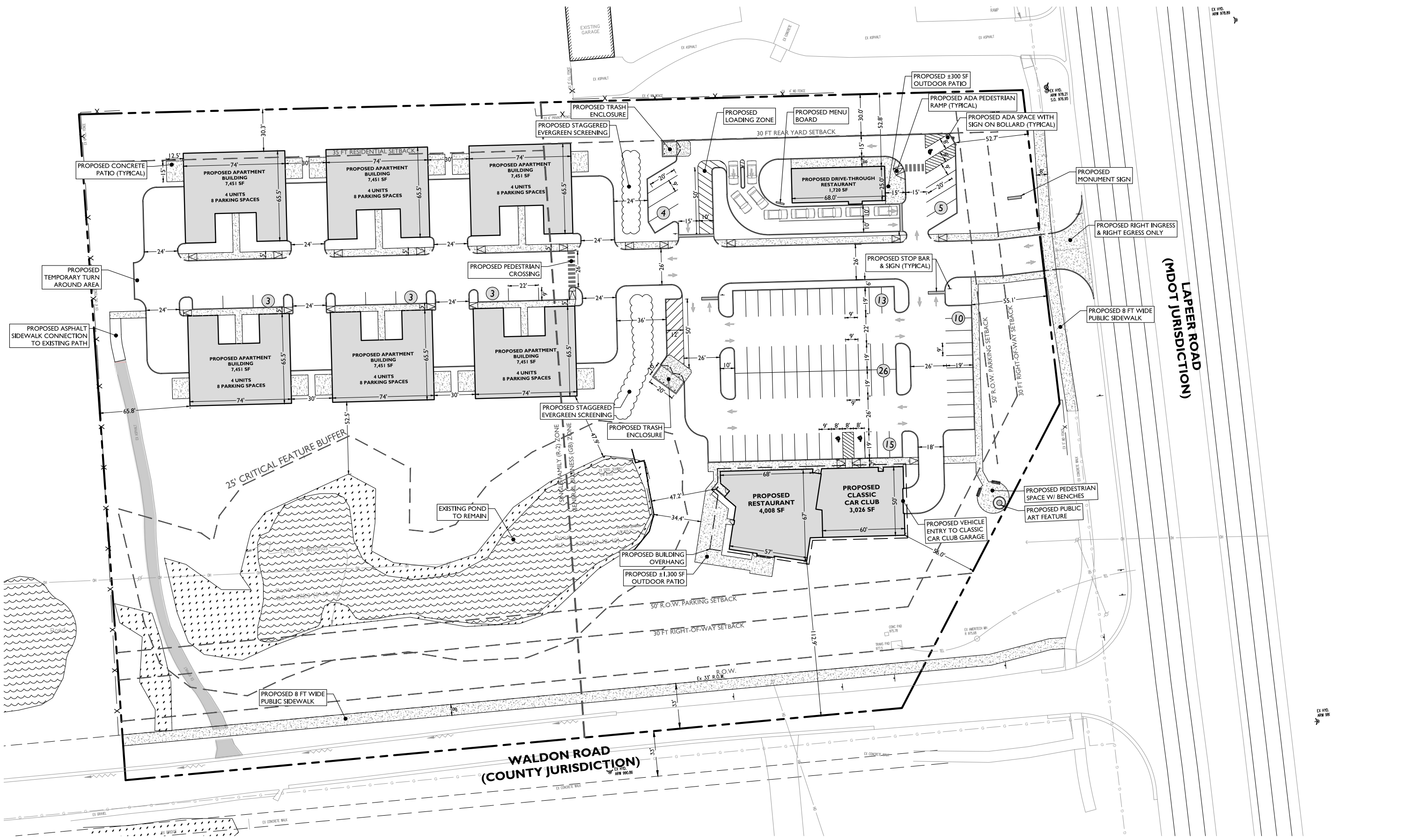
TABLE OF LAND USE AND ZONING		
PIN: 09-26-101-021		
PROPOSED ZONE: PLANNED UNIT DEVELOPMENT (PUD)		
UNDERLYING ZONE: SINGLE-FAMILY (R-2)		
PROPOSED USE		
MULTIPLE-FAMILY RESIDENTIAL		
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT SIZE	10,800 SF	N / A
MINIMUM LOT WIDTH	80 FT	N / A
MAXIMUM LOT COVERAGE	25%	N / A
MAXIMUM BUILDING HEIGHT	30 FT	< 30 FT
MINIMUM FRONT YARD SETBACK	25 FT	248.0 FT
MINIMUM SIDE YARD SETBACK	35 FT	65.8 FT
MINIMUM REAR YARD SETBACK	35 FT	30.3 FT (M)
MINIMUM BUILDING CLEAR SPACE	20 FT	30.0 FT
MINIMUM FLOOR AREA / UNIT	1,080 SF	N / A
MINIMUM OPEN SPACE	15%	PROVIDED

(M) MODIFICATION

OFF-STREET PARKING REQUIREMENTS		
CODE SECTION	**REQUIRED**	**PROPOSED**
§ 14.03.C	**DRIVE-THROUGH RESTAURANT:** 1 SPACE PER 100 SF OF GFA * (1,720 SF)(1 SPACE/100 SF) = 17 SPACES **RESTAURANT (SIT DOWN):** 1 SPACE PER 100 SF * (4,008 SF)(1 SPACE / 100 SF) = 40 SPACES **CLASSIC CAR CLUB:** 1 SPACE PER 200 SF OF GFA * (3,026 SF)(1 SPACE / 200 SF) = 15 SPACES TOTAL: 17 + 40 + 15 SPACES = **72 SPACES**	73 SPACES
	MULTI-FAMILY APARTMENT: 2 SPACES PER UNIT (24 UNITS)(2 SPACES/UNIT) = 48 SPACES	48 SPACES
	APARTMENT GUEST PARKING: 1 SPACE PER 3 UNITS (24 UNITS)(1 SPACE / 3 UNITS) = 8 SPACES	9 SPACES
§ 27.04.A	**90° PARKING:** 9 FT X 19 FT WITH 22 FT AISLE	9 FT X 19 FT WITH 22 FT AISLE
§ 14.04.A	**PARALLEL PARKING:** 9 FT X 22 FT	9 FT X 22 FT
§ 27.04.A	**OFF STREET LOADING:** 10 FT X 50 FT	10 FT X 50 FT

* OFF-STREET PARKING DETERMINED USING GENERAL BUSINESS DISTRICT REQUIREMENTS

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE PAVEMENT
	PROPOSED WALL
	PROPOSED BUILDING DOORS
	PROPOSED EVERGREEN LANDSCAPING SCREEN



GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

40' 0' 40' 80'

GRAPHIC SCALE IN FEET

1" = 40'

ISSUE	DATE	BY	DESCRIPTION
1	10/18/2022	KTH	FOR PUD APPROVAL

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SITE DEVELOPMENT PLAN

HUDSON SQUARE
3030 S. LAPEER ROAD
PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT

PID: 09-26-101-021
3030 SOUTH LAPEER ROAD
ORION TOWNSHIP
OAKLAND COUNTY, MICHIGAN

J. REID COOKSEY, P.E.
MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' PROJECT ID: DET-210193.01

TITLE: SITE PLAN

DRAWING: C-2

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE PAVEMENT
	PROPOSED WALL
	PROPOSED BUILDING DOORS
	PROPOSED EVERGREEN LANDSCAPING SCREEN

GENERAL NOTES

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11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
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SITE DEVELOPMENT PLAN

HUDSON SQUARE
3030 S. LAPEER ROAD
PROPOSED MULTI-USE PLANNED UNIT DEVELOPMENT

PID: 09-26-101-021
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J. REID COOKSEY, P.E.
MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' PROJECT ID: DET-210193.01

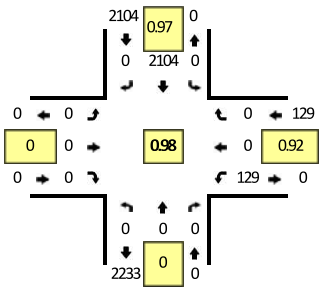
TITLE: AERIAL OVERLAY PLAN

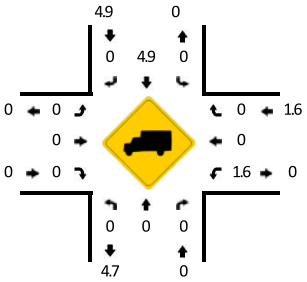
DRAWING: C-3

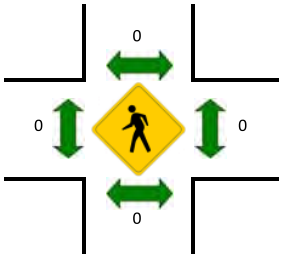
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

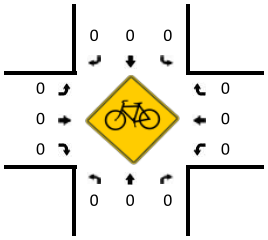
LOCATION: SB Lapeer Rd -- NB to SB X/O North of Waldon | **QC JOB #:** 15971077
CITY/STATE: Orion Township, MI | **DATE:** Thu, Oct 13 2022

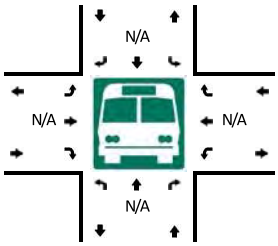
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 8:00 AM -- 8:15 AM

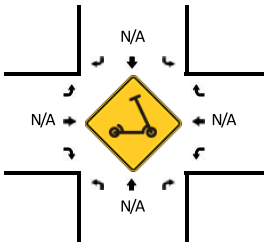












15-Min Count Period Beginning At	SB Lapeer Rd (Northbound)				SB Lapeer Rd (Southbound)				NB to SB X/O North of Waldon (Eastbound)				NB to SB X/O North of Waldon (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	0	432	0	0	0	0	0	0	22	0	0	0	454	
7:15 AM	0	0	0	0	0	498	0	0	0	0	0	0	21	0	0	0	519	
7:30 AM	0	0	0	0	0	503	0	0	0	0	0	0	30	0	0	0	533	
7:45 AM	0	0	0	0	0	534	0	0	0	0	0	0	31	0	0	0	565	2071
8:00 AM	0	0	0	0	0	543	0	0	0	0	0	0	28	0	0	0	571	2188
8:15 AM	0	0	0	0	0	517	0	0	0	0	0	0	35	0	0	0	552	2221
8:30 AM	0	0	0	0	0	510	0	0	0	0	0	0	35	0	0	0	545	2233
8:45 AM	0	0	0	0	0	457	0	0	0	0	0	0	21	0	0	0	478	2146

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	2172	0	0	0	0	0	0	112	0	0	0	2284
Heavy Trucks	0	0	0		0	84	0		0	0	0		0	0	0		84
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

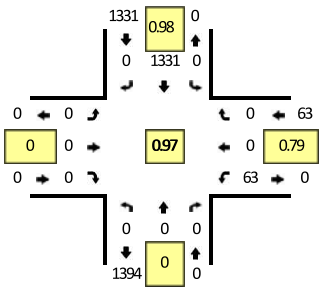
Comments:

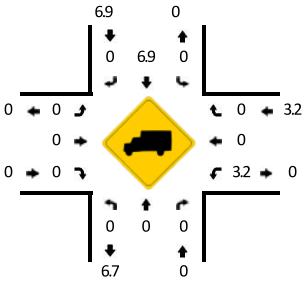
Report generated on 11/3/2022 12:50 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

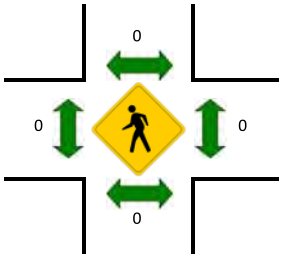
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

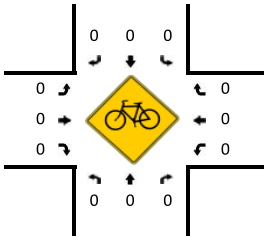
LOCATION: SB Lapeer Rd -- NB to SB X/O North of Waldon | **QC JOB #:** 15971079
CITY/STATE: Orion Township, MI | **DATE:** Thu, Oct 13 2022

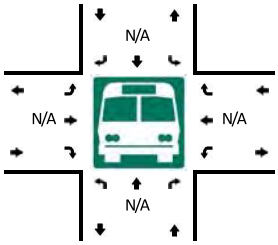
Peak-Hour: 12:00 PM -- 1:00 PM
Peak 15-Min: 12:00 PM -- 12:15 PM

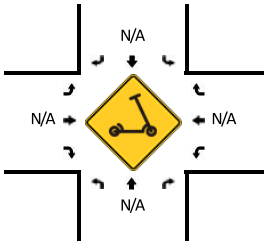












15-Min Count Period Beginning At	SB Lapeer Rd (Northbound)				SB Lapeer Rd (Southbound)				NB to SB X/O North of Waldon (Eastbound)				NB to SB X/O North of Waldon (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	0	0	0	0	0	318	0	0	0	0	0	0	10	0	0	0	328	
11:15 AM	0	0	0	0	0	288	0	0	0	0	0	0	13	0	0	0	301	
11:30 AM	0	0	0	0	0	309	0	0	0	0	0	0	16	0	0	0	325	
11:45 AM	0	0	0	0	0	311	0	0	0	0	0	0	24	0	0	0	335	1289
12:00 PM	0	0	0	0	0	340	0	0	0	0	0	0	20	0	0	0	360	1321
12:15 PM	0	0	0	0	0	336	0	0	0	0	0	0	17	0	0	0	353	1373
12:30 PM	0	0	0	0	0	330	0	0	0	0	0	0	13	0	0	0	343	1391
12:45 PM	0	0	0	0	0	325	0	0	0	0	0	0	13	0	0	0	338	1394

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	1360	0	0	0	0	0	0	80	0	0	0	1440
Heavy Trucks	0	0	0		0	76	0		0	0	0		4	0	0		80
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

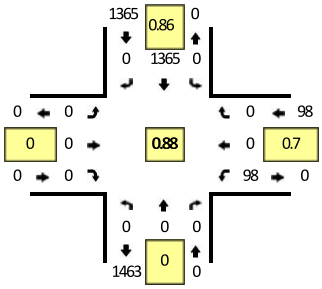
Comments:

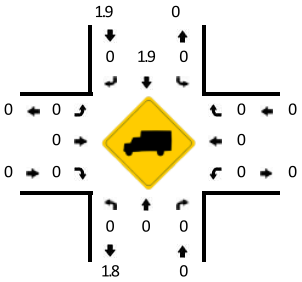
Report generated on 11/3/2022 12:50 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

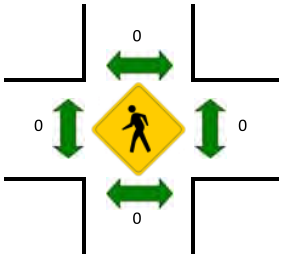
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

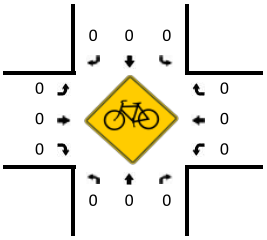
LOCATION: SB Lapeer Rd -- NB to SB X/O North of Waldon | **QC JOB #:** 15971080
CITY/STATE: Orion Township, MI | **DATE:** Tue, Oct 18 2022

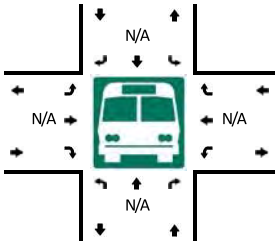
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

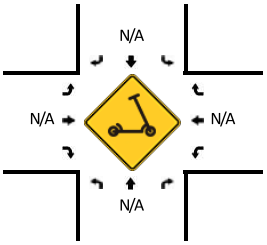












15-Min Count Period Beginning At	SB Lapeer Rd (Northbound)				SB Lapeer Rd (Southbound)				NB to SB X/O North of Waldon (Eastbound)				NB to SB X/O North of Waldon (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	0	0	0	0	297	0	0	0	0	0	0	20	0	0	0	317	
2:15 PM	0	0	0	0	0	287	0	0	0	0	0	0	14	0	0	0	301	
2:30 PM	0	0	0	0	0	347	0	0	0	0	0	0	15	0	0	0	362	
2:45 PM	0	0	0	0	0	472	0	0	0	0	0	0	25	0	0	0	497	1477
3:00 PM	0	0	0	0	0	364	0	0	0	0	0	0	33	0	0	0	397	1557
3:15 PM	0	0	0	0	0	369	0	0	0	0	0	0	24	0	0	0	393	1649
3:30 PM	0	0	0	0	0	363	0	0	0	0	0	0	29	0	0	0	392	1679
3:45 PM	0	0	0	0	0	369	0	0	0	0	0	0	22	0	0	0	391	1573
4:00 PM	0	0	0	0	0	342	0	0	0	0	0	0	25	0	0	0	367	1543
4:15 PM	0	0	0	0	0	384	0	0	0	0	0	0	30	0	0	0	414	1564
4:30 PM	0	0	0	0	0	357	0	0	0	0	0	0	32	0	0	0	389	1561
4:45 PM	0	0	0	0	0	287	0	0	0	0	0	0	29	0	0	0	316	1486
5:00 PM	0	0	0	0	0	322	0	0	0	0	0	0	35	0	0	0	357	1476
5:15 PM	0	0	0	0	0	396	0	0	0	0	0	0	20	0	0	0	416	1478
5:30 PM	0	0	0	0	0	343	0	0	0	0	0	0	18	0	0	0	361	1450
5:45 PM	0	0	0	0	0	304	0	0	0	0	0	0	25	0	0	0	329	1463

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	1584	0	0	0	0	0	0	80	0	0	0	1664
Heavy Trucks	0	0	0		0	20	0		0	0	0		0	0	0		20
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

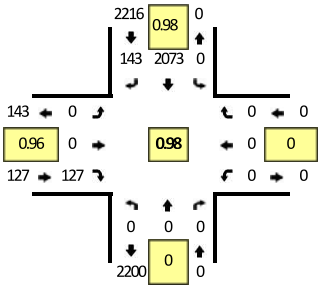
Comments:

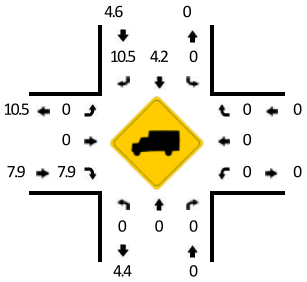
Report generated on 11/3/2022 1:25 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

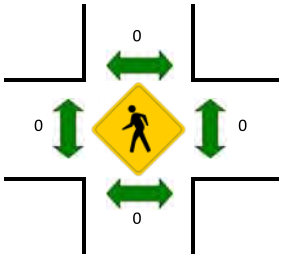
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

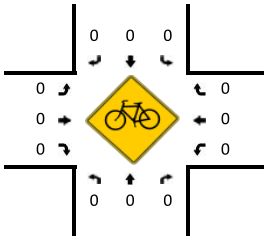
LOCATION: SB Lapeer Rd -- Waldon Road | **QC JOB #:** 15971069
CITY/STATE: Orion Township, MI | **DATE:** Thu, Oct 13 2022

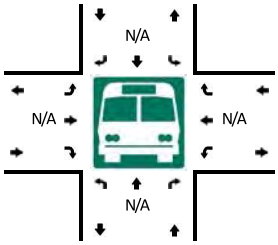
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

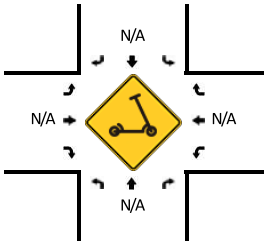












15-Min Count Period Beginning At	SB Lapeer Rd (Northbound)				SB Lapeer Rd (Southbound)				Waldon Road (Eastbound)				Waldon Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	0	423	32	0	0	0	64	0	0	0	0	0	519	
7:15 AM	0	0	0	0	0	482	37	0	0	0	34	0	0	0	0	0	553	
7:30 AM	0	0	0	0	0	495	36	0	0	0	32	0	0	0	0	0	563	
7:45 AM	0	0	0	0	0	534	30	0	0	0	32	0	0	0	0	0	596	2231
8:00 AM	0	0	0	0	0	529	30	0	0	0	29	0	0	0	0	0	588	2300
8:15 AM	0	0	0	0	0	514	37	0	0	0	33	0	0	0	0	0	584	2331
8:30 AM	0	0	0	0	0	496	46	0	0	0	33	0	0	0	0	0	575	2343
8:45 AM	0	0	0	0	0	432	51	0	0	0	36	0	0	0	0	0	519	2266

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	2136	120	0	0	0	128	0	0	0	0	0	2384
Heavy Trucks	0	0	0		0	80	4		0	0	12		0	0	0		96
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

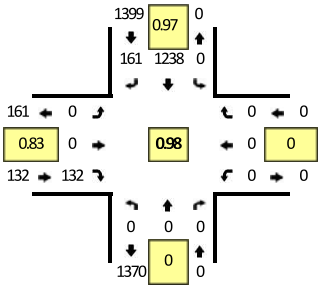
Comments:

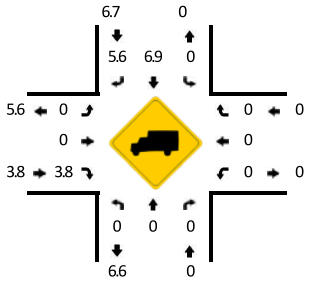
Report generated on 11/3/2022 12:50 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

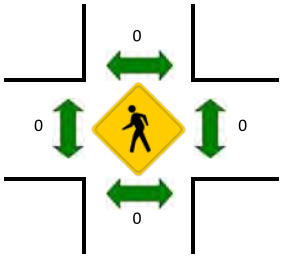
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

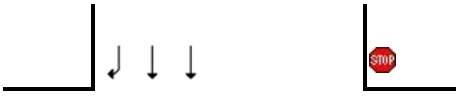
LOCATION: SB Lapeer Rd -- Waldon Road | **QC JOB #:** 15971071
CITY/STATE: Orion Township, MI | **DATE:** Thu, Oct 13 2022

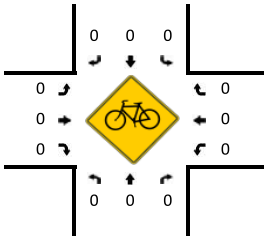
Peak-Hour: 12:00 PM -- 1:00 PM
Peak 15-Min: 12:15 PM -- 12:30 PM

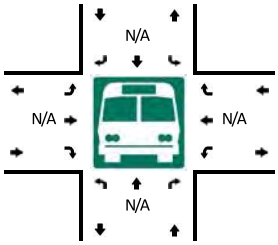


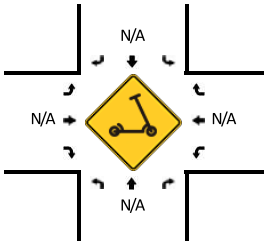












15-Min Count Period Beginning At	SB Lapeer Rd (Northbound)				SB Lapeer Rd (Southbound)				Waldon Road (Eastbound)				Waldon Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	0	0	0	0	0	297	30	0	0	0	25	0	0	0	0	0	352	
11:15 AM	0	0	0	0	0	273	29	0	0	0	24	0	0	0	0	0	326	
11:30 AM	0	0	0	0	0	281	44	0	0	0	45	0	0	0	0	0	370	
11:45 AM	0	0	0	0	0	289	43	0	0	0	22	0	0	0	0	0	354	1402
12:00 PM	0	0	0	0	0	302	58	0	0	0	27	0	0	0	0	0	387	1437
12:15 PM	0	0	0	0	0	323	34	0	0	0	34	0	0	0	0	0	391	1502
12:30 PM	0	0	0	0	0	307	31	0	0	0	40	0	0	0	0	0	378	1510
12:45 PM	0	0	0	0	0	306	38	0	0	0	31	0	0	0	0	0	375	1531

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	1292	136	0	0	0	136	0	0	0	0	0	1564
Heavy Trucks	0	0	0		0	104	12		0	0	4		0	0	0		120
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/3/2022 12:50 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

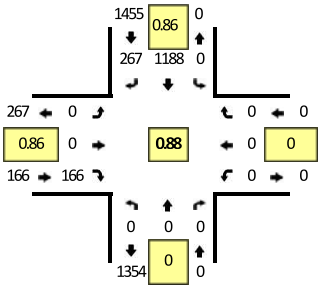
Type of peak hour being reported: User-Defined

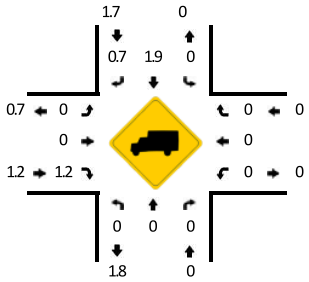
Method for determining peak hour: Total Entering Volume

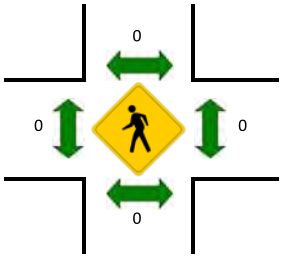
LOCATION: SB Lapeer Rd -- Waldon Road
CITY/STATE: Orion Township, MI

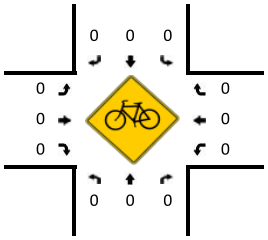
QC JOB #: 15971072
DATE: Tue, Oct 18 2022

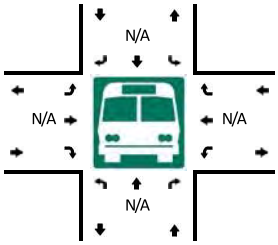
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

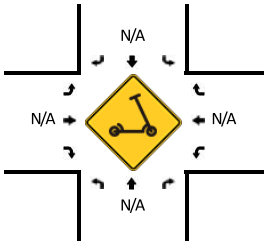












15-Min Count Period Beginning At	SB Lapeer Rd (Northbound)				SB Lapeer Rd (Southbound)				Waldon Road (Eastbound)				Waldon Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	0	0	0	0	270	40	0	0	0	42	0	0	0	0	0	352	
2:15 PM	0	0	0	0	0	261	37	0	0	0	34	0	0	0	0	0	332	
2:30 PM	0	0	0	0	0	306	50	0	0	0	30	0	0	0	0	0	386	
2:45 PM	0	0	0	0	0	361	128	0	0	0	38	0	0	0	0	0	527	1597
3:00 PM	0	0	0	0	0	342	77	0	0	0	35	0	0	0	0	0	454	1699
3:15 PM	0	0	0	0	0	314	57	0	0	0	29	0	0	0	0	0	400	1767
3:30 PM	0	0	0	0	0	334	73	0	0	0	33	0	0	0	0	0	440	1821
3:45 PM	0	0	0	0	0	328	63	0	0	0	31	0	0	0	0	0	422	1716
4:00 PM	0	0	0	0	0	309	58	0	0	0	53	0	0	0	0	0	420	1682
4:15 PM	0	0	0	0	0	331	89	0	0	0	37	0	0	0	0	0	457	1739
4:30 PM	0	0	0	0	0	308	77	0	0	0	29	0	0	0	0	0	414	1713
4:45 PM	0	0	0	0	0	266	60	0	0	0	40	0	0	0	0	0	366	1657
5:00 PM	0	0	0	0	0	269	76	0	0	0	48	0	0	0	0	0	393	1630
5:15 PM	0	0	0	0	0	345	76	0	0	0	42	0	0	0	0	0	463	1636
5:30 PM	0	0	0	0	0	298	61	0	0	0	40	0	0	0	0	0	399	1621
5:45 PM	0	0	0	0	0	276	54	0	0	0	36	0	0	0	0	0	366	1621

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	1380	304	0	0	0	168	0	0	0	0	0	1852
Heavy Trucks	0	0	0		0	12	0		0	0	0		0	0	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

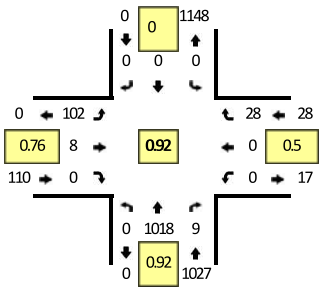
Report generated on 11/3/2022 1:25 PM

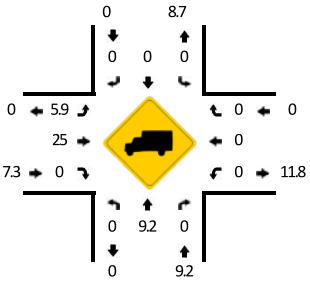
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

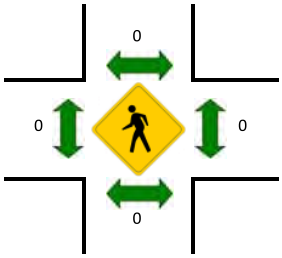
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

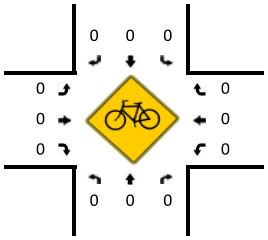
LOCATION: NB Lapeer Rd -- Eagle Ridge Rd | **QC JOB #:** 15971073
CITY/STATE: Orion Township, MI | **DATE:** Thu, Oct 13 2022

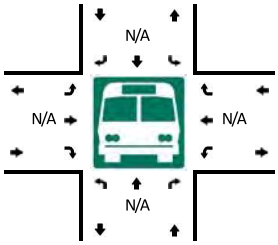
Peak-Hour: 8:00 AM -- 9:00 AM
Peak 15-Min: 8:45 AM -- 9:00 AM

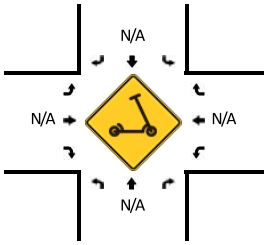












15-Min Count Period Beginning At	NB Lapeer Rd (Northbound)				NB Lapeer Rd (Southbound)				Eagle Ridge Rd (Eastbound)				Eagle Ridge Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	312	0	0	0	0	0	0	52	0	0	0	0	0	12	0	376	
7:15 AM	0	243	0	0	0	0	0	0	24	4	0	0	0	0	4	0	275	
7:30 AM	0	183	0	0	0	0	0	0	22	2	0	0	0	0	8	0	215	
7:45 AM	0	267	1	0	0	0	0	0	18	0	0	0	0	0	8	0	294	1160
8:00 AM	0	278	2	0	0	0	0	0	23	1	0	0	0	0	8	0	312	1096
8:15 AM	0	210	3	0	0	0	0	0	21	3	0	0	0	0	14	0	251	1072
8:30 AM	0	258	1	0	0	0	0	0	22	4	0	0	0	0	2	0	287	1144
8:45 AM	0	272	3	0	0	0	0	0	36	0	0	0	0	0	4	0	315	1165

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1088	12	0	0	0	0	0	144	0	0	0	0	0	16	0	1260
Heavy Trucks	0	100	0		0	0	0		8	0	0		0	0	0		108
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

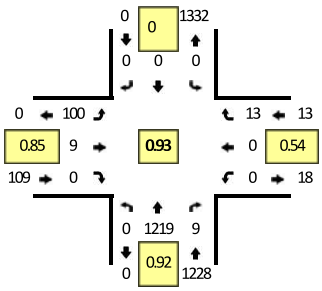
Comments:

