

GRIFFIN NOVI JSP 20-27

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Public hearing at the request of Singh Development, LLC for JSP 20-27 Griffin Novi for Planning Commission's recommendation to the City Council for approval of a Preliminary Site Plan with a PD-2 Option, Special Land Use permit, Wetland Permit, and Stormwater Management Plan approval. The subject property is located at the southeast corner of Twelve Mile Road and Twelve Oaks Mall access drive in Section 14. The applicant proposes to utilize the Planned Development 2 (PD-2) option to develop 174 multi-family residential units. A private street network is proposed to connect the development to Twelve Mile Road and the Twelve Oaks Mall access drive on the west side of the property.

Required Action

Recommend approval/denial to the City Council of the Preliminary Site Plan with PD-2 Option, Special Land Use Permit, Wetland Permit and Storm Water Management Plan

REVIEW	RESULT	DATE	COMMENTS
			 Findings regarding Section 3.31.4 relating to the PD-2 Option Special Land Use Permit required Ordinance deviations for the following
Planning	Approval recommended	1-25-22	 Building setbacks – all yards Minimum setback adjoining residential district Maximum building height Maximum building length Minimum distance between buildings Dumpster location Minimum building setback from parking stall Minimum parking spaces requirement Location of accessory structures Average light level ratio Additional items to be addressed with Final Site Plan
Engineering	Approval recommended	1-25-22	 DCS variance for sidewalk offset in one location Additional items to be addressed with Final Site Plan
Landscaping	Approval recommended with conditions	1-7-22	 Landscape deviations for the following Landscape berm in greenbelt @ 12 Mile Rd, Twelve Oaks Dr, and southern road Landscape berm @ eastern property line Lack of multifamily unit canopy trees Missing Multifamily unit trees, greenbelt trees and street trees Multifamily unit building foundation landscape Parking lot perimeter landscaping

			•	Additional items to be addressed with Final Site Plan
Wetland	Approval recommended with conditions	8-23-21	•	Non-Minor Wetland permit
Traffic	Approval recommended	1-25-22	٠	Additional items to be addressed with Final Site Plan
Traffic Study	Approval recommended		•	Revise parking study to remove misleading data points
Façade	Approval recommended	5-5-21	•	Section 9 Waiver Recommended
Fire	Approval recommended with conditions	4-20-21	•	Additional items to be addressed with Final Site Plan

Motion sheet

Recommend Approval – Special Land Use Permit

In the matter of JSP 20-27 Griffin Novi, motion to <u>recommend approval</u> to the City Council for <u>Special Land Use</u> based on and subject to the following:

- 1. The proposed use will not cause detrimental impact on existing thoroughfares (based on Traffic review);
- 2. The proposed use will not cause a 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 woodlands on site, and minimal impacts to wetland areas are proposed);
- 4. The proposed use is compatible with adjacent uses of land (because the proposed use is similar to the residential community to the south and complements other nearby uses);
- 5. The proposed use is consistent with the goals, objectives, and recommendations of the City's Master Plan for Land Use (as it fulfills the Master Plan objectives to provide a wide range of housing options and to provide residential developments that support healthy lifestyles);
- 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 ensure compatibility between residential and non-residential developments);
- 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 JSP 20-27 Griffin Novi, motion to <u>recommend approval</u> to the City Council for <u>Preliminary Site Plan with a PD-2 Option</u> 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. Planning Commission findings that the standards of Section 3.31.7.B.viii.d of the Zoning Ordinance are adequately addressed, as identified in the Planning Review Letter.
- 3. The recommendation includes the following ordinance deviations for consideration by the Planning Commission in its recommendation to the City Council:
 - *i.* Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for front yard (Twelve Mile frontage). A minimum of 50 feet is required, 20 feet is provided. The applicant states the standard setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
 - ii. Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for western exterior side yard (Twelve Oaks Mall Road frontage). A minimum of 50 feet is required, 30 feet is provided. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
 - iii. Deviation from Section 3.31.7.D for not meeting the minimum building setback

requirements for southern exterior side yard (Access Drive frontage). A minimum of 50 feet is required, 42 feet is provided. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.

