CULVER'S
JSP 23-37

CULVER'S JSP 23-37

Public hearing at the request of Union Pacific Holdings for JSP 23-37 Culver's for Planning Commission's recommendation to the City Council for approval of Preliminary Site Plan with a PD-2 Option, Special Land Use and Stormwater Management Plan approval. The subject property is located at the northwest corner of Novi Road and West Oaks Drive in Section 15. The applicant is proposing to develop a 4,160 square foot Culver's restaurant with a drive-through. The applicant will be utilizing the Planned Development 2 (PD-2) option to propose a drive-thru and is proposing to vacate and move a portion of Karevich Drive so that it traverses around the site. The street vacation will require approval from the City Council.

Required Action

Recommend approval/denial of the Preliminary Site Plan with PD-2 Option, Special Land Use Permit, and Storm Water Management Plan, or postpone the decision until the applicant provides another revised Preliminary Site Plan and revised Traffic Impact Study.

REVIEW	RESULT	DATE	COMMENTS

Planning	Approval **not** recommended	02-29-24	• **Findings regarding Section 3.31.4 relating to the PD-2 Option**
			• **Special Land Use Permit required**
			• **Ordinance deviations for the following**
			  ○ **Proximity to other restaurants**
			  ○ **Parking setbacks**
			  ○ **Dumpster location**
			  ○ **Bypass lane width**
			• Additional items to be addressed with Final Site Plan

Engineering	Approval recommended with conditions	02-29-24	• Additional items to be addressed with Final Site Plan

Landscape	Approval recommended with conditions	02-12-24	• **Landscape deviations for the following**
			  ○ **No berm along either frontage**
			  ○ **Greenbelt along West Oaks Drive**
			  ○ **Greenbelt trees along West Oaks Drive**
			  ○ **Building foundation landscape**
			  ○ **Accessway perimeter trees**
			• Additional items to be addressed with Final Site Plan

Traffic	Approval **not** recommended	02-27-24	• **Below standard radius at one driveway** • **Bicycle parking below standards** • **Clear path width to bicycle parking below standard** • **Inconclusive if required stacking spaces in drive-thru are met**
Traffic Study	Approval **not** recommended	02-27-24	• **Excessive delay (Level of Service F) at intersection of site driveway and West Oaks Drive; however, the potential queue will back up within the site and there is enough space to**

			accommodate the number of vehicles at the peak periods of the day • **Number of parking spaces are inconsistent with what is shown on the site plan and justification for parking deficiency is not supported**
Façade	Approval recommended	01-08-24	• Section 9 Façade waiver required and recommended
Fire	Approval recommended with conditions	12-22-2023	• Additional items to be addressed with Final Site Plan – **bypass lane must be 20 feet in width**

Motion sheet

Postpone – Special Land Use Permit

In the matter of JSP23-37 Culver's motion to **postpone making a recommendation** of the Special Land Use Permit…*(in order to allow the applicant time to further review items discussed during the public hearing, provide a response letter to staff reviews, provide another revised Preliminary Site Plan submittal and Traffic Impact Study, and to work toward greater compliance with the requirements of the Zoning Ordinance.)*

-AND-

Postpone – Preliminary Site Plan

In the matter of JSP23-37 Culver's motion to **postpone making a recommendation** of the Preliminary Site Plan…*(in order to allow the applicant time to further review items discussed during the public hearing, provide a response letter to staff reviews, provide another revised Preliminary Site Plan submittal and Traffic Impact Study, and to work toward greater compliance with the requirements of the Zoning Ordinance.)*

-AND-

Postpone – Stormwater Management Plan

In the matter of JSP23-37 Culver's motion **to postpone making a recommendation** of the Preliminary Site Plan…*(in order to allow the applicant time to further review items discussed during the public hearing, provide a response letter to staff reviews, provide another revised Preliminary Site Plan submittal and Traffic Impact Study, and to work toward greater compliance with the requirements of the Zoning Ordinance.)*

– OR –

Recommend Approval – Special Land Use Permit

In the matter of the request of Union Pacific Holdings for JSP23-37 Culver's, motion to recommend approval to the City Council for Special Land Use based on and subject to the following:

1. The proposed use will **not** cause any detrimental impact on existing thoroughfares *(based on Traffic review);*
2. The proposed use will **not** cause any detrimental impact on the capabilities of public services and facilities *(based on Engineering review);*
3. The proposed use is compatible with the natural features and characteristics of the land *(because there are no regulated natural features on site);*
4. The proposed use is compatible with adjacent uses of land *(because the proposed use is similar to other nearby restaurants with drive-thrus)*;
5. The proposed use is consistent with the goals, objectives, and recommendations of the City's Master Plan for Land Use *(as it fulfills one of the Master Plan objectives to attract new businesses within City of Novi);*
6. The proposed use will promote the use of land in a socially and economically desirable manner *(as it fulfills one of the Master Plan objectives to attract new businesses within City of Novi);*
7. The proposed use is (1) listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and (2) is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located;
8. *(additional comments here if any)*

(This motion is made because the plan is otherwise in compliance with Article 3, Article 4, Article 5, and Article 6 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)

-AND-

Recommend Approval – Preliminary Site Plan with PD-2 Option

In the matter of the request of Union pacific Holdings for JSP23-37 Culver's, motion to recommend approval to the City Council for Preliminary Site Plan with a PD-2 Option based on and subject to the following:

1. Planning Commission findings that the standards of Section 3.31.4 of the Zoning Ordinance are adequately addressed, as identified in the Planning Review Letter;
2. The recommendation includes the following ordinance deviations for consideration by the City Council:
    i. Deviation from Section 3.31.7.B.v.a, the use conditions for fast food drive-thru under PD-2 Option as listed under that requires a minimum distance of 1,000 feet between a proposed independently freestanding restaurant from any other such use on the same side of the street;
    ii. Deviation from Section 5.3.11.D that requires a bypass lane, minimum of 18 feet width. The applicant is providing A 13 foot bypass lane;
    iii. Deviation from Section 3.31.7.D for not meeting the minimum parking setback requirements for front yard along West Oaks Drive (South). A minimum of 20 feet is required, 10.6 feet is proposed;
    iv. Deviation from Section 4.19.2.F for allowing a dumpster in the exterior side yard instead of required rear yard.
    v. Landscape deviation from Section 5.5.3.B.ii and iii for insufficient greenbelt width along West Oaks Drive.
    vi. Landscape deviation from Section 5.5.3.B.ii and iii for lack of berm or wall along both Novi Road and West Oaks Drive.
    vii. Landscape deviation from Section 5.5.3.B.ii and iii for not providing trees within the watermain easement along West Oaks Drive.
    viii. Landscape deviation from Section 5.5.3.C to not plant accessway perimeter trees within the watermain easement
3. The findings of compliance with Ordinance standards in the staff and consultant review letters, and the conditions and items listed in those letters being addressed on the Final Site Plan; and
4. (additional conditions here if any).

(This motion is made because the plan is otherwise in compliance with Article 3, Article 4, and Article 5 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)

-AND-

Recommend Approval – Stormwater Management Plan

In the matter of the request of Union Pacific Holdings for JSP23-37 Culver's, motion to recommend approval to the City Council for Storm Water Management Plan based on and subject to the following:

a. The findings of compliance with Ordinance standards in the staff and consultant review letters, and the conditions and items listed in those letters being addressed on the Final Site Plan; and
b. (additional conditions here if any).

(This motion is made *because it otherwise in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.)*

– OR –

Recommend Denial – Special Land Use

In the matter of the request of Union Pacific Holdings for JSP23-37 Culver's, motion to recommend denial to the City Council for Special Land Use …. *(because the plan is not in compliance with Article 3, Article 4, and Article 5 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)*

-AND-

Recommend Denial – Preliminary Site Plan with a PD-2 Option

In the matter of the request of Union Pacific Holdings for JSP23-37 Culver's, motion to recommend denial to the City Council for Preliminary Site Plan with a PD-2 Option… *(because the plan is not in compliance with Article 3, Article 4, and Article 5 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)*

-AND-

Recommend Denial – Stormwater Management Plan

In the matter of the request of Union Pacific Holdings for JSP23-37 Culver's, motion to recommend denial to the City Council for Storm water Management Plan …*(because the plan is not in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.*

MAPS

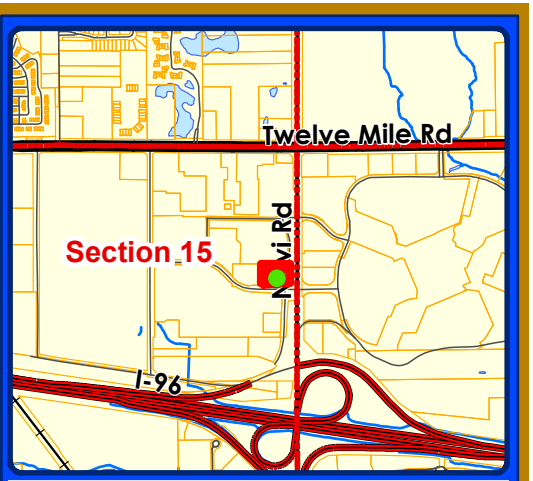
Location

Zoning

Future Land Use

Natural Features

CULVER'S
LOCATION



Subject Property

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

Map Author: James Hill
Date: 3/13/2024
Project: CULVER'S
Version #: 1

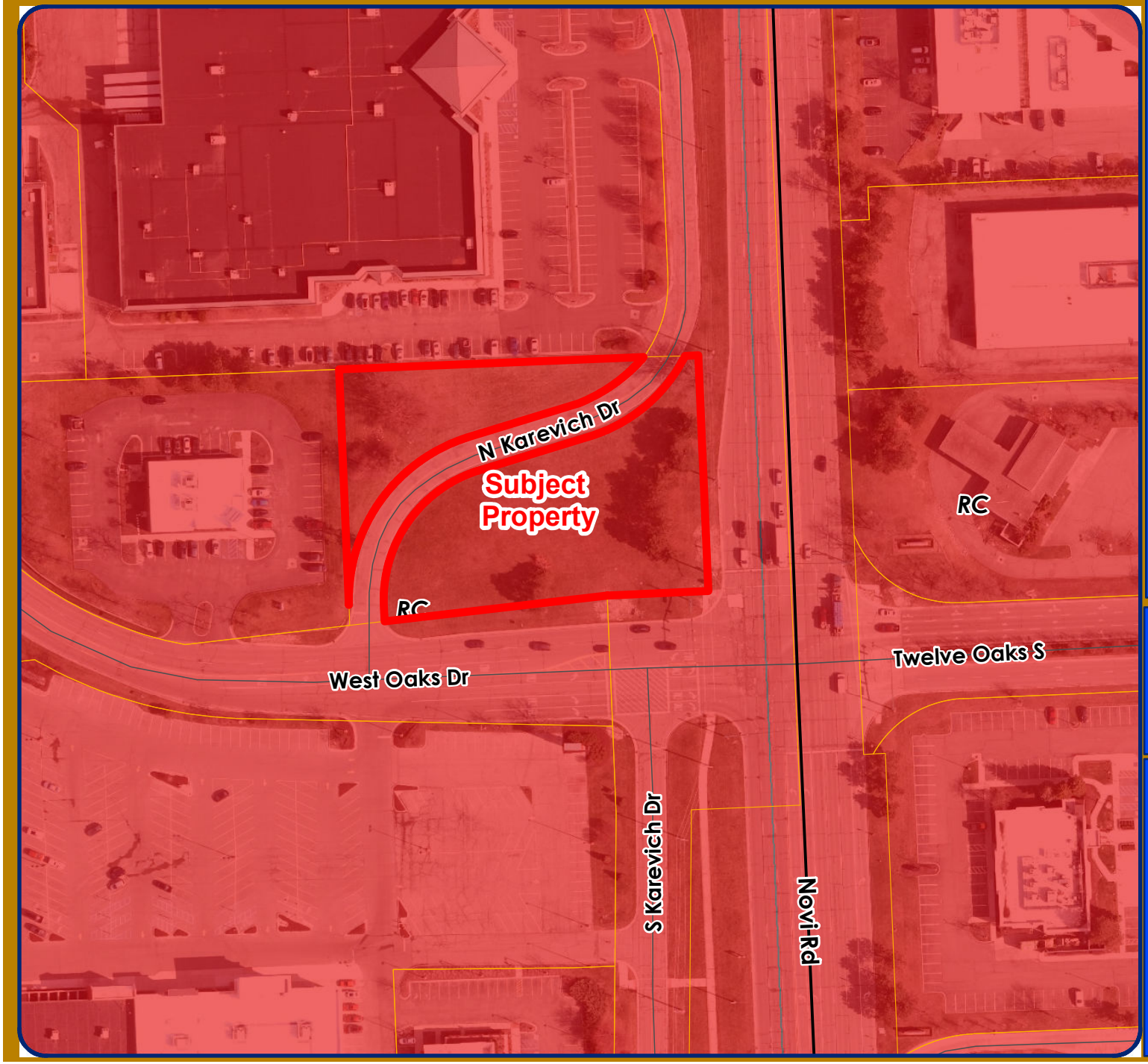
Feet
0 25 50 100 150

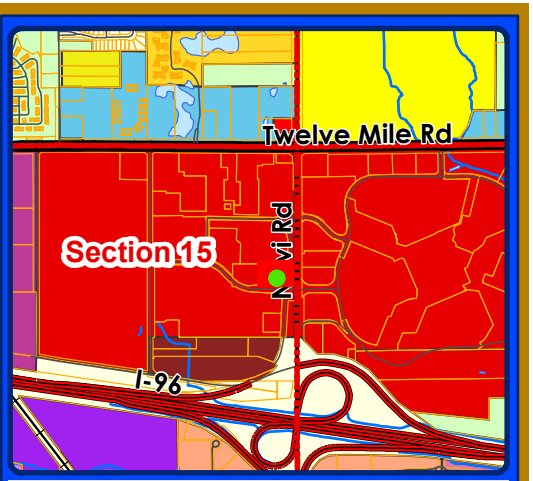
1 inch = 131 feet

MAP INTERPRETATION NOTICE

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

CULVER'S
ZONING





Subject Property

LEGEND

- R-A: Residential Acreage
- R-1: One-Family Residential District
- R-4: One-Family Residential District
- RM-1: Low-Density Multiple Family
- B-3: General Business District
- C: Conference District
- I-1: Light Industrial District
- I-2: General Industrial District
- OS-1: Office Service District
- OSC: Office Service Commercial
- OST: Office Service Technology
- RC: Regional Center District
- TC: Town Center District

City of Novi
Dept. of Community Development
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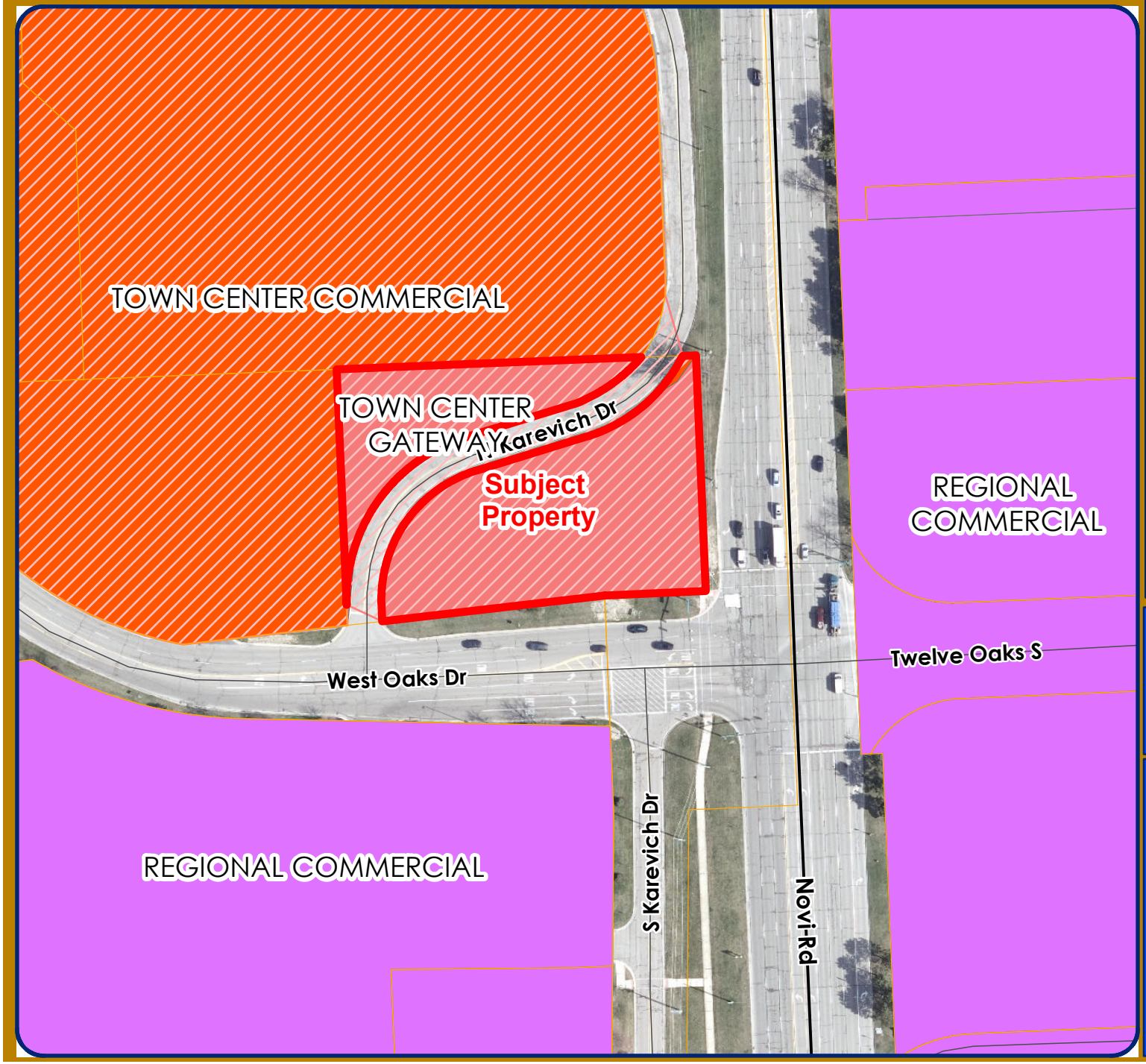
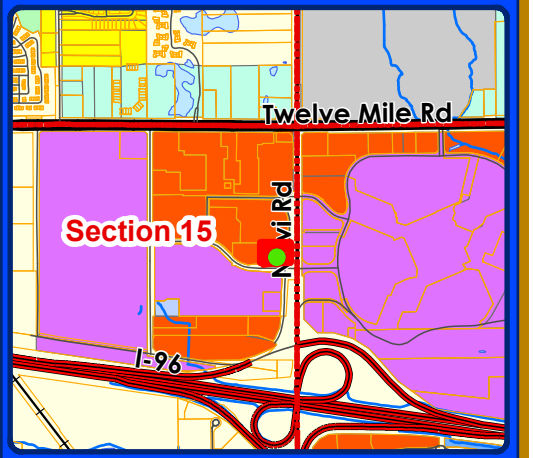
CULVER'S

FUTURE LAND USE





Subject Property

LEGEND

Future Land Use 2015

Land Use Description

- CEMETERY
- COMMUNITY OFFICE
- OFFICE COMMERCIAL
- PUBLIC
- PUBLIC PARK
- REGIONAL COMMERCIAL
- SINGLE FAMILY
- TOWN CENTER COMMERCIAL
- TOWN CENTER GATEWAY

City of Novi

Dept. of Community Development
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PLANNING REVIEW

PLAN REVIEW CENTER REPORT

Planning Review

Culver's

JSP 23-37

February 22, 2024

PETITIONER

UPH Novi Property, LLC

REVIEW TYPE

Revised Preliminary Site Plan with Planned Development 2 Option, Special Land Use Request, and a Street Vacation Request

PROPERTY CHARACTERISTICS

Section	15	
Site Location	West of Novi Road, north of West Oaks Drive, 22-15-200-097 and -099	
Site School	Novi Community School District	
Site Zoning	RC Regional Commercial with a PD-2 Option	
Adjoining Zoning	North	RC Regional Commercial
	East	RC Regional Commercial
	West	RC Regional Commercial
	South	RC Regional Commercial
Current Site Use	Vacant, bisected by North Karevich Drive	
Adjoining Uses	North	Value City Furniture
	East	Former bank (now vacant)
	West	Salon
	South	Parking for West Oaks
Site Size	1.69 acres	
Plan Date	June 23, 2023	

PROJECT SUMMARY

The applicant is proposing to construct a Culver's restaurant with a drive-thru. North Karevich Drive is requested to be vacated, and the plan shows that a new private drive will be relocated around the restaurant site so that one can still drive from West Oaks Drive to North Karevich Drive in front of the Value City Furniture.

The subject property is currently vacant land zoned RC, Regional Commercial, with a Planned Development, PD-2 Option overlay. The land comprises approximately 1.4 acres as two parcels bisected by North Karevich Drive but is proposed to comprise approximately 1.69 acres if the site plan, street vacation, and parcel combination are approved. The site is located west of Novi Road, north of West Oaks Drive in Section 15.

In its recommendation to the City Council, the Planning Commission will also need to consider the standards for Special Land Use consideration as well as the standards of the site plan review section of the Planned Development option, as detailed in this letter. As a part of this request, the City Council will consider whether to vacate a portion of North Karevich Drive, and consider the terms under which the property could be conveyed to the applicant.

RECOMMENDATION

Approval of the Revised Preliminary Site Plan is not recommended at this time. Traffic is not recommending approval for the Revised Preliminary Site Plan or the Traffic Impact Study. A response letter that addresses the issues in the review letters and how they will be resolved is required, in addition to the issues being resolved during Final Site Plan submittal and a revised Traffic Impact Study. Landscape and Engineering recommend approval of the Revised Preliminary Site Plan.

Although there are remaining deviations and concerns, the applicant would like to appear before the Planning Commission to receive feedback on the project. The Planning Commission can recommend approval or denial to the City Council, or postpone the decision until a 2nd revised Preliminary Site Plan and Traffic Impact Study is provided.

PLANNED DEVELOPMENT OPTION CONDITIONS

Section 3.31.4 of the ordinance outlines the review procedures for Preliminary Site Plans using the PD-2 Option. This requires the Preliminary Site Plan to receive a recommendation for approval or denial from the Planning Commission with City Council ultimately approving or denying the proposed plan. It also outlines specific factors the Planning Commission and City Council shall consider in the review:

1. The plan meets all the requirements of Section 6.1 of this Ordinance for Preliminary Site Plans and the requirements set forth in the City's Site Plan and Development Manual. **The plan meets most requirements except the deviations as noted in the review letters.**
2. The plan satisfies the intent of the Special Land Use provisions as stated in Section 6.1.2.c. **See the Special Land Use Considerations noted in this Plan Review Letter.**
3. The Community Impact Statement and Traffic Study are provided, regardless of site size, in accordance with the requirements set forth in the City's Site Plan and Development Manual. **The applicant has provided Community Impact Statement and Traffic Impact Study – see Traffic review letter for further details.**
4. The plan satisfies the intent of this Section with respect to use of the land and principal and accessory use relationships within the site as well as with uses on adjacent sites.
5. That all existing or proposed streets, road, utilities and marginal access service drives, as are required, are correctly located on the site plan in accordance with the approved plans for these improvements. **See the attached Engineering and Traffic Review Letter for additional information.**
6. The plan meets all the applicable standards of this Ordinance relative to height, bulk and area requirements, building setbacks, off-street parking and preliminary site engineering requirements. **The plan is in general conformance with the code requirements. See the attached Plan Review Chart for additional information.**
7. That there exists a reasonable harmonious relationship between the location of buildings on the site relative to buildings on lands in the surrounding area; that there is a reasonable architectural and functional compatibility between all structures on the site and structures within the surrounding area to assure proper relationships between:
    a. The topography of the adjoining lands as well as that of the site itself including any significant natural or manmade features. **Street relocation proposed.**
    b. The relationship of one building to another whether on-site or on adjacent land, i.e., entrances, service areas and mechanical appurtenances**.**
    c. The rooftops of buildings that may lie below street levels or from windows of higher adjacent buildings.

d. Landscape plantings, off-street parking areas and service drives on adjacent lands. **Landscape generally conforms to the requirements. See the Landscape Review Letter for additional information.**
e. Compliance with street, road and public utility layouts approved for the area. **See the Engineering and Traffic Review Letters for additional information.**
f. The architecture of the proposed building including overall design and façade materials used. Architectural design and façade material are to be complimentary to existing or proposed buildings within the site and the surrounding area. It is not intended that contrasts in architectural design and use of façade materials is to be discouraged, but care shall be taken so that any such contrasts will not be so out of character with existing building designs and façade materials so as to create an adverse effect on the stability and value of the surrounding area. **See the Façade Review Letter for additional information.**

Section 3.31.4.B indicates the City Council shall review the proposed plan considering the Planning Commission's recommendation and the requirements of Section 3.31.4.A. As part of its approval of the Preliminary Site Plan, the Council is permitted to impose conditions that are reasonably related to the purposes of this section and that will:

1. Insure that public services and facilities affected by a proposed land use or activity will be capable of accommodating increased services and facility loads caused by the land use or activity;
2. Protect the natural environment and conserving natural resources and energy;
3. Insure compatibility with adjacent use of land; and
4. Promote the use of land in a socially and economically desirable manner.

SPECIAL LAND USE CONSIDERATIONS

When the PD-2 Option is utilized, all uses fall under the Special Land Use requirements. Section 6.1.2.C of the Zoning Ordinance outlines specific factors the Planning Commission shall consider in the review and recommendation to City Council of the Special Land Use Permit request:

i. Whether, relative to other feasible uses of the site, the proposed use will cause any detrimental impact on existing thoroughfares in terms of overall volumes, capacity, safety, vehicular turning patterns, intersections, view obstructions, line of sight, ingress and egress, acceleration/deceleration lanes, off-street parking, off-street loading/unloading, travel times and thoroughfare level of service.
ii. Whether, relative to other feasible uses of the site, the proposed use will cause any detrimental impact on the capabilities of public services and facilities, including water service, sanitary sewer service, storm water disposal and police and fire protection to service existing and planned uses in the area.
iii. Whether, relative to other feasible uses of the site, the proposed use is compatible with the natural features and characteristics of the land, including existing woodlands, wetlands, watercourses and wildlife habitats.
iv. Whether, relative to other feasible uses of the site, the proposed use is compatible with adjacent uses of land in terms of location, size, character, and impact on adjacent property or the surrounding neighborhood.
v. Whether, relative to other feasible uses of the site, the proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use.
vi. Whether, relative to other feasible uses of the site, the proposed use will promote the use of land in a socially and economically desirable manner.
vii. Whether, relative to other feasible uses of the site, the proposed use is
    a. Listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and
    b. Is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located.

ORDINANCE REQUIREMENTS

This project was reviewed for compliance with the Zoning Ordinance, with respect to Article 3 (Zoning Districts), Article 4 (Use Standards), Article 5 (Site Standards), and any other areas of the ordinance, as noted. The plans show general compliance with ordinance requirements. Please address the items in **bold** with the next submittal.

1. Parking Setback Deviation (Sec. 3.31.7.D): The proposed parking should be setback a minimum of 20 feet from front yards and exterior side yards. The proposed front yard parking setback facing West Oaks Drive to the south shows a setback of 10.6 feet. **This setback should be adjusted to meet the minimum standards or will require a deviation from City Council**: "*The City Council shall be authorized to grant deviations from the strict terms of the zoning ordinance governing area, bulk, yard, and dimensional requirements applicable to the property" in accordance with section 3.31.5. The standards are as follows):*
    a. *That each zoning ordinance provision from which a deviation is sought would, if the deviation were not granted, prohibit an enhancement of the development that would be in the public interest;*
    b. *That approving the proposed deviation would be compatible with the existing and planned uses in the surrounding area;*
    c. *That the proposed deviation would not be detrimental to the natural features and resources of the affected property and surrounding area, or would enhance or preserve such natural features and resources;*
    d. *That the proposed deviation would not be injurious to the safety or convenience of vehicular or pedestrian traffic; and*
    e. *That the proposed deviation would not cause an adverse fiscal or financial impact on the City's ability to provide services and facilities to the property or to the public as a whole.*

    Applicant has acknowledged that a deviation will be required for the front yard parking setback.

2. Parking Spaces (Sec. 5.2.12.C): Fast food restaurants require one parking space for every two employees plus one parking space for every two customers allowed under max capacity. The applicant's calculations indicate that 48 parking spaces are required and 49 parking spaces are provided – however, the parallel parking spaces in front of the pickup window are not dimensioned. **Please dimension these spaces and ensure that they are in compliance with Section 5.3.** If, after properly dimensioning the parallel parking spaces, the site is deficient in parking, it will require a deviation from the City Council. In choosing whether to grant said deviation, Council should use the standards noted above in item 1. In addition, the Traffic Impact Study is inconsistent with the site plan regarding the number of parking spaces provided. The TIS indicates and provides justification for 42 spaces (see item 6 below).

3. Drive-thru Stacking Spaces (Sec. 5.3.11.I): The distance between the order board and the pick-up window shall store four vehicles, and four vehicles shall be stored in advance of the menu board **Please dimension the stacking spaces to show that 19 feet is provided per stacking space. See Traffic Review letter for further details.**

4. Drive-thru Bypass Lane (Sec. 5.3.11.D): Drive-through facilities shall provide one bypass lane to allow unobstructed travel for vehicles to pass those waiting to be served. Such bypass lane shall be a minimum of 18 feet in width, unless otherwise determined by the Fire Marshal. **The current bypass lane is 13 feet in width. This will need to be adjusted to comply with the Ordinance. The Fire Marshal is requesting that the bypass lane be 20 feet in width.**

5. Fast-food Restaurants (Sec. 3.31.7.B.v.a): Fast food restaurants are allowed as a special land use when using the PD-2 option in the RC district, subject to certain conditions, namely that

a. No restaurants shall be closer than 1,000 feet on the same side of the street. The subject property is within 1,000 feet of another restaurant, as both Carrabba's to the south and Starbucks to the north are within 1,000 feet. **The applicant will be asking for a deviation from this standard, based on the criteria provided in item 1**.
b. The parcel must be at least 1.25 acres; (1.69 acres) and
c. The site shall be designed to achieve traffic circulation features both within the site and in relation to access streets that assure safety and convenience of both vehicular and pedestrian traffic. Please see the Traffic Engineering Review letter for comment on this.

6. Street vacation request: The submitted site plan's approval will be contingent on the successful approval of the requested street vacation. The street vacation request will be reviewed separately with a public hearing at an upcoming City Council meeting. As the public street was not designed as a part of a plat, but was conveyed to the City by a deed, the vacated land does not automatically go to the adjacent property owner. **The applicant has proposed to vacate the part of Karevich Drive that is intended to be moved in addition to the portion of Karevich Drive north of the site that is in front of Value City Furniture. The applicant has proposed to take on the maintenance responsibilities for the vacated street and maintain public access, in addition to constructing a sidewalk along Novi Road from West Oaks Drive to West Oaks Access Drive. The applicant will prepare a formal letter for the street vacation proposal including the dedicated ROW, maintenance responsibilities, and other required details.**

7. Traffic Study: The Traffic Study is currently not recommended for approval by the City's Traffic Consultant. The following items will need to be addressed in a response letter and revised Traffic Study. Please contact our Traffic Consultant if you should have any additional questions.

    a. The parking evaluation states that 42 spaces are proposed yet the site plan shows 49 spaces. Please make these quantities consistent. The justification for 42 spaces is not accepted by the Traffic Consultant, as detailed in the Traffic review letter.

8. Dumpster (Sec. 4.19.2): All exterior side yards abutting a street shall meet the regulations applicable to a front yard. Dumpsters may only be located in the rear yard. **Dumpster location will require a deviation.** *Acknowledged by the applicant.*

9. Bicycle Parking General Requirements (Sec. 5.16): Proposed dimensions are not in compliance with the Ordinance. **Please revise the bicycle parking layout so that it meets the requirements from Text Amendment 18.301. Please also dimension the width of the sidewalk from the crosswalk to the bicycle parking to ensure that the 6' requirement is met. See Traffic review letter for further detail.**

10. Signage: For sign permit information please contact Ordinance Enforcement at 248-735-5678 or ordinanceenforcement@cityofnovi.org in the Code Compliance Division for more information.

11. Planning Chart: Please be sure to address the other issues included in the attached Planning Chart.

OTHER REVIEWS

a. Engineering Review: Engineering recommends approval of the revised Preliminary Site Plan, with comments to be addressed at the time of Final Site Plan submittal.
b. Landscape Review: Landscape recommends approval of the revised Preliminary Site Plan, with comments to be addressed at the time of Final Site Plan submittal.
c. Traffic Review: Traffic **does not recommend** approval of the revised Preliminary Site Plan or Traffic Impact Study. A response to the issues brought forth in the Traffic Review is required.
d. Façade Review: Façade recommended approval of the Preliminary Site Plan. A Section 9 Façade waiver is required for an underage of brick and overage of composite siding.

e. Fire Review: Fire recommended approval of the Preliminary Site Plan, with comments to be addressed at Final Site Plan.
f. Irrigation: The irrigation plan is currently not recommended for approval and will need to be revised for Final Site Plan.

NEXT STEP: PLANNING COMMISSION AND RESPONSE LETTER

Although not all reviewers are recommending approval, the Special Land Use, Preliminary Site Plan and Stormwater Management Plan can proceed to the Planning Commission. The Planning Commission can provide their feedback on the plan and recommend approval or denial to the City Council, or postpone the decision until a second revised Preliminary Site Plan and Traffic Impact Study is provided.

1. Site Plan submittal in PDF format (maximum of 10MB) **NO CHANGES MADE**
2. A response letter addressing ALL the comments from ALL review letters and a request for waivers/variances as you see fit.
3. A color rendering of the Site Plan (to be used for Planning Commission presentation).

FUTURE STEP: CITY COUNCIL FOR PRELIMINARY SITE PLAN AND STREET VACATION

After the Planning Commission meeting, the site plan and street vacation will concurrently appear before the City Council. Any deviations from the Zoning Ordinance that pertain to bulk, area, and dimensions will be granted by the City Council.

FUTURE STEP: FINAL SITE PLAN SUBMITTAL

After receiving City Council's approval of the Special Land Use, Preliminary Site Plan, and Stormwater Management Plan and any necessary deviations, please submit the following for review:

1. **Six** copies of Final Site Plan sets (24" x 36", folded) addressing ALL comments from Preliminary Site Plan Review.
2. Response letter addressing ALL comments from ALL review letters and **refer to sheet numbers where the change is reflected.**
3. Final Site Plan Application
4. Final Site Plan Checklist
5. No Revision Façade Affidavit (only if no façade changes have been made)
6. An itemized engineering cost estimate including sanitary sewer, watermain, storm sewer, paving and grading costs, size 8.5" x 11" (The cost estimate should not include soil erosion or demolition costs.)
7. An itemized landscaping cost estimate including greenbelt and greenbelt ornamental trees, perennials, pond plantings, shrubs, edging, mulch, seed mix and seeded lawn, size 8.5" x 11" (The cost estimate should not include woodland trees, replacement trees or mitigation.)
8. Other Agencies Checklist
9. Non-Domestic User Survey
10. Hazardous Chemical Survey

ELECTRONIC STAMPING SET SUBMITTAL AND RESPONSE LETTER

After receiving Final Site Plan approval, plans addressing the comments in all the staff and consultant review letters should be submitted electronically for informal review and approval prior to printing Stamping Sets**.** A letter from either the applicant or the applicant's representative addressing comments in this and other review letters and associated charts is to be submitted with the electronic stamping set. This letter should address all comments in ALL letters and ALL charts and **refer to sheet numbers where the change is reflected.** *If required, drafts for all legal documents with a legal transmittal are to be submitted along with stamping sets.*

STAMPING SET APPROVAL

Stamping sets will be required for this project. After having received all the review letters from City staff the applicant should make the appropriate changes on the plans and submit **9 size 24" x 36" copies with**

signature and seal (may be electronic) to the Community Development Department for final Stamping Set approval.

PRE-CONSTRUCTION MEETING

A **Pre-Construction meeting is required for this project.** Prior to the start of any work on the site, Pre-Construction (Pre-Con) meetings must be held with the applicant's contractor and the City's consulting engineer. Pre-Con meetings are generally held after Stamping Sets have been issued and prior to the start of any work on the site. There are a variety of requirements, fees and permits that must be issued before a Pre-Con can be scheduled, so it is suggested you contact Sarah Marchioni (248.347.0430 or smarchioni@cityofnovi.org) once the Final Site Plan has been approved to begin the Pre-Con checklist. If you have questions regarding the checklist or the Pre-Con itself, please contact Sarah.

CHAPTER 26.5

Chapter 26.5 of the City of Novi Code of Ordinances generally requires all projects be completed within two years of the issuance of any starting permit. Please contact Sarah Marchioni at 248-347-0430 for additional information on starting permits. The applicant should review and be aware of the requirements of Chapter 26.5 before starting construction.

If the applicant has any questions concerning the above review or the process in general, do not hesitate to contact me at 248.347.0547 or jhill@cityofnovi.org.

James Hill, Planner

PLANNING REVIEW CHART: RC with PD-2 Option

Review Date: February 20, 2024
Review Type: Revised Preliminary Site Plan
Project Name: JSP 23-37 Culver's Restaurant
Plan Date: February 6, 2024
Prepared by: James Hill, Planner
E-mail: jhill@cityofnovi.org; **Phone:** (248) 347-0547

Items in **Bold** need to be addressed by the applicant with next submittal. Underlined items need to be addressed on the Stamping set submittal.

Item	Required Code	Proposed	Meets Code	Comments
Zoning and Use Requirements				
Master Plan *(adopted July 27, 2017)*	Regional Commercial	PD-2: Planned Development	Yes	**PD-2 Option would require the Planning Commission's recommendation to City Council – concurrent with site plan/special land use**
Area Study	None		NA	
Zoning *(Effective January 8, 2015)*	RC: Regional Commercial	RC with PD-2 Option	Yes	
Uses Permitted (Sec 3.1.24. B & C)	Sec 3.1.24.B Principal Uses Permitted. Sec 3.1.24.C Special Land Uses	Restaurant: Fast food drive-through	Yes	**Subject to City Council approval upon Planning Commission's recommendation** **It requires a Special Land Use permit with a 15-day public hearing**
Phasing	Provide phases lines and detail description of activities in each phase	Phasing not proposed	NA	
Planned Development Site Plan Submittal Requirements (Sec. 3.31.4.A)				
Special Land Use *(Sec. 3.31.4.A.ii)*	Special Land use requirements listed in Sec. 6.1.2.C.		Yes	**Requires a 15-day public hearing notice**

Item	Required Code	Proposed	Meets Code	Comments
Community Impact Statement *(Sec. 3.31.4.A.iii)*	Required according to site plan manual (SDM link: *Site development Manual)*	Included	Yes	
Traffic Study *(Sec. 3.31.4.A.iii)*	Required according to site plan manual (SDM link: *Site development Manual)*	Included	Yes	**Not recommended for approval - See Traffic Review**
Planning Commission Findings for Site plan review *(Sec. 3.31.4.A)*	The proposed site plan meets the intent of other items listed in Section		TBD	**PD Option and PSP can proceed simultaneously – Review conditions listed in this section**
Use Conditions for Allowable uses under PD-2 Option (Sec. 3.31.7.B)				
Fast food drive-thru *(Sec. 3.31.7.B.v.a)*	When restaurants are independently freestanding uses and not attached to or otherwise clearly accessory to a principle use, they shall be located no closer than one-thousand (1,000) feet from any other such use on the same side of the street	Carabba's (south of site) appears to be closer than 1000 feet	**No**	**Deviation will be required** **Deviation will be subject to the Planning Commission's recommendation, which will then go to City Council for approval**
Minimum parcel size *(Sec. 3.31.7.B.v.b)*	1.25 acres.	1.4 acres as two separate parcels 1.69 acres proposed	Yes	
Traffic Circulation *(Sec. 3.31.7.B.v.c)*	The site plan shall be designed to achieve traffic circulation features both within the site and in relation to access streets that assure safety and convenience of both vehicular and pedestrian traffic.	Traffic does not recommend approval	**No**	**Traffic Impact Study not recommended for approval** **Drive radius of 5' not permitted** **See Traffic Review for comments**
Restaurant in the Character of a Fast Food Carryout, Drive-In, Fast Food Drive-Through, or Fast Food Sit Down (Sec. 4.40.)				
Noise Impact Statement *(Sec. 4.40.1)*	A noise impact statement is required subject to the standards of Sec. 5.14.10.B.	Included	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Drive-through Lanes *(Sec. 5.3.11)*				
Drive-through Lanes Separation (Sec. 5.3.11.A)	Drive-through lanes shall be separate from the circulation routes & lanes necessary for ingress to & egress from the property	Shown		
Drive-through setbacks (Sec. 5.3.11.A,B)	Drive through shall follow parking setback requirements and applicable parking lot landscaping requirements	Complies	Yes	
Drive-through lanes parking access (Sec. 5.3.11.C)	Drive-through lanes shall not utilize any space which is necessary for adequate access to parking spaces from internal maneuvering lanes	13' one-way maneuvering lane along drive thru lane	Yes	**See Traffic Review for further details**
Bypass Lane for Drive-through (Sec. 5.3.11.D)	Drive-through facilities shall provide 1 bypass lane, min. of 18 ft. in width, unless otherwise determined by the Fire Marshal	Bypass lane shown to be 13 feet wide	**No**	**Bypass lane will need to be revised to comply with the Ordinance. The Fire Marshal is requiring that the bypass lane be 20 feet wide.** **See Fire Review and Traffic Review for any additional comments**
Width & Centerline Radius of Drive-through Lanes (Sec. 5.3.11.E,F,H)	Drive-through lanes shall have a minimum 9 ft. width, centerline radius of 25 ft. and a minimum length of 19 ft.	10 ft wide, 8 ft wide after pick-up window 22 ft and 25 ft centerline radius	**No**	**See Traffic Review for additional comments** **Deviation may be required**
Drive-Thru Stacking Spaces (Sec. 5.3.11.I)	The distance between the order board and the pick-up window shall store four (4) vehicles, and four (4) vehicles shall be stored in advance of the menu board (not including the vehicles at the pick-up window and menu board).	Two menu boards shown Appears to comply	**TBD**	**Show dimensions of stacking spaces to show that enough space is provided** **See Traffic Review for additional comments**
Drive-through Lane Delineated (Sec. 5.3.11.G)	Drive-through lanes shall be striped, marked, or otherwise delineated	Appears to comply Drive-through lane delineated by concrete pavement	Yes	**See Traffic Review for additional comments**

Item	Required Code	Proposed	Meets Code	Comments
Height, bulk, density and area limitations *(Sec 3.1.23.D)*				
Frontage on a Public Street *(Sec. 5.12)* **Access To Major Thoroughfare** *(Sec. 5.13)*	Frontage on a Public Street is required.	Frontage on W Oaks Drive and Novi Road	Yes	
Minimum Zoning Lot Size for each Unit in Acres *(Sec 3.6.2.D)*	Except where otherwise provided in this Ordinance, the minimum lot area and width, and the maximum percent of lot coverage shall be determined on the basis of off-street parking, loading, greenbelt screening, yard setback, or usable open space.		NA	
Minimum Zoning Lot Size for each Unit: Width in Feet *(Sec 3.6.2.D)*			NA	
Open Space Area	-------	----------	NA	
Maximum % of Lot Area Covered (By All Buildings)	*(Sec 3.6.2.D)*	Building lot coverage: 5.6%	Yes	
Building Height *(Sec. 3.20)*	45 ft. or 3 stories whichever is less	23 ft	Yes	
Outdoor Restaurants (Sec. 4.84)				
Accessory Use *(Sec. 4.84)*	Outdoor seating as an accessory use is allowed per section 4.84.	315 sq ft exterior seating area	Yes	
Site Plan Review *(Sec. 4.84.1)*	If the seating area is proposed as part of a site plan application it shall require site plan review and approval by the Planning Commission		**TBD**	
Building and fire codes *(Sec. 4.84.1)*	Outdoor seating areas shall also comply with all applicable building and fire codes		**TBD**	
Timings *(Sec. 4.84.2)*	Permitted between March 1st and November 30th.	Details included	Yes	
Pathway *(Sec. 4.84.4)*	Outdoor seating areas shall be located in a manner to	315 sq ft patio area	Yes	

Item	Required Code	Proposed	Meets Code	Comments
	maintain a minimum pathway width of six (6) feet (clear of structures such as light poles, trees and hydrants) along the sidewalk			
Enclosure *(Sec. 4.84.4)*	It shall be enclosed where there is alcohol service.		NA	
Location *(Sec. 4.84.5)*	If located in public, ROW, then approval from all relate agencies is required. Additional requirements may apply.		NA	
Parking *(Sec. 4.84.6)*	For more than 20 seating, parking shall be calculated.	Approximately 15 seats appear to be shown	Yes	
Hours of Operation *(Sec. 4.84.7)*	Hours of operation same as inside restaurant.		**TBD**	**Please state the proposed hours of operation on the next submittal**
Building Setbacks *(Sec 3.31.7.D)*				
Front @ W Oaks Drive (South)	50 ft.	50.52 ft	Yes	
Exterior side yard @ Novi Road (East)	50 ft	80.52 ft	Yes	
Exterior side yard @ N Karevich Drive (North)	50 ft	114.88 ft	Yes	
Exterior Side Yard @ N Karevich Dr (West)	50 ft.	161.78 ft	Yes	
Parking Setback *(Sec 3.31.7.D)*				
Front @ W Oaks Drive (South)	20 ft.	10.6 ft	**No**	**Deviation will be required for Front Setback** **See Traffic Review for additional comments** **There is no Rear Yard Setback due to the site abutting a street on all four sides (See Sec. 3.6.2.C)**
Exterior side yard @ N Karevich Drive (West)	20 ft.	Greater than 50 ft.	Yes	
Exterior side yard @ N Karevich Drive (North)	20 ft.	46.2 ft.	Yes	
Exterior Side Yard @ Novi Road (East)	20 ft.	24.1 ft.	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Note To District Standards for RC District *(Sec 3.6.2)*				
Exterior Side Yard Abutting a Street *(Sec 3.6.2.C)*	All exterior side yards abutting a street shall be provided with a setback equal to front yard.	Shown	NA	See comments above
Off-Street Parking in Front Yard *(Sec 3.6.2.E)*	Off-street parking is allowed in front yard.	Shown	Yes	
Distance between buildings *(Sec 3.6.2.H)*	It is governed by sec. 3.8.2 or by the minimum setback requirements, whichever is greater.	Only one building proposed	NA	
Wetland/Watercourse Setback *(Sec 3.6.2.M)*	A setback of 25ft from wetlands and from high watermark course shall be maintained.	No wetlands present	NA	
Additional Building height *(Sec 3.6.2.O)*	Additional height up to 65 ft. may be allowed for properties within 1200 ft from a freeway subject to additional conditions		NA	
Parking setback screening *(Sec 3.6.2.P)*	Required parking setback area shall be landscaped per sec 5.5.3.	Landscape plan provided	**TBD**	**See Landscape Review**
Modification of parking setback requirements *(Sec 3.6.2.Q)*	The Planning Commission may modify parking setback requirements based on its determination according to Sec 3.6.2.Q.	Does not apply	NA	
Parking, Loading and Dumpster Requirements				
Number of Parking Spaces *Sec. 5.2.12.C*	**Fast Food Restaurants** 1 for every 2 employees, plus 1 for every 2 customers allowed under maximum capacity (including waiting areas)	6 employees per shift: 3 spaces 90 seats: 45 spaces Total required: 3+ 45 = 48 Total provided: 49	Yes	**Parking space count in Traffic Impact Study is not consistent with what's provided on the Site Plan. In addition, the parallel parking spaces are not dimensioned.**

Item	Required Code	Proposed	Meets Code	Comments
Parking Space Dimensions and Maneuvering Lanes *(Sec. 5.3.2)*	90° spaces: 9 ft. x 19 ft. parking spaces with 24 ft. drives	9 ft x 19 ft proposed with 24 ft. drive	Yes	**See Traffic Review for additional comments**
	45° spaces: 9 ft. x 18 ft. with 15 ft. drives	5 spaces, 9 ft. wide x 18 ft. with 15 ft. drive	Yes	
	9 ft. x 17 ft. parking spaces along 7 ft. interior sidewalks, provided a 4 in. curb at these locations & along landscaping	19 spaces, 9ft. x 17 ft., not along sidewalk	Yes	
	0° Parallel parking spaces: 8 ft x 23 ft with 13 ft drives and 6 ft buffers	Length of parallel parking spaces not shown	**TBD**	
Parking stall located adjacent to a parking lot entrance(public or private) *(Sec. 5.3.13)*	- shall not be located closer than twenty-five (25) feet from the street right-of-way (ROW) line, street easement or sidewalk, whichever is closer	Parking spot located in the northwestern corner of the site appears to be closer than 25 feet from the street easement	**TBD**	
End Islands *(Sec. 5.3.12)*	- End Islands with landscaping and raised curbs are required at the end of all parking bays that abut traffic circulation aisles. - The end islands shall generally be at least 8 feet wide, have an outside radius of 15 feet, and be constructed 3' shorter than the adjacent parking stall as illustrated in the Zoning Ordinance	End islands are 3' shorter than adjacent parking stall and appear to comply with the other requirements	Yes	**See Landscape Review and Traffic Review for additional comments**
Barrier Free Spaces *Barrier Free Code*	For 51 to 75 spaces, 3 BF spaces are required	3 BF shown, 1 van accessible	Yes	
Barrier Free Space Dimensions *Barrier Free Code*	- 8' wide with an 8' wide access aisle for van accessible spaces - 8' wide with a 5' wide access aisle for regular accessible spaces	Shown	Yes	
Barrier Free Signs *Barrier Free Code*	One sign for each accessible parking space.	Signs shown, details and dimensions provided on attachment	Yes	**See Traffic Review for additional comments** **Please provide details**

Item	Required Code	Proposed	Meets Code	Comments
				of barrier free signs in the next submittal
Minimum number of Bicycle Parking *(Sec. 5.16.1)*	4 spaces required	3 bike hoops proposed, details of hoop provided, but not foundation and layout (distance between hoops)	**TBD**	**Please include bicycle parking details in the next submittal** **See Sec. 5.16 for bicycle parking requirements**
Bicycle Parking General requirements *(Sec. 5.16)*	No farther than 120 ft. from the entrance being served	Yes	Yes	
	When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations	One entrance served		
	Spaces to be paved and the bike rack shall be inverted "U" design Shall be accessible via 6 ft. paved sidewalk	Connected to sidewalk		
Bicycle Parking Lot layout *(Sec 5.16.6)*	Parking space width: 7 ft. One tier width: 11 ft. Two tier width: 18 ft. Maneuvering lane width: 4 ft. Parking space depth: 32 in.	Please provide details in the next submittal	**TBD**	**See comments above**
Loading Spaces *Sec. 5.4.1*	Within the RC districts, loading, unloading space shall be: - provided in the rear yard at a ratio of ten (10) square feet for each front foot of building - in the case of a double frontage lot, in the interior side yard, beyond the minimum side yard setback requirement of the district.	Loading space: 10.5 ft. x 50 ft. (500 sq ft)	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Dumpster *Sec 4.19.2.F*	- Located in rear yard - Attached to the building or - No closer than 10 ft. from building if not attached - Not located in parking setback - If no setback, then it cannot be any closer than 10 ft., from property line. - Away from Barrier free spaces	Dumpster shown and enclosure is attached to the building Located in exterior side yard Details provided	Yes	**Location in the exterior side yard will require a deviation (3.6.2.C)** *Acknowledged by applicant*
Dumpster Enclosure *Sec. 21-145. (c) Chapter 21 of City Code of Ordinances*	- Screened from public view - A wall or fence 1 ft. higher than height of refuse bin - And no less than 5 ft. on three sides - Posts or bumpers to protect the screening - Hard surface pad. - Screening Materials: Masonry, wood or evergreen shrubbery	Screening indicated	Yes	
Accessory Structures *Sec. 4.19*			Yes	
Exterior lighting *Sec. 5.7*	Photometric plan and exterior lighting details needed at time of Final Site Plan submittal.	Photometric Plan included	Yes	
Roof top equipment and wall mounted utility equipment *Sec. 4.19.2.E.ii*	- All roof top equipment must be screened and all wall mounted utility equipment must be enclosed and integrated into the design and color of the building.	None proposed	Yes	
Roof top appurtenances screening	Roof top appurtenances shall be screened in accordance with applicable facade regulations, and shall not be visible from any street, road, or adjacent property.			
Non-Motorized Facilities				
Article XI. Off-Road Non-Motorized Facilities	A 6 foot sidewalk is required along collector and arterial roads Building exits must be	8' sidewalk proposed along Novi Road Exits are connected to sidewalks	Yes	**See Engineering Review**

Item	Required Code	Proposed	Meets Code	Comments
	connected to sidewalk system or parking lot.			
Pedestrian Connectivity	Assure safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets	Appears to comply	**TBD**	**See Traffic Review and Engineering Review for additional comments**
Other Requirements				
Design and Construction Standards Manual	Land description, Sidwell number (metes and bounds for acreage parcel, lot number(s), Liber, and page for subdivisions).	Appears to comply	Yes?	**See Landscape Review for any additional comments**
General layout and dimension of proposed physical improvements	Location of all existing and proposed buildings, proposed building heights, building layouts, (floor area in square feet), location of proposed parking and parking layout, streets and drives, and indicate square footage of pavement area (indicate public or private).	Appears to comply	Yes	
Economic Impact	- Total cost of the proposed building & site improvements - Number of anticipated jobs created (during construction & after building is occupied, if known)	Not included	**No**	**Please include the total cost and number of anticipated jobs with the Final Site Plan submittal**
Development/ Business Sign & Street addressing	- Signage if proposed requires a permit. - The applicant should contact the Building Division for an address prior to applying for a building permit.	Proposed signage not reviewed at this time	**TBD**	**For further information contact Ordinance 248-347-0438 if a sign permit is required.**
Project and Street naming	Some projects may need approval from the Street and Project Naming Committee.		**TBD**	

Item	Required Code	Proposed	Meets Code	Comments
Property Split	The proposed property split must be submitted to the Assessing Department for approval.	No split proposed	NA	Parcels 22-15-200-097 and 22-15-200-098 will need to be combined prior to final approval
Lighting and Photometric Plan *(Sec. 5.7)*				
Intent *(Sec. 5.7.1)*	Establish appropriate minimum levels, prevent unnecessary glare, reduce spillover onto adjacent properties, & reduce unnecessary transmission of light into the night sky.		Yes	
	Site plan showing location of all existing & proposed buildings, landscaping, streets, drives, parking areas & exterior lighting fixtures.		Yes	
Security Lighting *(Sec. 5.7.3.H)* Lighting for security purposes shall be directed only onto the area to be secured.	- All fixtures shall be located, shielded, and aimed at the areas to be secured. - Fixtures mounted on the building and designed to illuminate the facade are preferred.	Provided	Yes	
Building Lighting *(Sec. 5.7.2.A.iii)*	Relevant building elevation drawings showing all fixtures, the portions of the walls to be illuminated, illuminance levels of walls and the aiming points of any remote fixtures.	Lighting shown on building elevations	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Lighting Standards *(Sec.5.7.A.2)*	Specifications for all proposed & existing lighting fixtures.	Included	Yes	
	Photometric data	Included	Yes	
	Fixture height	Included	Yes	
	Mounting & design	Included	Yes	
	Glare control devices	Included	Yes	
	Type & color rendition of lamps	Included	Yes	
	Hours of operation	Included	Yes	
	Photometric plan illustrating all light sources that impact the subject site, including spill-over information from neighboring properties.	Included	Yes	
Maximum Height *(Sec. 5.7.3.A)*	Height not to exceed maximum height of zoning district (or 25 ft. where adjacent to residential districts or uses.	Max is 25 feet Not adjacent to residential	Yes	
Standard Notes *(Sec. 5.7.3.B)*	- Electrical service to light fixtures shall be placed underground - Flashing light shall not be permitted - Only necessary lighting for security purposes & limited operations shall be permitted after a site's hours of operation	Included	Yes	
Average Light level ratio *(Sec. 5.7.3.E)*	Average light level of the surface being lit to the lowest light of the surface being lit shall not exceed 4:1.	4.7:1	**No**	**Average light level ratio exceeds the maximum 4:1. Please revise lighting plans to comply with this requirement.**
Color Spectrum Management *(Sec. 5.7.3.F)*	For all permanent lighting installations – minimum Color Rendering Index of 70 and Correlated Color Temperature of no greater than 3000 Kelvin	D-Series lights = 70CRI; 4000K Wall Sconces= 90 CRI; 3000K LDN6 Static White = 80 CRI; 3500K	**No**	**Please select products that comply with these requirements**
Min. Illumination	Parking areas: 0.2 min	All in compliance	Yes	

Item	Required Code	Proposed	Meets Code	Comments
(Sec. 5.7.3.k)	Loading & unloading areas: 0.4 min		Yes	
	Walkways: 0.2 min		Yes	
	Building entrances, frequent use: 1.0 min		Yes	
	Building entrances, infrequent use: 0.2 min		Yes	
Max. Illumination adjacent to Non-Residential *(Sec. 5.7.3.K)*	When site abuts a non-residential district: - Maximum illumination at the property line shall not exceed 1 foot candle.	Appears to comply	Yes	
Cut off Angles *(Sec. 5.7.3.L)*	When adjacent to residential districts: - All cut off angles of fixtures must be 90°. - Maximum illumination at the property line shall not exceed 0.5 foot candle.	Not adjacent to residential	NA	

NOTES:
1. This table is a working summary chart and not intended to substitute for any Ordinance or City of Novi requirements or standards.
2. The section of the applicable ordinance or standard is indicated in parenthesis. Please refer to those sections in Article 3, 4 and 5 of the zoning ordinance for further details
3. Please include a written response to any points requiring clarification or for any corresponding site plan modifications to the City of Novi Planning Department with future submittals.

ENGINEERING REVIEW

PLAN REVIEW CENTER REPORT

2/29/2024

Engineering Review

Culver's
JSP23-0037

APPLICANT

UPH Novi Property, LLC

REVIEW TYPE

Revised Preliminary Site Plan

PROPERTY CHARACTERISTICS

- Site Location: NW corner of Novi Road and West Oaks Drive
- Site Size: 1.69acres
- Plan Date: 2/6/2024.
- Design Engineer: Mannik & Smith Group Inc.

PROJECT SUMMARY

- Construction of an approximately 4,106 square-foot building and associated parking. Site access would be provided via public roadways.
- Construction of an 8-foot-wide pathway along the Novi Road frontage.
- Proposed vacation of N. Karevich Drive (or a portion of), and combination of Parcels 22-15-200-097 and 22-15-200-098.
- Water service would be provided by a 6-inch extension from the existing 12-inch water main along the east side of the property. One additional hydrant would be constructed along the proposed water main. Two 2-inch leads would be provided to service the proposed building.
- Sanitary sewer service would be provided by a 6-inch sewer lead extended from the proposed 8-inch sanitary which would be extended from the existing off-site sanitary sewer northwest of the property, along with a monitoring manhole.
- Storm water would be collected by a single sewer collection system and will be treated on-site before being discharged to the West Oaks Regional Detention District.

RECOMMENDATION

Approval of the Revised Preliminary Site Plan and Preliminary Storm Water Management Plan is recommended.

Comments:
The Revised Preliminary Site Plan meets the general requirements of the design and construction standards as set forth in Chapter 11 of the City of Novi Code of Ordinances, the Storm Water Management Ordinance and the Engineering Design Manual with the following items to be addressed at the time of Final Site Plan submittal (further engineering detail will be required at the time of the final site plan submittal):

General

1. A Right-of-Way Permit will be required from the City of Novi and Oakland County.
2. Provide sight distance measurements for the West Oaks Drive entrance in accordance with Figure VIII-E of the Design and Construction Standards, Chapter 11 of the City of Novi Code of Ordinances.
3. Provide a traffic control sign table listing the quantities of each ***permanent*** sign type proposed for the development. Provide a note along with the table stating all traffic signage will comply with the current MMUTCD standards.
4. Provide a note that compacted sand backfill (MDOT sand Class II) shall be provided for all utilities within the influence of paved areas and **illustrate and label on the profiles.**
5. Provide a utility crossing table indicating that at least 18-inch vertical clearance will be provided, or that additional bedding measures will be utilized at points of conflict where adequate clearance cannot be maintained.
6. Where the minimum 18-inch clearance at utility crossings cannot be achieved, provide a prominent note stating the substandard clearance and that proper bedding/encasement will be determined by the inspecting engineer. There appears to be at least three crossings.
7. Show the locations of all light poles on the utility plan and indicate the typical foundation depth for the pole to verify that no conflicts with utilities will occur. Light poles in a utility easement will require a License Agreement.
8. The grading and SESC sheets shall show the tree fence at least as far from the trunk as the critical root zone, defined as a circular area around a tree with a radius measured to the tree's longest dripline radius plus one (1) foot. No grading shall occur within the dripline. If the critical root zone is not fully protected, then replacements for that tree may be required.
9. Only at the time of the printed Stamping Set submittal, provide the City's standard detail sheets for water main (5 sheets), sanitary sewer (3 sheets), storm sewer (2 sheets), paving (2 sheets) and Boardwalks/Pathways (1 sheet). The most updated details can be found on the City's website under Engineering Standards and Construction Details.

North Karevich Drive Vacation

If the proposal involves the vacation of Karevich Drive, it's crucial to thoroughly consider the implications and provide comprehensive documentation to support the request. Here are some key points to consider:

10. The ROW vacation (for both the Culver's site and the portion to the north if ultimately proposed) and parcel combination will be required prior to final stamping set approval.
11. If N. Karevich drive (Value City portion) is to be vacated:
    a) Clearly outline the boundaries of the area proposed for vacation and provides detailed reasoning for the request.
    b) If there are any existing utilities or easements within the proposed vacation area, the applicant should provide information on how these will be maintained to ensure continued functionality. A water main easement will be required.
    c) The portion vacated should extend 5 feet east of the curb for the future Right of Way determination.
    d) The plans shall state the Culver's will provide all future maintenance along N. Karevich Drive.
12. A public access easement will be required through the Culver's property to provide access from N. Karevich to West Oaks Drive. If N. Karevich Drive is vacated, an access easement will be required to allow public access to both Culver's and the Value City parking lot from West Oaks Access Drive to the north.

Water Main

13. In most of your responses to the previous review, you referred to Sheet 11. However, the revisions are not showing up on that sheet, but rather somewhere else in the plans. For future reviews, please reference the correct sheet number(s).
14. Show the 20-foot easement over the proposed hydrants and 6-inch hydrant leads.
15. A sealed set of utility plans along with the Michigan Department of Environment, Great Lakes & Energy (EGLE) permit application for water main construction, the Streamlined Water Main Permit Checklist, and electronic utility plan should be submitted to the Engineering Division for review, assuming no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets, and the standard detail sheets.

Irrigation Comments

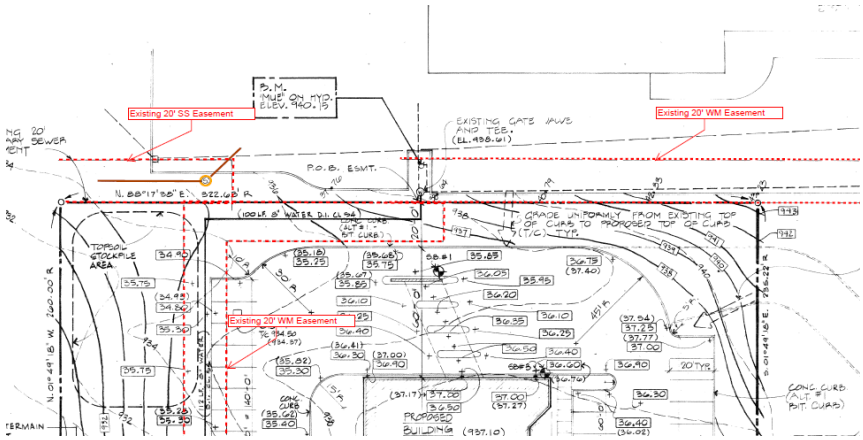
16. The irrigation plans are not approved; revise the plans per the attached irrigation review letter and include containment notes on irrigation sheets as well.

17. For common area irrigation systems connected to public water supplies: Install a backflow prevention Reduced Pressure Zone Assembly (RPZ) with an ASSE 1013 listing approval at each tap to the public water supply. A minimum clearance of 12-inches measured from the bottom of pressure relief valve to the finished landscaped grade shall be required. Provide a detail showing the RPZ installation setup and height above grade. If backflow preventer is to be enclosed, provide a detail of the enclosure with required drainage outlets. Show all locations on a site plan. A plumbing permit is required for the installation of the backflow preventer. Installation of the backflow preventer shall be in such a manner as to not require blowing out the system through the backflow preventer. Drain ports and blow out ports shall be included. Any deviations from these requirements must be approved through the Novi Water & Sewer Division Cross Connection Control Specialist (248-735-5661).

Sanitary Sewer

18. Provide a sanitary sewer monitoring manhole, unique to this site, within a dedicated access easement or within the road right-of-way. If not in the right-of-way, provide a 20-foot-wide access easement to the monitoring manhole from the right-of-way (rather than a public sanitary sewer easement).