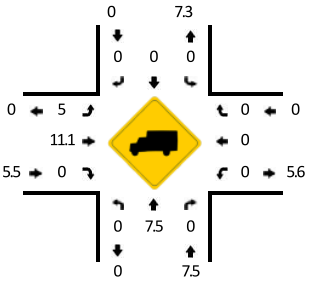
Report generated on 11/3/2022 12:50 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

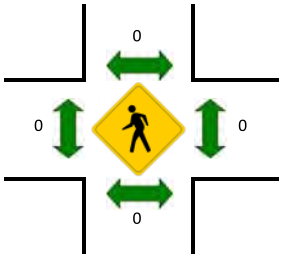
LOCATION: NB Lapeer Rd -- Eagle Ridge Rd
CITY/STATE: Orion Township, MI

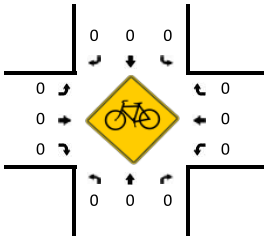
QC JOB #: 15971075
DATE: Thu, Oct 13 2022

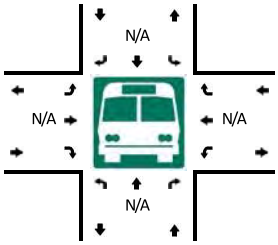
Peak-Hour: 11:45 AM -- 12:45 PM
Peak 15-Min: 11:45 AM -- 12:00 PM

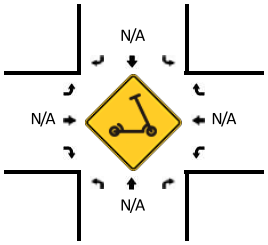












15-Min Count Period Beginning At	NB Lapeer Rd (Northbound)				NB Lapeer Rd (Southbound)				Eagle Ridge Rd (Eastbound)				Eagle Ridge Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	0	267	2	0	0	0	0	0	19	5	0	0	0	0	2	0	295	
11:15 AM	0	271	1	0	0	0	0	0	26	3	0	0	0	0	3	0	304	
11:30 AM	0	295	1	0	0	0	0	0	21	2	0	0	0	0	4	0	323	
11:45 AM	0	332	2	0	0	0	0	0	28	2	0	0	0	0	0	0	364	1286
12:00 PM	0	310	3	0	0	0	0	0	18	2	0	0	0	0	3	0	336	1327
12:15 PM	0	286	3	0	0	0	0	0	27	0	0	0	0	0	6	0	322	1345
12:30 PM	0	291	1	0	0	0	0	0	27	5	0	0	0	0	4	0	328	1350
12:45 PM	0	304	1	0	0	0	0	0	29	3	0	0	0	0	2	0	339	1325

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1328	8	0	0	0	0	0	112	8	0	0	0	0	0	0	1456
Heavy Trucks	0	104	0		0	0	0		12	0	0		0	0	0		116
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

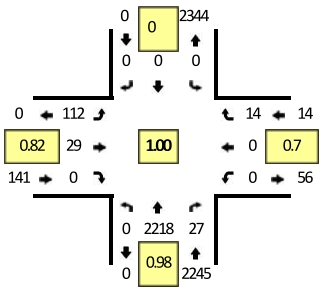
Report generated on 11/3/2022 12:50 PM

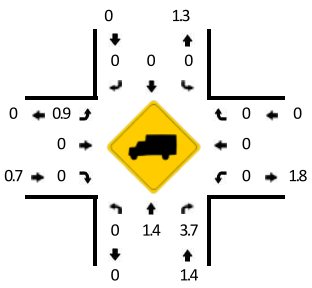
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

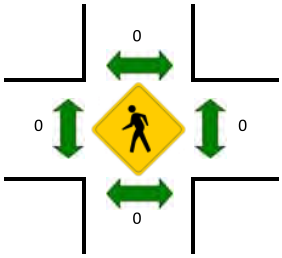
LOCATION: NB Lapeer Rd -- Eagle Ridge Rd
CITY/STATE: Orion Township, MI

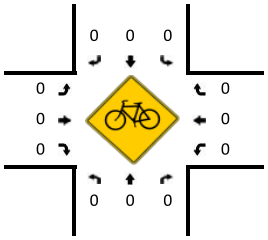
QC JOB #: 15971076
DATE: Tue, Oct 18 2022

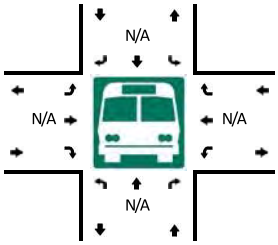
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

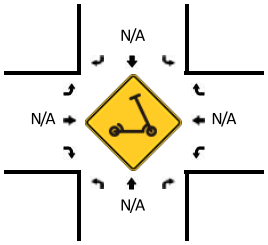












15-Min Count Period Beginning At	NB Lapeer Rd (Northbound)				NB Lapeer Rd (Southbound)				Eagle Ridge Rd (Eastbound)				Eagle Ridge Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	0	358	2	0	0	0	0	0	30	0	0	0	0	0	6	0	396	
2:15 PM	0	416	0	0	0	0	0	0	26	1	0	0	0	0	3	0	446	
2:30 PM	0	446	2	0	0	0	0	0	25	1	0	0	0	0	3	0	477	
2:45 PM	0	465	1	0	0	0	0	0	29	7	0	0	0	0	3	0	505	1824
3:00 PM	0	456	5	0	0	0	0	0	19	7	0	0	0	0	7	0	494	1922
3:15 PM	0	455	6	0	0	0	0	0	17	4	0	0	0	0	4	0	486	1962
3:30 PM	0	550	9	0	0	0	0	0	33	2	0	0	0	0	7	0	601	2086
3:45 PM	0	572	8	0	0	0	0	0	22	7	0	0	0	0	6	0	615	2196
4:00 PM	0	528	7	0	0	0	0	0	33	4	0	0	0	0	4	0	576	2278
4:15 PM	0	474	4	0	0	0	0	0	32	6	0	0	0	0	4	0	520	2312
4:30 PM	0	536	4	0	0	0	0	0	28	2	0	0	0	0	7	0	577	2288
4:45 PM	0	537	3	0	0	0	0	0	30	3	0	0	0	0	10	0	583	2256
5:00 PM	0	567	5	0	0	0	0	0	21	5	0	0	0	0	5	0	603	2283
5:15 PM	0	558	7	0	0	0	0	0	27	8	0	0	0	0	3	0	603	2366
5:30 PM	0	547	9	0	0	0	0	0	28	9	0	0	0	0	3	0	596	2385
5:45 PM	0	546	6	0	0	0	0	0	36	7	0	0	0	0	3	0	598	2400

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	2268	20	0	0	0	0	0	84	20	0	0	0	0	20	0	2412
Heavy Trucks	0	40	0		0	0	0		0	0	0		0	0	0		40
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Search...

Crash and Road Data

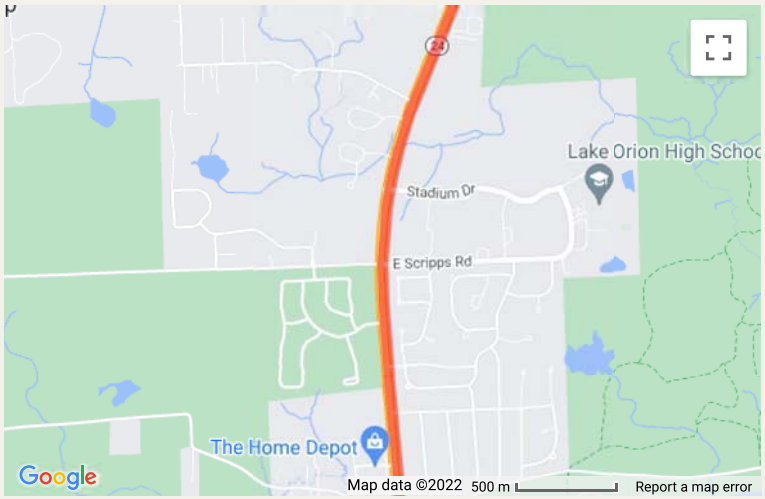
Road Segment Report

Lapeer Rd, (PR Number 616604)

From:	Waldon Rd 3.933 BMP
To:	Clarkston Rd W 6.206 EMP
Jurisdiction:	State
FALINK ID:	323
Community:	Orion Township
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	2.273 miles
Number of Lanes:	2
Posted Speed:	55 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2017-2021:	43
Traffic Volume (2016)*:	20,800 (Observed AADT)
Pavement Type (2021):	Asphalt
Pavement Rating (2021):	Fair
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View



Search...

Crash and Road Data

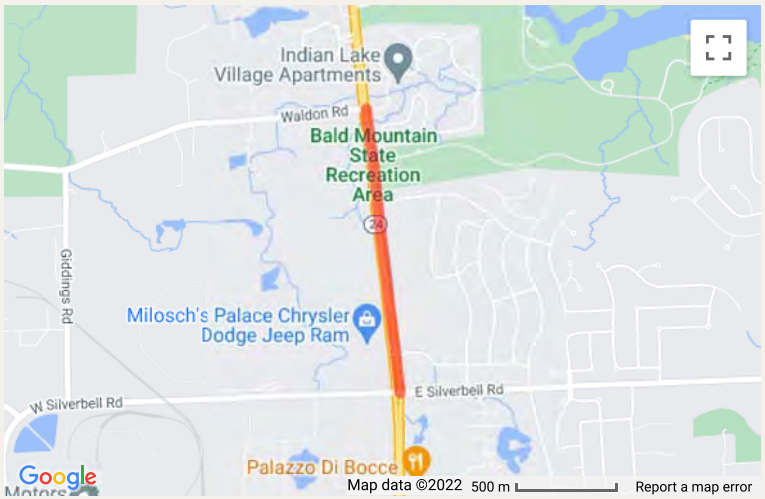
Road Segment Report

Lapeer Rd, (PR Number 616604)

From:	Silver Bell Rd E 3.050 BMP
To:	Waldon Rd 3.933 EMP
Jurisdiction:	State
FALINK ID:	322
Community:	Orion Township
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	0.883 miles
Number of Lanes:	2
Posted Speed:	55 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2017-2021:	19
Traffic Volume (2019)*:	23,700 (Observed AADT)
Pavement Type (2021):	Asphalt
Pavement Rating (2021):	Fair
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View



Search...

Crash and Road Data

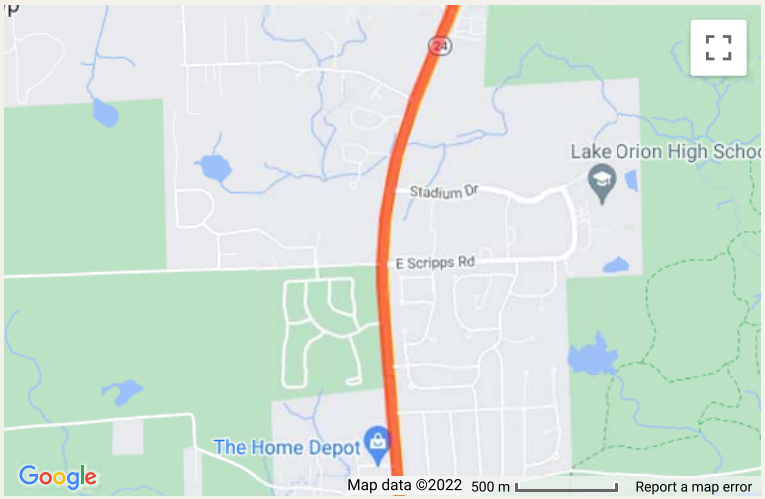
Road Segment Report

Lapeer Rd, (PR Number 616605)

From:	Waldon Rd 3.920 BMP
To:	Clarkston Rd W 6.193 EMP
Jurisdiction:	State
FALINK ID:	349
Community:	Orion Township
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	2.273 miles
Number of Lanes:	2
Posted Speed:	55 (source: TCO)
Route Classification:	BL-75
Annual Crash Average 2017-2021:	43
Traffic Volume (2016)*:	22,600 (Observed AADT)
Pavement Type (2021):	Asphalt
Pavement Rating (2021):	Good
Short Range (TIP) Projects:	(10867) Rehabilitate Roadway
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View



Search...

Crash and Road Data

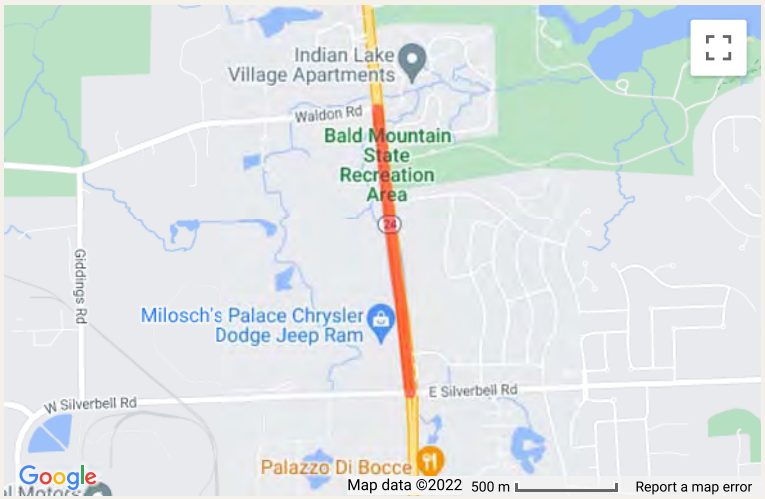
Road Segment Report

Lapeer Rd, (PR Number 616605)

From:	Silver Bell Rd E 3.037 BMP
To:	Waldon Rd 3.920 EMP
Jurisdiction:	State
FALINK ID:	348
Community:	Orion Township
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	0.883 miles
Number of Lanes:	2
Posted Speed:	55 (source: TCO)
Route Classification:	BL-75
Annual Crash Average 2017-2021:	19
Traffic Volume (2016)*:	21,900 (Observed AADT)
Pavement Type (2021):	Asphalt
Pavement Rating (2021):	Good
Short Range (TIP) Projects:	(10867) Rehabilitate Roadway
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View



Search...

Crash and Road Data

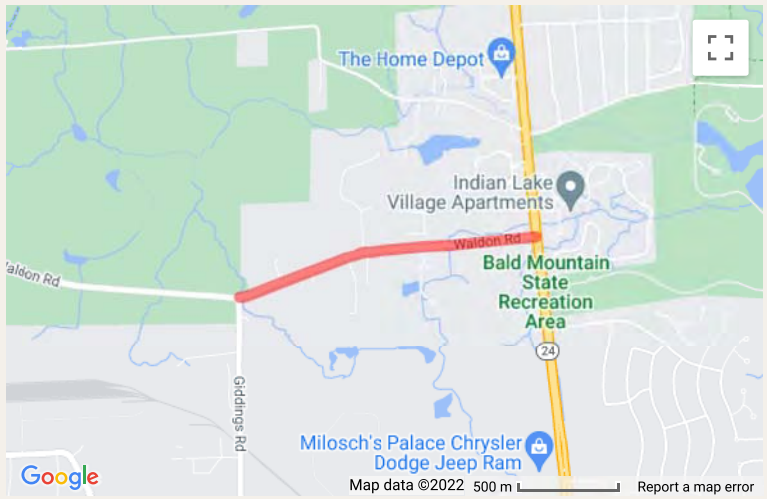
Road Segment Report

Waldon Rd, (PR Number 627303)

From:	Giddings Rd 8.038 BMP
To:	Lapeer Rd 8.990 EMP
Jurisdiction:	County
FALINK ID:	661
Community:	Orion Township
County:	Oakland
Functional Class:	5 - Major Collector
Direction:	1 Way
Length:	0.952 miles
Number of Lanes:	2
Posted Speed:	40 (source: TCO)
Route Classification:	BL-75
Annual Crash Average 2017-2021:	16
Traffic Volume (2018)*:	4,300 (Observed AADT)
Pavement Type (2021):	Asphalt
Pavement Rating (2021):	Fair
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View



SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

Orion Township

2323 Joslyn Road
Lake Orion, MI 48360
http://www.oriontownship.org

SEMCOG MEMBER

Census 2020 Population: 35,330
Area: 34.6 square miles

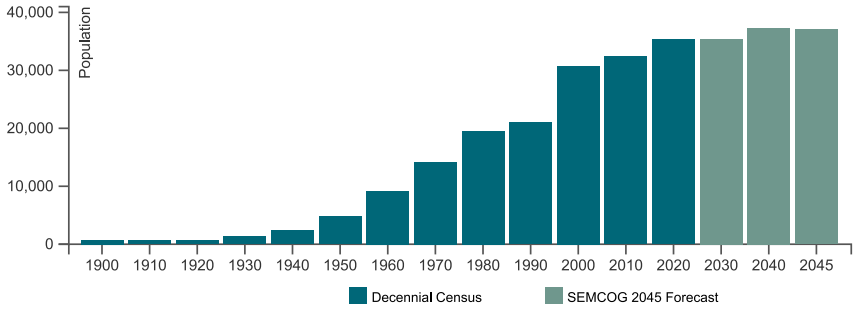
VIEW COMMUNITY EXPLORER MAP VIEW 2020 CENSUS MAP

Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year** 2016-2020 **Social** | **Demographic**

Population and Household Estimates for Southeast Michigan, 2021

Population Forecast



Population and Households

Population and Households	Census 2020	Census 2010	Change 2010-2020	Pct Change 2010-2020	SEMCOG Jul 2021	SEMCOG 2045
Total Population	35,330	32,421	2,909	9.0%	35,541	37,032
Group Quarters Population	121	140	-19	-13.6%	121	212
Household Population	35,209	32,281	2,928	9.1%	35,420	36,820
Housing Units	13,885	12,515	1,370	10.9%	14,018	-
Households (Occupied Units)	13,219	11,673	1,546	13.2%	13,361	14,652
Residential Vacancy Rate	4.8%	6.7%	-1.9%	-	4.7%	-
Average Household Size	2.66	2.77	-0.10	-	2.65	2.51

Source: **U.S. Census Bureau** and **SEMCOG 2045 Regional Development Forecast**

Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.	2011-2018 Avg.
Natural Increase (Births - Deaths)	132	50	94
Births	275	172	260
Deaths	143	122	166
Net Migration (Movement In - Movement Out)	78	75	349
Population Change (Natural Increase + Net Migration)	210	125	443

Source: **Michigan Department of Community Health Vital Statistics**, **U.S. Census Bureau**, and SEMCOG

SEMCOG | Southeast Michigan Council of Governments

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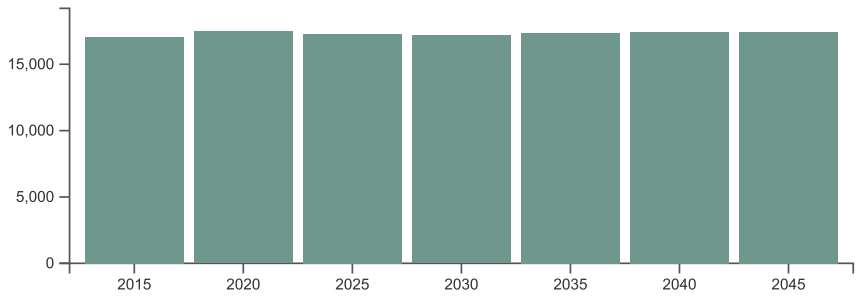
VIEW COMMUNITY EXPLORER MAP VIEW 2020 CENSUS MAP

Economy & Jobs

Link to American Community Survey (ACS) Profiles: **Select a Year** 2016-2020 **Economic**

Forecasted Jobs



Source: **SEMCOG 2045 Regional Development Forecast**

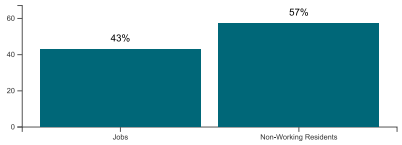
Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
Natural Resources, Mining, & Construction	975	1,126	1,072	1,057	1,068	1,079	1,091	116	11.9%
Manufacturing	2,885	2,576	2,415	2,224	2,102	1,995	1,880	-1,005	-34.8%
Wholesale Trade	904	925	923	913	913	912	905	1	0.1%
Retail Trade	2,458	2,600	2,613	2,586	2,575	2,552	2,493	35	1.4%
Transportation, Warehousing, & Utilities	576	595	589	587	598	611	618	42	7.3%
Information & Financial Activities	1,611	1,692	1,691	1,712	1,752	1,759	1,779	168	10.4%
Professional and Technical Services & Corporate HQ	1,175	1,233	1,159	1,253	1,349	1,332	1,346	171	14.6%
Administrative, Support, & Waste Services	1,690	1,745	1,768	1,778	1,817	1,859	1,884	194	11.5%
Education Services	1,020	992	993	992	1,004	1,009	1,023	3	0.3%
Healthcare Services	1,014	1,095	1,147	1,184	1,274	1,365	1,450	436	43%
Leisure & Hospitality	1,368	1,499	1,539	1,558	1,592	1,664	1,659	291	21.3%
Other Services	1,219	1,253	1,223	1,200	1,194	1,184	1,168	-51	-4.2%
Public Administration	138	138	137	135	135	135	135	-3	-2.2%
Total Employment Numbers	17,033	17,469	17,269	17,179	17,373	17,456	17,431	398	2.3%

Source: **SEMCOG 2045 Regional Development Forecast**

Daytime Population

Daytime Population	ACS 2016
Jobs	12,576
Non-Working Residents	16,770
Age 15 and under	8,051
Not in labor force	7,657
Unemployed	1,062
Daytime Population	29,346



Source: **2012-2016 American Community Survey 5-Year Estimates** and **2012-2016 Census Transportation Planning Products Program (CTPP).** For additional information, visit SEMCOG's **Interactive Commuting Patterns Map**

Note: The number of residents attending school outside Southeast Michigan is not available. Likewise, the number of students commuting into Southeast Michigan to attend school is also not known.

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Exhibit 20-2. As used here, control delay is defined as the total elapsed time from the time 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, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular controlled movement is a function three (capacity) factors: distribution of gaps in the major-street traffic stream, driver judgment in selecting gaps through which to execute the desired maneuvers, and the follow-up headways required by each driver in a queue.

The basic capacity model assumes gaps in the conflicting movements are randomly distributed. When traffic signals are present on the major street, upstream of the subject intersection, flows may not be random but will likely have some platoon structure. Although the procedures in this chapter provide a method for approximating the operations of a TWSC intersection with an upstream signal, the operations of such an intersection is arguably best handled by including it in a complete simulation

Exhibit 20-2. Level of Service Criteria for Stop-Controlled Intersections (Motor Vehciles)

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. A total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The LOS criteria for TWSC intersections differ somewhat from the criteria used in Chapter 19 for signalized intersections, primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection.

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle. The criteria are given in Exhibit 19-8. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with a control delay of 10 s/veh or less. This level is typically assigned when the volume-to-capacity ratio is low and either progression is extremely favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during a green indication and travel through the intersection without stopping.

LOS B describes operations with control delay between 10 and 20 s/veh. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

Exhibit 19.8. Level-of-Service Criteria for Signalized Intersections (Motorized Vehicles)

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤10.0
B	> 10.0 and ≤20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	>80.0

1. If the v/c ratio for a lane group exceeds 1.0, a LOS F is assigned to the individual lane group. LOS for approach-based and intersection-wide assessments are determined solely by the control delay.

LOS C describes operations with control delay between 20 and 35 s/veh. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e. one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number if vehicle stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D describes operations with control delay between 35 and 55 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with control delay between 55 and 80 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level, considered to be unacceptable to most drivers, often occurs with over-saturation, that is, when arrival flow rates exceed the capacity of the intersection. This level is typically assigned when the volume-to-capacity ratio is high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	129	0	0	0	0	2104
Future Vol, veh/h	129	0	0	0	0	2104
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	95	95
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	140	0	0	0	0	2215

Major/Minor	Minor1			Major2	
Conflicting Flow All	1108	-		-	-
Stage 1	0	-		-	-
Stage 2	1108	-		-	-
Critical Hdwy	6.84	-		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	5.84	-		-	-
Follow-up Hdwy	3.52	-		-	-
Pot Cap-1 Maneuver	204	0		0	-
Stage 1	-	0		0	-
Stage 2	278	0		0	-
Platoon blocked, %					-
Mov Cap-1 Maneuver	204	-		-	-
Mov Cap-2 Maneuver	204	-		-	-
Stage 1	-	-		-	-
Stage 2	278	-		-	-

Approach	WB	SB
HCM Control Delay, s	54.3	0
HCM LOS	F	

Minor Lane/Major Mvmt	WBLn1	SBT
Capacity (veh/h)	204	-
HCM Lane V/C Ratio	0.687	-
HCM Control Delay (s)	54.3	-
HCM Lane LOS	F	-
HCM 95th %tile Q(veh)	4.3	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	127	0	0	2090	143
Future Vol, veh/h	0	127	0	0	2090	143
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	95	95
Heavy Vehicles, %	8	8	2	2	5	5
Mvmt Flow	0	134	0	0	2200	151

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	1100		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	7.06		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.38		-	-
Pot Cap-1 Maneuver	0	198		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	198		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	54.3	0
HCM LOS	F	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	198	-	-
HCM Lane V/C Ratio	0.675	-	-
HCM Control Delay (s)	54.3	-	-
HCM Lane LOS	F	-	-
HCM 95th %tile Q(veh)	4.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	102	8	0	0	0	28	0	1018	9	0	0	0
Future Vol, veh/h	102	8	0	0	0	28	0	1018	9	0	0	0
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	-	-	-	-	-	0	-	-	475	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1085	325	568
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	60	60	60	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	0	0	0	9	9	9	2	2	2
Mvmt Flow	134	11	0	0	0	47	0	1107	10	0	0	0

Major/Minor	Minor2		Minor1			Major1			
Conflicting Flow All	554	1117	-	-	-	554	-	0	0
Stage 1	0	0	-	-	-	-	-	-	-
Stage 2	554	1117	-	-	-	-	-	-	-
Critical Hdwy	7.64	6.64	-	-	-	6.9	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.64	5.64	-	-	-	-	-	-	-
Follow-up Hdwy	3.57	4.07	-	-	-	3.3	-	-	-
Pot Cap-1 Maneuver	404	198	0	0	0	481	0	-	-
Stage 1	-	-	0	0	0	-	0	-	-
Stage 2	472	271	0	0	0	-	0	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	365	198	-	-	-	481	-	-	-
Mov Cap-2 Maneuver	365	198	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	426	271	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	22.9	13.3	0
HCM LOS	C	B	

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	344	481
HCM Lane V/C Ratio	-	-	0.421	0.097
HCM Control Delay (s)	-	-	22.9	13.3
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	2	0.3

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	98	0	0	0	0	1365
Future Vol, veh/h	98	0	0	0	0	1365
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	92	92	86	86
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	140	0	0	0	0	1587

Major/Minor	Minor1			Major2	
Conflicting Flow All	794	-		-	-
Stage 1	0	-		-	-
Stage 2	794	-		-	-
Critical Hdwy	6.8	-		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	5.8	-		-	-
Follow-up Hdwy	3.5	-		-	-
Pot Cap-1 Maneuver	329	0		0	-
Stage 1	-	0		0	-
Stage 2	411	0		0	-
Platoon blocked, %					-
Mov Cap-1 Maneuver	329	-		-	-
Mov Cap-2 Maneuver	329	-		-	-
Stage 1	-	-		-	-
Stage 2	411	-		-	-

Approach	WB	SB
HCM Control Delay, s	23.8	0
HCM LOS	C	

Minor Lane/Major Mvmt	WBLn1	SBT
Capacity (veh/h)	329	-
HCM Lane V/C Ratio	0.426	-
HCM Control Delay (s)	23.8	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	2	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	166	0	0	1196	267
Future Vol, veh/h	0	166	0	0	1196	267
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	92	92	86	86
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	0	193	0	0	1391	310

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	696		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	6.92		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.31		-	-
Pot Cap-1 Maneuver	0	386		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	386		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	23.3	0
HCM LOS	C	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	386	-	-
HCM Lane V/C Ratio	0.5	-	-
HCM Control Delay (s)	23.3	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	2.7	-	-

Intersection	
Int Delay, s/veh	39.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	112	29	0	0	0	14	0	2218	27	0	0	0
Future Vol, veh/h	112	29	0	0	0	14	0	2218	27	0	0	0
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	-	-	-	-	-	0	-	-	475	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1085	325	568
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	70	70	70	95	95	95	92	92	92
Heavy Vehicles, %	1	1	1	0	0	0	1	1	1	2	2	2
Mvmt Flow	137	35	0	0	0	20	0	2335	28	0	0	0

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	1168	2363	-	-	-	1168	-	0	0
Stage 1	0	0	-	-	-	-	-	-	-
Stage 2	1168	2363	-	-	-	-	-	-	-
Critical Hdwy	7.52	6.52	-	-	-	6.9	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.51	4.01	-	-	-	3.3	-	-	-
Pot Cap-1 Maneuver	150	~ 35	0	0	0	189	0	-	-
Stage 1	-	-	0	0	0	-	0	-	-
Stage 2	207	68	0	0	0	-	0	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	~ 134	~ 35	-	-	-	189	-	-	-
Mov Cap-2 Maneuver	~ 134	~ 35	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	185	68	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	$ 580.1	26.3	0
HCM LOS	F	D	

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	85	189
HCM Lane V/C Ratio	-	-	2.023	0.106
HCM Control Delay (s)	-	-	$ 580.1	26.3
HCM Lane LOS	-	-	F	D
HCM 95th %tile Q(veh)	-	-	15.1	0.3

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

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	66
Average Queue (ft)	46
95th Queue (ft)	60
Link Distance (ft)	12
Upstream Blk Time (%)	64
Queuing Penalty (veh)	82
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB
Directions Served	L	T
Maximum Queue (ft)	196	61
Average Queue (ft)	60	2
95th Queue (ft)	154	44
Link Distance (ft)		1471
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)	1	
Queuing Penalty (veh)	4	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB
Directions Served	R
Maximum Queue (ft)	203
Average Queue (ft)	82
95th Queue (ft)	188
Link Distance (ft)	2710
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB
Directions Served	LT	R
Maximum Queue (ft)	69	38
Average Queue (ft)	38	13
95th Queue (ft)	60	32
Link Distance (ft)	4	354
Upstream Blk Time (%)	13	
Queuing Penalty (veh)	15	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB
Directions Served	L
Maximum Queue (ft)	73
Average Queue (ft)	13
95th Queue (ft)	48
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 101

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	36
95th Queue (ft)	54
Link Distance (ft)	12
Upstream Blk Time (%)	25
Queuing Penalty (veh)	26
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB
Directions Served	L
Maximum Queue (ft)	66
Average Queue (ft)	11
95th Queue (ft)	43
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB
Directions Served	R
Maximum Queue (ft)	108
Average Queue (ft)	46
95th Queue (ft)	87
Link Distance (ft)	2710
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB
Directions Served	LT	R	T
Maximum Queue (ft)	57	43	514
Average Queue (ft)	40	10	18
95th Queue (ft)	51	32	368
Link Distance (ft)	4	354	2497
Upstream Blk Time (%)	87		0
Queuing Penalty (veh)	123		0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

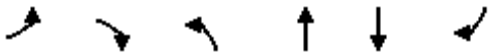
Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	389	355	346
Average Queue (ft)	194	64	53
95th Queue (ft)	372	274	249
Link Distance (ft)		529	529
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	300		
Storage Blk Time (%)	12	3	
Queuing Penalty (veh)	74	4	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