- iv. Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for the eastern side yard. A minimum of 35 feet is required, 19.2 feet is provided. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
- v. Deviation from Section 3.6.2.H for not meeting the requirement for additional setback from a residential district to the south. A minimum of 174 feet is required for a building 58 feet in height, 87 feet is provided. This deviation is supported as the uses are both multi-family residential and the additional protection afforded by the larger setback is not warranted. However, the ZBA granted a conditional approval for a setback variance for the Waltonwood Phase 2 in 2003 that stated any building on the subject property would be a minimum of 150 feet from those buildings, which is shown on the plans and is consistent with the ZBA's previous approval.
- vi. Deviation from Section 3.31.7.B.viii.b.iv to exceed the maximum building height of 55 feet for Building C (58 feet proposed) and Building D (56 feet 7.5 inches proposed). The applicant states that the minor deviations for additional height are due to the site topography, and will not be perceivable to the human eye from ground level.
- vii. Deviation from Section 3.31.7.B.viii.b.vii to exceed the maximum building length of 125 feet without providing pedestrian entranceways every 125 feet along the frontage for Building B (135 feet proposed) and Building D (135 feet proposed). The applicant states that pedestrian entranceways are geared toward the parking lot and resident garages at the back of the building. There are entrances on the Twelve Mile Road frontage to individual units, which meets the intent of the ordinance.
- viii. Deviation from Section 3.8.2.H to allow a reduction in the minimum distance between buildings in two locations: between Buildings E & F (21.5 feet proposed, at least 30 feet required), between Buildings F & G (20 feet proposed, at least 30 feet required. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose. Pedestrian access and landscaping have been provided at these locations, so the site is not compromised as a result of this deviation.
- ix. Deviation from Sec. 5.2.12.C to allow reduction of minimum required parking spaces for multiple family residential uses. A minimum of 355 are required, 308 spaces are provided. The proposed parking supply (308 spaces) is 25% higher than the projected peak demand (247 spaces), and therefore seems to contain a reasonable safeguard should these assumptions be off by some degree. Staff recommends approval of the deviation to allow for a 13% reduction in parking from the Ordinance requirement consistent with the applicant's request.
- x. Deviation from Section 5.10.1.B.vi to allow parking stalls within 25 feet of Building D and the Clubhouse in a residential district (8-10 feet proposed, 25 feet required). The applicant states maintaining adequate parking for visitors is an important feature of the site. The unusual configuration of the property boundary creates some awkward angles that are not conducive to consistent rectilinear buffers. The deviations requested are located in areas that are less objectionable. For example, locating ADA accessible spaces closer to the building, near the community clubhouse, and near the high traffic Twelve Oaks Mall Road.
- xi. Deviation from Section 4.19.2.F for allowing a dumpster in the side yard instead of required rear yard. Staff supports this deviation as the site has three street frontages, which limits the possibilities to conform. The applicant indicates the dumpster has been located to best avoid negative views from unit balconies and exterior

roadways, while still being accessible to waste hauler vehicles.