19. **Refer to the as-built plans for (43600 WEST OAKS DR). See below for the location of the existing water main for the adjacent parcels 50-22-15-200-070 and 50-22-15-200-103 to be able to maintain a 10-foot-wide separation between the sanitary sewer and water main. See below:**



20. The proposed 8-inch sanitary sewer shall be located at least 10 feet from the water main and maintain at least 10 feet of clearance from the existing trees.

21. Provide a sanitary sewer basis of design for the development on the utility plan sheet. (Calculations should use peaking factor of 4.0 and 3.2 People/REU).

22. Note on the construction materials table that 6-inch sanitary leads shall be a minimum SDR 23.5, and mains shall be SDR 26.

23. Provide a note on the Utility Plan and sanitary profile stating the sanitary leads will be buried at least 5 feet deep where under the influence of pavement.
24. For 8-inch and larger extensions - Provide a testing bulkhead immediately upstream of the sanitary connection point. (If more than one run of 8-inch proposed) Additionally, provide a temporary 1-foot-deep sump in the first sanitary structure proposed upstream of the connection point, and provide a secondary watertight bulkhead in the downstream side of this structure.
25. Provide an internal drop connection at structure (Existing Manhole), where the inlet pipe enters the manhole at an invert elevation 18 inches or greater above the invert elevation of the outlet pipe.
26. Three (3) sealed sets of revised utility plans along with the Michigan Department of Environment, Great Lakes & Energy (EGLE) permit application, electronic utility plan for sanitary sewer construction, and the Streamlined Sanitary Sewer Permit Certification Checklist should be submitted to the Engineering Division for review, assuming no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets, and the standard detail sheets. It should be indicated with the application if an expedited EGLE review is requested. EGLE will charge a fee that can be paid directly to the State.

Storm Sewer

27. The proposed catch basin CB8 shall be relocated outside the water main & Hydrant easement.
28. Normally we require SCH-40 for 6" storm leads, PVC SDR 26 for 8" & 10", and HP or RCP for anything larger.
29. Label the 10-year HGL on the storm sewer profiles and ensure the HGL remains at least 1-foot below the rim of each structure.
30. Illustrate all pipes intersecting storm structures on the storm profiles.
31. Provide a schedule listing the casting type, rim elevation, diameter, and invert sizes/elevations for each proposed, adjusted, or modified storm structure on the utility plan. Round casting shall be provided on all catch basins except curb inlet structures.

Storm Water Management Plan

32. The Storm Water Management Plan (SWMP) for this development shall be designed in accordance with the Storm Water Ordinance and Chapter 5 of the Engineering Design Manual.
33. Provide supporting calculations for the runoff coefficient determination.
34. A runoff coefficient of 0.35 shall be used for all turf grass lawns (mowed lawns) and 0.95 shall be used for all impervious surfaces.
35. Mark up the distribution areas and the C factors for the whole site. Sheet 12 shows the site plan with no areas and the C number.
36. Show and label all roof conductors and show where they tie into the storm sewer.

37. Remove underground detention details if underground detention is not proposed. (see sheet 12 & 13)
38. As part of the Storm Drainage Facility Maintenance Easement Agreement, provide an access easement for maintenance over the pretreatment structure.

Paving & Grading

39. Provide a construction materials table on the Paving Plan listing the quantity and material type for each pavement cross-section being proposed.
40. Detectable warning plates are required for this site, show on the plans and provide the quantities.
41. The Dumpster Pad details shall meet the city standards, 8" concrete on 8" 21 AA aggregate base. Note: Dumpster pad shall extend minimum 10' beyond dumpster enclosure.
42. Provide a pathway cross-section and indicate a maximum cross-slope of 2%. Add the maximum 2-percent cross-slope to the sidewalk detail.
43. Provide at least 3-foot of buffer distance between the sidewalk and any fixed objects, including hydrants and irrigation backflow devices. Include a note on the plan where the 3-foot separation cannot be provided.
44. Provide top of curb/walk and pavement/gutter grades to indicate height of curb adjacent to parking stalls or drive areas.
45. Curbing and walks adjacent to the end of 17-foot stalls shall be reduced to 4-inches high (rather than the standard 6-inch height to be provided adjacent to 19-foot stalls). Additionally, 2-foot overhang should be provided adjacent to 17-foot parking stalls (show 2-foot overhang on paving sheets). Provide additional details as necessary. Sidewalk width should be adjusted to 7-feet wide in order to have the required 2-foot overhang, if overhang cannot be provided in this area 19-foot stalls with 6-inch curb should be proposed.
46. All sheets shall be signed and sealed by the design engineer.

Soil Erosion and Sediment Control

47. A SESC permit is required. A full review has not been completed at this time but will be completed once a complete package has been submitted to Sarah Marchioni at Community Development. according to the permit application requirements.

Off-Site Easements

48. Any off-site utility easements anticipated must be executed **prior to final approval of the plans**. If you have not already done so, drafts of the easements and a recent title search shall be submitted to the Community Development Department as soon as possible for review and shall be approved by the Engineering Division and the City Attorney prior to executing the easements.
49. A temporary construction easement from the neighboring property owner for the work associated with the off-site sanitary sewer shall be forwarded to the Engineering Division **prior to Stamping Set approval**.

50. A 20-foot-wide off-site Sanitary Sewer Easement must be executed **prior to final approval of the plans.**

The following must be submitted with the Final Site Plan:

51. A letter from either the applicant or the applicant's engineer must be submitted with the Stamping Set highlighting the changes made to the plans addressing each of the comments listed above and indicating the revised sheets involved. **Additionally, a statement must be provided stating that all changes to the plan have been discussed in the applicant's response letter.**

52. An itemized construction cost estimate must be submitted to the Community Development Department for the determination of plan review and construction inspection fees. This estimate should only include the civil sitework and not any costs associated with construction of the building or any demolition work. ***The estimate must be itemized*** for each utility (water, sanitary, storm sewer), on-site paving (square yardage, should include number do detectable warning plates), right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pre-treatment structure and restoration).

The following must be submitted with the Stamping Set:

(*Please note that all documents must be submitted together as a package with the Stamping Set submittal with a legal review transmittal form. Partial submittals will not be accepted. Links to the PDF copy of the easements are below, word document versions of each legal document can be found on the City's Website under Forms and Permits*)

53. A draft copy of the Storm Drainage Facility Maintenance Easement Agreement (SDFMEA), as outlined in the Storm Water Management Ordinance, must be submitted to the Community Development Department. Once the agreement is approved by the City's Legal Counsel, this agreement will then be sent to City Council for approval/acceptance. The SDFMEA will then be recorded at the office of the Oakland County Register of Deeds. This document is available on our website.

54. A draft copy of the 20-foot-wide Watermain System Easement onsite must be submitted to the Community Development Department.

55. A draft copy of the 20-foot-wide Sanitary Sewer Easement onsite must be submitted to the Community Development Department.

56. A draft copy of the 20-foot-wide Sanitary Sewer Monitoring Manhole Access Easement onsite must be submitted to the Community Development Department.

57. Executed copies of approved off-site utility easements must be submitted.

The following must be addressed prior to construction:

58. A pre-construction meeting shall be required prior to any site work being started. Please contact Sarah Marchioni in the Community Development Department to set up a meeting (248-347-0430). **Be advised that scheduling the pre-construction meeting can take 2-4 weeks.**

59. A City of Novi Grading Permit will be required prior to any grading on the site. This permit will be issued at the pre-construction meeting (no application required). No fee is required for this permit.

60. Material certifications must be submitted to Spalding DeDecker for review prior to the construction of any onsite utilities. Contact Heather Gendron at 248-844-5400 for more information.

61. Construction inspection fees in the amount of **$TBD** must be paid to the Community Development Department. ****fees are subject to change.**

62. Off-Site Legal exhibit review fees in the amount of **$660.00** must be paid to the Community Development Department.

63. Legal escrow fees (off-site Sanitary Sewer legal review) in the amount of **$862.50** must be paid to the Community Development Department.

64. Legal escrow fees in the amount of **$TBD** must be deposited with the Community Development Department. **All unused escrow will be returned to the payee at the end of the project** (except for escrows that are $50 or less)**.** This amount includes engineering legal fees only. There may be additional legal fees for planning legal documents. ****fees are subject to change.**

65. Legal fees for off-site easements should be paid as soon as possible so that documents can be approved.

66. A storm water performance guarantee in the amount of **$TBD** (Equal to 120% of the cost required to complete the storm water management facilities) as specified in the Storm Water Management Ordinance must be posted at the Community Development Department.

67. Storm water detention tap fees in the amount of **$TBD** for the proposed discharge to an off-site regional detention basin must be paid to the Community Development Department. ****fees are subject to change.**

68. Water and Sanitary Sewer Fees must be paid prior to the pre-construction meeting. Contact the Treasury Department at 248-347-0498 to determine the amount of these fees.

69. A street sign financial guarantee in the amount of **$TBD** ($400 per traffic control sign proposed) must be posted at the Community Development Department. Signs must be installed in accordance with MMUTCD standards.

70. A traffic control inspection fee of **$TBD** must be paid to Community Development. This fee is the inspection of traffic control items such as signs,

striping, curbs, parking stalls, sidewalk, detectable warning surfaces, and temporary pavement markings.

71. A Soil Erosion Control Permit must be obtained from the City of Novi. Contact Sarah Marchioni in the Community Development Department, Building Division (248-347-0430) for forms and information. The financial guarantee and inspection fees will be determined during the SESC review.

72. A permit for all proposed work activities within the road right-of-way must be obtained from the City of Novi. This application is available from the City Engineering Division or on the city website (Right-of-Way Permit Application) and can be filed once the Final Site Plan has been submitted. Please contact the Engineering Division at 248-347-0454 for further information. Please submit the cover sheet, standard details, and plan sheets applicable to the permit only.

73. A permit for work within the road right-of-way of Novi Road must be obtained from the Road Commission for Oakland County (RCOC). Please contact the RCOC (248-858-4835) directly with any questions. The applicant must forward a copy of this permit to the city. Provide a note on the plans indicating all work within the road right-of-way will be constructed in accordance with the RCOC standards. **Be advised that review by the RCOC may take four weeks or longer.**

74. An Act 399 Permit for Community Water Supply Systems for water main construction must be obtained from EGLE. This permit application must be submitted through the Engineering Division after the water main plans have been approved. Please submit the cover sheet, overall utility sheet, standard details, and plan/profile sheets applicable to the permit.

75. A Part 41 Permit For Wastewater Systems for sanitary sewer construction must be obtained from EGLE. This permit application must be submitted through the Engineering Division after the sanitary sewer plans have been approved. Please submit the cover sheet, overall utility sheet, standard details, and plan/profile sheets applicable to the permit. **Be aware that approval by both (1) Oakland County Water Resources Commissioner (OCWRC) and (2) Wayne County Department of Public Services (WCDPS) are required prior to submittal to EGLE.**

Prior to preparing stamping sets, the Applicant should submit the Electronic Stamping set to Planning for review, if any changes are proposed after Electronic Stamping set approval send revised sheets directly to Engineering for an informal review and approval.

To the extent this review letter addresses items and requirements that require the approval of or a permit from an agency or entity other than the City, this review shall not be considered an indication or statement that such approvals or permits will be issued.

Please contact Adam Yako at (248)735-5695 or email at ayako@cityofnovi.org with any questions.

Adam Yako
Project Engineer

cc: James Hill, Community Development
Humna Anjum, Engineering
Ben Nelson, Engineering
Ben Croy, City Engineer

LANDSCAPE REVIEW

PLAN REVIEW CENTER REPORT
February 12, 2024
Culver's Restaurant
Revised Preliminary Site Plan - Landscaping

Review Type	**Job #**
Revised Preliminary Site Plan Landscape Review	JSP23-0037

Property Characteristics
- Site Location: NW corner of Novi Road and West Oaks Drive
- Site Acreage: 1.5 ac. (approx.)
- Site Zoning: R-C with PD2 option
- Adjacent Zoning: North, South, East, West: R-C
- Plan Date: 2/6/2024

Ordinance Considerations
This project was reviewed for conformance with Chapter 37: Woodland Protection, Zoning Article 5.5 Landscape Standards, the Landscape Design Manual and any other applicable provisions of the Zoning Ordinance. Items in **bold** below must be addressed and incorporated as part of the revised Preliminary Site Plan submittal. Underlined items must be addressed on the Final Site Plans. Please follow guidelines of the Zoning Ordinance and Landscape Design Guidelines. This review and the accompanying Landscape Chart are summaries and are not intended to substitute for any Ordinance.

RECOMMENDATION:
This project is **recommended for approval.** The only unsupported waiver is that a landscape architect needs to create the plans. That hasn't been confirmed yet. The only waivers required are supported by staff. The other changes needed can be addressed on Final Site Plans.

LANDSCAPE WAIVERS REQUIRED FOR PROPOSED LAYOUT
- Plans do not appear to have been created, signed and sealed by a professional landscape architect – *not supported by staff*.
- Greenbelt width along West Oaks is insufficient – *supported by staff as required landscaping is proposed*
- No greenbelt berms are provided on either frontage – *supported by staff as a hedge is provided as screening.*
- Greenbelt trees not planted along 75lf of West Oaks frontage occupied by existing utility easements – *supported by staff*
- Accessway perimeter trees not planted along the drive-thru lane within the watermain easement – *supported by staff*.

Ordinance Considerations

A professional landscape architect must create, sign and seal the landscape plans. It is not clear that a landscape architect has worked on the plans so far. **Please add the name and seal of the landscape architect responsible for these plans.**

Existing Trees (Sec 37 Woodland Protection, Preliminary Site Plan checklist #17 and LDM 2.3 (2))
1. A complete tree survey is provided.

2. No wetlands exist on the site.
3. Two trees are being preserved.

Adjacent to Residential - Buffer (Zoning Sec. 5.5.3.B.ii and iii)

The site is not adjacent to any residential property.

Adjacent to Public Rights-of-Way – Berm/Wall, Buffer and Street Trees (Zoning Sec. 5.5.3.B.ii, iii)

1. As Karevich Drive is being vacated, the exterior drive is not considered a public right-of-way so the greenbelt berm and landscaping along its south and east sides are no longer required. It is being treated as an accessway instead of a public road.
2. **A landscape waiver is required for the deficient greenbelt width along West Oaks Drive**. *It would be supported by staff because all of the required greenbelt landscaping is provided.*
3. **A landscape waiver is required for the lack of berms along both West Oaks Drive and Novi Road**. *It would be supported by staff because hedges are provided to screen the drive-thru lanes from both roads*.
4. **A landscape waiver to not provide trees within the watermain easement along West Oaks Drive should be requested.** *It will be supported by staff.*
5. The required landscaping is mostly provided, and with the waiver noted above for the watermain easement, the plan will have sufficient landscaping for the greenbelt and street tree requirements.

Parking Lot Landscaping (Zoning Sec. 5.5.3.C.)

1. Per the calculations provided, the required landscape area and interior trees are provided.
2. **See the detailed discussion regarding parking lot perimeter trees and accessway perimeter tree placement.**
3. **A landscape waiver to not plant accessway perimeter trees within the watermain easement** *would be supported by staff***.**

Building Foundation Landscaping (*Zoning Section 5.5.3.D*)

1. Calculations and hatched area showing proposed landscape areas are provided.
2. Please provide detailed planting plans on the Final Site Plans.

Plant List (LDM 4, 10)

Please provide a plant list on the Final Site Plans.

Planting Notations and Details (*LDM 10*)

1. All required notes are provided.
2. Please add any additional planting details that may be required once the plant species are determined.

Storm Basin Landscape (*Zoning Sec 5.5.3.E.iv and LDM 3*)

1. No above-ground detention is proposed.
2. **If above-ground detention is required by Engineering, the basin must be landscaped per the current ordinance.**

Irrigation (LDM 10)

1. An irrigation system plan is provided.
2. It will be reviewed by our cross-connection specialist.

If the applicant has any questions concerning the above review or the process in general, do not hesitate to contact me at 248.735.5621 or rmeader@cityofnovi.org.

Rick Meader – Landscape Architect

LANDSCAPE REVIEW SUMMARY CHART – Revised Preliminary Site Plan

Review Date: February 12, 2024
Project Name: JSP23 – 0037: CULVER'S RESTAURANT
Plan Date: February 6, 2024
Prepared by: Rick Meader, Landscape Architect E-mail: rmeader@cityofnovi.org; Phone: (248) 735-5621

Items in **Bold** need to be addressed by the applicant before approval of the Preliminary Site Plan. Underlined items need to be addressed for Final Site Plan.

LANDSCAPE WAIVERS REQUIRED FOR PROPOSED LAYOUT

- Plans do not appear to have been created, signed and sealed by a professional landscape architect – *not supported by staff.*
- Greenbelt width along West Oaks is insufficient – *supported by staff as required landscaping is proposed*
- No greenbelt berms are provided on either frontage – *supported by staff as a hedge is provided as screening.*
- Greenbelt trees not planted along 75lf of West Oaks frontage occupied by existing utility easements – *supported by staff*
- Accessway perimeter trees not planted along the drive-thru lane within the watermain easement – *supported by staff.*

Item	Required	Proposed	Meets Code	Comments
Landscape Plan Requirements (Landscape Design Manual (LDM) and Zoning Ordinance (Zoning Sec)				
Landscape Plan *(Zoning Sec 5.5.2, LDM 2, 10)*	• New commercial or residential developments • Addition to existing building greater than 25% increase in overall footage or 400 SF whichever is less. • 1" = 20' minimum with proper North. Variations from this scale can be approved by LA • Consistent with plans throughout set	Scale: 1" = 20'	Yes	
Project Information *(LDM 10)*	Name and Address	Yes	Yes	
Owner/Developer Contact Information *(LDM 10)*	Name, address and telephone number of the owner and developer or association	Yes	Yes	
Landscape Architect contact information *(LDM 10)*	Name, Address and telephone number of RLA/PLA/LLA who created the plan	No landscape architect is indicated and it's not clear that an LA created the plans.	No	**1. The plans must be created, signed and sealed by a licensed landscape architect.** **2. They won't be approved without this.**

Item	Required	Proposed	Meets Code	Comments
Sealed by LA. *(LDM 10)*	Requires original signature	Copy of seal and signature		Live signature of LA is required on the printed stamping sets.
Miss Dig Note (800) 482-7171 *(LDM 10)*	Show on all plan sheets	Yes	Yes	
Zoning *(LDM 10)*	Include all adjacent zoning	• Parcel: R-C with PD-2 option • North South, East, West: R-C	Yes	
Survey information *(LDM 10)*	• Legal description or boundary line survey • Existing topography	• Legal description on Sheet 2 • Topographical survey is on Sheet 3	Yes	
Existing plant material Existing woodlands or wetlands *(LDM 10)*	• Show location type and size. Label to be saved or removed. • Plan shall state if none exists.	• Tree survey is shown on Sheet 16. • Removals are indicated. • There are no regulated woodlands on the site	• Yes • Yes • Yes	1. As there are no regulated trees being removed due to their size being less than 36" dbh and not being in a regulated woodland, no replacements are required 2. Trees #1286 is shown as being saved, but may conflict with the center street tree. **Please adjust the position of the street tree(s) to remove the conflict.** 3. As those are non-regulated pines in relatively poor condition, they could be removed without requiring replacement.
Soil types *(LDM10)*	• As determined by Soils survey of Oakland county • Show types, boundaries	• Sheet 16 • Entire site is Marlette sandy loam	Yes	
Existing and proposed improvements *(LDM 10)*	Existing and proposed buildings, easements, parking spaces, vehicular use areas, and R.O.W	Yes	Yes	
Existing and proposed utilities *(LDM 10)*	• Overhead and underground utilities, including hydrants	• All utility lines and structures are shown on the	• Yes • Yes	1. There appear to be a number of light post/tree conflicts.

Item	Required	Proposed	Meets Code	Comments
	• Show all existing and proposed lightposts on the site.	landscape plan. • Proposed lighting is shown		**2. Please adjust as needed to remove the conflicts.**
Proposed grading. 2' contour minimum *(LDM 10)*	Provide proposed contours at 2' interval	• Sheet 5 • No berms are proposed	• Yes • No	**A landscape waiver is requested for the lack of the required berms.**
Snow deposit *(LDM 10)*	Show snow deposit areas on plan	No	No	**Please indicate snow deposit areas that won't harm landscaping.**
LANDSCAPING REQUIREMENTS				
Parking Area Landscape Requirements (*Zoning Sec 5.5.3.C and LDM 5)*				
General requirements *(LDM 5)*	• Clear sight distance within parking islands • No evergreen trees	Clear vision zones shown for all entries	Yes	
Name, type and number of ground cover *(LDM 5)*	As proposed on planting islands	Lawn seed is indicated in the notes, but not on the plan view	Yes	Please show which areas will be seeded on the plan view.
General *(Zoning Sec 5.5.3.C)*				
Parking lot Islands	• A minimum of 200 SF to qualify • A minimum of 200sf unpaved area per tree planted in an island • 6" curbs • Islands minimum width 10' BOC to BOC	All islands are sufficiently large	Yes	
Curbs and Parking stall reduction *(Zoning Sec 5.3.12)*	Parking stall can be reduced to 17' and the curb to 4" adjacent to a sidewalk of minimum 7 ft.	Spaces are shown as 17' long where they abut greenspace and 19 feet long when they abut a 5 foot sidewalk	Yes	
Contiguous space limit *(Zoning sec 5.5.3.C)*	Maximum of 15 contiguous spaces	10 is maximum bay length	Yes	
Plantings around Fire Hydrant *(Zoning sec 5.5.3.C)*	• No plantings with matured height greater than 12' within 10 ft. of fire hydrants • Plant trees at least 5 ft from water and storm lines and 10 feet from sanitary lines. • Plantings near hydrants or FDCs should be no taller than 12"	One hydrant on the west end of the site is shown. There is no landscaping blocking the hydrant.	Yes	**If the building has a Fire Department Connector (FDC), please show it on the landscape plan and add a note that no plantings above 12" tall should be planted in front of it.**

Item	Required	Proposed	Meets Code	Comments
Landscaped area *(Zoning sec 5.5.3.C)*	Areas not dedicated to parking use or driveways exceeding 100 sq. ft. shall be landscaped	Yes	Yes	
Category 1: For OS-1, OS-2, OSC, OST, B-1, B-2, B-3, NCC, EXPO, FS, TC, TC-1, RC, Special Land Use or non-residential use in any R district *(Zoning Sec 5.5.3.C)*				
A = Total square footage of vehicular use areas up to 50,000sf x 7.5%	• A = x sf * 7.5 % = A sf • 11,085 * 7.5% = 832 sf	Calculations proposed	Yes	
B = Total square footage of additional paved vehicular use areas (not including A or B) over 50,000 SF) x 1 %	• B = x sf * 1% = B sf • (xxx – 50000) * 1% = xx sf	NA		
Category 2: For: I-1 and I-2 *(Zoning Sec 5.5.3.C)*				
A. = Total square footage of vehicular use area up to 50,000 sf x 5%	A = x sf * 6% = A sf	NA		
B = Total square footage of additional paved vehicular use areas over 50,000 SF x 0.5%	B = 0.5% x 0 sf = B SF	NA		
All Categories				
C = A+B Total square footage of landscaped islands	• C = A + B • C = 832 + 0 = 832 SF	1341 sf	Yes	
D = C/200 Number of canopy trees required	• D = C/200 trees • 832/200 = 4 Trees	5 trees	Yes	
Perimeter Green space (Zoning Sec 5.5.3.C)	• 1 Canopy tree per 35 lf • North side: 229/35 = 7 trees • South side: 84/35 = 2 trees	North side: 9 trees South side: 1 tree	• Yes • No	**1. The area within the parking lot does not need to be included in the calculation** **2. Please move one of the perimeter trees provided to south of the 5 space bay, west of the sanitary line.**
Accessway perimeter (Zoning Sec 5.5.3.C)	1 canopy tree per 35 lf on each side of road, less widths of access drives. **Exterior accessway (Karevich):** (480+135+241+33)/35 =	**Exterior accessway** • 27 trees (including 9 parking lot perimeter trees along the north side of the north parking lot, 1 Novi Road greenbelt	• Yes • No • Yes	**1. Please move one of the north parking lot perimeter trees to the gap at the northwest bend of the access drive and one to the gap on the west side of the drive near**

Item	Required	Proposed	Meets Code	Comments
	25 trees **Drive-thru accessway:** • Inner edge: (138 + 80)/35 = 6 trees • Outer edge: 523/35 = 15 trees A waiver for not providing 2 (67/35) canopy trees within the watermain easement along the accessway would be supported by staff.	tree and 1 accessway perimeter trees between the exterior accessway and the drive-thru (both are within 15 feet of the curbs of both) **Drive-thru accessway** • Inner edge: 5 trees proposed • Drive-thru accessway outer edge: 16 trees (including 4 shared by Karevich Drive and 13 greenbelt trees)		**West Oaks.** **2. Please move one of the 3 interior drive thru accessway trees crowded in the area with the dumpsters across to the island between the two drive thru lanes.** **3. Please replace the two subcanopy trees east of the building with one canopy tree in that island to provided better shade for the drive.** **4. Please move the southernmost Novi Road greenbelt canopy tree to within 15 feet of the access drive, west of the watermain easement to provide shade for the drive (it will still be considered to be in the Novi Road greenbelt).** **5. Please move the canopy tree 5 feet from the building to the west to give it more room to grow.** **6.** *A waiver to not provide 2 trees along the outer edge of the interior drive within the watermain easement would be supported by staff.*
Berms *(Zoning Sec 5.5.3.A & LDM 1)*				
• All berms shall have a maximum slope of 33%. Gradual slopes are encouraged. Show 1ft. contours • Berm should be located on lot line except in conflict with utilities. • Berms should be constructed with 6" of topsoil.				
Residential Adjacent to Non-residential *(Sec 5.5.3.A & LDM 1.a)*				
Berm requirements *(Zoning Sec 5.5.A)*	The site is not adjacent to residential property so this screening berm is not required.	None	Yes	
Adjacent to Public Rights-of-Way *(Sec 5.5.3.B and LDM 1.b)*				

Item	Required	Proposed	Meets Code	Comments
Berm requirements *(Zoning Sec 5.5.3.A.(5))*	An undulating berm a minimum 2 feet high with a 3 foot wide crest is required	No berm is proposed	No	**A landscape waiver is required for the lack of a berm.** *As a screening hedge is proposed for most of the frontages, it would be supported by staff.*
Cross-Section of Berms *(LDM 10)*				
Slope, height and width	• Label contour lines • Maximum 33% • Min. 3 feet flat horizontal area • Minimum 3 feet high • Constructed of loam with 6' top layer of topsoil.	No berms are proposed.		
Type of Ground Cover		NA		
Walls *(Zoning Sec 5.5.3.A & LDM 10)*				
Material, height and type of construction footing	Freestanding walls should have brick or stone exterior with masonry or concrete interior	No walls are indicated	TBD	
Walls greater than 4 ft. should be designed and sealed by an Engineer		NA		
ROW Landscape Screening Requirements *(Zoning Sec 5.5.3.B.ii)*				
Greenbelt width	Adj to Parking: 20 ft.	• Novi Road: 25 ft • West Oaks Dr: All but 20lf of frontage has less than 20 ft	• Yes • No	**A landscape waiver is required for the deficiency in greenbelt width provided.** *As all of the required landscaping is being provided, it would be supported by staff***.**
Min. berm crest width	Adj to Parking: 2 ft.	None	No	**As noted above, a landscape waiver is required for the lack of a berm.** *As a screening hedge is proposed for most of the frontage, it would be supported by staff*
Minimum berm height	Adj to Parking: 3 ft.	None	No	**See above**
3' wall	(2)(3)(4)	No		
Canopy deciduous or large evergreen trees	• Adj to Parking: 1 tree per 35 lf	• Novi Road: 7 trees (double-counted	• Yes • Yes	**1. A waiver to not plant trees within the 75**

Item	Required	Proposed	Meets Code	Comments
	• Novi Road: 214/35 = 6 trees • West Oaks Dr: (275/35 = 8 trees Since Karevich Drive is being vacated, the frontage along it does not need to be considered as public right-of-way greenbelt.	accessway perimeter trees) • West Oaks Dr: 8 trees (7 double-counted accessway perimeter trees + 1 existing tree to remain).		**feet of West Oaks frontage occupied by the water main easement** *would be supported by staff.* **2. If that is done, the number of greenbelt canopy trees could be reduced, unless they are needed to meet the accessway perimeter requirement.**
Sub-canopy deciduous trees)	• Adj to Parking: 1 tree per 20 lf • Novi Road: 217/20 = 11 trees • West Oaks Dr: 275/20 = 14 trees Since Karevich Drive is being vacated, the frontage along it does not need to be considered as public right-of-way greenbelt.	• Novi Road: 11 trees • West Oaks Dr: 11 trees	• Yes • No	**A waiver to not plant trees within the 75 feet of West Oaks frontage occupied by the water main easement** *would be supported by staff.*
Canopy deciduous trees in area between sidewalk and curb	• Parking & No Parking: 1 tree per 45 lf • Novi Road: (217-120)/45 = 3 trees (120lf is shown as in the RCOC "no plant" zone) • West Oaks Dr: (307-70)/45 = 5 trees	• Novi Road: 5 subcanopy trees near overhead wires • West Oaks Dr: 6 trees	• Yes • Yes	If the Road Commission for Oakland County (RCOC) does not allow some or all of the required trees along Novi Road, they do not need to be planted but a copy of their decision must be provided to the City.
Non-Residential Projects *(Zoning Sec 5.5.3.F.iii)* Refer to Planting in ROW, building foundation landscape, parking lot landscaping and LDM				
Screening of outdoor storage, loading/unloading *(Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)*	The loading zone must be screened from roads	The proposed loading zone is partially blocked by greenbelt plantings from view of West Oaks Drive.	TBD	Please note the height and species/variety of the shrubs proposed. They should be tall enough to screen a vehicle.
Transformers/Utility boxes *(LDM 6)*	• A minimum of 2ft. separation between box and the plants • Ground cover below 4" is allowed up to pad. • No plant materials within 8 ft. from the	No transformer is shown	TBD	1. When transformer locations are finalized, screening shrubs per standard detail are required. 2. Please add the City utility box screening detail to plans.

Item	Required	Proposed	Meets Code	Comments
	doors			
Building Foundation Landscape Requirements *(Zoning Sec 5.5.3.D)*				
Interior site landscaping SF *(Zoning Sec 5.5.3.D)*	• Equal to the entire perimeter of the building x 8. • A: (283-16.42)lf x 8ft = 2,133 SF • Planting beds should have a minimum width of 4 ft.	2232 sf – not noted	Yes	**1.** Shaded areas indicate that sufficient area is provided. **2.** Detailed foundation planting plans must be included on the Final Site Plans and all plantings are to be included in the cost estimate.
Building Frontage Landscaping (Zoning Sec 5.5.3.D)	If visible from public street a minimum of 60% of the exterior building perimeter should be covered in green space	• Novi Road: 100% • West Oaks Dr.: 100%	• Yes • Yes	The greenbelt hedge may be included in the West Oaks Drive frontage calculation since it blocks the view of the building from West Oaks Drive.
Detention/Retention Basin Requirements *(Zoning Sec. 5.5.3.E & LDM 3)*				
Planting requirements *(Zoning Sec 5.5.3.E & LDM 3)*	• Clusters of large native shrubs shall cover 70-75% of the basin rim area at 10 lf from permanent water level • 10" to 14" tall grass along sides of basin • Refer to wetland for basin mix • Deciduous canopy tree 1/35 of east, south and west sides of pond at 10 feet from permanent water level	No above-ground detention is shown	TBD	If above-ground detention is provided, it must be landscaped per the current ordinance.
Phragmites and Japanese Knotweed Control *(Zoning Sec 5.5.6.B)*	• Any and all populations of Phragmites australis and/or Japanese Knotweed on site shall be included on tree survey. • Treat populations per MDEQ guidelines and requirements to eradicate the weed from the site.	A note indicates there is none of either weed on the site	Yes	If any is found during construction, it must be completely removed.
LANDSCAPING NOTES, DETAILS AND GENERAL REQUIREMENTS				
Landscape Notes – Utilize City of Novi Standard Notes				

Item	Required	Proposed	Meets Code	Comments
Installation date *(LDM 10)*	Provide intended date	Between Mar 15 and Nov 15	Yes	
Maintenance & Statement of intent *(Zoning Sec 5.5.6 & LDM 10)*	• Include statement of intent to install and guarantee all materials for 2 years. • Include a minimum one cultivation in June, July and August for the 2-year warranty period.	Both notes are provided	Yes	
Plant source *(LDM 10 & 11)*	Shall be northern nursery grown, No.1 grade.	Northern nursery	Yes	
Irrigation plan *(LDM 10)*	• A fully automatic irrigation system or a method of providing sufficient water for plant establishment and survival is required on Final Site Plans. • If irrigation won't be used, note how trees will get sufficient water for establishment and long-term survival	Provided	TBD	The irrigation plan will be reviewed by our cross-connection specialist.
Establishment period *(Zoning Sec 5.5.6 & LDM 10)*	**2 yr. Guarantee**	Yes	Yes	
Approval of substitutions. *(Zoning Sec 5.5.5 & LDM 10)*	City must approve any substitutions in writing prior to installation.	Yes	Yes	
Plant List *(LDM 10 & 11)* **– Include all cost estimates**				
Quantities and sizes	• At least 50% of species used shall be native to Michigan • Tree diversity shall follow guidelines of LDM Section 4	No plant list is provided	No	Please provide a complete plant list on the Final Site Plans.
Root type		No	No	See above
Botanical and common names *(LDM 4 & 11)*			TBD	See above
Type and amount of lawn		Not indicated	No	Please add areas of each type of ground cover in the cost table.
Cost estimate *(LDM 10)*	For all new plantings, mulch and sod as listed on the plan	No		Please add to final site plan.
Planting Details/*Info (LDM Part III)* **– Utilize City of Novi Standard Details**				
Canopy Deciduous Tree	Refer to LDM for detail drawings	Yes	Yes	
Evergreen Tree		No	No	Please add if any

Item	Required	Proposed	Meets Code	Comments
				evergreen trees will be used.
Multi-stem Tree		No	TBD	Please add if any multi-stem trees will be used.
Shrub		Yes	Yes	
Perennial/ Ground Cover		No	TBD	Please add to plan if needed
Tree stakes and guys. (Wood stakes, fabric guys)		No	No	Please add to plan set
Tree protection fencing	Located at Critical Root Zone (1' outside of dripline)	2 on-site trees are shown as being saved	No	Please show protective tree fence on the Demolition and/or Soil Erosion Control plan to protect any saved trees or trees on adjacent properties within 50 feet of disturbance.
Other Plant Material Requirements *(LDM 11)*				
General Conditions	Plant materials shall not be planted within 4 ft. of property line	No	No	Please add a callout at the property line stating that plants shall not be installed within 4 feet of the property line.
Landscape tree credit *(LDM 11)*	• Substitutions to landscape standards for preserved canopy trees outside woodlands/ wetlands should be approved by LA. • Refer to Landscape tree Credit Chart in LDM	No		
Plant Sizes for ROW, Woodland replacement and others *(LDM 11)*	• Size determined by use detailed in LDM Table 11.b.(2)a.i • Indicate on plant list	No	No	Please provide a plant list with all appropriate plant sizes on the Final Site Plans.
Plant size credit *(LDM 11)*	NA	No		
Prohibited Plants *(LDM 11.b)*	No plants on City Invasive Species List	No plant list is provided	No	No prohibited species, as shown in the Landscape Design Manual, may be used.
Recommended trees for planting under overhead utilities *(LDM 11)*	Label the distance from the overhead utilities	• Overhead lines are shown along Novi Road • Subcanopy trees are proposed as street trees there.	Yes	

Item	Required	Proposed	Meets Code	Comments
Nonliving Durable Material: Mulch *(LDM 12)*	• Trees shall be mulched to 3"depth and shrubs, groundcovers to 2" depth • Specify natural color, finely shredded hardwood bark mulch. Include in cost estimate.	On details	Yes	

NOTES:
1. This table is a working summary chart and not intended to substitute for any Ordinance or City of Novi requirements or standards.
2. The section of the applicable ordinance or standard is indicated in parenthesis. For the landscape requirements, please see the Zoning Ordinance landscape section 5.5 and the Landscape Design Manual for the appropriate items under the applicable zoning classification.
3. Please include a written response to any points requiring clarification or for any corresponding site plan modifications to the City of Novi Planning Department with future submittals.

Irrigation System Requirements

1. Any booster pump installed to connect the project's irrigation system to an existing irrigation system must be downstream of the RPZ.
2. The RPZ must be installed in accordance with the 2015 Michigan Plumbing Code.
3. The RPZ must be installed in accordance with the manufacture installation instructions for winterization that includes drain ports and blowout ports.
4. The RPZ must be installed a minimum of 12-inches above FINISHED grade.
5. Attached is a handout that addresses winterization installation requirements to assist with this.
6. A plumbing permit is required.
7. The assembly must be tested after installation with results recorded on the City of Novi test report form.

TRAFFIC REVIEW

AECOM
39575 Lewis Dr, Ste. 400
Novi
MI, 48377
USA
aecom.com

Project name:
JSP23-37 – Culver's Revised Preliminary Traffic Review

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

From:
AECOM

Date:
February 27, 2024

CC:
Lindsay Bell, Humna Anjum, Diana Shanahan, James Hill, Adam Yako, Heather Zeigler

Memo

Subject: JSP23-37 – Culver's Revised Preliminary Traffic Review

The revised preliminary site plan was reviewed to the level of detail provided and AECOM recommends **denial** until the comments and deviations provided below are adequately addressed to the satisfaction of the City.

GENERAL COMMENTS

1. The applicant, PEA Group, is proposing a 4,106 SF Culver's restaurant.
2. The development is located on the south side of Karevich Drive, north of West Oaks Drive and west of Novi Road. Karevick Drive and West Oaks Drive are under the jurisdiction of the City of Novi. Novi Road is under the jurisdiction of the Road Commission for Oakland County.
3. The site is zoned RC (Regional Center).
4. There following traffic related deviations may be required if plans are not revised:
    a. Below standard radius at one driveway.
    b. Below standard bicycle parking layout.
    c. Below minimum clear path width to bicycle parking.
    d. Inconclusive if the required stacking spaces in drive-through are met.
5. The applicant has indicated the following deviations will be requested:
    a. Dumpster location.
    b. Front setback below standard.

TRAFFIC IMPACTS

1. AECOM performed an initial trip generation based on the ITE Trip Generation Manual, 11th Edition, as follows.

    ITE Code: 934 – Fast-Food Restaurant with Drive-Through Window
    Development-specific Quantity: 4,106 GLA
    Zoning Change: None

Trip Generation Summary	Estimated Trips	Estimated Peak-Direction Trips	City of Novi Threshold	Above Threshold?
AM Peak-Hour Trips	183	93	100	No
PM Peak-Hour Trips	135	70	100	No
Daily (One-Directional) Trips	1,917	N/A	750	Yes

2. The City of Novi generally requires a traffic impact study/statement if the number of trips generated by the proposed development exceeds the City's threshold of more than 750 trips per day or 100 trips per either the AM or PM peak hour, or if the project meets other specified criteria.

Trip Impact Study Recommendation	
Type of Study:	**Justification**
Traffic Impact Study	Traffic study submitted and is reviewed under a separate letter.

TRAFFIC REVIEW

The following table identifies the aspects of the plan that were reviewed. Items marked O are listed in the City's Code of Ordinances. Items marked with ZO are listed in the City's Zoning Ordinance. Items marked with ADA are listed in the Americans with Disabilities Act. Items marked with MMUTCD are listed in the Michigan Manual on Uniform Traffic Control Devices.

The values in the 'Compliance' column read as 'met' for plan provision meeting the standard it refers to, 'not met' stands for provision not meeting the standard and 'inconclusive' indicates applicant to provide data or information for review and 'NA' stands for not applicable for subject Project. The 'remarks' column covers any comments reviewer has and/or 'requested/required variance' and 'potential variance'. A potential variance indicates a variance that will be required if modifications are not made or further information provided to show compliance with the standards and ordinances. The applicant should put effort into complying with the standards; the variances should be the last resort after all avenues for complying have been exhausted. Indication of a potential variance does not imply support unless explicitly stated.

EXTERNAL SITE ACCESS AND OPERATIONS				
No.	**Item**	**Proposed**	**Compliance**	**Remarks**
1	Driveway Radii | O Figure IX.3	5', 15' and 35'	**Partially Met**	**5' does not meet 15' minimum requirement. The applicant has not indicated if the exit with the 5' radius is no right turn.**
2	Driveway Width | O Figure IX.3	24'	Met	Within range.
3	Driveway Taper | O Figure IX.11			
3a	Taper length	-	N/A	
3b	Tangent	-	N/A	
4	Emergency Access | O 11-194.a.19	2 access points	Met	
5	Driveway sight distance | O Figure VIII-E	Not indicated	N/A	For major through roads.
6	Driveway spacing			
6a	Same-side | O 11.216.d.1.d	-	N/A	
6b	Opposite side | O 11.216.d.1.e	-	N/A	
7	External coordination (Road agency)	-	N/A	No changes proposed to Novi Road.

EXTERNAL SITE ACCESS AND OPERATIONS				
No.	**Item**	**Proposed**	**Compliance**	**Remarks**
8	External Sidewalk | Master Plan & EDM	Proposed 8' walk along Novi Road and 5' connection to site	Met	
9	Sidewalk Ramps | EDM 7.4 & R-28-K	Indicated	**Partially Met**	Include standard detail R-28-K in future submittal.
10	Any Other Comments:			

INTERNAL SITE OPERATIONS				
No.	**Item**	**Proposed**	**Compliance**	**Remarks**
11	Loading zone | ZO 5.4	500 SF	Met	
12	Trash receptacle | ZO 5.4.4	Proposed directly next to the building on the west side	**Not Met**	**The applicant is requesting a deviation for location of dumpster.**
13	Emergency Vehicle Access	Turning movements provided	Met	
14	Maneuvering Lane | ZO 5.3.2	24', 15' and 13'	Met	
15	End islands | ZO 5.3.12			
15a	Adjacent to a travel way	Dimensioned	Met	3' shorter than adjacent space.
15b	Internal to parking bays	Provided	Met	Internal islands not required to be 3' shorter than adjacent parking.
16	Parking spaces | ZO 5.2.12	49 including 3 accessible spaces		See Planning review letter. **4 parallel parking spaces are proposed directly after the drive-thru lanes, which could restrict access to these parking spaces.**
17	Adjacent parking spaces | ZO 5.5.3.C.ii.i	<15 spaces in all parking bays	Met	
18	Parking space length | ZO 5.3.2	17' and 19' perpendicular spaces, 18' angled spaces, parallel spaces not dimensioned	**Partially Met**	**Dimension parallel parking spaces in future submittal.**
19	Parking space Width | ZO 5.3.2	8' parallel spaces and 9'	Met	

INTERNAL SITE OPERATIONS				
No.	**Item**	**Proposed**	**Compliance**	**Remarks**
20	Parking space front curb height | ZO 5.3.2	Not Indicated	**Inconclusive**	Provide in future submittal, **6" standard in front of 19' parking spaces, 4" standard with 2' overhang in front of 17' spaces.** Flush curb noted on site plan in front of some of the parking spaces. **Provide detail of bumper blocks in future submittal.**
21	Accessible parking – number | ADA	3	Met	
22	Accessible parking – size | ADA	8' with 5' or 8' aisle	Met	
23	Number of Van-accessible space | ADA	1	Met	
24	Bicycle parking			
24a	Requirement | ZO 5.16.1	4 required, 4 proposed	Met	
24b	Location | ZO 5.16.1	Provided	Met	
24c	Clear path from Street | ZO 5.16.1	6' required	**Inconclusive**	**Dimension the width of the sidewalk from the crosswalk to the bicycle parking** to ensure the 6' requirement is met.
24d	Height of rack | ZO 5.16.5.B	3' required	Met	Separate detail provided, include in plan set in future submittal.
24e	Other (Covered / Layout) | ZO 5.16.1	Partially dimensioned	**Not Met**	**Refer to Text Amendment 18.301 for updated layout requirements.**
25	Sidewalk – min 5' wide | Master Plan	5'	Met	
26	Sidewalk ramps | EDM 7.4 & R-28-K	Not indicated at accessible spaces.	**Inconclusive**	**Label on plan and provide detail in future submittal.**
27	Sidewalk – distance back of curb | EDM 7.4	-	N/A	
28	Cul-De-Sac | O Figure VIII-F	-	N/A	
29	EyeBrow | O Figure VIII-G	-	N/A	
30	Stacking Spaces | ZO 5.3.11.I	Not Indicated	**Inconclusive**	Ordinance requires 4 stacking spaces between board and window and 4 spaces before board, not including the vehicles at the window and board). Stacking spaces shall have a minimum length of 19'. **Dimension and label stacking spaces in future submittal.**

INTERNAL SITE OPERATIONS				
No.	**Item**	**Proposed**	**Compliance**	**Remarks**
31	Any Other Comments:	Minimum 25' drive-through lane centerline radius provided. There could be a conflict between the angled parking space and perpendicular parking space on the southwest corner of the site.		

SIGNING AND STRIPING				
No.	**Item**	**Proposed**	**Compliance**	**Remarks**
32	Signing: Sizes | MMUTCD	No Parking Fire Lane sign included	**Partially Met**	Include all proposed signs in future submittal.
33	Signing table: quantities and sizes	Not included	**Not Met**	Include in future submittal.
34	Signs 12" x 18" or smaller in size shall be mounted on a galvanized 2 lb. U-channel post | MMUTCD	Indicated for No Parking Fire Lane sign	**Partially Met**	Include for all proposed signs in future submittal.
35	Signs greater than 12" x 18" shall be mounted on a galvanized 3 lb. or greater U-channel post | MMUTCD	Indicated for No Parking Fire Lane sign	**Partially Met**	Include for all proposed signs in future submittal.
36	Sign bottom height of 7' from final grade | MMUTCD	Indicated for No Parking Fire Lane sign	**Partially Met**	Include for all proposed signs in future submittal.
37	Signing shall be placed 2' from the face of the curb or edge of the nearest sidewalk to the near edge of the sign | MMUTCD	Not included	**Not Met**	Include in future submittal.
38	FHWA Standard Alphabet series used for all sign language | MMUTCD	Not included	**Not Met**	Include in future submittal.
39	High-Intensity Prismatic (HIP) sheeting to meet FHWA retro-reflectivity | MMUTCD	Not included	**Not Met**	Include in future submittal.
40	Parking space striping notes	4" proposed	**Partially Met**	Indicate color of all proposed markings in future submittal.
41	The international symbol for accessibility pavement markings | ADA	Not included	**Not Met**	Include in future submittal.
42	Crosswalk pavement marking detail	Not included	**Not Met**	Include in future submittal.
43	Any Other Comments:	**Provide details for arrows, drive thru, stop and do not enter pavement markings. Provide proposed pavement markings and signing for Karevich Drive.**		

Note: Hyperlinks to the standards and Ordinances are for reference purposes only, the applicant and City of Novi to ensure referring to the latest standards and Ordinances in its entirety.

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

Sincerely,

AECOM

Paula K. Johnson, PE
Senior Transportation Engineer

Saumil Shah, PMP
Project Manager

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

Project name:
JSP23-09 – Novi Ten TIS Traffic Review

From:
AECOM

Date:
February 27, 2024

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

CC:
Lindsay Bell, James Hill, Ian Hogg, Heather Zeigler, Diana Shanahan

Memo

Subject: JSP23-37 – Culver's of Novi TIS Traffic Review

The Traffic Impact Study was reviewed to the level of detail provided and AECOM recommends **denial** of the Traffic Impact Study (parking evaluation); the applicant should review the comments provided below and provide a revised study to the City.

GENERAL COMMENTS

1. The memo will provide comments on a section-by-section basis following the format of the submitted report.
2. The project is located in the northwest corner of the intersection of Novi Road and West Oaks Drive/Twelve Oaks Mall Road in the City, Oakland County, Michigan.
3. The proposed development consists of a 4,106 sft Culver's fast-food restaurant with a drive-through window and realignment of Karevich Drive.

BACKGROUND DATA

1. The following roadways were included in the study:
    a. Novi Road: North/South, 45 mph, 2/3 lanes divided.
    b. The intersections and site driveways were included in the study.
        - Novi Road and Twelve Oaks Mall Road/Oaks Drive South (signalized).
        - Novi Road and Oaks Drive North (signalized).
        - Oaks Drive South and Karevich Drive/Proposed Site Driveway (unsignalized).
        - Oaks Drive North and Karevich Drive (unsignalized)
2. Applicant collected turning movements at the study intersections during the weekday m.d. (11 a.m. to 1 p.m.) and p.m. (4 p.m. to 6 p.m.) peak periods of the road network on Thursday, January 25, 2024

EXISTING CONDITIONS

1. The overall Level of Service (LOS) at the major road intersections is D or better.
2. The study reported SimTraffic simulations were also reviewed to observe network operations and vehicle queues. For existing conditions, study network operations are acceptable, with no significant vehicle queues.

SITE TRIP GENERATION

1. A total of 1,919 daily trips are anticipated based on the ITE trip generation for 'Fast Food Restaurant with Drive Through Window' code 934.
2. A total of 55% of trips are considered pass-by trips during the afternoon peak hours (m.d. and p.m.). And a net increase of approx. 104 trips during the afternoon peak hour (m.d.) and approx. 61 trips during the evening peak hour (p.m.) are considered for a traffic impact study on the surrounding road network.

SITE TRAFFIC ASSIGNMENT

1. The largest portion of the traffic is assumed to be coming from/going to Novi Road followed by Twelve Oaks Mall Road and W Oaks Drive. The directions that site traffic will travel to and from were based upon existing traffic patterns during the m.d. and p.m. peak hours.

FUTURE CONDITIONS

1. Operations at the signalized intersections are not expected to deteriorate significantly at the study area intersections except at Oaks Drive South and Karevich Drive/Site Driveway (stop-controlled).
2. Excessive delay (LOS F) at Karevich Drive/Site driveway. However, the 95th percentile queues for the SB approach of the Oaks Drive South and Karevich Drive/Site Driveway intersection are 96 feet (four vehicles) and 63 feet (three vehicles) during the m.d. and p.m. peak hours, respectively.

Parking Evaluation

The report includes the parking requirements for a restaurant one space for every two employees, plus one space for every two customers allowed under maximum capacity (including waiting areas) following the City ordinance. This calculates to 48 spaces. The development is proposing 42 parking spaces, which is a deficit of 6 spaces per the City's zoning ordinance.

The report also anticipated parking demand calculated using the methodologies presented in the ITE Parking Generation Manual, 5th Edition resulting in a peak parking demand of 38 parking spaces.

We do not agree with the TIS preparer's conclusion for the parking evaluation suggesting a peak parking demand of 38 spaces. The study has not considered the peak parking demand for Friday which is 51 spaces per ITE 5th Edition.

CONCLUSIONS

1. The study concluded with excessive delay (LOS F) at Karevich Drive/Site driveway. However, the 95th percentile queues for the SB approach of the Oaks Drive South and Karevich Drive/Site Driveway intersection are 96 feet (four vehicles) and 63 feet (three vehicles) during the m.d. and p.m. peak hours, respectively.
2. The study has not considered the peak parking demand for Friday which is 51 spaces per ITE 5th Edition.

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

Sincerely,

AECOM

Saumil Shah, PMP
Project Manager

Jeff Wood, PE, PTOE
Senior Traffic Engineer

FAÇADE REVIEW

DRN & ASSOCIATES, ARCHITECTS, PC
Phone: (248) 880-6523
E-Mail: dnecci@drnarchitects.com
Web: drnarchitects.com
50850 Applebrooke Dr., Northville, MI 48167

January 8, 2024

Status: Approved
Section 9 Waiver Recommended

City of Novi Planning Department

45175 W. 10 Mile Rd.
Novi, MI 48375-3024

Re: FACADE ORDINANCE - **Facade Review – Preliminary Site Plan**
Culver's, JSP23-37
Façade Region: 1, Zoning District: RC

Dear Ms. McBeth;
The following Facade Review is based on the drawings prepared by Henrickson Architects, dated 10/12/23. The percentages of materials proposed for each façade are as shown on the table below. The maximum percentages allowed by the Façade Ordinance are shown in the right-hand column. Materials in non-compliance with the Façade Chart, if any, are highlighted in bold.

	North (Front)	East	West	South	Ordinance Maximum (Minimum)
Brick	**23%**	30%	**15%**	47%	100% (30%)
Cultured Stone	26%	50%	50%	23%	50%
Composite Siding (Simulated Wood)	**31%**	6%	6%	18%	25%
EIFS	7%	11%	10%	4%	25%
Metal Awnings (Simiar to Standing Seam)	13%	3%	19%	8%	25%

As shown above the minimum percentage of Brick is not provided on the north and west elevations and the percentage of Composite Siding exceeds the maximum amount allowed by the Façade Ordinance on the north elevation. In this case the combined percentage of Brick and Stone meets the intent of the Ordinance with respect to the minimum amount of masonry and the comparatively small overage of Composite Siding enhances the design on the north elevation.

The aforementioned deviations are consistent with the intent and purpose of the Façade Ordinance. A Section 9 Waiver for the underage of Brick and overage of Composite Siding is therefore recommended.

The applicant has provided a sample board indicating that all facade materials including the "harbor blue" accents are consistent with Section 5.15.2 of the Ordinance. It should be noted that the blue LED accent lights proposed for the cornice must also comply with Section 5.15.2, which prohibits intense colors.

Notes to the Applicant:

1. Façade Ordinance requires façade inspection(s) for all projects. Materials and colors must be consistent with those displayed on the approved sample board or otherwise approved. It is the applicant's responsibility to request the inspection of each façade material at the appropriate time, prior to installation. Inspections may be requested using the Novi Building Department's Online Inspection Portal with the following link. Please click on "Click here to Request an Inspection" under "Contractors", then click "Façade". **http://www.cityofnovi.org/Services/CommDev/OnlineInspectionPortal.asp**.

2. All roof top equipment must be concealed from view from all vantage points both on-site and off-site using extended parapets or roof screens constructed of materials in compliance with the Façade Chart and harmonious with other façade materials.

If you have any questions regarding this review, please do not hesitate to call.

Sincerely,
DRN & Architects PC

Douglas R. Necci, AIA

FIRE REVIEW

December 22, 2023

TO: Barbara McBeth - City Planner
Lindsay Bell - Plan Review Center
Ian Hogg – Plan Review Center
James Hill – Plan Review Center
Diana Shanahan – Planning Assistant

RE: Culver's

PreApp# 23-0018
PSP#23-055
JSP#23-37

Project Description:

Build a 4,060 Sq. Ft. structure off West Oaks Dr.

Comments:

- **All** fire hydrants **MUST** be installed and operational prior to any combustible material is brought on site. **IFC 2015 3312.1**
- For new buildings and existing buildings, you **MUST** comply with the International Fire Code Section 510 for Emergency Radio Coverage. This shall be completed by the time the final inspection of the fire alarm and fire suppression permits.
- The minimum width of a posted fire lane is 20 feet. The minimum height of a posted fire lane is 14 feet. ***(D.C.S Sec. 158-99(a).)***
- Fire apparatus access drives to and from buildings through parking lots shall have a minimum fifty (50) feet outside turning radius and designed to support a minimum of thirty-five (35) tons. ***(D.C.S. Sec 11-239(b)(5))***
- **RECEIVED 12/22/23** - A hazardous chemical survey is required to be submitted to the Planning & Community Development Department for distribution to the Fire Department at the time any Preliminary Site Plan is submitted for review and approval. Definitions of chemical types can be obtained from the Fire Department at (248) 735-5674.
- **COMPLETED 12/22/23** - Watermains and fire hydrant shall be put on the plans for review.

Recommendation:

Approved with Conditions

Sincerely,

Andrew Copeland – Acting Fire Marshal
City of Novi Fire Department

Novi Public Safety Administration
45125 Ten Mile Road
Novi, Michigan 48375
248.348.7100
248.347.0590 fax

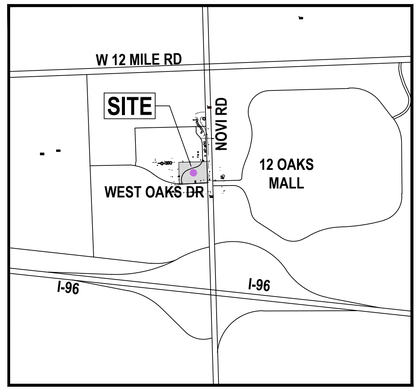
cityofnovi.org

SITE PLAN

(Full plan set available for viewing at the Community Development Department)

SITE PLAN SUBMITTAL FOR
UNION PACIFIC HOLDINGS, LLC
CULVER'S OF NOVI

NOVI ROAD & WEST OAKS DRIVE
PART OF THE NE. 1/4 OF SECTION 15, T.1N, R.8E
CITY OF NOVI, OAKLAND COUNTY, MICHIGAN



VICINITY MAP
NOT TO SCALE

PROJECT CONTACTS

OWNER/DEVELOPER
UNION PACIFIC HOLDINGS LLC.
CHARLES PAISLEY
49169 ALPHA DRIVE
WIXOM, MI 48393
PHONE: (248) 860-8365

ARCHITECT
HENRICKSON ARCHITECTURE, LLC.
JACKIE VANDERPLOEG
415 LEONARD ST. NW SUITE 201
GRAND RAPIDS, MI 49504
PHONE: (616) 458-5554

CIVIL ENGINEER
MANNIK SMITH GROUP
TYLER SMITH, P.E.
2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
PHONE: (734) 397-3100
FAX: (734) 397-3131

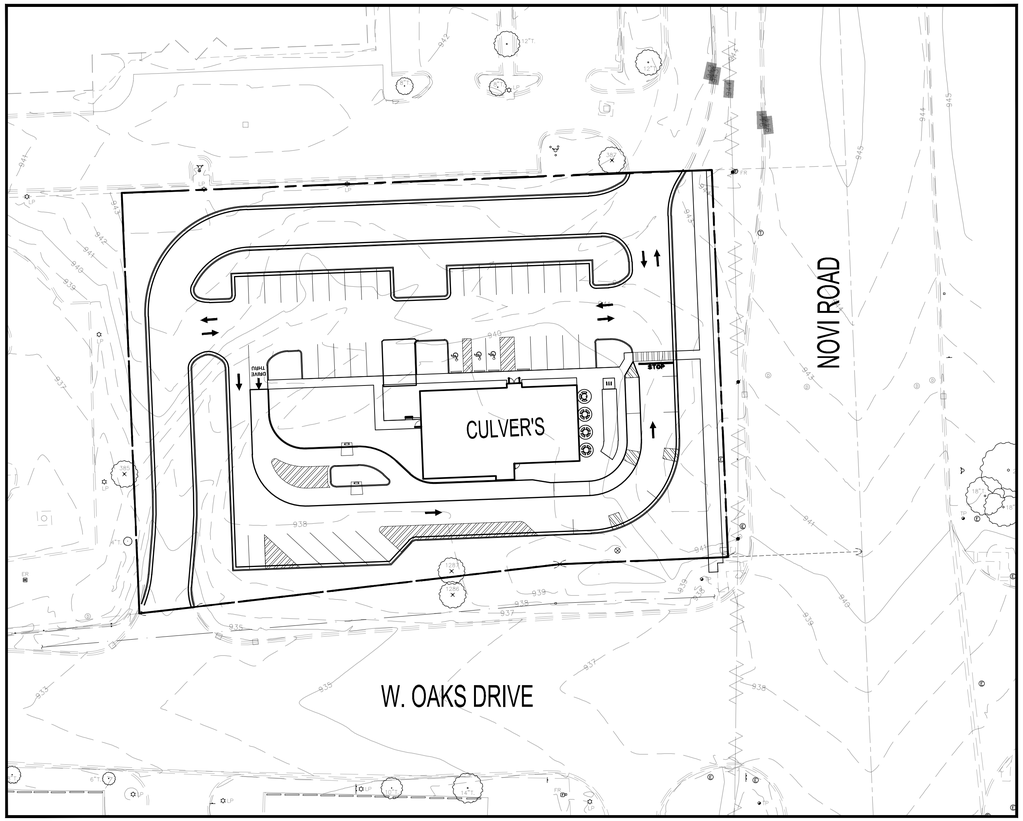
PROJECT SUMMARY

THE PROJECT CONSISTS OF THE VACATING OF EXISTING KAREVICH DRIVE AND REDEVELOPMENT OF THE VACANT PROPERTY AT THE NORTHWEST CORNER OF W OAKS DRIVE AND NOVI ROAD IN NOVI, MICHIGAN 48377.

THE PROJECT CONSISTS OF CONSTRUCTION AND INSTALLATION OF THE PROPOSED CULVER'S "METRO M" TYPE BUILDING, SURROUNDING DRIVE-THRU AND ASSOCIATED PARKING AND DRIVES. LANDSCAPING, UTILITIES, AND STORMWATER TREATMENT ARE ALSO INCLUDED IN THE PROJECT.

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE CURRENT CITY OF NOVI STANDARDS AND SPECIFICATIONS.
2. IF DEWATERING IS ANTICIPATED OR ENCOUNTERED DURING CONSTRUCTION, A DEWATERING PLAN MUST BE SUBMITTED TO THE ENGINEERING DIVISION FOR REVIEW.
3. ALL WORK WITHIN RIGHT-OF-WAY WILL BE CONSTRUCTED IN ACCORDANCE WITH THE RCOC STANDARDS.



PROJECT LIMITS MAP
1" = 40'

SHEET INDEX	
SHEET NUMBER	
01	TITLE SHEET
02	ALTA [BY OTHERS]
03	EXISTING CONDITIONS & DEMOLITION PLAN
04	SITE PLAN
05	GRADING PLAN
06	DETAILED GRADING PLAN
07	UTILITY PLAN - OVERALL
08	UTILITY PLAN - STORM SEWER
09	UTILITY PLAN - STORM SEWER PLAN AND PROFILE
10	UTILITY PLAN - SANITARY
11	UTILITY PLAN - FIRE PROTECTION
12	STORMWATER MANAGEMENT - PLAN
13	STORMWATER MANAGEMENT - DETAILS
14	LIGHTING - PLAN
15	LIGHTING - DETAILS
16	LANDSCAPE - EXISTING CONDTIONS & REMOVAL
17	LANDSCAPE - CALCULATIONS
18	LANDSCAPE - PLAN
19	LANDSCAPE - DETAILS
20	CIVIL - DETAILS
21	IRRIGATION - PLAN
22	IRRIGATION - DETAILS
23	ARCHITECTURAL - DIMENSIONAL FLOOR PLAN
24	ARCHITECTURAL - EXTERIOR ELEVATIONS
25	ARCHITECTURAL - EXTERIOR ELEVATIONS
26	ARCHITECTURAL - FOOD SERVICE PLAN

3 FULL WORKING DAYS
BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #: _____
Survey Ticket #: _____

TYLER SMITH, PE DATE
REGISTERED PROFESSIONAL ENGINEER

JSP 23-37

NO.	DATE	BY	DESCRIPTION
	05/23/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3131

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

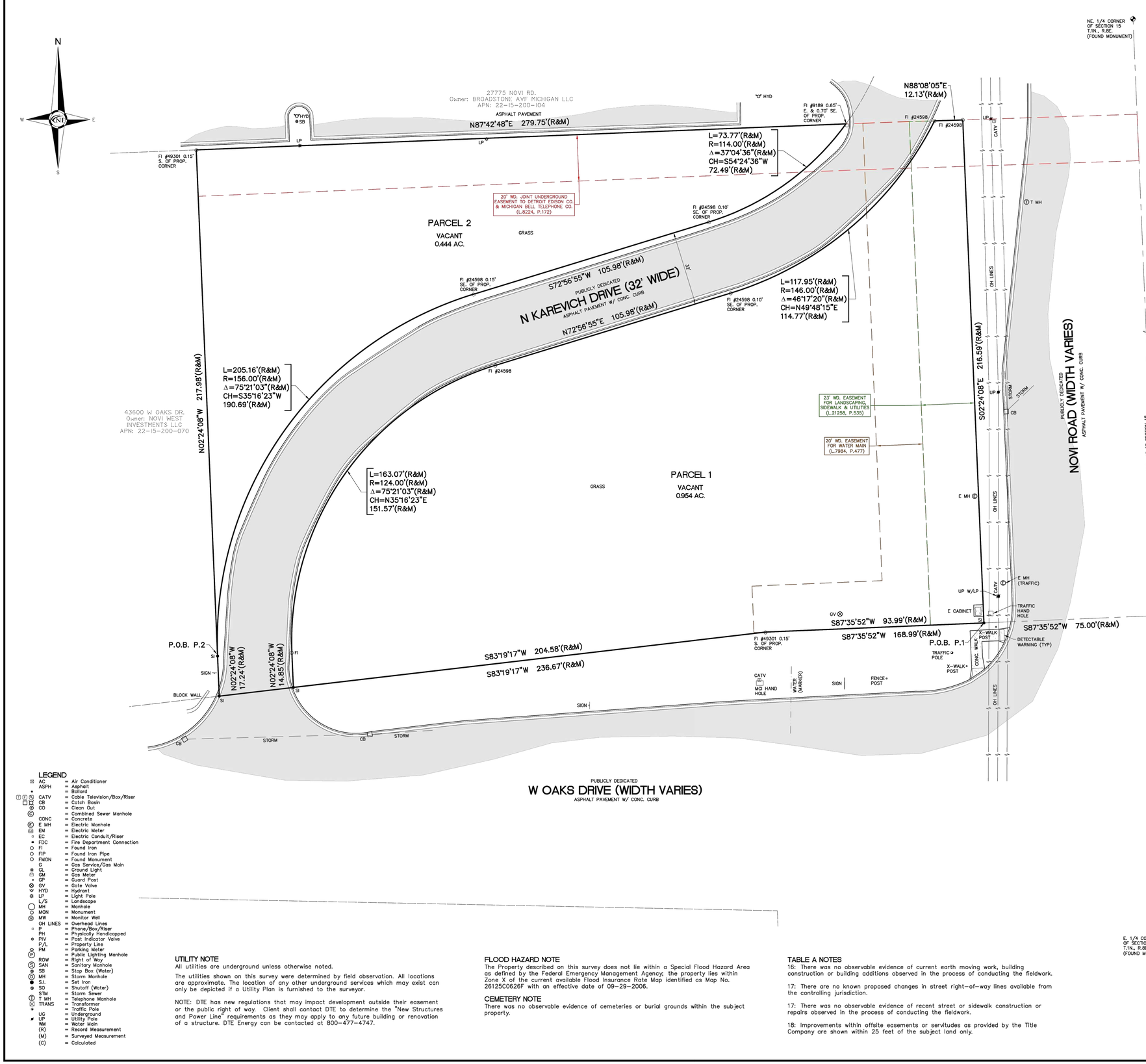
TECHNICAL SKILL. CREATIVE SPIRIT.
Mannik Smith GROUP
www.MannikSmithGroup.com

PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

TITLE

01 / 22



LEGEND

- AC = Air Conditioner
- ASPH = Asphalt
- = Bollard
- CATV = Cable Television/Box/Riser
- CB = Catch Basin
- CO = Clean Out
- = Combined Sewer Manhole
- CONC = Concrete
- E MH = Electric Manhole
- EM = Electric Meter
- EC = Electric Conduit/Riser
- FDC = Fire Department Connection
- FI = Found Iron
- FIP = Found Iron Pipe
- FMON = Found Monument
- G = Gas Service/Gas Main
- GL = Ground Light
- GM = Gas Meter
- GP = Guard Post
- GV = Gate Valve
- HYD = Hydrant
- LP = Light Pole
- L/S = Landscape
- MH = Manhole
- MON = Monument
- MW = Monitor Well
- OH LINES = Overhead Lines
- P = Phone/Box/Riser
- PH = Physically Handicapped
- PIV = Post Indicator Valve
- P/L = Property Line
- PM = Parking Meter
- = Public Lighting Manhole
- ROW = Right of Way
- SAN = Sanitary Manhole
- SB = Stop Box (Water)
- MH = Storm Manhole
- S.I. = Set Iron
- SO = Shutoff (Water)
- STM = Storm Sewer
- T MH = Telephone Manhole
- TRANS = Transformer
- = Traffic Pole
- UG = Underground
- UP = Utility Pole
- WM = Water Main
- (R) = Record Measurement
- (M) = Surveyed Measurement
- (C) = Calculated

UTILITY NOTE
All utilities are underground unless otherwise noted.