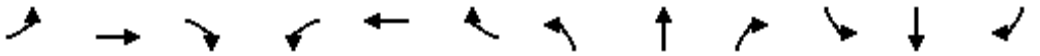
Zone Summary

Zone wide Queuing Penalty: 227



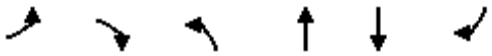
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	127	0	0	2090	143
Future Volume (vph)	0	127	0	0	2090	143
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8			6.1	6.1
Lane Util. Factor		1.00			0.95	1.00
Frt		0.86			1.00	0.85
Flt Protected		1.00			1.00	1.00
Satd. Flow (prot)		1602			3619	1619
Flt Permitted		1.00			1.00	1.00
Satd. Flow (perm)		1602			3619	1619
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	134	0	0	2200	151
RTOR Reduction (vph)	0	0	0	0	0	26
Lane Group Flow (vph)	0	134	0	0	2200	125
Heavy Vehicles (%)	8%	8%	2%	2%	5%	5%
Turn Type		Perm			NA	Perm
Protected Phases					6	
Permitted Phases		4				6
Actuated Green, G (s)		16.2			102.9	102.9
Effective Green, g (s)		16.2			102.9	102.9
Actuated g/C Ratio		0.12			0.79	0.79
Clearance Time (s)		4.8			6.1	6.1
Vehicle Extension (s)		3.0			3.0	3.0
Lane Grp Cap (vph)		199			2864	1281
v/s Ratio Prot					c0.61	
v/s Ratio Perm		c0.08				0.08
v/c Ratio		0.67			0.77	0.10
Uniform Delay, d1		54.4			7.2	3.1
Progression Factor		1.00			0.62	0.35
Incremental Delay, d2		8.7			1.5	0.1
Delay (s)		63.0			6.0	1.2
Level of Service		E			A	A
Approach Delay (s)	63.0			0.0	5.7	
Approach LOS	E			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



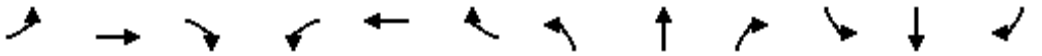
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	8	0	0	0	28	0	1018	9	0	0	0
Future Volume (vph)	102	8	0	0	0	28	0	1018	9	0	0	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8				4.8		6.1	6.1			
Lane Util. Factor		1.00				1.00		0.95	1.00			
Frt		1.00				0.86		1.00	0.85			
Flt Protected		0.96				1.00		1.00	1.00			
Satd. Flow (prot)		1787				1730		3486	1560			
Flt Permitted		0.96				1.00		1.00	1.00			
Satd. Flow (perm)		1787				1730		3486	1560			
Peak-hour factor, PHF	0.76	0.76	0.76	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	11	0	0	0	47	0	1107	10	0	0	0
RTOR Reduction (vph)	0	119	0	0	0	43	0	0	2	0	0	0
Lane Group Flow (vph)	0	26	0	0	0	4	0	1107	8	0	0	0
Heavy Vehicles (%)	7%	7%	7%	0%	0%	0%	9%	9%	9%	2%	2%	2%
Turn Type	Perm	NA				Perm		NA	Perm			
Protected Phases		4						2				
Permitted Phases	4					8			2			
Actuated Green, G (s)		9.9				9.9		109.2	109.2			
Effective Green, g (s)		9.9				9.9		109.2	109.2			
Actuated g/C Ratio		0.08				0.08		0.84	0.84			
Clearance Time (s)		4.8				4.8		6.1	6.1			
Vehicle Extension (s)		5.0				5.0		3.0	3.0			
Lane Grp Cap (vph)		136				131		2928	1310			
v/s Ratio Prot								c0.32				
v/s Ratio Perm		0.01				0.00			0.01			
v/c Ratio		0.19				0.03		0.38	0.01			
Uniform Delay, d1		56.3				55.6		2.4	1.7			
Progression Factor		0.80				1.00		1.00	1.00			
Incremental Delay, d2		1.0				0.2		0.4	0.0			
Delay (s)		45.8				55.8		2.8	1.7			
Level of Service		D				E		A	A			
Approach Delay (s)		45.8			55.8			2.8			0.0	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	166	0	0	1196	267
Future Volume (vph)	0	166	0	0	1196	267
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8			6.1	6.1
Lane Util. Factor		1.00			0.95	1.00
Frt		0.86			1.00	0.85
Flt Protected		1.00			1.00	1.00
Satd. Flow (prot)		1713			3725	1667
Flt Permitted		1.00			1.00	1.00
Satd. Flow (perm)		1713			3725	1667
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.86	0.86
Adj. Flow (vph)	0	193	0	0	1391	310
RTOR Reduction (vph)	0	0	0	0	0	73
Lane Group Flow (vph)	0	193	0	0	1391	237
Heavy Vehicles (%)	1%	1%	2%	2%	2%	2%
Turn Type		Perm			NA	Perm
Protected Phases					6	
Permitted Phases		4				6
Actuated Green, G (s)		19.9			99.2	99.2
Effective Green, g (s)		19.9			99.2	99.2
Actuated g/C Ratio		0.15			0.76	0.76
Clearance Time (s)		4.8			6.1	6.1
Vehicle Extension (s)		3.0			3.0	3.0
Lane Grp Cap (vph)		262			2842	1272
v/s Ratio Prot					c0.37	
v/s Ratio Perm		c0.11				0.14
v/c Ratio		0.74			0.49	0.19
Uniform Delay, d1		52.5			5.8	4.3
Progression Factor		1.00			0.74	1.87
Incremental Delay, d2		10.3			0.6	0.3
Delay (s)		62.8			4.9	8.3
Level of Service		E			A	A
Approach Delay (s)	62.8			0.0	5.5	
Approach LOS	E			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	29	0	0	0	14	0	2218	27	0	0	0
Future Volume (vph)	112	29	0	0	0	14	0	2218	27	0	0	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8				4.8		6.1	6.1			
Lane Util. Factor		1.00				1.00		0.95	1.00			
Frt		1.00				0.86		1.00	0.85			
Flt Protected		0.96				1.00		1.00	1.00			
Satd. Flow (prot)		1904				1730		3762	1683			
Flt Permitted		0.96				1.00		1.00	1.00			
Satd. Flow (perm)		1904				1730		3762	1683			
Peak-hour factor, PHF	0.82	0.82	0.82	0.70	0.70	0.70	0.95	0.95	0.95	0.92	0.92	0.92
Adj. Flow (vph)	137	35	0	0	0	20	0	2335	28	0	0	0
RTOR Reduction (vph)	0	23	0	0	0	17	0	0	6	0	0	0
Lane Group Flow (vph)	0	149	0	0	0	3	0	2335	22	0	0	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	2%	2%	2%
Turn Type	Perm	NA				Perm		NA	Perm			
Protected Phases		4						2				
Permitted Phases	4					8			2			
Actuated Green, G (s)		17.3				17.3		101.8	101.8			
Effective Green, g (s)		17.3				17.3		101.8	101.8			
Actuated g/C Ratio		0.13				0.13		0.78	0.78			
Clearance Time (s)		4.8				4.8		6.1	6.1			
Vehicle Extension (s)		5.0				5.0		3.0	3.0			
Lane Grp Cap (vph)		253				230		2945	1317			
v/s Ratio Prot								c0.62				
v/s Ratio Perm		0.08				0.00			0.01			
v/c Ratio		0.59				0.01		0.79	0.02			
Uniform Delay, d1		53.0				48.9		8.1	3.1			
Progression Factor		0.94				1.00		1.00	1.00			
Incremental Delay, d2		4.9				0.0		2.3	0.0			
Delay (s)		54.8				49.0		10.4	3.1			
Level of Service		D				D		B	A			
Approach Delay (s)		54.8			49.0			10.3			0.0	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	79
Average Queue (ft)	48
95th Queue (ft)	65
Link Distance (ft)	12
Upstream Blk Time (%)	70
Queuing Penalty (veh)	90
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB
Directions Served	L	T
Maximum Queue (ft)	181	37
Average Queue (ft)	75	1
95th Queue (ft)	169	27
Link Distance (ft)		1471
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	224	209	169	49
Average Queue (ft)	114	73	66	12
95th Queue (ft)	195	150	139	38
Link Distance (ft)	2693	279	279	279
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB	NB	NB
Directions Served	LT	R	T	T	R
Maximum Queue (ft)	66	35	111	131	15
Average Queue (ft)	33	13	18	21	1
95th Queue (ft)	55	31	69	77	8
Link Distance (ft)	4	354	2482	2482	
Upstream Blk Time (%)	23				
Queuing Penalty (veh)	26				
Storage Bay Dist (ft)					475
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB
Directions Served	L
Maximum Queue (ft)	178
Average Queue (ft)	34
95th Queue (ft)	117
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 116

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	37
95th Queue (ft)	54
Link Distance (ft)	12
Upstream Blk Time (%)	26
Queuing Penalty (veh)	28
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB
Directions Served	L
Maximum Queue (ft)	70
Average Queue (ft)	12
95th Queue (ft)	43
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	235	121	113	66
Average Queue (ft)	125	44	37	23
95th Queue (ft)	209	95	92	54
Link Distance (ft)	2693	279	279	279
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB	NB	NB
Directions Served	LT	R	T	T	R
Maximum Queue (ft)	50	43	285	731	30
Average Queue (ft)	39	8	108	135	3
95th Queue (ft)	48	27	242	494	18
Link Distance (ft)	4	354	2482	2482	
Upstream Blk Time (%)	60			0	
Queuing Penalty (veh)	85			0	
Storage Bay Dist (ft)					475
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB	SB
Directions Served	L	T
Maximum Queue (ft)	169	19
Average Queue (ft)	81	1
95th Queue (ft)	158	10
Link Distance (ft)		529
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 113

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	131	0	0	0	0	2136
Future Vol, veh/h	131	0	0	0	0	2136
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	95	95
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	142	0	0	0	0	2248

Major/Minor	Minor1			Major2	
Conflicting Flow All	1124	-		-	-
Stage 1	0	-		-	-
Stage 2	1124	-		-	-
Critical Hdwy	6.84	-		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	5.84	-		-	-
Follow-up Hdwy	3.52	-		-	-
Pot Cap-1 Maneuver	199	0		0	-
Stage 1	-	0		0	-
Stage 2	272	0		0	-
Platoon blocked, %					-
Mov Cap-1 Maneuver	199	-		-	-
Mov Cap-2 Maneuver	199	-		-	-
Stage 1	-	-		-	-
Stage 2	272	-		-	-

Approach	WB	SB
HCM Control Delay, s	58.7	0
HCM LOS	F	

Minor Lane/Major Mvmt	WBLn1	SBT
Capacity (veh/h)	199	-
HCM Lane V/C Ratio	0.716	-
HCM Control Delay (s)	58.7	-
HCM Lane LOS	F	-
HCM 95th %tile Q(veh)	4.6	-

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	129	0	0	2122	145
Future Vol, veh/h	0	129	0	0	2122	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	95	95
Heavy Vehicles, %	8	8	2	2	5	5
Mvmt Flow	0	136	0	0	2234	153

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	1117		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	7.06		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.38		-	-
Pot Cap-1 Maneuver	0	192		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	192		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	59.4	0
HCM LOS	F	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	192	-	-
HCM Lane V/C Ratio	0.707	-	-
HCM Control Delay (s)	59.4	-	-
HCM Lane LOS	F	-	-
HCM 95th %tile Q(veh)	4.4	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	104	8	0	0	0	28	0	1033	9	0	0	0
Future Vol, veh/h	104	8	0	0	0	28	0	1033	9	0	0	0
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	-	-	-	-	-	0	-	-	475	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1085	325	568
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	60	60	60	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	0	0	0	9	9	9	2	2	2
Mvmt Flow	137	11	0	0	0	47	0	1123	10	0	0	0

Major/Minor	Minor2			Minor1			Major1					
Conflicting Flow All	562	1133	-	-	-	562	-	0	0			
Stage 1	0	0	-	-	-	-	-	-	-			
Stage 2	562	1133	-	-	-	-	-	-	-			
Critical Hdwy	7.64	6.64	-	-	-	6.9	-	-	-			
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-			
Critical Hdwy Stg 2	6.64	5.64	-	-	-	-	-	-	-			
Follow-up Hdwy	3.57	4.07	-	-	-	3.3	-	-	-			
Pot Cap-1 Maneuver	399	194	0	0	0	475	0	-	-			
Stage 1	-	-	0	0	0	-	0	-	-			
Stage 2	467	266	0	0	0	-	0	-	-			
Platoon blocked, %								-	-			
Mov Cap-1 Maneuver	360	194	-	-	-	475	-	-	-			
Mov Cap-2 Maneuver	360	194	-	-	-	-	-	-	-			
Stage 1	-	-	-	-	-	-	-	-	-			
Stage 2	421	266	-	-	-	-	-	-	-			

Approach	EB	WB	NB
HCM Control Delay, s	23.5	13.4	0
HCM LOS	C	B	

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	339	475
HCM Lane V/C Ratio	-	-	0.435	0.098
HCM Control Delay (s)	-	-	23.5	13.4
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	2.1	0.3

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	99	0	0	0	0	1386
Future Vol, veh/h	99	0	0	0	0	1386
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	92	92	86	86
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	141	0	0	0	0	1612

Major/Minor	Minor1			Major2	
Conflicting Flow All	806	-		-	-
Stage 1	0	-		-	-
Stage 2	806	-		-	-
Critical Hdwy	6.8	-		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	5.8	-		-	-
Follow-up Hdwy	3.5	-		-	-
Pot Cap-1 Maneuver	324	0		0	-
Stage 1	-	0		0	-
Stage 2	405	0		0	-
Platoon blocked, %					-
Mov Cap-1 Maneuver	324	-		-	-
Mov Cap-2 Maneuver	324	-		-	-
Stage 1	-	-		-	-
Stage 2	405	-		-	-

Approach	WB	SB
HCM Control Delay, s	24.4	0
HCM LOS	C	

Minor Lane/Major Mvmt	WBLn1	SBT
Capacity (veh/h)	324	-
HCM Lane V/C Ratio	0.437	-
HCM Control Delay (s)	24.4	-
HCM Lane LOS	C	-
HCM 95th %tile Q(veh)	2.1	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	169	0	0	1214	271
Future Vol, veh/h	0	169	0	0	1214	271
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	92	92	86	86
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	0	197	0	0	1412	315

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	706		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	6.92		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.31		-	-
Pot Cap-1 Maneuver	0	381		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	381		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	24.1	0
HCM LOS	C	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	381	-	-
HCM Lane V/C Ratio	0.516	-	-
HCM Control Delay (s)	24.1	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	2.8	-	-

Intersection	
Int Delay, s/veh	41.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	114	29	0	0	0	14	0	2251	27	0	0	0
Future Vol, veh/h	114	29	0	0	0	14	0	2251	27	0	0	0
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	-	-	-	-	-	0	-	-	475	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1085	325	568
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	70	70	70	95	95	95	92	92	92
Heavy Vehicles, %	1	1	1	0	0	0	1	1	1	2	2	2
Mvmt Flow	139	35	0	0	0	20	0	2369	28	0	0	0

Major/Minor	Minor2			Minor1			Major1					
Conflicting Flow All	1185	2397	-	-	-	1185	-	0	0			
Stage 1	0	0	-	-	-	-	-	-	-			
Stage 2	1185	2397	-	-	-	-	-	-	-			
Critical Hdwy	7.52	6.52	-	-	-	6.9	-	-	-			
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-			
Critical Hdwy Stg 2	6.52	5.52	-	-	-	-	-	-	-			
Follow-up Hdwy	3.51	4.01	-	-	-	3.3	-	-	-			
Pot Cap-1 Maneuver	146	~ 34	0	0	0	185	0	-	-			
Stage 1	-	-	0	0	0	-	0	-	-			
Stage 2	202	65	0	0	0	-	0	-	-			
Platoon blocked, %								-	-			
Mov Cap-1 Maneuver	~ 130	~ 34	-	-	-	185	-	-	-			
Mov Cap-2 Maneuver	~ 130	~ 34	-	-	-	-	-	-	-			
Stage 1	-	-	-	-	-	-	-	-	-			
Stage 2	180	65	-	-	-	-	-	-	-			

Approach	EB	WB	NB
HCM Control Delay, s	$ 616.1	26.8	0
HCM LOS	F	D	

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	83	185
HCM Lane V/C Ratio	-	-	2.101	0.108
HCM Control Delay (s)	-	-	$ 616.1	26.8
HCM Lane LOS	-	-	F	D
HCM 95th %tile Q(veh)	-	-	15.6	0.4

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

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	79
Average Queue (ft)	47
95th Queue (ft)	63
Link Distance (ft)	12
Upstream Blk Time (%)	66
Queuing Penalty (veh)	87
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB
Directions Served	L	T
Maximum Queue (ft)	224	44
Average Queue (ft)	69	2
95th Queue (ft)	170	32
Link Distance (ft)		1471
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	1	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB
Directions Served	R	T
Maximum Queue (ft)	188	4
Average Queue (ft)	84	0
95th Queue (ft)	163	3
Link Distance (ft)	2710	294
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB
Directions Served	LT	R
Maximum Queue (ft)	68	47
Average Queue (ft)	36	12
95th Queue (ft)	56	34
Link Distance (ft)	4	354
Upstream Blk Time (%)	15	
Queuing Penalty (veh)	17	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB
Directions Served	L
Maximum Queue (ft)	80
Average Queue (ft)	14
95th Queue (ft)	52
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 105

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	36
95th Queue (ft)	54
Link Distance (ft)	12
Upstream Blk Time (%)	23
Queuing Penalty (veh)	24
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB
Directions Served	L
Maximum Queue (ft)	43
Average Queue (ft)	9
95th Queue (ft)	32
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	596	104	100
Average Queue (ft)	196	36	32
95th Queue (ft)	848	173	159
Link Distance (ft)	2710	294	294
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		1	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB
Directions Served	LT	R	T
Maximum Queue (ft)	54	39	513
Average Queue (ft)	40	11	35
95th Queue (ft)	50	34	528
Link Distance (ft)	4	354	2497
Upstream Blk Time (%)	87		0
Queuing Penalty (veh)	125		0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

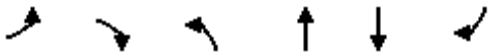
Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	377	350	325
Average Queue (ft)	248	154	79
95th Queue (ft)	526	527	351
Link Distance (ft)		529	529
Upstream Blk Time (%)		14	0
Queuing Penalty (veh)		98	1
Storage Bay Dist (ft)	300		
Storage Blk Time (%)	30	1	
Queuing Penalty (veh)	189	1	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	10	12
Average Queue (ft)	1	1
95th Queue (ft)	10	9
Link Distance (ft)	614	614
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

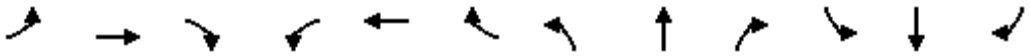
Zone Summary

Zone wide Queuing Penalty: 439



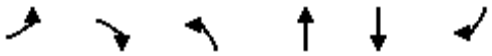
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	129	0	0	2122	145
Future Volume (vph)	0	129	0	0	2122	145
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8			6.1	6.1
Lane Util. Factor		1.00			0.95	1.00
Frt		0.86			1.00	0.85
Flt Protected		1.00			1.00	1.00
Satd. Flow (prot)		1602			3619	1619
Flt Permitted		1.00			1.00	1.00
Satd. Flow (perm)		1602			3619	1619
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	136	0	0	2234	153
RTOR Reduction (vph)	0	0	0	0	0	26
Lane Group Flow (vph)	0	136	0	0	2234	127
Heavy Vehicles (%)	8%	8%	2%	2%	5%	5%
Turn Type		Perm			NA	Perm
Protected Phases					6	
Permitted Phases		4				6
Actuated Green, G (s)		16.4			102.7	102.7
Effective Green, g (s)		16.4			102.7	102.7
Actuated g/C Ratio		0.13			0.79	0.79
Clearance Time (s)		4.8			6.1	6.1
Vehicle Extension (s)		3.0			3.0	3.0
Lane Grp Cap (vph)		202			2859	1279
v/s Ratio Prot					c0.62	
v/s Ratio Perm		c0.08				0.08
v/c Ratio		0.67			0.78	0.10
Uniform Delay, d1		54.2			7.5	3.1
Progression Factor		1.00			0.63	0.35
Incremental Delay, d2		8.5			1.6	0.1
Delay (s)		62.8			6.3	1.2
Level of Service		E			A	A
Approach Delay (s)	62.8			0.0	6.0	
Approach LOS	E			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



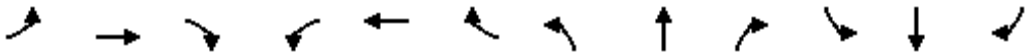
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	8	0	0	0	28	0	1033	9	0	0	0
Future Volume (vph)	104	8	0	0	0	28	0	1033	9	0	0	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8				4.8		6.1	6.1			
Lane Util. Factor		1.00				1.00		0.95	1.00			
Frt		1.00				0.86		1.00	0.85			
Flt Protected		0.96				1.00		1.00	1.00			
Satd. Flow (prot)		1786				1730		3486	1560			
Flt Permitted		0.96				1.00		1.00	1.00			
Satd. Flow (perm)		1786				1730		3486	1560			
Peak-hour factor, PHF	0.76	0.76	0.76	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	11	0	0	0	47	0	1123	10	0	0	0
RTOR Reduction (vph)	0	115	0	0	0	43	0	0	2	0	0	0
Lane Group Flow (vph)	0	33	0	0	0	4	0	1123	8	0	0	0
Heavy Vehicles (%)	7%	7%	7%	0%	0%	0%	9%	9%	9%	2%	2%	2%
Turn Type	Perm	NA				Perm		NA	Perm			
Protected Phases		4						2				
Permitted Phases	4					8			2			
Actuated Green, G (s)		10.3				10.3		108.8	108.8			
Effective Green, g (s)		10.3				10.3		108.8	108.8			
Actuated g/C Ratio		0.08				0.08		0.84	0.84			
Clearance Time (s)		4.8				4.8		6.1	6.1			
Vehicle Extension (s)		5.0				5.0		3.0	3.0			
Lane Grp Cap (vph)		141				137		2917	1305			
v/s Ratio Prot								c0.32				
v/s Ratio Perm		0.02				0.00			0.01			
v/c Ratio		0.23				0.03		0.38	0.01			
Uniform Delay, d1		56.1				55.2		2.6	1.7			
Progression Factor		0.80				1.00		1.00	1.00			
Incremental Delay, d2		1.2				0.2		0.4	0.0			
Delay (s)		46.1				55.4		2.9	1.7			
Level of Service		D				E		A	A			
Approach Delay (s)		46.1			55.4			2.9			0.0	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	169	0	0	1214	271
Future Volume (vph)	0	169	0	0	1214	271
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8			6.1	6.1
Lane Util. Factor		1.00			0.95	1.00
Frt		0.86			1.00	0.85
Flt Protected		1.00			1.00	1.00
Satd. Flow (prot)		1713			3725	1667
Flt Permitted		1.00			1.00	1.00
Satd. Flow (perm)		1713			3725	1667
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.86	0.86
Adj. Flow (vph)	0	197	0	0	1412	315
RTOR Reduction (vph)	0	0	0	0	0	75
Lane Group Flow (vph)	0	197	0	0	1412	240
Heavy Vehicles (%)	1%	1%	2%	2%	2%	2%
Turn Type		Perm			NA	Perm
Protected Phases					6	
Permitted Phases		4				6
Actuated Green, G (s)		20.2			98.9	98.9
Effective Green, g (s)		20.2			98.9	98.9
Actuated g/C Ratio		0.16			0.76	0.76
Clearance Time (s)		4.8			6.1	6.1
Vehicle Extension (s)		3.0			3.0	3.0
Lane Grp Cap (vph)		266			2833	1268
v/s Ratio Prot					c0.38	
v/s Ratio Perm		c0.12				0.14
v/c Ratio		0.74			0.50	0.19
Uniform Delay, d1		52.4			6.0	4.3
Progression Factor		1.00			0.75	1.89
Incremental Delay, d2		10.6			0.6	0.3
Delay (s)		63.0			5.1	8.5
Level of Service		E			A	A
Approach Delay (s)	63.0			0.0	5.7	
Approach LOS	E			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	29	0	0	0	14	0	2251	27	0	0	0
Future Volume (vph)	114	29	0	0	0	14	0	2251	27	0	0	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8				4.8		6.1	6.1			
Lane Util. Factor		1.00				1.00		0.95	1.00			
Frt		1.00				0.86		1.00	0.85			
Flt Protected		0.96				1.00		1.00	1.00			
Satd. Flow (prot)		1904				1730		3762	1683			
Flt Permitted		0.96				1.00		1.00	1.00			
Satd. Flow (perm)		1904				1730		3762	1683			
Peak-hour factor, PHF	0.82	0.82	0.82	0.70	0.70	0.70	0.95	0.95	0.95	0.92	0.92	0.92
Adj. Flow (vph)	139	35	0	0	0	20	0	2369	28	0	0	0
RTOR Reduction (vph)	0	23	0	0	0	17	0	0	6	0	0	0
Lane Group Flow (vph)	0	151	0	0	0	3	0	2369	22	0	0	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	2%	2%	2%
Turn Type	Perm	NA				Perm		NA	Perm			
Protected Phases		4						2				
Permitted Phases	4					8			2			
Actuated Green, G (s)		17.4				17.4		101.7	101.7			
Effective Green, g (s)		17.4				17.4		101.7	101.7			
Actuated g/C Ratio		0.13				0.13		0.78	0.78			
Clearance Time (s)		4.8				4.8		6.1	6.1			
Vehicle Extension (s)		5.0				5.0		3.0	3.0			
Lane Grp Cap (vph)		254				231		2943	1316			
v/s Ratio Prot								c0.63				
v/s Ratio Perm		0.08				0.00			0.01			
v/c Ratio		0.60				0.01		0.80	0.02			
Uniform Delay, d1		53.0				48.8		8.3	3.1			
Progression Factor		0.93				1.00		1.00	1.00			
Incremental Delay, d2		4.9				0.0		2.5	0.0			
Delay (s)		54.5				48.9		10.8	3.1			
Level of Service		D				D		B	A			
Approach Delay (s)		54.5			48.9			10.7			0.0	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB	SB
Directions Served	L	T
Maximum Queue (ft)	75	141
Average Queue (ft)	47	5
95th Queue (ft)	65	101
Link Distance (ft)	12	1466
Upstream Blk Time (%)	68	
Queuing Penalty (veh)	89	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB
Directions Served	L	T
Maximum Queue (ft)	147	11
Average Queue (ft)	56	0
95th Queue (ft)	127	8
Link Distance (ft)		1471
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	216	165	161	51
Average Queue (ft)	106	69	64	13
95th Queue (ft)	185	135	134	39
Link Distance (ft)	2693	279	279	279
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB	NB	NB
Directions Served	LT	R	T	T	R
Maximum Queue (ft)	68	39	96	132	5
Average Queue (ft)	34	12	11	19	0
95th Queue (ft)	57	32	52	79	4
Link Distance (ft)	4	354	2482	2482	
Upstream Blk Time (%)	21				
Queuing Penalty (veh)	24				
Storage Bay Dist (ft)					475
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB
Directions Served	L
Maximum Queue (ft)	182
Average Queue (ft)	32
95th Queue (ft)	109
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 113

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	36
95th Queue (ft)	55
Link Distance (ft)	12
Upstream Blk Time (%)	25
Queuing Penalty (veh)	27
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB
Directions Served	L
Maximum Queue (ft)	59
Average Queue (ft)	10
95th Queue (ft)	38
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	237	120	116	60
Average Queue (ft)	126	43	38	21
95th Queue (ft)	215	93	90	51
Link Distance (ft)	2693	279	279	279
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB	NB	NB
Directions Served	LT	R	T	T	R
Maximum Queue (ft)	48	39	253	259	20
Average Queue (ft)	39	8	100	113	2
95th Queue (ft)	47	29	206	222	13
Link Distance (ft)	4	354	2482	2482	
Upstream Blk Time (%)	57				
Queuing Penalty (veh)	83				
Storage Bay Dist (ft)					475
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB	SB
Directions Served	L	T
Maximum Queue (ft)	164	31
Average Queue (ft)	75	1
95th Queue (ft)	146	23
Link Distance (ft)		529
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 109

Intersection	
Int Delay, s/veh	7.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	169	0	0	0	0	2177
Future Vol, veh/h	169	0	0	0	0	2177
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	95	95
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	184	0	0	0	0	2292

Major/Minor	Minor1		Major2	
Conflicting Flow All	1146	-	-	-
Stage 1	0	-	-	-
Stage 2	1146	-	-	-
Critical Hdwy	6.84	-	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-
Follow-up Hdwy	3.52	-	-	-
Pot Cap-1 Maneuver	193	0	0	-
Stage 1	-	0	0	-
Stage 2	265	0	0	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	193	-	-	-
Mov Cap-2 Maneuver	193	-	-	-
Stage 1	-	-	-	-
Stage 2	265	-	-	-

Approach	WB	SB
HCM Control Delay, s	102.8	0
HCM LOS	F	

Minor Lane/Major Mvmt	WBLn1	SBT
Capacity (veh/h)	193	-
HCM Lane V/C Ratio	0.952	-
HCM Control Delay (s)	102.8	-
HCM Lane LOS	F	-
HCM 95th %tile Q(veh)	7.7	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	131	0	0	2207	148
Future Vol, veh/h	0	131	0	0	2207	148
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	95	95
Heavy Vehicles, %	8	8	2	2	5	5
Mvmt Flow	0	138	0	0	2323	156

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	1162		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	7.06		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.38		-	-
Pot Cap-1 Maneuver	0	179		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	179		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	71.6	0
HCM LOS	F	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	179	-	-
HCM Lane V/C Ratio	0.77	-	-
HCM Control Delay (s)	71.6	-	-
HCM Lane LOS	F	-	-
HCM 95th %tile Q(veh)	5.1	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	159	8	0	0	0	28	0	1057	9	0	0	0
Future Vol, veh/h	159	8	0	0	0	28	0	1057	9	0	0	0
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	-	-	-	-	-	0	-	-	475	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1085	325	568
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	60	60	60	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	0	0	0	9	9	9	2	2	2
Mvmt Flow	209	11	0	0	0	47	0	1149	10	0	0	0

Major/Minor	Minor2			Minor1			Major1					
Conflicting Flow All	575	1159	-	-	-	575	-	0	0			
Stage 1	0	0	-	-	-	-	-	-	-			
Stage 2	575	1159	-	-	-	-	-	-	-			
Critical Hdwy	7.64	6.64	-	-	-	6.9	-	-	-			
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-			
Critical Hdwy Stg 2	6.64	5.64	-	-	-	-	-	-	-			
Follow-up Hdwy	3.57	4.07	-	-	-	3.3	-	-	-			
Pot Cap-1 Maneuver	391	187	0	0	0	466	0	-	-			
Stage 1	-	-	0	0	0	-	0	-	-			
Stage 2	458	258	0	0	0	-	0	-	-			
Platoon blocked, %								-	-			
Mov Cap-1 Maneuver	352	187	-	-	-	466	-	-	-			
Mov Cap-2 Maneuver	352	187	-	-	-	-	-	-	-			
Stage 1	-	-	-	-	-	-	-	-	-			
Stage 2	412	258	-	-	-	-	-	-	-			