- xii. Design & Construction Standards variance for lack of sidewalk offset from the travel way near the pool. Supported by staff as compliance will be achieved in other locations.
- xiii. Landscape deviation from Section 5.5.3.B.ii and iii for lack of 4.5-6 foot landscaped berm along eastern property line. Supported by staff as alternative screening is provided with large evergreen trees and the applicant will add additional fencing to block the headlights from the parking lot.
- xiv. Landscape deviation from Section 5.5.3.B.ii and iii for lack of berm or wall in the greenbelt of Twelve Mile Road, Twelve Oaks Drive and the southern road. Supported by staff due to the topography and presence of utilities, but the proposed hedges must be planted adjacent to the parking lots in order to screen headlights effectively.
- xv. Landscape deviation from Section 5.5.3.B.ii and iii for deficiency in greenbelt canopy trees on Twelve Oaks Drive. Supported by staff due to utility conflicts.
- xvi. Landscape deviation from Section 5.5.3.B.ii and iii for deficiency in street trees on Twelve Oaks Drive. Supported by staff due to utility conflicts.
- xvii. Landscape deviation from Section 5.5.3xx for a 25% deficiency in multi-family unit trees. Supported by staff as 75% of requirement will be provided.
- xviii. Landscape deviation to permit up to 30% of the multi-family unit trees to consist of subcanopy species. Supported by staff.
- xix. Landscape deviation from Section 5.5.3.C.iii for deficiency in parking lot perimeter landscaping. Supported by staff as the parking areas are fully landscaped.
- xx. Landscape deviation from Sec 5.5.3.E.ii for deficiency in mutlifamily building foundation landscaping along interior drives. Support by staff as the applicant will include small beds to provide relief between garages.
- xxi. Façade deviation under Section 9 of the Façade Ordinance to permit an overage of vertical batten siding on the side elevations of buildings B, C and D (maximum of 50% permitted, 51-59% proposed). Supported by façade consultant as the deviation is minor in nature and is consistent with the overall compositions of the facades.
- xxii. Deviation from Section 5.7.3.K to allow the average to minimum light ratio to exceed the 4:1 maximum (5:1 proposed).
- 4. 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
- 5. (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-

<u> Approval – Wetland Permit</u>

In the matter of JSP 20-27 Griffin Novi, motion to **approve** the <u>Wetland Permit</u> 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 the plan is otherwise in compliance with Chapter 12, Article V of the Code of Ordinances and all other applicable provisions of the Ordinance.)

-AND-

Recommend Approval – Stormwater Management Plan

In the matter of JSP 20-27 Griffin Novi, motion to <u>recommend approval</u> to the City Council for <u>Stormwater Management Plan</u> 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 Singh Development, LLC for JSP 20-27 Griffin Novi, motion to recommend denial to the City Council for <u>Special Land Use</u> (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 JSP 20-27 Griffin Novi, motion to <u>recommend denial</u> to the City Council for <u>Preliminary Site Plan with a PD-2 Option</u>... (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-

Denial- Wetland Permit

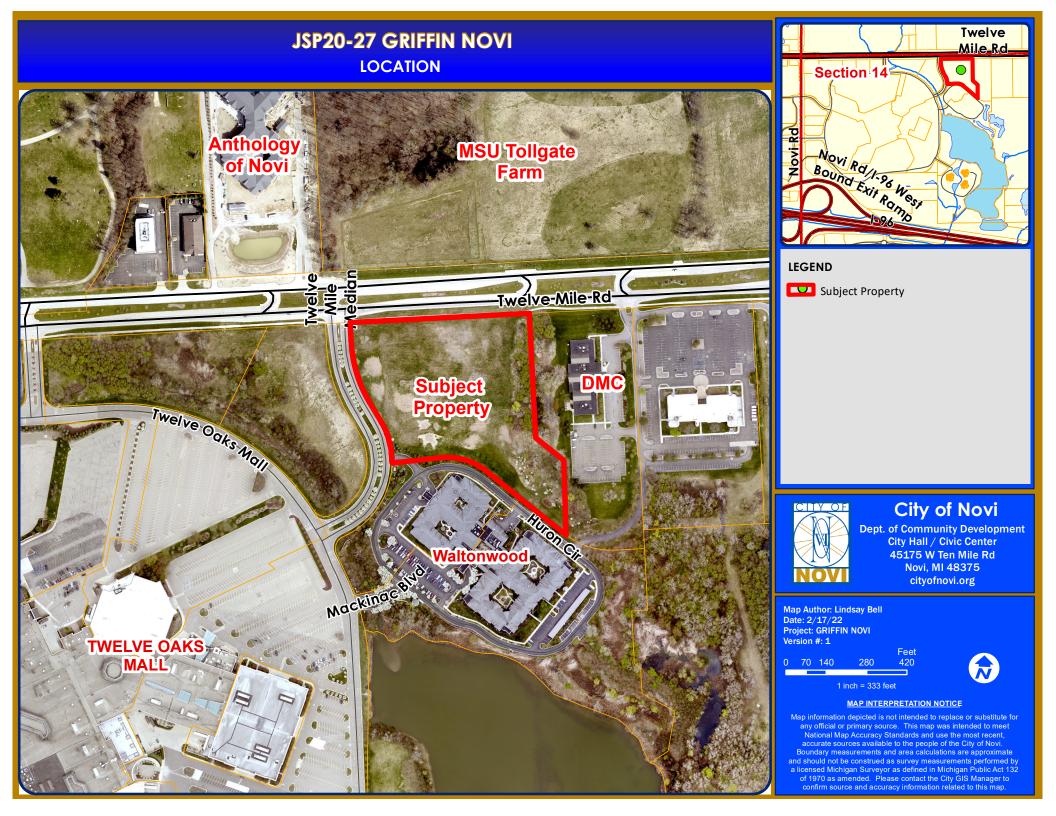
In the matter of JSP 20-27 Griffin Novi, motion to **deny** the <u>Wetland Permit</u>... (because the plan is not in compliance with Chapter 12, Article V of the Code of Ordinances, and all other applicable provisions of the Ordinance.)