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

NOTE: DTE has new regulations that may impact development outside their easement or the public right of way. Client shall contact DTE to determine the "New Structures and Power Line" requirements as they may apply to any future building or renovation of a structure. DTE Energy can be contacted at 800-477-4747.

FLOOD HAZARD NOTE
The Property described on this survey does not lie within a Special Flood Hazard Area as defined by the Federal Emergency Management Agency, the property lies within Zone X of the current available Flood Insurance Rate Map identified as Map No. 26125C0626F with an effective date of 09-29-2006.

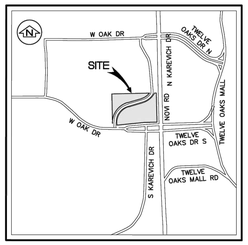
CEMETERY NOTE
There was no observable evidence of cemeteries or burial grounds within the subject property.

TABLE A NOTES
16: There was no observable evidence of current earth moving work, building construction or building additions observed in the process of conducting the fieldwork.

17: There are no known proposed changes in street right-of-way lines available from the controlling jurisdiction.

17: There was no observable evidence of recent street or sidewalk construction or repairs observed in the process of conducting the fieldwork.

18: Improvements within offsite easements or servitudes as provided by the Title Company are shown within 25 feet of the subject land only.



LOCATION MAP

LEGAL DESCRIPTION
Land in the City of Novi, Oakland County, MI, described as follows:

Parcel 1:
Part of the Northeast 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as beginning at a point located North 02 degrees 24 minutes 08 seconds West 1103.75 feet along the East line of said Section 15 and South 87 degrees 35 minutes 52 seconds West 75.00 feet from the East 1/4 corner of said Section; thence continuing South 87 degrees 35 minutes 52 seconds West 93.99 feet; thence South 83 degrees 19 minutes 17 seconds West 204.58 feet; thence North 02 degrees 24 minutes 08 seconds West 14.85 feet to a point of curve; thence along the arc of a curve to the right 163.07 feet to a point of tangency, said curve having a radius of 124.00 feet, a central angle of 75 degrees 21 minutes 03 seconds, and a long chord bearing North 35 degrees 16 minutes 23 seconds East 151.57 feet; thence North 72 degrees 56 minutes 55 seconds East 105.98 feet to a point of curve; thence along the arc of a curve to the left 117.95 feet to a non-tangent point, said curve having a radius of 146.00 feet, a central angle of 46 degrees 17 minutes 20 seconds, and a long chord bearing North 49 degrees 48 minutes 15 seconds East 114.77 feet; thence North 88 degrees 08 minutes 05 seconds East 12.13 feet; thence South 02 degrees 24 minutes 08 seconds East 216.59 feet to the point of beginning.

Parcel 2:
Part of the Northeast 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as beginning at a point located North 02 degrees 24 minutes 08 seconds West 1103.75 feet along the East line of said Section 15 and South 87 degrees 35 minutes 52 seconds West 168.99 feet and South 83 degrees 19 minutes 17 seconds West 236.67 feet and North 02 degrees 24 minutes 08 seconds West 17.24 feet from the East 1/4 corner of said Section; thence continuing North 02 degrees 24 minutes 08 seconds West 217.98 feet; thence North 87 degrees 42 minutes 48 seconds East 279.75 feet to a point on curve; thence along the arc of a curve to the right 73.77 feet to a point of tangency, said curve having a radius of 114.00 feet, a central angle of 37 degrees 04 minutes 36 seconds, and a long chord bearing South 54 degrees 24 minutes 36 seconds West 72.49 feet; thence South 72 degrees 56 minutes 55 seconds West 105.98 feet to a point of curve; thence along the arc of a curve to the left 205.16 feet, said curve having a radius of 156.00 feet, a central angle of 75 degrees 21 minutes 03 seconds, and a long chord bearing South 35 degrees 16 minutes 23 seconds West 190.69 feet to the point of beginning.

Novi Road and West Oaks Drive – Vacant
Tax ID: Parcel 1 22-15-200-099 & Parcel 2 22-15-200-097

BASIS OF BEARING NOTE
The basis of bearing for this survey was established by the record description as shown in the Title Commitment referenced hereon.

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

3. Easements, encumbrances, or claims thereof, not shown by the Public Records.

7. Easement granted to Michigan Bell Telephone Company, a Michigan Corporation disclosed by instrument recorded in Liber 6139, Page 332, Oakland County Records. (Affects Parcel 2) [EASEMENT IS WITHIN THE PUBLIC R.O.W. OF NOVI ROAD AND DOES NOT TOUCH THE SURVEYED LAND AND ITS LOCATION IS NOT SHOWN].

8. The terms, provisions and easement(s) contained in the document entitled "Declaration of Easements" recorded April 08, 1981 as Liber 7984, Page 477 of Official Records. (Affects both Parcels) [PERMANENT EASEMENT IS WITHIN THE SURVEYED LAND AND ITS LOCATION IS SHOWN].

9. The terms, provisions and easement(s) contained in the document entitled "Joint Underground Easement" recorded August 09, 1982 as Liber 8224, Page 172 of Official Records. (Affects both Parcels) [EASEMENT IS WITHIN THE SURVEYED LAND AND ITS LOCATION IS SHOWN].

10. The terms, provisions and easement(s) contained in the document entitled "Warranty Deed" recorded April 04, 2000 as Liber 21258, Page 535 of Official Records. (Affects Parcel 1) [EASEMENT IS WITHIN THE SURVEYED LAND AND ITS LOCATION IS SHOWN].

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

12. Rights of tenants under unrecorded leases.

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

ALL EXCEPTIONS SHOWN OR NOTED ON THIS SURVEY WERE OBTAINED FROM TITLE COMMITMENT NO. NCS-1183326-MICH, WITH A COMMITMENT DATE OF 06-20-2023, ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY.

SITE DATA
Gross Land Area:
41,566 Square Feet or 0.954 Acres – PARCEL 1
19,326 Square Feet or 0.444 Acres – PARCEL 2
There exist no parking spaces on surveyed land – vacant.
Zoned: RC (Regional Center District)
Building Setbacks:
Front= 100'
Sides= 100'
Rear= 100'

Max. Building Height permitted: 3 stories/45'

The above zoning and zoning requirements were obtained from the City of Novi online Zoning Map and Zoning Ordinance.

NOTE: The setbacks & height restrictions noted above are for reference purposes only and should not be used for design or construction and should not be used to determine compliance. A surveyor cannot make a certification on the basis of an interpretation or opinion of another party. A zoning endorsement letter should be obtained from the City of Novi to insure conformity as well as make a final determination of the required building setback & height requirements.

SURVEYOR'S CERTIFICATION
To:

Novi 4 and 5, LLC, a Michigan limited liability company
First American Title Insurance Company

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2021 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes items 1, 2, 3, 4, 6(a), 6(b), 7(a), 7(b1), 7(c), 8, 9, 11(a), 13, 14, 16, 17, 18 & 19 of Table A thereof.

The field work was completed on 07-07-2023.

Kevin Christopher Navaroli, P.S.
No 4001053503
Date of Plat or Map: 07-17-2023
Revised:

STATE OF MICHIGAN
KEVIN CHRISTOPHER NAVAROLI
License No. 4001053503
LICENSED PROFESSIONAL SURVEYOR

NF ENGINEERS
CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS

NOWAK & FRAUS ENGINEERS
46777 WOODWARD AVENUE
PONTIAC, MI 48342
TEL. (248) 332-7931
FAX. (248) 332-8257
www.nowakfraus.com
EMAIL: rfraus@nfe-engr.com

PROJECT
NOVI ROAD AND WEST OAKS DRIVE

PROJECT LOCATION
Vacant
Novi Road &
West Oaks Drive
Part of the NE. 1/4 of
Section 15, T.1N., R.8E.,
City of Novi,
Oakland County, MI

SHEET
ALTA / NSPS
Land Title Survey

REVISIONS

DRAWN BY:
A.G.

APPROVED BY:
K.N./R.FRAUS

EMAIL:
rfraus@nfe-engr.com

DATE ISSUED:
07-17-2023

SCALE: 1" = 20'
20 10 0 10 20 30

NFE JOB NO.
N706

SHEET NO.
02 of 22

MISS DIG / UTILITY DISCLAIMER NOTE

A MISS DIG TICKET NUMBER 2023100502363, PURSUANT TO MICHIGAN PUBLIC ACT 174 WAS ENTERED FOR THE SURVEYED PROPERTY. DUE TO THE EXTENDED REPORTING PERIOD FOR UNDERGROUND FACILITY OWNERS TO PROVIDE THEIR RECORDS, THE SURVEY MAY NOT REFLECT ALL THE UTILITIES AT THE TIME THE SURVEY WAS ISSUED ON OCTOBER 12, 2023. THE SURVEY ONLY REFLECTS THOSE UTILITIES WHICH COULD BE OBSERVED BY THE SURVEYOR IN THE FIELD OR AS DEPICTED BY THE UTILITY COMPANY RECORDS FURNISH PRIOR TO THE DATE THIS SURVEY WAS ISSUED. THE CLIENT AND/OR THEIR AUTHORIZED AGENT SHALL VERIFY WITH THE FACILITY OWNERS AND/OR THEIR AUTHORIZED AGENTS, THE COMPLETENESS AND EXACTNESS OF THE UTILITIES LOCATION.

DTE DISCLAIMER NOTE

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

SURVEY DATA

SITE AREA:
PARCEL 1: 41,566 SQUARE FEET OR 0.954 ACRES
PARCEL 2: 19,326 SQUARE FEET OR 0.444 ACRES
ZONED:
RC, REGIONAL CENTER DISTRICT

PARKING SPACES:
NO PARKING SPACES (VACANT)

BUILDING SETBACKS:
FRONT: 100'
SIDES: 100'
REAR: 100'

MAX. BUILDING HEIGHT PERMITTED:
3 STORIES / 45 FEET

THE ABOVE ZONING AND ZONING REQUIREMENTS WERE OBTAINED FROM THE CITY OF NOVI ONLINE ZONING MAP AND ZONING ORDINANCE.
FRONT: THE SETBACKS & HEIGHT RESTRICTIONS NOTED ABOVE ARE FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION AND SHOULD NOT BE USED TO DETERMINE COMPLIANCE. A SURVEYOR CANNOT MAKE A CERTIFICATION ON THE BASIS OF AN INTERPRETATION OR OPINION OF ANOTHER PARTY. A ZONING ENDORSEMENT LETTER SHOULD BE OBTAINED FROM THE CITY OF NOVI TO INSURE CONFORMITY AS WELL AS MAKE A FINAL DETERMINATION OF THE REQUIRED BUILDING SETBACK & HEIGHT REQUIREMENTS.

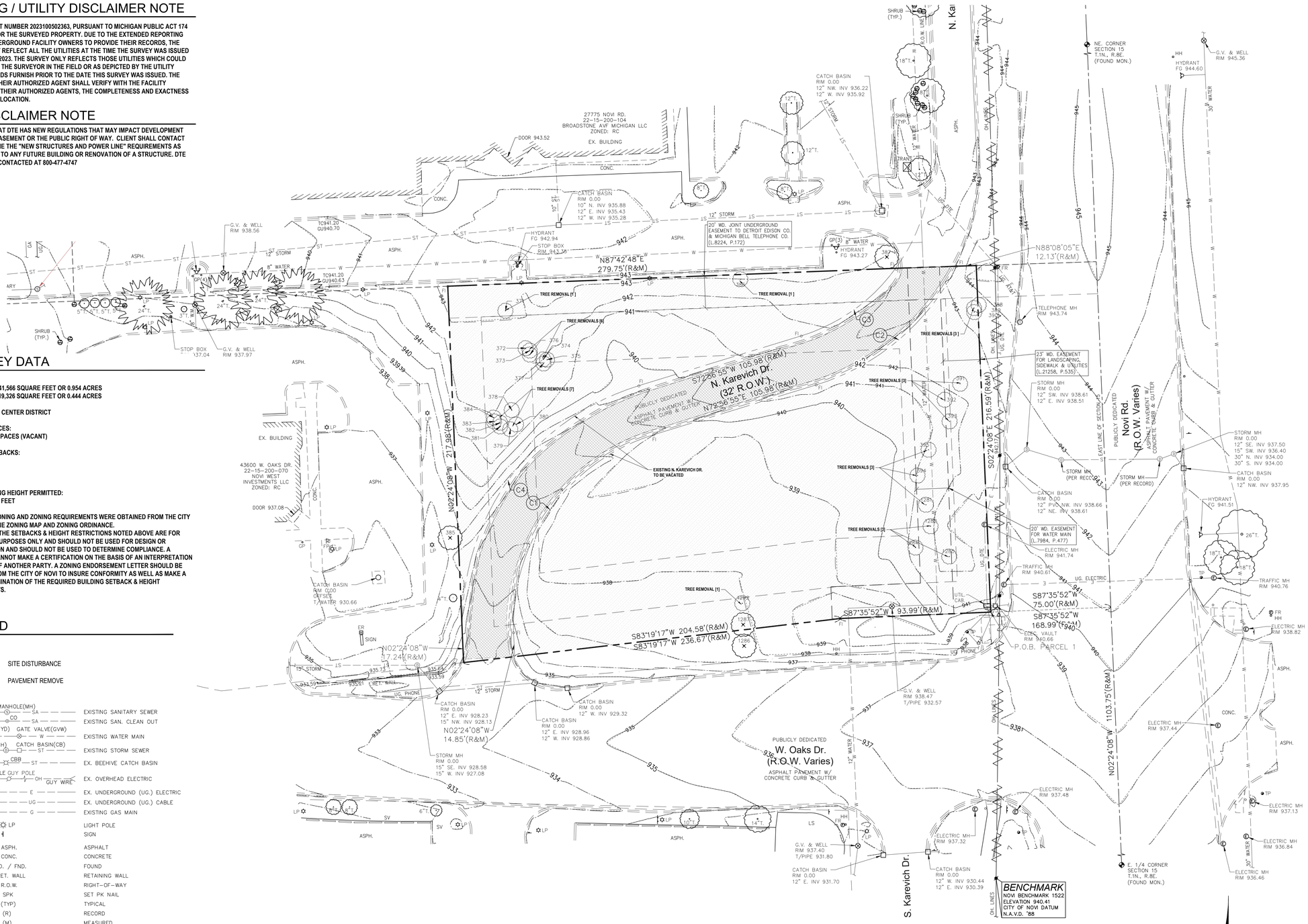
LEGEND

SITE DISTURBANCE

PAVEMENT REMOVE

- EXISTING SANITARY SEWER
- EXISTING SAN. CLEAN OUT
- EXISTING WATER MAIN
- EXISTING STORM SEWER
- EX. BEEHIVE CATCH BASIN
- EX. OVERHEAD ELECTRIC
- EX. UNDERGROUND (UG.) ELECTRIC
- EX. UNDERGROUND (UG.) CABLE
- EXISTING GAS MAIN
- LIGHT POLE
- SIGN

ASPH.	ASPHALT
CONC.	CONCRETE
FD. / FND.	FOUND
RET. WALL	RETAINING WALL
R.O.W.	RIGHT–OF–WAY
SPK	SET PK NAIL
(TYP)	TYPICAL
(R)	RECORD
(M)	MEASURED
C/L	CENTERLINE
P/L	PROPERTY LINE
GM	GAS METER
EM	ELECTRIC METER
LS	LANDSCAPE
TP	TRAFFIC POLE
FP	FLAG POLE
HH	HAND HOLE
ER	ELECTRIC RISER
FR	FIBER RISER
GP	GUARD POST
SV	SPRINKLER VALVE



TOPOGRAPHIC SURVEY NOTES

ALL ELEVATIONS ARE EXISTING ELEVATIONS, UNLESS OTHERWISE NOTED.

UTILITY LOCATIONS WERE OBTAINED FROM MUNICIPAL OFFICIALS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.

THIS SURVEY MAY NOT SHOW ALL EASEMENTS OF RECORD UNLESS AN UPDATED TITLE POLICY IS FURNISHED TO THE SURVEYOR BY THE OWNER.

DATUM

ALL ELEVATIONS SHOWN HEREON ARE ON THE CITY OF NOVI DATUM (CITY OF NOVI BENCHMARK #1522, REFERENCED HEREON);
BEING THE SAME AS THE N.A.V.D. 88 DATUM (CORS).

BASIS OF BEARING

THE BASIS OF BEARING FOR THIS SURVEY WAS ESTABLISHED BY THE RECORD DESCRIPTION AS SHOWN IN THE TITLE COMMITMENT AS REFERENCED BELOW:

THE LEGAL DESCRIPTION(S) AND ALL EXCEPTIONS SHOWN OR NOTED ON THIS SURVEY WERE OBTAINED FROM TITLE COMMITMENT NO. NCS-1183326-MICH, WITH A COMMITMENT DATE OF 06-20-2023, ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY.

3 FULL WORKING DAYS BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #: _____
Survey Ticket #: _____

NO.	DATE	BY	DESCRIPTION
	05/03/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3151

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE IMPACT.
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PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

EXISTING CONDITIONS & DEMOLITION PLAN

03 / 22

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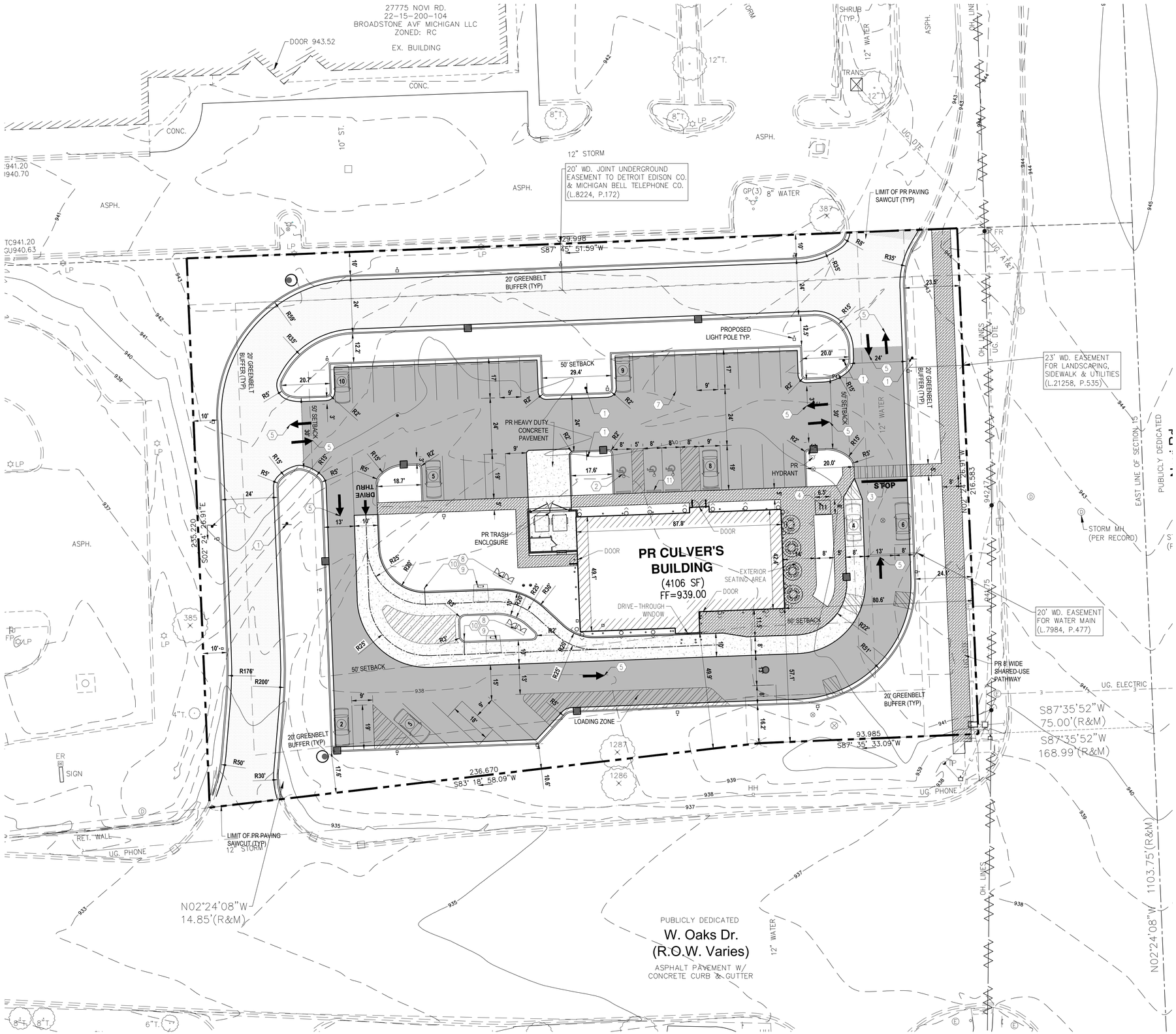

LEGEND

- CONCRETE PAVEMENT
- HMA PAVMENT
- HEAVY DUTY HMA PAVMENT
- CONCRETE SIDEWALK
- SPILL OUT CURB
- STANDARD CURB & GUTTER
- PROPOSED LIGHT POLE
- PROPOSED STORM INLET
- PROPOSED STORM MANHOLE
- PROPOSED ADS BARRICUDA STRUCTURE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED CLEANOUT
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED WATERMAIN REDUCER

SITE DATA TABLE

SITE AREA: 1.69 ACRES (73,763 SF.) NET AND GROSS

ZONING: RC

PROPOSED USE: RESTAURANT (4,060 SF.)

BUILDING INFORMATION:
MAXIMUM ALLOWABLE BUILDING HEIGHT = 45 FEET
PROPOSED BUILDING HEIGHT = 23 FEET (1 STORY)
BUILDING FOOTPRINT AREA = 4,060 SF
BUILDING LOT COVERAGE = 5.6%

SETBACK REQUIREMENTS:

	REQUIRED:	PROPOSED:
FRONT:	100'	50.52'
SIDE:	100'	100'
REAR:	100'	100'

PARKING CALCULATIONS:
RESTAURANT = ONE FOR EVERY TWO EMPLOYEES, PLUS FOR EVERY TWO CUSTOMERS ALLOWED UNDER MAXIMUM CAPACITY (INCLUDING WAITING AREAS)
TOTAL PARKING REQUIRED = 90 SEATS / 2 = 45 SPACES
+ 6 EMPLOYEES PER SHIFT / 2 = 3
= 48 SPACES

TOTAL PROPOSED PARKING SPACES = 49 SPACES INC. 3 H/C SPACES

LOADING CALCULATIONS:
LOADING REQUIRED = 1 10'X50' SPACE
LOADING PROVIDED=500 SF AT BACK OF BUILDING

SITE PLAN NOTES

1. THERE WILL NOT BE ANY ROOFTOP EQUIPMENT INCLUDED WITH THE PROPOSED CULVER'S BUILDING
2. OUTDOOR SEATING PERMITTED BETWEEN MARCH 1ST AND NOVEMBER 30TH.
3. ALL TRAFFIC SIGNAGE WILL COMPLY WITH THE CURRENT MMUTCD STANDARDS.

1. FIRE LANE
2. BARRIER FREE PARKING STRIPING
3. STOP BAR
4. 3 BIKE HOOPS
5. DIRECTIONAL ARROW
6. DRIVE THRU ARROW
7. 4" WIDE PARKING STRIPE
8. MENU BOARD
9. DRIVE-THRU CALL BOX
10. HEIGHT RESTRICTION POLE
11. WHEEL STOP

GRAPHIC SCALE
0 20 40

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CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
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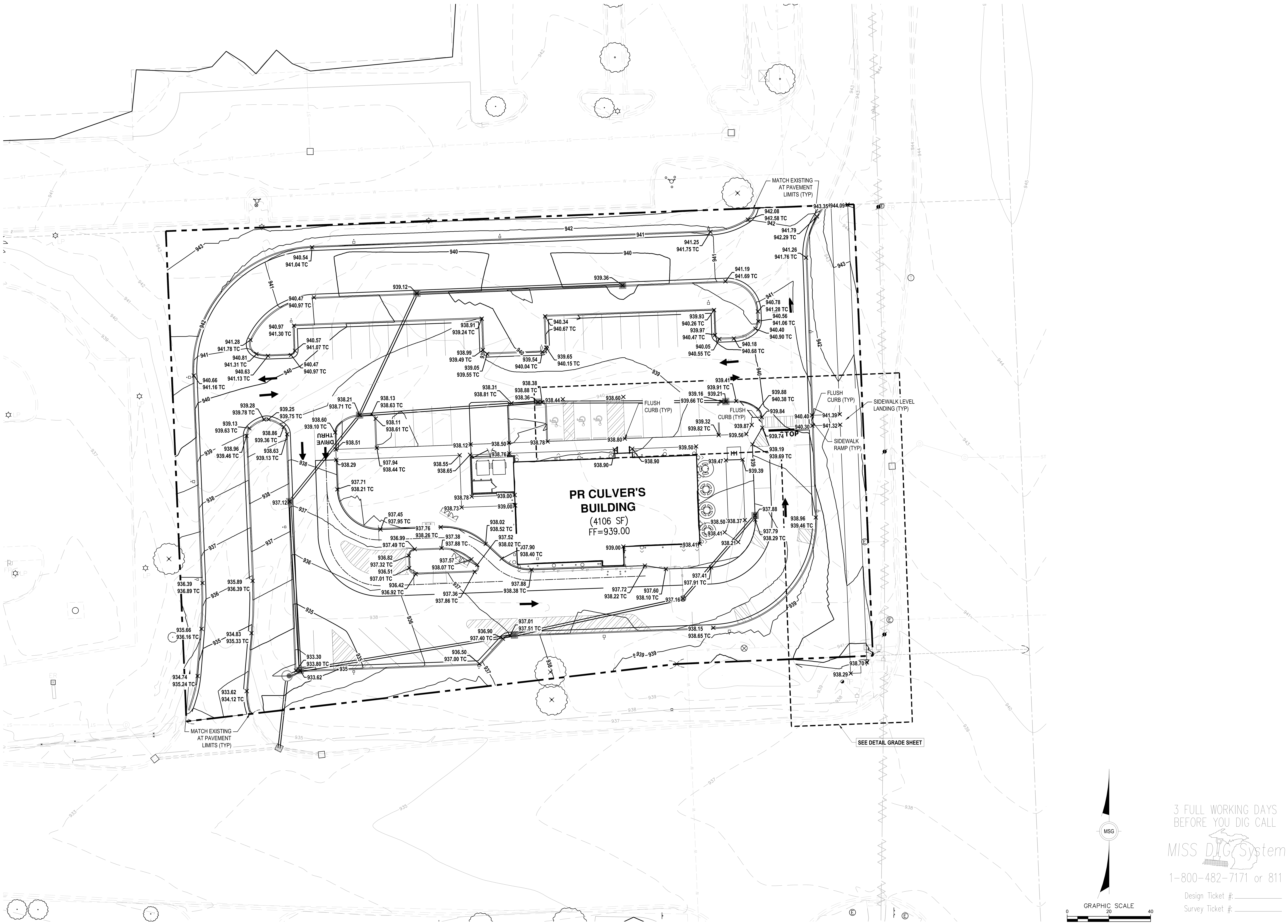
04 | 22



NO.	DATE	BY	DESCRIPTION
	06/23/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

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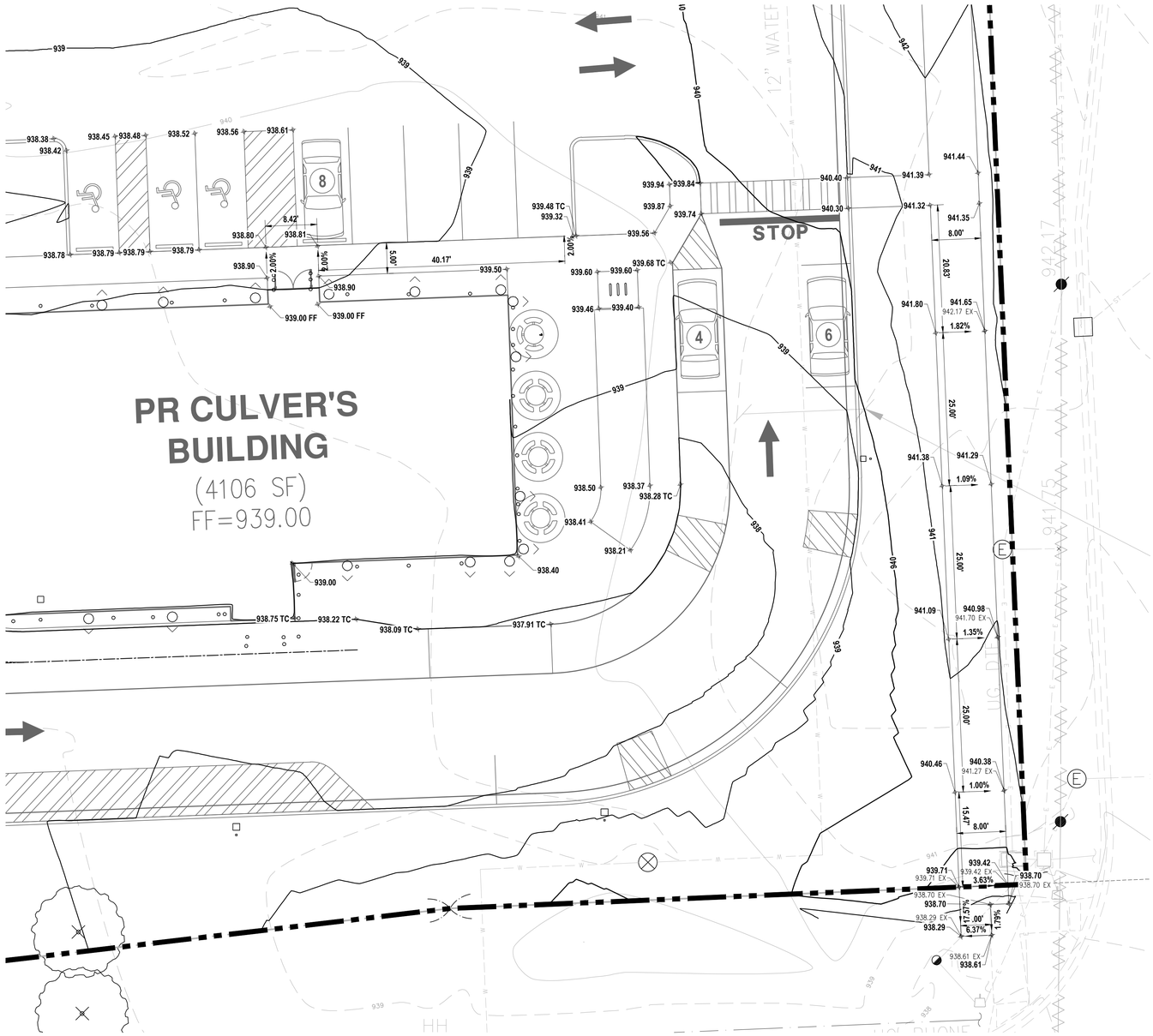
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

GRADING PLAN



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Design Ticket #:
Survey Ticket #:

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	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3101

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
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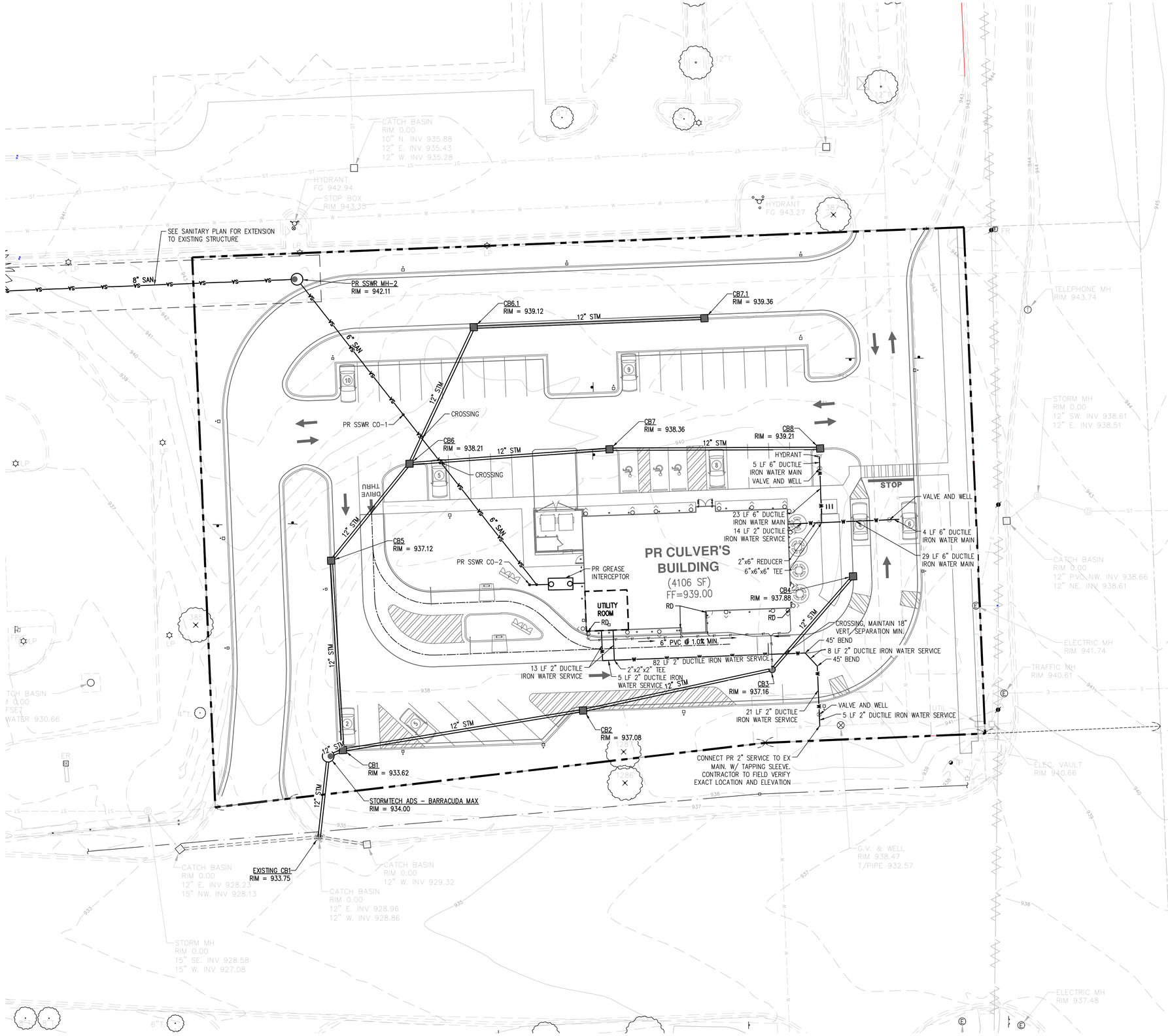
PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

DETAIL GRADE

06 | 22



LEGEND

- CONCRETE PAVEMENT
- HMA PAVMENT
- HEAVY DUTY HMA PAVMENT
- CONCRETE SIDEWALK
- SPILL OUT CURB
- STANDARD CURB & GUTTER
- PROPOSED LIGHT POLE
- PROPOSED STORM INLET
- PROPOSED STORM MANHOLE
- PROPOSED ADS BARRICUDA STRUCTURE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED CLEANOUT
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED WATERMAIN REDUCER

UTILITY NOTES

1. CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN EXCAVATING AROUND EXISTING UTILITIES. COORDINATE ANY RELOCATION WITH RESPECTIVE UTILITY OWNER.
2. THE INFORMATION SHOWN CONCERNING EXISTING UTILITIES IS NOT REPRESENTED, WARRANTED OR GUARANTEED TO BE COMPLETE OR ACCURATE. INVESTIGATION, LOCATION, SUPPORT, PROTECTION, AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, PRIOR TO CONSTRUCTION TO DETERMINE IN THE FIELD THE ACTUAL LOCATION AND ELEVATIONS OF ALL EXISTING UTILITIES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL CALL MISS DIG 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
3. THE CONTRACTOR SHALL PROVIDE MINIMUM CLEARANCES OF 1.0' VERTICAL AND 3.0' HORIZONTAL BETWEEN ALL UNDERGROUND UTILITIES. WATER, SANITARY AND STORM UTILITIES REQUIRE MINIMUM CLEARANCES OF 1.5' VERTICAL AND 10.0' HORIZONTAL. NO FACILITY SHALL BE INSTALLED WITH LESS THAN THESE MINIMUM CLEARANCES WITHOUT THE WRITTEN APPROVAL OF THE OWNERS OF THE OTHER FACILITIES INVOLVED. THE CONTRACTOR SHALL EXPOSE ALL UTILITIES OR STRUCTURES PRIOR TO CONSTRUCTION TO VERIFY THE VERTICAL AND HORIZONTAL CLEARANCES WITH PROPOSED CONSTRUCTION. THE FLOW OF ALL SEWERS, DRAINS AND WATER COURSES ENCOUNTERED AND DISTURBED OR DESTROYED DURING THE PROSECUTION OF THE WORK SHALL BE RESTORED BY THE CONTRACTOR TO A SATISFACTORY CONDITION.
4. COMPACTED SAND BACKFILL (MDOT SAND CLASS II) SHALL BE PROVIDED FOR ALL UTILITIES WITHIN THE INFLUENCE OF PAVED AREAS.
5. THE CONTRACTOR SHALL RESTORE OFF-SITE CONSTRUCTION AREAS TO EQUAL OR BETTER CONDITION THAN EXISTED PRIOR TO COMMENCEMENT.
6. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES FOUND BETWEEN THE PLANS OR FIELD CONDITIONS PRIOR TO START OF CONSTRUCTION.
7. CONTRACTOR SHALL COORDINATE ELECTRICAL SERVICE WITH UTILITY COMPANY TO VERIFY THE LOCATION, ORIGIN OF SERVICE, AND ALL STANDARDS FOR WORK. SEE ARCHITECTURAL PLANS FOR ADDITIONAL DETAILS.
8. ALL PROPOSED STORM SEWER PIPES SHALL BE RCP UNLESS STATED OTHERWISE.
9. PER THE TEN STATES STANDARDS ARTICLE 8.8.3, ONE FULL 20-FOOT PIPE LENGTH OF WATER MAIN SHALL BE USED WHENEVER STORM SEWER OR SANITARY SEWER IS CROSSED, AND THE PIPE SHALL BE CENTERED ON THE CROSSING, IN ORDER TO ENSURE 10-FOOT SEPARATION BETWEEN WATER MAIN AND SEWERS."

STORM

755 LF	–	12" RCP STORM SEWER
144 LF	–	6" RCP ROOF DRAIN STORM
9	–	2' X 3' RECTANGULAR MANHOLE
1	–	5' CIRCULAR CATCH BASIN
1	–	STORMTECH ADS – BARRACUDA MAX

SANITARY

185 LF	–	6" SANITARY SEWER (SDR 23.5 MINIMUM)
300 LF	–	8" SANITARY SEWER (SDR 26)
2	–	5' CIRCULAR MANHOLE
2	–	SANITARY CLEANOUT
1	–	GREASE INTERCEPTOR

WATER

159 LF	–	2" DUCTILE IRON WATER SERVICE
1	–	2" VALVE AND WELL
2	–	45° BEND
1	–	2"x2"x2" TEE
61 LF	–	6" DUCTILE IRON WATER MAIN
2	–	6" VALVE AND WELL
1	–	6"x6"x6" TEE
1	–	2"x6" REDUCER
1	–	HYDRANT

GRAPHIC SCALE
0 20 40

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PRELIMINARY SITE PLAN
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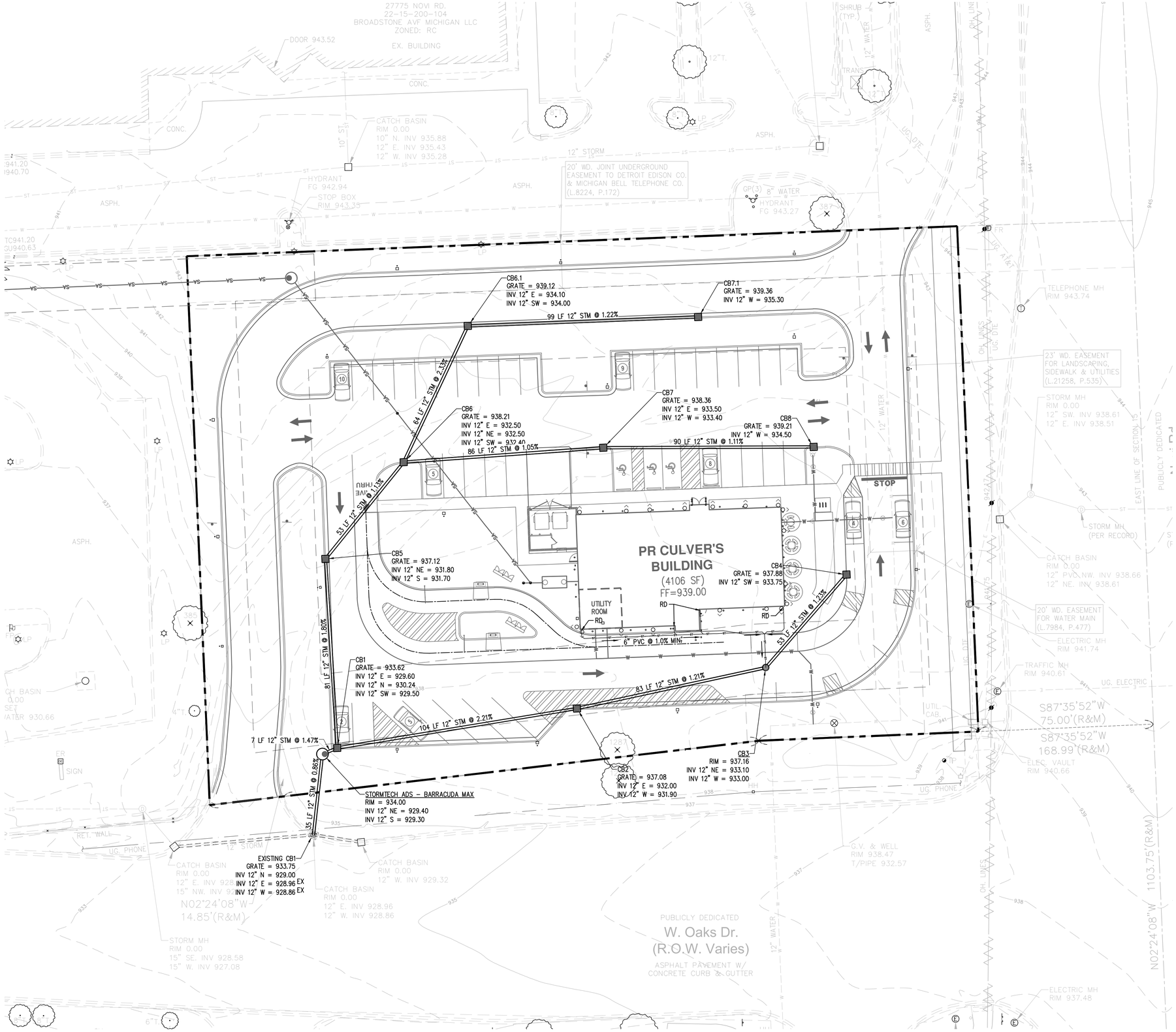
NOVI, MI 48137

OVERALL UTILITY PLAN

07 / 22



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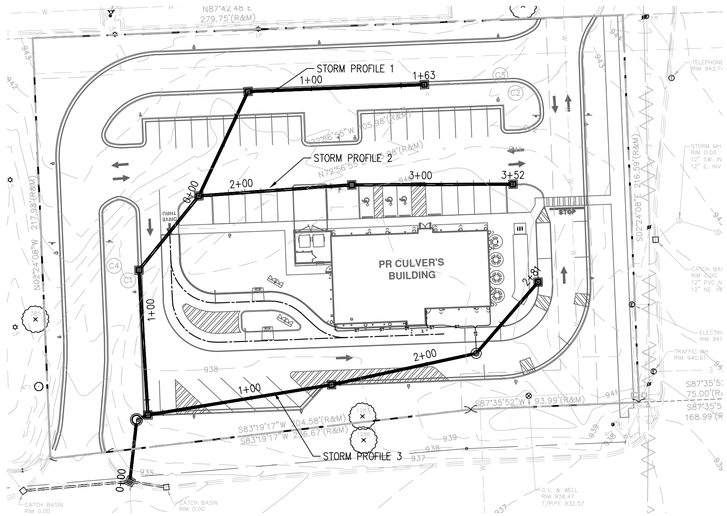
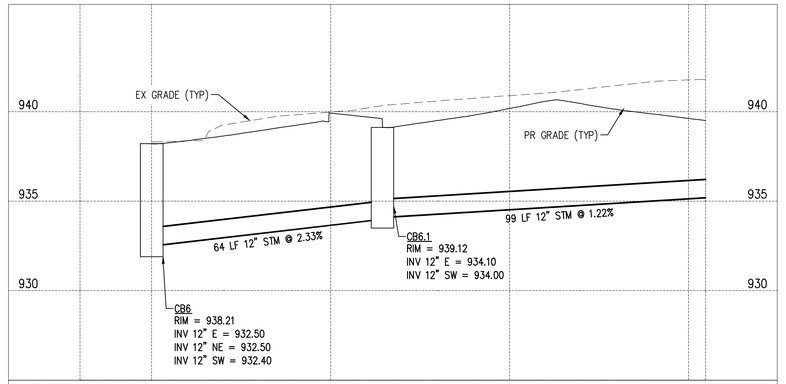
UTILITY PLAN
STORM SEWER

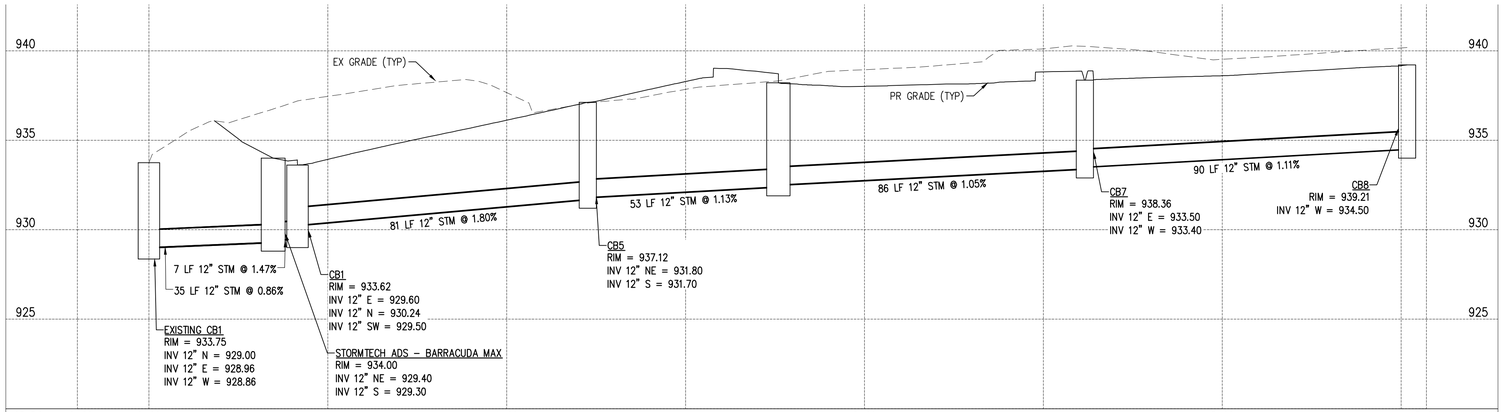
08 | 22





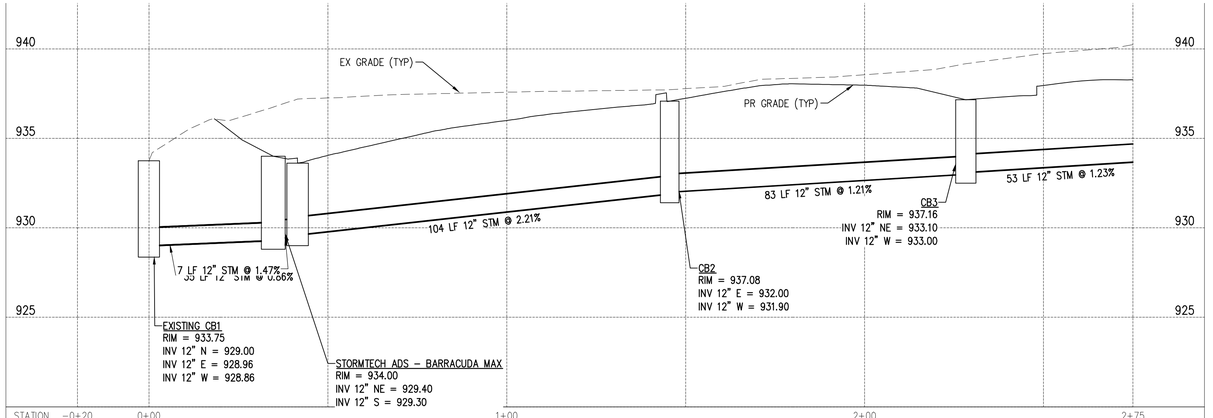
STATION −0+20	0+00	1+00	1+55
SURFACE	938.31	940.90	941.82
PR ELEV	938.31	940.90	941.82

STORM PROFILE 1 (1)
SCALE: VERT: 1"=4' HORIZ: 1"=20'



STATION −0+20	0+00	1+00	2+00	3+00	3+57
SURFACE	933.75	937.67	938.94	939.52	
PR ELEV	933.75	937.67	938.94	939.52	

STORM PROFILE 2 (2)
SCALE: VERT: 1"=4' HORIZ: 1"=20'



STATION −0+20	0+00	1+00	2+00	2+75
SURFACE	933.75	937.58	938.55	940.24
PR ELEV	933.75	937.58	938.55	940.24

STORM PROFILE 3 (3)
SCALE: VERT: 1"=4' HORIZ: 1"=20'

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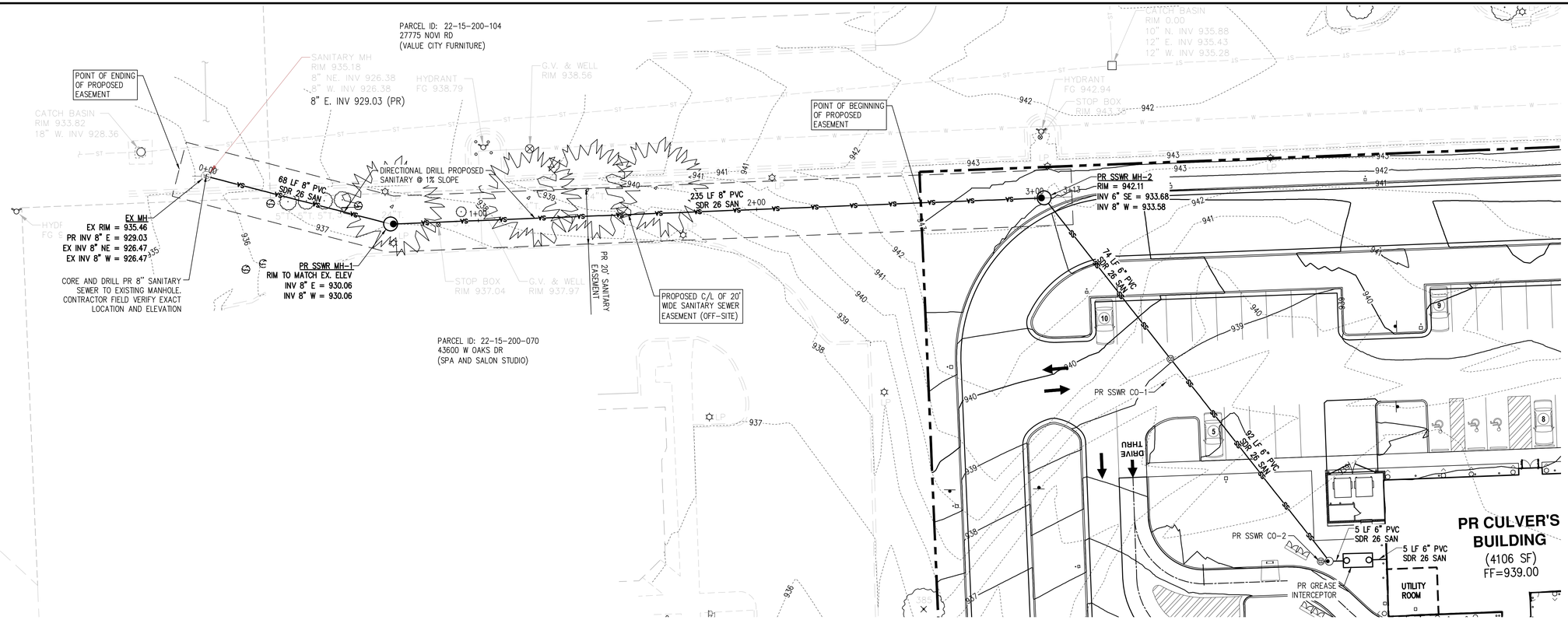
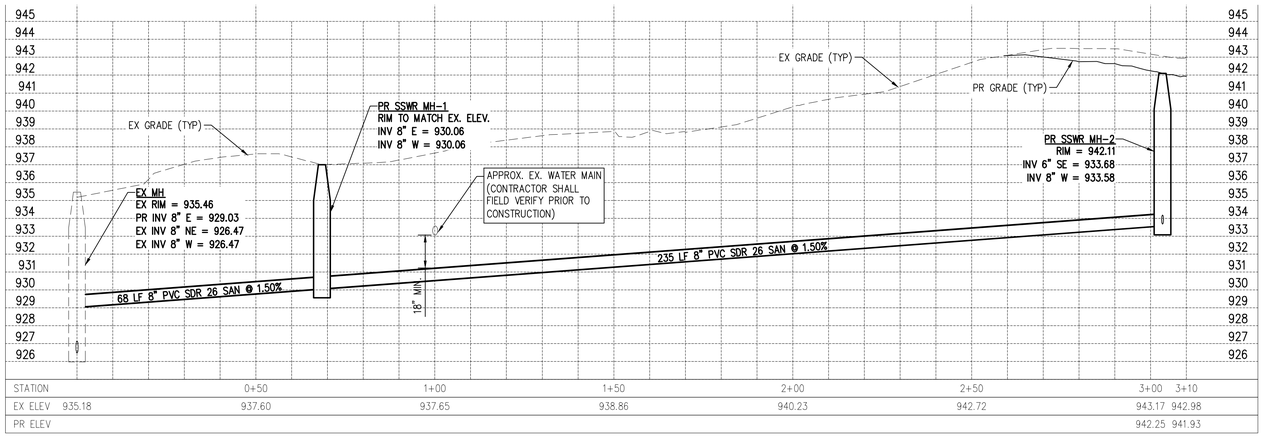
UTILITY PLAN
STORM SEWER

09 / 22





LEGEND

- EX SANITARY LINE
- EX WATER LINE
- EX STORM LINE
- EX SANITARY MANHOLE
- EX STORM MANHOLE
- EX HYDRANT & VALVE
- EX UTILITY POLE
- EX STORM CURB INLET
- PR WATER SERVICE
- PR SANITARY SERVICE
- PR SANITARY MAIN
- PR CATCH BASIN
- PR CURB AND GUTTER INLET
- PR SANITARY MANHOLE

GRAPHIC SCALE 0 20 40

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UTILITY PLAN
SANITARY SEWER

10 / 22

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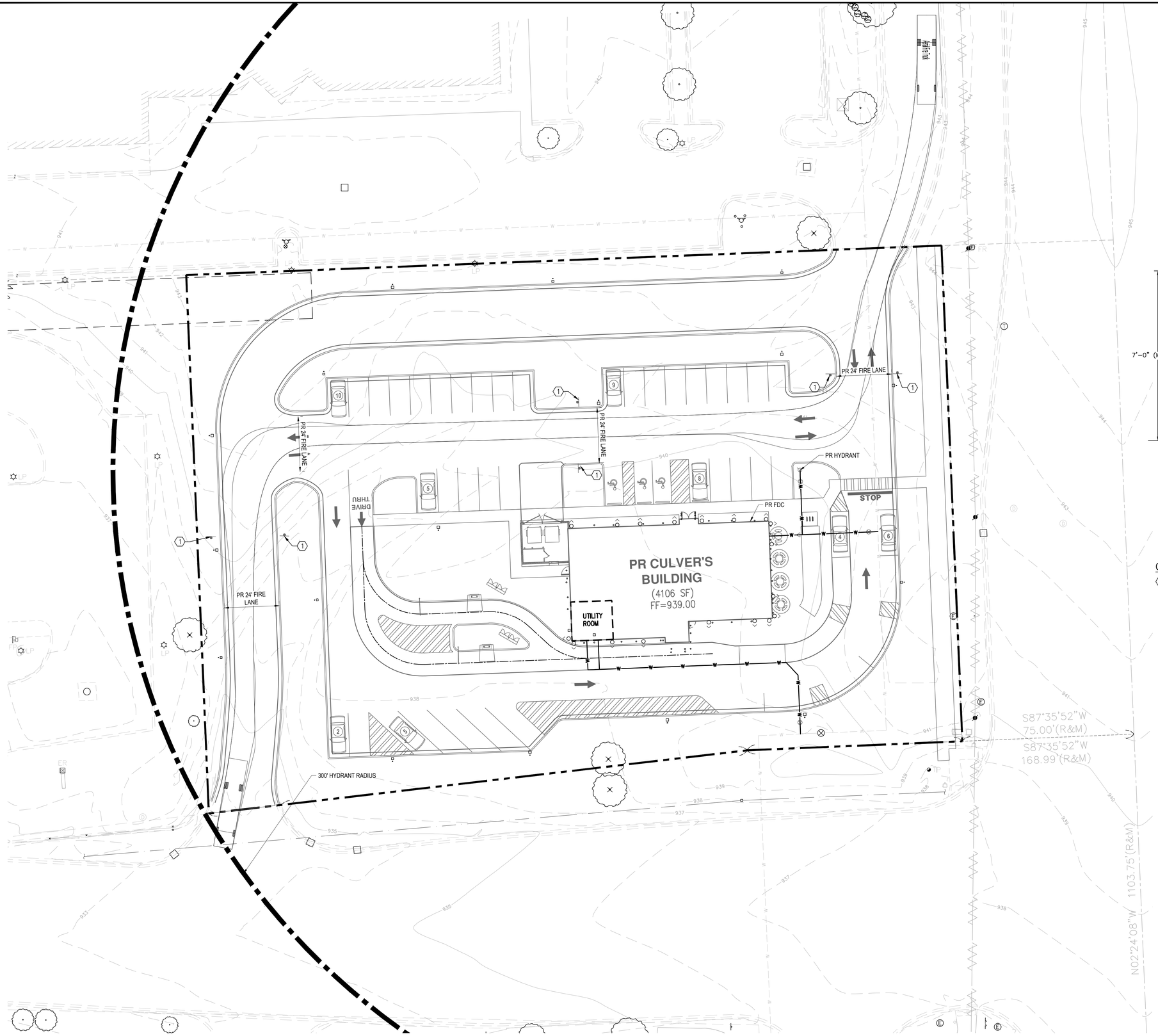
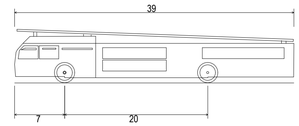
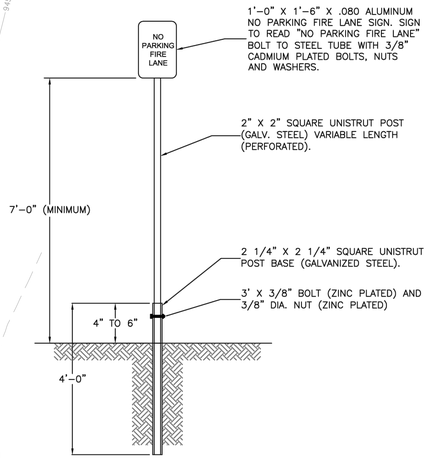




Aerial Fire Truck	
Overall Length	39.00'
Overall Width	8.167'
Overall Body Height	7.500'
Min Body Ground Clearance	0.750'
Track Width	8.167'
Lock-to-lock time	5.00s
Max Wheel Angle	45.00°



NO PARKING FIRE LANE SIGN DETAIL

CODED NOTES

(1) NO PARKING FIRE LANE SIGN

GRAPHIC SCALE
0 20 40

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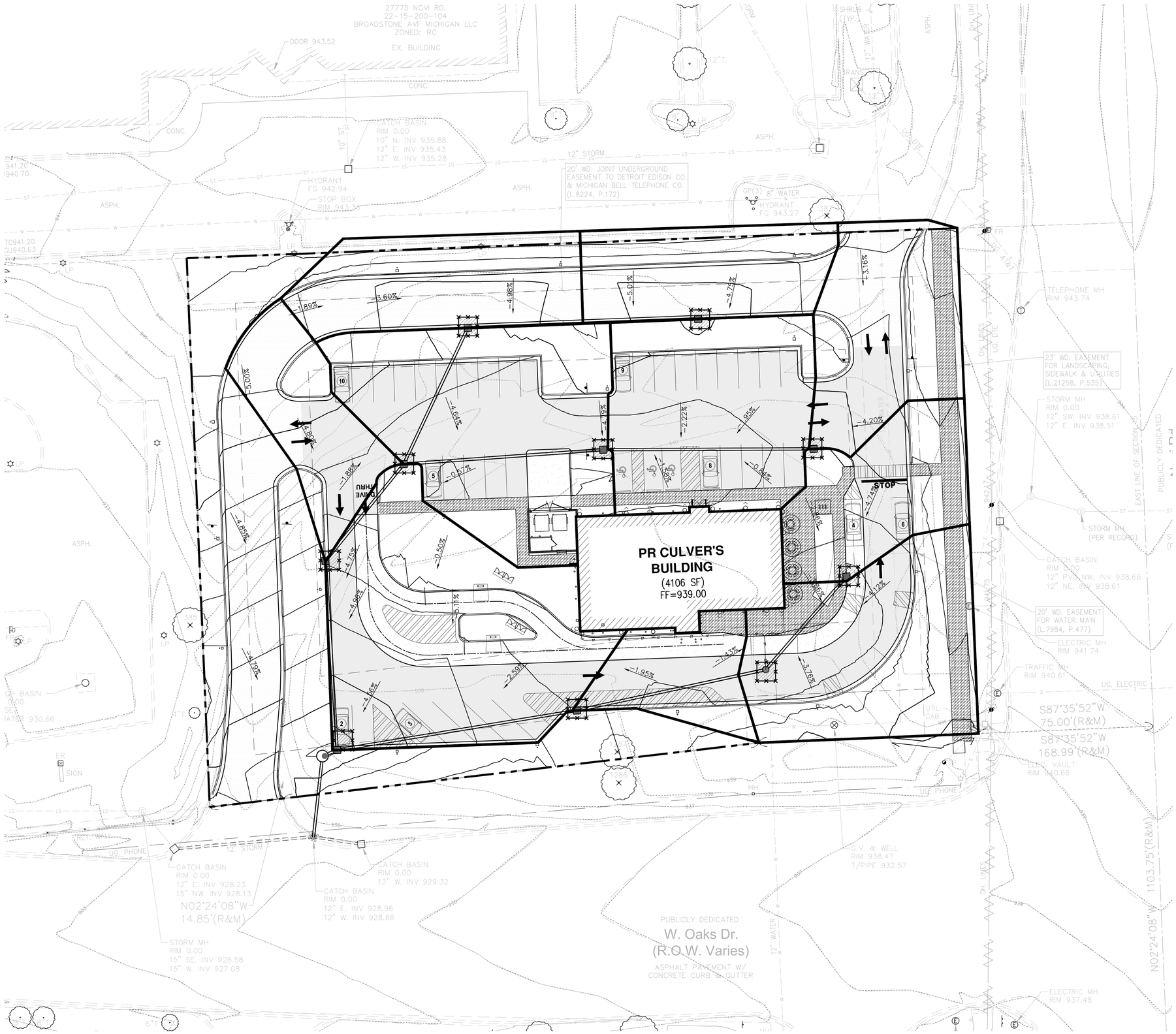
FIRE PROTECTION PLAN

11 / 22



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- PROPOSED CLEANOUT
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED WATERMAIN REDUCER
- 822 EX CONTOURS
- 822 PR CONTOURS
- INLET PROTECTION
- STABILIZED CONSTRUCTION ENTRANCE

STORMWATER MANAGEMENT SUMMARY

SITE DRAINAGE SUMMARY:

THE EXISTING SITE DRAINAGE PATTERN FLOWS FROM NORTHEAST TO SOUTHWEST, ULTIMATELY DISCHARGING INTO W OAKS DRIVE. THE ENTIRE SITE'S STORMWATER WILL BE CAPTURED AND MANAGED THROUGH A COMPREHENSIVE STORM SEWER SYSTEM.