Approach	EB	WB	NB
HCM Control Delay, s	33.4	13.6	0
HCM LOS	D	B	

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	338	466
HCM Lane V/C Ratio	-	-	0.65	0.1
HCM Control Delay (s)	-	-	33.4	13.6
HCM Lane LOS	-	-	D	B
HCM 95th %tile Q(veh)	-	-	4.3	0.3

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	113	0	0	2242	104
Future Vol, veh/h	0	113	0	0	2242	104
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	175
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	95	95
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	0	123	0	0	2360	109

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	1235		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	7.14		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.92		-	-
Pot Cap-1 Maneuver	0	144		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	144		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	100.3	0
HCM LOS	F	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	144	-	-
HCM Lane V/C Ratio	0.853	-	-
HCM Control Delay (s)	100.3	-	-
HCM Lane LOS	F	-	-
HCM 95th %tile Q(veh)	5.6	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	148	0	0	0	0	1407
Future Vol, veh/h	148	0	0	0	0	1407
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	92	92	86	86
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	211	0	0	0	0	1636

Major/Minor	Minor1			Major2	
Conflicting Flow All	818	-		-	-
Stage 1	0	-		-	-
Stage 2	818	-		-	-
Critical Hdwy	6.8	-		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	5.8	-		-	-
Follow-up Hdwy	3.5	-		-	-
Pot Cap-1 Maneuver	318	0		0	-
Stage 1	-	0		0	-
Stage 2	399	0		0	-
Platoon blocked, %					-
Mov Cap-1 Maneuver	318	-		-	-
Mov Cap-2 Maneuver	318	-		-	-
Stage 1	-	-		-	-
Stage 2	399	-		-	-

Approach	WB	SB
HCM Control Delay, s	36.2	0
HCM LOS	E	

Minor Lane/Major Mvmt	WBLn1	SBT
Capacity (veh/h)	318	-
HCM Lane V/C Ratio	0.665	-
HCM Control Delay (s)	36.2	-
HCM Lane LOS	E	-
HCM 95th %tile Q(veh)	4.5	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	172	0	0	1264	272
Future Vol, veh/h	0	172	0	0	1264	272
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	92	92	86	86
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	0	200	0	0	1470	316

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	735		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	6.92		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.31		-	-
Pot Cap-1 Maneuver	0	364		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	364		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	26.3	0
HCM LOS	D	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	364	-	-
HCM Lane V/C Ratio	0.549	-	-
HCM Control Delay (s)	26.3	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	3.2	-	-

Intersection	
Int Delay, s/veh	61.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	142	29	0	0	0	14	0	2286	27	0	0	0
Future Vol, veh/h	142	29	0	0	0	14	0	2286	27	0	0	0
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	-	-	-	-	-	0	-	-	475	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	1085	325	568
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	70	70	70	95	95	95	92	92	92
Heavy Vehicles, %	1	1	1	0	0	0	1	1	1	2	2	2
Mvmt Flow	173	35	0	0	0	20	0	2406	28	0	0	0

Major/Minor	Minor2			Minor1			Major1					
Conflicting Flow All	1203	2434	-	-	-	1203	-	0	0			
Stage 1	0	0	-	-	-	-	-	-	-			
Stage 2	1203	2434	-	-	-	-	-	-	-			
Critical Hdwy	7.52	6.52	-	-	-	6.9	-	-	-			
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-			
Critical Hdwy Stg 2	6.52	5.52	-	-	-	-	-	-	-			
Follow-up Hdwy	3.51	4.01	-	-	-	3.3	-	-	-			
Pot Cap-1 Maneuver	~ 141	~ 32	0	0	0	180	0	-	-			
Stage 1	-	-	0	0	0	-	0	-	-			
Stage 2	197	62	0	0	0	-	0	-	-			
Platoon blocked, %								-	-			
Mov Cap-1 Maneuver	~ 125	~ 32	-	-	-	180	-	-	-			
Mov Cap-2 Maneuver	~ 125	~ 32	-	-	-	-	-	-	-			
Stage 1	-	-	-	-	-	-	-	-	-			
Stage 2	175	62	-	-	-	-	-	-	-			

Approach	EB	WB	NB
HCM Control Delay, s	$ 780.4	27.5	0
HCM LOS	F	D	

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	84	180
HCM Lane V/C Ratio	-	-	2.483	0.111
HCM Control Delay (s)	-	-	$ 780.4	27.5
HCM Lane LOS	-	-	F	D
HCM 95th %tile Q(veh)	-	-	19.6	0.4

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

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	58	0	0	1478	77
Future Vol, veh/h	0	58	0	0	1478	77
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	175
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	63	0	0	1719	90

Major/Minor	Minor2			Major2	
Conflicting Flow All	-	905		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	7.14		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.92		-	-
Pot Cap-1 Maneuver	0	240		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	240		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	SB
HCM Control Delay, s	25.3	0
HCM LOS	D	

Minor Lane/Major Mvmt	EBLn1	SBT	SBR
Capacity (veh/h)	240	-	-
HCM Lane V/C Ratio	0.263	-	-
HCM Control Delay (s)	25.3	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	1	-	-

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	78
Average Queue (ft)	50
95th Queue (ft)	64
Link Distance (ft)	12
Upstream Blk Time (%)	82
Queuing Penalty (veh)	139
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB
Directions Served	L	T
Maximum Queue (ft)	287	169
Average Queue (ft)	137	10
95th Queue (ft)	277	85
Link Distance (ft)		1471
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)	5	0
Queuing Penalty (veh)	29	0

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB
Directions Served	R
Maximum Queue (ft)	377
Average Queue (ft)	133
95th Queue (ft)	375
Link Distance (ft)	2710
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB
Directions Served	LT	R
Maximum Queue (ft)	73	51
Average Queue (ft)	39	15
95th Queue (ft)	58	37
Link Distance (ft)	4	354
Upstream Blk Time (%)	20	
Queuing Penalty (veh)	34	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB
Directions Served	L
Maximum Queue (ft)	111
Average Queue (ft)	24
95th Queue (ft)	71
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement	EB
Directions Served	R
Maximum Queue (ft)	128
Average Queue (ft)	50
95th Queue (ft)	97
Link Distance (ft)	249
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 202

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	42
95th Queue (ft)	57
Link Distance (ft)	12
Upstream Blk Time (%)	45
Queuing Penalty (veh)	71
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB
Directions Served	L	T
Maximum Queue (ft)	160	46
Average Queue (ft)	37	4
95th Queue (ft)	118	52
Link Distance (ft)		1471
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	250	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	1694	292	307
Average Queue (ft)	627	136	77
95th Queue (ft)	1952	359	273
Link Distance (ft)	2710	294	294
Upstream Blk Time (%)		23	0
Queuing Penalty (veh)		116	2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB
Directions Served	LT	R	T
Maximum Queue (ft)	62	39	4
Average Queue (ft)	41	9	0
95th Queue (ft)	53	28	3
Link Distance (ft)	4	354	2497
Upstream Blk Time (%)	93		
Queuing Penalty (veh)	159		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

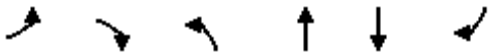
Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	500	576	542
Average Queue (ft)	400	390	135
95th Queue (ft)	648	775	482
Link Distance (ft)		529	529
Upstream Blk Time (%)		44	0
Queuing Penalty (veh)		314	2
Storage Bay Dist (ft)	300		
Storage Blk Time (%)	74	3	
Queuing Penalty (veh)	471	5	

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement	EB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	178	248	238
Average Queue (ft)	72	74	66
95th Queue (ft)	200	278	257
Link Distance (ft)	249	614	614
Upstream Blk Time (%)	8		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			1
Queuing Penalty (veh)			3

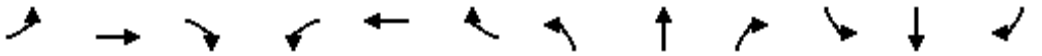
Zone Summary

Zone wide Queuing Penalty: 1144



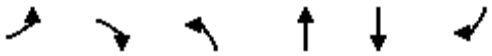
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	131	0	0	2207	148
Future Volume (vph)	0	131	0	0	2207	148
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8			6.1	6.1
Lane Util. Factor		1.00			0.95	1.00
Frt		0.86			1.00	0.85
Flt Protected		1.00			1.00	1.00
Satd. Flow (prot)		1602			3619	1619
Flt Permitted		1.00			1.00	1.00
Satd. Flow (perm)		1602			3619	1619
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	138	0	0	2323	156
RTOR Reduction (vph)	0	0	0	0	0	26
Lane Group Flow (vph)	0	138	0	0	2323	130
Heavy Vehicles (%)	8%	8%	2%	2%	5%	5%
Turn Type		Perm			NA	Perm
Protected Phases					6	
Permitted Phases		4				6
Actuated Green, G (s)		16.5			102.6	102.6
Effective Green, g (s)		16.5			102.6	102.6
Actuated g/C Ratio		0.13			0.79	0.79
Clearance Time (s)		4.8			6.1	6.1
Vehicle Extension (s)		3.0			3.0	3.0
Lane Grp Cap (vph)		203			2856	1277
v/s Ratio Prot					c0.64	
v/s Ratio Perm		c0.09				0.08
v/c Ratio		0.68			0.81	0.10
Uniform Delay, d1		54.2			8.1	3.1
Progression Factor		1.00			0.67	0.32
Incremental Delay, d2		8.7			2.0	0.1
Delay (s)		63.0			7.4	1.1
Level of Service		E			A	A
Approach Delay (s)	63.0			0.0	7.0	
Approach LOS	E			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



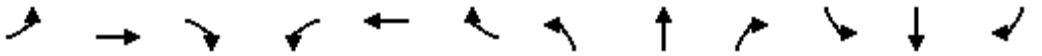
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	159	8	0	0	0	28	0	1057	9	0	0	0
Future Volume (vph)	159	8	0	0	0	28	0	1057	9	0	0	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8				4.8		6.1	6.1			
Lane Util. Factor		1.00				1.00		0.95	1.00			
Frt		1.00				0.86		1.00	0.85			
Flt Protected		0.95				1.00		1.00	1.00			
Satd. Flow (prot)		1784				1730		3486	1560			
Flt Permitted		0.95				1.00		1.00	1.00			
Satd. Flow (perm)		1784				1730		3486	1560			
Peak-hour factor, PHF	0.76	0.76	0.76	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	11	0	0	0	47	0	1149	10	0	0	0
RTOR Reduction (vph)	0	104	0	0	0	42	0	0	2	0	0	0
Lane Group Flow (vph)	0	116	0	0	0	5	0	1149	8	0	0	0
Heavy Vehicles (%)	7%	7%	7%	0%	0%	0%	9%	9%	9%	2%	2%	2%
Turn Type	Perm	NA				Perm		NA	Perm			
Protected Phases		4						2				
Permitted Phases	4					8			2			
Actuated Green, G (s)		15.2				15.2		103.9	103.9			
Effective Green, g (s)		15.2				15.2		103.9	103.9			
Actuated g/C Ratio		0.12				0.12		0.80	0.80			
Clearance Time (s)		4.8				4.8		6.1	6.1			
Vehicle Extension (s)		5.0				5.0		3.0	3.0			
Lane Grp Cap (vph)		208				202		2786	1246			
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.06				0.00			0.01			
v/c Ratio		0.56				0.03		0.41	0.01			
Uniform Delay, d1		54.2				50.9		3.9	2.6			
Progression Factor		0.78				1.00		1.00	1.00			
Incremental Delay, d2		3.5				0.1		0.5	0.0			
Delay (s)		45.7				51.0		4.4	2.6			
Level of Service		D				D		A	A			
Approach Delay (s)		45.7			51.0			4.3			0.0	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	172	0	0	1264	272
Future Volume (vph)	0	172	0	0	1264	272
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8			6.1	6.1
Lane Util. Factor		1.00			0.95	1.00
Frt		0.86			1.00	0.85
Flt Protected		1.00			1.00	1.00
Satd. Flow (prot)		1713			3725	1667
Flt Permitted		1.00			1.00	1.00
Satd. Flow (perm)		1713			3725	1667
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.86	0.86
Adj. Flow (vph)	0	200	0	0	1470	316
RTOR Reduction (vph)	0	0	0	0	0	76
Lane Group Flow (vph)	0	200	0	0	1470	240
Heavy Vehicles (%)	1%	1%	2%	2%	2%	2%
Turn Type		Perm			NA	Perm
Protected Phases					6	
Permitted Phases		4				6
Actuated Green, G (s)		20.4			98.7	98.7
Effective Green, g (s)		20.4			98.7	98.7
Actuated g/C Ratio		0.16			0.76	0.76
Clearance Time (s)		4.8			6.1	6.1
Vehicle Extension (s)		3.0			3.0	3.0
Lane Grp Cap (vph)		268			2828	1265
v/s Ratio Prot					c0.39	
v/s Ratio Perm		c0.12				0.14
v/c Ratio		0.75			0.52	0.19
Uniform Delay, d1		52.3			6.2	4.4
Progression Factor		1.00			0.77	1.76
Incremental Delay, d2		10.8			0.7	0.3
Delay (s)		63.1			5.5	8.0
Level of Service		E			A	A
Approach Delay (s)	63.1			0.0	5.9	
Approach LOS	E			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	142	29	0	0	0	14	0	2286	27	0	0	0
Future Volume (vph)	142	29	0	0	0	14	0	2286	27	0	0	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		4.8				4.8		6.1	6.1			
Lane Util. Factor		1.00				1.00		0.95	1.00			
Frt		1.00				0.86		1.00	0.85			
Flt Protected		0.96				1.00		1.00	1.00			
Satd. Flow (prot)		1901				1730		3762	1683			
Flt Permitted		0.96				1.00		1.00	1.00			
Satd. Flow (perm)		1901				1730		3762	1683			
Peak-hour factor, PHF	0.82	0.82	0.82	0.70	0.70	0.70	0.95	0.95	0.95	0.92	0.92	0.92
Adj. Flow (vph)	173	35	0	0	0	20	0	2406	28	0	0	0
RTOR Reduction (vph)	0	22	0	0	0	17	0	0	7	0	0	0
Lane Group Flow (vph)	0	186	0	0	0	3	0	2406	21	0	0	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	2%	2%	2%
Turn Type	Perm	NA				Perm		NA	Perm			
Protected Phases		4						2				
Permitted Phases	4					8			2			
Actuated Green, G (s)		19.7				19.7		99.4	99.4			
Effective Green, g (s)		19.7				19.7		99.4	99.4			
Actuated g/C Ratio		0.15				0.15		0.76	0.76			
Clearance Time (s)		4.8				4.8		6.1	6.1			
Vehicle Extension (s)		5.0				5.0		3.0	3.0			
Lane Grp Cap (vph)		288				262		2876	1286			
v/s Ratio Prot								c0.64				
v/s Ratio Perm		0.10				0.00			0.01			
v/c Ratio		0.65				0.01		0.84	0.02			
Uniform Delay, d1		51.9				46.9		10.0	3.6			
Progression Factor		0.93				1.00		1.00	1.00			
Incremental Delay, d2		5.8				0.0		3.1	0.0			
Delay (s)		54.3				46.9		13.1	3.7			
Level of Service		D				D		B	A			
Approach Delay (s)		54.3			46.9			13.0			0.0	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	83
Average Queue (ft)	51
95th Queue (ft)	67
Link Distance (ft)	12
Upstream Blk Time (%)	83
Queuing Penalty (veh)	141
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	326	302	134
Average Queue (ft)	170	51	15
95th Queue (ft)	375	272	147
Link Distance (ft)		1471	1471
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	250		
Storage Blk Time (%)	21		
Queuing Penalty (veh)	114		

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	216	192	198	48
Average Queue (ft)	109	101	96	16
95th Queue (ft)	193	172	174	43
Link Distance (ft)	2693	279	279	279
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB	NB	NB
Directions Served	LT	R	T	T	R
Maximum Queue (ft)	73	43	123	153	18
Average Queue (ft)	39	14	18	23	1
95th Queue (ft)	61	36	78	93	7
Link Distance (ft)	4	354	2482	2482	
Upstream Blk Time (%)	23				
Queuing Penalty (veh)	40				
Storage Bay Dist (ft)					475
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB	SB
Directions Served	L	T
Maximum Queue (ft)	186	47
Average Queue (ft)	40	2
95th Queue (ft)	119	30
Link Distance (ft)		529
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement	EB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	240	12	6
Average Queue (ft)	109	0	0
95th Queue (ft)	223	8	4
Link Distance (ft)	249	614	614
Upstream Blk Time (%)	3		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 295

Intersection: 10: SB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	WB
Directions Served	L
Maximum Queue (ft)	48
Average Queue (ft)	41
95th Queue (ft)	56
Link Distance (ft)	12
Upstream Blk Time (%)	36
Queuing Penalty (veh)	58
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: NB Lapeer Road (M-24) & NB-to-SB X/O, N. of Waldon

Movement	NB
Directions Served	L
Maximum Queue (ft)	118
Average Queue (ft)	24
95th Queue (ft)	76
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: SB Lapeer Road (M-24) & Waldon Road

Movement	EB	SB	SB	SB
Directions Served	R	T	T	R
Maximum Queue (ft)	242	149	138	75
Average Queue (ft)	130	52	49	23
95th Queue (ft)	210	112	110	54
Link Distance (ft)	2693	279	279	279
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 30: NB Lapeer Road (M-24) & SB-to-NB X/O/Eagle Ridge Road

Movement	EB	WB	NB	NB	NB
Directions Served	LT	R	T	T	R
Maximum Queue (ft)	53	47	315	362	28
Average Queue (ft)	40	9	128	147	3
95th Queue (ft)	48	32	271	293	17
Link Distance (ft)	4	354	2482	2482	
Upstream Blk Time (%)	61				
Queuing Penalty (veh)	105				
Storage Bay Dist (ft)					475
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 31: SB Lapeer Road (M-24) & SB-to-NB X/O

Movement	SB	SB
Directions Served	L	T
Maximum Queue (ft)	233	18
Average Queue (ft)	101	1
95th Queue (ft)	195	11
Link Distance (ft)		529
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

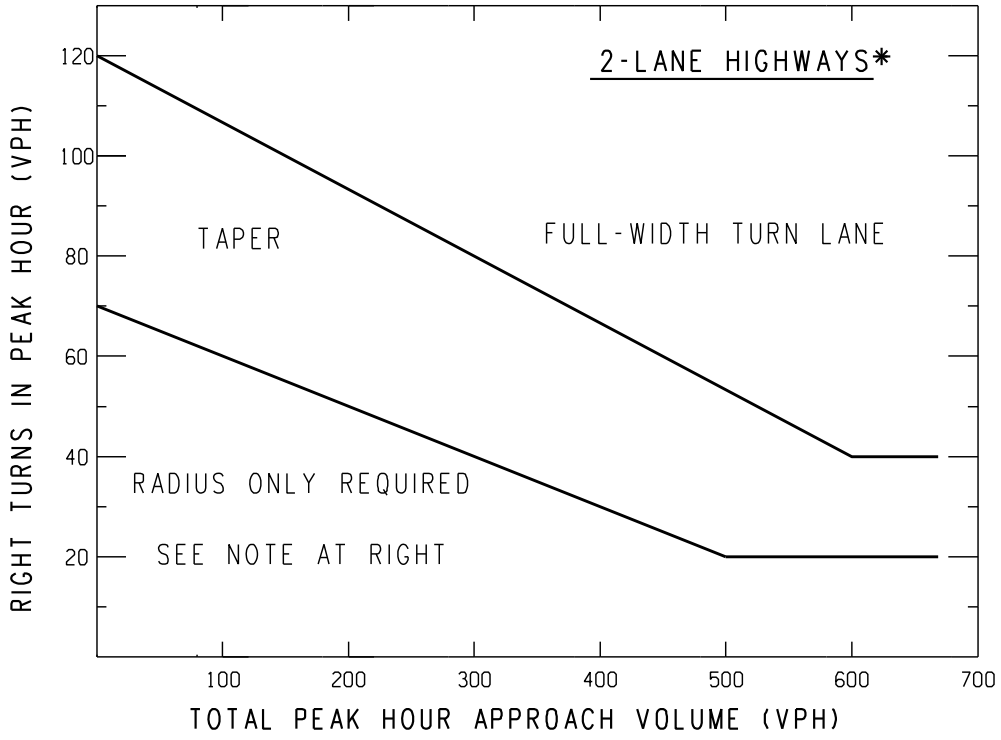
Intersection: 40: SB Lapeer Road (M-24) & Site Drive

Movement	EB
Directions Served	R
Maximum Queue (ft)	69
Average Queue (ft)	30
95th Queue (ft)	59
Link Distance (ft)	249
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

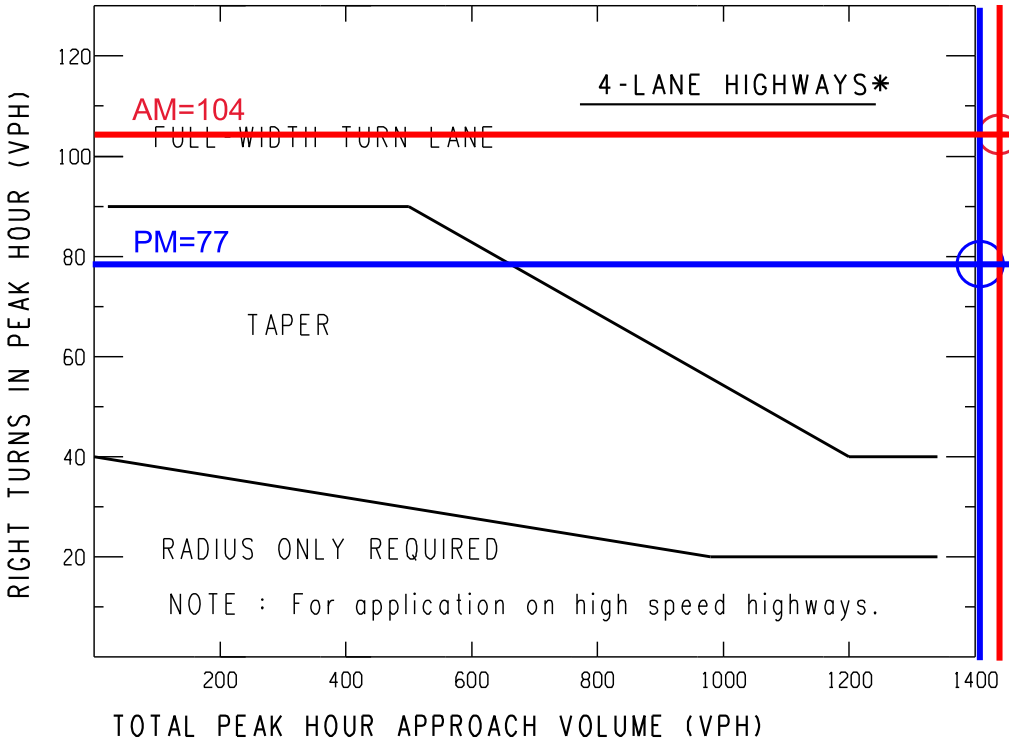
Zone wide Queuing Penalty: 163

SB Lapeer Road (M-24) & Site Drive



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

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



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

RT LANE Recommended

AM=2,346
PM=1,555

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 208

TRAFFIC VOLUME GUIDELINES FOR RIGHT-TURN LANES AND TAPERS

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

Summary of Warrants

Spot Number:	Existing Conditions		
Major Street:	SB Lapeer Road (M-24)	Minor Street:	NB-to-SB X/O
Intersection:	SB Lapeer Road (M-24) at NB-to-SB X/O		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	NO
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	1967	104	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	2027	119	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1226	63	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1331	63	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1403	74	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1465	108	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1370	116	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1365	98	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**3**
Number of Hours that met the warrant 1B =	**8**
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)	**YES**
C. Combination of Warrants A and B Criteria Met?	**N/A**

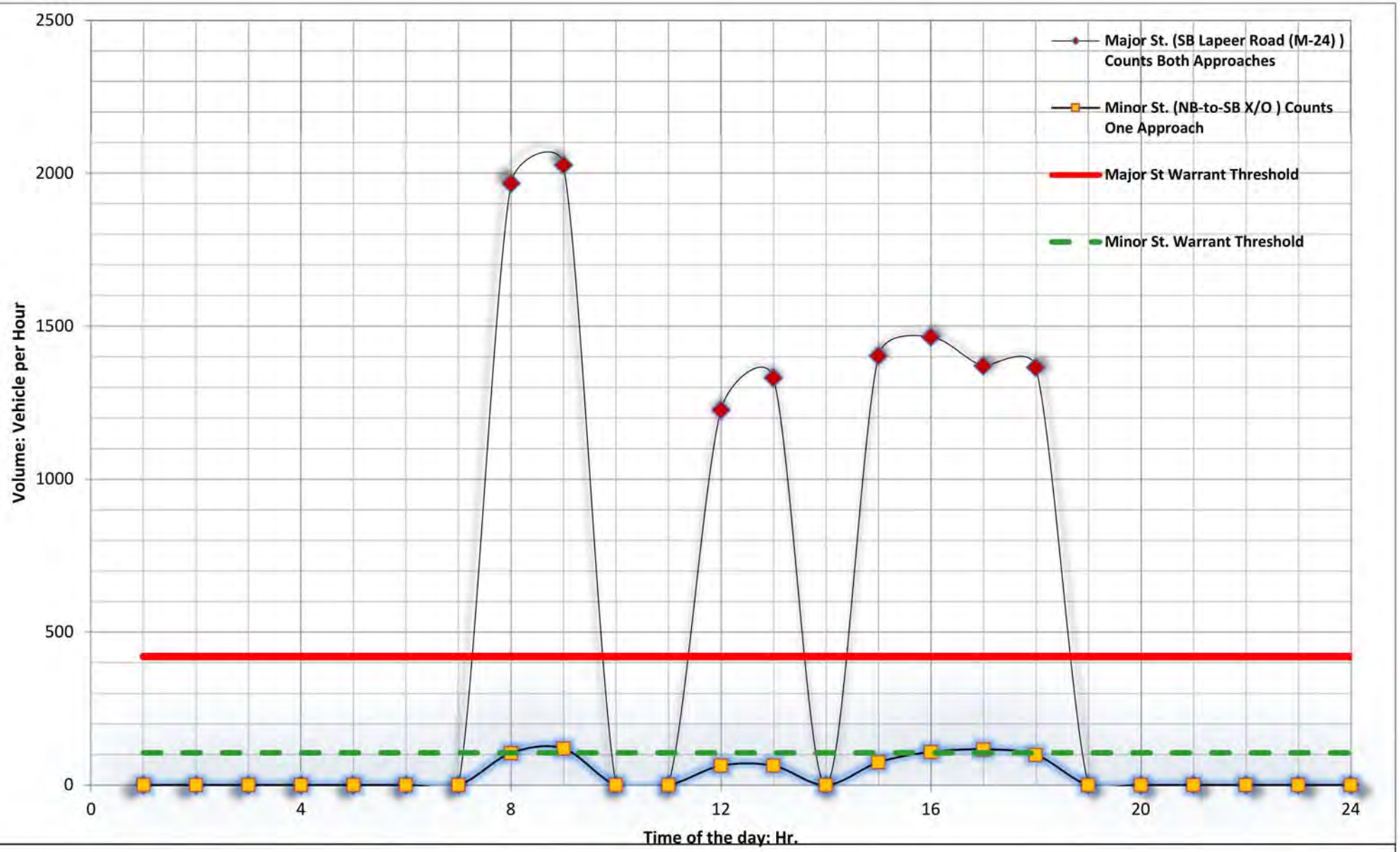


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Existing Conditions**

SB Lapeer Road (M-24) @ NB-to-SB X/O

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **3**

Does this intersection meet Warrant 1A for signal installation? **NO**

Data Collection Date: **10/13/2022**

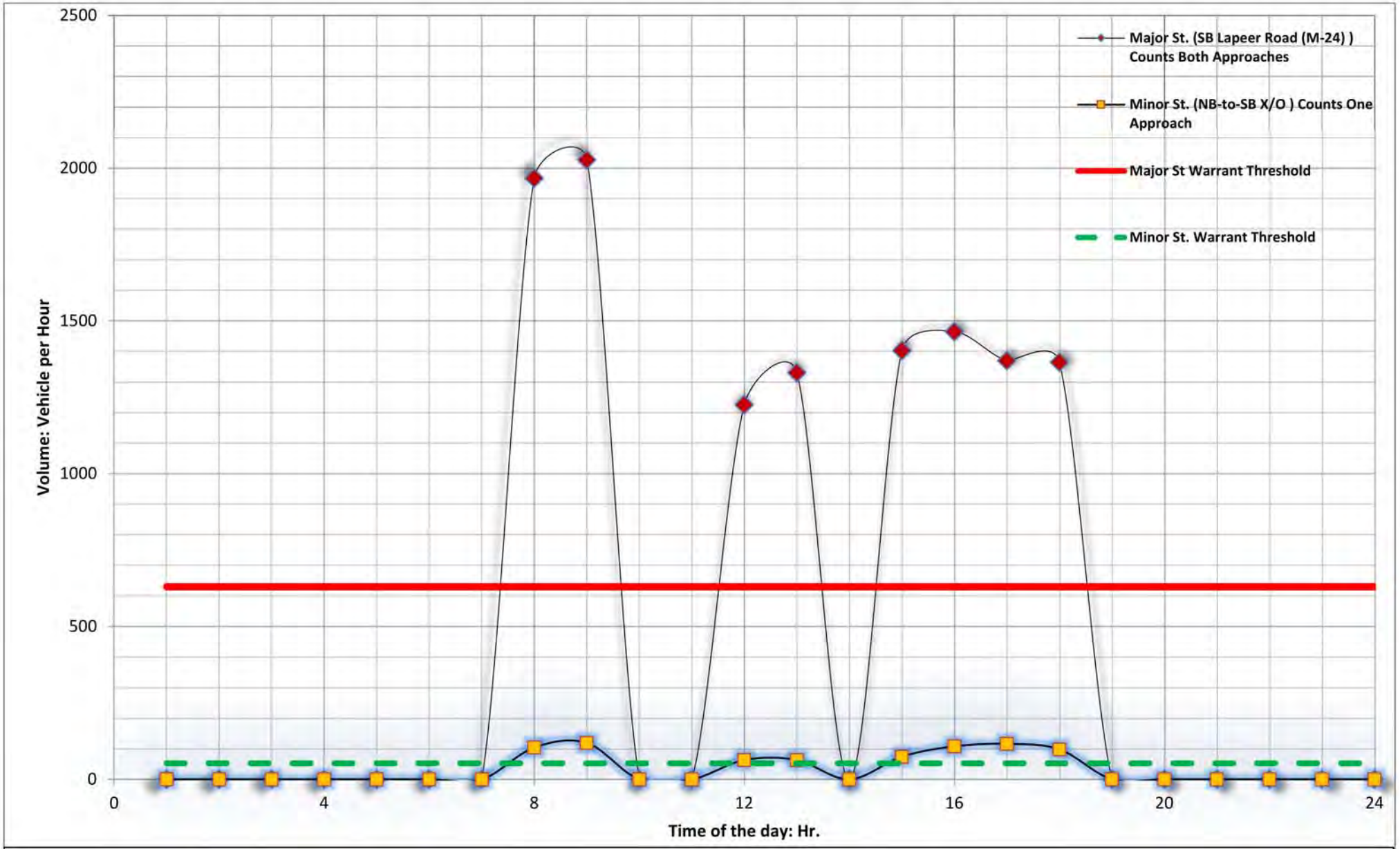


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Existing Conditions**

SB Lapeer Road (M-24) @ NB-to-SB X/O

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **8**

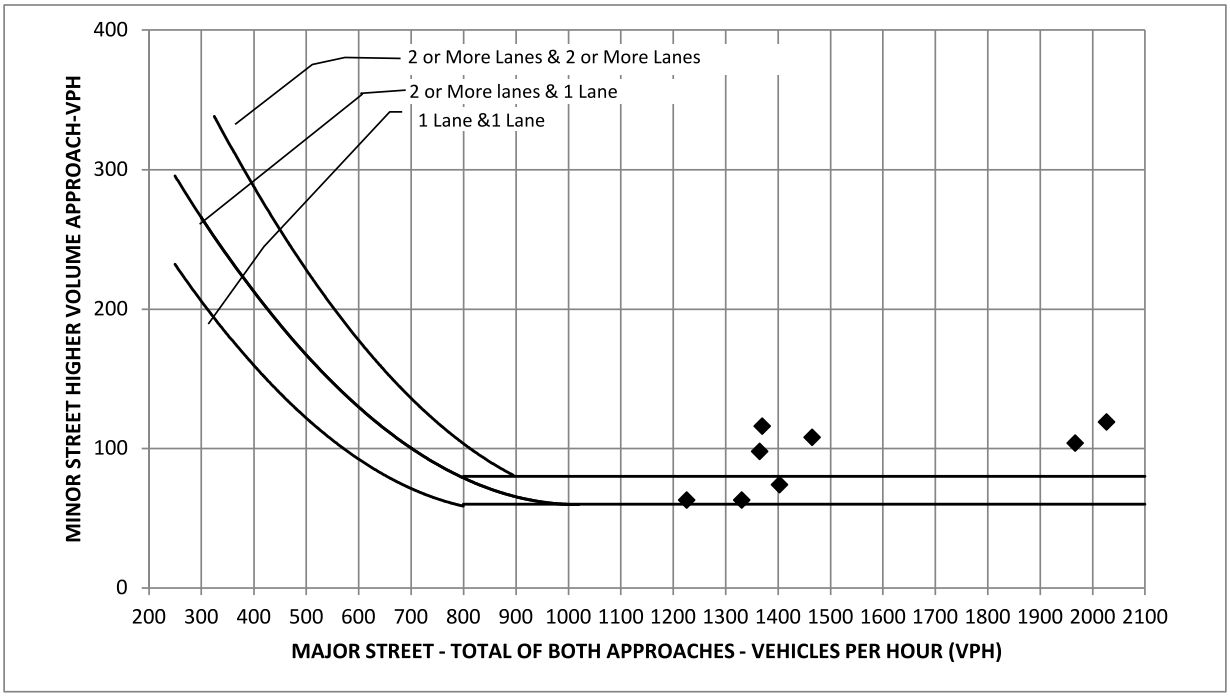
Does this intersection meet Warrant **1B** for signal installation? **YES**