STORMWATER CONVEYANCE AND TREATMENT:

INTEGRATED STORM SEWER SYSTEM: THE FULL SITE'S STORMWATER RUNOFF WILL BE COLLECTED BY STORM SEWER.

ADS BARRACUDA MAX SYSTEM: THE PRIMARY TREATMENT AND MANAGEMENT OF STORMWATER WILL BE FACILITATED BY THE ADS BARRACUDA MAX STRUCTURE. THIS SYSTEM IS SELECTED FOR ITS EFFICIENCY IN TREATING STORMWATER, PARTICULARLY FOR THE CRITICAL FIRST FLUSH VOLUME, WHICH IS OFTEN THE MOST POLLUTED.

FIRST FLUSH VOLUME MANAGEMENT: SPECIAL ATTENTION IS GIVEN TO TREATING THE FIRST FLUSH VOLUME, WHICH CARRIES A SIGNIFICANT AMOUNT OF POLLUTANTS. THE ADS BARRACUDA MAX SYSTEM IS DESIGNED TO EFFECTIVELY TREAT THIS INITIAL RUNOFF, ENHANCING THE OVERALL QUALITY OF DISCHARGED WATER.

FLOW RATE CONTROL: THE SYSTEM IS CALIBRATED TO MANAGE A DISCHARGE RATE OF 0.15 CUBIC FEET PER SECOND (CFS) PER ACRE. THIS CONTROLLED RATE HELPS IN MITIGATING POTENTIAL EROSION AND FLOODING ISSUES DOWNSTREAM AND ENSURES COMPLIANCE WITH LOCAL STORMWATER MANAGEMENT STANDARDS.

CONNECTION TO EXISTING INFRASTRUCTURE: THE TREATED STORMWATER WILL BE DISCHARGED INTO THE EXISTING STORMWATER INFRASTRUCTURE LOCATED IN W OAKS DRIVE. THIS CONNECTION IS DESIGNED TO SEAMLESSLY INTEGRATE WITH THE EXISTING MUNICIPAL STORMWATER SYSTEM, ENSURING EFFICIENT MANAGEMENT OF SITE RUNOFF.

OVERALL STORMWATER MANAGEMENT DESIGN:

THE STORMWATER MANAGEMENT SYSTEM, INCLUSIVE OF THE ADS BARRACUDA MAX, IS DESIGNED TO UPDATE AND ENHANCE THE SITE'S DRAINAGE PATTERNS. IT ALIGNS WITH THE CURRENT STANDARDS SET BY THE WASHTENAW COUNTY WATER RESOURCES COMMISSIONER'S OFFICE (WCWRCO). THE SYSTEM ENSURES THAT THE SITE EFFECTIVELY MANAGES STORM EVENTS UP TO THE 100-YEAR LEVEL, MAINTAINING CONTROLLED DISCHARGE RATES AS PER REGULATORY REQUIREMENTS.

TOTAL DRAINAGE AREA =	1.33 ACRES	(C)
ROOF =	4,106 SF	0.95
PAVEMENT =	40,316 SF	0.95
GREEN =	13,514 SF	0.35
TOTAL CAPTURE AREA =	57,936 SF	0.81

GRAPHIC SCALE
0 20 40

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STORMWATER MANAGEMENT PLAN

12 / 22

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	MIGUEL VARGAS 419-215-8020 MIGUEL.VARGAS@ADSPIPE.COM
ADS SALES REP:	MAXWELL SURIS 810-986-5131 MAXWELL.SURIS@ADSPIPE.COM
PROJECT NO:	S390011

Advanced Drainage Systems, Inc.

CULVER'S - NOVI MI

NOVI MI

BAYSAVER BARRACUDA SPECIFICATIONS

MATERIALS AND DESIGN

CONCRETE STRUCTURES: DESIGNED FOR H-20 TRAFFIC LOADING AND APPLICABLE SOIL LOADS OR AS OTHERWISE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER. THE MATERIALS AND STRUCTURAL DESIGN OF THE DEVICES SHALL BE PER ASTM C857 AND ASTM C858.

48" HP MANHOLE STRUCTURES: MADE FROM AN IMPACT MODIFIED COPOLYMER POLYPROPYLENE MEETING THE MATERIAL REQUIREMENTS OF ASTM F2764. THE ECCENTRIC CONE REDUCER SHALL BE MANUFACTURED FROM POLYETHYLENE MATERIAL MEETING ASTM D3350 CELL CLASS 213320C. GASKETS SHALL BE MADE OF MATERIAL MEETING THE REQUIREMENTS OF ASTM F477.

SEPARATOR INTERNALS SHALL BE SUBSTANTIALLY CONSTRUCTED OF STAINLESS STEEL, POLYETHYLENE, OR OTHER THERMOPLASTIC MATERIAL APPROVED BY THE MANUFACTURER.

PERFORMANCE

THE STORMWATER TREATMENT UNIT SHALL BE AN INLINE UNIT CAPABLE OF CONVEYING 100% OF THE DESIGN PEAK FLOW. IF PEAK FLOW RATES EXCEED MAXIMUM HYDRAULIC RATE, THE UNIT SHALL BE INSTALLED OFFLINE.

THE STORMWATER TREATMENT UNIT INTERNALS SHALL CONSIST OF(1)SEPARATOR CONE ASSEMBLY, AND (1)SUMP ASSEMBLY WHICH INCLUDES(4) LEGS WITH "TEETH".

THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 80% OF THE SUSPENDED SOLIDS ON AN ANNUAL AGGREGATE REMOVAL BASIS. SAID REMOVAL SHALL BE BASED ON FULL-SCALE THIRD PARTY TESTING USING OK-110 MEDIA GRADATION OR EQUIVALENT AND 300 mg/L INFLUENT CONCENTRATION. SAID FULL SCALE TESTING SHALL HAVE INCLUDED SEDIMENT CAPTURE BASED ON ACTUAL TOTAL MASS COLLECTED BY THE STORMWATER TREATMENT UNIT.

-OR -

THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS USING A MEDIA MIX WITH d_{50}=75 MICRON AND 200 MG/L INFLUENT CONCENTRATION.

-OR -

THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS PER CURRENT NJDEP/NJCAT HDS PROTOCOL..

MANUFACTURER

EACH STORMWATER TREATMENT SYSTEM SHALL BE A BARRACUDA SYSTEM AS MANUFACTURED BY BAYSAVER, LLC, 1030 DEER HOLLOW DR., MOUNT AIRY, MD 21771, PHONE (301) 829-6470, FAX (301) 829-3747, TOLL FREE 1-800-229-7283 (1-800-BAYSAVER), EMAIL INFO@BAYSAVER.COM

BARRACUDA MAINTENANCE

BARRACUDA SYSTEMS MUST BE INSPECTED AND MAINTAINED PERIODICALLY. INSPECTION IS MADE BY CHECKING THE DEPTH OF SEDIMENT IN EACH MANHOLE WITH A GRADE STICK OR SIMILAR DEVICE. MAINTENANCE IS REQUIRED WHEN THE SEDIMENT DEPTH IN EXCEEDS 20 INCHES. MINIMUM INSPECTION IS RECOMMENDED TWICE A YEAR TO MAINTAIN OPERATION AND FUNCTION OF THE UNIT.

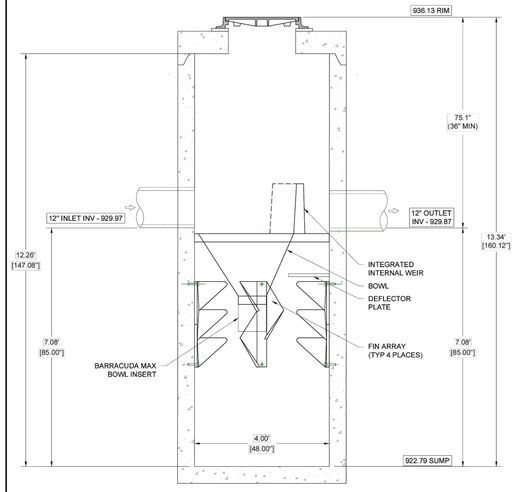
MAINTENANCE INSTRUCTIONS

1. REMOVE THE MANHOLE COVER TO PROVIDE ACCESS TO THE POLLUTANT STORAGE. POLLUTANTS ARE STORED IN THE SUMP, BELOW THE BOWL ASSEMBLY VISIBLE FROM THE SURFACE. YOU'LL ACCESS THIS AREA THROUGH THE 10" DIAMETER ACCESS CYLINDER.
2. USE A VACUUM TRUCK OR OTHER SIMILAR EQUIPMENT TO REMOVE ALL WATER, DEBRIS, OILS AND SEDIMENT.
3. USE A HIGH PRESSURE HOSE TO CLEAN THE MANHOLE OF ALL THE REMAINING SEDIMENT AND DEBRIS. THEN, USE THE VACUUM TRUCK TO REMOVE THE WATER.
4. FILL THE CLEANED MANHOLE WITH WATER UNTIL THE LEVEL REACHES THE INVERT OF THE OUTLET PIPE.
5. REPLACE THE MANHOLE COVER.
6. DISPOSE OF THE POLLUTED WATER, OILS, SEDIMENT AND TRASH AT AN APPROVED FACILITY.
   - LOCAL REGULATIONS PROHIBIT THE DISCHARGE OF SOLID MATERIAL INTO THE SANITARY SYSTEM. CHECK WITH THE LOCAL SEWER AUTHORITY FOR AUTHORITY TO DISCHARGE THE LIQUID.
   - SOME LOCALITIES TREAT THE POLLUTANTS AS LEACHATE. CHECK WITH LOCAL REGULATORS ABOUT DISPOSAL REQUIREMENTS.
   - ADDITIONAL LOCAL REGULATIONS MAY APPLY TO THE MAINTENANCE PROCEDURE.

BARRACUDA INSTALLATION NOTES

INSTALLATION OF THE STORMWATER TREATMENT UNIT(S) SHALL BE PERFORMED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. SUCH INSTRUCTIONS CAN BE OBTAINED BY CALLING ADVANCED DRAINAGE SYSTEMS AT (800) 821-6710 OR BY LOGGING ON TO WWW.ADS-PIPE.COM OR WWW.BAYSAVER.COM.

BARRACUDA MAX S4	
UNIT ID	WQU
PEAK FLOW RATE (CFS)	
TREATMENT FLOW RATE (CFS)	1.52



SECTION VIEW A-A
SCALE: 1/2" = 1'-0"

PRODUCT SPECIFICATIONS

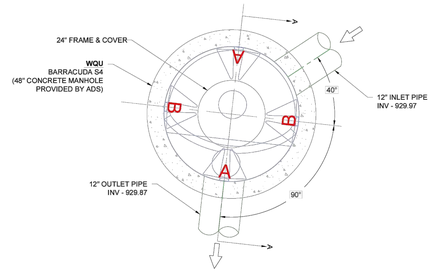
- THE STORMWATER TREATMENT UNIT SHALL BE AN INLINE UNIT CAPABLE OF CONVEYING 100% OF THE DESIGN PEAK FLOW. IF PEAK FLOW RATES EXCEED MAXIMUM HYDRAULIC RATE, THE UNIT SHALL BE INSTALLED OFFLINE.
- THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 80% OF THE SUSPENDED SOLIDS ON AN ANNUAL AGGREGATE REMOVAL BASIS. SAID REMOVAL SHALL BE BASED ON FULL-SCALE THIRD PARTY TESTING USING OK-110 MEDIA GRADATION OR EQUIVALENT AND 300 mg/L INFLUENT CONCENTRATION. SAID FULL SCALE TESTING SHALL HAVE INCLUDED SEDIMENT CAPTURE BASED ON ACTUAL TOTAL MASS COLLECTED BY THE STORMWATER TREATMENT UNIT.

  -OR -

  THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS USING A MEDIA MIX WITH d_{50}=75 MICRON AND 200 MG/L INFLUENT CONCENTRATION.

  -OR -

  THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS PER CURRENT NJDEP/NJCAT HDS PROTOCOL.



SITE SPECIFIC PLAN VIEW
SCALE: 1/2" = 1'-0"

NO.	DATE	BY	DESCRIPTION
	05/03/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3101

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

TECHNICAL SKILL.
CREATIVE SPIRIT.

Mannik Smith GROUP
www.MannikSmithGroup.com

PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

STORMWATER MANAGEMENT PLAN

13 / 22

ADS® Barracuda™ Max

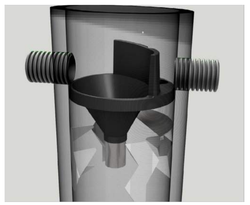
The Barracuda Max is market-changing stormwater quality technology. This high-performance vortex hydrodynamic separator is designed to remove total suspended solids in order to protect our precious receiving waters. The Barracuda Max is also an outstanding value that offers multiple pipe configurations, and quick installation. The "Max" version of the Barracuda is built on the base platform of the original ADS Barracuda with improved removal efficiencies and installation components.

Features

- Single manhole design
- No elevation loss between the inlet and outlet
- Variable inlet/outlet angle configurations (not just 180 degree orientation)
- Internal bypass for inline installation (where applicable)
- Revolutionary, patent-pending "teeth" mitigate turbulence in the sump area to prevent re-suspension of captured contaminants and an added deflector plate and bowl extension enhance the unit's removal capabilities

Benefits

- Internal components are in stock for quick delivery
- The S3, S4, S6, and S8 can be installed in a standard 36" (900 mm), 48" (1200 m), 72" (1800 m), and 96" (2400 m) precast manhole, respectively
- The S3 & S4 can be provided factory installed within a 36" (900 mm) and 48" (1200 mm) ADS HP manhole and delivered to the jobsite
- The Barracuda Max "teeth" and deflector plate apparatus are fabricated and designed for quick and easy field assembly
- Designed for easy maintenance using a vacuum truck or similar equipment.
- Inspection and maintenance are performed from the surface with no confined space entry



ADS

Barrucuda Specification

Materials and Design

- Concrete Structures: Designed for H-20 traffic loading and applicable soil loads or as otherwise determined by a Licensed Professional Engineer. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.
- 36" (900 mm) and 48" (1200 mm) HP Manhole Structures: Made from an impact modified copolymer polypropylene meeting the material requirements of ASTM F2764. The eccentric cone reducer shall be manufactured from polyethylene material meeting ASTM D3350 cell class 213320C. Gaskets shall be made of material meeting the requirements of ASTM F477.
- Separator internals shall be substantially constructed of stainless steel, polyethylene or other thermoplastic material approved by the manufacturer.

Performance

- The stormwater treatment unit shall be an inline unit capable of conveying 100% of the design peak flow. If peak flow rates exceed maximum hydraulic rate, the unit shall be installed offline.
- The Barracuda Max unit shall be designed to remove at least 80% of the suspended solids on an annual aggregate removal basis. Said removal shall be based on full-scale third party testing using OK-110 media gradation or equivalent and 300 mg/L influent concentration. Said full scale testing shall have included sediment capture based on actual total mass collected by the stormwater treatment unit.

  - OR -

  The Barracuda Max unit shall be designed to remove at least 50% of TSS using a media mix with d_{50}=75 micron and 200 mg/L influent concentration.

  - OR -

  The Barracuda Max unit shall be designed to remove at least 50% of TSS per current NJDEP/NJCAT HDS protocol.
- The stormwater treatment unit internals shall consist of (1) separator cone assembly, and (1) sump assembly, which includes the "teeth".

Barracuda Max Model	Manhole Diameter	NJDEP (50% removal)	OK-110 (80% removal)
S3	36" (900 mm)	0.85 CFS (24.1 L/s)	0.86 CFS (24.1 L/s)
S4	48" (1200 mm)	1.52 CFS (43.0 L/s)	1.52 CFS (43.0 L/s)
S6	72" (1800 mm)	3.40 CFS (96.3 L/s)	3.42 CFS (96.8 L/s)
S8	96" (2400 mm)	6.08 CFS (172.2 L/s)	6.08 CFS (172.2 L/s)

* Peak bypass flows are dependent on final design

Installation

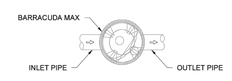
Installation of the stormwater treatment unit(s) shall be performed per manufacturer's installation instructions. Such instructions can be obtained by calling Advanced Drainage Systems at 800-821-6710 or by logging on to www.adspipe.com.

ADS

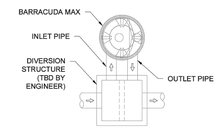
adspipe.com
800-821-6710

BARRACUDA MAX MINIMUM RIM TO INVERT OUT	
MODEL	INCH (MM)
S3	36 (914)
S4	36 (914)
S6	39 (991)
S8	41 (1041)

THE S3, S4, S6, AND S8 CAN BE INSTALLED IN A STANDARD 36" (900 mm), 48" (1200 mm), 72" (1800 mm), AND 96" (2400 mm) PRECAST MANHOLE, RESPECTIVELY. THE S3 AND S4 CAN BE PROVIDED FACTORY INSTALLED WITHIN A 36" (900 mm) AND 48" (1200 mm) ADS HP MANHOLE AND DELIVERED TO THE JOBSITE.



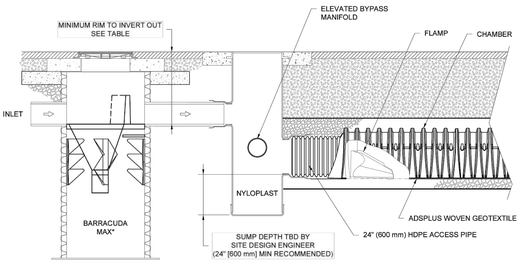
ONLINE CONFIGURATION



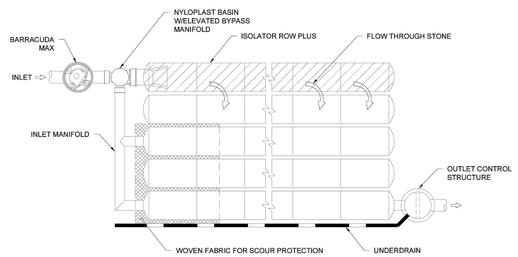
OFFLINE CONFIGURATION

ISOLATOR ROW PLUS FLOW RATES			
CHAMBER MODEL	SURFACE LOADING RATE GPM/FT² (L/S/m²)	EFFECTIVE FILTRATION TREATMENT AREA FT² (m²)	MTFR CFS (L/S)*
SC-160	4.13 (2.8)	11.45 (1.064)	0.11 (2.983)
SC-310	4.13 (2.8)	17.7 (1.644)	0.16 (4.612)
SC-740	4.13 (2.8)	27.8 (2.583)	0.26 (7.244)
DC-780	4.13 (2.8)	27.8 (2.583)	0.26 (7.244)
MC-3500	4.13 (2.8)	42.9 (3.986)	0.40 (11.178)
MC-4500	4.13 (2.8)	30.1 (2.796)	0.28 (7.843)
MC-7200	4.13 (2.8)	50.0 (4.645)	0.46 (13.028)

* PER CHAMBER LOADING RATES BASED ON NJCAT VERIFICATION TESTING OF THE STORMTECH SC-740 ISOLATOR ROW PLUS IN ACCORDANCE WITH NJDEP LABORATORY PROTOCOL TO ACCESS TOTAL SUSPENDED SOLIDS REMOVAL BY FILTRATION MANUFACTURED TREATMENT DEVICES, 2013.



BARRACUDA MAX & ISOLATOR ROW PLUS CROSS SECTION/PROFILE
NTS



BARRACUDA MAX & ISOLATOR ROW PLUS SCHEMATIC
NTS

KEY BENEFITS OF THE BARRACUDA MAX

- SINGLE MANHOLE DESIGN
- VARIABLE INLET/OUTLET ANGLE CONFIGURATIONS (NOT JUST 180 DEGREE ORIENTATION)
- INTERNAL BYPASS FOR INLINE INSTALLATION (WHERE APPLICABLE)
- ALL UNITS CAN BE INSTALLED INTO A STANDARD PRECAST MANHOLE
- 3' & 4' UNITS CAN BE FACTORY FABRICATED IN HP MANHOLES FOR QUICK DELIVERY WITH A LIGHT, EASY TO INSTALL STRUCTURE
- IN-STOCK COMPONENTS FOR QUICK DELIVERY
- NO ELEVATION LOSS BETWEEN THE INLET AND OUTLET
- SURFACE INSPECTION AND MAINTENANCE WITH NO CONFINED SPACE ENTRY
- DESIGNED FOR EASY MAINTENANCE USING A VACUUM TRUCK OR SIMILAR EQUIPMENT
- FIELD ENGINEERS AND INTERNAL ENGINEERING SERVICES DEPARTMENT TO ASSIST ENGINEERING WITH SIZING/DETAILS

BARRACUDA DESIGN TOOL

https://www.ads-pipe.com/water-quality-design-tool

BARRACUDA MAX TREATMENT FLOW (80% TSS)	
MODEL	CFS (L/s)
S3	0.85 (24.1)
S4	1.52 (43.0)
S6	3.40 (96.3)
S8	6.08 (172.2)

BARRACUDA MAX CAN BE CONFIGURED WITH AN OIL POUCH OR TRASH GUARD FOR ENHANCED TREATMENT.

KEY BENEFITS OF A BARRACUDA MAX & ISOLATOR PLUS DESIGN

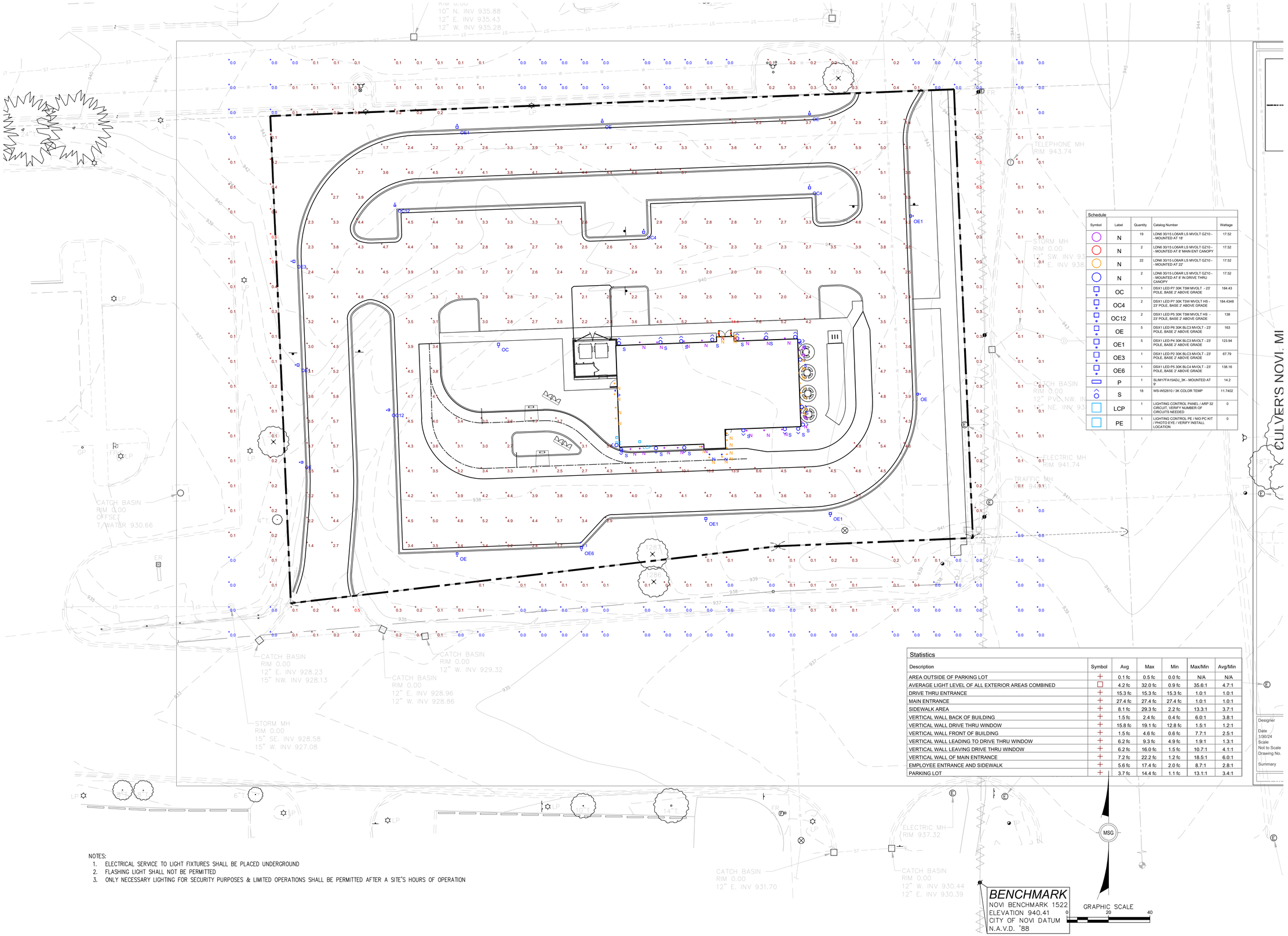
- ENHANCED SEDIMENT REMOVAL BY COMBINING TWO INDUSTRY PROVEN DEVICES
- EXTENDED MAINTENANCE CYCLES
- EASY TO INSTALL AND CONFIGURE TO SPECIFIC SITE CONSTRAINTS
- ONLINE DESIGN TOOLS ALLOW DESIGNERS TO EASILY CREATE LAYOUTS AND DETAILS

KEY BENEFITS OF STORMTECH CHAMBERS

- LARGE FAMILY OF CHAMBERS TO FIT YOUR SITE
- EASILY CONFIGURABLE FOR IRREGULAR SHAPED BEDS
- MEETS PRODUCT REQUIREMENTS OF ASTM F2418 AND ASTM F2922 AND DESIGN REQUIREMENTS OF ASTM F2787
- EXCEED AASHTO LRFD DESIGN SPECIFICATIONS FOR HS-20 LIVE LOADS & DEEP BURIAL EARTH LOADS
- PATENTED ISOLATOR ROW PLUS FOR LESS FREQUENT MAINTENANCE, WATER QUALITY AND LONG-TERM PERFORMANCE
- THIRD PARTY VERIFIED PERFORMANCE
- FIELD ENGINEERS AND INTERNAL ENGINEERING SERVICES DEPARTMENT TO ASSIST ENGINEERING WITH LAYOUTS

STORMTECH DESIGN TOOL

https://designtool.ads-pipe.com/



Schedule

Symbol	Label	Quantity	Catalog Number	Wattage
	N	19	LDN6 30/15 L06AR LS MVOLT GZ10 - - MOUNTED AT 18'	17.52
	N	2	LDN6 30/15 L06AR LS MVOLT GZ10 - - MOUNTED AT 8' MAIN ENT CANOPY	17.52
	N	22	LDN6 30/15 L06AR LS MVOLT GZ10 - - MOUNTED AT 22'	17.52
	N	2	LDN6 30/15 L06AR LS MVOLT GZ10 - - MOUNTED AT 8' IN DRIVE THRU CANOPY	17.52
	OC	1	DSX1 LED P7 30K T5M MVOLT - 23' POLE, BASE 2' ABOVE GRADE	184.43
	OC4	2	DSX1 LED P7 30K T5W MVOLT HS - 23' POLE, BASE 2' ABOVE GRADE	184.4348
	OC12	2	DSX1 LED P5 30K T5M MVOLT HS - 23' POLE, BASE 2' ABOVE GRADE	138
	OE	5	DSX1 LED P6 30K BLC3 MVOLT - 23' POLE, BASE 2' ABOVE GRADE	163
	OE1	5	DSX1 LED P4 30K BLC3 MVOLT - 23' POLE, BASE 2' ABOVE GRADE	123.94
	OE3	1	DSX1 LED P2 30K BLC3 MVOLT - 23' POLE, BASE 2' ABOVE GRADE	67.79
	OE6	1	DSX1 LED P5 30K BLC4 MVOLT - 23' POLE, BASE 2' ABOVE GRADE	138.16
	P	1	SLIM17FA15ADJ_3K - MOUNTED AT 9'	14.2
	S	18	WS-WS2610 / 3K COLOR TEMP	11.7402
	LCP	1	LIGHTING CONTROL PANEL / ARP 32 CIRCUIT, VERIFY NUMBER OF CIRCUITS NEEDED	0
	PE	1	LIGHTING CONTROL PE / NIO PC KIT / PHOTO EYE / VERIFY INSTALL LOCATION	0

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
AREA OUTSIDE OF PARKING LOT	+	0.1 fc	0.5 fc	0.0 fc	N/A	N/A
AVERAGE LIGHT LEVEL OF ALL EXTERIOR AREAS COMBINED	□	4.2 fc	32.0 fc	0.9 fc	35.6:1	4.7:1
DRIVE THRU ENTRANCE	+	15.3 fc	15.3 fc	15.3 fc	1.0:1	1.0:1
MAIN ENTRANCE	+	27.4 fc	27.4 fc	27.4 fc	1.0:1	1.0:1
SIDEWALK AREA	+	8.1 fc	29.3 fc	2.2 fc	13.3:1	3.7:1
VERTICAL WALL BACK OF BUILDING	+	1.5 fc	2.4 fc	0.4 fc	6.0:1	3.8:1
VERTICAL WALL DRIVE THRU WINDOW	+	15.8 fc	19.1 fc	12.8 fc	1.5:1	1.2:1
VERTICAL WALL FRONT OF BUILDING	+	1.5 fc	4.6 fc	0.6 fc	7.7:1	2.5:1
VERTICAL WALL LEADING TO DRIVE THRU WINDOW	+	6.2 fc	9.3 fc	4.9 fc	1.9:1	1.3:1
VERTICAL WALL LEAVING DRIVE THRU WINDOW	+	6.2 fc	16.0 fc	1.5 fc	10.7:1	4.1:1
VERTICAL WALL OF MAIN ENTRANCE	+	7.2 fc	22.2 fc	1.2 fc	18.5:1	6.0:1
EMPLOYEE ENTRANCE AND SIDEWALK	+	5.6 fc	17.4 fc	2.0 fc	8.7:1	2.8:1
PARKING LOT	+	3.7 fc	14.4 fc	1.1 fc	13.1:1	3.4:1

NOTES:
1. ELECTRICAL SERVICE TO LIGHT FIXTURES SHALL BE PLACED UNDERGROUND
2. FLASHING LIGHT SHALL NOT BE PERMITTED
3. ONLY NECESSARY LIGHTING FOR SECURITY PURPOSES & LIMITED OPERATIONS SHALL BE PERMITTED AFTER A SITE'S HOURS OF OPERATION

BENCHMARK
NOVI BENCHMARK 1522
ELEVATION 940.41
CITY OF NOVI DATUM
N.A.V.D. '88

NO.	DATE	BY	DESCRIPTION
	05/23/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3101

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

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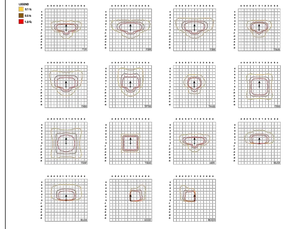
PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

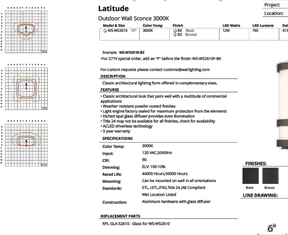
PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

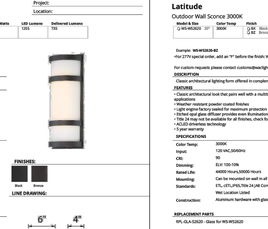
Designer
Date 1/30/24
Scale Not to Scale
Drawing No.
Summary

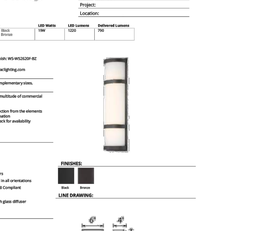
LIGHTING PLAN

14 | 22









D-Series Size 1
LED Area Luminaire

Catalog Number

Notes

Type

Specifications

EPA:	0.69 ft² (0.06 m²)
Length:	32.71" (83.1 cm)
Width:	14.26" (36.2 cm)
Height H1:	7.88" (20.0 cm)
Height H2:	2.73" (6.9 cm)
Weight:	34 lbs (15.4 kg)

Introduction

The modern styling of the D-Series features a highly refined aesthetic that blends seamlessly with its environment. The D-Series offers the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire.

The photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. D-Series outstanding photometry aids in reducing the number of poles required in area lighting applications with typical energy savings of 65% and expected service life of over 100,000 hours.

Ordering Information

EXAMPLE: DSX1 LED P7 40K 70CRI T3M MVOLT SPA NLTAIR2 PIRHN DDBXD

One Lithonia Way • Conyers, Georgia 30012 • Phone: 1-800-705-SERV (7378) • www.lithonia.com

DSX1-LED Rev. 09/05/23 Page 1 of 10

WAC LIGHTING
Latitude
Outdoor Wall Sconce 3000K

Fixture Type:
Catalog Number:
Project:
Location:

Model & Size	Color Temp	Finish	LED Watts	LED Lumens	Delivered Lumens
○ WS-W52610 10"	3000K	○ BK Black ○ BZ Bronze	12W	765	415

Example: WS-W52610-BZ

•For 277V special order, add an "F" before the finish: WS-W52610F-BK

For custom requests please contact customs@waclighting.com

DESCRIPTION

Classic architectural lighting form offered in complementary sizes.

FEATURES

- Classic architectural look that pairs well with a multitude of commercial applications
- Weather resistant powder coated finishes
- Light engine factory sealed for maximum protection from the elements
- Etched opal glass diffuser provides even illumination
- Title 24 may not be available for all finishes, check for availability
- ACLED driverless technology
- 5 year warranty

SPECIFICATIONS

Color Temp:	3000K
Input:	120 VAC,50/60Hz
CRI:	90
Dimming:	ELV: 100-10%
Rated Life:	44000 Hours,50000 Hours
Mounting:	Can be mounted on wall in all orientations
Standards:	ETL, cETL,IP65,Title 24 JA8 Compliant Wet Location Listed
Construction:	Aluminum hardware with glass diffuser

REPLACEMENT PARTS

RPL-GLA-52610 - Glass for WS-W52610

FINISHES:

Black Bronze

LINE DRAWING:

WS-W52610

waclighting.com | Phone (800) 526.2588 | Fax (800) 526.2585 | Headquarters/Eastern Distribution Center 44 Harbor Park Drive Port Washington, NY 11050

WAC Lighting retains the right to modify the design of our products at any time as part of the company's continuous improvement program. February 2024

1

WS-W52614

WS-W52620

LDN6 STATIC WHITE

NO.	DATE	BY	DESCRIPTION
	06/23/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3131

PROJECT DATE:	11/15/2023
PROJECT NO:	2300851
DRAWN BY:	SM
CHECKED BY:	TS

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
www.MannikSmithGroup.com

PREPARED FOR:

UNION PACIFIC HOLDINGS, LLC

CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN

CULVER'S OF NOVI

W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

LIGHTING DETAILS

15 / 22

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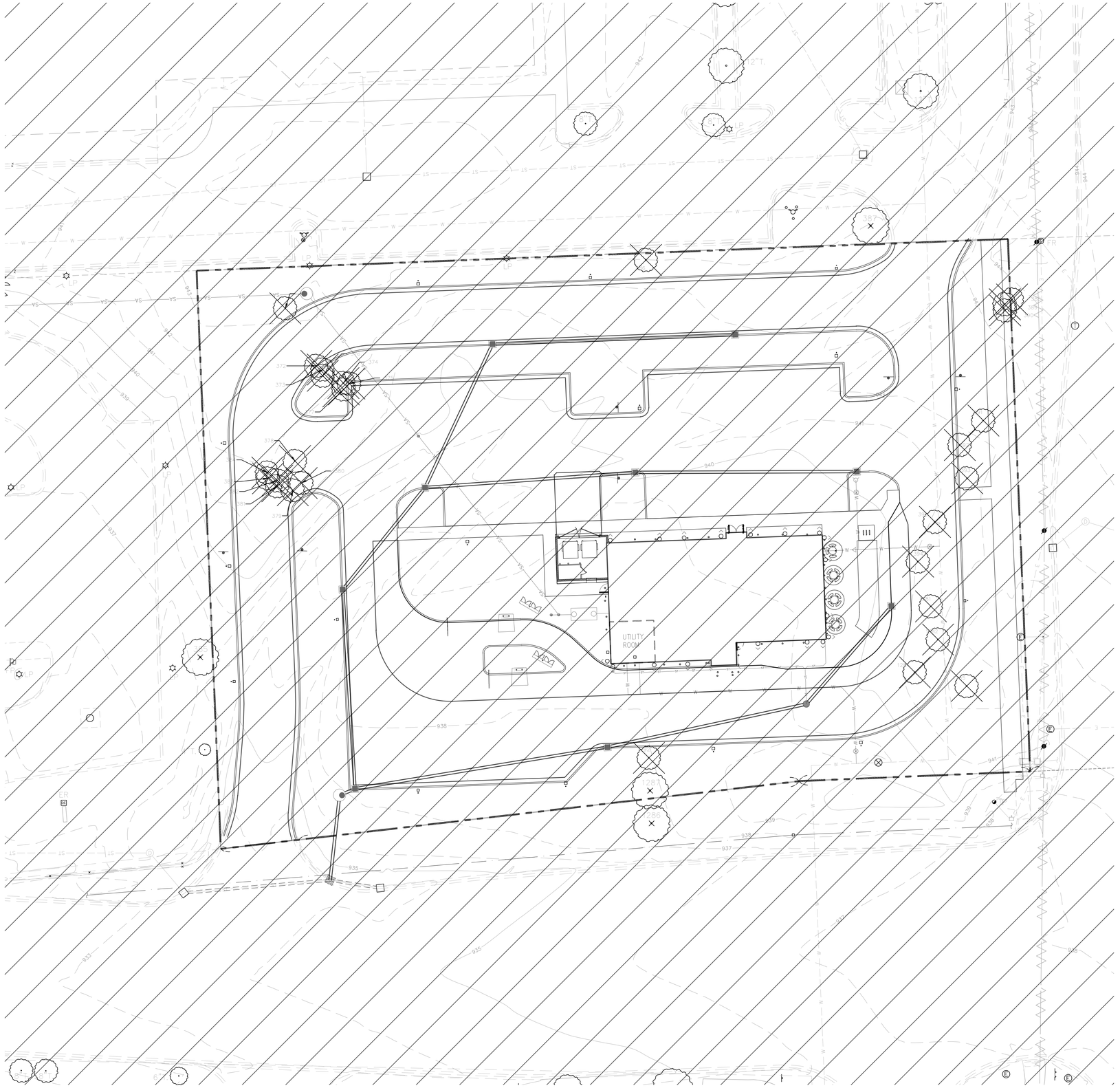


TREE REMOVAL LIST					
TAG #	DBH	TYPE (DECIDOUS/EVERGREEN	CONDITION	REMOVAL	REPLACEMENT COUNT
371	15"	DECIDOUS	GOOD	YES	0
372	12"	DECIDOUS	GOOD	YES	0
373	22.5"	DECIDOUS	GOOD	YES	0
374	3.5"	DECIDOUS	POOR	YES	0
375	14"	DECIDOUS	FAIR	YES	0
376	15"	DECIDOUS	GOOD	YES	0
377	11"	DECIDOUS	GOOD	YES	0
378	17"	DECIDOUS	POOR	YES	0
379	12"	EVERGREEN	POOR	YES	0
380	5"	DECIDOUS	POOR	YES	0
381	20"	DECIDOUS	POOR	YES	0
382	5"	DECIDOUS	POOR	YES	0
383	30"	DECIDOUS	POOR	YES	0
384	8"	DECIDOUS	FAIR	YES	0
385	14"	EVERGREEN	GOOD	NO	0
386	12.2"	DECIDOUS	GOOD	YES	0
387	18"	DECIDOUS	GOOD	YES	0
388	28"	DECIDOUS	GOOD	YES	0
389	21.6"	DECIDOUS	GOOD	YES	0
390	16.3"	DECIDOUS	GOOD	YES	0
391	13.4"	EVERGREEN	FAIR	YES	0
392	11.3"	EVERGREEN	GOOD	YES	0
393	15"	EVERGREEN	GOOD	YES	0
394	15.4"	EVERGREEN	GOOD	YES	0
395	14"	EVERGREEN	GOOD	YES	0
1281	12.8"	EVERGREEN	GOOD	YES	0
1282	13.2"	EVERGREEN	GOOD	YES	0
1284	14"	EVERGREEN	GOOD	YES	0
1285	12.2"	EVERGREEN	GOOD	YES	0
1286	9"	EVERGREEN	POOR	NO	0
1287	18"	EVERGREEN	GOOD	NO	0
1292	12"	EVERGREEN	POOR	YES	0
				TOTAL:	0

LEGEND:

EXISTING TREE TO REMAIN

EXISTING TREE TO BE REMOVED

MARLETTE SANDY LOAM, 1 TO 6 PERCENT SLOPES

NOTES:
1. **PER THE SOILS SURVEY OF OAKLAND COUNTY, THERE IS ONLY ONE SOIL TYPE, (MARLETTE SANDY LOAM, 1 TO 6 PERCENT SLOPES) ON AND AROUND THE PROPERTY.**
2. **PER THE SURVEY THERE IS NO PHRAGMITES OR JAPANESE KNOTWEED ON SITE.**

GRAPHIC SCALE
0 20 40

3 FULL WORKING DAYS BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #: _____
Survey Ticket #: _____

NO.	DATE	BY	DESCRIPTION
	05/03/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3101

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

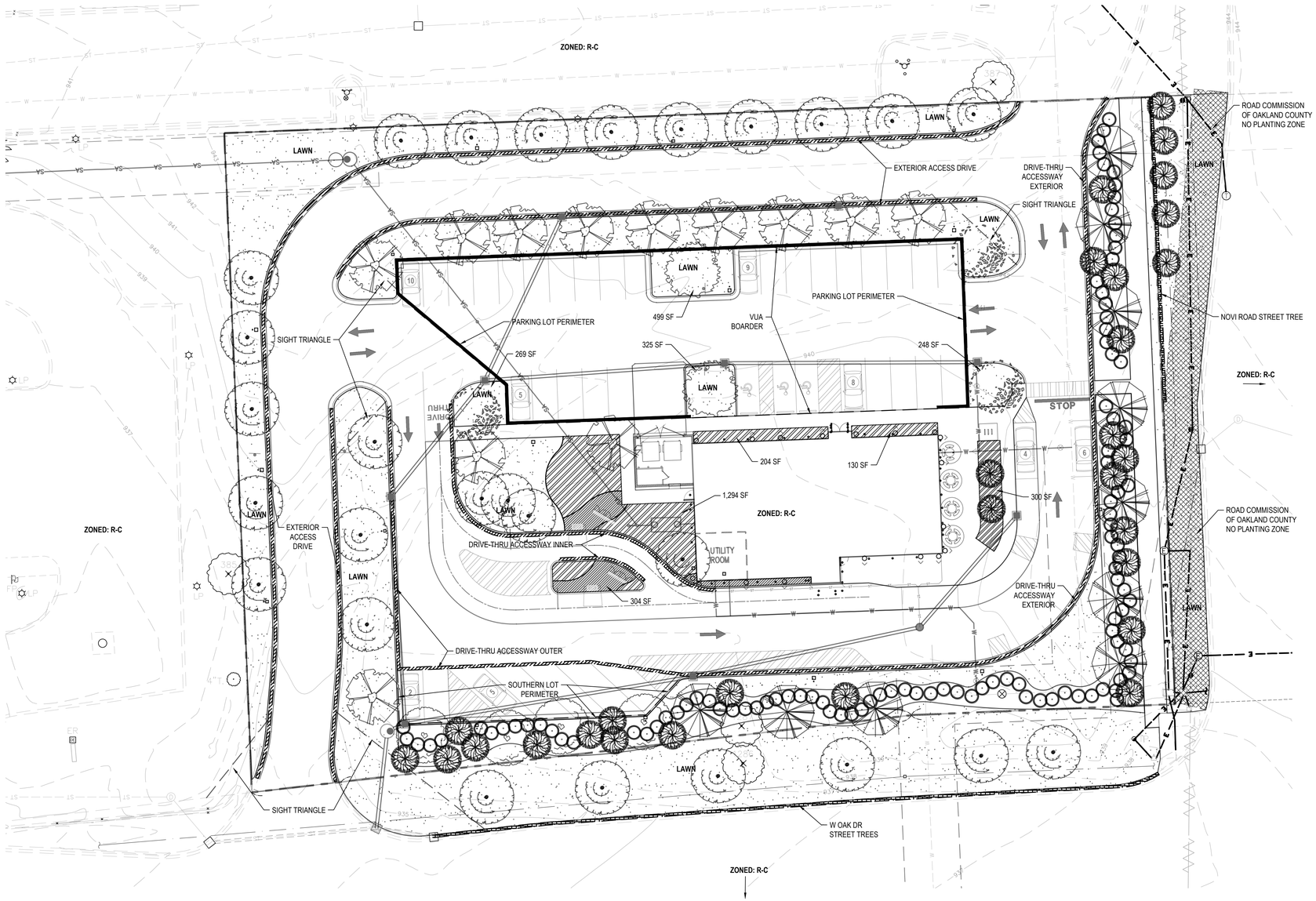
Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
www.MannikSmithGroup.com

PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

EXISTING LANDSCAPE CONDITIONS & REMOVAL

16 / 22



LEGEND:

- VEHICULAR USE AREA BOARDER
- VEHICULAR USE AREA PERIMETER
- ACCESSWAY PERIMETER
- STREET TREE PERIMETER
- ROAD COMMISSION OF OAKLAND COUNTY NO PLANTING ZONE

CALCULATIONS:

NORTH PARKING LOT:
VEHICLE USE AREA- (11,085 SF X .075) + ((11,085 SF - 50,000 SF) X .01) = 832 SF
832 SF / 200 = 5 TREES
PERIMETER- 505 LF - 88 LF = 417 LF
417 LF / 35 LF = 12 TREES

SOUTH PARKING LOT:
PERIMETER- 124 LF / 35 LF = 4 TREES

FOUNDATION: 283 - 16.42 = 266.58 LF x 8 = 2,133 SF

ACCESSWAY KAREVICH DR (PRIVATE):
472 LF + 236 LF + 134 LF = 842 LF
842 LF / 35 LF = 25 TREES

ACCESSWAY DRIVE-THRU OUTER:
527 LF / 35 = 16 TREES

ACCESSWAY DRIVE-THRU INNER:
33 LF + 138 LF = 171 LF
171 LF / 35 LF = 6 TREES

NOVI RD STREET TREES:
217 LF - 108 LF = 109 LF
109 LF / 45 LF = 3 TREES
2.42 TREES X 1.5 SUB CANOPY = 5

W OAKS DR STREET TREES:
260 LF / 45 LF = 6 TREES

ACCESSWAY/GREENBELT REQUIREMENTS

	DESIGN AREA/LENGTH	REQUIRED SPACING	MIN. REQUIRED	DESIGN QUANTITY
KAREVICH DR (PRIVATE)	842 LF	1 TREE/35 LF	25	25
DRIVE-THRU OUTER	527 LF	1 TREE/35 LF	16	16
DRIVE-THRU INNER	171 LF	1 TREE/35 LF	5	5
W OAK DRIVE GREENBELT	298 LF	1 TREE/35 LF 1 TREE/20 LF	6 11	7 11
NOVI RD GREENBELT	217	1 TREE/35 LF 1 TREE/20 LF	6 11	7 11

NOTE
1. PERIMETER PARKING LOT TREES ON THE NORTH, SOUTH AND EAST ARE BEING USED TO COUNT TOWARD GREENBELT REQUIREMENTS
2. SUB-CANOPY TREES NOT PLACED IN THE GREENBELT ARE BEING USED AS FOUNDATION PLANTING TREES
3. SOUTHERN GREENBELT HAS AN EXISTING TREE THAT IS BEING SAVED AND COUNTED TOWARDS THE REQUIREMENTS

PARKING LOT TREE/GREEN SPACE REQUIREMENTS

	DESIGN AREA/LENGTH	REQUIRED SPACING	MIN. REQUIRED	DESIGN QUANTITY
INTERIOR TREES (NORTH)	832 SF	1 TREE/200 SF	5	5
PERIMETER TREES (NORTH)	417 LF	1 TREE/35 LF	12	12
GREEN SPACE (NORTH)	N/A	N/A	832 SF	1,339 SF
INTERIOR TREES (SOUTH)	N/A	N/A	N/A	N/A
PERIMETER (SOUTH)	124 LF	1 TREE/35 LF	4	4

NOTE
1. PERIMETER PARKING LOT TREES ON THE NORTH, SOUTH AND EAST ARE BEING USED TO COUNT TOWARD GREENBELT REQUIREMENTS
2. SOUTHERN LOT ONLY REQUIRES PERIMETER TREES, ZONING ORDINANCE 5.5.3.C.iv.j
3. NO TREES SHALL BE CLOSER THAN 10 FEET FROM PROPOSED HYDRANT OR UTILITY STRUCTURE.

STREET TREE REQUIREMENTS

	DESIGN AREA/LENGTH	REQUIRED SPACING	MIN. REQUIRED	DESIGN QUANTITY
NOVI RD	109	1 TREE/45 LF X 1.5	5	5
W OAKS DR	260	1 TREE/45 LF	6	6

NOTE
1. PER ROAD COMMISSION FOR OAKLAND COUNTY 8.1.1, LANDSCAPE IN THE R.O.W. MAY ONLY BE INSTALLED AFTER A PERMIT IS ISSUED FROM THE PERMITS DIVISION.
2. PER ROAD COMMISSION FOR OAKLAND COUNTY 8.2.1 NO PLANTINGS WILL BE PERMITTED 12 FEET FROM EDGE OF PAVEMENT ON ROADS WITH SPEEDS GREATER THAN 25 M.P.H.

GRAPHIC SCALE
0 20 40

3 FULL WORKING DAYS BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #:
Survey Ticket #:

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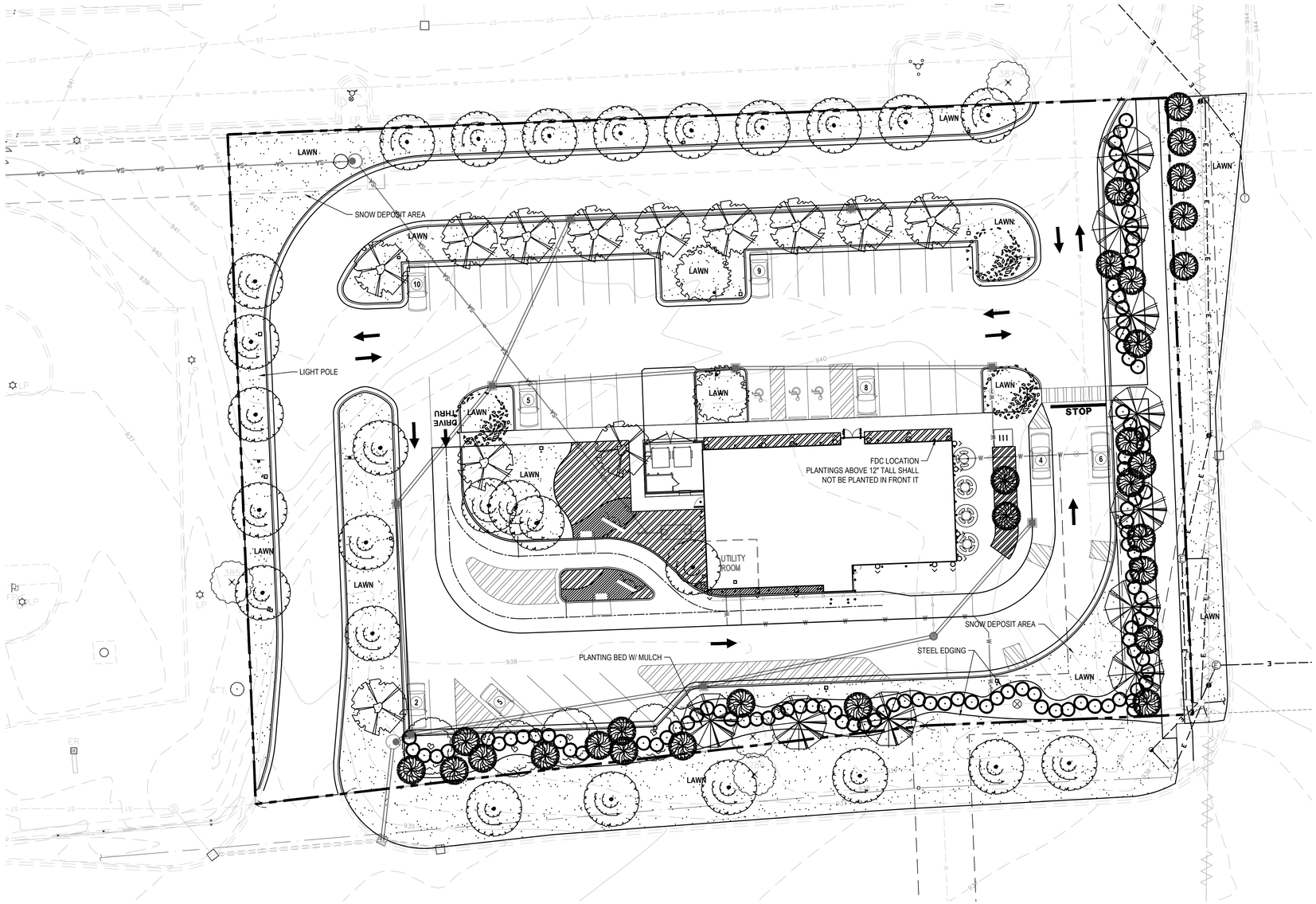
PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

LANDSCAPE CALCULATIONS

17 / 22



TREE SYMBOLS

	TREE USE
	INTERIOR PARKING LOT TREE
	STREET TREE
	PERIMETER, STREET TREE
	GREENBELT
	PERIMETER, GREENBELT TREE
	PERIMETER, INTERIOR PARKING LOT TREE
	SUB CANOPY TREE

SHRUB SYMBOLS

	GREENBELT SHRUB
	GRASSES AND SHRUBS MAX HEIGHT 18"
	GRASSES AND SHRUBS 12-36" TALL

EXPECTED PLANTS:

CANOPY:
- KENTUCKY COFFEE TREE
- THORNLESS HONEY LOCUST
- RED MAPLE
- RED OAK
- BLACK GUM

SUB-CANOPY TREES:
- SERVICE BERRY
- SNOWDRIFT CRABAPPLE
- COCKSPUR HAWTHORN

SHRUBS:
- NINEBARK
- SPIREA
- LO GRO SUMAC
- FORSYTHIA
- VIBURNUM
- NORTHERN SPICEBUSH

GRASSES:
- HANSE HERMS SWITCH GRASS
- LITTLE BLUE STEM
- SEDGE
- PRAIRIE DROPSEED
- FOUNTAIN GRASS

NOTE:
1. TREES ARE TO BE 10 FEET AWAY FROM ALL SANITARY SEWERS AND 5 FEET AWAY FROM ALL WATER AND STORM SEWER LINES.
2. PLANTS SHALL NOT BE INSTALLED WITHIN 4 FEET OF THE PROPERTY LINE

JON B. HORNBURG, PLA — DATE
LICENSED LANDSCAPE ARCHITECT

GRAPHIC SCALE
0 20 40

3 FULL WORKING DAYS
BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #:
Survey Ticket #:

NO.	DATE	BY	DESCRIPTION
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	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

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LANDSCAPE PLANS

18 / 22

NOTES:

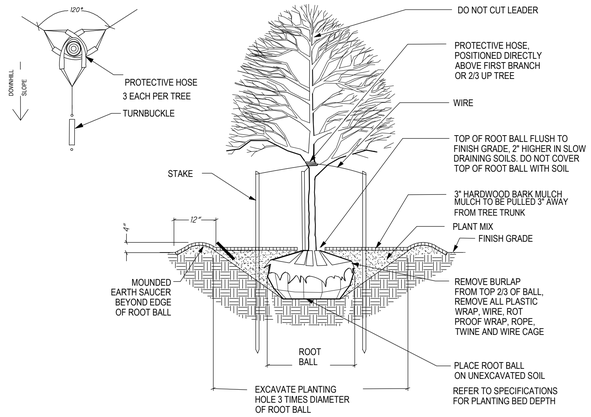
STAKES TO EXTEND 18" INTO UNDISTURBED SOIL.

SET STAKES VERTICAL AND AT EQUAL HEIGHT.

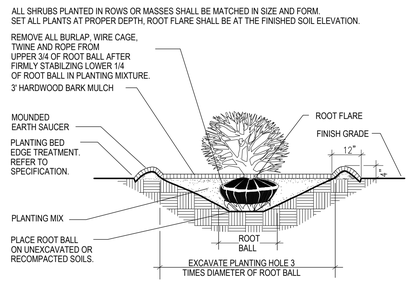
TREE SHALL BEAR SAME RELATION TO FINISH GRADE AS IT BORE TO PREVIOUS GRADE.

REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

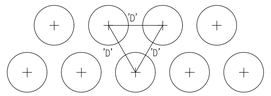
STAKE TREES UNDER 3" CALIPER - GUY TREES 3" CALIPER & OVER.



DECIDUOUS TREE WITH GUYS
(2 1/2" CALIPER AND LESS)
NO SCALE

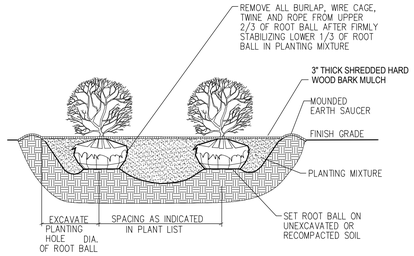


SHRUB PLANTING B&B
NO SCALE



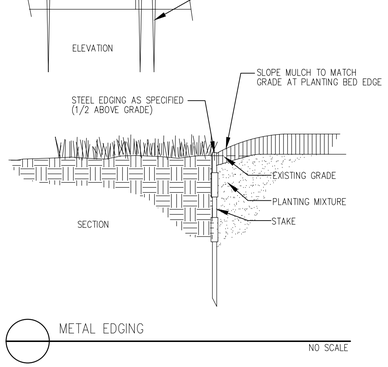
D = DIMENSION OF PLANT SPACING (SHRUB, GROUNDCOVER OR PERENNIAL) AS INDICATED IN PLANT LIST

TYPICAL PLANT SPACING
NO SCALE



NOTE:
ALL SHRUBS PLANTED IN ROWS OR MASSES SHALL BE MATCHED IN SIZE AND FORM
SHRUBS SHALL BEAR SAME RELATION TO FINISH GRADE AS THEY BORE TO PREVIOUS GRADE.

MASS SHRUB PLANTING
B & B or CONTAINER
NO SCALE



METAL EDGING
NO SCALE

CITY OF NOVI LANDSCAPE NOTES:

1. ALL PLANT MATERIALS ARE TO BE INSTALLED IN A SOUND, WORKMAN-LIKE MANNER AND IN ACCORDANCE WITH THE CURRENT CITY OF NOVI PLANTING REQUIREMENTS.
2. ALL PLANT MATERIALS SHALL BE INSTALLED BETWEEN MARCH 15TH AND NOVEMBER 15TH.
3. ALL PLANT MATERIALS ARE TO BE NORTHERN NURSERY GROWN NO. 1 GRADE AND INSTALLED ACCORDING TO ACCEPTED PLANTING PROCEDURES. ALL PLANT MATERIALS SHALL CONFORM TO THE CURRENT AMERICAN ASSOCIATION OF NURSERYMEN (AAN) STANDARDS FOR NURSERY STOCK. THEY SHALL BE PLANTED ACCORDING TO THE CITY OF NOVI PLANTING DETAILS AND SPECIFICATIONS. THE CITY SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIALS PRIOR TO PLANTING AND TO REJECT ANY PLANT MATERIALS DEEMED NOT TO MEET THE STANDARDS OF THE CITY OF NOVI ZONING ORDINANCE OR LANDSCAPE DESIGN MANUAL.
4. ALL TREES SHALL HAVE A CENTRAL LEADER AND A RADIAL BRANCHING STRUCTURE. PARK GRADE TREES ARE NOT ACCEPTABLE. ALL TREES SHALL BE BALLED AND BURLAPPED (B&B).
5. ANY DECIDUOUS CANOPY TREES WITH BRANCHES THAT MIGHT TEND TO DEVELOP INTO "V" CROTCHES SHALL BE SUBORDINATED SO AS NOT TO BECOME DOMINANT BRANCHES.
6. MULCH SHALL BE NATURAL COLOR, FINELY SHREDDED HARDWOOD BARK FOR ALL PLANTINGS - 3" THICK FOR TREES IN A 4-FOOT DIAMETER CIRCLE WITH 3" PULLED AWAY FROM TRUNK, 3" THICK FOR SHRUBS AND SHRUB BEDS, AND 2" THICK FOR PERENNIALS AND PERENNIAL BEDS. ALSO PULL AWAY ROOT BALL DIRT FROM TRUNK AND ROOT FLARE.
7. ALL PLANT MATERIAL SHALL BE WARRANTIED FOR TWO (2) FULL YEARS AFTER DATE OF ACCEPTANCE BY THE CITY OF NOVI. ALL UNHEALTHY AND DEAD MATERIAL SHALL BE REPLACED WITHIN THREE (3) MONTHS OR THE NEXT APPROPRIATE PLANTING PERIOD.
8. ALL PLANT MATERIAL SHALL BE MAINTAINED IN A HEALTHY GROWING CONDITION, INCLUDING WATERING, CULTIVATION, WEED CONTROL AND SOIL ENRICHMENTS AS MAY BE NECESSARY.
9. ANY SUBSTITUTIONS OR DEVIATIONS FROM THE LANDSCAPE PLAN MUST BE APPROVED IN WRITING BY THE CITY OF NOVI PRIOR TO INSTALLATION.
10. ALL LANDSCAPE AREAS ARE TO BE MAINTAINED IN A HEALTHY GROWING CONDITION FREE OF DEBRIS AND REFUSE AND IN CONFORMANCE WITH THE APPROVED LANDSCAPE PLAN.
11. CONTRACTOR TO REMOVE ALL CONSTRUCTION DEBRIS AND EXCESS MATERIAL FROM THE SITE PRIOR TO FINAL ACCEPTANCE.
12. PLANT MATERIALS, EXCEPT SOD, GROUND COVERS AND CREEPING VINE TYPE PLANTINGS, SHALL NOT BE LOCATED WITHIN FOUR (4) FEET OF THE PROPERTY LINE.
13. ALL TRANSFORMERS ARE TO BE SCREENED ON THREE SIDES (MINIMUM) IN ACCORDANCE WITH THE CITY OF NOVI ORDINANCE AND SO AS TO NOT CONFLICT WITH DTE RESTRICTIONS (SEE DETAIL THIS SHEET).
14. THE OWNER IS RESPONSIBLE FOR REQUEST OF FINAL INSPECTION AND ACCEPTANCE OF THE LANDSCAPE AT THE END OF THE 2-YEAR GUARANTEE PERIOD.
15. THE PROVIDER OF THE FINANCIAL GUARANTEE FOR THE LANDSCAPE INSTALLATION SHALL BE FULLY REPSONSIBLE FOR COMPLETION OF THE LANDSCAPE INSTALLATION AND MAINTENANCE PER THE APPROVED LANDSCAPE PLAN AND APPLICABLE CITY ORDINANCES.

THE MANNIK & SMITH GROUP LANDSCAPE NOTES

THE WORK CONSISTS OF PROVIDING ALL NECESSARY MATERIALS, LABOR, EQUIPMENT, TOOLS AND SUPERVISION REQUIRED TO COMPLETE THE WORK AS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING AND COORDINATING WITH ALL PERTINENT UTILITY COMPANIES 3 WORKING DAYS IN ADVANCE OF ANY DIGGING TO FAMILIARIZE THEMSELVES WITH ALL UNDERGROUND UTILITIES, PIPES AND STRUCTURES. THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR ANY COST INCURRED DUE TO DAMAGE TO ANY UTILITIES.

THE CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH THE CONSTRUCTION AS DESIGNED WHEN IT IS OBVIOUS THAT OBSTRUCTIONS AND/OR GRADE DIFFERENCES EXIST. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT AND FIELD ENGINEER. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE NOTIFICATION.

DISCREPANCIES BETWEEN DIMENSIONED LAYOUT AND ACTUAL FIELD CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATION.

ALL UNPAVED PORTIONS OF THE SITE SHALL BE PLANTED WITH GRASS, GROUNDCOVER, SHRUBS OR OTHER LIVE PLANT MATERIAL.

ALL LAWN AREAS SHALL HAVE 4" MINIMUM OF TOPSOIL.

ALL PLANTING BEDS SHALL HAVE 12" MINIMUM OF PLANT MIX.

ALL TOPSOIL SHALL BE SCREENED, FERTILE, SANDY LOAM. PH RANGE SHALL BE 6.5%-7%. ORGANIC CONTENT SHALL RANGE BETWEEN 4%-6%. AMEND SOIL AS NECESSARY TO ACHIEVE SOIL PARAMETERS.

PLANT MATERIAL
REFER TO THE DRAWING AND PLANTING DETAILS FOR PLANTING REQUIREMENTS, MATERIALS AND EXECUTION. IF THERE IS A DISCREPANCY BETWEEN THE DRAWINGS AND THE PLANT LIST, THE DRAWINGS SHALL GOVERN.

ALL PLANTS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT UPON DELIVERY TO THE SITE. PLANTS DELIVERED TO THE SITE THAT DO NOT MEET THE ABOVE CRITERIA MAY BE REJECTED AND ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

THE OWNER RESERVES THE RIGHT TO SELECT AND/OR APPROVE PLANT SELECTIONS AT THE NURSERY WHERE GROWN, PRIOR TO ACCEPTANCE OF MATERIALS.

CONTRACTOR SHALL FIELD STAKE TREES AND SHRUBS TO BE APPROVED BY THE LANDSCAPE ARCHITECT.

THE LANDSCAPE ARCHITECT SHALL APPROVE ALL BED LAYOUTS, PRIOR TO INSTALLATION BY THE CONTRACTOR
BACKFILL MIX FOR ALL PLANTINGS, USE BACKFILL MIX CONSISTING OF THE FOLLOWING:
1. ONE PART EXCAVATED SOIL.
2. ONE PART EPA RATED CLASS IV COMPOST.
3. A SLOW RELEASE COMMERCIAL FERTILIZER (20-20-20 OR EQUAL) ADDED AT A RATE OF 5 POUNDS PER CUBIC YARD TO THE BACKFILL MIX.
4. IF SOIL AREAS ARE OF HIGH PH (GREATER THAN 6.5) APPLY 1.25 POUNDS OF ELEMENTAL SULFUR PER CUBIC YARD OF BACKFILL MIX.

CONTRACTOR SHALL SUPPLY A DETAILED SOIL ANALYSIS PRIOR TO ALL PLANT BED PREPARATION. ANALYSIS SHALL INDICATE SOIL PH, TEXTURE, MAJOR NUTRIENTS, SALTS, ETC. SOIL ANALYSIS SHALL BE FROM A REPUTABLE, INDEPENDENT LAB. SOIL AMENDMENTS SHALL BE INCORPORATED INTO BACKFILL/PLANT MIX AS RECOMMENDED BY THE INDEPENDENT LAB.

SMOOTH AND SHAPE THE BACKFILL MIX TO FORM A SHALLOW BASIN SLIGHTLY LARGER THAN THE PLANTING HOLE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING, DELIVERING, APPLYING, MEASURING AND SCHEDULING A SUFFICIENT AMOUNT
OF WATER NECESSARY TO KEEP EACH PLANT IN A HEALTHY GROWING CONDITION THROUGHOUT THE PERIOD OF ESTABLISHMENT. THE CONTRACTOR SHALL APPLY 1" OF WATER PER WEEK TO ALL NEW PLANTS.

RESTORATION OF DISTURBED AREAS FOR NEW LAWN. ALL DISTURBED AREAS NOT COVERED BY BUILDING, PAVEMENT OR LANDSCAPE PLANTING BEDS SHALL BE PREPARED FOR GRASS AND SEEDED. LOOSEN RUTS AND WORK THE SOIL AREAS TO A MINIMUM OF 6" DEEP PRIOR TO FINE GRADING AND SEEDING WORK.

STRAW MULCH SHALL BE APPLIED 3" IN DEPTH. ALL MULCHING MUST HAVE A TIE DOWN.

LAWN SEED SHALL BE FRESH, CLEAN, DRY NEW-CROP SEED COMPOSED OF VARIETIES, MIXED IN PROPORTIONS, AND TESTED FOR MINIMUM PERCENTAGES OF PURITY AND GERMINATION AS FOLLOWS BY WEIGHT.

VARIETY	PROPORTION BY WEIGHT	PURITY	GERMINATION
BARON KENTUCKY BLUEGRASS	20	90	80
VANTAGE KENTUCKY BLUEGRASS	20	90	80
PARK KENTUCKY BLUEGRASS	20	90	80
PENNFINE PERENNIAL RYEGRASS	20	90	80
CREEPING RED FESCUE	20	90	80

IRRIGATION
ALL PLANTING BEDS AND TURF AREAS SHALL HAVE FULLY AUTOMATIC IRRIGATION SYSTEM INSTALLED.

WATER SHALL BE POTABLE AND SUPPLIED FROM THE BUILDING.

CONTRACTOR TO COORDINATE WITH THE MEP CONTRACTORS TO HAVE WATER AND POWER SUPPLIED FOR THE IRRIGATION SYSTEM.

WATER SHALL NOT BE SPRAYED ACROSS WALKS, AT SIGNS, OTHER SITE FEATURES OR THE BUILDING.

PLANTING BEDS AND TURF AREAS SHALL BE ZONED SEPARATELY.

CONTRACTOR SHALL DISCUSS WITH OWNER IRRIGATION OPTIONS TO DETERMINING PREFERRED IRRIGATION METHOD OF PLANTING BEDS

TURF AREAS SHALL BE IRRIGATED WITH POP UPS AND/OR ROTORS, SIZED TO FIT THE LAWN AREA TO BE IRRIGATED.

IF THE OWNER ELECTS TO USE DRIP IRRIGATION IN PLANTING BEDS, THE FOLLOWING SPECIFICATIONS APPLY:
- DRIPPERLINE TO BE MANUFACTURED BY HUNTER PLD-06-12, NETAFIM TECHLINE CV, RAINBIRD XSF DRIPLINE XSF-06-12, OR TORO DL2000, RGP-2-12.
- SUBSURFACE IRRIGATION TUBING SHALL BE SELF-FLUSHING, PRESSURE COMPENSATING DRIPPERLINE WITH INTERNAL CHECK VALVE AT EACH EMITTER. DRIPPERLINE SHALL CONSIST OF NOMINAL SIZED ONE-HALF INCH LOW DENSITY, LINEAR POLYETHYLENE TUBING WITH INTERNAL PRESSURE COMPENSATING, CONTINUOUSLY SELF-FLUSHING, INTEGRAL DRIP EMITTERS. THE EMITTERS SHALL HAVE THE ABILITY TO INDEPENDENTLY REGULATE DISCHARGE RATES, WITH AN OUTPUT PRESSURE OF 7 TO 70 PSI AND SHALL CONTINUOUSLY CLEAN THEMSELVES WHILE IN OPERATION.
- DRIPPERLINE SHALL HAVE EMITTERS SPACED 12" O.C. AND EACH EMITTER SHALL HAVE .5 - .6 GPH EMITTER OUTPUT.
- HEADER PIPE FOR ALL DRIPPERLINE SHALL BE POLYETHYLENE PIPE, 1" SIZE.
- ALL FITTINGS SHALL BE MANUFACTURED FOR USE WITH THE SUBSURFACE IRRIGATION TUBING BY THE SUBSURFACE DRIPPERLINE MANUFACTURER.
- ALL ASSOCIATED SYSTEM EQUIPMENT INCLUDING AIR RELIEF VALVES, FLUSH VALVES, PRESSURE REGULATING VALVES AND FILTERS SHALL BE MANUFACTURED FOR USE WITH THE SUBSURFACE IRRIGATION TUBING BY THE SUBSURFACE DRIPPERLINE MANUFACTURER.

SUBMIT SHOP DRAWING OF ALL IRRIGATION COMPONENTS, PROPOSED LAYOUT AND WATER SOURCE, TO THE LANDSCAPE ARCHITECT, FOR REVIEW, PRIOR TO THE START OF CONSTRUCTION.

CONTRACTOR TO OPERATE THE SYSTEM FOR APPROVAL BY THE OWNER.

CONTRACTOR TO PROVIDE SPRING START UP, FALL SHUT DOWN AND TRAINING TO THE OWNER'S MAINTENANCE STAFF.

ADJUST IRRIGATION HEADS AND TIMING TO SUIT NEW LANDSCAPE PLAN.

TREAT TREES TO BE RELOCATED, WITH WILT PRUF, OR EQUAL, PRIOR TO TRANSPLANTING. FOLLOW MANUFACTURER'S DIRECTIONS

NO.	DATE	BY	DESCRIPTION
	05/03/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3101

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

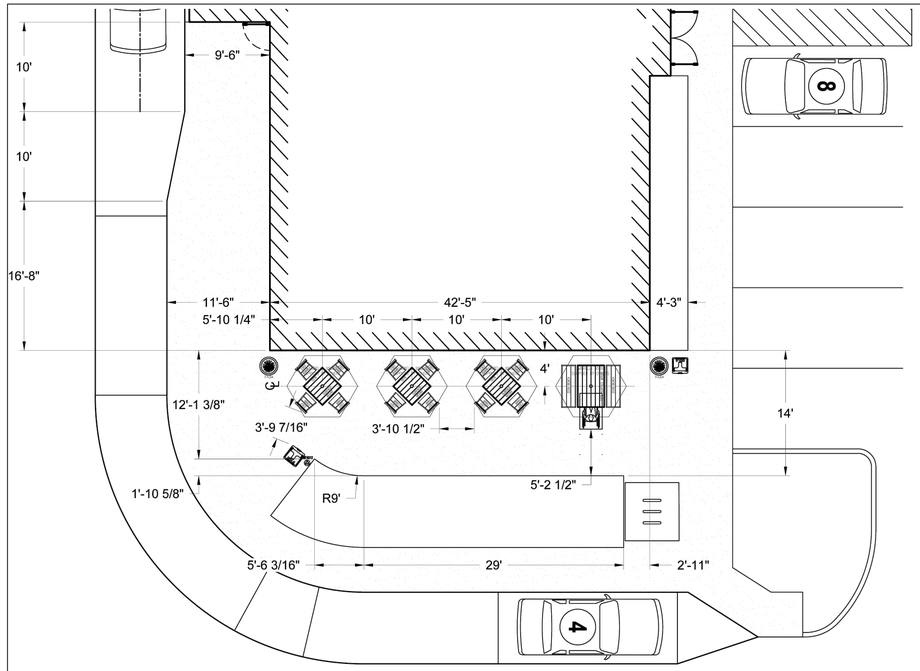
TECHNICAL SKILL. CREATIVE SPIRIT.
Mannik Smith GROUP
www.MannikSmithGroup.com

PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

LANDSCAPE DETAILS

19 / 22



WAUSAU TILE
P.O. BOX 1520 WAUSAU, WI 54402-1520
800-388-8728
E-MAIL: WTILE@WAUSAUTILE.COM
WEBSITE: WWW.WAUSAUTILE.COM

REVISIONS

	BY	DATE	NOTES
1	PW	1/31/2024	OPTION 2 CHANGED TO 4 TABLES STAGGERED, ADDED OPTION 3 & 4
2			
3			
4			
5			

DIMENSIONS SHOWN ARE ROUNDED TO THE CLOSEST FRACTION ± 1/16"

DRAWING SCALE: NOT TO SCALE

CULVER'S
NOVI, MI

NOTE:
ALL DIMENSIONS OF PATIO AREA NEED TO BE VERIFIED TO AVOID INSTALL AND ADA ISSUES. EXACT DIMENSIONED PLAN NOT GIVEN.
ALL ACCESSIBLE PATHS TO ACCESSIBLE PATIO SEATING NEED TO BE ADA COMPLIANT AND MAINTAIN
NO GREATER SLOPE OF 2% IN ALL DIRECTIONS

SIGN BELOW IF DRAWINGS ARE APPROVED W/ MARKED CHANGES
PLEASE VERIFY ALL DIMENSIONS PRIOR TO RELEASING DRAWINGS

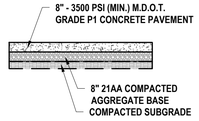
APPROVED: _____

DATE: _____

(SIGNATURE ABOVE ILLUSTRATES ACCEPTANCE OF DIMENSIONS SHOWN.)

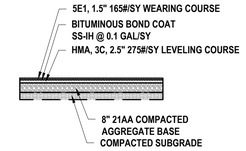
DRAWN BY: PW | PROJ MNGR: CG
DATE: 1/30/24
CO NUMBER: CO ------
REFERENCE: PATIO OPTION 4

TYPICAL CONCRETE ROADWAY SECTION FOR RESIDENTIAL ROAD DETAIL - 1A



- CURRENT MDOT STANDARD SPECIFICATIONS SHALL APPLY
- ASPHALT BINDER PG 64-22
- ALL MIX DESIGNS REQUIRE REVIEW & APPROVAL BY CITY OF NOVI INCLUDING USE OF ANY RECLAIMED ASPHALT PRODUCT (R.A.P.) MATERIALS.

TYPICAL BITUMINOUS ROADWAY SECTION FOR RESIDENTIAL ROAD DETAIL - 1B



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- ASPHALT BINDER PG 64-22
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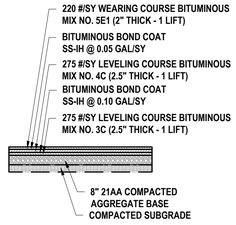
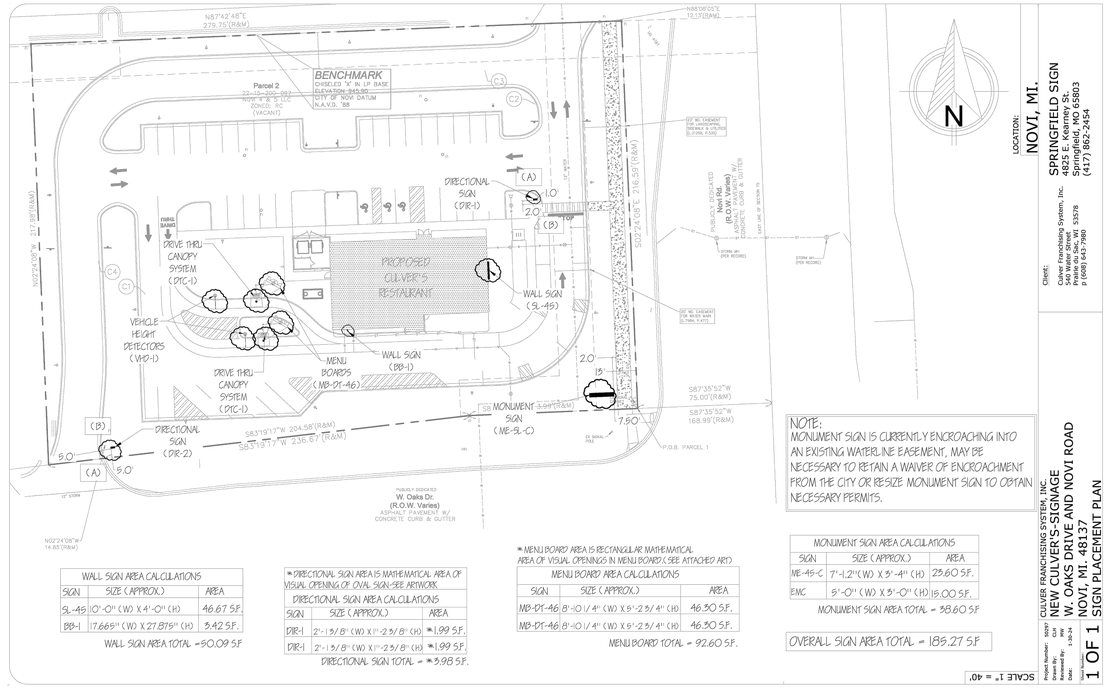


- CURRENT MDOT STANDARD SPECIFICATIONS SHALL APPLY
- ASPHALT BINDER PG 64-22
- ALL MIX DESIGNS REQUIRE REVIEW & APPROVAL BY CITY OF NOVI INCLUDING USE OF ANY RECLAIMED ASPHALT PRODUCT (R.A.P.) MATERIALS.

TYPICAL BITUMINOUS ROADWAY SECTION FOR COLLECTOR & INDUSTRIAL ROADS DETAIL - 2B



NOTE:
MONUMENT SIGN IS CURRENTLY ENCROACHING INTO AN EXISTING WATERLINE EASEMENT, MAY BE NECESSARY TO RETAIN A WAIVER OF ENCROACHMENT FROM THE CITY OR RESIZE MONUMENT SIGN TO OBTAIN NECESSARY PERMITS.

WALL SIGN AREA CALCULATIONS		
SIGN	SIZE (APPROX.)	AREA
SL-A5	10'-0" (W) X 4'-0" (H)	46.67 S.F.
BB-1	17.665" (W) X 27.875" (H)	3.42 S.F.
WALL SIGN AREA TOTAL = 50.09 S.F.		

*DIRECTIONAL SIGN AREA IS MATHEMATICAL AREA OF VISUAL OPENING OF OVAL SIGN-SEE ARTWORK.

DIRECTIONAL SIGN AREA CALCULATIONS		
SIGN	SIZE (APPROX.)	AREA
DIR-1	2'-1 3/8" (W) X 1'-2 5/8" (H)	*1.99 S.F.
DIR-1	2'-1 3/8" (W) X 1'-2 5/8" (H)	*1.99 S.F.
DIRECTIONAL SIGN TOTAL = *3.98 S.F.		

*MENU BOARD AREA IS RECTANGULAR MATHEMATICAL AREA OF VISUAL OPENINGS IN MENU BOARDS (SEE ATTACHED ART)

MENU BOARD AREA CALCULATIONS		
SIGN	SIZE (APPROX.)	AREA
MB-DT-A6	8'-10 1/4" (W) X 5'-2 5/8" (H)	46.30 S.F.
MB-DT-A6	8'-10 1/4" (W) X 5'-2 5/8" (H)	46.30 S.F.
MENU BOARD TOTAL = 92.60 S.F.		

MONUMENT SIGN AREA CALCULATIONS		
SIGN	SIZE (APPROX.)	AREA
ME-A5-C	7'-1.2" (W) X 3'-4" (H)	23.60 S.F.
EMC	5'-0" (W) X 3'-0" (H)	15.00 S.F.
MONUMENT SIGN AREA TOTAL = 38.60 S.F.		

OVERALL SIGN AREA TOTAL = 185.27 S.F.

LOCATION:
NOVI, MI.

SPRINGFIELD SIGN
4925 E. Kearney St.
Springfield, MO 65803
(417) 862-2454

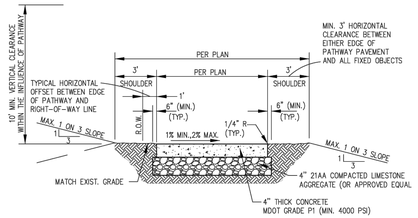
Client:
Culver Franchising System, Inc.
540 Water Street
Prairie du Sac, WI 53578
p (608) 643-7980

CULVER FRANCHISING SYSTEM, INC.
NEW CULVER'S SIGNAGE
W. OAKS DRIVE AND NOVI ROAD
NOVI, MI. 48137
1 OF 1 SIGN PLACEMENT PLAN

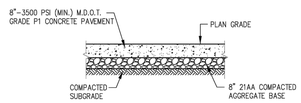
Project Number: 50237
Drawn By: CLK
Revised By: PW
Date: 1-30-24

CONCRETE PATHWAY NOTES

1. FOR CONCRETE PATHWAY PROVIDE TRANSVERSE PLANE OF WEAKNESS SAW CUT JOINTS AT APPROXIMATELY 8' INTERVALS. SAW ¼" WIDE x 1" DEEP JOINTS AND DO NOT SEAL THE JOINTS. TOOLED JOINTS ARE NOT ACCEPTABLE.
2. PROVIDE FULL DEPTH TRANSVERSE EXPANSION JOINTS, BY INSTALLING ½ INCH THICK PREMOLDED JOINT FILLER SET ½INCH BELOW THE SURFACE OF THE CONCRETE IN THE JOINTS AT 50' INTERVALS (MAX.).
3. PLACE ½" FIBER EXPANSION JOINT FILLERS AT MAX. 50' INTERVALS. EXTEND EXPANSION JOINT FILLER THE FULL DEPTH OF THE JOINT WITH THE TOP SLIGHTLY BELOW THE FINISHED SURFACE OF THE PATHWAY.
4. PLACE ½" FIBER EXPANSION JOINT FILLERS AT EACH SIDE OF DRIVE.
5. PROVIDE 1" FIBER EXPANSION JOINT FILLERS AT CURB AND BUILDING OR R.O.W. LINE.
6. AT DRIVEWAYS WITH CURB & GUTTER, PROVIDE CURB DROP PER MDOT STANDARD PLANS R-29-D, DETAIL "L", EXCEPT, REPLACE 1" RISE AT BACK OF GUTTER BY A ROUNDED VALLEY AS SHOWN ON THE SIDEWALK RAMP DETAIL.
7. AT UNPAVED DRIVE OR PAVED DRIVE WITH POOR CONDITION, INCREASE THE SLAB THICKNESS TO 6" OR EXISTING SLAB THICKNESS WHICHEVER IS LARGER.
8. PROVIDE 10' BETWEEN EDGE OF PATHWAY TO TOP OF BANK FOR DETENTION BASINS, OPEN DRAINS, ETC.
9. ADJACENT FINISHED GRADE SHALL BE SET 2" BELOW TO ACCOMODATE SOD.



TYPICAL NON-MOTORIZED PATHWAY/SIDEWALK CONCRETE SECTION
DETAIL - 11B
NOT TO SCALE



8' CONCRETE DUMPSTER PAD
DETAIL - 8
NOT TO SCALE

NOTE:DUMPSTER PAD SHALL EXTEND MIN. 10' BEYOND DUMPSTER ENCLOSURE OPENING.

NO.	DATE	BY	DESCRIPTION
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	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

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2365 HAGGERTY ROAD SOUTH
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TEL: 734.397.3100
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PROJECT DATE: 11/15/2023
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DRAWN BY: SM
CHECKED BY: TS

TECHNICAL SKILL. CREATIVE SPIRIT.
Mannik Smith GROUP
www.MannikSmithGroup.com

PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

DETAILS
CIVIL

20 | 22

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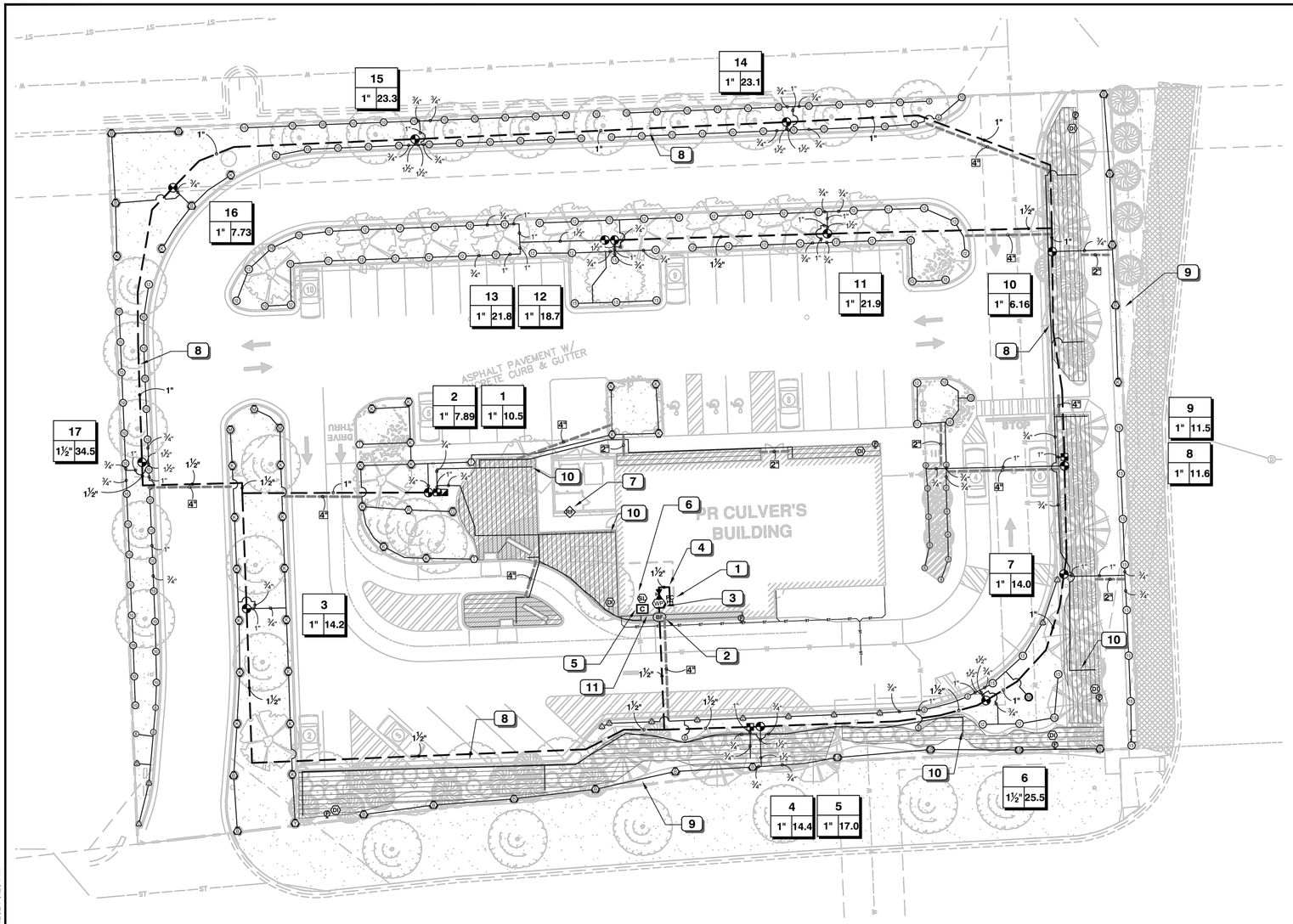


CRITICAL ANALYSIS

Generated:	2024-01-29 13:45
P.O.C. NUMBER: 01	
Water Source Information:	Irrigation Point of Connection.
FLOW AVAILABLE	
Point of Connection Size:	1 1/2"
Flow Available	40.32 GPM
PRESSURE AVAILABLE	
Static Pressure at POC:	60 PSI
Pressure Available:	60 PSI
DESIGN ANALYSIS	
Maximum Station Flow:	34.45 GPM
Flow Available at POC:	40.32 GPM
Residual Flow Available:	5.87 GPM
Design Pressure:	30 PSI
Friction Loss:	2.46 PSI
Fittings Loss:	0.25 PSI
Elevation Loss:	0 PSI
Loss through Valve:	2.48 PSI
Pressure Req. at Critical Station:	35.2 PSI
Loss for Fittings:	1.05 PSI
Loss for Main Line:	10.5 PSI
Loss for POC to Valve Elevation:	0 PSI
Loss for Backflow:	2.69 PSI
Critical Station Pressure at POC:	49.4 PSI
Pressure Available:	60 PSI
Residual Pressure Available:	10.6 PSI

VALVE SCHEDULE

NUMBER	MODEL	SIZE	TYPE	GPM	PRECIP
1	Rain Bird XCZ-100-LC	1"	Area for Dripline	10.51	0.81 in/h
2	Rain Bird PGA Globe	1"	Turf Rotary	7.89	0.44 in/h
3	Rain Bird PGA Globe	1"	Turf Rotary	14.25	0.41 in/h
4	Rain Bird XCZ-100-LC	1"	Area for Dripline	14.4	0.61 in/h
5	Rain Bird PGA Globe	1"	Turf Rotary	17.03	0.23 in/h
6	Rain Bird PGA Globe	1-1/2"	Turf Spray	25.54	1.55 in/h
7	Rain Bird PGA Globe	1"	Turf Spray	13.97	0.79 in/h
8	Rain Bird PGA Globe	1"	Turf Spray	11.58	1.95 in/h
9	Rain Bird XCZ-100-LC	1"	Area for Dripline	11.54	0.56 in/h
10	Rain Bird PGA Globe	1"	Turf Rotary	6.16	0.25 in/h
11	Rain Bird PGA Globe	1"	Turf Spray	21.85	1.4 in/h
12	Rain Bird PGA Globe	1"	Turf Spray	18.73	1.33 in/h
13	Rain Bird PGA Globe	1"	Turf Spray	21.83	1.55 in/h
14	Rain Bird PGA Globe	1"	Turf Spray	23.08	1.85 in/h
15	Rain Bird PGA Globe	1"	Turf Spray	23.35	1.58 in/h
16	Rain Bird PGA Globe	1"	Turf Rotary	7.73	0.42 in/h
17	Rain Bird PGA Globe	1-1/2"	Turf Spray	34.45	1.83 in/h

REFERENCE NOTES SCHEDULE

SYMBOL	DESCRIPTION
1	Irrigation system water source to be a 1-1/2" connection off of the domestic water line, prior to building backflow preventer. System requirements are 34 gpm at a working pressure of 55 psi. Verify available flow and pressure prior to construction.
2	Install PVB 12" above the highest sprinkler outlet. All exposed piping to be either copper or galvanzied pipe.
3	Winterization point, 1-1/2" x 1" tee, 1"x3" nipple and 1" gate valve with a plug in the outlet.
4	All interior piping to be copper or galavanized.
5	Coordinate the exact location of the controller with the owners representative. Provide 120v 10 amp power to the controller. Install controller as per plan notes, details and manufacturers instructions.
6	Install WiFi link in the controller as per manufacturers instructions.
7	Coordinate the exact location of the Wireless Rain Freeze sensor with the owners representative. Install and program as per plan notes, detail and manufacturers instructions.
8	Pipe location is diagrammatic. Install all pipe as per plan notes and details. Multiple pipes in a common trench must have a minimum 3" seperation.
9	Install sprinklers and pipe within the property lines. Adjust sprinklers to irrigate out to the curb.
10	Dripline lateral supply header. Install as per drip layout example details. Typical for all lateral pipe to dripline connections.
11	All control wire from the controller to 12" below FG to be in SCH 40 PVC electical conduit. Mulit-conducter wire is not an approved wire product for the project.

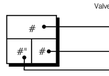
IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	PSI
ES LCS RCS CS SS	Hunter PROS-06-PRS30-CV Strip Series Turf Spray, 30 psi regulated 6in. Pop-Up. With factory installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	30
Q T H F	Hunter PROS-06-PRS30-CV 12 Series Turf Spray, 30 psi regulated 6in. Pop-Up. With factory installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	30
6 8 10 12 15 17	Hunter PROS-06-PRS30-CV Adj Series Turf Spray, 30 psi regulated 6in. Pop-Up. With factory installed Drain Check Valve. Co-molded wiper seal with UV Resistant Material.	30
T	Hunter MP Corner PROS-06-PRS30-CV Turf Rotator, 6in. pop-up with factory installed check valve, pressure regulated to 30 psi, MP Rotator nozzle on PRS30 body. T=Turquoise adj arc 45-105.	30
M L O	Hunter MP1000 PROS-06-PRS30-CV Turf Rotator, 6in. pop-up with check valve, pressure regulated to 30 psi, MP Rotator nozzle on PRS30 body. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.	30
A G R	Hunter MP2000 PROS-06-PRS30-CV Turf Rotator, 6in. pop-up with factory installed check valve, pressure regulated to 30 psi, MP Rotator nozzle on PRS30 body. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.	30
B Y A	Hunter MP3000 PROS-06-PRS30-CV Turf Rotator, 6in. pop-up with factory installed check valve, pressure regulated to 30 psi, MP Rotator nozzle on PRS30 body. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc.	30
LB	Hunter MP3500 PROS-06-PRS30-CV Turf Rotator, 6in. Pop-up with factory installed check valve, pressure regulated to 30 psi, MP Rotator nozzle on PRS30 body. LB=light brown adjustable arc, 90-210.	30

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	Rain Bird XCZ-100-LC 1" Wide Flow Drip Control Kit, for Light Commercial Uses. 1in. PEB Valve, with 1in. Pressure Regulating 40psi Basket Filter. 0.3-20 GPM.
P	Hunter PLD-BV Manual flush/shut off valve, barbed insert. Typically installed in 10in. box, with adequate blank tubing to extend valve out of valve box. Use with HDL or other 3/4in. dripline.
DI	Hunter ECO-ID ECO-ID: 1/2in. FPT connection with 12 psi-70 psi operating pressure. Specify with Hunter SJ swing joint.
	Area to Receive Dripline Rain Bird XFCV-06-18 XFCV On-Surface Landscape Dripline with a Heavy-Duty 3.5 psi Check Valve. 0.6 GPH emitters at 18" O.C. Dripline laterals spaced at 18" apart, with emitters offset for triangular pattern. Great for elevation change. Specify XF insert fittings.

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	Rain Bird PGA Globe 1" 1in., 1-1/2in., 2in. Electric Remote Control Valve, Globe.
	Rain Bird PGA Globe 1-1/2" 1in., 1-1/2in., 2in. Electric Remote Control Valve, Globe.
	Rain Bird 44-LRC 1" 1in. Brass Quick-Coupling Valve, with Corrosion-Resistant Stainless Steel Spring, Locking Thermoplastic Rubber Cover, and 2-Piece Body.
	Landscape Products Inc. BBV 1/2in., 3/4in., 1in., 1-1/4in., 1-1/2in., 2in., 2-1/2in., 3in. Full Port Brass Ball Valve. Suitable for a full range of liquids and gases in residential and commercial applications.
BF	Febco 765 1-1/2" Pressure Vacuum Breaker, brass with ball valve SOV. Install 12in. above highest downstream outlet and the highest point in the downstream piping.
C	Rain Bird ESP4ME3 with (1) ESP-SM3 (2) ESP-SM6 19 Station, Hybrid Modular Outdoor Controller. For Residential or Light Commercial Use. LNK WiFi Module and Flow Sensor Ready.
SL	Rain Bird LNK2WIFI Upgrades controllers (ESP-M, ESP-RZXe, ST8) to Have Weather Data for ET-Based Adjustments (WaterSense Approved) & WiFi Capabilities -
RF	Rain Bird WR2-RFS Wireless Rain/Freeze Sensor.
WP	Winterization Point Line sized tee with 1" gate valve for compressor connection.
PC POC	Point of Connection 1 1/2" Irrigation Point of Connection.
	Irrigation Lateral Line: PVC Class 200 SDR 21 3/4"
	Irrigation Lateral Line: PVC Class 200 SDR 21 1"
	Irrigation Lateral Line: PVC Class 200 SDR 21 1 1/2"
	Irrigation Mainline: PVC Class 200 SDR 21 1"
	Irrigation Mainline: PVC Class 200 SDR 21 1 1/2"
	Pipe Sleeve: PVC Schedule 40
	Pipe Sleeve: PVC Schedule 40 2"
	Pipe Sleeve: PVC Schedule 40 4"

Valve Callout



0 20 40 60 80 feet

1" = 20'

NORTH

3 FULL WORKING DAYS BEFORE YOU DIG CALL

MISS DIG System

1-800-482-7171 or 811

Design Ticket #: _____

Survey Ticket #: _____

NO.	DATE	BY	DESCRIPTION
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2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3101

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

TECHNICAL SKILL. CREATIVE SPIRIT.

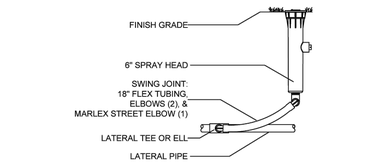
Mannik Smith GROUP
www.MannikSmithGroup.com

PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

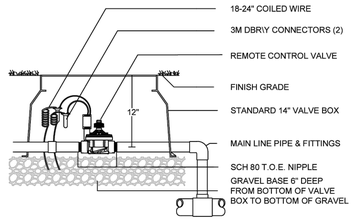
PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

IRRIGATION PLANS

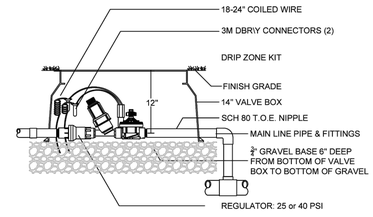
21 / 22



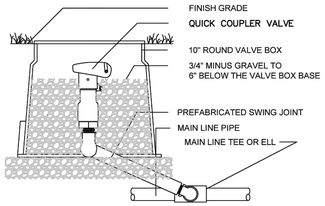
1 6" SPRAY BODY
NTS



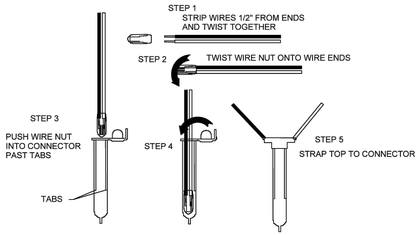
2 ELECTRIC CONTROL VALVE
NTS



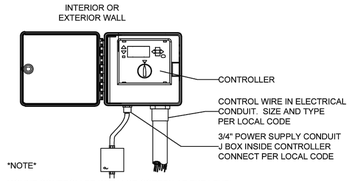
3 DRIP CONTROL ZONE
NTS



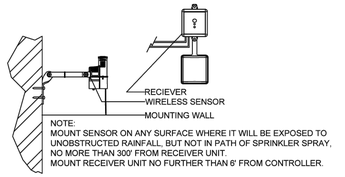
4 QUICK COUPLER VALVE
NTS



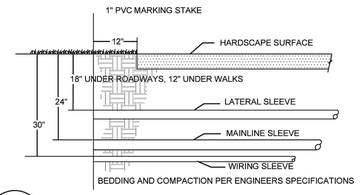
5 WIRE CONNECTION 3M-DBR6-Y
NTS



6 WALL MOUNT CONTROLLER
NTS



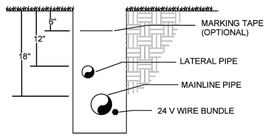
7 WIRELESS RAIN SENSOR
NTS



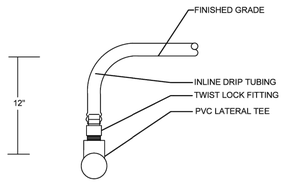
8 SLEEVING
NTS

GENERAL NOTES

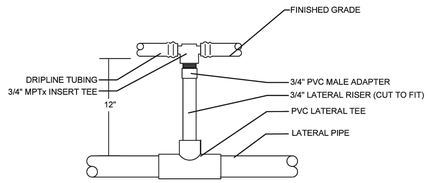
1. ALL TRENCHING TO BE OUTSIDE OF TREE DRIP LINE, IF TRENCHING MUST BE DONE WITHIN TREE DRIPLINE FOLLOW TREE PRESERVATION GUIDELINES FOR THE PROJECT OR LOCAL MUNICIPALITY
2. MAINLINE TO HAVE MINIMUM OF 18" OF COVER AND A MINIMUM OF 18" OFF OF THE HARDSCAPE
3. LATERALS TO HAVE MINIMUM OF 12" OF COVER AND A MINIMUM OF 12" OFF OF THE HARDSCAPE
4. NO ROCKS, BOULDERS OR SHARP OBJECTS TO BE IN TRENCH BACKFILL
5. ALL PIPE TO BE INSTALLED AS PER MANUFACTURES SPECIFICATIONS
6. SPRINKLERS AND RELATED EQUIPMENT TO BE INSTALLED AS PER DETAILS
7. CONTROL WIRE TO BE 14 GA UL APPROVED, SINGLE CONDUCTOR, PE JACKETED
8. WIRE SPLICES TO BE DONE AS PER DETAILS
9. ALL WIRE SPLICES OUSIDE OF CONTROL VALVE BOX TO BE IN 10" VALVE BOX
10. WIRE TO BE COLOR CODED, RED FOR POWER AND WHITE FOR COMMON
11. CONTRACTOR SHALL INSTALL MANUFACTURES GROUNDING EQUIPMENT ON BOTH THE POWER AND OUTPUT SIDES
12. CONTRACTOR SHALL PROVIDE EXPANSION COILS AT EACH WIRE CONNECTION BY WRAPPING WIRE AROUND 3/4" PIPE 12 TIMES
13. AT EACH CHANGE IN MAINLINE DIRECTION CONTRACTOR TO INSTALL A 30" LOOP OF EXTRA WIRE
14. WIRE TO BE BUNDLED WITH ZIP-TIE EVERY 15'
15. SPRINKLERS ARE TO BE ADJUSTED TO AVOID OVER-SPRAY INTO NON-IRRIGATED AREAS
16. ELECTRIC CONTROL VALVES ARE TO BE INSTALLED IN VALVE BOXES AS FOLLOWS
    14" RECTANGULAR FOR EACH ELECTRIC CONTROL VALVE
17. SPRINKLERS TO BE INSTALLED 12" FROM FOUNDATIONS AND 2" FROM HARDSCAPE
18. CONTRACTOR TO ADD RISER EXTENSIONS TO SPRINKLERS IF REQUIRED TO MAINTAIN PROPER COVERAGE
19. ALL PIPING TO BE FLUSHED PRIOR TO INSTALLATION OF SPRINKLERS
20. ALL VALVES, QUICK COUPLER VALVES, WIRE SPLICES TO BE IN LANDSCAPED BEDS WHEREVER POSSIBLE
21. CONTRACTOR IS RESPONSIBLE FOR OBTAINING PROPER COVERAGE OF AREA TO BE IRRIGATED, MAKE ADJUSTMENTS AS NECESSARY
22. CONTRACTOR SHALL EXERCISE CARE NOT TO DAMAGE EXISTING UTILITIES REPAIRING ANY DAMAGES AT HIS OWN COST
23. PLAN IS DIAGRAMMATIC TO IMPROVE CLARITY ALL IRRIGATION EQUIPMENT TO BE INSTALLED WITHIN PROPERTY LINES AND LANDSCAPED AREAS
24. ANY DISCREPANCIES BETWEEN THE PLAN AND THE SITE TO BE REFERRED TO THE OWNERS REPRESENTATIVE PRIOR TO CONSTRUCTION
25. CONTRACTOR TO PROVIDE 1 YEAR WARRANTEE OF ALL PRODUCTS AND WORKMANSHIP TO INCLUDE WINTERIZATION AND SPRING START-UP
26. CONTRACTOR TO PROVIDE OWNER AND OR LANDSCAPE ARCHITECT RECORD DRAWING PRIOR TO SUBSTANTIAL COMPLETION
27. INSTALLATION OF IRRIGATION SLEEVES IS THE IRRIGATION CONTRACTORS RESPONSIBILITY IRRIGATION CONTRACTOR TO COORDINATE WITH GENERAL CONTRACTOR SLEEVE INSTALLATION PRIOR TO PAVEMENT INSTALLATION
28. CLEANUP AND DISPOSE OF ALL DEBRIS, WASTE AND EXCESS CONSTRUCTION MATERIALS LEAVE AREA NEAT, CLEAN AND READY FOR OWNERS USE PROVIDE CLEAN PAVEMENT SURFACES INCLUDING AREAS OF PUBLIC R.O.W.



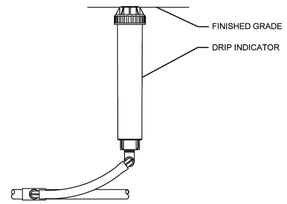
9 TRENCH, PIPE AND WIRE
NTS



10 START CONNECTION LATERAL TO DRIPLINE
NTS



11 START CONNECTION LATERAL TO DRIPLINE (WITH PVC RISER)
NTS



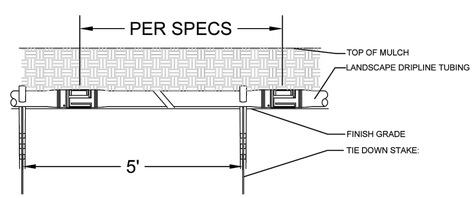
12 DRIP INDICATOR
NTS

DRIP ZONE NOTES

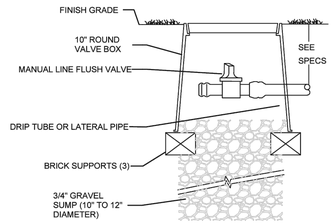
1. IT IS IRRIGATION CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT EACH PLANT IS WITHIN THE DRIPLINE WETTED PATTERN ON NO LESS THAN 2 SIDES.
2. DRIPLINE TO BE LAID OUT AND INSTALLED AS DETAIL EXAMPLES.
3. DRIPLINE TO BE INSTALLED IN GRID FASHION WITH TUBING ON 18" CENTERS, ELBOWS AND TEES ARE TO BE USED FOR CHANGES IN DIRECTION, LOOPING OF DRIPLINE IS NOT ACCEPTABLE.
4. DRIPLINE IS TO BE INSTALLED, TESTED AND INSPECTED TO ENSURE EACH EMITTER FUNCTIONS PROPERLY PRIOR TO COVERING WITH MULCH.
5. ALL DRIPLINE SUPPLY PIPING TO BE CL 200 PVC.
6. ALL PIPING WITHIN A DRIP ZONE THAT IS UNDER THE HARDSCAPE TO BE CL 200 PVC.
7. DRIPLINE TO BE STAKED DOWN EVERY 3' AND WITHIN 1' OF ALL FITTING OUTLETS.
8. ALL FLUSH VALVES ARE TO BE INSPECTED FOR PROPER OPERATION.
9. IRRIGATION CONTRACTOR TO MEET WITH DRIP COMPONENT MANUFACTURERS REPRESENTATIVE AND OWNER'S REPRESENTATIVE ON SITE PRIOR TO CONSTRUCTION TO REVIEW DRIP COMPONENT CONSTRUCTION, OPERATION AND MAINTENANCE.

CONTROLLER INSTALLATION NOTES

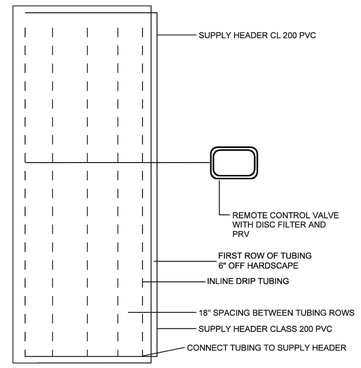
1. IRRIGATION CONTRACTOR TO COORDINATE EXACT LOCATION OF CONTROLLER WITH OWNER'S REPRESENTATIVE.
2. PROVIDE 120VAC 10 AMP POWER TO JUNCTION BOX AT CONTROLLER LOCATION.
3. IRRIGATION CONTRACTOR TO HARD WIRE CONTROLLER TO POWER SUPPLY AS PER PREVAILING CODE.
4. CONTROLLER TO BE SECURELY ATTACHED TO THE WALL USING METALLIC FASTENERS MADE FOR WALL TYPE.
5. ALL IRRIGATION CONTROL WIRE ABOVE GRADE TO BE ENCASED IN PVC ELECTRICAL CONDUIT.
6. IRRIGATION CONTRACTOR IS RESPONSIBLE FOR ALL POTENTIAL WALL PENETRATIONS AND THE SEALING OF THOSE PENETRATIONS.
7. CONTROLLER TO BE GROUNDED AS PER MANUFACTURERS RECOMMENDATIONS.



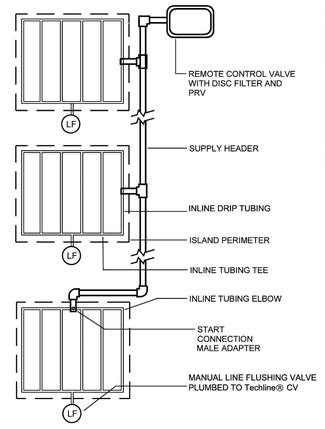
13 DRIPLINE ON GRADE WITH MULCH COVER
NTS



14 MANUAL LINE FLUSHING VALVE
NTS



16 INLINE DRIP TUBING FOR SHRUBS
NTS



17 ISLAND LAYOUT
NTS

3 FULL WORKING DAYS
BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #:
Survey Ticket #:

NO.	DATE	BY	DESCRIPTION
	05/23/2023	SM	CITY OF NOVI - DESIGN REVIEW
	02/06/2024	SM	CITY OF NOVI - DESIGN REVIEW RESUBMITTAL

PRELIMINARY
NOT FOR CONSTRUCTION

2365 HAGGERTY ROAD SOUTH
CANTON, MI 48188
TEL: 734.397.3100
FAX: 734.397.3131

PROJECT DATE: 11/15/2023
PROJECT NO: 2300851
DRAWN BY: SM
CHECKED BY: TS

TECHNICAL SKILL.
CREATIVE SPIRIT.

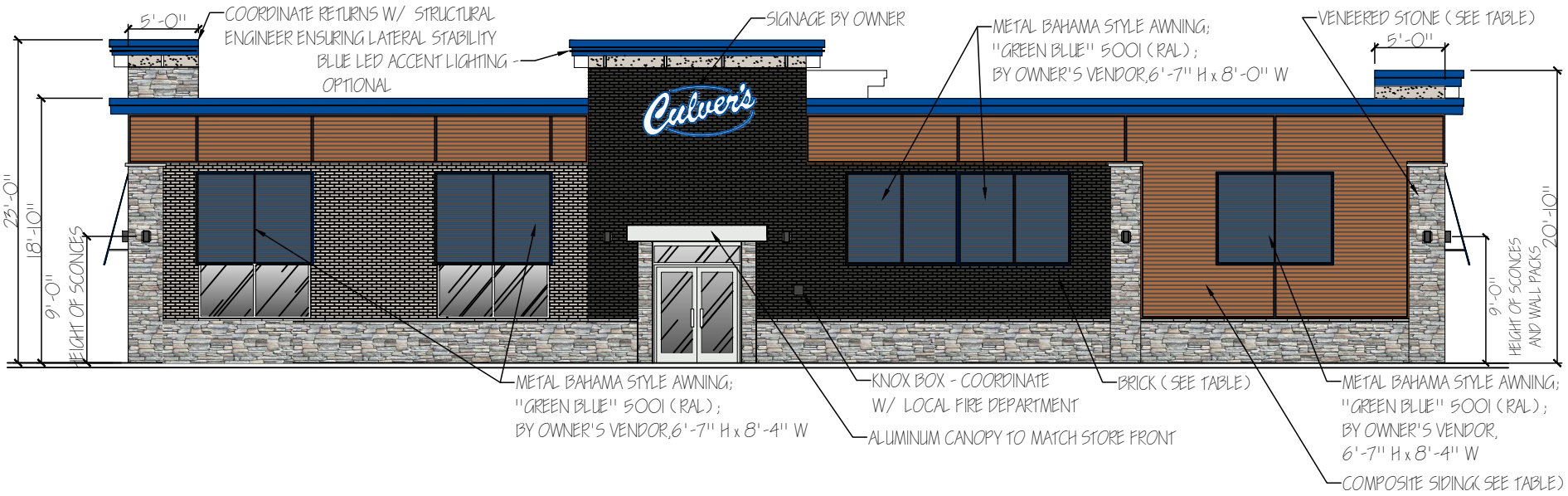
Mannik Smith GROUP
www.MannikSmithGroup.com

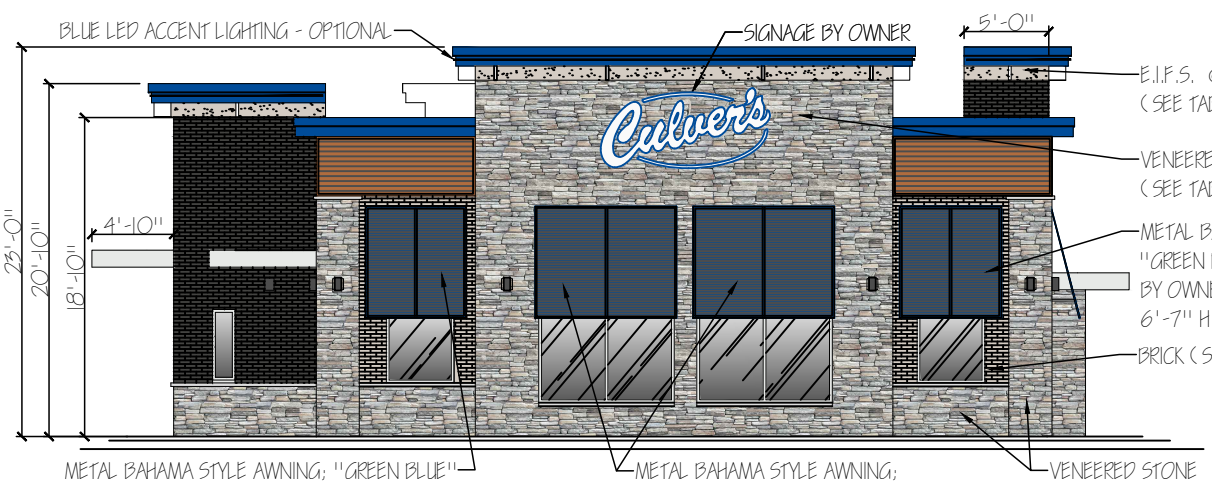
PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

IRRIGATION PLANS

22 / 22

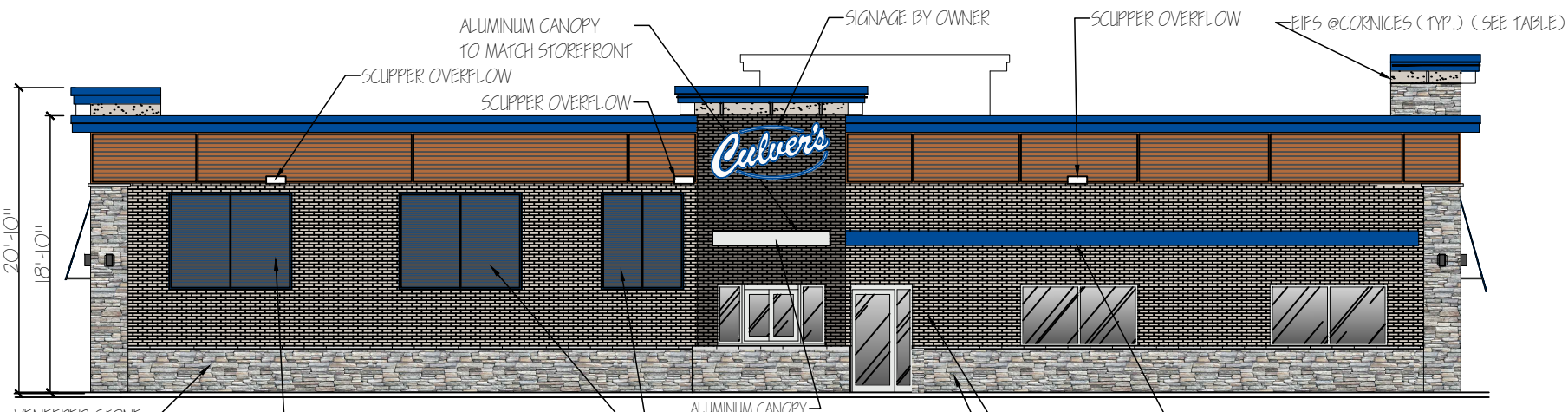


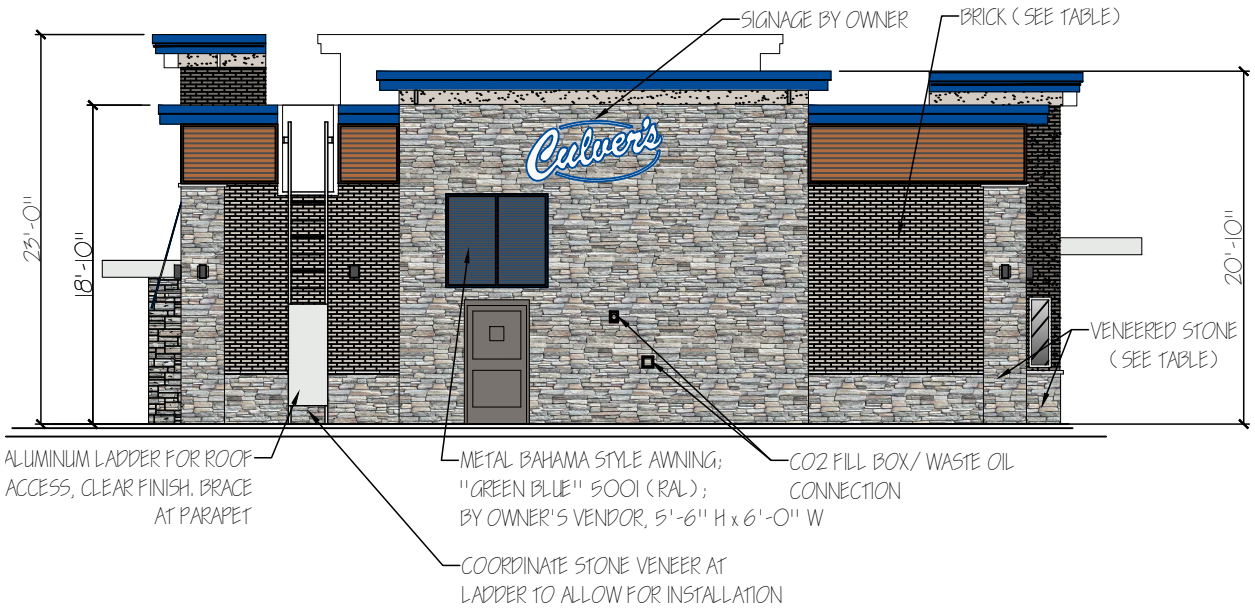


BAHAMA STYLE AWNINGS
(OWNER SUPPLIED/ VENDOR INSTALLED)

QUANTITIES:
5 - METAL AWNINGS @ 6'-7" H x 8'-4" W x 2'-0" D
4 - METAL AWNINGS @ 6'-7 H x 8'-0" W x 2'-0" D
3 - METAL AWNINGS @ 6'-7"H x 6'-0" W x 2'-0" D
1 - METAL AWNING @ 5'-6" H x 6'-0" W x 2'-0" D
13 - TOTAL

METAL AWNING COLOR SPECIFICATIONS:
- "GREEN BLUE" 5001 (RAL) BY OWNER'S VENDOR





EXTERIOR MATERIAL OPTIONS: SEE EXTERIOR FINISH DOCUMENT FOR SELECTIONS

GENERAL NOTES:
1. METAL COMPRESSION EDGE AT PARAPET COLOR: "HARBOR BLUE"
2. DO NOT DRYSTACK CULTURED STONE

MATERIAL OPTIONS:

STONE:
- ENVIRONMENTAL STONEWORKS, STYLE: TUSCAN LEDGE, COLOR: "ANDES SUMMIT" OR
- BORAL STONE, STYLE: COUNTRY LEDGESTONE; COLOR: MATCH "ANDES SUMMIT"

COMPOSITE CLADDING:
- NEWTECHWOOD, "ULTRASHIELD NATURALE" WOOD-LOOK CLADDING; COLOR: "BRAZILIAN IPE"

SILL & ACCESSORIES:
- COORDINATE COLOR PER MFG. RECOMMENDATION, FLAT LIGHT STONES TO BE USED AT SCONCE FIXTURES

MAIN FIELD MATERIAL:
- BRICK: MEDIUM SAND FINISH. COLOR: SW6071 "POPULAR GRAY"

TOWERS & ENTRY ACCENT:
- BRICK: MEDIUM SAND FINISH, COLOR: SW7019 "GAUNTLET GRAY" (DARK COLOR)
- E.I.F.S.@ CORNICE: MEDIUM SAND FINISH. COLOR: SW6071 "POPULAR GRAY"

OTHER EXTERIOR BUILDING FINISHES

EXTERIOR HOLLOW METAL:	PAINT TO MATCH "GAUNTLET GRAY"
REMOVABLE MULLION:	SILVER, TO MATCH ALUMINUM
BOLLARD COVER:	ACCESSIBLE BLUE
ALUMINUM FRAMES & DOORS:	CLEAR ANODIZED FINISH
TRANSITION BASE FLASHING:	PREFINISHED, MATCH UPPER MATERIAL
ROOF LADDER:	MILL FINISH, ALUMINUM
LIGHT FIXTURES:	SEE ELECTRICAL

CLADDING ALTERNATE

IN LIEU OF ULTRASHIELD COMPOSITE CLADDING, PROVIDE LONGBOARD CLADDING SYSTEM COMPLETE W/ MFGR. CLIPS & TRIMS. INSTALL ON FURRING STRIPS PER MANUFACTURER SPECIFICATIONS.

S.P.A.
EXTERIOR ELEVATIONS

PROJECT No.	230626
DRAWN BY:	JMV
DATE:	12.27.2023

A-3

Metro - M
NOVI, MICHIGAN

STATE OF MICHIGAN
DANNY SCOTT HENRICKSON
ARCHITECT
NO. 33200
LICENSED ARCHITECT

HENRICKSON
ARCHITECTURE + PLANNING

PROPOSED STREET VACATION

LEGEND

- CONCRETE PAVEMENT
- HMA PAVMENT
- HEAVY DUTY HMA PAVMENT
- CONCRETE SIDEWALK
- SPILL OUT CURB
- STANDARD CURB & GUTTER
- PROPOSED LIGHT POLE
- PROPOSED STORM INLET
- PROPOSED STORM MANHOLE
- PROPOSED ADS BARRICUDA STRUCTURE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED CLEANOUT
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED WATERMAIN REDUCER

GRAPHIC SCALE
0 30 60

3 FULL WORKING DAYS BEFORE YOU DIG CALL
MISS DIG System
1-800-482-7171 or 811
Design Ticket #: _____
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NO.	DATE	BY	DESCRIPTION
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TECHNICAL SKILL. CREATIVE SPIRIT.
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PREPARED FOR:
UNION PACIFIC HOLDINGS, LLC
CHARLES PAISLEY: 248-860-8365
49169 ALPHA DRIVE WIXOM, MI

PRELIMINARY SITE PLAN
CULVER'S OF NOVI
W OAKS DRIVE AT NOVI RD
NOVI, MI 48137

EXHIBIT - KAREVICH (NORTH)

01 / 01

TRAFFIC IMPACT STUDY

Culver's of Novi
Traffic Impact Study

Union Pacific Holdings, LLC

Project No. 231767
February 6, 2024

fishbeck
Engineers | Architects | Scientists | Constructors

fishbeck
Engineers | Architects | Scientists | Constructors

39500 MacKenzie Drive, Suite 100
Novi, Michigan 48377

248.324.2090 | fishbeck.com

Culver's of Novi
Traffic Impact Study

Prepared For:
Union Pacific Holdings, LLC
Wixom, MI

February 6, 2024
Project No. 231767

Table of Contents

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List of Abbreviations/Acronyms

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
City	City of Novi
EB	eastbound
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
LUC	Land Use Code
m.d.	mid-day
MDOT	Michigan Department of Transportation
mph	miles per hour
NB	northbound
RCOC	Road Commission for Oakland County
SB	southbound
SCATS	Sydney Coordinated Adaptive Traffic System
sft	square foot
TIS	Traffic Impact Study
TMC	Turning Movement Count
WB	westbound
vpd	vehicles per day

References

Institute of Transportation Engineers, 2021, *Trip Generation Manual*, 11th Edition.
Michigan Department of Transportation, 2021, *Electronic Traffic Control Device Guidelines.*
Michigan Department of Transportation, 2017, *Geometric Design Guidance*.
Michigan Department of Transportation, 2013, *Michigan Manual on Uniform Traffic Control Devices*.
Transportation Research Board, 2016, *Highway Capacity Manual*, 6th Edition.

Executive Summary

Fishbeck has conducted a traffic impact study (TIS) related to the proposed development located in the northwest corner of the intersection of Novi Road and West Oaks Drive/Twelve Oaks Mall Road in the City of Novi (City), Oakland County, Michigan. Existing land use is vacant with Karevich Drive crossing through the site. The proposed development consists of a 4,106 square foot (sft) Culver's fast-food restaurant with a drive-through window and realignment of Karevich Drive. Access to the proposed site will be provided via one proposed driveway on West Oaks Drive. The development is assumed to be open and fully operational in 2024.

This study was conducted according to the methodologies and guidance published by Institute of Transportation Engineers (ITE), American Association of State Highway and Transportation Officials (AASHTO), Michigan Department of Transportation (MDOT), Road Commission for Oakland County (RCOC), and the City.

Vehicular turning movement counts (TMCs) were collected at the study intersections during the weekday mid-day (m.d.) (11 a.m. to 1 p.m.) and p.m. (4 p.m. to 6 p.m.) peak periods of the road network on Thursday, January 25, 2024.

Site-generated traffic was forecast using the information and methodologies specified in the *Trip Generation Manual*. Existing traffic volumes, site layout, and engineering judgement were used to develop a trip distribution model for the m.d. and p.m. peak hours for the new traffic that would be generated by the proposed development.

A portion of the site-generated trips are anticipated to be pass-by in nature, meaning they already exist on the adjacent road network and are interrupted to visit the site.