Data Collection Date: **10/13/2022**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Existing Conditions		
Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
55	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

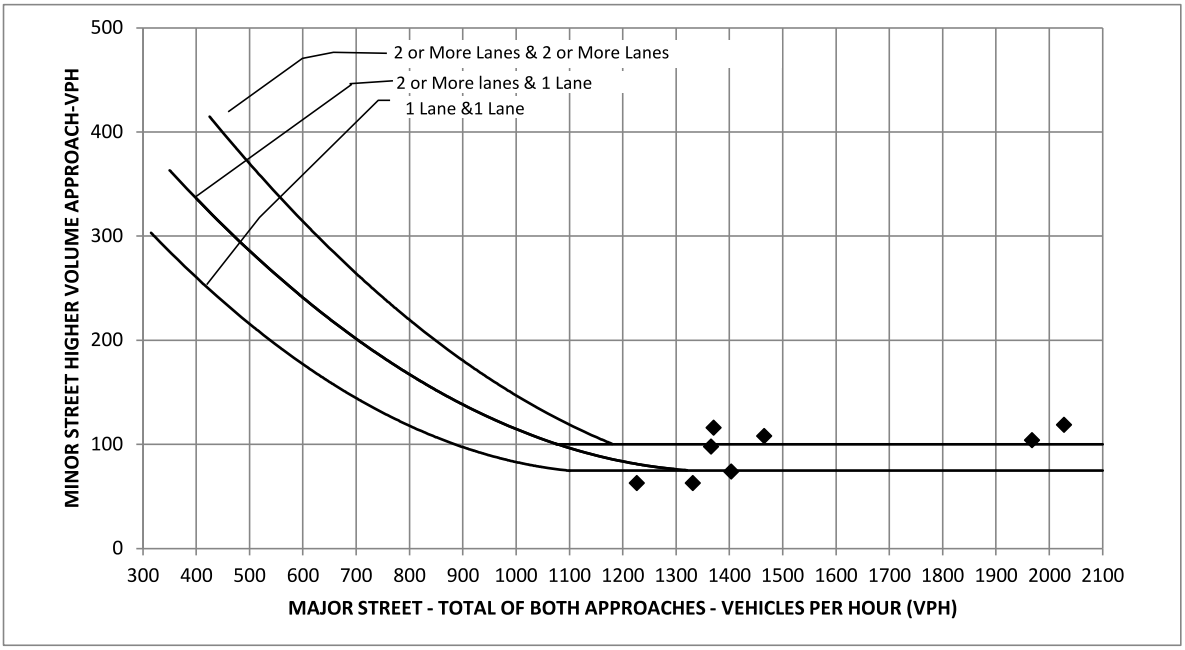


How Many Hours Are Met	8
Is Warrant (70%) Met?	YES

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Existing Conditions		
Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**5**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Existing Conditions		
Major Street:	SB Lapeer Road (M-24)	Minor Street:	Waldon Road
Intersection:	SB Lapeer Road (M-24) at Waldon Road		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	2069	162	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	2135	131	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1286	116	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1399	132	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1453	144	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1588	128	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1498	159	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1455	166	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

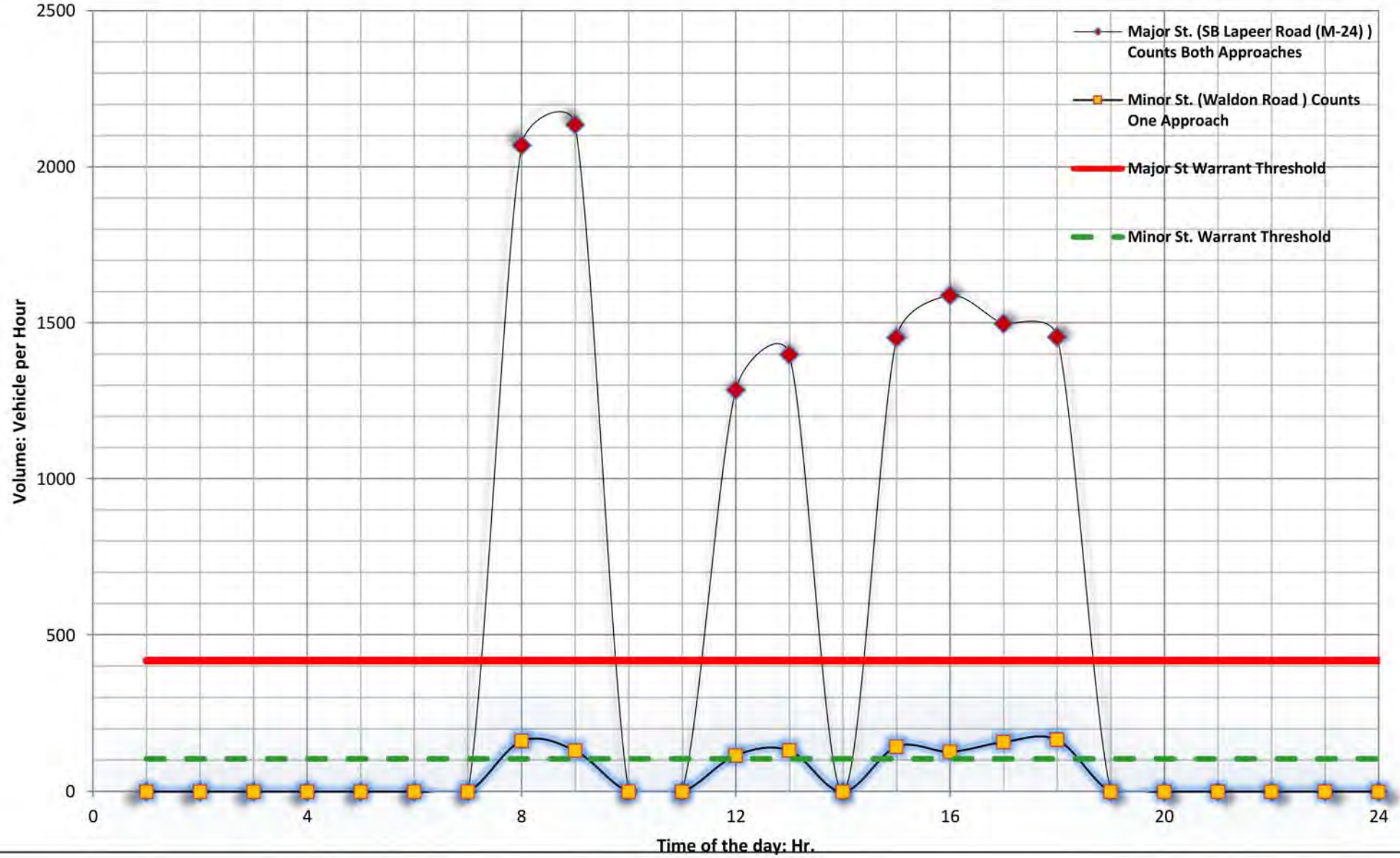


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Existing Conditions

SB Lapeer Road (M-24) @ Waldon Road

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

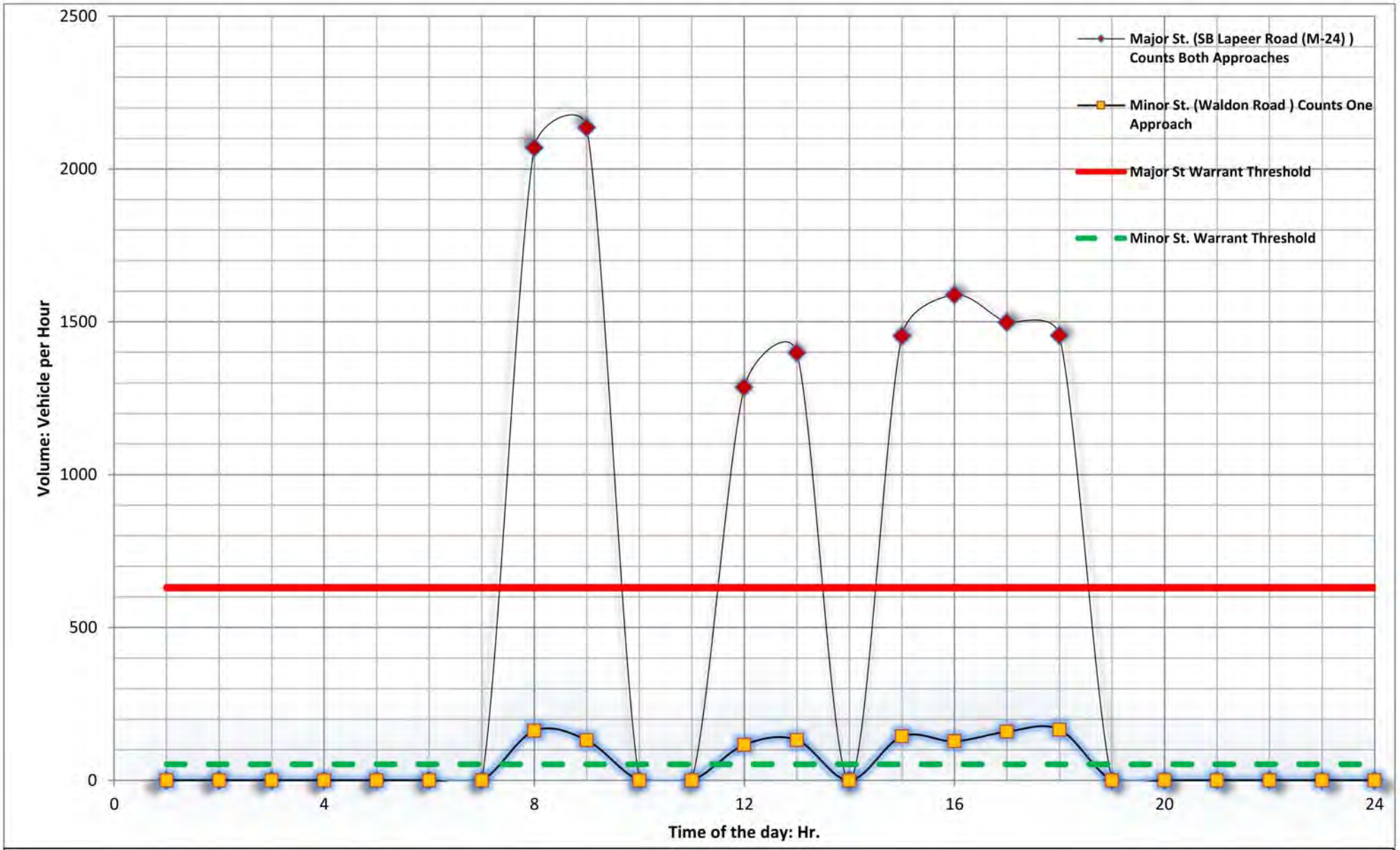


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Existing Conditions**

SB Lapeer Road (M-24) @ Waldon Road

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **8**

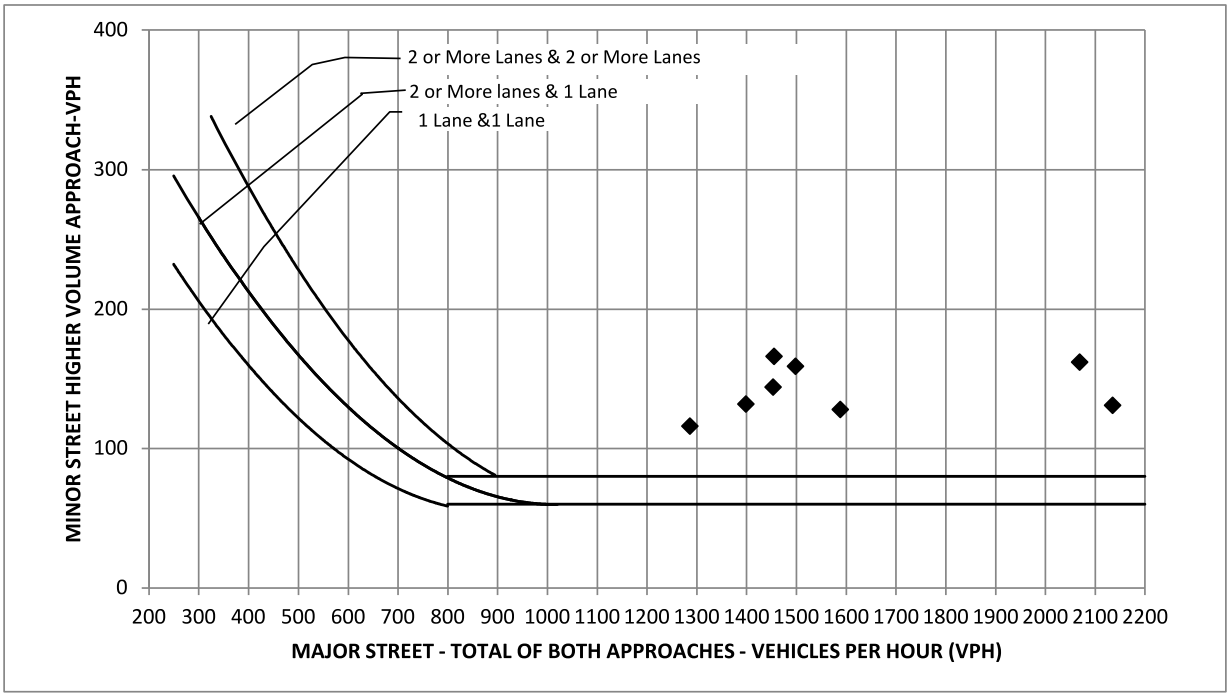
Does this intersection meet Warrant **1B** for signal installation? **YES**

Data Collection Date: **10/13/2022**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Existing Conditions		
Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
55	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

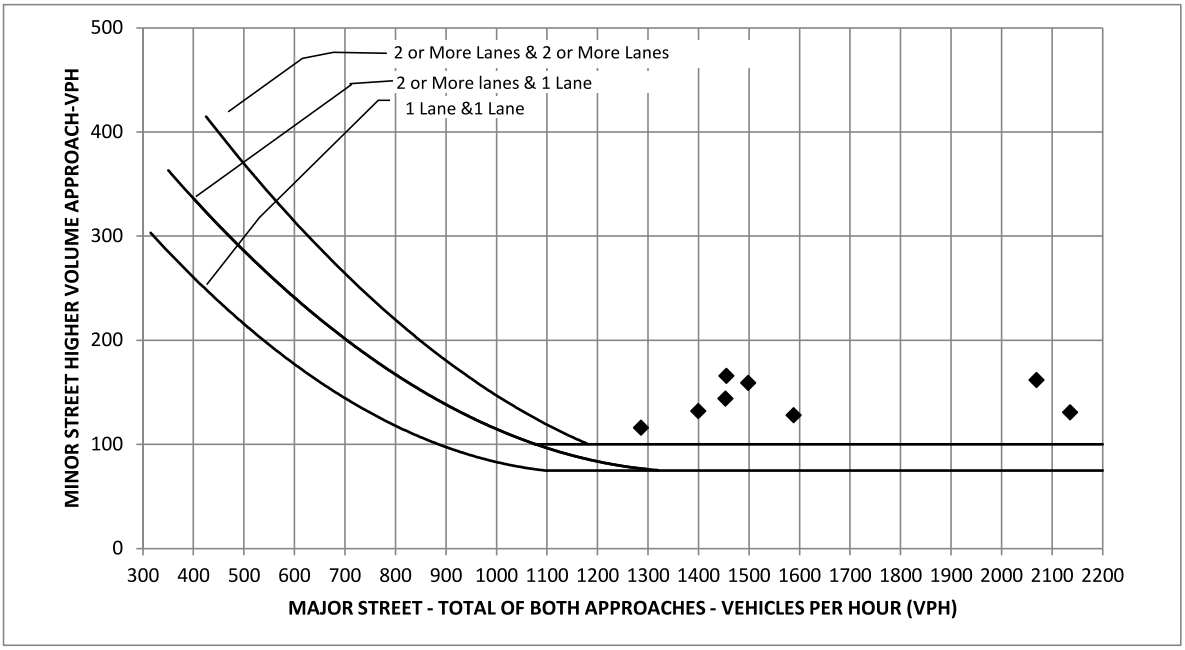


How Many Hours Are Met	8
Is Warrant (70%) Met?	YES

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Existing Conditions		
Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Existing Conditions		
Major Street:	NB Lapeer Road (M-24)	Minor Street:	SB-to-NB XO
Intersection:	NB Lapeer Road (M-24) at SB-to-NB XO		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	1005	122	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	1018	110	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1165	106	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1191	111	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1685	119	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	2033	111	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	2075	138	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	2218	141	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

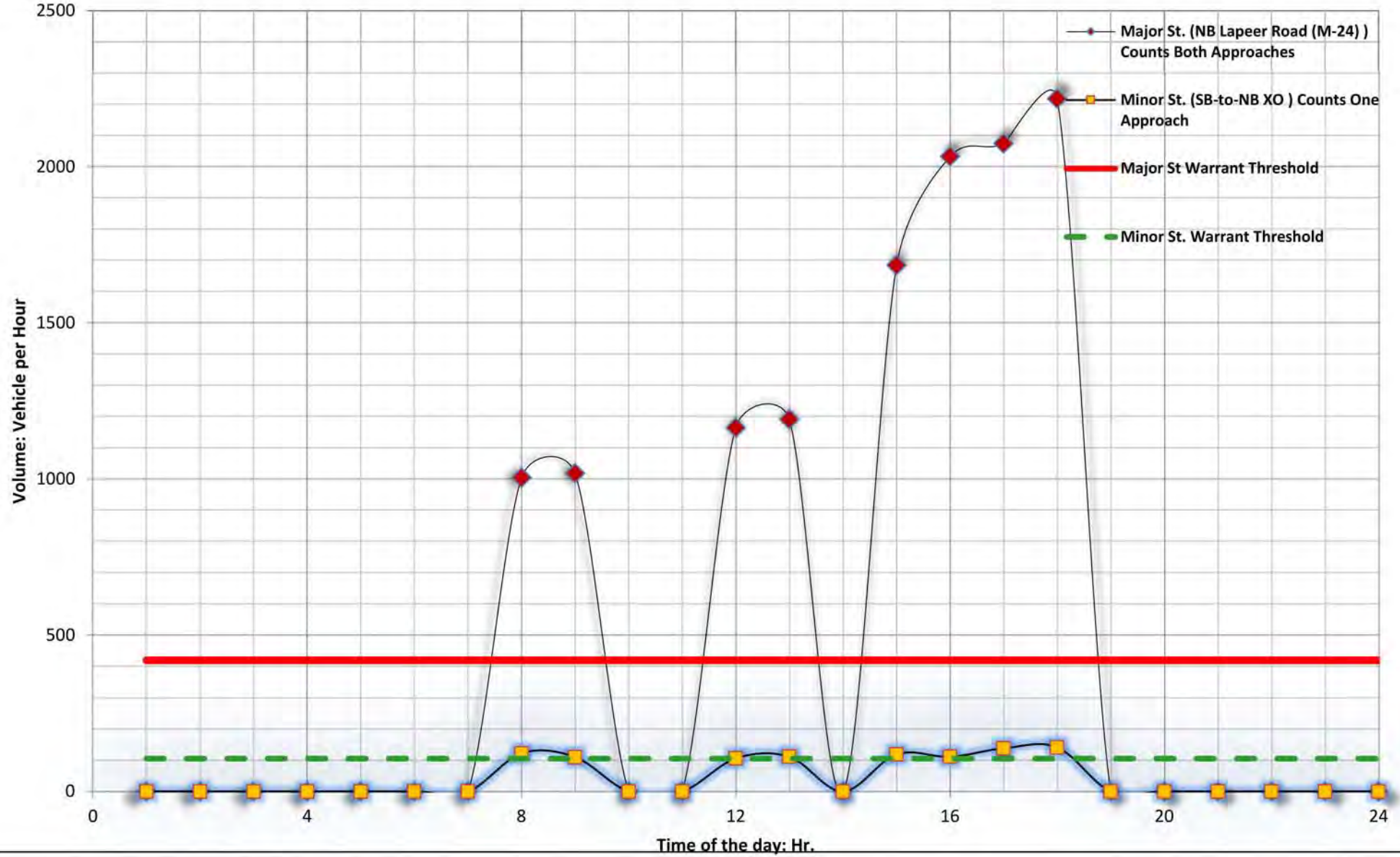


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Existing Conditions

NB Lapeer Road (M-24) @ SB-to-NB XO

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

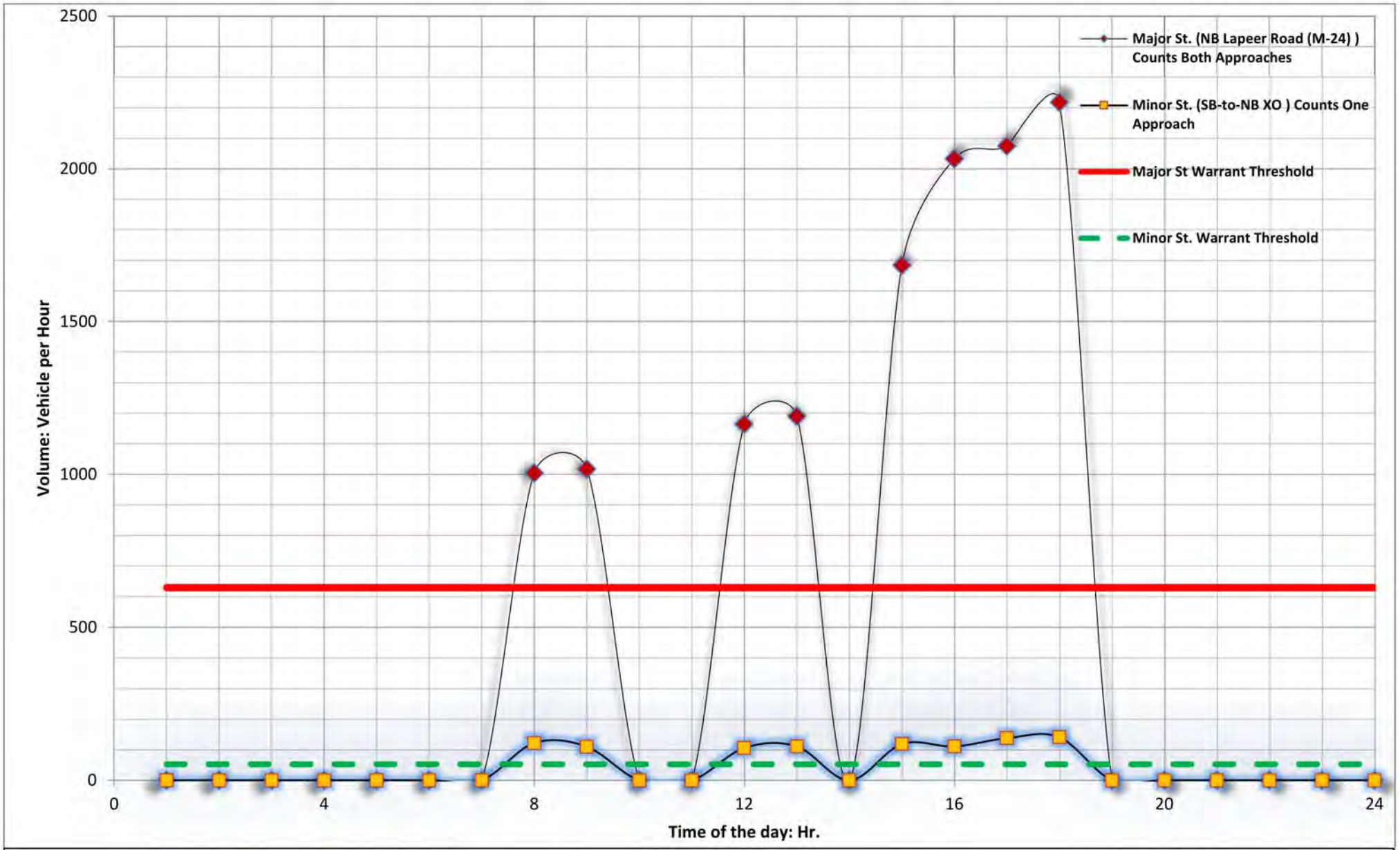


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Existing Conditions**

NB Lapeer Road (M-24) @ SB-to-NB XO

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **8**

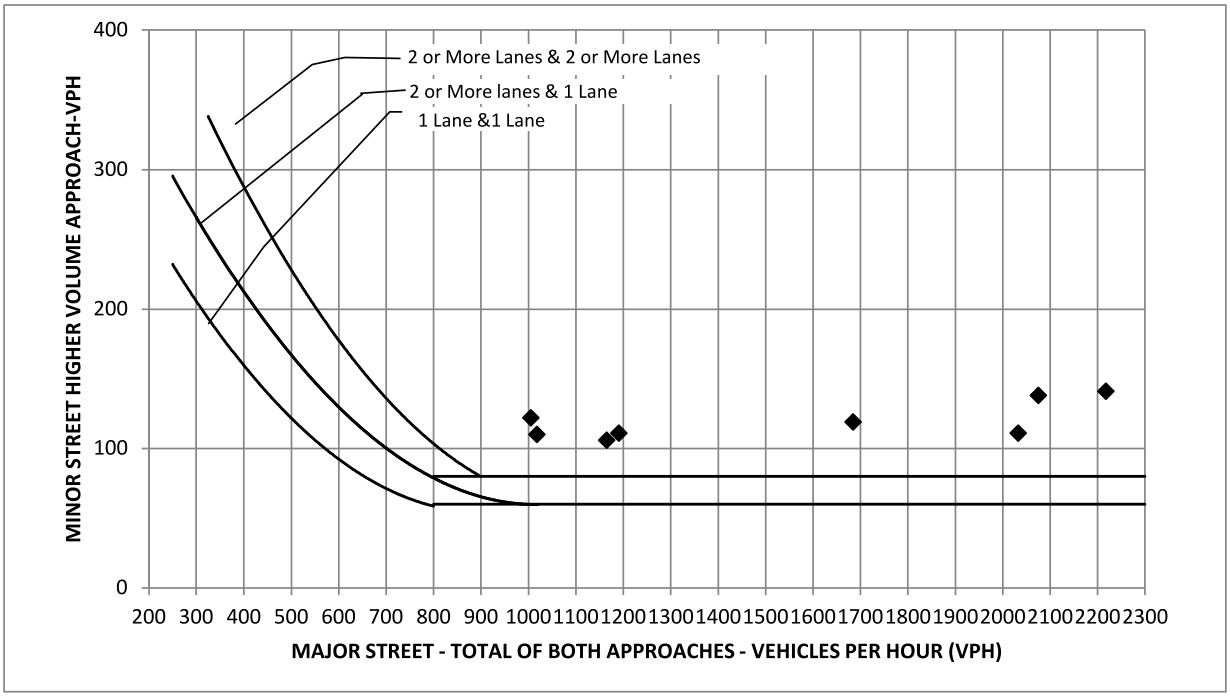
Does this intersection meet Warrant **1B** for signal installation? **YES**

Data Collection Date: **10/13/2022**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Existing Conditions		
Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
55	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

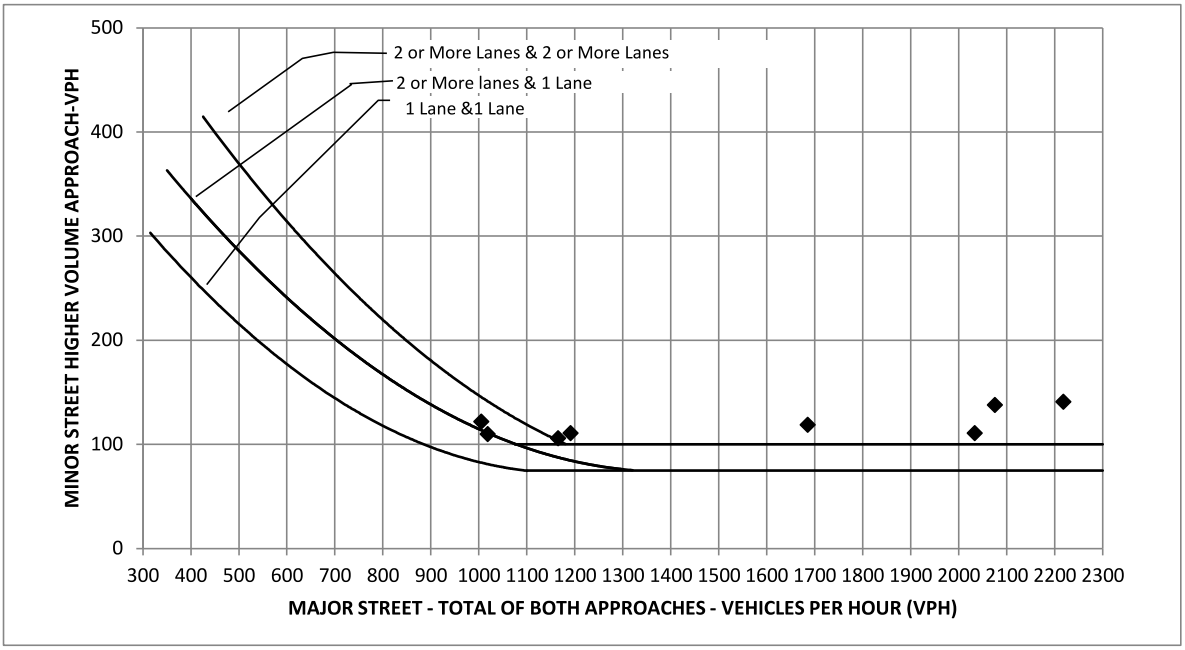


How Many Hours Are Met	8
Is Warrant (70%) Met?	YES

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Existing Conditions		
Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Background Conditions		
Major Street:	SB Lapeer Road (M-24)	Minor Street:	NB-to-SB X/O
Intersection:	SB Lapeer Road (M-24) at NB-to-SB X/O		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	NO
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	1997	106	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	2058	121	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1244	64	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1351	64	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1424	75	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1487	110	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1391	118	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1386	99	420	105	**NO**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**4**
Number of Hours that met the warrant 1B =	**8**
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)	**YES**
C. Combination of Warrants A and B Criteria Met?	**N/A**

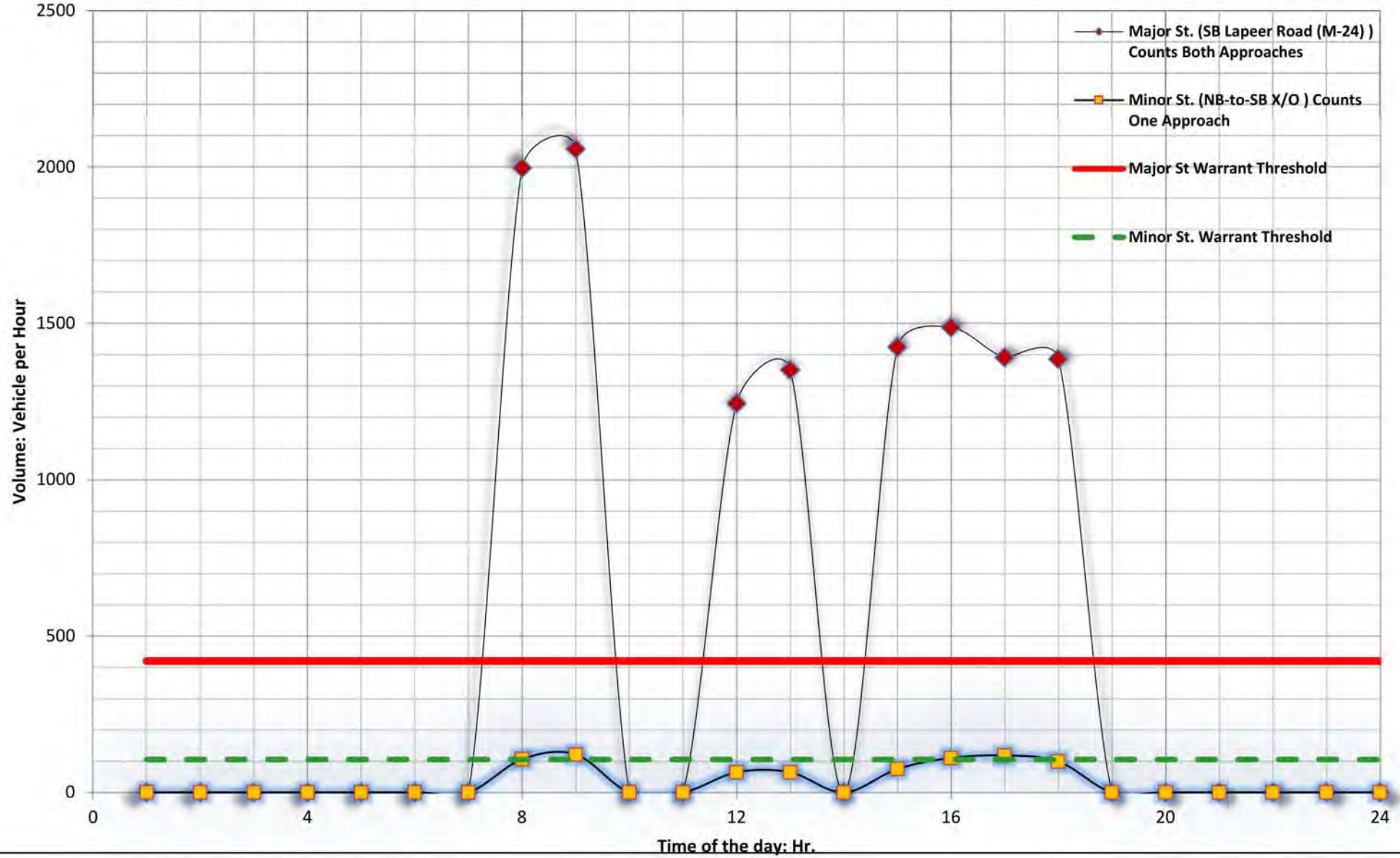


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Background Conditions

SB Lapeer Road (M-24) @ NB-to-SB X/O

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 4

Does this intersection meet Warrant 1A for signal installation? NO

Data Collection Date: 10/13/2022

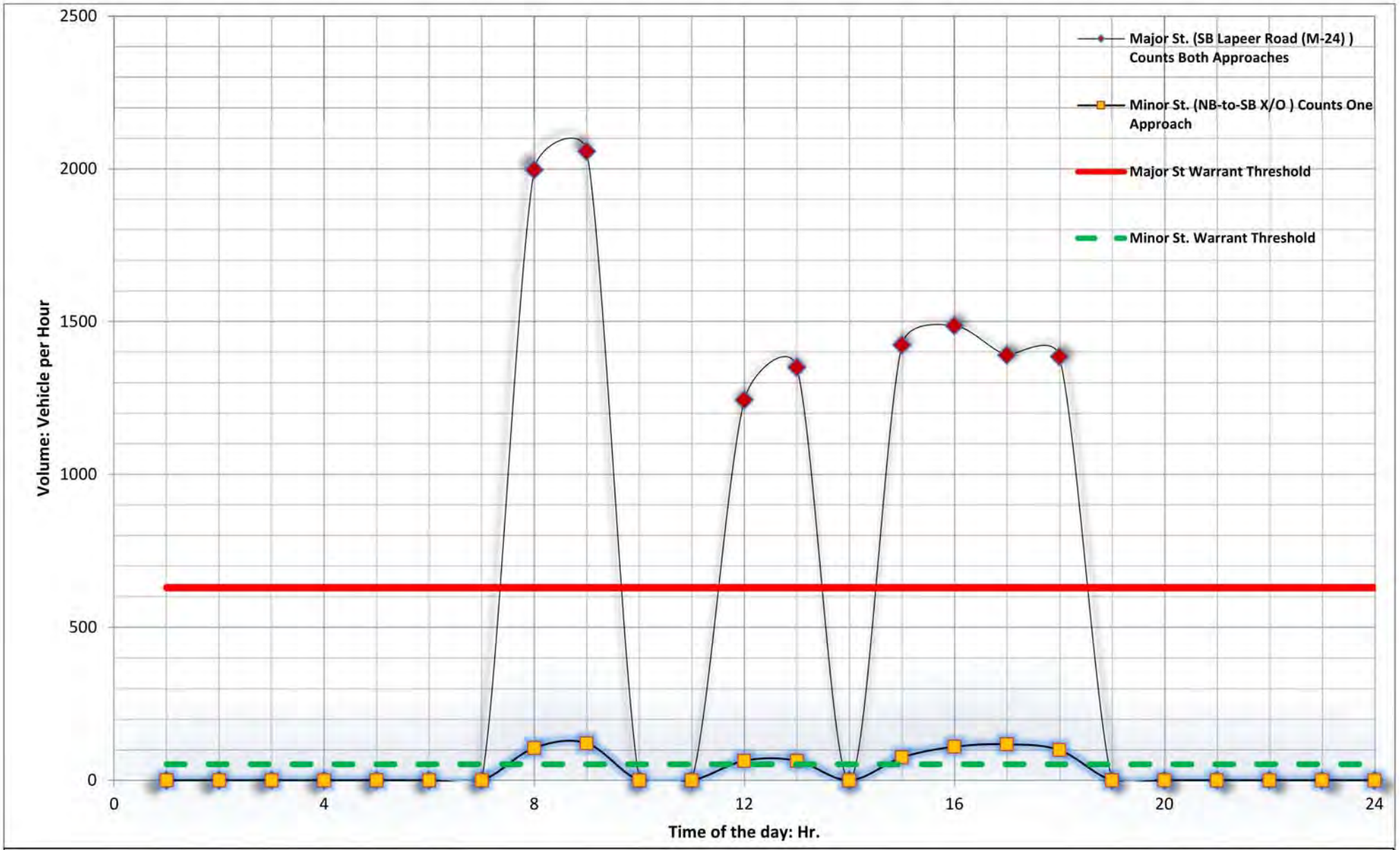


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Background Conditions

SB Lapeer Road (M-24) @ NB-to-SB X/O

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

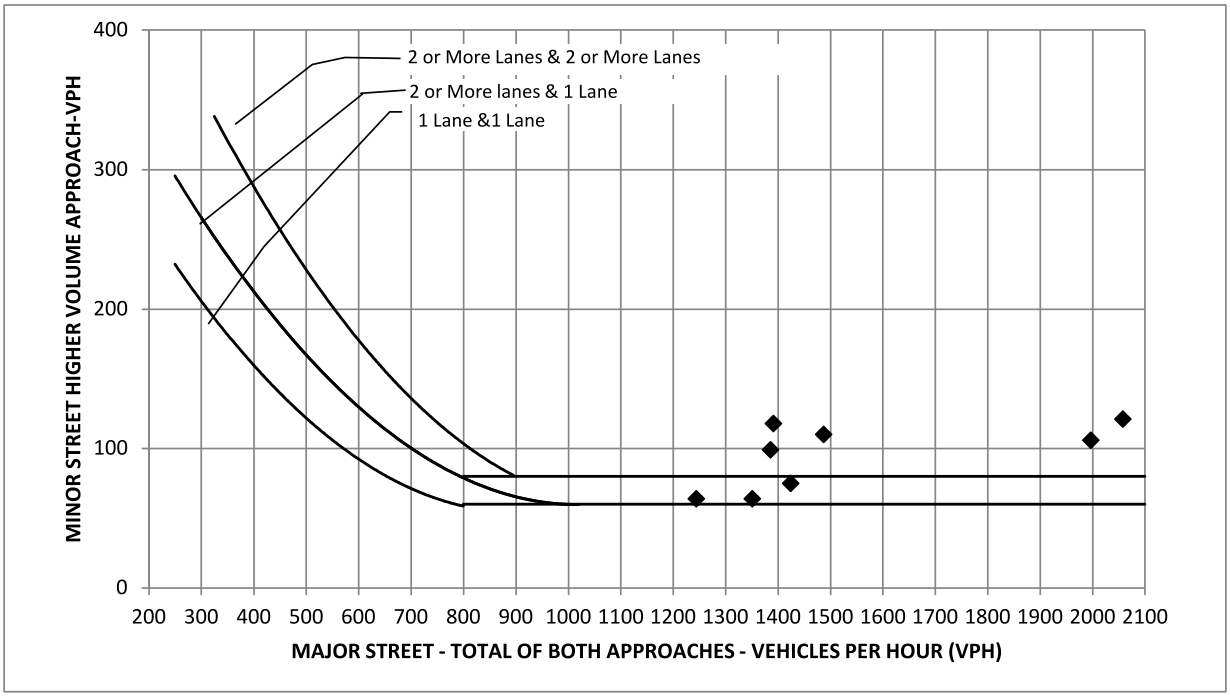
Does this intersection meet Warrant 1B for signal installation? YES

Data Collection Date: 10/13/2022

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Background Conditions		
Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**

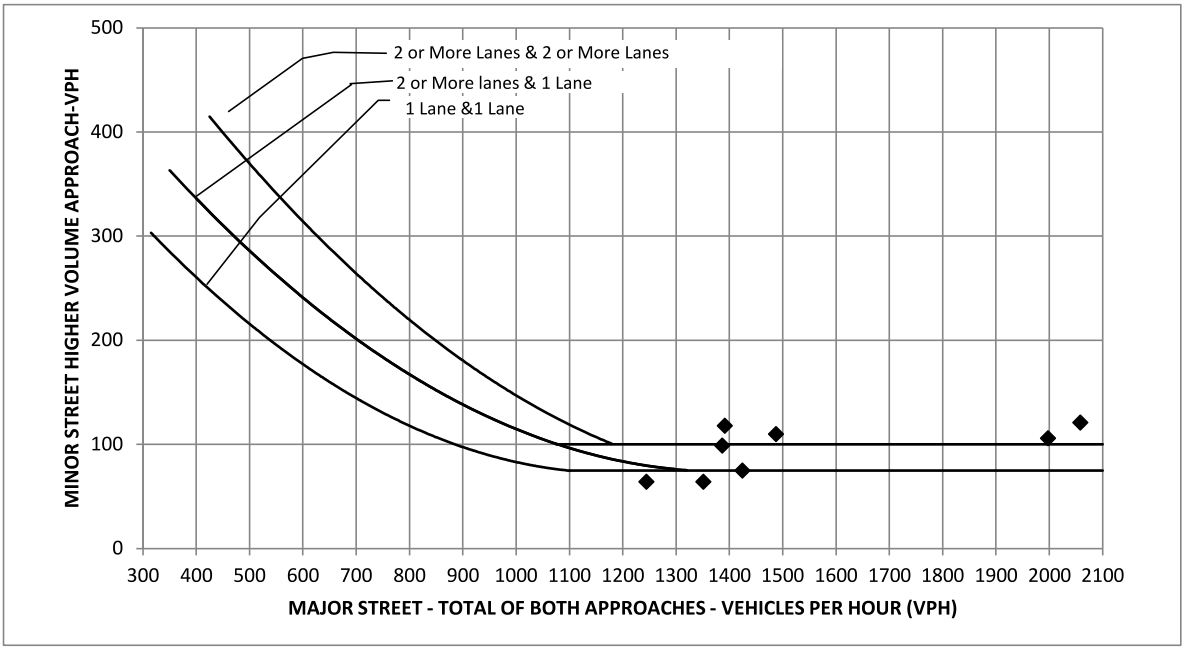


How Many Hours Are Met	**8**
Is Warrant (70%) Met?	**YES**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Background Conditions		
Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**5**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Background Conditions		
Major Street:	SB Lapeer Road (M-24)	Minor Street:	Waldon Road
Intersection:	SB Lapeer Road (M-24) at Waldon Road		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
07:00 - 08:00	2100	164	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
08:00 - 09:00	2167	133	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
11:00 - 12:00	1305	118	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
12:00 - 13:00	1420	134	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
14:00 - 15:00	1475	146	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
15:00 - 16:00	1612	130	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
16:00 - 17:00	1521	161	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
17:00 - 18:00	1477	169	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

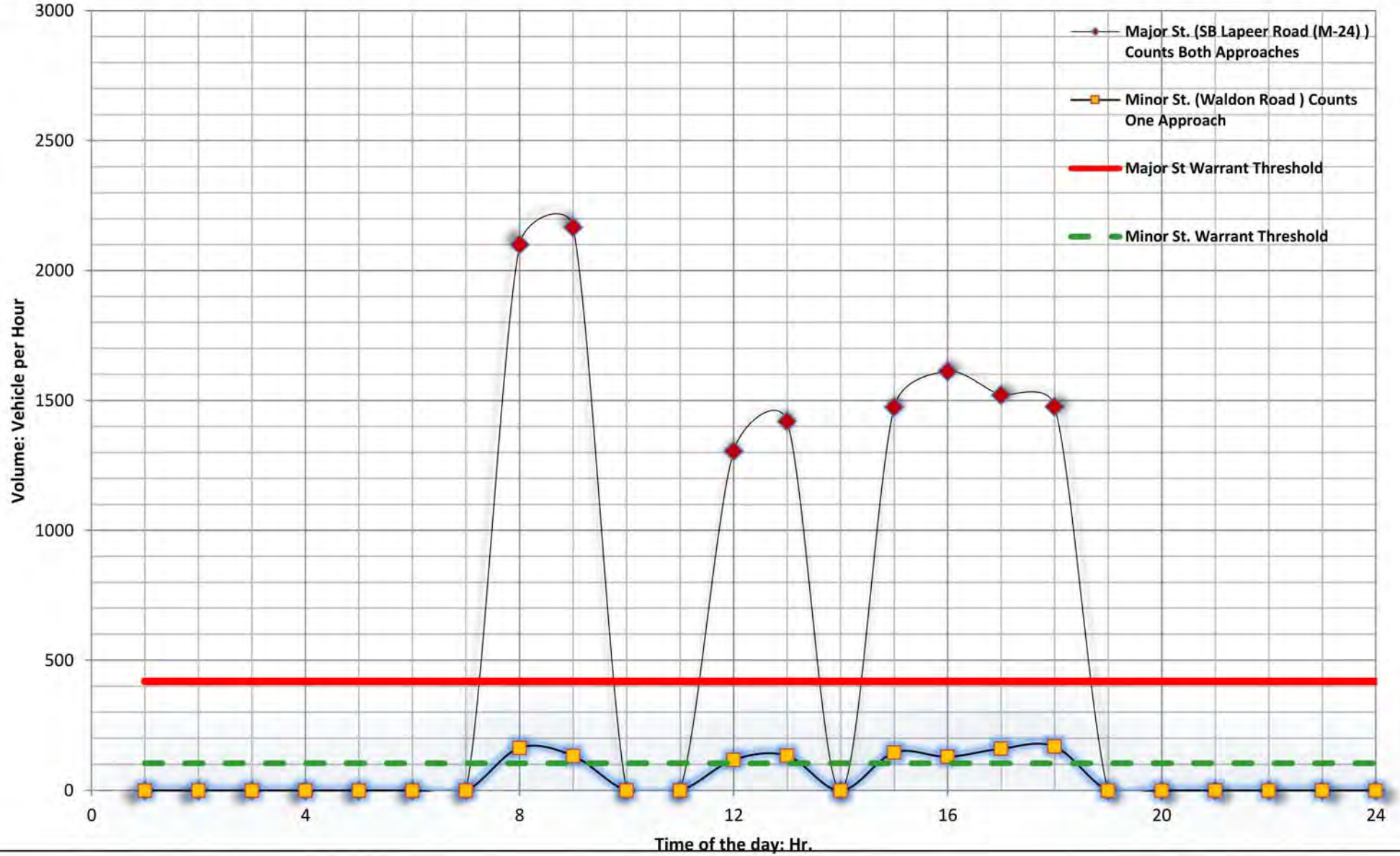


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Background Conditions

SB Lapeer Road (M-24) @ Waldon Road

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

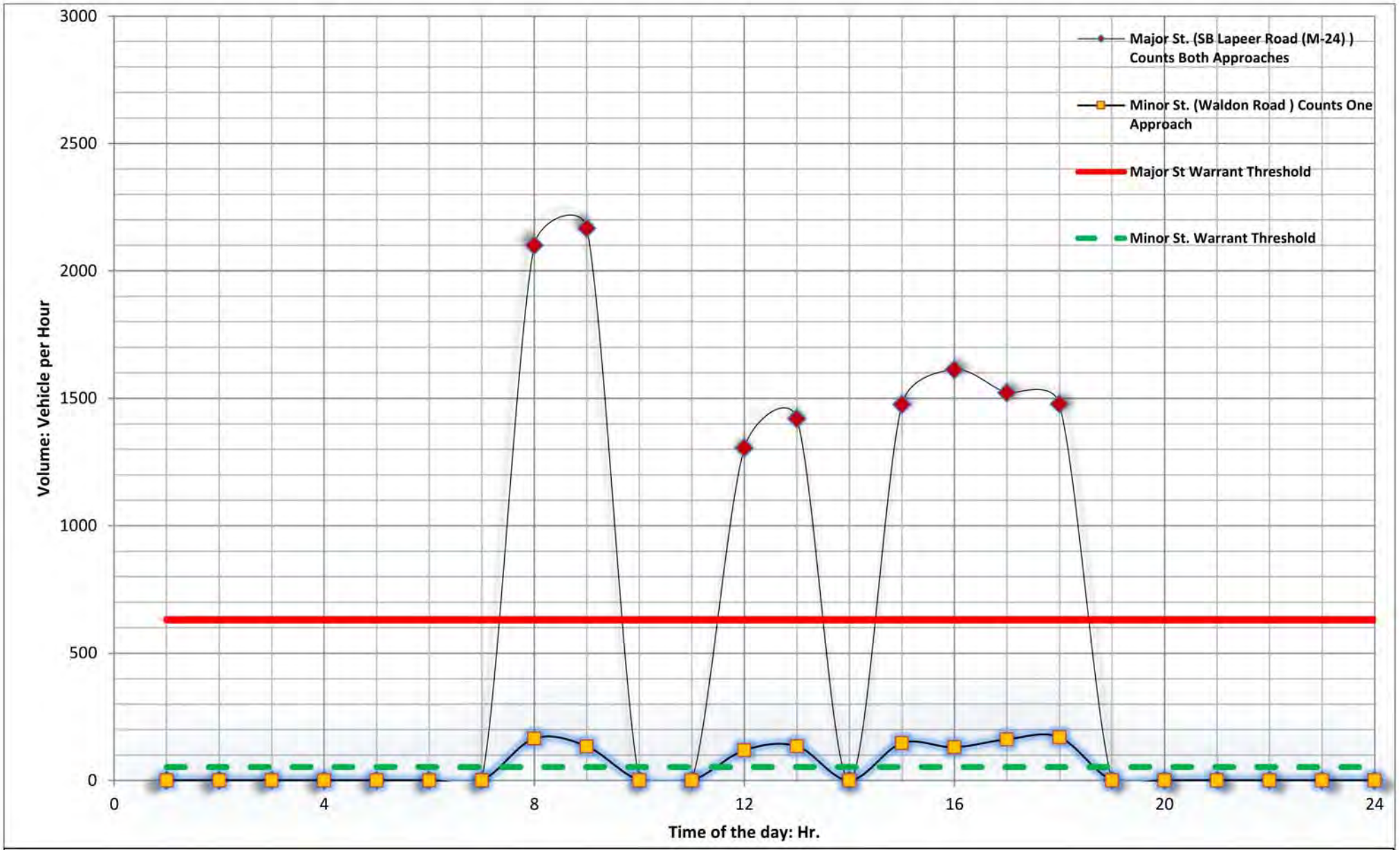


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Background Conditions**

SB Lapeer Road (M-24) @ Waldon Road

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **8**

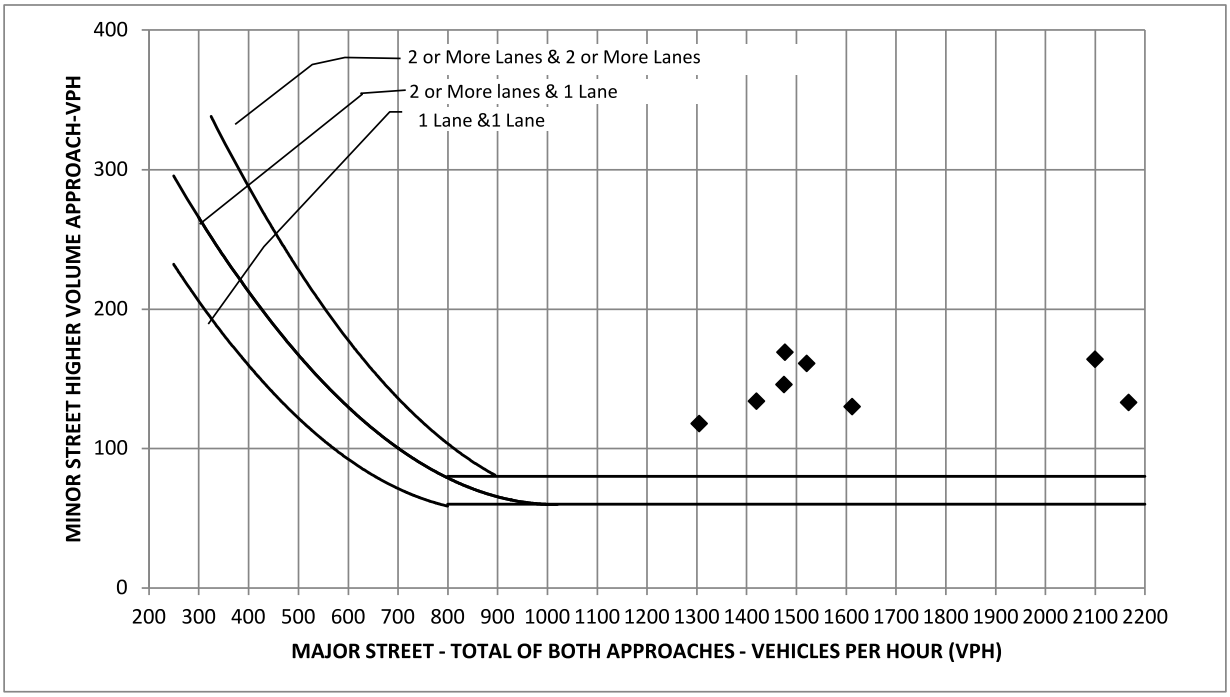
Does this intersection meet Warrant **1B** for signal installation? **YES**

Data Collection Date: **10/13/2022**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Background Conditions		
Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
55	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

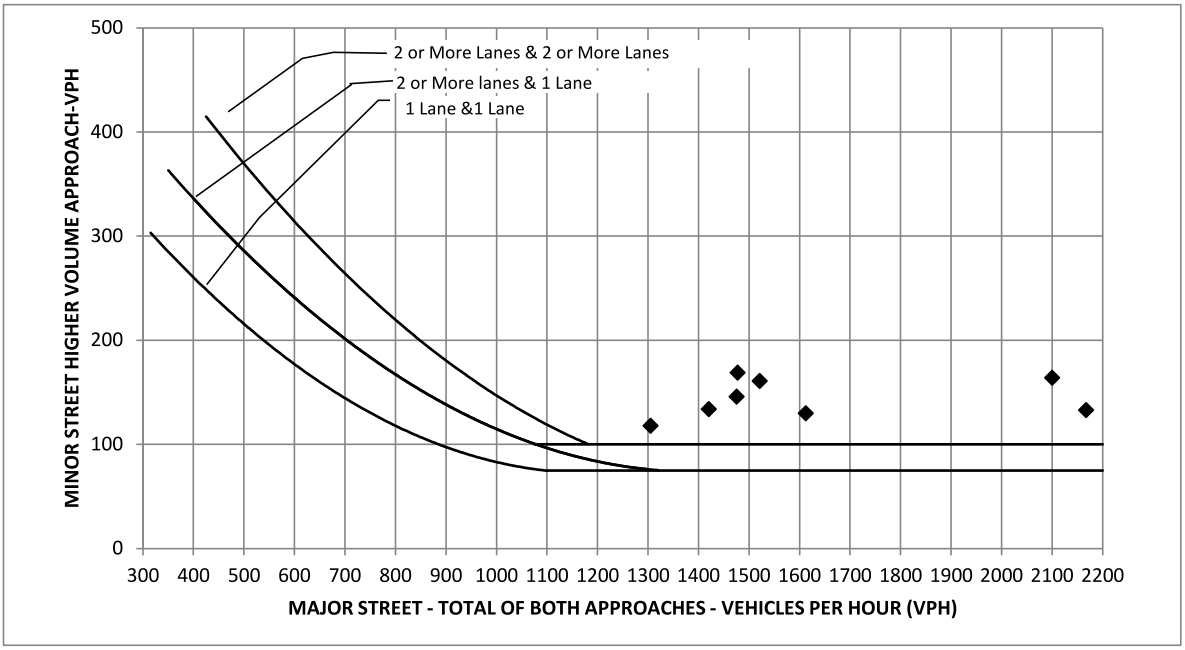


How Many Hours Are Met	8
Is Warrant (70%) Met?	YES

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Background Conditions		
Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Background Conditions		
Major Street:	NB Lapeer Road (M-24)	Minor Street:	SB-to-NB XO
Intersection:	NB Lapeer Road (M-24) at SB-to-NB XO		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	1020	124	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	1033	112	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1183	108	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1209	113	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1710	121	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	2064	113	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	2106	140	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	2251	143	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