Operational analyses were conducted for existing and total future conditions based on the *Highway Capacity Manual* (HCM) 6th Edition methodologies using Synchro traffic analysis software. Synchro network models were also simulated using SimTraffic to evaluate network operations including intersection queueing.

Based on the findings of the HCM operational analyses and site traffic generation, no improvements are recommended to mitigate traffic impacts.

The opinions, findings, and conclusions expressed in this TIS are those of Fishbeck and not necessarily those of the Owner/Applicant, MDOT, RCOC, or the City.

Prepared By: 

Jill Bauer, PE, PTOE
Project Manager – Fishbeck

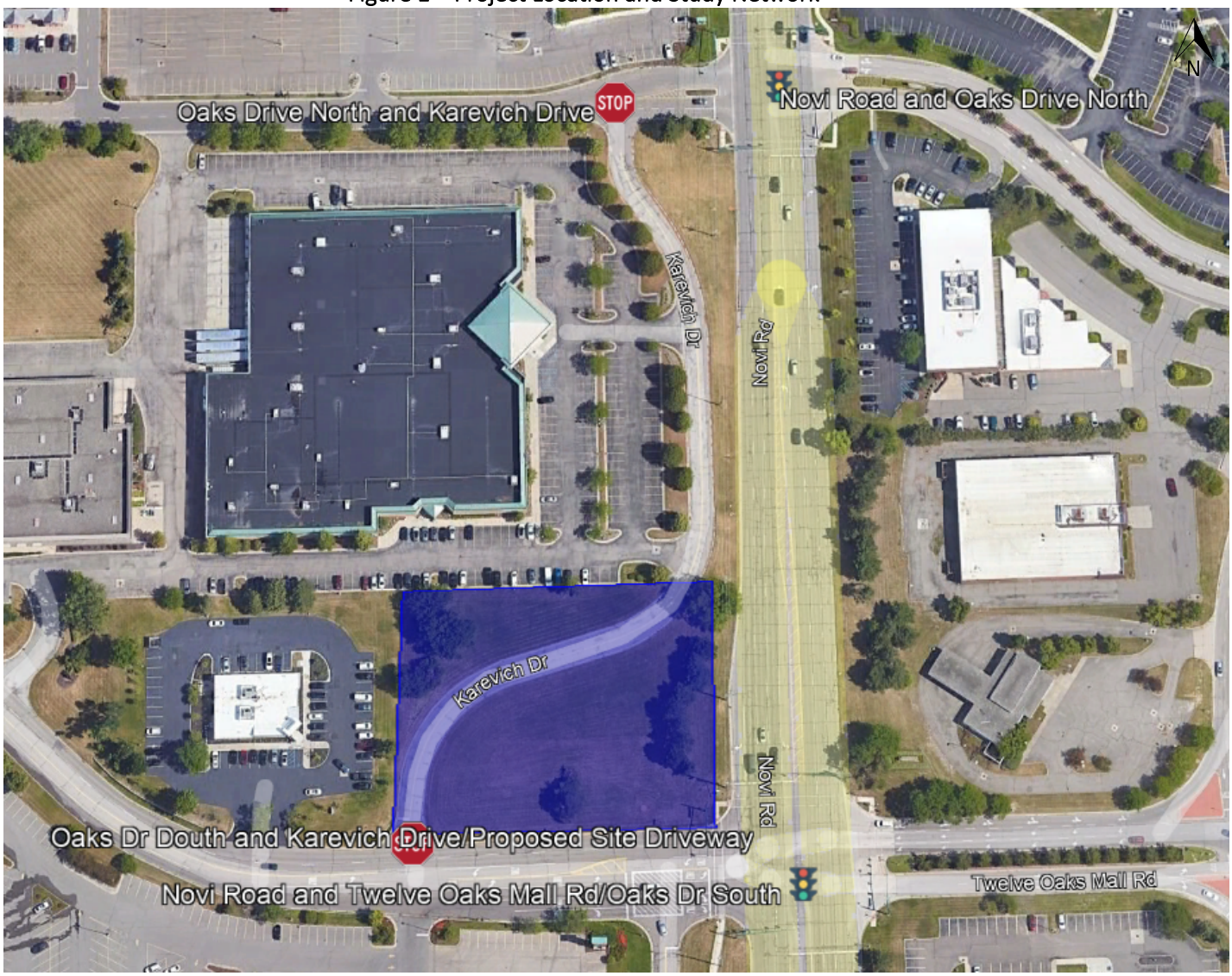
1.0 Introduction

1.1 Project Overview

On behalf of Union Pacific Holdings, LLC, Fishbeck has conducted a TIS related to the proposed development located in the northwest corner of the intersection of Novi Road and West Oaks Drive/Twelve Oaks Mall Road in the City, Oakland County, Michigan. Existing land use is vacant with Karevich Drive crossing through the site. The proposed development consists of a 4,106 sft Culver's fast-food restaurant with a drive-through window and realignment of Karevich Drive. Access to the proposed site will be provided via one proposed driveway on West Oaks Drive. The development is assumed to be open and fully operational in 2024.

The project location and study intersections are displayed in Figure 1.

Figure 1 – Project Location and Study Network



1.2 Study Methodology

The objectives of this TIS were to determine what impacts the proposed project traffic would have on adjacent roadway traffic operations, and to develop recommendations for any improvements necessary to mitigate the traffic impacts on the studied intersections. Study analyses were completed relative to typical weekday m.d. and p.m. peak periods.

This study was conducted according to the methodologies and guidance published by ITE, AASHTO, MDOT, RCOC, and the City.

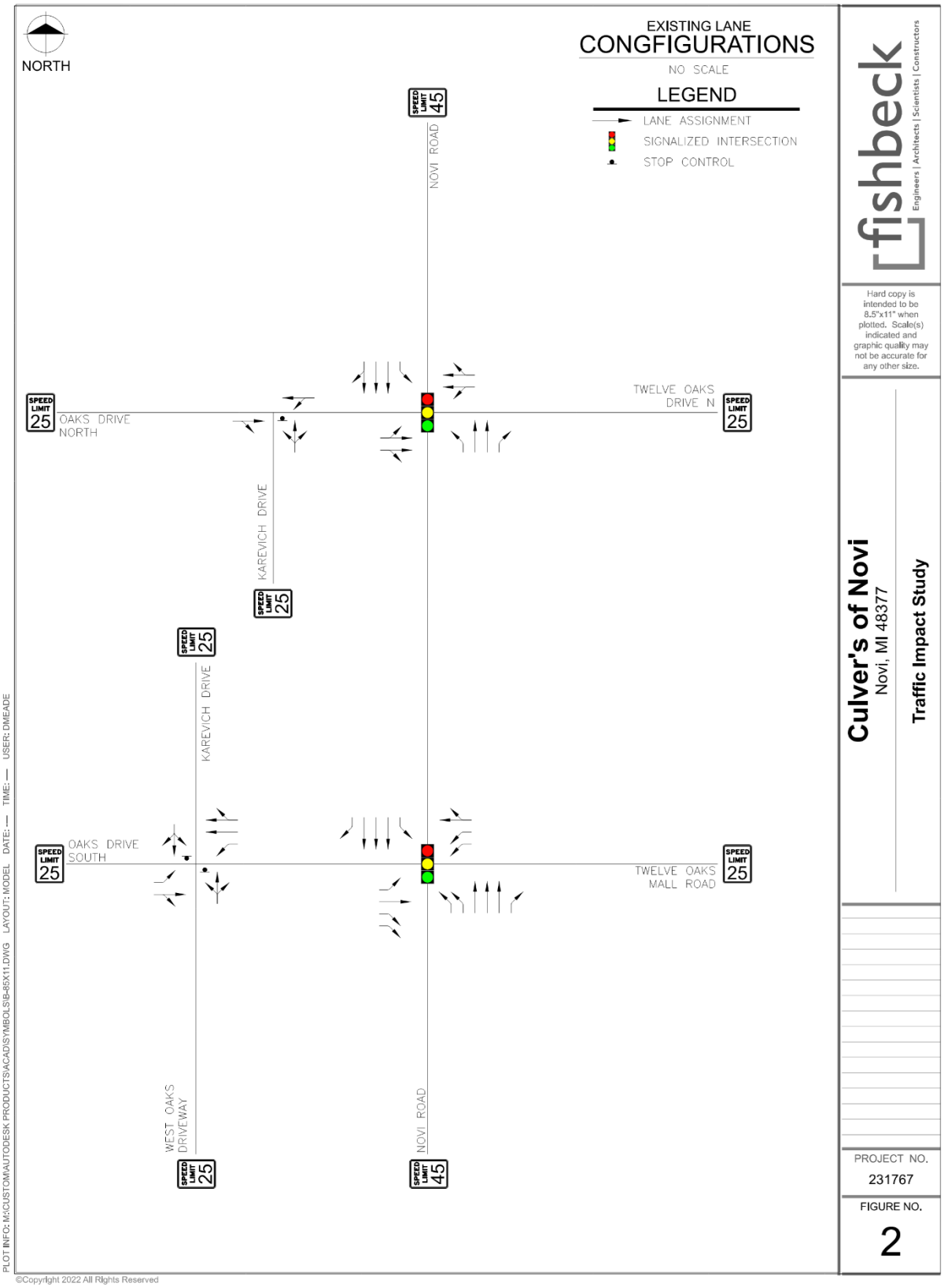
1.3 Intersection Characteristics

Based on the type and size of the proposed development and the area of influence for the site trips, traffic operations were analyzed for the following intersections:

- Novi Road and Twelve Oaks Mall Road/Oaks Drive South (signalized).
- Novi Road and Oaks Drive North (signalized).
- Oaks Drive South and Karevich Drive/Proposed Site Driveway (unsignalized).
- Oaks Drive North and Karevich Drive (unsignalized).

The existing intersection lane configurations, traffic controls, and posted speed limits are displayed in Figure 2.

Figure 2 – 2024 Existing Lane Configurations



1.4 Roadway Characteristics

The characteristics of the study area roadways and signalized intersections are described in Tables 1 and 2. The data points referenced were from the Southeast Michigan Council of Governments Traffic Count Database System online maps.

Table 1 – Roadway Characteristics

Roadway	Jurisdiction	Speed Limit (mph)	No. of Lanes	Roadway Classification	Direction	AADT (vpd)
Novi Road	RCOC	45	7-9	Principal Arterial	NB	16,358
					SB	8,847
Karevich Drive	City of Novi	Not Posted	2	Local	NB	Not Available
					SB	Not Available
Oaks Drive North	Private	Not Posted	2-4	Uncertified	EB	2,254
					WB	1,822
Oaks Drive South	City of Novi	30	4-7	Local	EB	6,198
					WB	4,294

AADT Average Annual Daily Traffic
mph miles per hour
vpd vehicles per day

Table 2 – Signal Characteristics

Intersection	Jurisdiction	Left Turn Phasing			
		NB	SB	EB	WB
Novi Road and Twelve Oaks Mall Road/Oaks Drive South	RCOC	Protected	Protected	Protected	Protected
Novi Road and Oaks Drive North	RCOC	Permitted and Protected	Permitted and Protected	Protected	Protected

EB eastbound
NB northbound
SB southbound
WB westbound

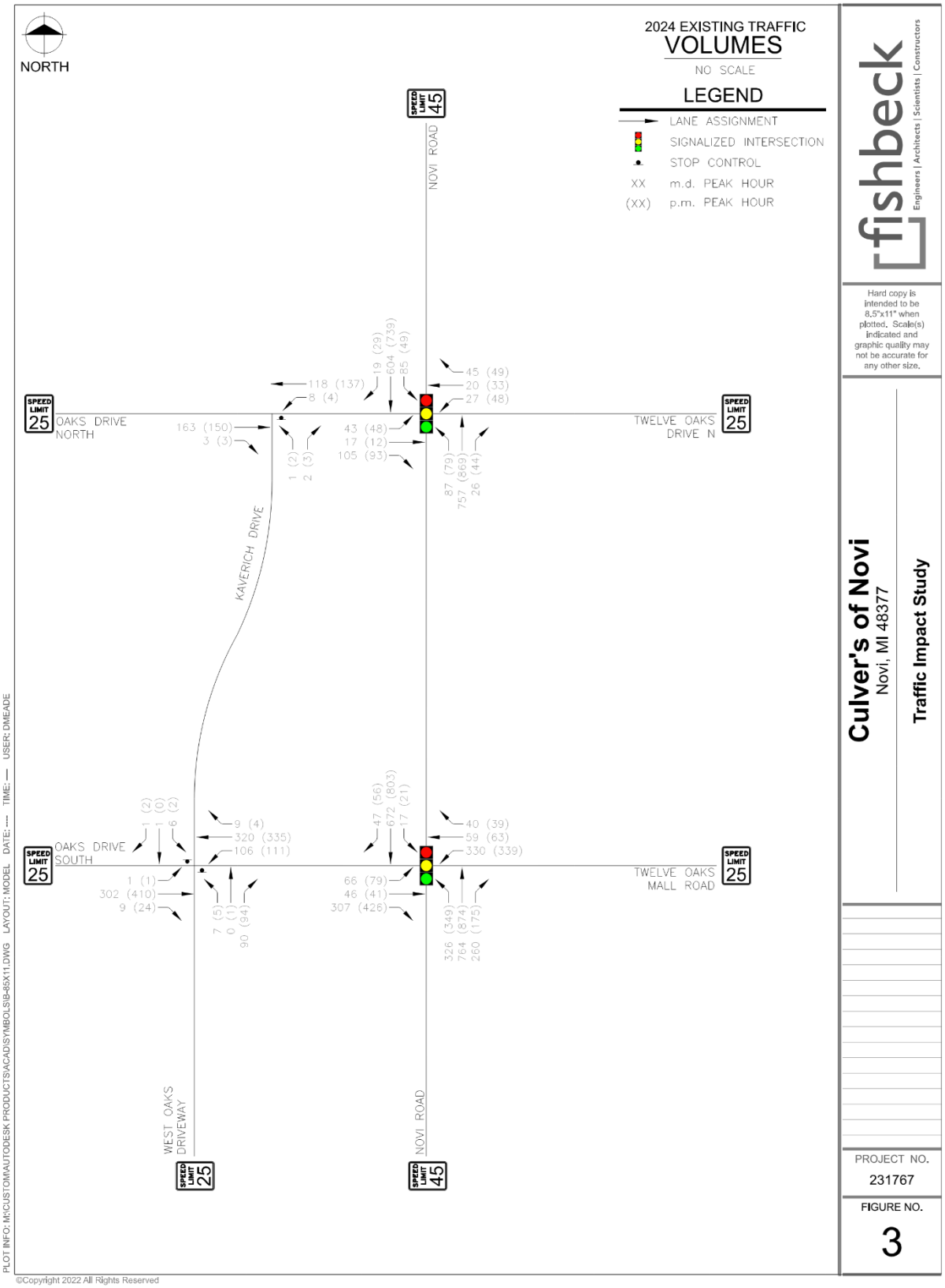
1.5 Existing Traffic Volumes

Vehicular TMCs were collected at the following study intersections during the weekday m.d. (11 a.m. to 1 p.m.) and p.m. (4 p.m. to 6 p.m.) peak periods of the road network on Thursday, January 25, 2024:

- Novi Road and Twelve Oaks Mall Road/Oaks Drive South
- Novi Road and Oaks Drive North
- Oaks Drive South and Karevich Drive/Proposed Site Driveway
- Oaks Drive North and Karevich Drive

Traffic volume information can be found in Appendix 1, which includes heavy vehicle data. The existing traffic volumes used in this study are provided in Figure 3.

Figure 3 – 2024 Existing Traffic Volumes



2.0 2024 Existing Conditions Analysis

2.1 Traffic Operations Analysis Methodology

Synchro was used to perform HCM operational analyses during the m.d. and p.m. peak hours for all intersections within this study. According to the most recent editions of the HCM, Level of Service (LOS) is a qualitative measure describing operational conditions of a traffic stream or intersection. LOS ranges from A to F, with LOS A representing desirable traffic operations characterized by low delay and LOS F representing extremely poor traffic operations characterized by excessive delays and long vehicle queues. LOS D is considered acceptable for most areas. Table 3 presents the HCM criteria for various LOSs for unsignalized and signalized intersections. The color coding in the table is used in the operational analysis summary tables later in this report.

Table 3 – LOS Criteria

LOS	Average Stopped Vehicle Delay (seconds)	
	Unsignalized	Signalized
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

2.2 Existing Conditions Traffic Analysis

Synchro models for the existing network were created based on the existing roadway configurations and traffic controls. The traffic signal timing permits for the signalized intersections were provided by RCOC for use in the models. The traffic signals are a part of RCOC's Sydney Coordinated Adaptive Traffic System (SCATS), meaning the traffic signals will adapt to give more green time to approaches than what may be shown in the traffic signal timing permit. The traffic signal cycle lengths and clearance intervals were maintained based on the traffic signal timing permit; however, the traffic signal timing splits were optimized in Synchro at the intersection of Novi Road and Twelve Oaks Mall Road/Oaks Drive South.

The resulting LOS and delay for the existing conditions are provided in Table 4.

Table 4 – LOS Analysis for Existing Conditions

Approach	LOS/Delay(s)			
	m.d. Peak Hour		p.m. Peak Hour	
Novi Road and Twelve Oaks Mall Road/Oaks Drive South (Signalized)				
EB Oaks Drive South	C	29.5	D	36.2
WB Twelve Oaks Mall Road	D	37.2	D	42.5
NB Novi Road	C	24.2	C	27.6
SB Novi Road	C	28.5	C	22.8
Overall	C	28.1	C	29.9
Novi Road and Oaks Drive North (Signalized)				
EB Oaks Drive North	D	41.5	D	50.0
WB Oaks Drive North	D	39.8	D	49.0
NB Novi Road	B	11.1	A	1.1
SB Novi Road	A	9.9	A	9.6
Overall	B	13.7	A	9.9
Oaks Drive South and Karevich Drive (Stop-Controlled)				
EB Oaks Drive South	A	0.0	A	0.0
WB Oaks Drive South	A	2.0	A	2.2
NB West Oaks Driveway	B	12.3	B	13.6
SB Karevich Drive	D	25.6	C	21.8
Overall	A	2.8	A	2.4
Oaks Drive North and Karevich Drive (Stop-Controlled)				
EB Oaks Drive North	A	0.0	A	0.0
WB Oaks Drive North	A	0.5	A	0.2
NB Karevich Drive	A	9.7	A	9.8
Overall	A	0.3	A	0.3

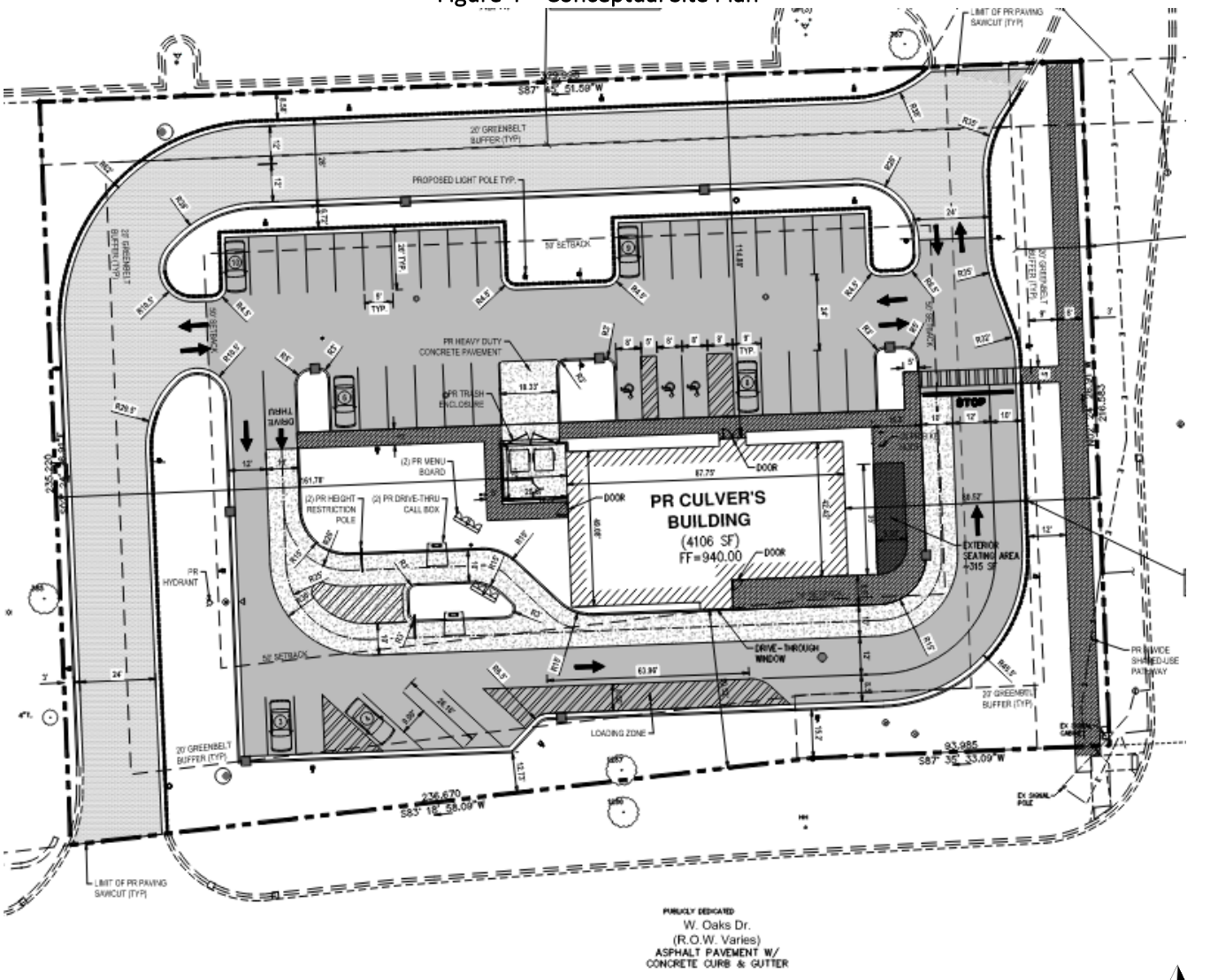
Further analysis of the LOS results for existing conditions revealed that all movements, approaches, and intersections are expected to operate at an acceptable LOS D or better during both the m.d. and p.m. peak hours.

SimTraffic simulations were also reviewed to observe network operations and vehicle queues. For existing conditions, study network operations are acceptable, with no significant vehicle queues. No 95th percentile queue lengths for the turning movements exceed the provided storage length. See Appendix 2 for the existing conditions LOS reports and queueing analysis reports.

3.0 Site Traffic Characteristics

A representation of the current conceptual site plan is provided in Figure 4.

Figure 4 – Conceptual Site Plan



3.1 Trip Generation

Using the information and methodologies specified in the ITE *Trip Generation Manual*, Fishbeck forecast the weekday m.d. and p.m. peak hour trips associated with the proposed development.

A portion of the site-generated trips are anticipated to be pass-by in nature, meaning they already exist on the adjacent road network and are interrupted to visit the site. According to ITE methodology, new trips are assumed to return to their direction of origin whereas pass-by trips continue in their original direction of travel. The ITE *Trip Generation Manual* was used to calculate what percentage of the trips would be pass-by trips, meaning they are vehicles already on the network that would access the development and are not additional trips added to the network.

Table 5 presents the resulting trip generation for the development. Refer to Appendix 3 for additional information.

Table 5 – Trip Generation for Proposed Development

ITE Land Use	LUC	Units	m.d. Peak Hour			p.m. Peak Hour			Weekday
			In	Out	Total	In	Out	Total	
Fast Food Restaurant with Drive Through Window	934	4,106 sft	115	115	230	71	65	136	1,919
Total			115	115	230	71	65	136	
Pass-By Rates, LUC 934: 55% m.d.; 55% p.m.			63	63	126	39	36	75	
Total New Trips			52	52	104	32	29	61	1,919

3.2 Trip Distribution

The directions that site traffic will travel to and from were based upon existing traffic patterns during the m.d. and p.m. peak hours. The existing traffic patterns reflect the gravity between origins and destinations in the study area, and therefore an accurate indication of where the proposed trips would be coming from and going to. Table 6 provides the probable distribution based on existing traffic patterns.

Table 6 – Trip Distribution

Direction	Via	New Trips				Pass-By Trips	
		m.d. Peak Hour		p.m. Peak Hour		m.d. Peak Hour	p.m. Peak Hour
		To	From	To	From		
North	Novi Road	30%	25%	31%	27%	65%	61%
South	Novi Road	44%	46%	48%	43%	35%	39%
East	Twelve Oaks Mall Road	11%	15%	7%	13%		
West	W Oaks Drive	15%	14%	14%	17%		

The trip distribution for the site is indicated in Figure 5. The pass-by volumes are indicated in Figure 6. These trips were added to the existing volumes (Figure 3) to result in the future conditions volumes in Figure 7.

Figure 5 – Trip Generation Volumes

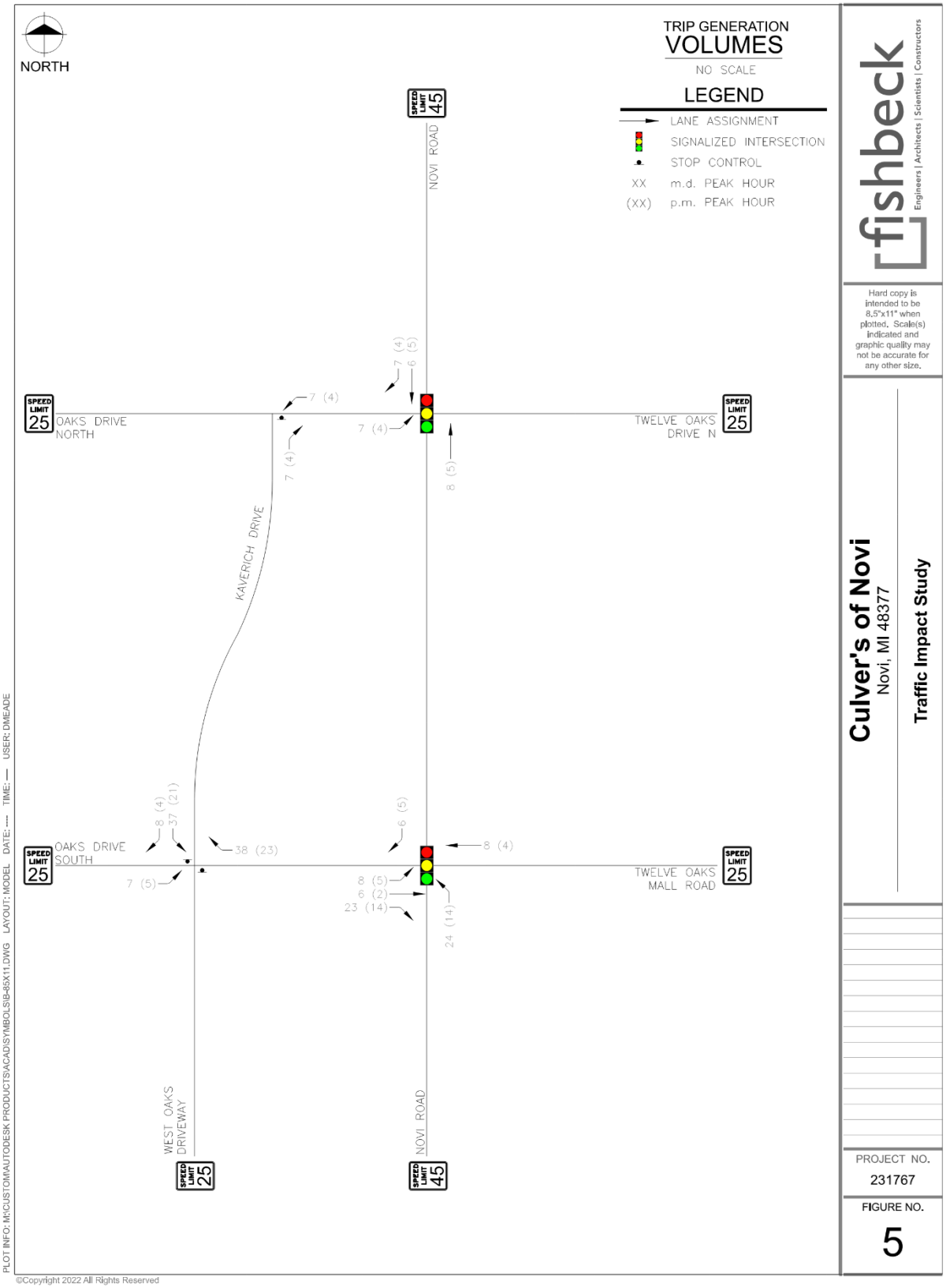


Figure 6 – Pass-By Volumes

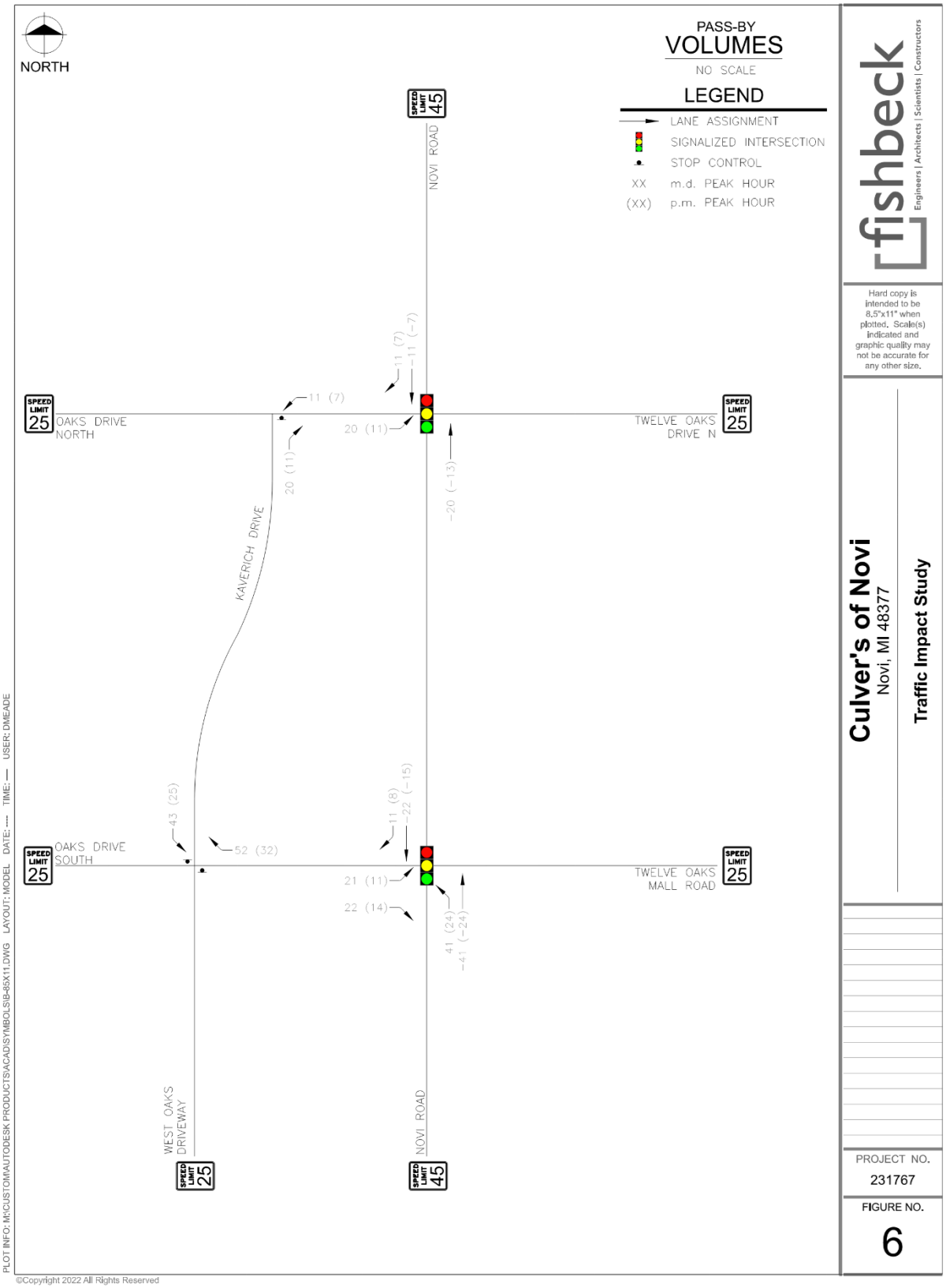
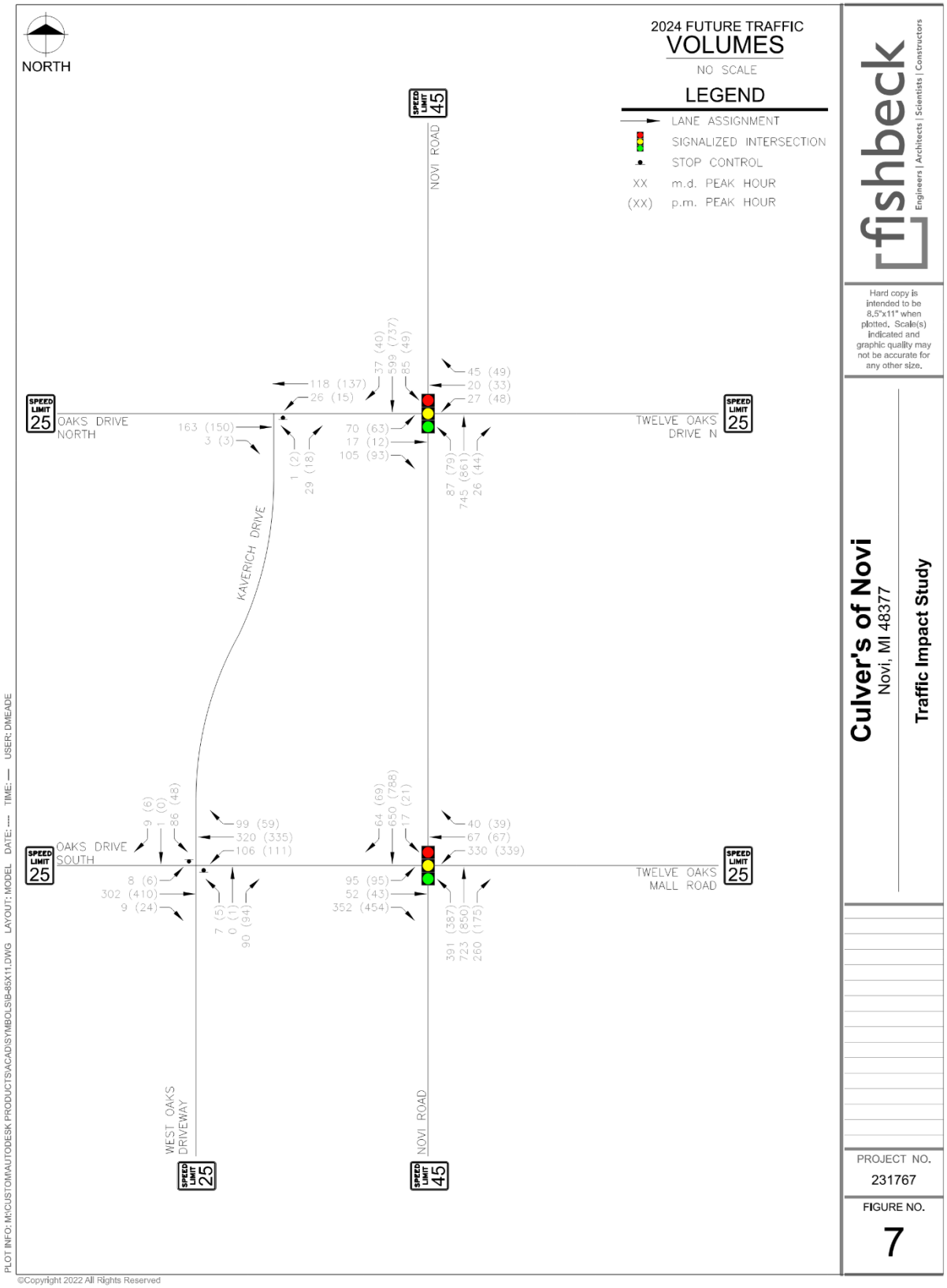


Figure 7 – 2024 Future Traffic Volumes



fishbeck
Engineers | Architects | Scientists | Constructors

Hard copy is intended to be 8.5"x11" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Culver's of Novi
Novi, MI 48377

Traffic Impact Study

PROJECT NO.
231767

FIGURE NO.
7

PLOT INFO: M:\CUSTOM\AUTODESK PRODUCTS\ACAD\SYMBOLS\B-85X11.DWG LAYOUT: MODEL DATE: --- TIME: --- USER: DMEADE

4.0 2024 Future Conditions Analysis

4.1 Turn Lane Warrants

An evaluation was performed in accordance with City requirements to determine if a right turn deceleration lane was required at the site driveway. A left turn lane for EB traffic already exists at the site driveway so this was not evaluated. The results of the analysis indicated a right turn taper is warranted at the Site Driveway. All turn lane warrant charts are provided in Appendix 4. The results of the analysis are presented in Table 7.

Table 7 – Turn Lane Warrants

Intersection	Movement	Existing Treatment	Result
Oaks Drive South and Karevich Drive/Site Driveway	WB Oaks Drive South	None	Right Turn Taper Warranted

4.2 Future Conditions Traffic Analysis

The resulting LOS and delay for the future conditions are presented in Table 8.

Table 8 – LOS Analysis for Future Conditions

Approach	LOS/Delay(s)			
	m.d. Peak Hour		p.m. Peak Hour	
Novi Road and Twelve Oaks Mall Road/Oaks Drive South (Signalized)[1]				
EB Oaks Drive South	C	28.3	C	33.7
WB Twelve Oaks Mall Road	D	37.1	D	44.3
NB Novi Road	C	25.4	C	28.1
SB Novi Road	C	30.0	C	29.4
Overall	C	28.8	C	31.8
Novi Road and Oaks Drive North (Signalized)				
EB Oaks Drive North	D	41.9	D	49.7
WB Oaks Drive North	D	39.8	D	49.0
NB Novi Road	B	11.2	A	1.1
SB Novi Road	B	10.1	A	9.8
Overall	B	14.3	B	10.3
Oaks Drive South and Karevich Drive/Site Driveway (Stop-Controlled)				
EB Oaks Drive South	A	0.2	A	0.1
WB Oaks Drive South	A	1.7	A	1.9
NB West Oaks Driveway	B	12.4	B	13.7
SB Karevich Drive/Site Driveway	F	137.2	F	79.3
Overall	C	19.8	A	7.8
Oaks Drive North and Karevich Drive (Stop-Controlled)				
EB Oaks Drive North	A	0.0	A	0.0
WB Oaks Drive North	A	1.4	A	0.8
NB Karevich Drive	A	9.5	A	9.5
Overall	A	1.5	A	1.2

[1]SCATS traffic signal timing was optimized

Further analysis of the LOS results for future conditions revealed that most movements, approaches, and intersections are expected to continue to operate at an acceptable LOS D or better during both the m.d. and p.m. peak hours, with the following exceptions:

- Oaks Drive South and Karevich Drive/Site Driveway:
  - The SB approach operates at LOS F in the m.d. and p.m. peak hours.

SimTraffic simulations were also reviewed to observe network operations and vehicle queues. For future conditions, study network operations are acceptable. The 95th percentile queues for the SB approach of the Oaks Drive South and Karevich Drive/Site Driveway intersection are 96 feet (four vehicles) and 63 feet (three vehicles) during the m.d. and p.m. peak hours, respectively. No mitigation is recommended at this location. See Appendix 5 for the future conditions LOS reports and queueing analysis reports.

4.3 Access Management

An evaluation was performed in accordance with the City code of ordinances to determine if the driveway spacing of the site driveway is adequate on West Oaks Drive.

On a roadway with a speed limit of 25 mph, near approach curb to near approach curb distance between access points should be 105 feet. The proposed driveway location will meet this distance from the driveway to the west. Additionally, keeping the approach in this location will keep it lined up with the driveway to the south.

4.4 Parking Evaluation

An evaluation of the parking related to the proposed development was completed. In accordance with the City ordinance, the parking requirements for a restaurant are one space for every two employees, plus one space for every two customers allowed under maximum capacity (including waiting areas). This calculates to 48 spaces. The development is proposing 42 parking spaces, which is a deficit of 6 spaces per the City's zoning ordinance.

The anticipated parking demand was calculated using the methodologies presented in the ITE *Parking Generation Manual*, 5th Edition resulting in a peak parking demand of 38 parking spaces. Generally, a parking facility is perceived as full in the range of 85%–95% occupancy, less than its actual capacity. Comparing the ITE methodologies parking demand of 38 spaces to the proposed supply of 42 parking spaces, the parking facility would be at 90% occupancy, which is below the upper limit of the perceived parking facility full threshold.

Table 9 compares the number of parking spaces required by the City ordinance and the parking demand calculated using the ITE *Parking Generation Manual* data. All parking calculations are included in Appendix 6.

Table 9 – Parking Generation

Source	Number of Parking Spaces	
	Weekday	Weekend
City of Novi Ordinance	48 Required Parking Spaces	
ITE *Parking Generation Manual*	36 Parking Space Demand	38 Parking Space Demand

Based on this evaluation, no parking occupancy issues are projected if the proposed number of spaces (42 parking spaces) were approved instead of the ordinance requirement of 48 parking spaces.

5.0 Findings and Recommendations

The analyses conducted for this TIS indicate the proposed development will not result in any significant operational impacts to the adjacent road network. The proposed site access configuration is appropriate and will facilitate site ingress and egress. These conclusions are supported by the following key findings:

- Existing storage lengths are adequate for all movements in existing and future conditions.
- Lane configurations and physical capacity are appropriate within the study area.
- No parking occupancy issues are projected with the proposed number of parking spaces shown on the site plan.

Based on the findings of the HCM operational analyses and site traffic generation, no improvements are recommended to mitigate traffic impacts.

Appendix 1

Traffic Volume Data

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1 - Novi Road & Oaks Drive South/Twelve Oaks Drive	m.d. Peak Hour 01/25/24 12:00 p.m. - 1:00 p.m.		PHF	0.92			0.91			0.93			0.95						
			% Heavy	1%			1%			2%			1%						
		2024	Existing	66	46	307	330	59	40	326	764	260	17	672	47	12	3	116	16
		2024	Existing Adj.	66	46	307	330	59	40	326	764	260	17	672	47				
		2024	Background	66	46	307	330	59	40	326	764	260	17	672	47				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	66	46	307	330	59	40	326	764	260	17	672	47				
			Site Generated	8	6	23		8		24					6				
			Pass By	21		22				41	-41			-22	11				
			Total Site Gen	29	6	45	0	8	0	65	-41	0	0	-22	17				
			Total Future	95	52	352	330	67	40	391	723	260	17	650	64				

Count Date: 1/25/2024
Count Year: 2024
Existing Adj. Year: 2024

Existing Adjustment Rate: 1.00
Growth Rate: 0.5%
Buildout Year: 2024
Scenario: m.d. Peak Hour

Bckgrd. Dev. A:
Bckgrd. Dev. B:
Bckgrd. Dev. C:

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2 - Novi Road & Oaks Drive North	m.d. Peak Hour 01/25/24 12:00 p.m. - 1:00 p.m.		PHF	0.92			0.80			0.91			0.92						
			% Heavy	1%			2%			3%			1%						
		2024	Existing	43	17	105	27	20	45	87	757	26	85	604	19	58	25	1	0
		2024	Existing Adj.	43	17	105	27	20	45	87	757	26	85	604	19				
		2024	Background	43	17	105	27	20	45	87	757	26	85	604	19				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	43	17	105	27	20	45	87	757	26	85	604	19				
			Site Generated	7							8			6	7				
			Pass By	20							-20			-11	11				
			Total Site Gen	27	0	0	0	0	0	0	-12	0	0	-5	18				
			Total Future	70	17	105	27	20	45	87	745	26	85	599	37				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#3 - Oaks Drive South & Karevich Drive/Site DW	m.d. Peak Hour 01/25/24 12:00 p.m. - 1:00 p.m.		PHF	0.82			0.93			0.81			0.60						
			% Heavy	1%			1%			1%			0%						
		2024	Existing	1	302	9	106	320	9	7	0	90	6	1	1				
		2024	Existing Adj.	1	302	9	106	320	9	7	0	90	6	1	1				
		2024	Background	1	302	9	106	320	9	7	0	90	6	1	1				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	1	302	9	106	320	9	7	0	90	6	1	1				
			Site Generated	7					38				37		8				
			Pass By						52				43						
			Total Site Gen	7	0	0	0	0	90	0	0	0	80	0	8				
			Total Future	8	302	9	106	320	99	7	0	90	86	1	9				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#4 - Oaks Drive North & Karevich Drive	m.d. Peak Hour 01/25/24 11:45 a.m. - 12:45 p.m.		PHF	0.83			0.81			0.75									
			% Heavy	1%			1%			0%									
		2024	Existing	0	163	3	8	118	0	1	0	2							
		2024	Existing Adj.	0	163	3	8	118	0	1	0	2	0	0	0				
		2024	Background	0	163	3	8	118	0	1	0	2	0	0	0				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	0	163	3	8	118	0	1	0	2	0	0	0				
			Site Generated				7					7							
			Pass By				11					20							
			Total Site Gen	0	0	0	18	0	0	0	0	27	0	0	0				
			Total Future	0	163	3	26	118	0	1	0	29	0	0	0				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#1 - Novi Road & Oaks Drive South/Twelve Oaks Drive	p.m. Peak Hour 01/25/24 4:45 p.m. - 5:45 p.m.		PHF	0.87			0.84			0.91			0.95						
			% Heavy	0%			0%			1%			0%						
		2024	Existing	**79**	**41**	**426**	**339**	**63**	**39**	**349**	**874**	**175**	**21**	**803**	**56**	**90**	**7**	**65**	**15**
		2024	Existing Adj.	79	41	426	339	63	39	349	874	175	21	803	56				
		2024	Background	79	41	426	339	63	39	349	874	175	21	803	56				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**79**	**41**	**426**	**339**	**63**	**39**	**349**	**874**	**175**	**21**	**803**	**56**				
			Site Generated	5	2	14		4		14					5				
			Pass By	11		14				24	-24			-15	8				
			Total Site Gen	16	2	28	0	4	0	38	-24	0	0	-15	13				
			Total Future	**95**	**43**	**454**	**339**	**67**	**39**	**387**	**850**	**175**	**21**	**788**	**69**				

Count Date: 1/25/2024
Count Year: 2024
Existing Adj. Year: 2024

Existing Adjustment Rate: 1.00
Growth Rate: 0.5%
Buildout Year: 2024
Scenario: p.m. Peak Hour

Bckgrd. Dev. A:
Bckgrd. Dev. B:
Bckgrd. Dev. C:

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#2 - Novi Road & Oaks Drive North	p.m. Peak Hour 01/25/24 4:30 p.m. - 5:30 p.m.		PHF	0.91			0.76			0.88			0.93						
			% Heavy	1%			0%			1%			1%						
		2024	Existing	**48**	**12**	**93**	**48**	**33**	**49**	**79**	**869**	**44**	**49**	**739**	**29**	**53**	**15**	**0**	**1**
		2024	Existing Adj.	48	12	93	48	33	49	79	869	44	49	739	29				
		2024	Background	48	12	93	48	33	49	79	869	44	49	739	29				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**48**	**12**	**93**	**48**	**33**	**49**	**79**	**869**	**44**	**49**	**739**	**29**				
			Site Generated	4							5			5	4				
			Pass By	11							-13			-7	7				
			Total Site Gen	15	0	0	0	0	0	0	-8	0	0	-2	11				
			Total Future	**63**	**12**	**93**	**48**	**33**	**49**	**79**	**861**	**44**	**49**	**737**	**40**				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#3 - Oaks Drive South & Karevich Drive/Site DW	p.m. Peak Hour 01/25/24 4:15 p.m. - 5:15 p.m.		PHF	0.85			0.95			0.93			0.60						
			% Heavy	1%			0%			0%			0%						
		2024	Existing	**1**	**410**	**24**	**111**	**335**	**4**	**5**	**1**	**94**	**2**	**0**	**2**				
		2024	Existing Adj.	1	410	24	111	335	4	5	1	94	2	0	2				
		2024	Background	1	410	24	111	335	4	5	1	94	2	0	2				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**1**	**410**	**24**	**111**	**335**	**4**	**5**	**1**	**94**	**2**	**0**	**2**				
			Site Generated	5					23				21		4				
			Pass By						32				25						
			Total Site Gen	5	0	0	0	0	55	0	0	0	46	0	4				
			Total Future	**6**	**410**	**24**	**111**	**335**	**59**	**5**	**1**	**94**	**48**	**0**	**6**				

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBRR	WBRR	NBRR	SBRR
#4 - Oaks Drive North & Karevich Drive	p.m. Peak Hour 01/25/24 4:30 p.m. - 5:30 p.m.		PHF	0.86			0.81			0.60									
			% Heavy	1%			2%			0%									
		2024	Existing	**0**	**150**	**3**	**4**	**137**	**0**	**2**	**0**	**3**							
		2024	Existing Adj.	0	150	3	4	137	0	2	0	3	0	0	0				
		2024	Background	0	150	3	4	137	0	2	0	3	0	0	0				
			Bckgrd. Dev. A																
			Bckgrd. Dev. B																
			Bckgrd. Dev. C																
			Total Background	**0**	**150**	**3**	**4**	**137**	**0**	**2**	**0**	**3**	**0**	**0**	**0**				
			Site Generated				4					4							
			Pass By				7					11							
			Total Site Gen	0	0	0	11	0	0	0	0	15	0	0	0				
			Total Future	**0**	**150**	**3**	**15**	**137**	**0**	**2**	**0**	**18**	**0**	**0**	**0**				

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg	Twelve Oaks Dr							Twelve Oaks Dr						
Direction	Eastbound							Westbound						
Time	L	T	R	U	RR	App	Ped*	L	T	R	U	RR	App	Ped*
2024-01-25 11:00AM	9	13	44	0	10	**76**	0	61	17	4	0	0	**82**	0
11:15AM	6	14	44	0	6	**70**	0	61	17	5	0	0	**83**	0
11:30AM	16	13	53	0	12	**94**	0	68	8	5	0	1	**82**	0
11:45AM	10	16	47	0	11	**84**	0	79	8	7	0	3	**97**	0
Hourly Total	41	56	188	0	39	**324**	0	269	50	21	0	4	**344**	0
12:00PM	18	10	56	0	5	**89**	0	77	12	5	0	1	**95**	0
12:15PM	10	14	77	0	2	**103**	0	79	18	10	0	1	**108**	0
12:30PM	20	10	81	0	3	**114**	0	91	18	9	0	0	**118**	0
12:45PM	18	12	81	0	2	**113**	0	83	11	13	0	1	**108**	0
Hourly Total	66	46	295	0	12	**419**	0	330	59	37	0	3	**429**	0
4:00PM	24	11	81	0	5	**121**	0	86	23	13	0	1	**123**	0
4:15PM	34	16	105	0	4	**159**	0	72	29	16	1	0	**118**	0
4:30PM	23	11	92	0	0	**126**	0	85	15	14	0	2	**116**	0
4:45PM	17	7	91	0	4	**119**	0	74	22	8	0	2	**106**	0
Hourly Total	98	45	369	0	13	**525**	0	317	89	51	1	5	**463**	0
5:00PM	25	13	78	0	32	**148**	0	100	22	6	0	3	**131**	0
5:15PM	25	9	92	0	28	**154**	0	91	12	4	0	1	**108**	0
5:30PM	12	12	75	0	26	**125**	0	74	7	14	0	1	**96**	0
5:45PM	9	6	71	0	27	**113**	0	84	13	12	0	0	**109**	0
Hourly Total	71	40	316	0	113	**540**	0	349	54	36	0	5	**444**	0
Total	276	187	1168	0	177	**1808**	0	1265	252	145	1	17	**1680**	0
% Approach	15.3%	10.3%	64.6%	0%	9.8%	**-**	-	75.3%	15.0%	8.6%	0.1%	1.0%	**-**	-
% Total	2.4%	1.6%	10.2%	0%	1.5%	**15.8%**	-	11.0%	2.2%	1.3%	0%	0.1%	**14.7%**	-
Lights	274	186	1157	0	177	**1794**	-	1259	249	142	1	17	**1668**	-
% Lights	99.3%	99.5%	99.1%	0%	100%	**99.2%**	-	99.5%	98.8%	97.9%	100%	100%	**99.3%**	-
Articulated Trucks	0	0	1	0	0	**1**	-	1	0	0	0	0	**1**	-
% Articulated Trucks	0%	0%	0.1%	0%	0%	**0.1%**	-	0.1%	0%	0%	0%	0%	**0.1%**	-
Buses and Single-Unit Trucks	2	1	10	0	0	**13**	-	5	3	3	0	0	**11**	-
% Buses and Single-Unit Trucks	0.7%	0.5%	0.9%	0%	0%	**0.7%**	-	0.4%	1.2%	2.1%	0%	0%	**0.7%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

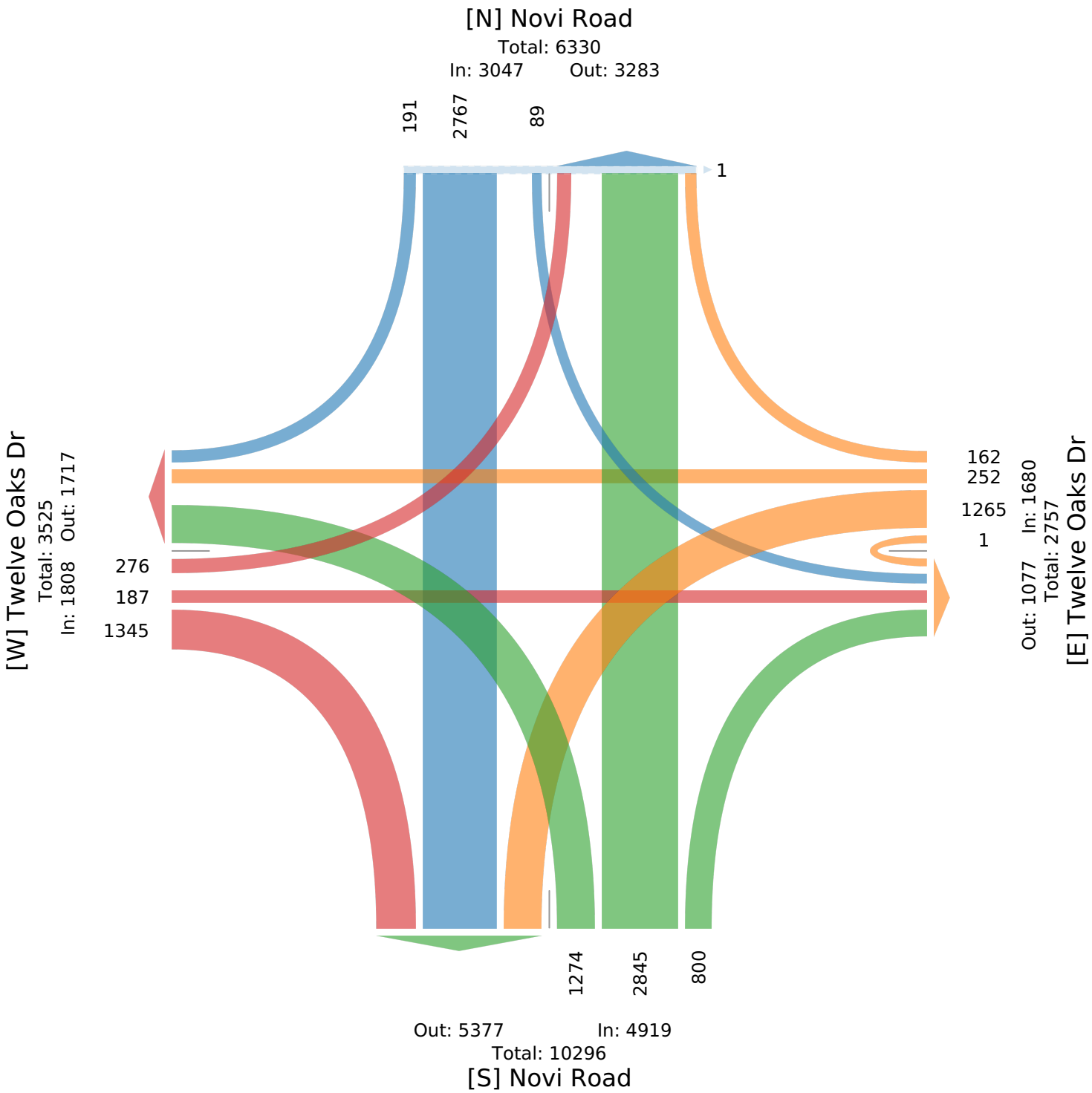
Leg Direction	Novi Road Northbound							Novi Road Southbound							
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*	**Int**
2024-01-25 11:00AM	62	105	33	0	18	**218**	0	3	121	6	0	2	**132**	0	**508**
11:15AM	86	108	36	0	23	**253**	0	6	132	4	0	0	**142**	0	**548**
11:30AM	63	108	32	0	13	**216**	0	5	136	12	0	2	**155**	0	**547**
11:45AM	90	134	42	0	15	**281**	0	7	152	14	0	5	**178**	0	**640**
Hourly Total	301	455	143	0	69	**968**	0	21	541	36	0	9	**607**	0	**2243**
12:00PM	87	150	36	0	22	**295**	0	4	170	11	0	3	**188**	0	**667**
12:15PM	87	191	31	0	24	**333**	0	4	161	5	0	5	**175**	0	**719**
12:30PM	79	216	34	0	35	**364**	0	6	162	6	0	6	**180**	0	**776**
12:45PM	73	207	43	0	35	**358**	0	3	169	8	0	2	**182**	0	**761**
Hourly Total	326	764	144	0	116	**1350**	0	17	662	30	0	16	**725**	0	**2923**
4:00PM	68	208	16	0	9	**301**	0	7	197	7	0	6	**217**	0	**762**
4:15PM	71	174	19	0	16	**280**	0	9	192	10	0	0	**211**	0	**768**
4:30PM	72	191	17	0	26	**306**	0	8	183	5	0	7	**203**	1	**751**
4:45PM	94	199	22	0	11	**326**	0	6	194	10	0	3	**213**	0	**764**
Hourly Total	305	772	74	0	62	**1213**	0	30	766	32	0	16	**844**	1	**3045**
5:00PM	84	250	33	0	17	**384**	0	8	205	12	0	3	**228**	0	**891**
5:15PM	82	215	31	0	17	**345**	0	6	210	7	0	2	**225**	0	**832**
5:30PM	89	210	24	0	20	**343**	0	1	194	12	0	7	**214**	0	**778**
5:45PM	87	179	26	0	24	**316**	0	6	189	7	0	2	**204**	0	**742**
Hourly Total	342	854	114	0	78	**1388**	0	21	798	38	0	14	**871**	0	**3243**
Total	1274	2845	475	0	325	**4919**	0	89	2767	136	0	55	**3047**	1	**11454**
% Approach	25.9%	57.8%	9.7%	0%	6.6%	**-**	-	2.9%	90.8%	4.5%	0%	1.8%	**-**	-	-
% Total	11.1%	24.8%	4.1%	0%	2.8%	**42.9%**	-	0.8%	24.2%	1.2%	0%	0.5%	**26.6%**	-	-
Lights	1263	2788	475	0	322	**4848**	-	89	2739	135	0	55	**3018**	-	11328
% Lights	99.1%	98.0%	100%	0%	99.1%	**98.6%**	-	100%	99.0%	99.3%	0%	100%	**99.0%**	-	98.9%
Articulated Trucks	1	16	0	0	1	**18**	-	0	7	0	0	0	**7**	-	27
% Articulated Trucks	0.1%	0.6%	0%	0%	0.3%	**0.4%**	-	0%	0.3%	0%	0%	0%	**0.2%**	-	0.2%
Buses and Single-Unit Trucks	10	41	0	0	2	**53**	-	0	21	1	0	0	**22**	-	99
% Buses and Single-Unit Trucks	0.8%	1.4%	0%	0%	0.6%	**1.1%**	-	0%	0.8%	0.7%	0%	0%	**0.7%**	-	0.9%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Twelve Oaks Dr Eastbound							Twelve Oaks Dr Westbound						
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*
2024-01-25 12:00PM	18	10	56	0	5	**89**	0	77	12	5	0	1	**95**	0
12:15PM	10	14	77	0	2	**103**	0	79	18	10	0	1	**108**	0
12:30PM	20	10	81	0	3	**114**	0	91	18	9	0	0	**118**	0
12:45PM	18	12	81	0	2	**113**	0	83	11	13	0	1	**108**	0
Total	66	46	295	0	12	**419**	0	330	59	37	0	3	**429**	0
% Approach	15.8%	11.0%	70.4%	0%	2.9%	**-**	-	76.9%	13.8%	8.6%	0%	0.7%	**-**	-
% Total	2.3%	1.6%	10.1%	0%	0.4%	**14.3%**	-	11.3%	2.0%	1.3%	0%	0.1%	**14.7%**	-
PHF	0.825	0.821	0.910	-	0.600	**0.919**	-	0.907	0.819	0.712	-	0.750	**0.909**	-
Lights	66	46	291	0	12	**415**	-	327	59	35	0	3	**424**	-
% Lights	100%	100%	98.6%	0%	100%	**99.0%**	-	99.1%	100%	94.6%	0%	100%	**98.8%**	-
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-
Buses and Single-Unit Trucks	0	0	4	0	0	**4**	-	3	0	2	0	0	**5**	-
% Buses and Single-Unit Trucks	0%	0%	1.4%	0%	0%	**1.0%**	-	0.9%	0%	5.4%	0%	0%	**1.2%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

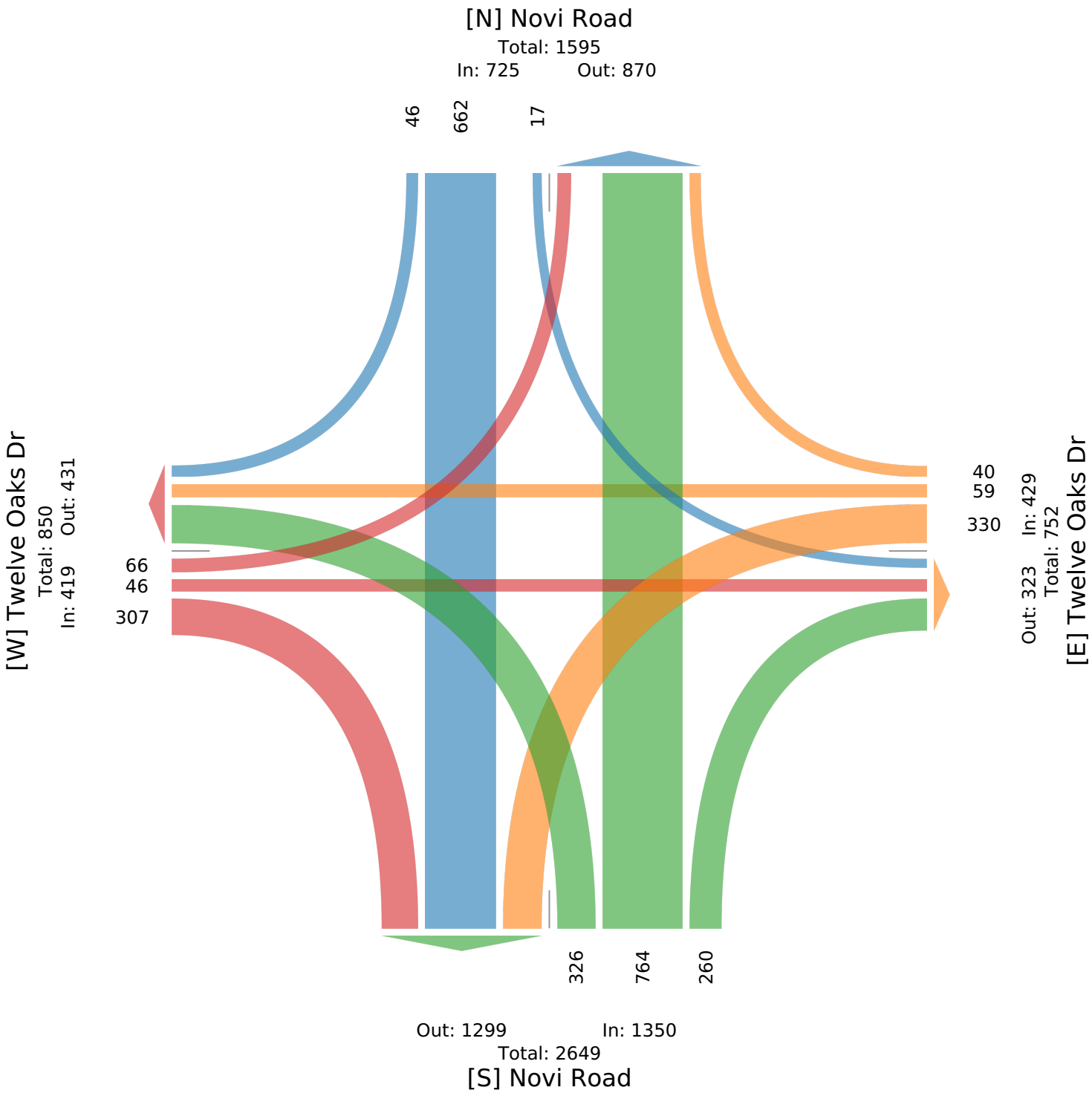
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Novi Road Northbound							Novi Road Southbound							
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*	**Int**
2024-01-25 12:00PM	87	150	36	0	22	**295**	0	4	170	11	0	3	**188**	0	**667**
12:15PM	87	191	31	0	24	**333**	0	4	161	5	0	5	**175**	0	**719**
12:30PM	79	216	34	0	35	**364**	0	6	162	6	0	6	**180**	0	**776**
12:45PM	73	207	43	0	35	**358**	0	3	169	8	0	2	**182**	0	**761**
Total	326	764	144	0	116	**1350**	0	17	662	30	0	16	**725**	0	**2923**
% Approach	24.1%	56.6%	10.7%	0%	8.6%	**-**	-	2.3%	91.3%	4.1%	0%	2.2%	**-**	-	**-**
% Total	11.2%	26.1%	4.9%	0%	4.0%	**46.2%**	-	0.6%	22.6%	1.0%	0%	0.5%	**24.8%**	-	**-**
PHF	0.937	0.884	0.837	-	0.829	**0.927**	-	0.708	0.974	0.682	-	0.667	**0.964**	-	0.942
Lights	321	739	144	0	115	**1319**	-	17	652	30	0	16	**715**	-	2873
% Lights	98.5%	96.7%	100%	0%	99.1%	**97.7%**	-	100%	98.5%	100%	0%	100%	**98.6%**	-	98.3%
Articulated Trucks	1	9	0	0	0	**10**	-	0	3	0	0	0	**3**	-	13
% Articulated Trucks	0.3%	1.2%	0%	0%	0%	**0.7%**	-	0%	0.5%	0%	0%	0%	**0.4%**	-	0.4%
Buses and Single-Unit Trucks	4	16	0	0	1	**21**	-	0	7	0	0	0	**7**	-	37
% Buses and Single-Unit Trucks	1.2%	2.1%	0%	0%	0.9%	**1.6%**	-	0%	1.1%	0%	0%	0%	**1.0%**	-	1.3%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC
Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Twelve Oaks Dr Eastbound							Twelve Oaks Dr Westbound						
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*
2024-01-25 4:45PM	17	7	91	0	4	**119**	0	74	22	8	0	2	**106**	0
5:00PM	25	13	78	0	32	**148**	0	100	22	6	0	3	**131**	0
5:15PM	25	9	92	0	28	**154**	0	91	12	4	0	1	**108**	0
5:30PM	12	12	75	0	26	**125**	0	74	7	14	0	1	**96**	0
Total	79	41	336	0	90	**546**	0	339	63	32	0	7	**441**	0
% Approach	14.5%	7.5%	61.5%	0%	16.5%	**-**	-	76.9%	14.3%	7.3%	0%	1.6%	**-**	-
% Total	2.4%	1.3%	10.3%	0%	2.8%	**16.7%**	-	10.4%	1.9%	1.0%	0%	0.2%	**13.5%**	-
PHF	0.790	0.788	0.913	-	0.703	**0.886**	-	0.848	0.716	0.571	-	0.583	**0.842**	-
Lights	79	41	335	0	90	**545**	-	339	63	32	0	7	**441**	-
% Lights	100%	100%	99.7%	0%	100%	**99.8%**	-	100%	100%	100%	0%	100%	**100%**	-
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-
Buses and Single-Unit Trucks	0	0	1	0	0	**1**	-	0	0	0	0	0	**0**	-
% Buses and Single-Unit Trucks	0%	0%	0.3%	0%	0%	**0.2%**	-	0%	0%	0%	0%	0%	**0%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC

Thu Jan 25, 2024
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

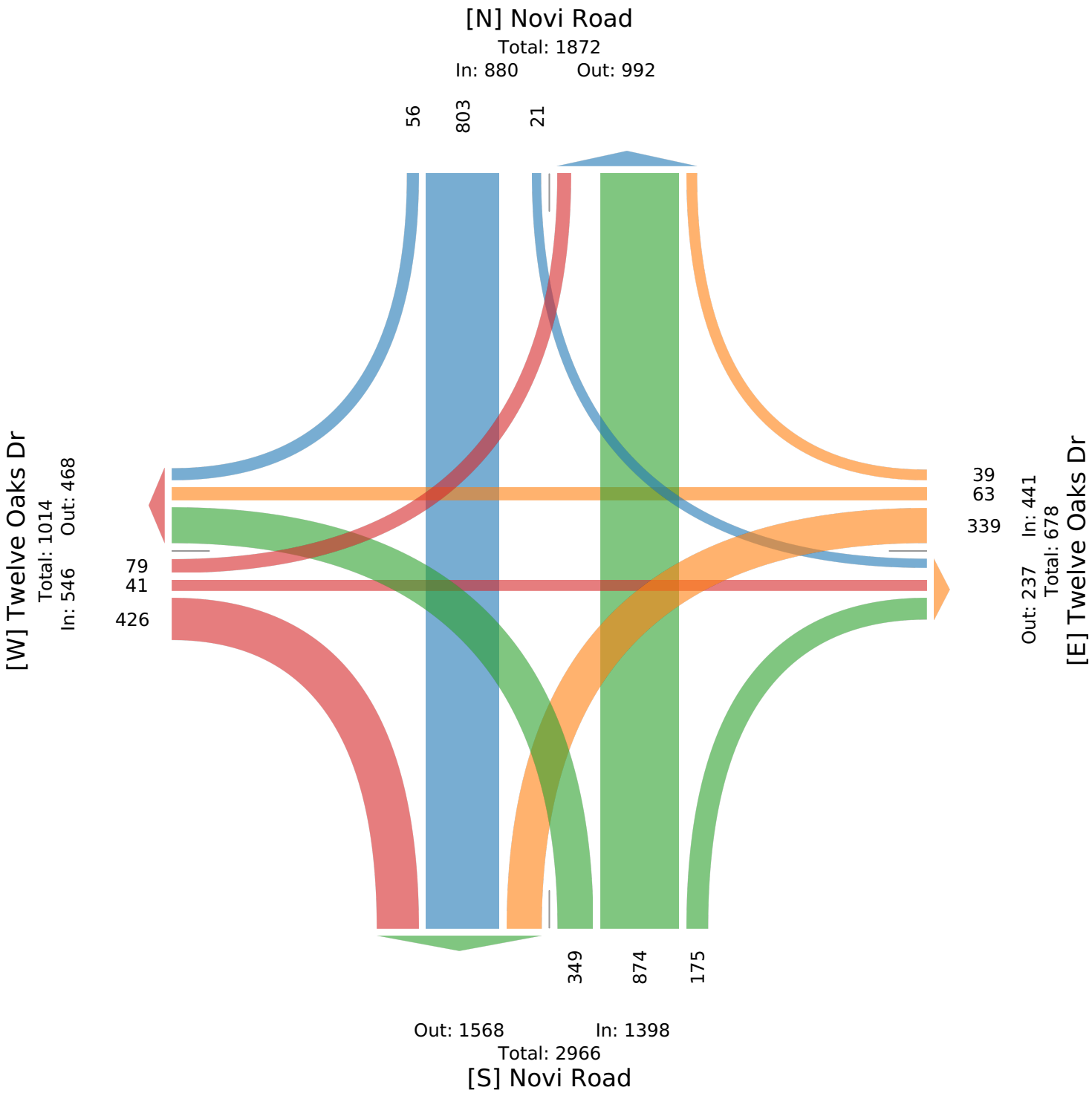
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Novi Road Northbound							Novi Road Southbound							
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*	**Int**
2024-01-25 4:45PM	94	199	22	0	11	**326**	0	6	194	10	0	3	**213**	0	**764**
5:00PM	84	250	33	0	17	**384**	0	8	205	12	0	3	**228**	0	**891**
5:15PM	82	215	31	0	17	**345**	0	6	210	7	0	2	**225**	0	**832**
5:30PM	89	210	24	0	20	**343**	0	1	194	12	0	7	**214**	0	**778**
Total	349	874	110	0	65	**1398**	0	21	803	41	0	15	**880**	0	**3265**
% Approach	25.0%	62.5%	7.9%	0%	4.6%	**-**	-	2.4%	91.3%	4.7%	0%	1.7%	**-**	-	-
% Total	10.7%	26.8%	3.4%	0%	2.0%	**42.8%**	-	0.6%	24.6%	1.3%	0%	0.5%	**27.0%**	-	-
PHF	0.928	0.874	0.833	-	0.813	**0.910**	-	0.656	0.956	0.854	-	0.536	**0.965**	-	0.916
Lights	349	865	110	0	65	**1389**	-	21	800	41	0	15	**877**	-	3252
% Lights	100%	99.0%	100%	0%	100%	**99.4%**	-	100%	99.6%	100%	0%	100%	**99.7%**	-	99.6%
Articulated Trucks	0	2	0	0	0	**2**	-	0	1	0	0	0	**1**	-	3
% Articulated Trucks	0%	0.2%	0%	0%	0%	**0.1%**	-	0%	0.1%	0%	0%	0%	**0.1%**	-	0.1%
Buses and Single-Unit Trucks	0	7	0	0	0	**7**	-	0	2	0	0	0	**2**	-	10
% Buses and Single-Unit Trucks	0%	0.8%	0%	0%	0%	**0.5%**	-	0%	0.2%	0%	0%	0%	**0.2%**	-	0.3%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Mall Rd/W Oaks Dri... - TMC
Thu Jan 25, 2024
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150529, Location: 42.491092, -83.476059

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg	Twelve Oaks Dr							Twelve Oaks Dr						
Direction	Eastbound							Westbound						
Time	L	T	R	U	RR	App	Ped*	L	T	R	U	RR	App	Ped*
2024-01-25 11:00AM	6	2	7	0	13	**28**	0	7	1	2	0	8	**18**	0
11:15AM	14	5	7	0	5	**31**	0	7	6	5	1	10	**29**	0
11:30AM	11	4	5	0	10	**30**	0	11	4	4	0	6	**25**	0
11:45AM	8	0	2	0	21	**31**	0	9	2	3	0	4	**18**	0
Hourly Total	39	11	21	0	49	**120**	0	34	13	14	1	28	**90**	0
12:00PM	7	9	14	0	13	**43**	0	9	3	4	0	9	**25**	0
12:15PM	14	3	10	0	18	**45**	0	9	3	5	0	2	**19**	0
12:30PM	11	2	16	0	10	**39**	0	5	10	7	0	6	**28**	0
12:45PM	11	3	7	0	17	**38**	0	4	2	4	0	8	**18**	0
Hourly Total	43	17	47	0	58	**165**	0	27	18	20	0	25	**90**	0
4:00PM	16	0	7	0	5	**28**	0	11	4	4	0	7	**26**	0
4:15PM	11	1	3	0	19	**34**	0	8	4	6	0	7	**25**	0
4:30PM	14	4	10	0	14	**42**	0	10	4	4	0	6	**24**	1
4:45PM	10	3	9	0	10	**32**	0	12	5	10	0	4	**31**	0
Hourly Total	51	8	29	0	48	**136**	0	41	17	24	0	24	**106**	1
5:00PM	10	3	7	0	17	**37**	0	11	17	13	0	2	**43**	0
5:15PM	14	2	13	0	12	**41**	0	15	7	7	0	3	**32**	0
5:30PM	6	4	2	0	5	**17**	0	9	4	9	0	6	**28**	0
5:45PM	14	3	9	0	14	**40**	0	7	2	6	0	7	**22**	0
Hourly Total	44	12	31	0	48	**135**	0	42	30	35	0	18	**125**	0
Total	177	48	128	0	203	**556**	0	144	78	93	1	95	**411**	1
% Approach	31.8%	8.6%	23.0%	0%	36.5%	**-**	-	35.0%	19.0%	22.6%	0.2%	23.1%	**-**	-
% Total	2.5%	0.7%	1.8%	0%	2.9%	**7.9%**	-	2.0%	1.1%	1.3%	0%	1.3%	**5.8%**	-
Lights	175	46	126	0	203	**550**	-	144	78	93	1	91	**407**	-
% Lights	98.9%	95.8%	98.4%	0%	100%	**98.9%**	-	100%	100%	100%	100%	95.8%	**99.0%**	-
Articulated Trucks	1	0	0	0	0	**1**	-	0	0	0	0	1	**1**	-
% Articulated Trucks	0.6%	0%	0%	0%	0%	**0.2%**	-	0%	0%	0%	0%	1.1%	**0.2%**	-
Buses and Single-Unit Trucks	1	2	2	0	0	**5**	-	0	0	0	0	3	**3**	-
% Buses and Single-Unit Trucks	0.6%	4.2%	1.6%	0%	0%	**0.9%**	-	0%	0%	0%	0%	3.2%	**0.7%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	1
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100%
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0%

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

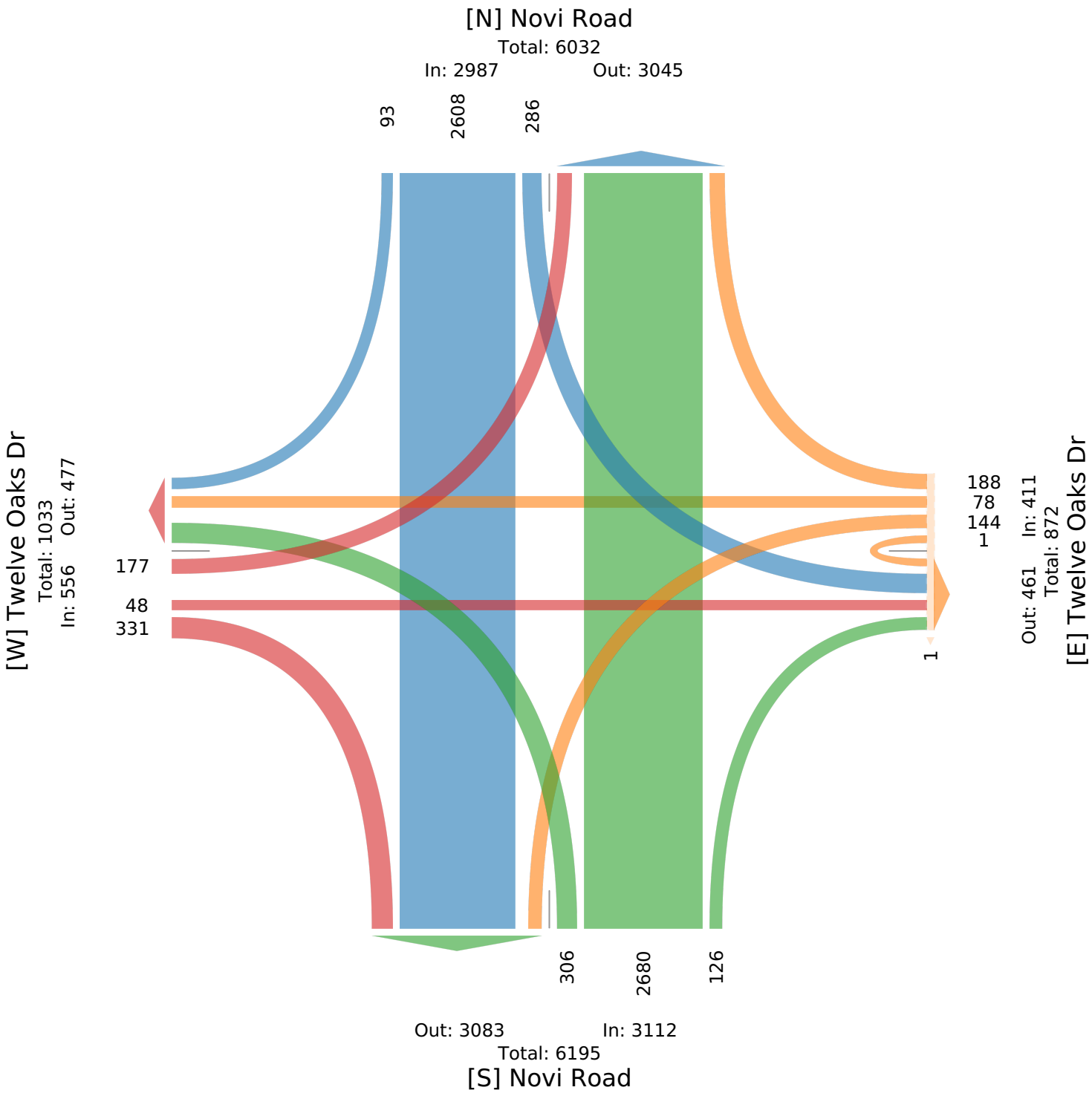
Leg Direction	Novi Road Northbound							Novi Road Southbound							
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*	**Int**
2024-01-25 11:00AM	16	90	6	0	0	**112**	0	19	102	7	0	0	**128**	0	**286**
11:15AM	21	78	8	0	1	**108**	0	19	125	4	0	0	**148**	0	**316**
11:30AM	23	92	8	0	0	**123**	0	24	135	3	0	0	**162**	0	**340**
11:45AM	26	114	6	0	0	**146**	0	25	151	11	0	0	**187**	0	**382**
Hourly Total	86	374	28	0	1	**489**	0	87	513	25	0	0	**625**	0	**1324**
12:00PM	21	141	6	0	1	**169**	0	20	144	5	0	0	**169**	0	**406**
12:15PM	18	184	7	0	0	**209**	0	21	137	0	0	0	**158**	0	**431**
12:30PM	22	197	6	0	0	**225**	0	27	154	5	0	0	**186**	0	**478**
12:45PM	17	206	6	0	0	**229**	0	17	169	7	0	0	**193**	0	**478**
Hourly Total	78	728	25	0	1	**832**	0	85	604	17	0	0	**706**	0	**1793**
4:00PM	17	196	9	0	0	**222**	0	18	203	6	0	0	**227**	0	**503**
4:15PM	5	193	4	0	0	**202**	0	13	185	6	0	0	**204**	0	**465**
4:30PM	20	198	13	0	0	**231**	0	13	178	5	0	0	**196**	0	**493**
4:45PM	15	191	7	0	0	**213**	0	17	191	11	0	0	**219**	0	**495**
Hourly Total	57	778	33	0	0	**868**	0	61	757	28	0	0	**846**	0	**1956**
5:00PM	26	227	13	0	0	**266**	0	6	184	3	0	0	**193**	0	**539**
5:15PM	14	208	9	0	0	**231**	0	13	180	9	0	1	**203**	0	**507**
5:30PM	19	197	10	0	0	**226**	0	11	198	4	0	0	**213**	0	**484**
5:45PM	26	168	6	0	0	**200**	0	23	172	6	0	0	**201**	0	**463**
Hourly Total	85	800	38	0	0	**923**	0	53	734	22	0	1	**810**	0	**1993**
Total	306	2680	124	0	2	**3112**	0	286	2608	92	0	1	**2987**	0	**7066**
% Approach	9.8%	86.1%	4.0%	0%	0.1%	**-**	-	9.6%	87.3%	3.1%	0%	0%	**-**	-	-
% Total	4.3%	37.9%	1.8%	0%	0%	**44.0%**	-	4.0%	36.9%	1.3%	0%	0%	**42.3%**	-	-
Lights	303	2630	122	0	2	**3057**	-	286	2578	88	0	1	**2953**	-	6967
% Lights	99.0%	98.1%	98.4%	0%	100%	**98.2%**	-	100%	98.8%	95.7%	0%	100%	**98.9%**	-	98.6%
Articulated Trucks	0	15	0	0	0	**15**	-	0	6	0	0	0	**6**	-	23
% Articulated Trucks	0%	0.6%	0%	0%	0%	**0.5%**	-	0%	0.2%	0%	0%	0%	**0.2%**	-	0.3%
Buses and Single-Unit Trucks	3	35	2	0	0	**40**	-	0	24	4	0	0	**28**	-	76
% Buses and Single-Unit Trucks	1.0%	1.3%	1.6%	0%	0%	**1.3%**	-	0%	0.9%	4.3%	0%	0%	**0.9%**	-	1.1%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Twelve Oaks Dr Eastbound							Twelve Oaks Dr Westbound						
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*
2024-01-25 12:00PM	7	9	14	0	13	**43**	0	9	3	4	0	9	**25**	0
12:15PM	14	3	10	0	18	**45**	0	9	3	5	0	2	**19**	0
12:30PM	11	2	16	0	10	**39**	0	5	10	7	0	6	**28**	0
12:45PM	11	3	7	0	17	**38**	0	4	2	4	0	8	**18**	0
Total	43	17	47	0	58	**165**	0	27	18	20	0	25	**90**	0
% Approach	26.1%	10.3%	28.5%	0%	35.2%	**-**	-	30.0%	20.0%	22.2%	0%	27.8%	**-**	-
% Total	2.4%	0.9%	2.6%	0%	3.2%	**9.2%**	-	1.5%	1.0%	1.1%	0%	1.4%	**5.0%**	-
PHF	0.768	0.472	0.734	-	0.806	**0.917**	-	0.750	0.450	0.714	-	0.694	**0.804**	-
Lights	43	16	46	0	58	**163**	-	27	18	20	0	23	**88**	-
% Lights	100%	94.1%	97.9%	0%	100%	**98.8%**	-	100%	100%	100%	0%	92.0%	**97.8%**	-
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-
Buses and Single-Unit Trucks	0	1	1	0	0	**2**	-	0	0	0	0	2	**2**	-
% Buses and Single-Unit Trucks	0%	5.9%	2.1%	0%	0%	**1.2%**	-	0%	0%	0%	0%	8.0%	**2.2%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

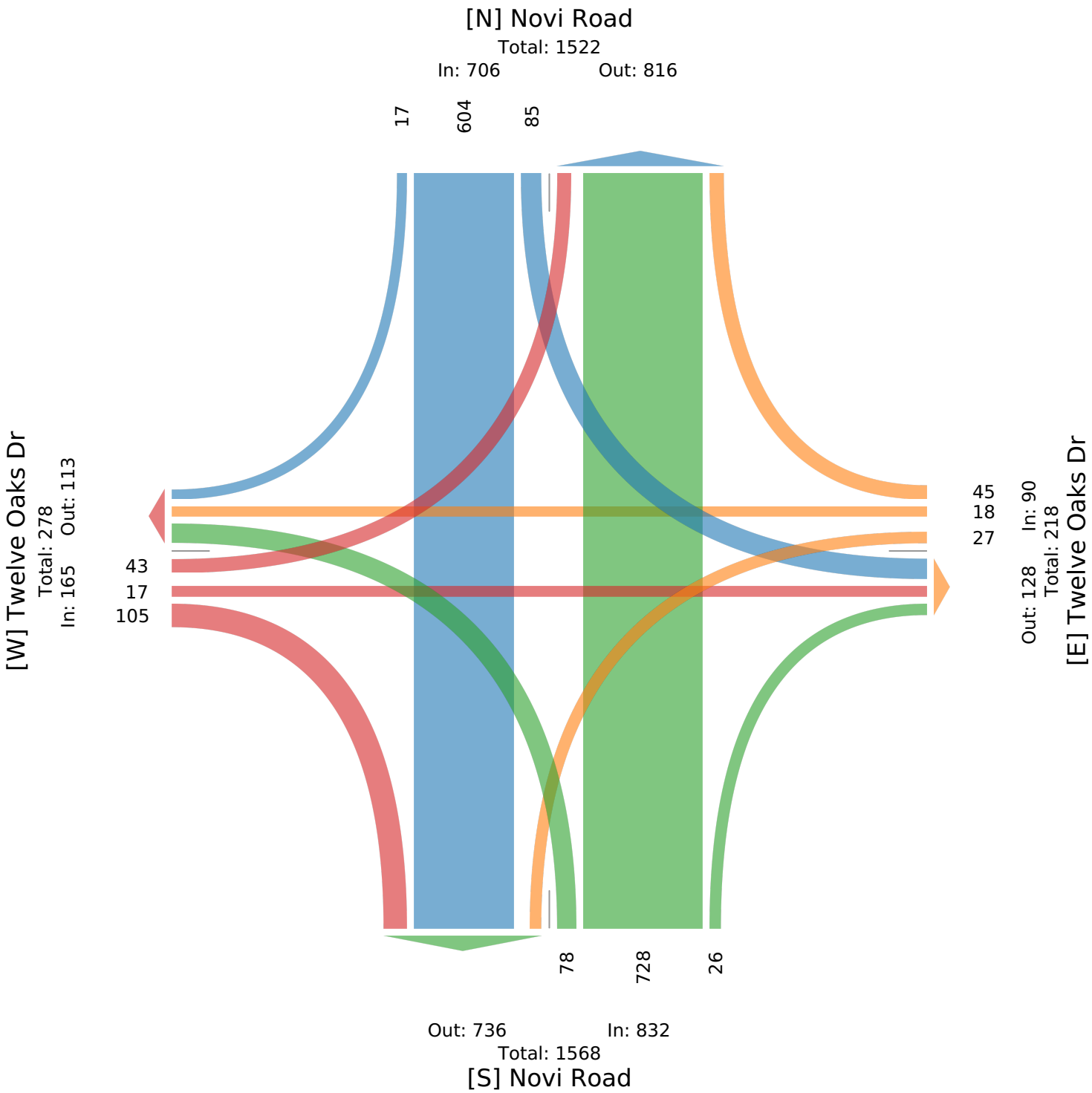
Leg Direction	Novi Road Northbound							Novi Road Southbound							
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*	**Int**
2024-01-25 12:00PM	21	141	6	0	1	**169**	0	20	144	5	0	0	**169**	0	**406**
12:15PM	18	184	7	0	0	**209**	0	21	137	0	0	0	**158**	0	**431**
12:30PM	22	197	6	0	0	**225**	0	27	154	5	0	0	**186**	0	**478**
12:45PM	17	206	6	0	0	**229**	0	17	169	7	0	0	**193**	0	**478**
Total	78	728	25	0	1	**832**	0	85	604	17	0	0	**706**	0	**1793**
% Approach	9.4%	87.5%	3.0%	0%	0.1%	**-**	-	12.0%	85.6%	2.4%	0%	0%	**-**	-	**-**
% Total	4.4%	40.6%	1.4%	0%	0.1%	**46.4%**	-	4.7%	33.7%	0.9%	0%	0%	**39.4%**	-	**-**
PHF	0.886	0.883	0.893	-	0.250	**0.908**	-	0.787	0.893	0.607	-	-	**0.915**	-	0.938
Lights	77	703	25	0	1	**806**	-	85	594	17	0	0	**696**	-	1753
% Lights	98.7%	96.6%	100%	0%	100%	**96.9%**	-	100%	98.3%	100%	0%	0%	**98.6%**	-	97.8%
Articulated Trucks	0	6	0	0	0	**6**	-	0	3	0	0	0	**3**	-	9
% Articulated Trucks	0%	0.8%	0%	0%	0%	**0.7%**	-	0%	0.5%	0%	0%	0%	**0.4%**	-	0.5%
Buses and Single-Unit Trucks	1	19	0	0	0	**20**	-	0	7	0	0	0	**7**	-	31
% Buses and Single-Unit Trucks	1.3%	2.6%	0%	0%	0%	**2.4%**	-	0%	1.2%	0%	0%	0%	**1.0%**	-	1.7%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Twelve Oaks Dr Eastbound							Twelve Oaks Dr Westbound						
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*
2024-01-25 4:30PM	14	4	10	0	14	**42**	0	10	4	4	0	6	**24**	1
4:45PM	10	3	9	0	10	**32**	0	12	5	10	0	4	**31**	0
5:00PM	10	3	7	0	17	**37**	0	11	17	13	0	2	**43**	0
5:15PM	14	2	13	0	12	**41**	0	15	7	7	0	3	**32**	0
Total	48	12	39	0	53	**152**	0	48	33	34	0	15	**130**	1
% Approach	31.6%	7.9%	25.7%	0%	34.9%	**-**	-	36.9%	25.4%	26.2%	0%	11.5%	**-**	-
% Total	2.4%	0.6%	1.9%	0%	2.6%	**7.5%**	-	2.4%	1.6%	1.7%	0%	0.7%	**6.4%**	-
PHF	0.857	0.750	0.750	-	0.779	**0.905**	-	0.800	0.485	0.654	-	0.625	**0.756**	-
Lights	47	12	39	0	53	**151**	-	48	33	34	0	15	**130**	-
% Lights	97.9%	100%	100%	0%	100%	**99.3%**	-	100%	100%	100%	0%	100%	**100%**	-
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-
Buses and Single-Unit Trucks	1	0	0	0	0	**1**	-	0	0	0	0	0	**0**	-
% Buses and Single-Unit Trucks	2.1%	0%	0%	0%	0%	**0.7%**	-	0%	0%	0%	0%	0%	**0%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	1
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100%
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0%

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Drive N - TMC

Thu Jan 25, 2024
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

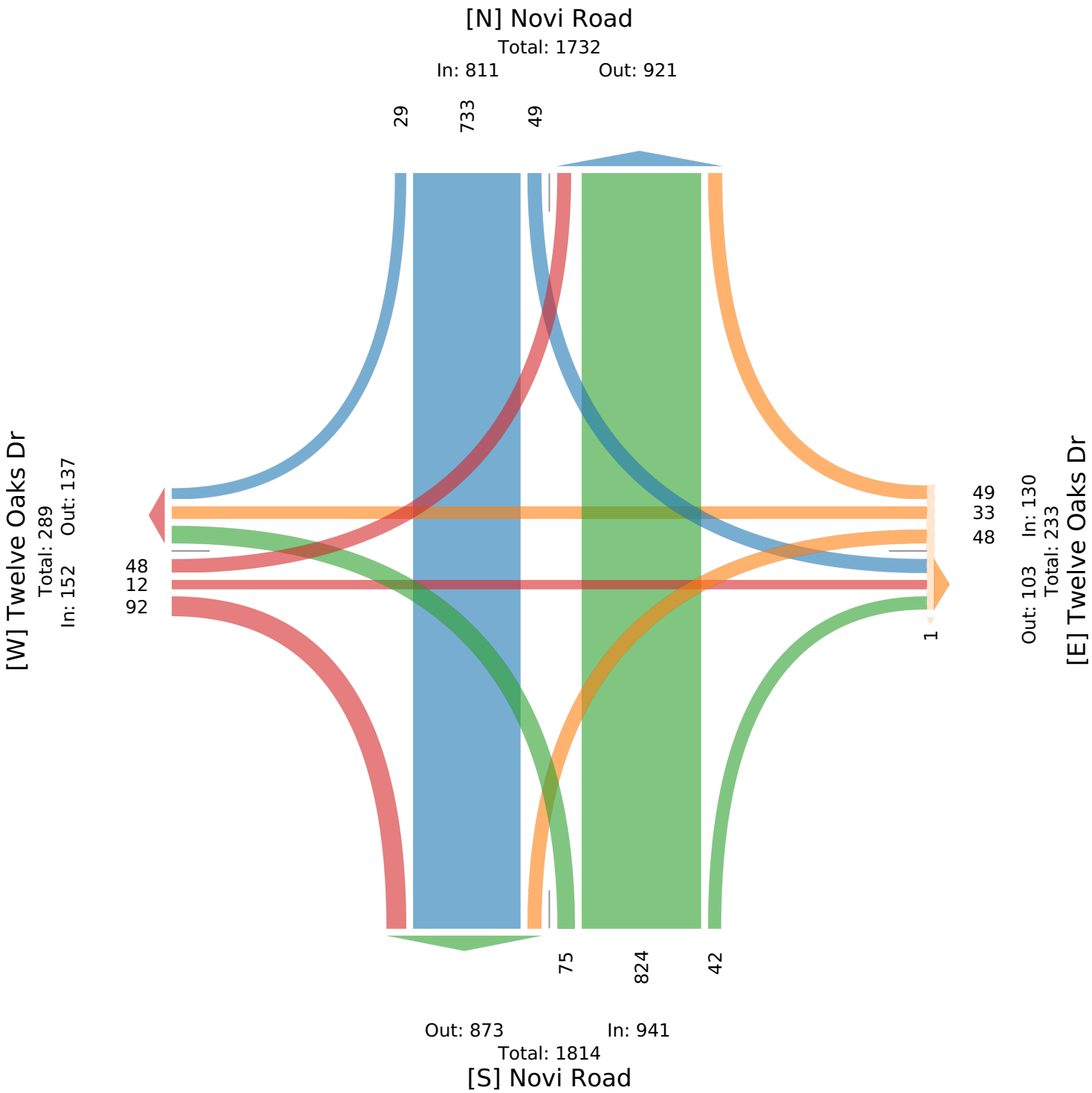
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Novi Road Northbound							Novi Road Southbound							
Time	L	T	R	U	RR	**App**	Ped*	L	T	R	U	RR	**App**	Ped*	**Int**
2024-01-25 4:30PM	20	198	13	0	0	**231**	0	13	178	5	0	0	**196**	0	**493**
4:45PM	15	191	7	0	0	**213**	0	17	191	11	0	0	**219**	0	**495**
5:00PM	26	227	13	0	0	**266**	0	6	184	3	0	0	**193**	0	**539**
5:15PM	14	208	9	0	0	**231**	0	13	180	9	0	1	**203**	0	**507**
Total	75	824	42	0	0	**941**	0	49	733	28	0	1	**811**	0	**2034**
% Approach	8.0%	87.6%	4.5%	0%	0%	**-**	-	6.0%	90.4%	3.5%	0%	0.1%	**-**	-	**-**
% Total	3.7%	40.5%	2.1%	0%	0%	**46.3%**	-	2.4%	36.0%	1.4%	0%	0%	**39.9%**	-	**-**
PHF	0.721	0.907	0.808	-	-	**0.884**	-	0.721	0.959	0.636	-	0.250	**0.926**	-	0.943
Lights	75	818	42	0	0	**935**	-	49	731	26	0	1	**807**	-	2023
% Lights	100%	99.3%	100%	0%	0%	**99.4%**	-	100%	99.7%	92.9%	0%	100%	**99.5%**	-	99.5%
Articulated Trucks	0	2	0	0	0	**2**	-	0	0	0	0	0	**0**	-	2
% Articulated Trucks	0%	0.2%	0%	0%	0%	**0.2%**	-	0%	0%	0%	0%	0%	**0%**	-	0.1%
Buses and Single-Unit Trucks	0	4	0	0	0	**4**	-	0	2	2	0	0	**4**	-	9
% Buses and Single-Unit Trucks	0%	0.5%	0%	0%	0%	**0.4%**	-	0%	0.3%	7.1%	0%	0%	**0.5%**	-	0.4%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

Novi Road and Twelve Oaks Drive N - TMC
Thu Jan 25, 2024
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150533, Location: 42.493327, -83.476122

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



W Oaks Dr and Karevich Drive/Proposed Site DW - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1150537, Location: 42.491062, -83.477498

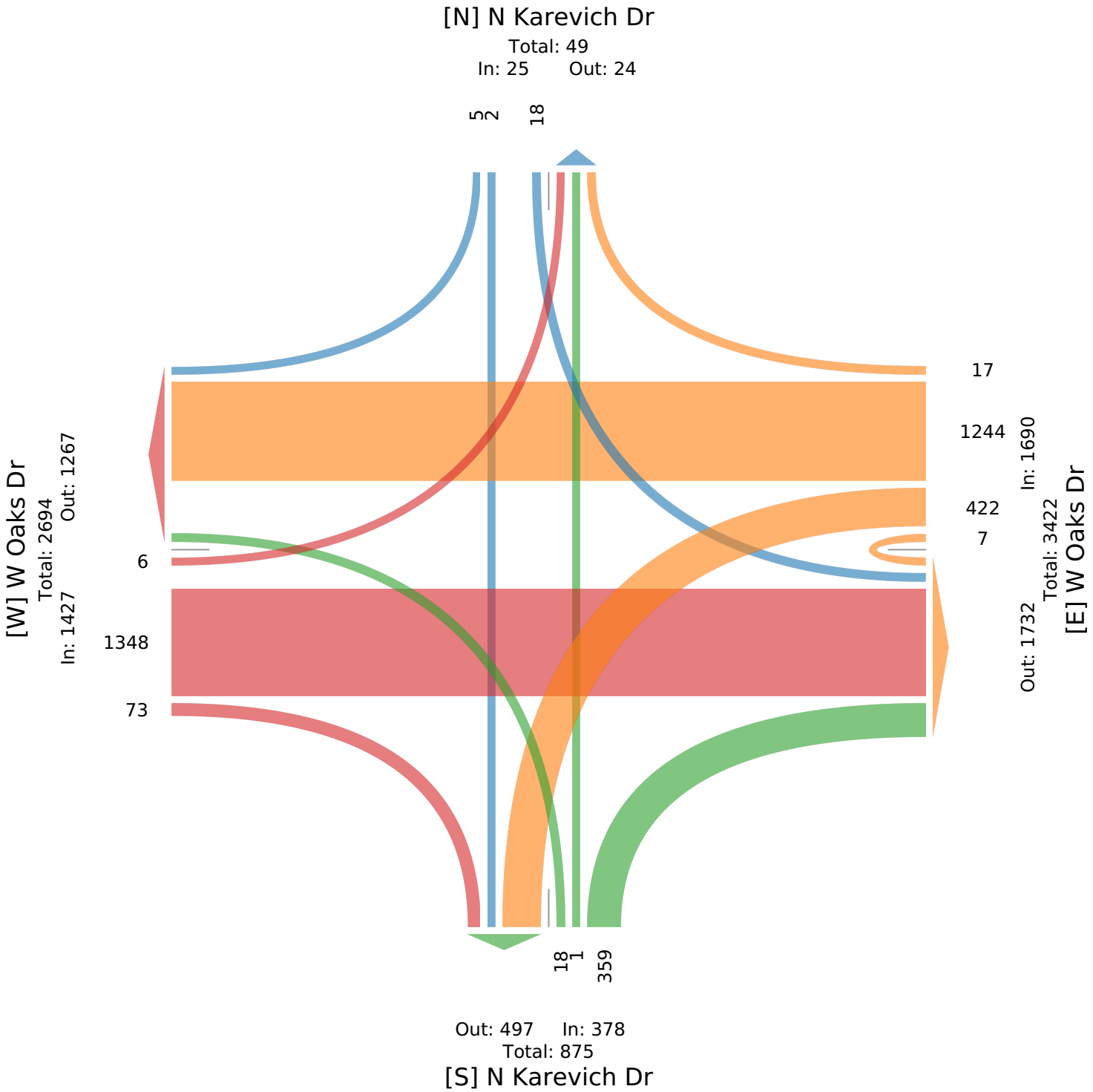
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE, Grand Rapids, MI, 49546, US

Leg	W Oaks Dr					W Oaks Dr					N Karevich Dr					N Karevich Dr					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2024-01-25 11:00AM	0	59	6	0	**65**	22	58	2	0	**82**	0	0	13	0	**13**	1	0	1	0	**2**	**162**
11:15AM	0	49	3	0	**52**	21	75	0	0	**96**	0	0	18	0	**18**	0	1	0	0	**1**	**167**
11:30AM	1	67	6	0	**74**	26	62	3	0	**91**	1	0	28	0	**29**	0	0	0	0	**0**	**194**
11:45AM	1	64	6	0	**71**	29	83	2	1	**115**	0	0	16	0	**16**	1	0	0	0	**1**	**203**
Hourly Total	2	239	21	0	**262**	98	278	7	1	**384**	1	0	75	0	**76**	2	1	1	0	**4**	**726**
12:00PM	0	67	3	0	**70**	42	74	1	0	**117**	1	0	18	0	**19**	1	1	0	0	**2**	**208**
12:15PM	1	70	0	0	**71**	15	99	1	1	**116**	3	0	27	0	**30**	0	0	1	0	**1**	**218**
12:30PM	0	90	5	0	**95**	27	73	2	2	**104**	1	0	19	0	**20**	1	0	0	0	**1**	**220**
12:45PM	0	75	1	0	**76**	22	74	0	2	**98**	2	0	26	0	**28**	4	0	0	0	**4**	**206**
Hourly Total	1	302	9	0	**312**	106	320	4	5	**435**	7	0	90	0	**97**	6	1	1	0	**8**	**852**
4:00PM	0	87	5	0	**92**	27	75	0	0	**102**	0	0	28	0	**28**	0	0	1	0	**1**	**223**
4:15PM	0	119	9	0	**128**	29	85	2	0	**116**	0	0	24	0	**24**	1	0	1	0	**2**	**270**
4:30PM	0	92	5	0	**97**	34	75	0	0	**109**	3	1	21	0	**25**	0	0	0	0	**0**	**231**
4:45PM	1	86	7	0	**94**	25	87	0	0	**112**	1	0	26	0	**27**	1	0	0	0	**1**	**234**
Hourly Total	1	384	26	0	**411**	115	322	2	0	**439**	4	1	99	0	**104**	2	0	2	0	**4**	**958**
5:00PM	0	113	3	0	**116**	23	88	2	0	**113**	1	0	23	0	**24**	0	0	1	0	**1**	**254**
5:15PM	2	117	4	0	**123**	21	79	0	1	**101**	0	0	25	0	**25**	3	0	0	0	**3**	**252**
5:30PM	0	95	4	0	**99**	30	78	1	0	**109**	4	0	29	0	**33**	2	0	0	0	**2**	**243**
5:45PM	0	98	6	0	**104**	29	79	1	0	**109**	1	0	18	0	**19**	3	0	0	0	**3**	**235**
Hourly Total	2	423	17	0	**442**	103	324	4	1	**432**	6	0	95	0	**101**	8	0	1	0	**9**	**984**
Total	6	1348	73	0	**1427**	422	1244	17	7	**1690**	18	1	359	0	**378**	18	2	5	0	**25**	**3520**
% Approach	0.4%	94.5%	5.1%	0%	**-**	25.0%	73.6%	1.0%	0.4%	**-**	4.8%	0.3%	95.0%	0%	**-**	72.0%	8.0%	20.0%	0%	**-**	-
% Total	0.2%	38.3%	2.1%	0%	**40.5%**	12.0%	35.3%	0.5%	0.2%	**48.0%**	0.5%	0%	10.2%	0%	**10.7%**	0.5%	0.1%	0.1%	0%	**0.7%**	-
Lights	6	1343	72	0	**1421**	419	1236	17	7	**1679**	18	1	355	0	**374**	18	2	5	0	**25**	3499
% Lights	100%	99.6%	98.6%	0%	**99.6%**	99.3%	99.4%	100%	100%	**99.3%**	100%	100%	98.9%	0%	**98.9%**	100%	100%	100%	0%	**100%**	99.4%
Articulated Trucks	0	0	0	0	**0**	1	3	0	0	**4**	0	0	1	0	**1**	0	0	0	0	**0**	5
% Articulated Trucks	0%	0%	0%	0%	**0%**	0.2%	0.2%	0%	0%	**0.2%**	0%	0%	0.3%	0%	**0.3%**	0%	0%	0%	0%	**0%**	0.1%
Buses and Single-Unit Trucks	0	5	1	0	**6**	2	5	0	0	**7**	0	0	3	0	**3**	0	0	0	0	**0**	16
% Buses and Single-Unit Trucks	0%	0.4%	1.4%	0%	**0.4%**	0.5%	0.4%	0%	0%	**0.4%**	0%	0%	0.8%	0%	**0.8%**	0%	0%	0%	0%	**0%**	0.5%

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

W Oaks Dr and Karevich Drive/Proposed Site DW - TMC
Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1150537, Location: 42.491062, -83.477498

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE, Grand Rapids, MI, 49546, US



W Oaks Dr and Karevich Drive/Proposed Site DW - TMC

Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1150537, Location: 42.491062, -83.477498

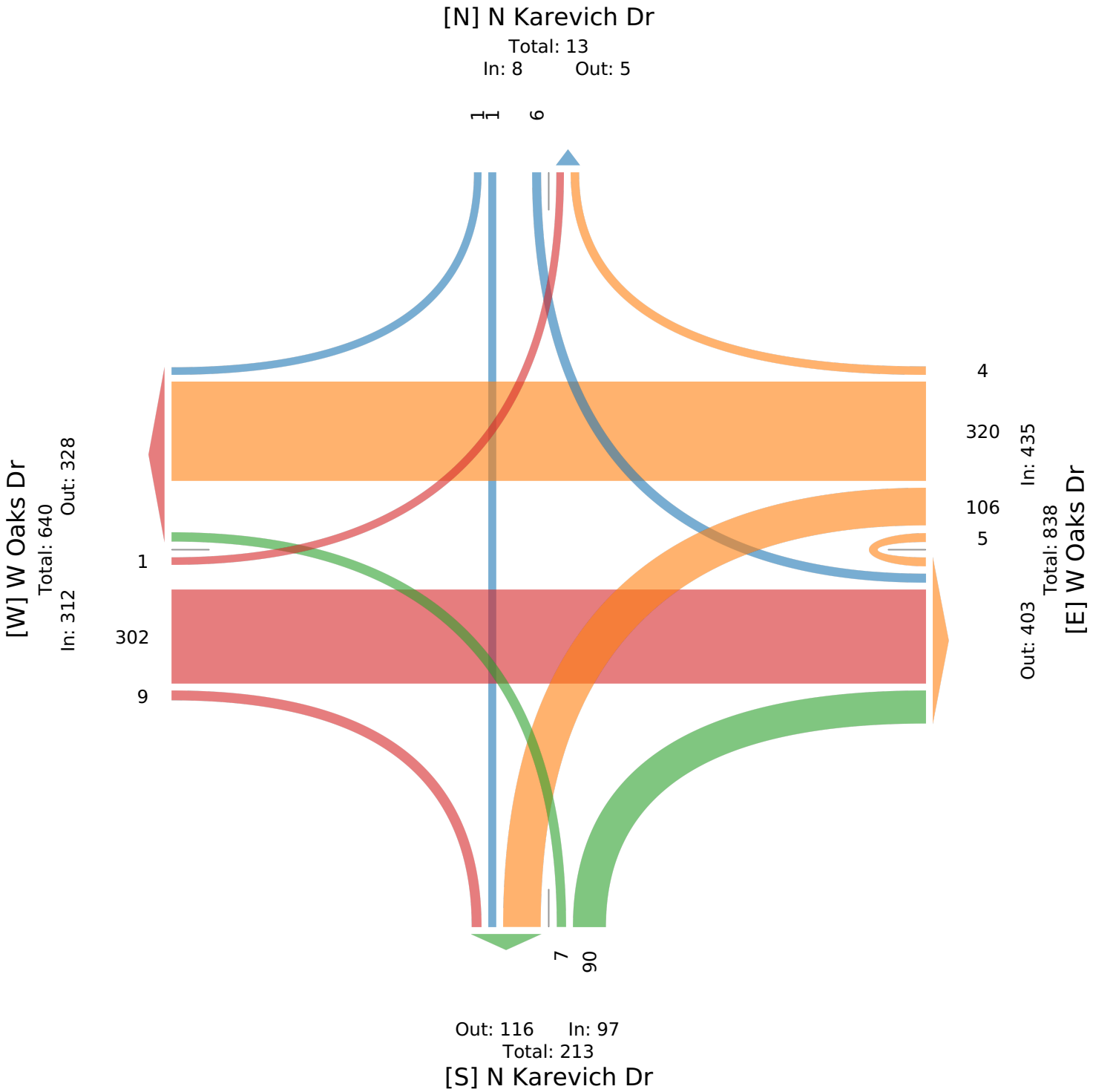
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE, Grand Rapids, MI, 49546, US

Leg	W Oaks Dr					W Oaks Dr					N Karevich Dr					N Karevich Dr					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2024-01-25 12:00PM	0	67	3	0	**70**	42	74	1	0	**117**	1	0	18	0	**19**	1	1	0	0	**2**	**208**
12:15PM	1	70	0	0	**71**	15	99	1	1	**116**	3	0	27	0	**30**	0	0	1	0	**1**	**218**
12:30PM	0	90	5	0	**95**	27	73	2	2	**104**	1	0	19	0	**20**	1	0	0	0	**1**	**220**
12:45PM	0	75	1	0	**76**	22	74	0	2	**98**	2	0	26	0	**28**	4	0	0	0	**4**	**206**
Total	1	302	9	0	**312**	106	320	4	5	**435**	7	0	90	0	**97**	6	1	1	0	**8**	**852**
% Approach	0.3%	96.8%	2.9%	0%	**-**	24.4%	73.6%	0.9%	1.1%	**-**	7.2%	0%	92.8%	0%	**-**	75.0%	12.5%	12.5%	0%	**-**	-
% Total	0.1%	35.4%	1.1%	0%	**36.6%**	12.4%	37.6%	0.5%	0.6%	**51.1%**	0.8%	0%	10.6%	0%	**11.4%**	0.7%	0.1%	0.1%	0%	**0.9%**	-
PHF	0.250	0.839	0.450	-	**0.821**	0.631	0.808	0.500	0.625	**0.929**	0.583	-	0.833	-	**0.808**	0.375	0.250	0.250	-	**0.500**	0.968
Lights	1	301	8	0	**310**	105	317	4	5	**431**	7	0	89	0	**96**	6	1	1	0	**8**	845
% Lights	100%	99.7%	88.9%	0%	**99.4%**	99.1%	99.1%	100%	100%	**99.1%**	100%	0%	98.9%	0%	**99.0%**	100%	100%	100%	0%	**100%**	99.2%
Articulated Trucks	0	0	0	0	**0**	1	0	0	0	**1**	0	0	0	0	**0**	0	0	0	0	**0**	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	0.9%	0%	0%	0%	**0.2%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0.1%
Buses and Single-Unit Trucks	0	1	1	0	**2**	0	3	0	0	**3**	0	0	1	0	**1**	0	0	0	0	**0**	6
% Buses and Single-Unit Trucks	0%	0.3%	11.1%	0%	**0.6%**	0%	0.9%	0%	0%	**0.7%**	0%	0%	1.1%	0%	**1.0%**	0%	0%	0%	0%	**0%**	0.7%

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

W Oaks Dr and Karevich Drive/Proposed Site DW - TMC
Thu Jan 25, 2024
Midday Peak (12 PM - 1 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1150537, Location: 42.491062, -83.477498

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE, Grand Rapids, MI, 49546, US



W Oaks Dr and Karevich Drive/Proposed Site DW - TMC

Thu Jan 25, 2024
PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1150537, Location: 42.491062, -83.477498

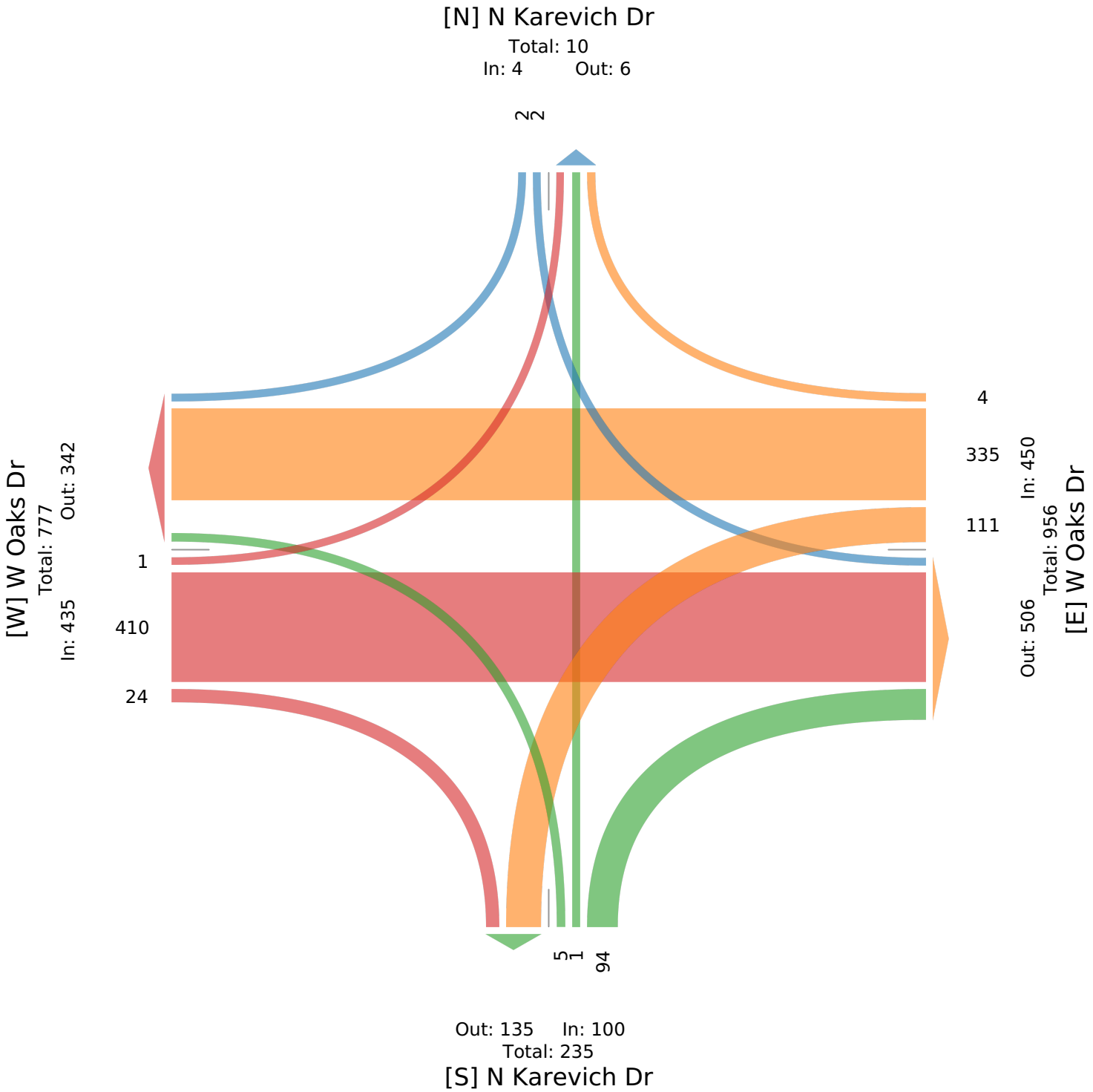
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE, Grand Rapids, MI, 49546, US

Leg	W Oaks Dr					W Oaks Dr					N Karevich Dr					N Karevich Dr					
Direction	Eastbound					Westbound					Northbound					Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2024-01-25 4:15PM	0	119	9	0	**128**	29	85	2	0	**116**	0	0	24	0	**24**	1	0	1	0	**2**	**270**
4:30PM	0	92	5	0	**97**	34	75	0	0	**109**	3	1	21	0	**25**	0	0	0	0	**0**	**231**
4:45PM	1	86	7	0	**94**	25	87	0	0	**112**	1	0	26	0	**27**	1	0	0	0	**1**	**234**
5:00PM	0	113	3	0	**116**	23	88	2	0	**113**	1	0	23	0	**24**	0	0	1	0	**1**	**254**
Total	1	410	24	0	**435**	111	335	4	0	**450**	5	1	94	0	**100**	2	0	2	0	**4**	**989**
% Approach	0.2%	94.3%	5.5%	0%	-	24.7%	74.4%	0.9%	0%	-	5.0%	1.0%	94.0%	0%	-	50.0%	0%	50.0%	0%	-	-
% Total	0.1%	41.5%	2.4%	0%	**44.0%**	11.2%	33.9%	0.4%	0%	**45.5%**	0.5%	0.1%	9.5%	0%	**10.1%**	0.2%	0%	0.2%	0%	**0.4%**	-
PHF	0.250	0.861	0.667	-	**0.850**	0.816	0.952	0.500	-	**0.970**	0.417	0.250	0.904	-	**0.926**	0.500	-	0.500	-	**0.500**	0.916
Lights	1	407	24	0	**432**	111	334	4	0	**449**	5	1	94	0	**100**	2	0	2	0	**4**	985
% Lights	100%	99.3%	100%	0%	**99.3%**	100%	99.7%	100%	0%	**99.8%**	100%	100%	100%	0%	**100%**	100%	0%	100%	0%	**100%**	99.6%
Articulated Trucks	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0
% Articulated Trucks	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0%
Buses and Single-Unit Trucks	0	3	0	0	**3**	0	1	0	0	**1**	0	0	0	0	**0**	0	0	0	0	**0**	4
% Buses and Single-Unit Trucks	0%	0.7%	0%	0%	**0.7%**	0%	0.3%	0%	0%	**0.2%**	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**	0.4%

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

W Oaks Dr and Karevich Drive/Proposed Site DW - TMC
Thu Jan 25, 2024
PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 1150537, Location: 42.491062, -83.477498

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE, Grand Rapids, MI, 49546, US



Twelve Oaks Drive N and Karevich Drive - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150500, Location: 42.49327, -83.476748

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

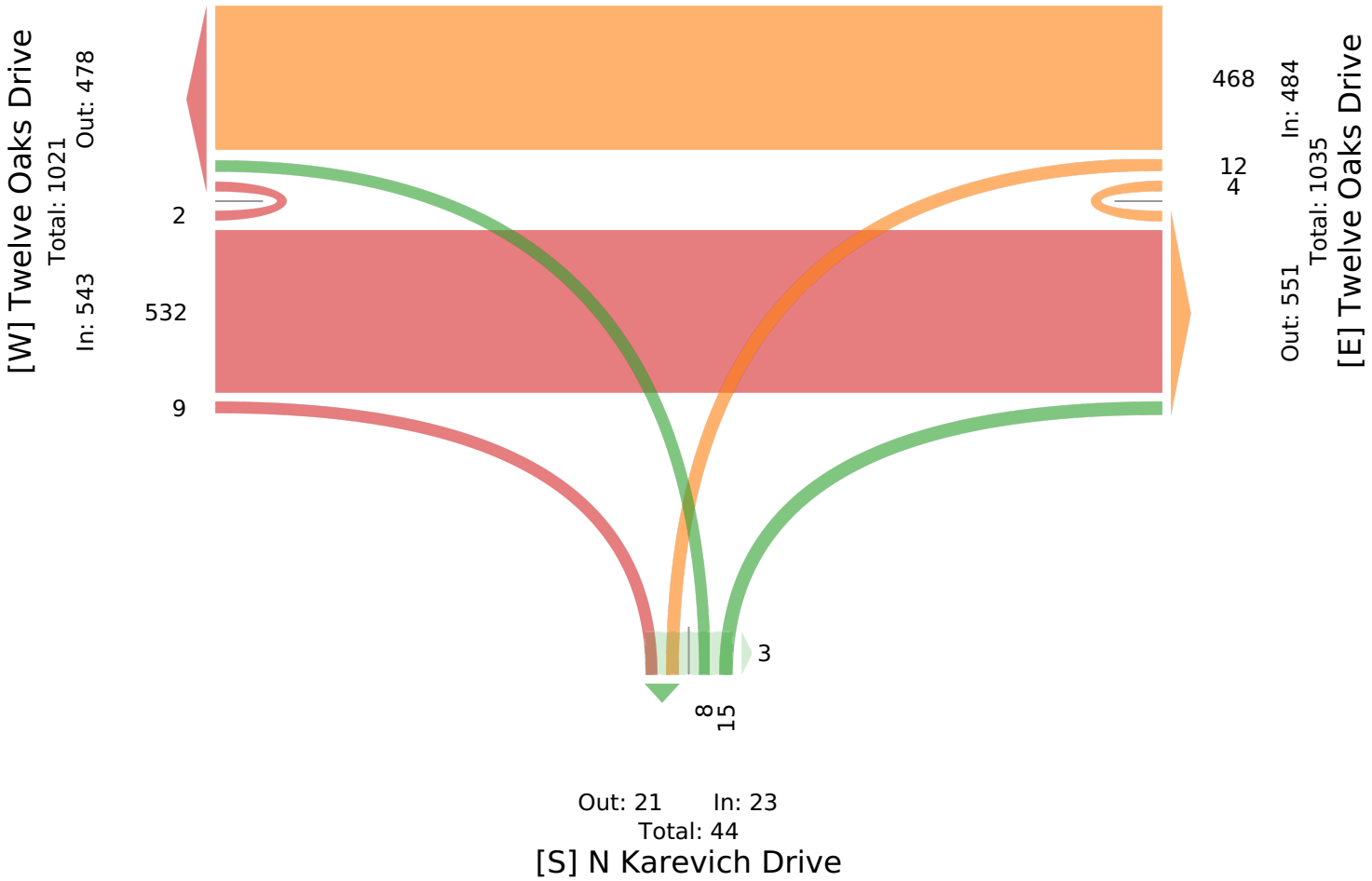
Leg / Direction	Twelve Oaks Drive Eastbound					Twelve Oaks Drive Westbound					N Karevich Drive Northbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2024-01-25 11:00AM	32	1	1	**34**	0	0	24	0	**24**	0	2	0	0	**2**	0	**60**
11:15AM	27	1	0	**28**	0	0	30	0	**30**	0	0	0	0	**0**	0	**58**
11:30AM	29	0	0	**29**	0	1	30	0	**31**	0	1	1	0	**2**	0	**62**
11:45AM	32	0	0	**32**	0	2	36	1	**39**	0	0	1	0	**1**	0	**72**
Hourly Total	120	2	1	**123**	0	3	120	1	**124**	0	3	2	0	**5**	0	**252**
12:00PM	45	2	0	**47**	0	2	27	0	**29**	0	0	0	0	**0**	0	**76**
12:15PM	41	0	0	**41**	0	2	19	0	**21**	0	1	0	0	**1**	0	**63**
12:30PM	35	1	0	**36**	0	0	36	1	**37**	0	0	1	0	**1**	1	**74**
12:45PM	38	0	0	**38**	0	1	24	1	**26**	0	0	1	0	**1**	2	**65**
Hourly Total	159	3	0	**162**	0	5	106	2	**113**	0	1	2	0	**3**	3	**278**
4:00PM	24	0	0	**24**	0	0	33	0	**33**	0	0	2	0	**2**	0	**59**
4:15PM	33	0	0	**33**	0	1	27	0	**28**	0	1	1	0	**2**	0	**63**
4:30PM	38	0	0	**38**	0	1	22	1	**24**	0	1	0	0	**1**	0	**63**
4:45PM	31	1	0	**32**	0	1	31	0	**32**	0	0	0	0	**0**	0	**64**
Hourly Total	126	1	0	**127**	0	3	113	1	**117**	0	2	3	0	**5**	0	**249**
5:00PM	33	1	1	**35**	0	1	38	0	**39**	0	0	3	0	**3**	0	**77**
5:15PM	42	1	0	**43**	0	0	32	0	**32**	0	1	0	0	**1**	0	**76**
5:30PM	16	0	0	**16**	0	0	27	0	**27**	0	0	2	0	**2**	0	**45**
5:45PM	36	1	0	**37**	0	0	32	0	**32**	0	1	3	0	**4**	0	**73**
Hourly Total	127	3	1	**131**	0	1	129	0	**130**	0	2	8	0	**10**	0	**271**
Total	532	9	2	**543**	0	12	468	4	**484**	0	8	15	0	**23**	3	**1050**
% Approach	98.0%	1.7%	0.4%	**-**	-	2.5%	96.7%	0.8%	**-**	-	34.8%	65.2%	0%	**-**	-	**-**
% Total	50.7%	0.9%	0.2%	**51.7%**	-	1.1%	44.6%	0.4%	**46.1%**	-	0.8%	1.4%	0%	**2.2%**	-	**-**
Lights	527	9	2	**538**	-	12	461	4	**477**	-	8	15	0	**23**	-	1038
% Lights	99.1%	100%	100%	**99.1%**	-	100%	98.5%	100%	**98.6%**	-	100%	100%	0%	**100%**	-	98.9%
Articulated Trucks	1	0	0	**1**	-	0	0	0	**0**	-	0	0	0	**0**	-	1
% Articulated Trucks	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0.1%
Buses and Single-Unit Trucks	4	0	0	**4**	-	0	7	0	**7**	-	0	0	0	**0**	-	11
% Buses and Single-Unit Trucks	0.8%	0%	0%	**0.7%**	-	0%	1.5%	0%	**1.4%**	-	0%	0%	0%	**0%**	-	1.0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	3	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Twelve Oaks Drive N and Karevich Drive - TMC

Thu Jan 25, 2024
Full Length (11 AM-1 PM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150500, Location: 42.49327, -83.476748

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Twelve Oaks Drive N and Karevich Drive - TMC

Thu Jan 25, 2024
Midday Peak (11:45 AM - 12:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150500, Location: 42.49327, -83.476748

fishbeck
Engineers | Architects | Scientists | Constructors
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