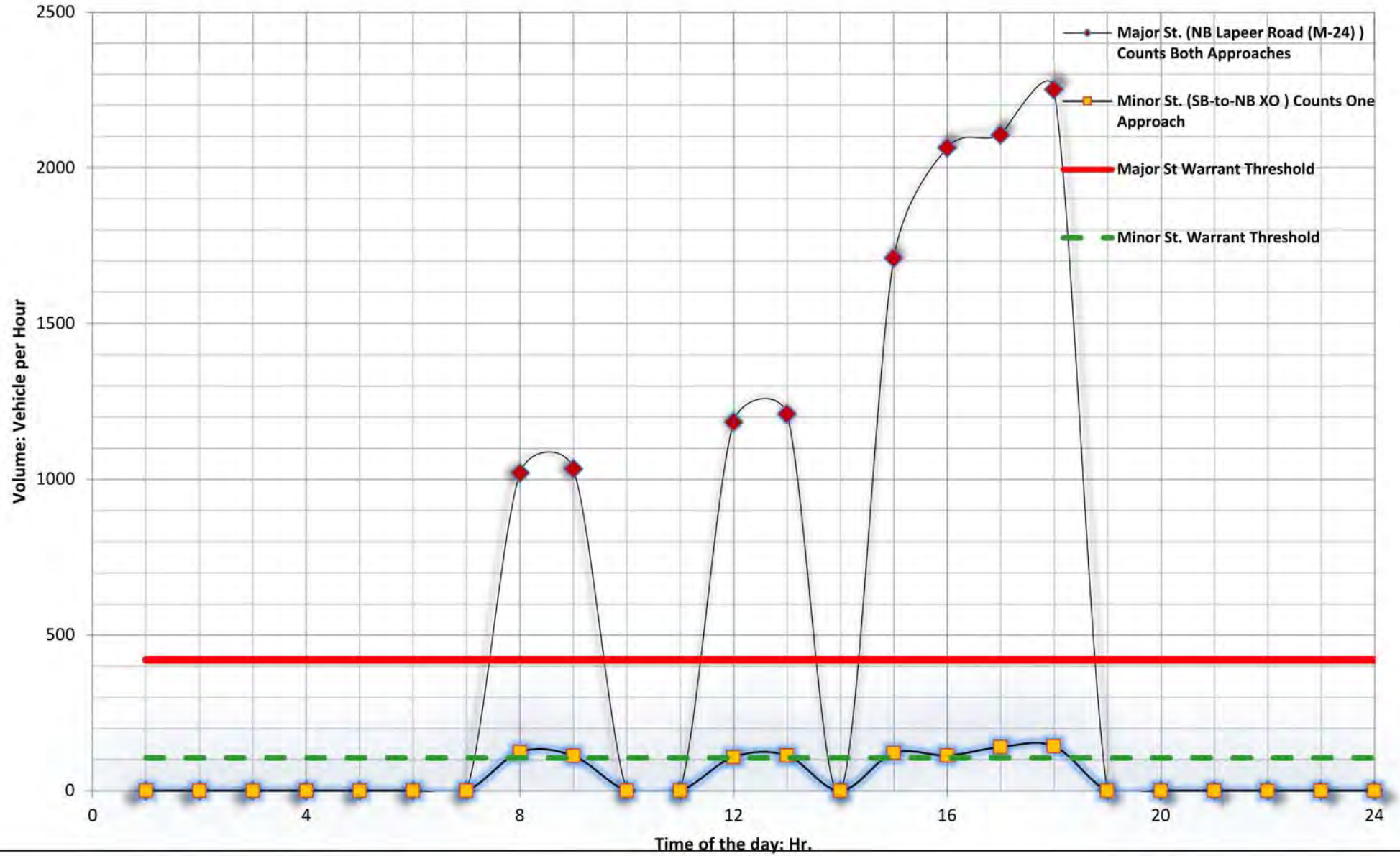


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Background Conditions

NB Lapeer Road (M-24) @ SB-to-NB XO

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

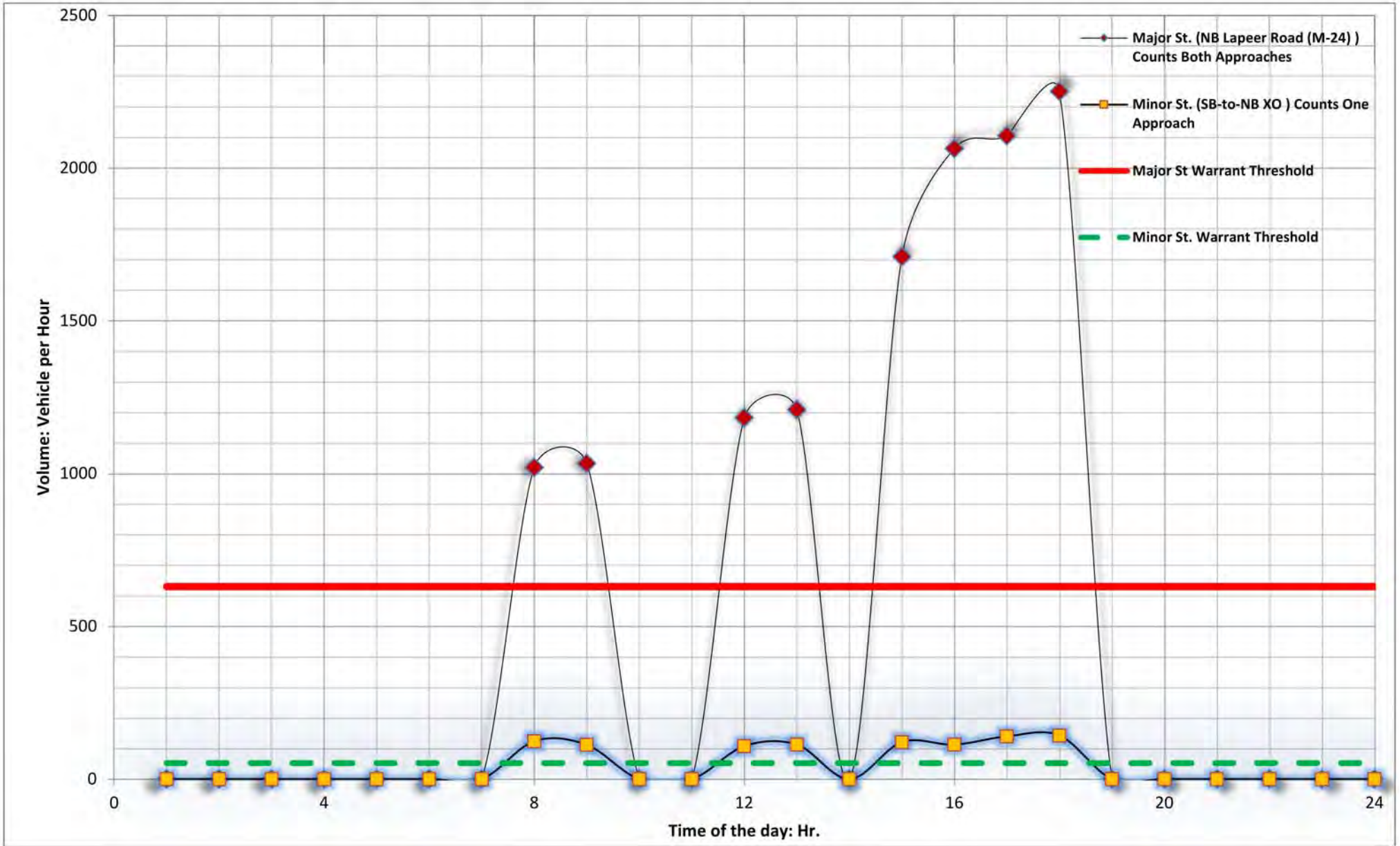


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Background Conditions**

NB Lapeer Road (M-24) @ SB-to-NB XO

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **8**

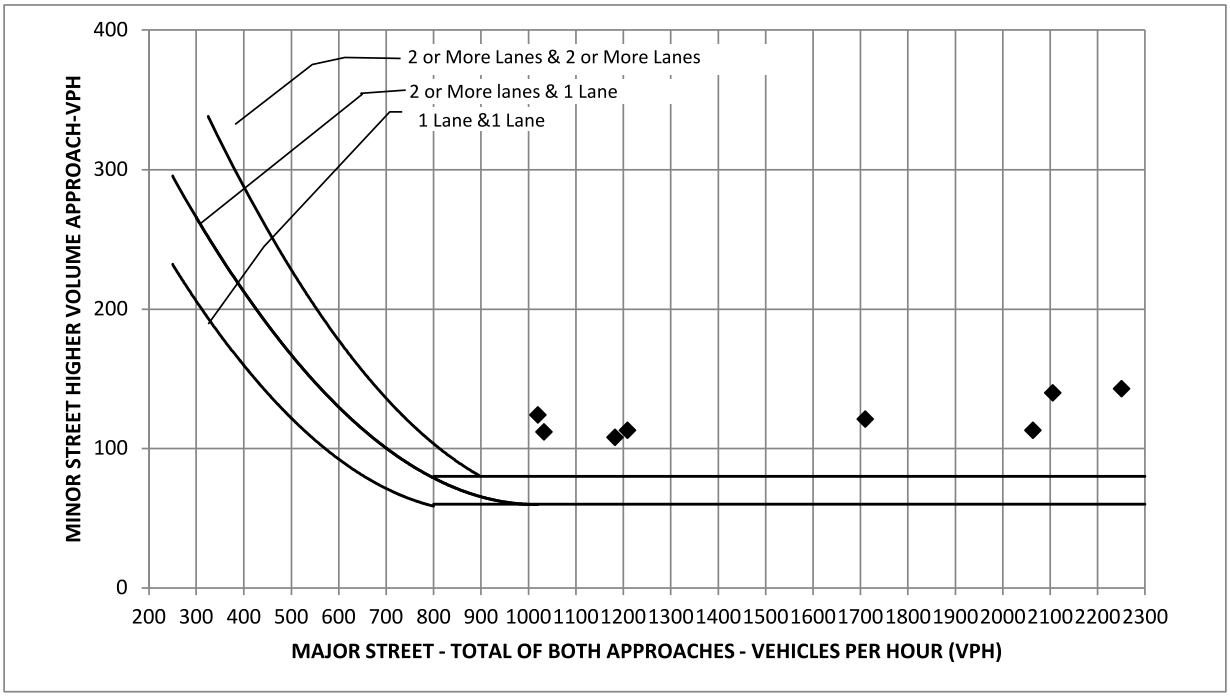
Does this intersection meet Warrant **1B** for signal installation? **YES**

Data Collection Date: **10/13/2022**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Background Conditions		
Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	: No. of Lanes on Major St.
1	: No. of Lanes on Minor St.
55	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

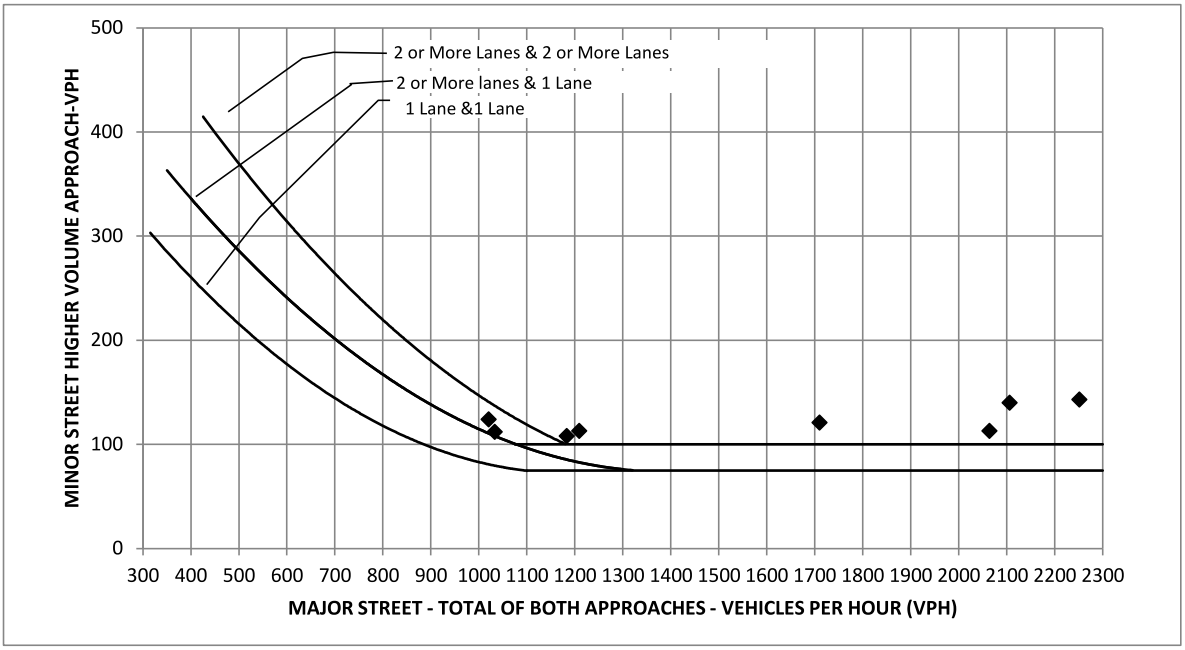


How Many Hours Are Met	8
Is Warrant (70%) Met?	YES

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Background Conditions		
Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Future Conditions		
Major Street:	SB Lapeer Road (M-24)	Minor Street:	NB-to-SB X/O
Intersection:	SB Lapeer Road (M-24) at NB-to-SB X/O		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	2036	144	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	2100	162	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1273	108	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1383	107	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1440	111	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1503	149	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1408	160	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1404	139	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

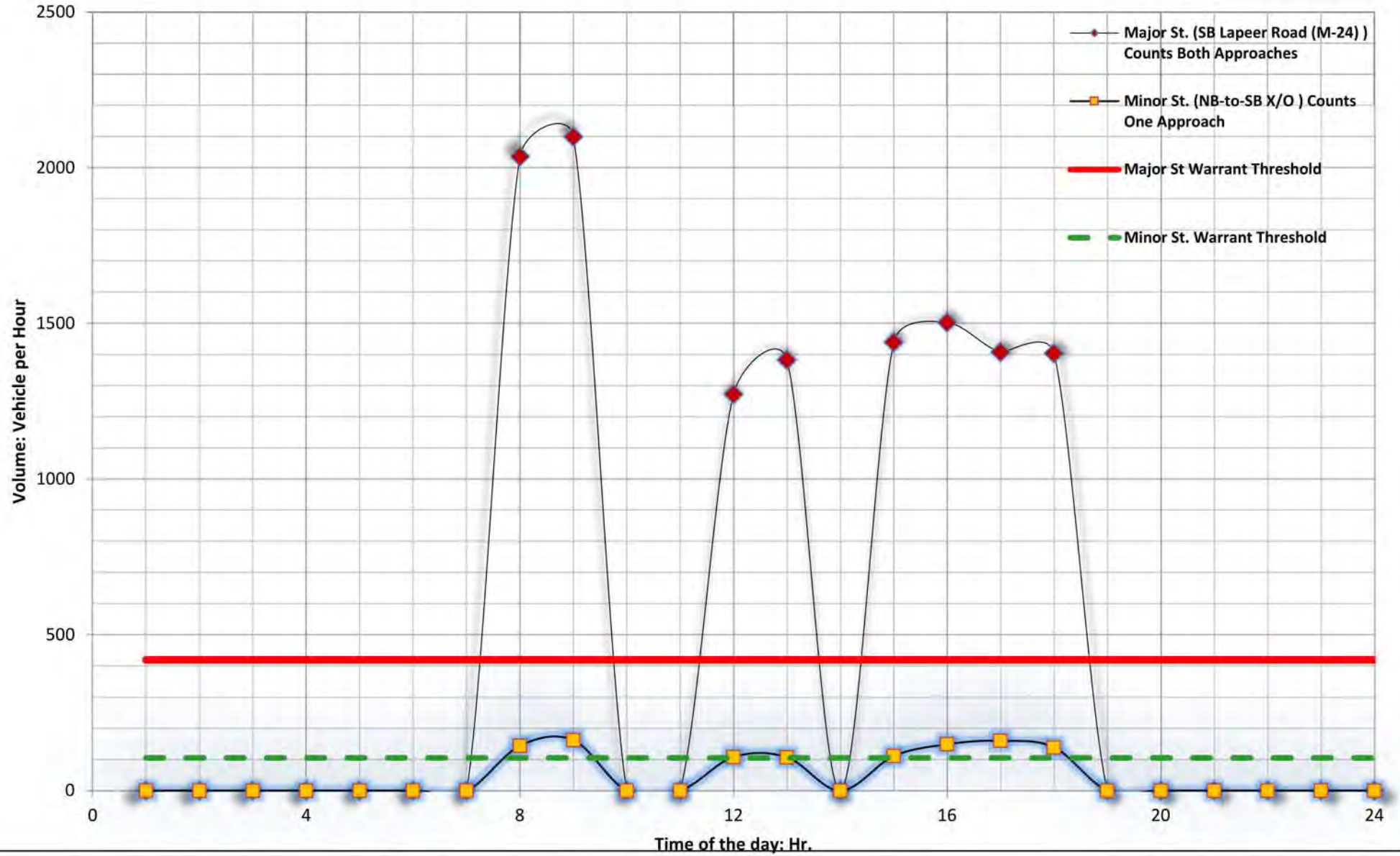


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Future Conditions

SB Lapeer Road (M-24) @ NB-to-SB X/O

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

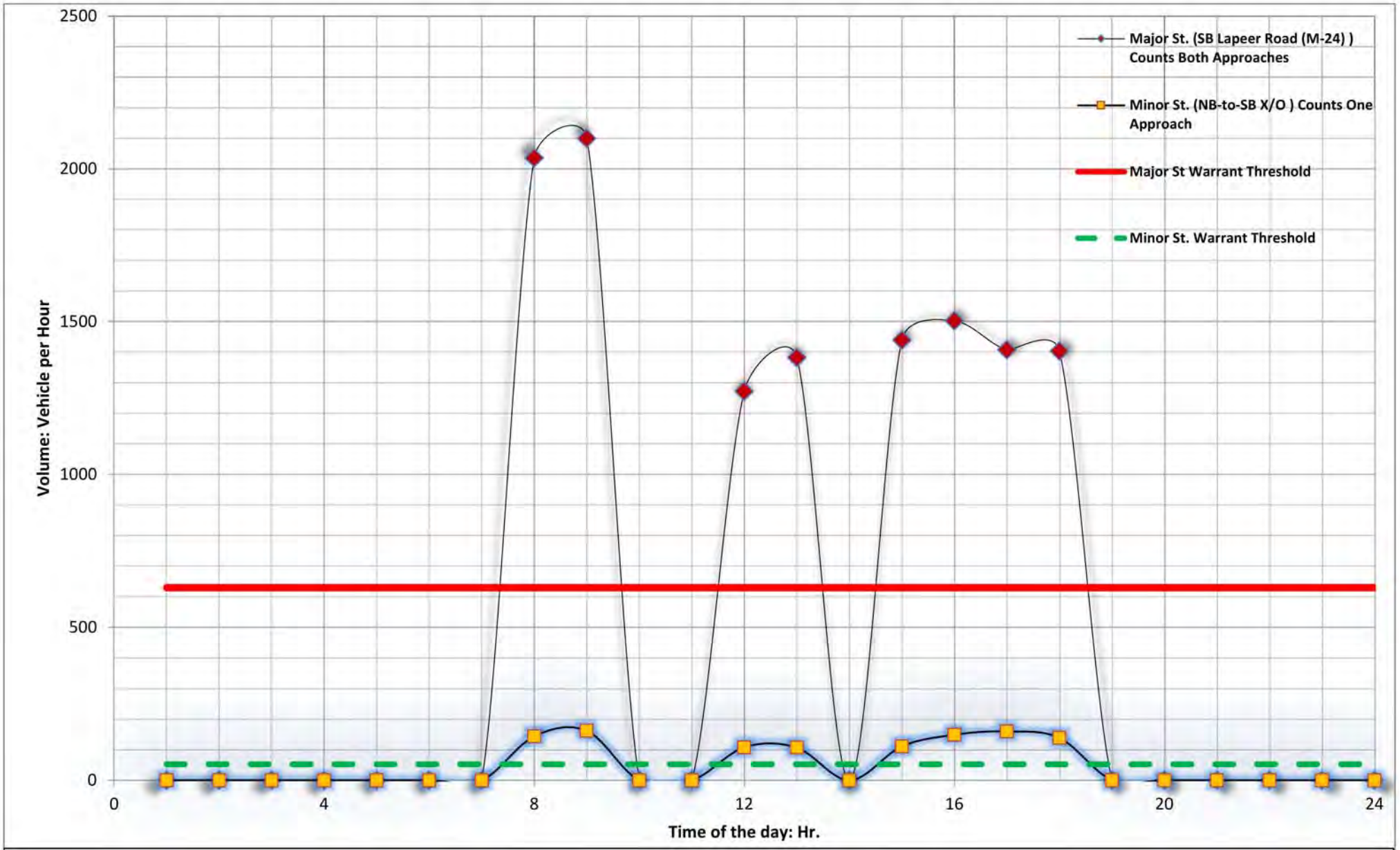


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: **Future Conditions**

SB Lapeer Road (M-24) @ NB-to-SB X/O

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

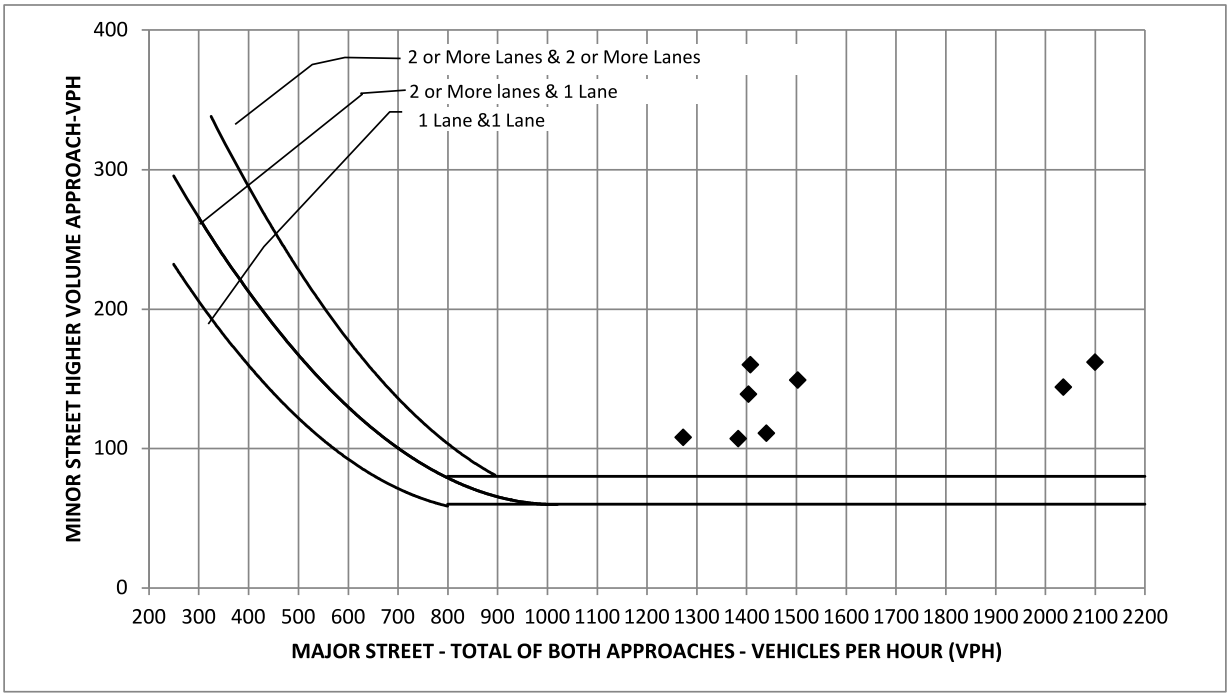
Does this intersection meet Warrant 1B for signal installation? YES

Data Collection Date: 10/13/2022

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Future Conditions		
Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**

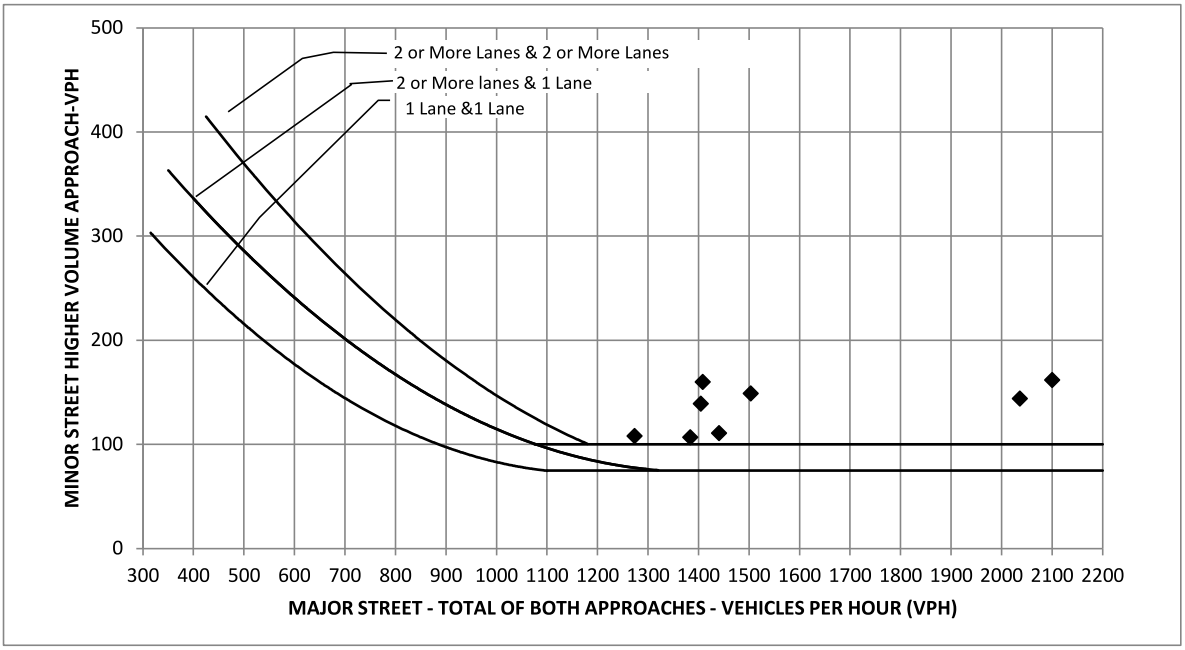


How Many Hours Are Met	**8**
Is Warrant (70%) Met?	**YES**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Future Conditions		
Intersection:	SB Lapeer Road (M-24) @ NB-to-SB X/O		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Future Conditions		
Major Street:	SB Lapeer Road (M-24)	Minor Street:	Waldon Road
Intersection:	SB Lapeer Road (M-24) at Waldon Road		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
07:00 - 08:00	2180	165	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
08:00 - 09:00	2250	134	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
11:00 - 12:00	1364	119	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
12:00 - 13:00	1482	135	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
14:00 - 15:00	1525	146	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
15:00 - 16:00	1660	131	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
16:00 - 17:00	1565	163	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
17:00 - 18:00	1524	171	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**	
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**	

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

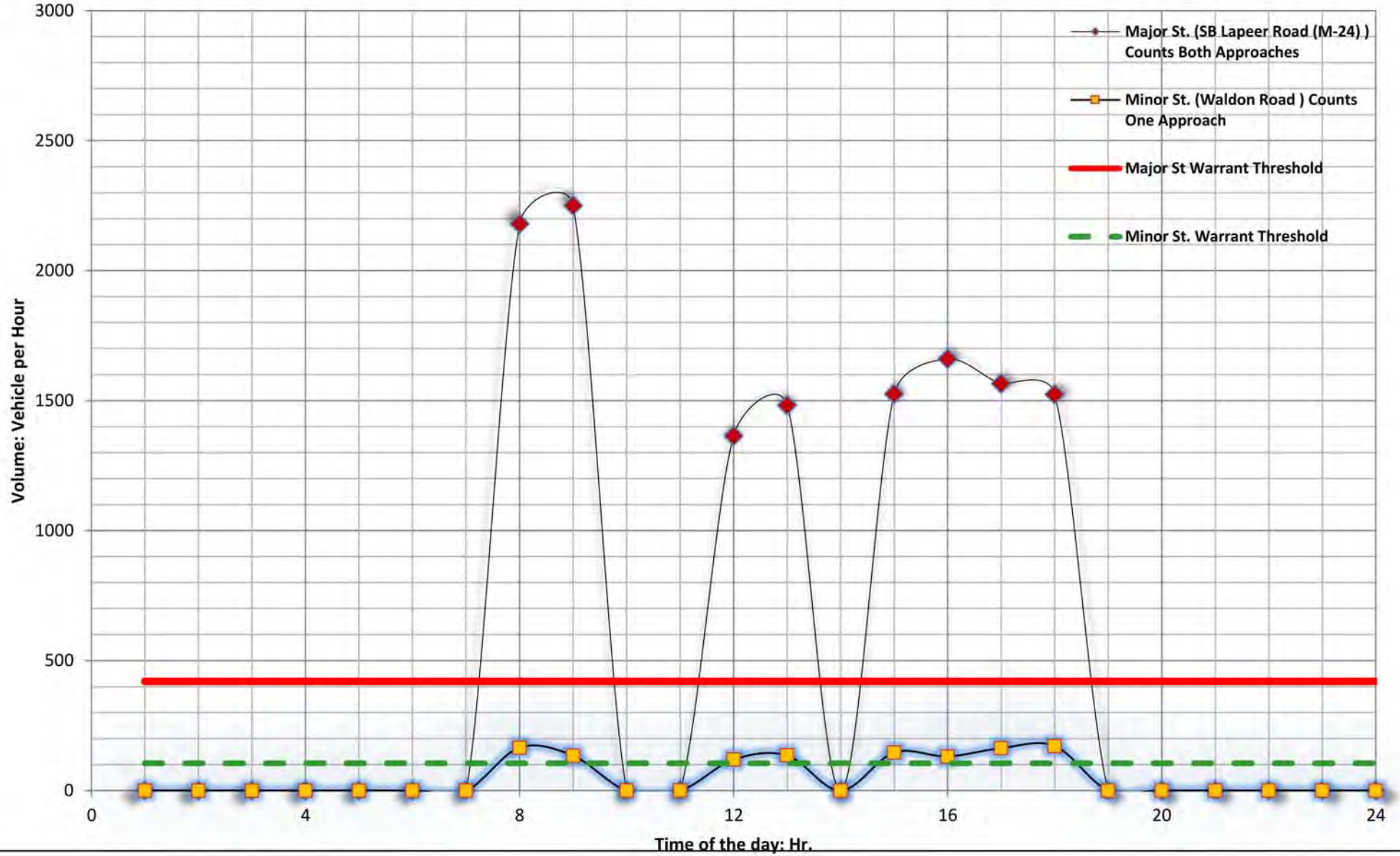


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Future Conditions

SB Lapeer Road (M-24) @ Waldon Road

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

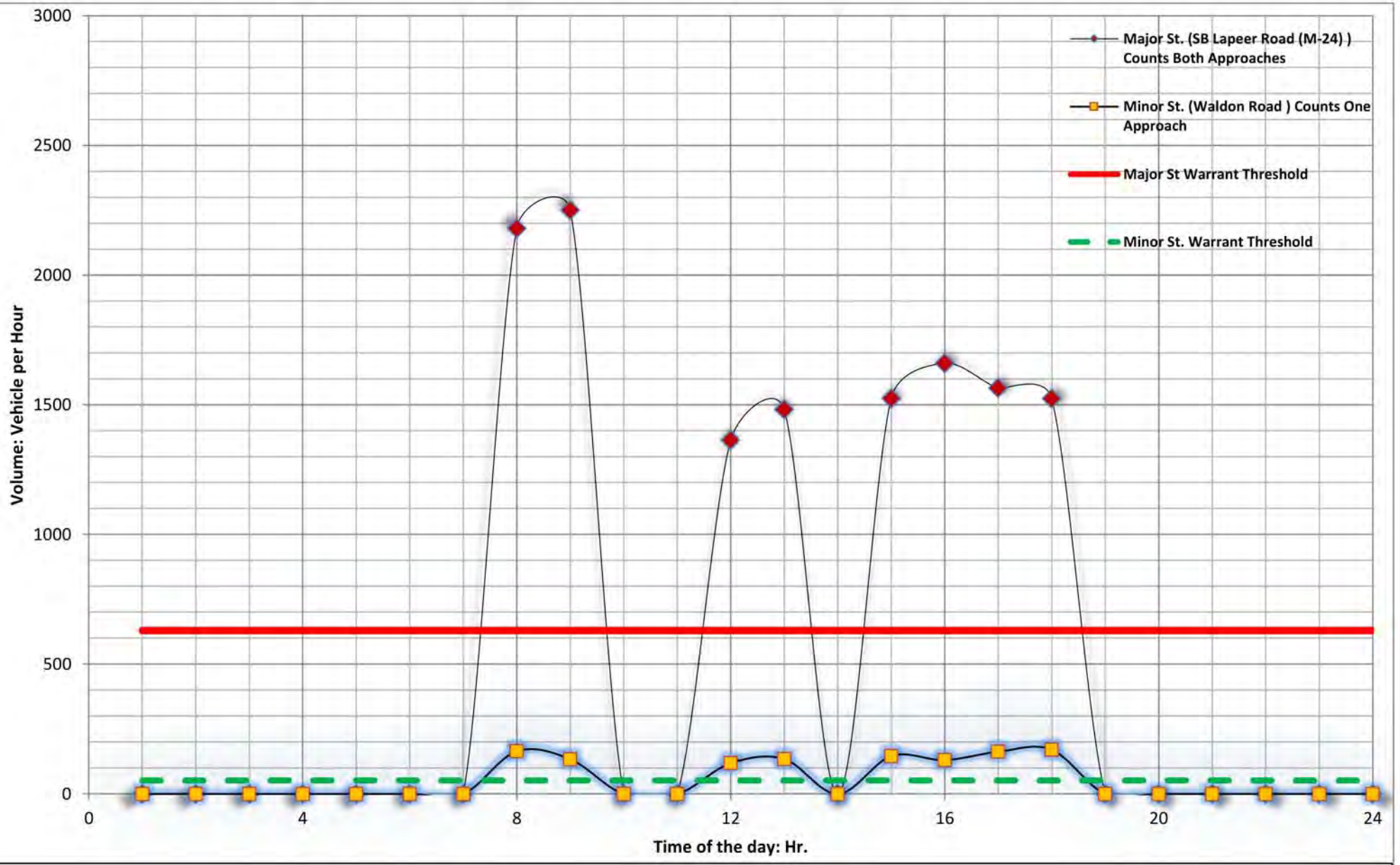


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? **YES**

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? **NO**

Spot Number: **Future Conditions**

SB Lapeer Road (M-24) @ Waldon Road

NO. OF LANES ON MAJOR ST.? **2**

NO. OF LANES ON MINOR ST.? **1**

Number of Hours that met the Warrant: **8**

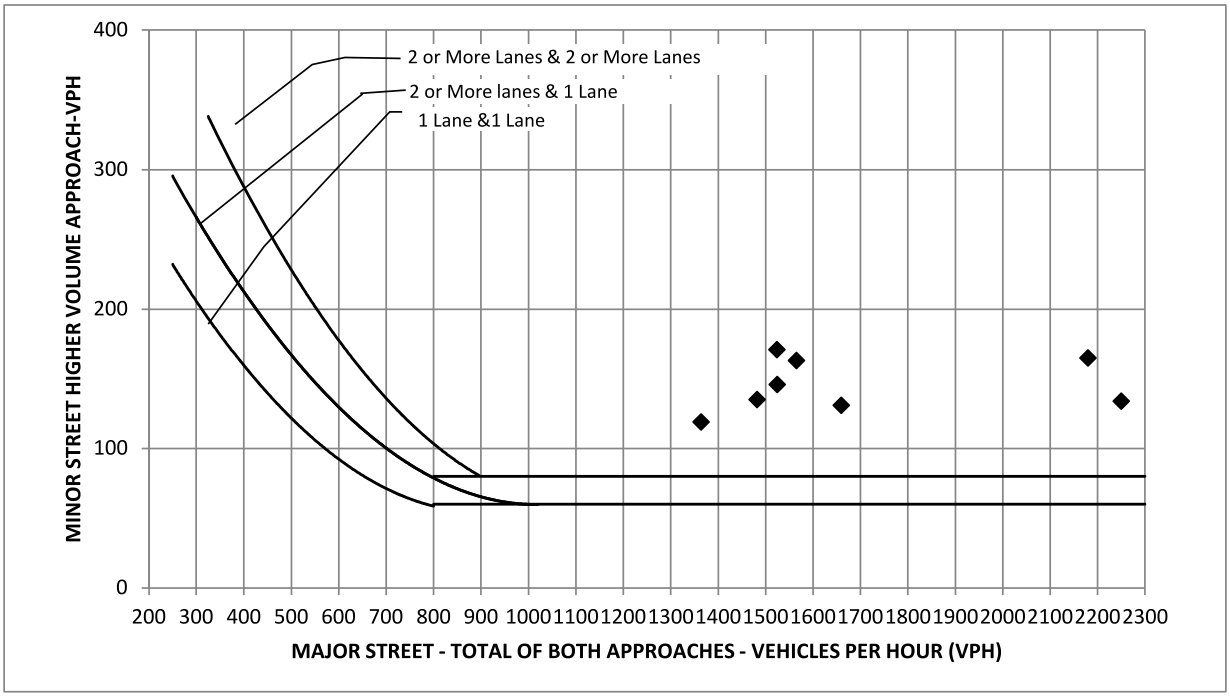
Does this intersection meet Warrant **1B** for signal installation? **YES**

Data Collection Date: **10/13/2022**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Future Conditions		
Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**

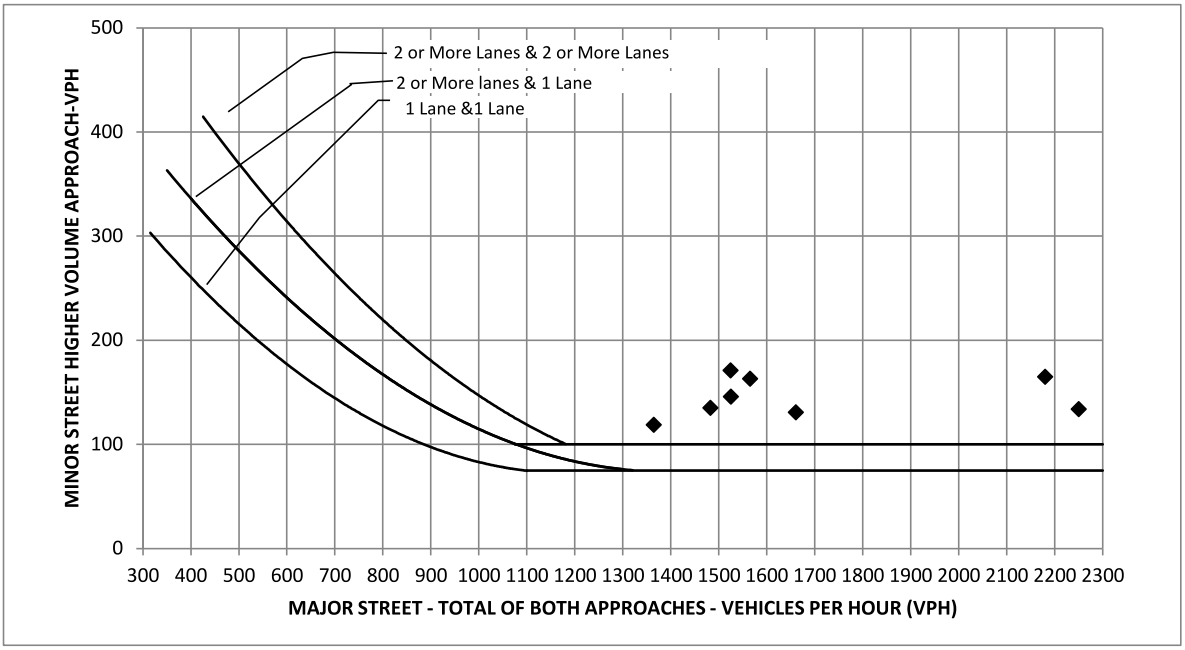


How Many Hours Are Met	**8**
Is Warrant (70%) Met?	**YES**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Future Conditions		
Intersection:	SB Lapeer Road (M-24) @ Waldon Road		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Summary of Warrants

Spot Number:	Future Conditions		
Major Street:	NB Lapeer Road (M-24)	Minor Street:	SB-to-NB XO
Intersection:	NB Lapeer Road (M-24) at SB-to-NB XO		
City/Twp:	Orion Township		
Date Performed:	11/4/2022	Performed By:	F&V
Date Volumes Collected:	10/13/2022		

Warrant	Condition	Is Warrant Met
Data Validation Error		**NO**
WARRANT 1: Eight-Hour Vehicular Volume		**YES**
	Condition A	YES
	Condition B	YES
	Condition A&B	N/A
WARRANT 2: Four-Hour Vehicular Volume	(70%)	**YES**
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	**YES**
	Condition A	**N/A**
	Condition B	**YES**
WARRANT 4: Pedestrian Volume	(70%)	**NO**
	Four Hour	N/A
	Peak Hour	N/A
(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

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St?**
1	**: No. of Lanes on Minor St?**
55	**: 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	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
01:00 - 02:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
02:00 - 03:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
03:00 - 04:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
04:00 - 05:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
05:00 - 06:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
06:00 - 07:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
07:00 - 08:00	1044	173	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
08:00 - 09:00	1069	165	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
09:00 - 10:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
10:00 - 11:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
11:00 - 12:00	1223	143	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
12:00 - 13:00	1251	149	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
13:00 - 14:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
14:00 - 15:00	1737	151	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
15:00 - 16:00	2115	142	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
16:00 - 17:00	2154	164	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
17:00 - 18:00	2310	168	420	105	**YES**	630	53	**YES**	N/A	N/A	N/A	N/A	**N/A**
18:00 - 19:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
19:00 - 20:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
20:00 - 21:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
21:00 - 22:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
22:00 - 23:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**
23:00 - 00:00	0	0	420	105	**NO**	630	53	**NO**	N/A	N/A	N/A	N/A	**N/A**

Number of Hours that met the warrant 1A =	**8**
Number of Hours that met the warrant 1B =	**8**
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**

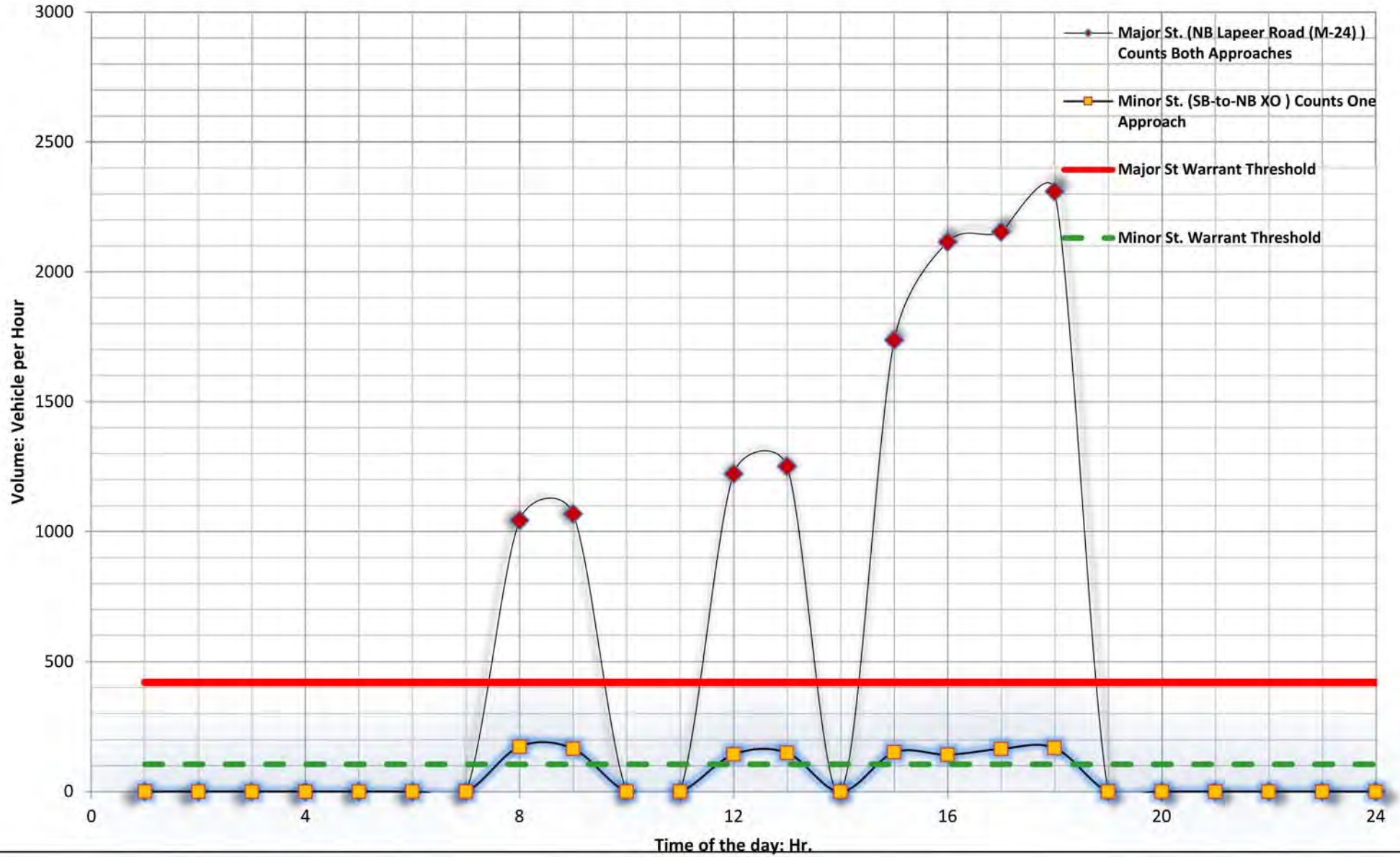


FIGURE 1: WARRANT **1A**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: Future Conditions

NB Lapeer Road (M-24) @ SB-to-NB XO

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

Does this intersection meet Warrant 1A for signal installation? YES

Data Collection Date: 10/13/2022

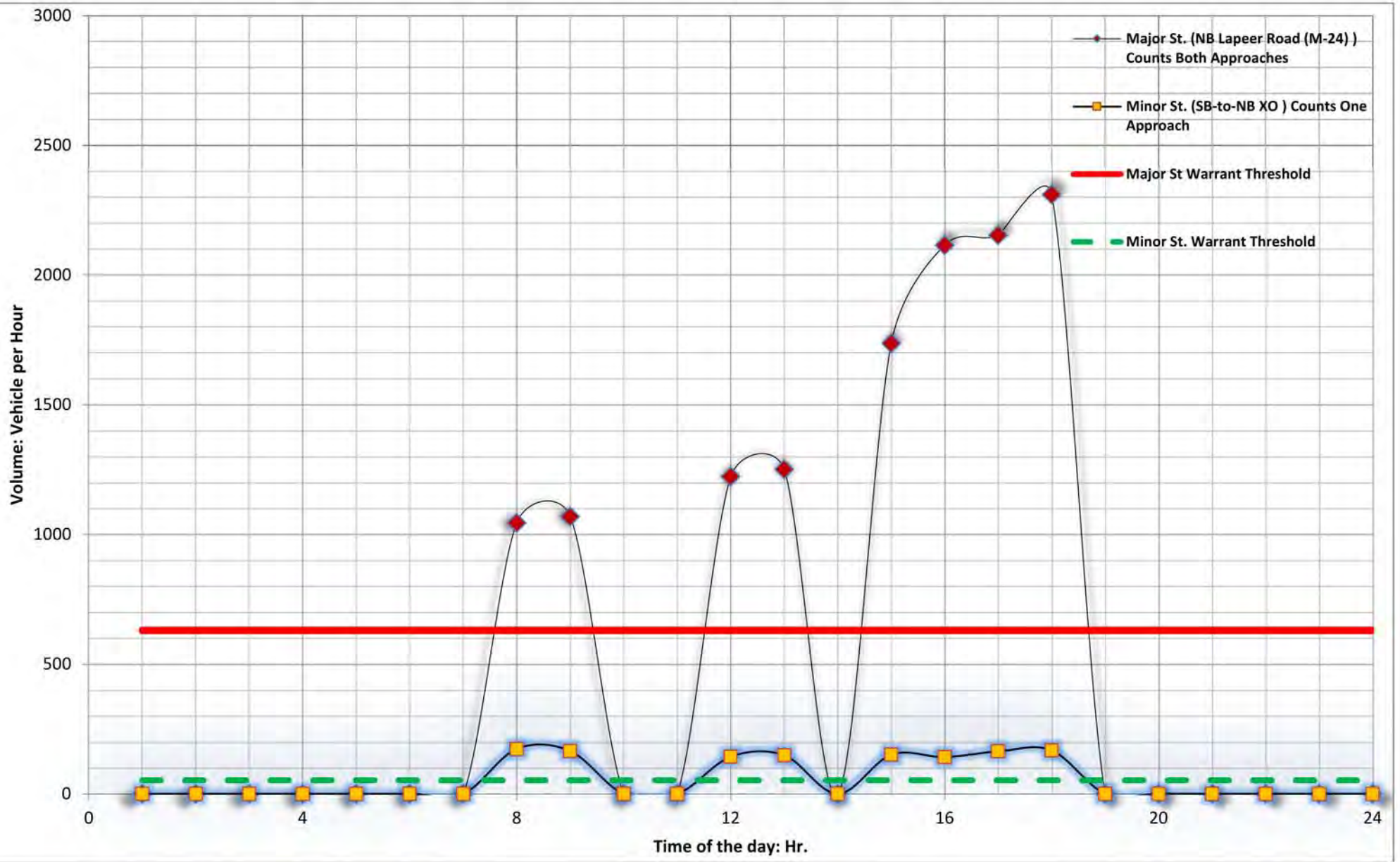


FIGURE 1: WARRANT **1B**

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? NO

Spot Number: **Future Conditions**

NB Lapeer Road (M-24) @ SB-to-NB XO

NO. OF LANES ON MAJOR ST.? 2

NO. OF LANES ON MINOR ST.? 1

Number of Hours that met the Warrant: 8

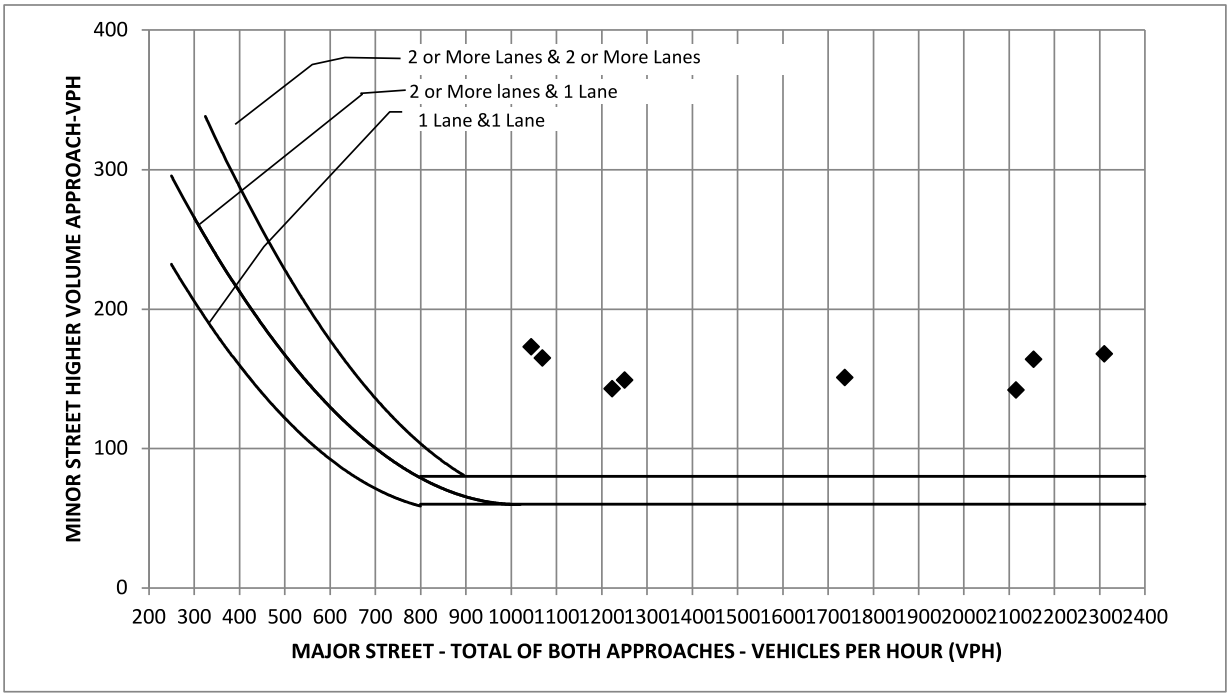
Does this intersection meet Warrant 1B for signal installation? YES

Data Collection Date: 10/13/2022

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	Future Conditions		
Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: Speed limit or 85th Percentile? (MPH)**
NO	**: Is the intersection within an Isolated community?**
0	**: What is the of the population isolated community?**

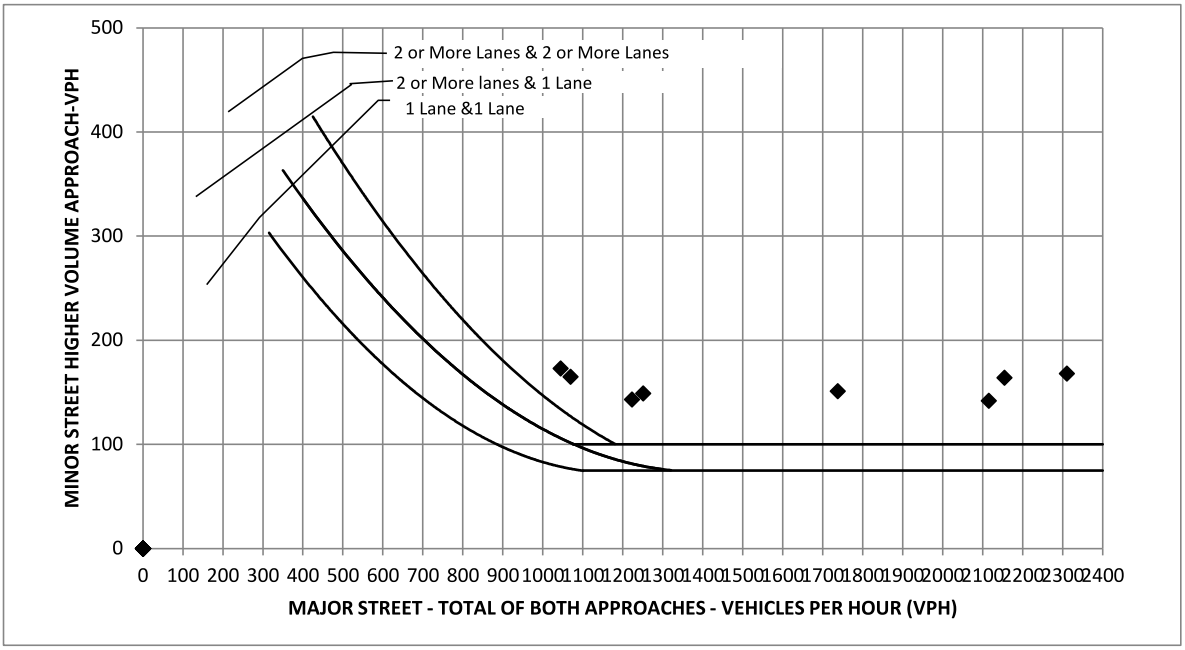


How Many Hours Are Met	**8**
Is Warrant (70%) Met?	**YES**

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	Future Conditions		
Intersection:	NB Lapeer Road (M-24) @ SB-to-NB XO		
Date	11/4/2022	by	F&V

2	**: No. of Lanes on Major St.**
1	**: No. of Lanes on Minor St.**
55	**: 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	**8**
Is Warrant (70%) Met?	**YES**

Biggby Drive-Thru Stacking Space
95th Percentile Probability - Drive Through Queue Length (# of Vehicles)

Volume = 50 vph
service rate = 60 veh/hr
λ = 0.833333

	1	2	3	4	5	6	7	8	9
λ^x	No Veh in Cycle	X	X!	P = (e^(-λ))(λ^x)/X!	ΣP	P* # Cycle containing Volume in 1	Σ Cycles in 6	Volume in Cycle (1*6)	Σ volume
1.0000	0	0	1	43.46%	43.46%	26	26	0	0
0.8333	1	1	1	36.22%	79.68%	22	48	22	22
0.6944	2	2	2	15.09%	94.77%	9	11	18	40
0.5787	3	3	6	4.19%	98.96%	3	14	8	47
0.4823	4	4	24	0.87%	99.83%	1	14	2	49
0.4019	5	5	120	0.15%	99.98%	0	14	0	50
0.3349	6	6	720	0.02%	100.00%	0	14	0	50
0.2791	7	7	5040	0.00%	100.00%	0	14	0	50
0.2326	8	8	40320	0.00%	100.00%	0	14	0	50
0.1938	9	9	362880	0.00%	100.00%	0	14	0	50
0.1615	10	10	3628800	0.00%	100.00%	0	14	0	50
0.1346	11	11	39916800	0.00%	100.00%	0	14	0	50

Charter Township of Orion
Planning & Zoning Department
2525 Joslyn Rd., Lake Orion MI 48360
P: (248) 391-0304 ext. 5000; Fax (248) 391-1454

TO: The Charter Township of Orion Planning Commission

FROM: Tammy Girling, Planning and Zoning Director

DATE: November 16, 2022

RE: 2023 Planning Commission Meeting Dates Resolution

As requested, I am providing a suggested motion for the abovementioned resolution. Please feel free to modify the language. The verbiage below could change based upon Planning Commission discussion.

Please review the dates, none fall on a Township designated holiday, however, the July 5th meeting falls the day after a holiday.

2023 Planning Commission Meeting Dates Resolution

Motion: I move that the Planning Commission approves the 2023 PC Meeting Dates Resolution as presented and forward to the Board of Trustee for adoption.

Or

I move that the Planning Commission approve the 2023 PC Meeting Dates as amended and forward to the Board of Trustees for adoption.

CHARTER TOWNSHIP OF ORION PLANNING COMMISSION

2023 REGULAR MEETING DATES RESOLUTION

WHEREAS the By-Laws of the Charter Township of Orion Planning Commission provide for the scheduling of regular meetings on the first and third Wednesday of each month; and,

WHEREAS, the State of Michigan has enacted Public Act No. 267 of 1976, Open Meetings Act, which requires the specific designation of the dates, times, and places of all regular meetings of the Planning Commission; and,

WHEREAS it is the desire of the Charter Township of Orion Planning Commission to conduct all of its business in an open forum, in compliance with said Act; and,

NOW, THEREFORE, BE IT RESOLVED, that the Charter Township of Orion Planning Commission will hold its regular meetings on the first and third Wednesday of each month of the calendar year beginning on January 4, 2023 and ending on December 20, 2023.

The following are the dates of the regularly scheduled meetings, which will begin at 7:00 p.m. and will be held at 2323 Joslyn Road, Lake Orion, Michigan:

January	4 & 18	July	5 & 19
February	1 & 15	August	2 & 16
March	1 & 15	September	6 & 20
April	5 & 19	October	4 & 18
May	3 & 17	November	1 & 15
June	7 & 21	December	6 & 20

AND BE IT FURTHER RESOLVED that a copy of this notice of regular meeting dates is to be published in The Lake Orion Review and to be posted at the Charter Township of Orion Hall.

PC approved: xx/xx/xxxx

The Future of Transportation: Electric Vehicles – Part 2

November 2nd, 2022

As described in the last newsletter, electric vehicles (EVs) have many benefits and therefore are increasing in popularity throughout the U.S. and world. Updates to our transportation infrastructure are needed to keep up with the increasingly widespread use of EVs. This newsletter will focus on charging stations and resources to support a cleaner transportation portfolio for communities.

Types of EV Chargers

According to the US Department of Energy, consumers and businesses with fleet vehicles are increasingly considering plug-in electric vehicles (PEVs). These include plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs)—all of which need access to charging stations. Most users will charge at home or at fleet facilities, but the availability of charging stations at workplaces and public destinations is a factor in the decision-making process. Making more stations available may help increase visibility and confidence in EVs.

There are three types of EV chargers:

- **Level 1 chargers:** These chargers use a regular 120-volt outlet, common to most home and commercial plugs. These chargers provide two to five miles of range per one hour of charging. This would result in about 40 miles of range for a vehicle parked overnight. According to the Department of Energy, the cost for this type of charging is between $200-500 (roughly the cost of adding a new outlet to an existing 120-v circuit).
- **Level 2 chargers:** These chargers use 208/240-volt outlets, which may be used in a residential home or commercial setting. These chargers provide between 18-28 miles of range per one hour of charging and can result in a full charge for a vehicle parked overnight.
- **Direct current (DC) fast chargers:** These chargers use 208/480-volt outlets and provide rapid charging. They provide about 60 to 80 miles of range per 20 minutes of charging. These are mainly found in heavy traffic corridors.

In general, when provided for users of a site, charging stations are reasonable accessory uses in all zoning districts, particularly when intended for those who live or work on the property. Non-residential properties may also offer charging for visitors of a site and may even charge for this service.

Great Locations for Charging Stations

(https://vpas.fullcoll.edu/home/campusprojects- home/)

Fullerton College in Fullerton, CA has 50 EV charging stations on campus, 44 of which are in this parking garage. **Image Source. (https://vpas.fullcoll.edu/home/campusprojects-home/)**

San Francisco's City Hall and Civic Center have had EV charging since 2011. Image Source: SF Gate.

Does your community have any of these? If so, they may be good places to consider installing EV charging infrastructure.

- Medical and higher-education campuses
- Civic spaces
- Neighborhood centers
- Leisure destinations such as parks, pools, museums, libraries, stadiums

Financing EV Charging Stations

Consumers Energy customers can participate in the PowerMIFleet program to help fleet owners and operators transition to electric vehicles, and reduce costs, maintenance, and emissions. To participate, you must be a Consumers Energy electric customer, own or lease the property and at least one EV, and provide data related to charger use. Consumers Energy pays for, owns, and maintains all electric infrastructure, and will upgrade or construct new infrastructure as needed, making it easy for anyone to participate. The program also provides rebates on chargers, including up to $5,000 per Level 2 Charge Port, and $35,00 and $70,000 per non-public and public-use DC Fast Charger, respectively.

The Climate Mayors, a network of majors committed to adopting, honoring, and upholding the goals of the Paris Climate Agreement, have a Vehicle Purchasing Collaborative. Mayors involved in the collaborative leverage their collective buying power to accelerate the conversion of public fleets to EVs, resulting in equal access to competitive pricing for EVs and charging infrastructure, financing, best practices, and other supports. The Collaborative currently has a membership of 250 fleets, and is a turnkey, all-inclusive online procurement portal.

Charging stations with payment kiosks at a Meijer in Lansing, MI, located across from multifamily and senior housing. Image Source: Giffels Webster

EV charging stations may be a good item to include in your community's annual Capital Improvement Plan (CIP). Including it here will allow for short- to mid-term planning for implementation, require the identification of funds for the stations (grants, matches, or budget items), and signal that transitioning to clean modes of transportation is a priority. The City of Clawson recently completed their CIP, which included plans for the installation of two level 2 charging stations sometime in the next 6 years. The Inflation Reduction Act of 2022 extended the federal tax credit for charging stations. For individual/residential uses, the tax credit is 30%, for up to $1,000. The tax credit is 6% with a maximum credit of $100,000 per charging unit for commercial uses. Commercial equipment purchased with these credits must be placed in a low-income community or non-urban area.

Giffels Webster News

Giffels Webster presented two workshops at the Michigan Association of Planning Conference. We presented two sessions at this year's conference on Mackinac Island. Jill Bahm co-presented Ethics and Equity in Planning, The following day, Jill Bahm, Sri Komaragiri, Eric Pietsch, and Joe Tangari presented on Future-Proofing Your Planning and Zoning Department. If you missed us up north but are curious about our sessions, feel free to reach out and we would be happy to talk more!

Welcome to our two new planners! We are excited to welcome two new senior planners, Julia Upfal, AICP and Andy Aamodt, to our team. Both Julia and Andy bring great planning expertise to enhance our team and we're happy to have them on board. Please say hello if you see them!