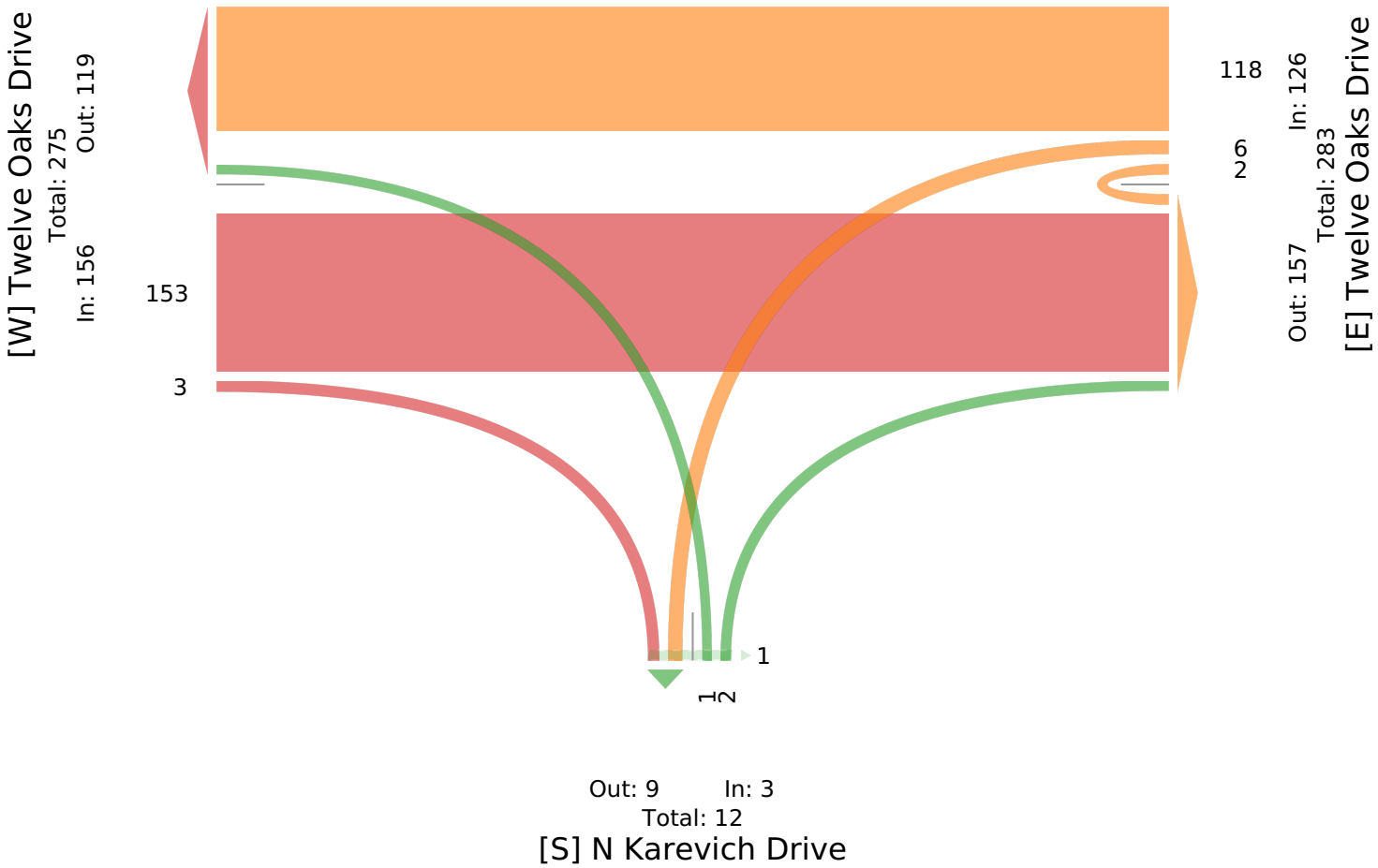
Leg / Direction	Twelve Oaks Drive Eastbound					Twelve Oaks Drive Westbound					N Karevich Drive Northbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2024-01-25 11:45AM	32	0	0	**32**	0	2	36	1	**39**	0	0	1	0	**1**	0	**72**
12:00PM	45	2	0	**47**	0	2	27	0	**29**	0	0	0	0	**0**	0	**76**
12:15PM	41	0	0	**41**	0	2	19	0	**21**	0	1	0	0	**1**	0	**63**
12:30PM	35	1	0	**36**	0	0	36	1	**37**	0	0	1	0	**1**	1	**74**
Total	153	3	0	**156**	0	6	118	2	**126**	0	1	2	0	**3**	1	**285**
% Approach	98.1%	1.9%	0%	**-**	-	4.8%	93.7%	1.6%	**-**	-	33.3%	66.7%	0%	**-**	-	**-**
% Total	53.7%	1.1%	0%	**54.7%**	-	2.1%	41.4%	0.7%	**44.2%**	-	0.4%	0.7%	0%	**1.1%**	-	**-**
PHF	0.850	0.375	-	**0.830**	-	0.750	0.819	0.500	**0.808**	-	0.250	0.500	-	**0.750**	-	0.938
Lights	152	3	0	**155**	-	6	117	2	**125**	-	1	2	0	**3**	-	283
% Lights	99.3%	100%	0%	**99.4%**	-	100%	99.2%	100%	**99.2%**	-	100%	100%	0%	**100%**	-	99.3%
Articulated Trucks	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Articulated Trucks	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Buses and Single-Unit Trucks	1	0	0	**1**	-	0	1	0	**1**	-	0	0	0	**0**	-	2
% Buses and Single-Unit Trucks	0.7%	0%	0%	**0.6%**	-	0%	0.8%	0%	**0.8%**	-	0%	0%	0%	**0%**	-	0.7%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Twelve Oaks Drive N and Karevich Drive - TMC

Thu Jan 25, 2024
Midday Peak (11:45 AM - 12:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150500, Location: 42.49327, -83.476748

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Twelve Oaks Drive N and Karevich Drive - TMC

Thu Jan 25, 2024
PM Peak (4:30 PM - 5:30 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150500, Location: 42.49327, -83.476748

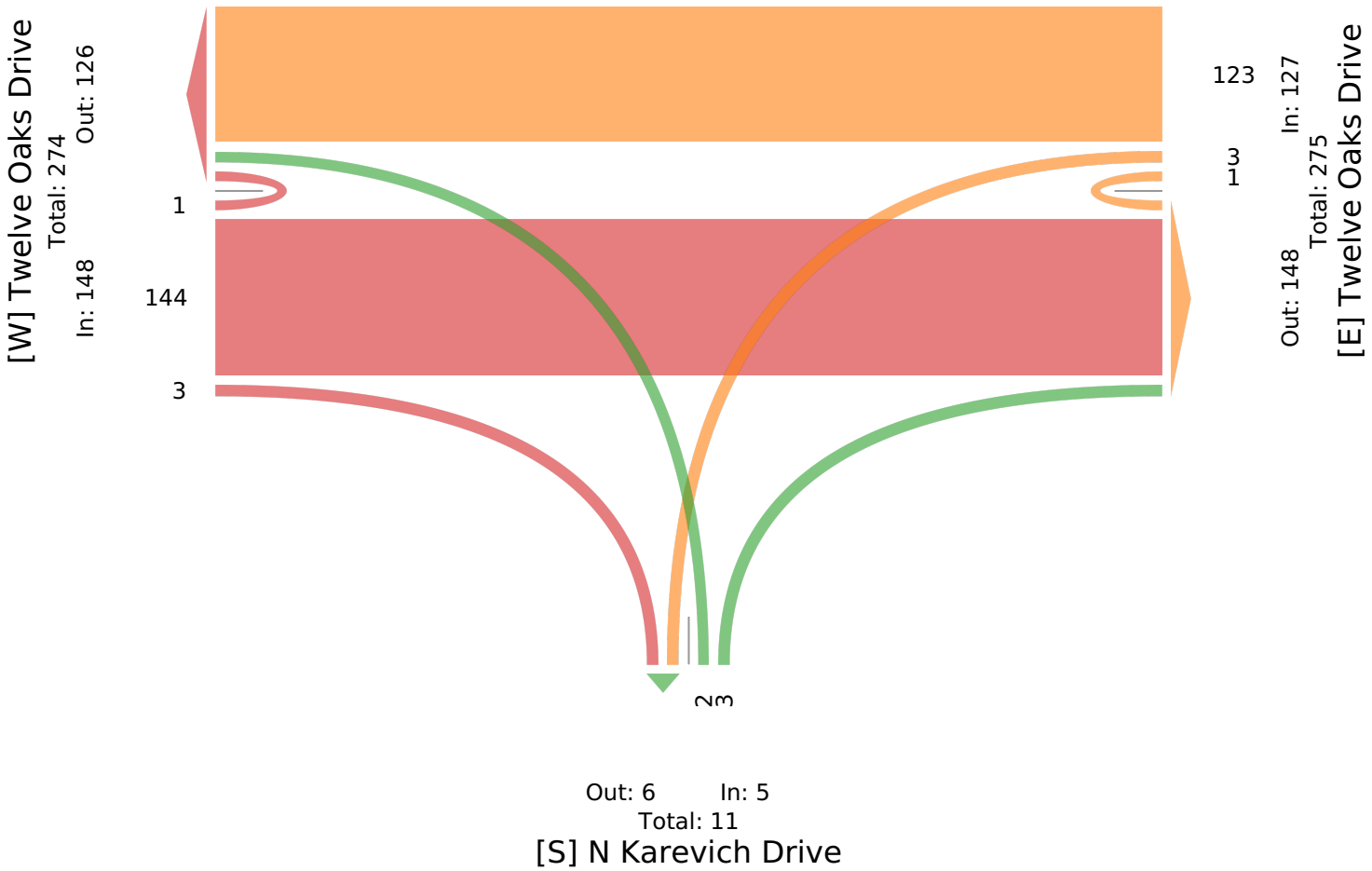
Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US

Leg Direction	Twelve Oaks Drive Eastbound					Twelve Oaks Drive Westbound					N Karevich Drive Northbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2024-01-25 4:30PM	38	0	0	**38**	0	1	22	1	**24**	0	1	0	0	**1**	0	**63**
4:45PM	31	1	0	**32**	0	1	31	0	**32**	0	0	0	0	**0**	0	**64**
5:00PM	33	1	1	**35**	0	1	38	0	**39**	0	0	3	0	**3**	0	**77**
5:15PM	42	1	0	**43**	0	0	32	0	**32**	0	1	0	0	**1**	0	**76**
Total	144	3	1	**148**	0	3	123	1	**127**	0	2	3	0	**5**	0	**280**
% Approach	97.3%	2.0%	0.7%	**-**	-	2.4%	96.9%	0.8%	**-**	-	40.0%	60.0%	0%	**-**	-	**-**
% Total	51.4%	1.1%	0.4%	**52.9%**	-	1.1%	43.9%	0.4%	**45.4%**	-	0.7%	1.1%	0%	**1.8%**	-	**-**
PHF	0.857	0.750	0.250	**0.860**	-	0.750	0.809	0.250	**0.814**	-	0.500	0.250	-	**0.417**	-	0.909
Lights	143	3	1	**147**	-	3	121	1	**125**	-	2	3	0	**5**	-	277
% Lights	99.3%	100%	100%	**99.3%**	-	100%	98.4%	100%	**98.4%**	-	100%	100%	0%	**100%**	-	98.9%
Articulated Trucks	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Articulated Trucks	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Buses and Single-Unit Trucks	1	0	0	**1**	-	0	2	0	**2**	-	0	0	0	**0**	-	3
% Buses and Single-Unit Trucks	0.7%	0%	0%	**0.7%**	-	0%	1.6%	0%	**1.6%**	-	0%	0%	0%	**0%**	-	1.1%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

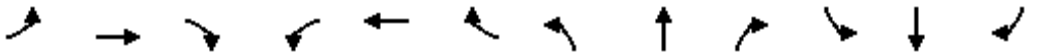
Twelve Oaks Drive N and Karevich Drive - TMC
Thu Jan 25, 2024
PM Peak (4:30 PM - 5:30 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1150500, Location: 42.49327, -83.476748

Provided by: Fishbeck-Main Account
1515 Arboretum Drive SE,
Grand Rapids, MI, 49546, US



Appendix 2

Existing LOS Output Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	46	307	330	59	40	326	764	260	17	672	47
Future Volume (veh/h)	66	46	307	330	59	40	326	764	260	17	672	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1969	1969	1969	1984	1984	1984
Adj Flow Rate, veh/h	72	50	321	363	65	41	351	822	155	18	707	32
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.93	0.93	0.93	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	1	1	1
Cap, veh/h	189	198	664	474	147	93	453	1989	617	171	1822	566
Arrive On Green	0.10	0.10	0.10	0.13	0.13	0.13	0.12	0.37	0.37	0.03	0.11	0.11
Sat Flow, veh/h	1890	1984	2960	3666	1138	718	3638	5375	1668	1890	5417	1682
Grp Volume(v), veh/h	72	50	321	363	0	106	351	822	155	18	707	32
Grp Sat Flow(s),veh/h/ln	1890	1984	1480	1833	0	1855	1819	1792	1668	1890	1806	1682
Q Serve(g_s), s	2.9	1.9	7.5	7.7	0.0	4.2	7.5	9.1	5.2	0.7	9.7	1.4
Cycle Q Clear(g_c), s	2.9	1.9	7.5	7.7	0.0	4.2	7.5	9.1	5.2	0.7	9.7	1.4
Prop In Lane	1.00		1.00	1.00		0.39	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	198	664	474	0	240	453	1989	617	171	1822	566
V/C Ratio(X)	0.38	0.25	0.48	0.77	0.00	0.44	0.78	0.41	0.25	0.10	0.39	0.06
Avail Cap(c_a), veh/h	189	198	664	596	0	301	618	1989	617	171	1822	566
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	33.7	33.2	27.0	33.7	0.0	32.2	33.9	18.7	17.5	35.6	27.9	24.2
Incr Delay (d2), s/veh	1.3	0.7	0.5	4.6	0.0	1.3	4.2	0.6	1.0	1.2	0.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.9	2.7	3.7	0.0	2.0	3.4	3.5	1.9	0.4	4.4	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.9	33.9	27.5	38.3	0.0	33.4	38.2	19.4	18.5	36.8	28.5	24.4
LnGrp LOS	C	C	C	D	A	C	D	B	B	D	C	C
Approach Vol, veh/h		443			469			1328			757	
Approach Delay, s/veh		29.5			37.2			24.2			28.5	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.7	36.0		16.3	16.4	33.3		14.0				
Change Period (Y+Rc), s	6.4	6.4		6.0	6.4	6.4		6.0				
Max Green Setting (Gmax), s	4.6	29.6		13.0	13.6	20.6		8.0				
Max Q Clear Time (g_c+I1), s	2.7	11.1		9.7	9.5	11.7		9.5				
Green Ext Time (p_c), s	0.0	5.5		0.7	0.5	3.0		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		28.1
HCM 6th LOS		C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	17	105	27	20	45	87	757	26	85	604	19
Future Volume (veh/h)	43	17	105	27	20	45	87	757	26	85	604	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1953	1953	1953	1984	1984	1984
Adj Flow Rate, veh/h	47	18	51	34	25	25	96	832	28	92	657	21
Peak Hour Factor	0.92	0.92	0.92	0.80	0.80	0.80	0.91	0.91	0.91	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	2	2	2	3	3	3	1	1	1
Cap, veh/h	114	28	78	77	58	59	530	1998	891	435	2900	92
Arrive On Green	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.54	0.54	0.04	0.54	0.54
Sat Flow, veh/h	1890	457	1295	1457	1095	1112	1860	3711	1655	1890	5393	172
Grp Volume(v), veh/h	47	0	69	44	0	40	96	832	28	92	439	239
Grp Sat Flow(s),veh/h/ln	1890	0	1751	1896	0	1769	1860	1856	1655	1890	1806	1953
Q Serve(g_s), s	1.9	0.0	3.1	1.8	0.0	1.7	1.8	10.7	0.6	1.7	5.1	5.1
Cycle Q Clear(g_c), s	1.9	0.0	3.1	1.8	0.0	1.7	1.8	10.7	0.6	1.7	5.1	5.1
Prop In Lane	1.00		0.74	0.77		0.63	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	114	0	106	100	0	93	530	1998	891	435	1942	1051
V/C Ratio(X)	0.41	0.00	0.65	0.44	0.00	0.43	0.18	0.42	0.03	0.21	0.23	0.23
Avail Cap(c_a), veh/h	213	0	197	308	0	287	699	1998	891	607	1942	1051
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.2	0.0	36.8	36.7	0.0	36.7	7.6	11.0	8.7	8.2	9.7	9.7
Incr Delay (d2), s/veh	2.4	0.0	6.7	3.0	0.0	3.0	0.2	0.6	0.1	0.2	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.5	0.9	0.0	0.8	0.6	3.8	0.2	0.6	1.8	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.6	0.0	43.4	39.8	0.0	39.8	7.7	11.6	8.7	8.4	10.0	10.2
LnGrp LOS	D	A	D	D	A	D	A	B	A	A	A	B
Approach Vol, veh/h		116			84			956			770	
Approach Delay, s/veh		41.5			39.8			11.1			9.9	
Approach LOS		D			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.7	49.3		10.2	9.7	49.2		10.8
Change Period (Y+Rc), s	* 6.2	* 6.2		6.0	* 6.2	* 6.2		6.0
Max Green Setting (Gmax), s	* 11	* 23		13.0	* 11	* 23		9.0
Max Q Clear Time (g_c+I1), s	3.7	12.7		3.8	3.8	7.1		5.1
Green Ext Time (p_c), s	0.1	3.8		0.2	0.1	3.5		0.1

Intersection Summary	
HCM 6th Ctrl Delay	13.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	302	9	106	320	9	7	0	90	6	1	1
Future Vol, veh/h	1	302	9	106	320	9	7	0	90	6	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	-	115	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	93	93	93	81	81	81	60	60	60
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	0	0	0
Mvmt Flow	1	368	11	114	344	10	9	0	111	10	2	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	354	0	0	379	0	0	777	958	374	1008	958	177
Stage 1	-	-	-	-	-	-	376	376	-	577	577	-
Stage 2	-	-	-	-	-	-	401	582	-	431	381	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.315	6.515	6.215	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.115	5.515	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.515	5.515	-	6.1	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5095	4.0095	3.3095	3.5	4	3.3
Pot Cap-1 Maneuver	1209	-	-	1184	-	-	302	258	674	209	259	842
Stage 1	-	-	-	-	-	-	647	618	-	474	505	-
Stage 2	-	-	-	-	-	-	600	500	-	607	617	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1209	-	-	1184	-	-	278	233	674	162	234	842
Mov Cap-2 Maneuver	-	-	-	-	-	-	278	233	-	162	234	-
Stage 1	-	-	-	-	-	-	646	617	-	474	457	-
Stage 2	-	-	-	-	-	-	539	452	-	507	616	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2	12.3	25.6
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	611	1209	-	-	1184	-	-	188
HCM Lane V/C Ratio	0.196	0.001	-	-	0.096	-	-	0.071
HCM Control Delay (s)	12.3	8	-	-	8.4	-	-	25.6
HCM Lane LOS	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.7	0	-	-	0.3	-	-	0.2

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	163	3	8	118	1	2
Future Vol, veh/h	163	3	8	118	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	81	81	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	196	4	10	146	1	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	200	0	364	198
Stage 1	-	-	-	-	198	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1378	-	639	848
Stage 1	-	-	-	-	840	-
Stage 2	-	-	-	-	868	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1378	-	635	848
Mov Cap-2 Maneuver	-	-	-	-	635	-
Stage 1	-	-	-	-	840	-
Stage 2	-	-	-	-	862	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	763	-	-	1378	-
HCM Lane V/C Ratio	0.005	-	-	0.007	-
HCM Control Delay (s)	9.7	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	T	R	R	L	L	TR	L	L	T	T	T
Maximum Queue (ft)	51	49	66	48	219	174	105	250	301	243	223	151
Average Queue (ft)	39	29	47	15	145	66	47	136	178	135	115	21
95th Queue (ft)	63	56	62	39	207	157	88	236	272	212	197	85
Link Distance (ft)	49	49	49	49	230	230	230			427	427	427
Upstream Blk Time (%)	22	11	14	0	0							
Queuing Penalty (veh)	23	11	15	0	0							
Storage Bay Dist (ft)								400	400			
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	T	T	T	R
Maximum Queue (ft)	76	91	190	179	167	105
Average Queue (ft)	38	14	121	105	79	29
95th Queue (ft)	65	53	177	163	148	78
Link Distance (ft)			694	694	694	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	350	115				80
Storage Blk Time (%)			14		8	0
Queuing Penalty (veh)			3		4	0

Intersection: 2: Novi Road & Oaks Drive North

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	LT	TR	L	T	T	R	L	T	T	TR
Maximum Queue (ft)	82	100	74	100	89	200	246	42	108	178	132	98
Average Queue (ft)	30	54	22	35	35	72	85	7	33	73	40	23
95th Queue (ft)	66	96	58	73	72	180	201	29	79	148	109	68
Link Distance (ft)		95	166	166		694	694	694		408	408	408
Upstream Blk Time (%)	0	2										
Queuing Penalty (veh)	0	3										
Storage Bay Dist (ft)	80				275				100			
Storage Blk Time (%)	0	4				0			0	4		
Queuing Penalty (veh)	1	2				0			0	3		

Intersection: 3: Karevich Drive & Oaks Drive South

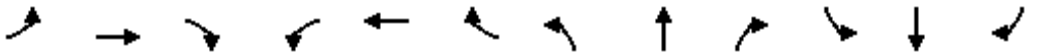
Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (ft)	6	17	67	4	74	31
Average Queue (ft)	0	0	27	0	34	6
95th Queue (ft)	4	8	61	3	60	26
Link Distance (ft)		286		179	77	651
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)	115		115			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Karevich Drive & Oaks Drive North

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	75	31	30
Average Queue (ft)	6	2	4
95th Queue (ft)	40	16	20
Link Distance (ft)	229	95	179
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 65



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	41	426	339	63	39	349	874	175	21	803	56
Future Volume (veh/h)	79	41	426	339	63	39	349	874	175	21	803	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	91	47	387	404	75	38	384	960	121	22	845	43
Peak Hour Factor	0.87	0.87	0.87	0.84	0.84	0.84	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	180	189	671	514	174	88	477	2144	666	208	2047	635
Arrive On Green	0.09	0.09	0.09	0.14	0.14	0.14	0.13	0.40	0.40	0.11	0.37	0.37
Sat Flow, veh/h	1905	2000	2983	3695	1252	634	3666	5417	1682	1905	5460	1695
Grp Volume(v), veh/h	91	47	387	404	0	113	384	960	121	22	845	43
Grp Sat Flow(s),veh/h/ln	1905	2000	1492	1848	0	1886	1833	1806	1682	1905	1820	1695
Q Serve(g_s), s	4.3	2.1	9.0	10.0	0.0	5.2	9.7	12.4	4.5	1.0	10.9	1.5
Cycle Q Clear(g_c), s	4.3	2.1	9.0	10.0	0.0	5.2	9.7	12.4	4.5	1.0	10.9	1.5
Prop In Lane	1.00		1.00	1.00		0.34	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	189	671	514	0	263	477	2144	666	208	2047	635
V/C Ratio(X)	0.50	0.25	0.58	0.79	0.00	0.43	0.80	0.45	0.18	0.11	0.41	0.07
Avail Cap(c_a), veh/h	180	189	671	700	0	357	679	2144	666	208	2047	635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	40.9	39.9	32.8	39.5	0.0	37.4	40.1	21.1	18.7	38.1	22.0	19.0
Incr Delay (d2), s/veh	2.2	0.7	1.2	4.1	0.0	1.1	4.7	0.7	0.6	1.0	0.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	1.1	4.1	4.8	0.0	2.5	4.5	4.9	1.7	0.5	4.4	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	40.5	34.0	43.7	0.0	38.6	44.8	21.8	19.3	39.1	22.6	19.2
LnGrp LOS	D	D	C	D	A	D	D	C	B	D	C	B
Approach Vol, veh/h		525			517			1465			910	
Approach Delay, s/veh		36.2			42.5			27.6			22.8	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.8	44.0		19.2	18.8	42.0		15.0				
Change Period (Y+Rc), s	6.4	6.4		6.0	6.4	6.4		6.0				
Max Green Setting (Gmax), s	5.6	37.6		18.0	17.6	25.6		9.0				
Max Q Clear Time (g_c+I1), s	3.0	14.4		12.0	11.7	12.9		11.0				
Green Ext Time (p_c), s	0.0	6.9		1.2	0.7	4.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		29.9	
HCM 6th LOS		C	

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	12	93	48	33	49	79	869	44	49	739	29
Future Volume (veh/h)	48	12	93	48	33	49	79	869	44	49	739	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	53	13	44	63	43	44	90	988	50	53	795	30
Peak Hour Factor	0.91	0.91	0.91	0.76	0.76	0.76	0.88	0.88	0.88	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	98	21	70	97	68	71	495	2249	1003	459	3161	119
Arrive On Green	0.05	0.05	0.05	0.06	0.06	0.06	0.08	1.00	1.00	0.03	0.59	0.59
Sat Flow, veh/h	1890	397	1345	1528	1075	1119	1890	3770	1682	1890	5358	202
Grp Volume(v), veh/h	53	0	57	79	0	71	90	988	50	53	535	290
Grp Sat Flow(s),veh/h/ln	1890	0	1742	1924	0	1799	1890	1885	1682	1890	1806	1948
Q Serve(g_s), s	2.6	0.0	3.0	3.8	0.0	3.6	1.8	0.0	0.0	1.0	6.8	6.8
Cycle Q Clear(g_c), s	2.6	0.0	3.0	3.8	0.0	3.6	1.8	0.0	0.0	1.0	6.8	6.8
Prop In Lane	1.00		0.77	0.79		0.62	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	98	0	90	122	0	114	495	2249	1003	459	2131	1149
V/C Ratio(X)	0.54	0.00	0.63	0.65	0.00	0.62	0.18	0.44	0.05	0.12	0.25	0.25
Avail Cap(c_a), veh/h	199	0	183	223	0	208	697	2249	1003	673	2131	1149
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.9	0.0	44.2	43.5	0.0	43.4	6.9	0.0	0.0	7.0	9.4	9.4
Incr Delay (d2), s/veh	4.6	0.0	7.1	5.7	0.0	5.4	0.2	0.6	0.1	0.1	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.5	2.0	0.0	1.8	0.6	0.2	0.0	0.4	2.4	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.6	0.0	51.3	49.2	0.0	48.8	7.1	0.6	0.1	7.1	9.7	9.9
LnGrp LOS	D	A	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		110			150			1128			878	
Approach Delay, s/veh		50.0			49.0			1.1			9.6	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.2	62.9		12.0	9.8	62.2		10.9
Change Period (Y+Rc), s	* 6.2	* 6.2		6.0	* 6.2	* 6.2		6.0
Max Green Setting (Gmax), s	* 14	* 36		11.0	* 14	* 36		10.0
Max Q Clear Time (g_c+I1), s	3.6	2.0		5.8	3.8	8.8		5.0
Green Ext Time (p_c), s	0.1	7.7		0.3	0.1	5.2		0.1

Intersection Summary	
HCM 6th Ctrl Delay	9.9
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

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

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	410	24	111	335	4	5	1	94	2	0	2
Future Vol, veh/h	1	410	24	111	335	4	5	1	94	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	-	115	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	95	95	95	93	93	93	60	60	60
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	482	28	117	353	4	5	1	101	3	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	357	0	0	510	0	0	909	1089	496	1138	1101	179
Stage 1	-	-	-	-	-	-	498	498	-	589	589	-
Stage 2	-	-	-	-	-	-	411	591	-	549	512	-
Critical Hdwy	4.115	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1206	-	-	1065	-	-	245	217	578	169	214	839
Stage 1	-	-	-	-	-	-	558	548	-	466	499	-
Stage 2	-	-	-	-	-	-	594	498	-	524	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1206	-	-	1065	-	-	223	193	578	127	190	839
Mov Cap-2 Maneuver	-	-	-	-	-	-	223	193	-	127	190	-
Stage 1	-	-	-	-	-	-	557	547	-	466	444	-
Stage 2	-	-	-	-	-	-	527	443	-	431	539	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.2	13.6	21.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	526	1206	-	-	1065	-	-	221
HCM Lane V/C Ratio	0.204	0.001	-	-	0.11	-	-	0.03
HCM Control Delay (s)	13.6	8	-	-	8.8	-	-	21.8
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.4	-	-	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	3	4	137	2	3
Future Vol, veh/h	150	3	4	137	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	81	81	60	60
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	174	3	5	169	3	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	177	0	355	176
Stage 1	-	-	-	-	176	-
Stage 2	-	-	-	-	179	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1399	-	647	872
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1399	-	644	872
Mov Cap-2 Maneuver	-	-	-	-	644	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	854	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	764	-	-	1399	-
HCM Lane V/C Ratio	0.011	-	-	0.004	-
HCM Control Delay (s)	9.8	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	T	R	R	L	L	TR	L	L	T	T	T
Maximum Queue (ft)	52	49	66	48	231	177	122	283	324	242	234	131
Average Queue (ft)	43	28	49	23	146	77	43	148	186	147	134	31
95th Queue (ft)	63	58	62	46	216	167	93	260	298	226	212	98
Link Distance (ft)	49	49	49	49	230	230	230			427	427	427
Upstream Blk Time (%)	33	11	25	1	0							
Queuing Penalty (veh)	45	15	34	1	0							
Storage Bay Dist (ft)								400	400			
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	T	T	T	R
Maximum Queue (ft)	72	138	231	214	187	101
Average Queue (ft)	29	19	138	122	90	27
95th Queue (ft)	57	70	205	185	155	72
Link Distance (ft)			694	694	694	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	350	115				80
Storage Blk Time (%)			22		8	0
Queuing Penalty (veh)			5		5	0

Intersection: 2: Novi Road & Oaks Drive North

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	LT	TR	L	T	T	R	L	T	T	TR
Maximum Queue (ft)	83	100	109	108	69	246	268	39	84	176	138	69
Average Queue (ft)	36	46	38	44	31	65	80	10	23	90	48	24
95th Queue (ft)	71	88	80	87	60	180	201	32	62	161	113	59
Link Distance (ft)		95	166	166		694	694	694		408	408	408
Upstream Blk Time (%)	0	2										
Queuing Penalty (veh)	0	3										
Storage Bay Dist (ft)	80				275				100			
Storage Blk Time (%)	1	3				0				5		
Queuing Penalty (veh)	1	1				0				2		

Intersection: 3: Karevich Drive & Oaks Drive South

Movement	EB	WB	NB	SB
Directions Served	TR	L	LTR	LTR
Maximum Queue (ft)	12	81	74	29
Average Queue (ft)	1	33	32	4
95th Queue (ft)	8	68	56	22
Link Distance (ft)	286		77	651
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)		115		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 4: Karevich Drive & Oaks Drive North

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	47	6	30
Average Queue (ft)	3	1	4
95th Queue (ft)	25	8	20
Link Distance (ft)	229	95	179
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 113

Appendix 3

Trip Generation Calculations

Trip Generation - Weekday Summary

ITE Code	ITE Rate Description	Unit	Amount	MD Ingress	MD Egress	MD Total	PM Ingress	PM Egress	PM Total	WD Ingress	WD Egress	WD Total
ITE 934	Fast Food Restaurant with Drive Through Window	SFT	4106	115	115	230	71	65	136	959	960	1919
			Pass-by	*63*	*63*	*126*	*39*	*36*	*75*			
			Total Trips	**52**	**52**	**104**	**32**	**29**	**61**	**959**	**960**	**1919**

ITE Trip Generation Rates - Weekday

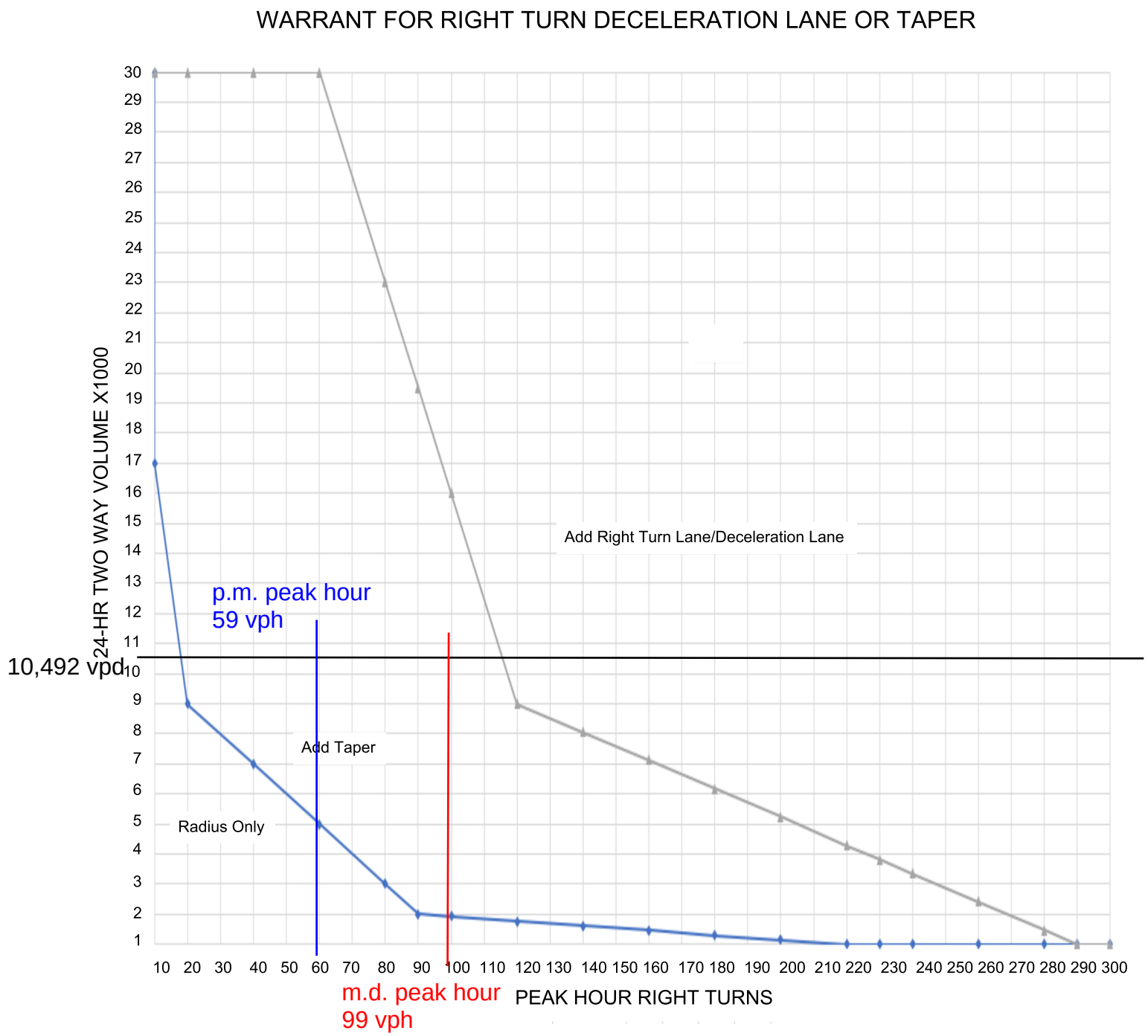
ITE Code	*ITE Rate Description*	*Unit*	*Amount*	*R2*	*Rate*	*Pass-by*
ITE 934	**Fast Food Restaurant with Drive Through Window**	**SFT**	**4,106**			
MD	N/A		230	N/A	12% WD	55%
PM	N/A		136	N/A	33.03	55%
WD	N/A		1919	N/A	467.48	

	AM Ingress	AM Egress	AM Total	PM Ingress	PM Egress	PM Total	WD Ingress	WD Egress	WD Total
Directional Distribution	50%	50%	100%	52%	48%	100%	50%	50%	100%
Volume Distribution	**115**	**115**	**230**	**71**	**65**	**136**	**959**	**960**	**1919**

Appendix 4

Turn Lane Warrants

FIGURE 6-3


WARRANT FOR RIGHT TURN DECELERATION LANE OR TAPER
24-HR TWO WAY VOLUME X1000
30
29
28
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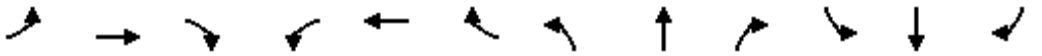
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
10,492 vpd
Add Right Turn Lane/Deceleration Lane
p.m. peak hour
59 vph
Add Taper
Radius Only
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
m.d. peak hour
99 vph
PEAK HOUR RIGHT TURNS

Appendix 5

Future LOS Output Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	52	352	330	67	40	391	723	260	17	650	64
Future Volume (veh/h)	95	52	352	330	67	40	391	723	260	17	650	64
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1969	1969	1969	1984	1984	1984
Adj Flow Rate, veh/h	103	57	370	363	74	41	420	777	155	18	684	50
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.93	0.93	0.93	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	1	1	1
Cap, veh/h	213	223	762	475	155	86	527	1921	596	171	1642	510
Arrive On Green	0.11	0.11	0.11	0.13	0.13	0.13	0.14	0.36	0.36	0.03	0.10	0.10
Sat Flow, veh/h	1890	1984	2960	3666	1200	665	3638	5375	1668	1890	5417	1682
Grp Volume(v), veh/h	103	57	370	363	0	115	420	777	155	18	684	50
Grp Sat Flow(s),veh/h/ln	1890	1984	1480	1833	0	1865	1819	1792	1668	1890	1806	1682
Q Serve(g_s), s	4.1	2.1	8.5	7.7	0.0	4.6	8.9	8.7	5.3	0.7	9.5	2.2
Cycle Q Clear(g_c), s	4.1	2.1	8.5	7.7	0.0	4.6	8.9	8.7	5.3	0.7	9.5	2.2
Prop In Lane	1.00		1.00	1.00		0.36	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	213	223	762	475	0	241	527	1921	596	171	1642	510
V/C Ratio(X)	0.48	0.26	0.49	0.76	0.00	0.48	0.80	0.40	0.26	0.11	0.42	0.10
Avail Cap(c_a), veh/h	213	223	762	596	0	303	709	1921	596	171	1642	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	33.3	32.4	25.2	33.6	0.0	32.3	33.1	19.3	18.2	35.7	29.4	26.1
Incr Delay (d2), s/veh	1.7	0.6	0.5	4.6	0.0	1.5	4.6	0.6	1.1	1.2	0.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.0	3.0	3.7	0.0	2.1	4.0	3.4	2.0	0.4	4.3	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.0	33.0	25.7	38.2	0.0	33.8	37.7	19.9	19.3	36.8	30.1	26.4
LnGrp LOS	D	C	C	D	A	C	D	B	B	D	C	C
Approach Vol, veh/h		530			478			1352			752	
Approach Delay, s/veh		28.3			37.1			25.4			30.0	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.6	35.0		16.4	18.0	30.6		15.0				
Change Period (Y+Rc), s	6.4	6.4		6.0	6.4	6.4		6.0				
Max Green Setting (Gmax), s	4.6	28.6		13.0	15.6	17.6		9.0				
Max Q Clear Time (g_c+I1), s	2.7	10.7		9.7	10.9	11.5		10.5				
Green Ext Time (p_c), s	0.0	5.1		0.7	0.7	2.3		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		28.8	
HCM 6th LOS		C	

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	17	105	27	20	45	87	745	26	85	599	37
Future Volume (veh/h)	70	17	105	27	20	45	87	745	26	85	599	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1969	1969	1969	1953	1953	1953	1984	1984	1984
Adj Flow Rate, veh/h	76	18	51	34	25	25	96	819	28	92	651	40
Peak Hour Factor	0.92	0.92	0.92	0.80	0.80	0.80	0.91	0.91	0.91	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	2	2	2	3	3	3	1	1	1
Cap, veh/h	120	29	83	77	58	59	521	1985	885	437	2789	170
Arrive On Green	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.53	0.53	0.04	0.53	0.53
Sat Flow, veh/h	1890	457	1295	1457	1095	1112	1860	3711	1655	1890	5220	319
Grp Volume(v), veh/h	76	0	69	44	0	40	96	819	28	92	449	242
Grp Sat Flow(s),veh/h/ln	1890	0	1751	1896	0	1769	1860	1856	1655	1890	1806	1927
Q Serve(g_s), s	3.1	0.0	3.1	1.8	0.0	1.7	1.8	10.5	0.6	1.7	5.3	5.3
Cycle Q Clear(g_c), s	3.1	0.0	3.1	1.8	0.0	1.7	1.8	10.5	0.6	1.7	5.3	5.3
Prop In Lane	1.00		0.74	0.77		0.63	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	120	0	112	100	0	93	521	1985	885	437	1930	1030
V/C Ratio(X)	0.63	0.00	0.62	0.44	0.00	0.43	0.18	0.41	0.03	0.21	0.23	0.23
Avail Cap(c_a), veh/h	213	0	197	308	0	287	690	1985	885	609	1930	1030
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.5	0.0	36.5	36.7	0.0	36.7	7.7	11.1	8.8	8.3	9.9	9.9
Incr Delay (d2), s/veh	5.3	0.0	5.5	3.0	0.0	3.0	0.2	0.6	0.1	0.2	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.5	0.9	0.0	0.8	0.6	3.7	0.2	0.6	1.8	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.9	0.0	42.0	39.8	0.0	39.8	7.9	11.7	8.9	8.5	10.2	10.5
LnGrp LOS	D	A	D	D	A	D	A	B	A	A	B	B
Approach Vol, veh/h		145			84			943			783	
Approach Delay, s/veh		41.9			39.8			11.2			10.1	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.7	49.0		10.2	9.7	48.9		11.1
Change Period (Y+Rc), s	* 6.2	* 6.2		6.0	* 6.2	* 6.2		6.0
Max Green Setting (Gmax), s	* 11	* 23		13.0	* 11	* 23		9.0
Max Q Clear Time (g_c+I1), s	3.7	12.5		3.8	3.8	7.3		5.1
Green Ext Time (p_c), s	0.1	3.8		0.2	0.1	3.6		0.2

Intersection Summary	
HCM 6th Ctrl Delay	14.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

Intersection	
Int Delay, s/veh	19.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	302	9	106	320	99	7	0	90	86	1	9
Future Vol, veh/h	8	302	9	106	320	99	7	0	90	86	1	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	-	115	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	93	93	93	81	81	81	60	60	60
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	0	0	0
Mvmt Flow	10	368	11	114	344	106	9	0	111	143	2	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	450	0	0	379	0	0	795	1072	374	1074	1024	225
Stage 1	-	-	-	-	-	-	394	394	-	625	625	-
Stage 2	-	-	-	-	-	-	401	678	-	449	399	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.315	6.515	6.215	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.115	5.515	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.515	5.515	-	6.1	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5095	4.0095	3.3095	3.5	4	3.3
Pot Cap-1 Maneuver	1115	-	-	1184	-	-	293	221	674	188	237	784
Stage 1	-	-	-	-	-	-	633	607	-	444	480	-
Stage 2	-	-	-	-	-	-	600	453	-	593	606	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1115	-	-	1184	-	-	263	198	674	144	212	784
Mov Cap-2 Maneuver	-	-	-	-	-	-	263	198	-	144	212	-
Stage 1	-	-	-	-	-	-	627	602	-	440	434	-
Stage 2	-	-	-	-	-	-	530	410	-	491	601	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.7	12.4	137.2
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	606	1115	-	-	1184	-	-	156
HCM Lane V/C Ratio	0.198	0.009	-	-	0.096	-	-	1.026
HCM Control Delay (s)	12.4	8.3	-	-	8.4	-	-	137.2
HCM Lane LOS	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.7	0	-	-	0.3	-	-	8

Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	163	3	26	118	1	29
Future Vol, veh/h	163	3	26	118	1	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	81	81	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	196	4	32	146	1	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	200	0	408	198
Stage 1	-	-	-	-	198	-
Stage 2	-	-	-	-	210	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1378	-	603	848
Stage 1	-	-	-	-	840	-
Stage 2	-	-	-	-	830	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1378	-	589	848
Mov Cap-2 Maneuver	-	-	-	-	589	-
Stage 1	-	-	-	-	840	-
Stage 2	-	-	-	-	811	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	836	-	-	1378	-
HCM Lane V/C Ratio	0.048	-	-	0.023	-
HCM Control Delay (s)	9.5	-	-	7.7	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	T	R	R	L	L	TR	L	L	T	T	T
Maximum Queue (ft)	50	49	61	50	227	173	109	382	405	378	299	219
Average Queue (ft)	44	28	48	18	146	65	44	273	312	232	145	31
95th Queue (ft)	62	56	62	43	211	160	89	435	459	477	307	133
Link Distance (ft)	49	49	49	49	230	230	230			427	427	427
Upstream Blk Time (%)	28	8	14	1	0			0	6	13	0	
Queuing Penalty (veh)	35	10	17	1	0			0	0	0	0	
Storage Bay Dist (ft)								400	400			
Storage Blk Time (%)								2	18	6		0
Queuing Penalty (veh)								4	42	26		1

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	T	T	T	R
Maximum Queue (ft)	106	111	194	179	157	101
Average Queue (ft)	45	18	125	107	81	35
95th Queue (ft)	92	67	179	160	138	83
Link Distance (ft)			694	694	694	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	350	115				80
Storage Blk Time (%)			17		7	0
Queuing Penalty (veh)			3		4	1

Intersection: 2: Novi Road & Oaks Drive North

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	LT	TR	L	T	T	R	L	T	T	TR
Maximum Queue (ft)	90	104	66	87	93	224	255	56	116	147	133	86
Average Queue (ft)	40	55	22	33	31	83	100	10	39	72	37	25
95th Queue (ft)	80	99	57	67	68	193	217	35	86	140	98	64
Link Distance (ft)		95	166	166		694	694	694		408	408	408
Upstream Blk Time (%)	0	3										
Queuing Penalty (veh)	0	6										
Storage Bay Dist (ft)	80				275				100			
Storage Blk Time (%)	2	5				0			0	4		
Queuing Penalty (veh)	2	3				0			0	3		

Intersection: 3: Karevich Drive & Oaks Drive South

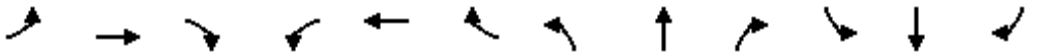
Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	L	LTR	LTR
Maximum Queue (ft)	30	10	58	79	120
Average Queue (ft)	3	1	24	33	43
95th Queue (ft)	18	7	55	62	96
Link Distance (ft)		286		77	651
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	115		115		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: Karevich Drive & Oaks Drive North

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	37	31	39
Average Queue (ft)	3	4	18
95th Queue (ft)	19	21	42
Link Distance (ft)	229	95	179
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 159



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	43	454	339	67	39	387	850	175	21	788	69
Future Volume (veh/h)	95	43	454	339	67	39	387	850	175	21	788	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	109	49	419	404	80	38	425	934	121	22	829	57
Peak Hour Factor	0.87	0.87	0.87	0.84	0.84	0.84	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	221	232	769	504	175	83	520	2144	666	173	1883	585
Arrive On Green	0.12	0.12	0.12	0.14	0.14	0.14	0.14	0.40	0.40	0.06	0.23	0.23
Sat Flow, veh/h	1905	2000	2983	3695	1282	609	3666	5417	1682	1905	5460	1695
Grp Volume(v), veh/h	109	49	419	404	0	118	425	934	121	22	829	57
Grp Sat Flow(s),veh/h/ln	1905	2000	1492	1848	0	1890	1833	1806	1682	1905	1820	1695
Q Serve(g_s), s	5.1	2.1	11.0	10.1	0.0	5.5	10.7	12.0	4.5	1.0	12.3	2.5
Cycle Q Clear(g_c), s	5.1	2.1	11.0	10.1	0.0	5.5	10.7	12.0	4.5	1.0	12.3	2.5
Prop In Lane	1.00		1.00	1.00		0.32	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	221	232	769	504	0	258	520	2144	666	173	1883	585
V/C Ratio(X)	0.49	0.21	0.55	0.80	0.00	0.46	0.82	0.44	0.18	0.13	0.44	0.10
Avail Cap(c_a), veh/h	221	232	769	622	0	318	718	2144	666	173	1883	585
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96
Uniform Delay (d), s/veh	39.4	38.1	30.4	39.8	0.0	37.8	39.6	21.0	18.7	41.0	28.7	24.9
Incr Delay (d2), s/veh	1.7	0.5	0.8	6.1	0.0	1.3	5.2	0.6	0.6	1.4	0.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	1.1	4.2	5.0	0.0	2.6	5.0	4.8	1.7	0.5	5.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.1	38.5	31.3	45.9	0.0	39.1	44.8	21.6	19.3	42.5	29.4	25.2
LnGrp LOS	D	D	C	D	A	D	D	C	B	D	C	C
Approach Vol, veh/h		577			522			1480			908	
Approach Delay, s/veh		33.7			44.3			28.1			29.4	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.0	44.0		19.0	19.9	39.2		17.0				
Change Period (Y+Rc), s	6.4	6.4		6.0	6.4	6.4		6.0				
Max Green Setting (Gmax), s	5.6	37.6		16.0	18.6	24.6		11.0				
Max Q Clear Time (g_c+I1), s	3.0	14.0		12.1	12.7	14.3		13.0				
Green Ext Time (p_c), s	0.0	6.7		0.9	0.8	3.9		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		31.8
HCM 6th LOS		C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	12	93	48	33	49	79	861	44	49	737	40
Future Volume (veh/h)	63	12	93	48	33	49	79	861	44	49	737	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	69	13	44	63	43	44	90	978	50	53	792	42
Peak Hour Factor	0.91	0.91	0.91	0.76	0.76	0.76	0.88	0.88	0.88	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	107	22	76	97	68	71	487	2231	995	459	3082	163
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.06	0.08	1.00	1.00	0.03	0.59	0.59
Sat Flow, veh/h	1890	397	1345	1528	1075	1119	1890	3770	1682	1890	5267	278
Grp Volume(v), veh/h	69	0	57	79	0	71	90	978	50	53	542	292
Grp Sat Flow(s),veh/h/ln	1890	0	1742	1924	0	1799	1890	1885	1682	1890	1806	1934
Q Serve(g_s), s	3.4	0.0	3.0	3.8	0.0	3.6	1.8	0.0	0.0	1.1	7.0	7.0
Cycle Q Clear(g_c), s	3.4	0.0	3.0	3.8	0.0	3.6	1.8	0.0	0.0	1.1	7.0	7.0
Prop In Lane	1.00		0.77	0.79		0.62	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	107	0	98	122	0	114	487	2231	995	459	2113	1132
V/C Ratio(X)	0.65	0.00	0.58	0.65	0.00	0.62	0.18	0.44	0.05	0.12	0.26	0.26
Avail Cap(c_a), veh/h	199	0	183	223	0	208	690	2231	995	674	2113	1132
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.9	0.0	43.7	43.5	0.0	43.4	7.1	0.0	0.0	7.2	9.6	9.6
Incr Delay (d2), s/veh	6.4	0.0	5.3	5.7	0.0	5.4	0.2	0.6	0.1	0.1	0.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	1.5	2.0	0.0	1.8	0.6	0.2	0.0	0.4	2.5	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.3	0.0	49.0	49.2	0.0	48.8	7.2	0.6	0.1	7.3	9.9	10.2
LnGrp LOS	D	A	D	D	A	D	A	A	A	A	A	B
Approach Vol, veh/h		126			150			1118			887	
Approach Delay, s/veh		49.7			49.0			1.1			9.8	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.2	62.4		12.0	9.8	61.8		11.4
Change Period (Y+Rc), s	* 6.2	* 6.2		6.0	* 6.2	* 6.2		6.0
Max Green Setting (Gmax), s	* 14	* 36		11.0	* 14	* 36		10.0
Max Q Clear Time (g_c+I1), s	13.1	2.0		5.8	3.8	9.0		5.4
Green Ext Time (p_c), s	0.1	7.6		0.3	0.1	5.3		0.2

Intersection Summary	
HCM 6th Ctrl Delay	10.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	410	24	111	335	59	5	1	94	48	0	6
Future Vol, veh/h	6	410	24	111	335	59	5	1	94	48	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	-	115	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	95	95	95	93	93	93	60	60	60
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	7	482	28	117	353	62	5	1	101	80	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	415	0	0	510	0	0	921	1159	496	1179	1142	208
Stage 1	-	-	-	-	-	-	510	510	-	618	618	-
Stage 2	-	-	-	-	-	-	411	649	-	561	524	-
Critical Hdwy	4.115	-	-	4.1	-	-	7.3	6.5	6.2	7.3	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1148	-	-	1065	-	-	241	197	578	158	202	804
Stage 1	-	-	-	-	-	-	550	541	-	448	484	-
Stage 2	-	-	-	-	-	-	594	469	-	516	533	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1148	-	-	1065	-	-	217	174	578	118	179	804
Mov Cap-2 Maneuver	-	-	-	-	-	-	217	174	-	118	179	-
Stage 1	-	-	-	-	-	-	547	538	-	445	431	-
Stage 2	-	-	-	-	-	-	522	417	-	422	530	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.9	13.7	79.3
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	522	1148	-	-	1065	-	-	130
HCM Lane V/C Ratio	0.206	0.006	-	-	0.11	-	-	0.692
HCM Control Delay (s)	13.7	8.2	-	-	8.8	-	-	79.3
HCM Lane LOS	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.8	0	-	-	0.4	-	-	3.8

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	3	15	137	2	18
Future Vol, veh/h	150	3	15	137	2	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	81	81	60	60
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	174	3	19	169	3	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	177	0	383	176
Stage 1	-	-	-	-	176	-
Stage 2	-	-	-	-	207	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1399	-	624	872
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	832	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1399	-	615	872
Mov Cap-2 Maneuver	-	-	-	-	615	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	820	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	837	-	-	1399	-
HCM Lane V/C Ratio	0.04	-	-	0.013	-
HCM Control Delay (s)	9.5	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	T	R	R	L	L	TR	L	L	T	T	T
Maximum Queue (ft)	52	49	68	55	242	183	128	371	396	382	319	218
Average Queue (ft)	47	25	51	27	153	78	53	251	286	222	156	42
95th Queue (ft)	59	53	63	49	222	174	105	414	435	436	283	141
Link Distance (ft)	49	49	49	49	230	230	230			427	427	427
Upstream Blk Time (%)	45	7	24	1	1			0	4	7	0	0
Queuing Penalty (veh)	67	10	36	2	0			0	0	0	0	0
Storage Bay Dist (ft)								400	400			
Storage Blk Time (%)								1	11	2		
Queuing Penalty (veh)								3	31	6		

Intersection: 1: Novi Road & Oaks Drive South/Twelve Oaks Drive

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	T	T	T	R
Maximum Queue (ft)	64	121	235	220	200	105
Average Queue (ft)	29	21	144	130	103	38
95th Queue (ft)	54	80	205	189	171	92
Link Distance (ft)			694	694	694	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	350	115				80
Storage Blk Time (%)		0	27		13	0
Queuing Penalty (veh)		0	6		9	0

Intersection: 2: Novi Road & Oaks Drive North

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	LT	TR	L	T	T	R	L	T	T	TR
Maximum Queue (ft)	92	104	104	129	89	279	321	70	125	187	166	87
Average Queue (ft)	42	48	40	46	34	76	93	13	26	92	53	29
95th Queue (ft)	80	85	84	95	72	208	240	44	69	169	130	70
Link Distance (ft)		95	166	166		694	694	694		408	408	408
Upstream Blk Time (%)	1	1		0								
Queuing Penalty (veh)	0	2		0								
Storage Bay Dist (ft)	80				275				100			
Storage Blk Time (%)	3	2							0	7		
Queuing Penalty (veh)	3	1							0	3		

Intersection: 3: Karevich Drive & Oaks Drive South

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (ft)	24	23	66	4	82	74
Average Queue (ft)	2	2	26	0	35	32
95th Queue (ft)	14	13	57	3	61	63
Link Distance (ft)		286		179	77	651
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)	115		115			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Karevich Drive & Oaks Drive North

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	57	31	42
Average Queue (ft)	3	3	14
95th Queue (ft)	29	16	40
Link Distance (ft)	229	95	179
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 181

Appendix 6

Parking Calculations

SITE DATA TABLE

SITE AREA: 1.69 ACRES (73,763 SF.) NET AND GROSS

ZONING: RC

PROPOSED USE: RESTAURANT (4,060 SF.)

BUILDING INFORMATION:
MAXIMUM ALLOWABLE BUILDING HEIGHT = 45 FEET
PROPOSED BUILDING HEIGHT = 23 FEET (1 STORY)
BUILDING FOOTPRINT AREA = 4,060 SF
BUILDING LOT COVERAGE = 5.6%

SETBACK REQUIREMENTS:

	REQUIRED:	PROPOSED:
FRONT:	100'	50.52'
SIDE:	100'	100'
REAR:	100'	100'

PARKING CALCULATIONS:
RESTAURANT = ONE FOR EVERY TWO EMPLOYEES, PLUS FOR EVERY TWO CUSTOMERS ALLOWED UNDER MAXIMUM CAPACITY (INCLUDING WAITING AREAS)
TOTAL PARKING REQUIRED = 90 SEATS / 2 = 45 SPACES
+ 6 EMPLOYEES PER SHIFT / 2 = 3
= 48 SPACES

TOTAL PROPOSED PARKING SPACES = 42 SPACES INC. 3 H/C SPACES

LOADING CALCULATIONS:
LOADING REQUIRED = 1 10'X50' SPACE
LOADING PROVIDED=500 SF AT BACK OF BUILDING

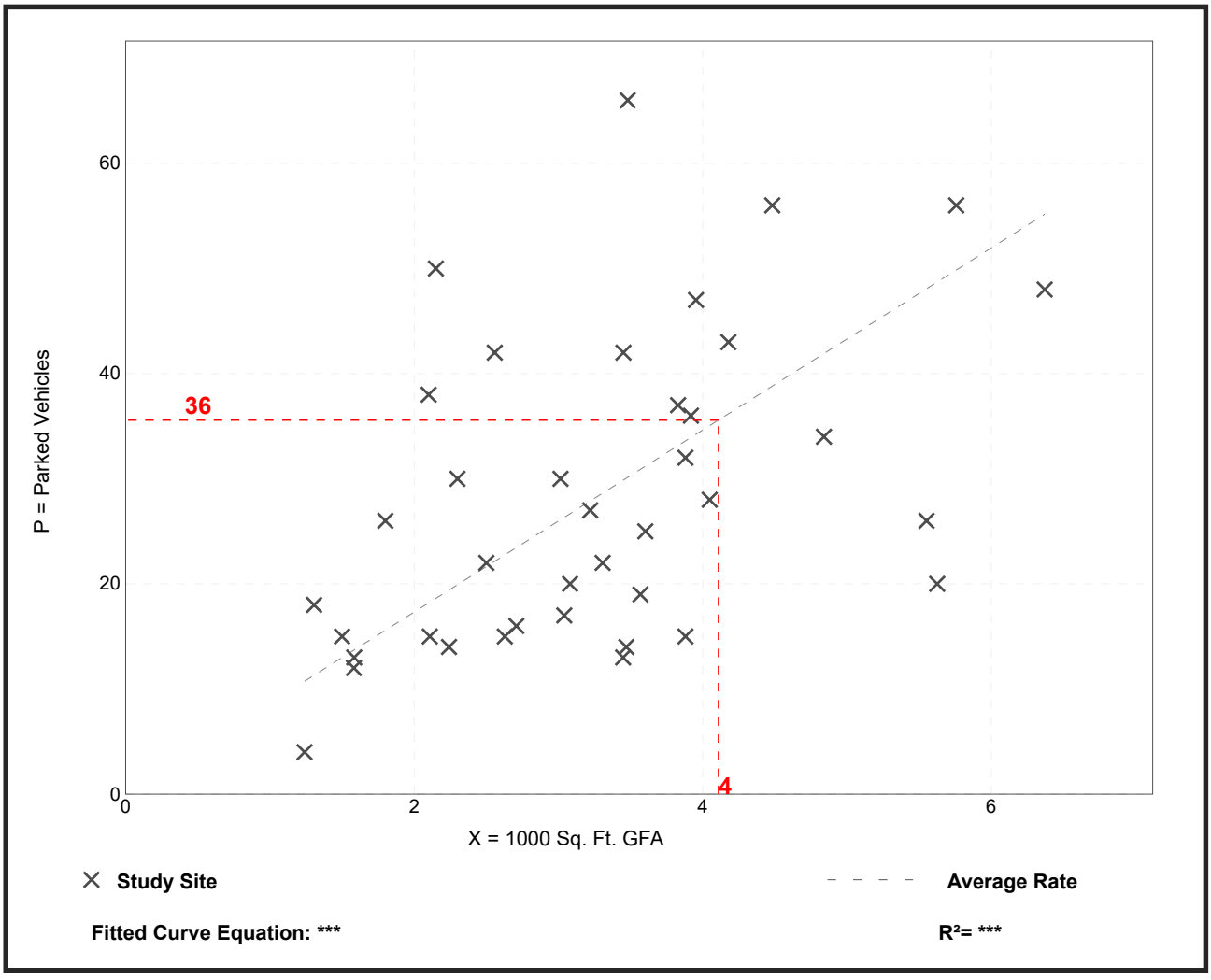
Fast-Food Restaurant with Drive-Through Window
(934)

Peak Period Parking Demand vs: **1000 Sq. Ft. GFA**
On a: **Weekday (Monday - Thursday)**
Setting/Location: **General Urban/Suburban**
Number of Studies: 39
Avg. 1000 Sq. Ft. GFA: 3.2

Peak Period Parking Demand per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
8.66	3.23 - 23.26	6.71 / 13.78	7.34 - 9.98	4.22 (49%)

Data Plot and Equation



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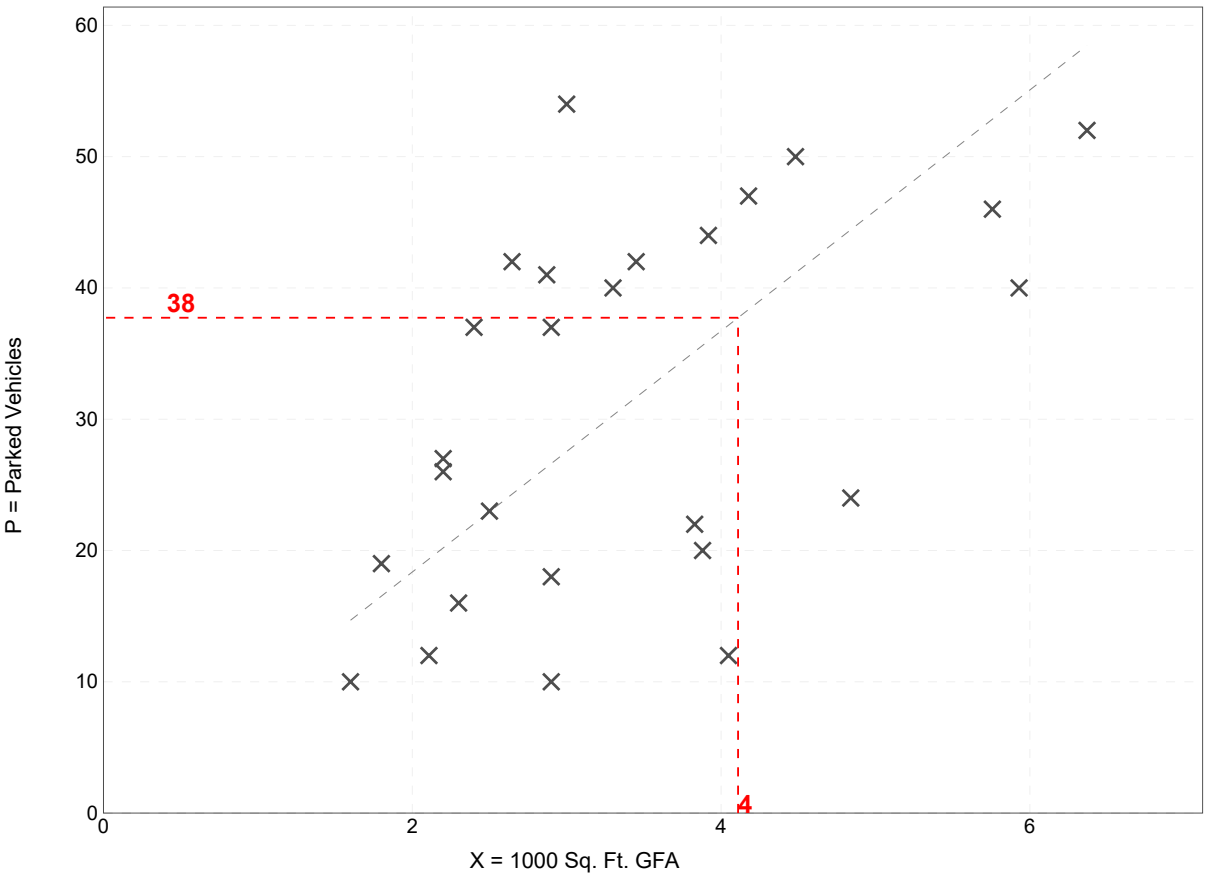
Fast-Food Restaurant with Drive-Through Window
(934)

Peak Period Parking Demand vs: **1000 Sq. Ft. GFA**
On a: **Saturday**
Setting/Location: **General Urban/Suburban**
Number of Studies: 26
Avg. 1000 Sq. Ft. GFA: 3.4

Peak Period Parking Demand per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
9.18	2.96 - 18.00	6.70 / 14.20	7.69 - 10.67	3.88 (42%)

Data Plot and Equation



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CORRESPONDENCE

2911 Dorr Road
Brighton, MI 48116
810.227.5225
810.227.3420 fax
genoa.org

March 7, 2024

City of Novi
Attn. Planning Commission
45175 Ten Mile Road
Novi, MI 48375

Re: Culver's Restaurant, Genoa Charter Township, Livingston County

Dear Esteemed Commissioners:

I am writing to you on behalf of Genoa Charter Township as it relates to the Culver's restaurant in our community. Culver's has been doing business in Genoa Charter Township for over 8 years. The franchise owner, Charles Paisley has been excellent to work with and has met or exceeded all expectations. They have maintained full compliance with their approved site plan and we have not had any code violations or enforcement issues. Furthermore, Culver's remains current on its real estate/personal property taxes and utility billings.

I am happy to recommend Culver's restaurant to you, and based on our experience I trust that you will have a positive experience.

Sincerely,

Kelly VanMarter
Township Manager

Township of Scio

March 6, 2024

City of Novi Planning Commission
45175 Ten Mile Road
Novi, MI 48375

Re: Culver's Restaurant, Scio Township

Dear Commissioners:

I am writing to you on behalf of Scio Township as it relates to Culver's restaurant in our business community. Culver's has been doing business in Scio Township since 2012. Since that time, Scio Township has never received any complaints from Scio residents or fellow business owners with respect to potential ordinance violations. Furthermore, Culver's does remain current on its real estate/personal property taxes and utility billings.

I am happy to recommend Culver's restaurant to you, and trust that your experience with them will be as positive as Scio Township's.

Sincerely,

Joyce A. Parker
Township Manager

Cc: Charles Paisley, Culver's Restaurant