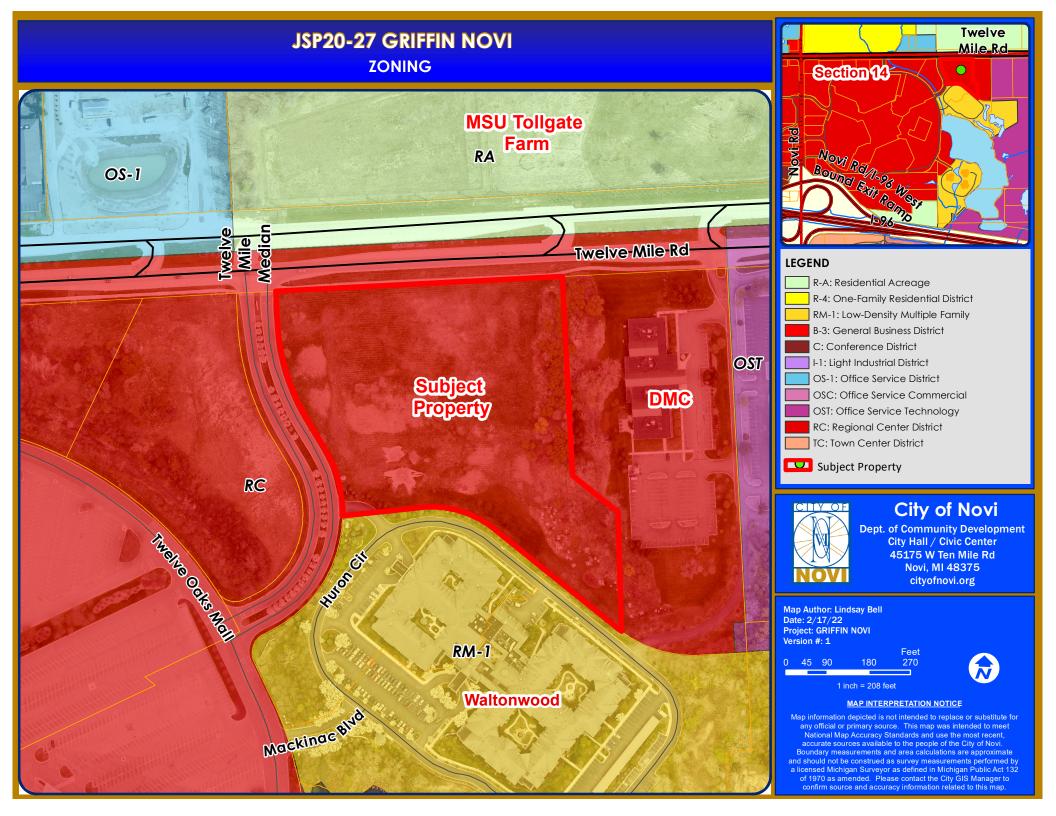
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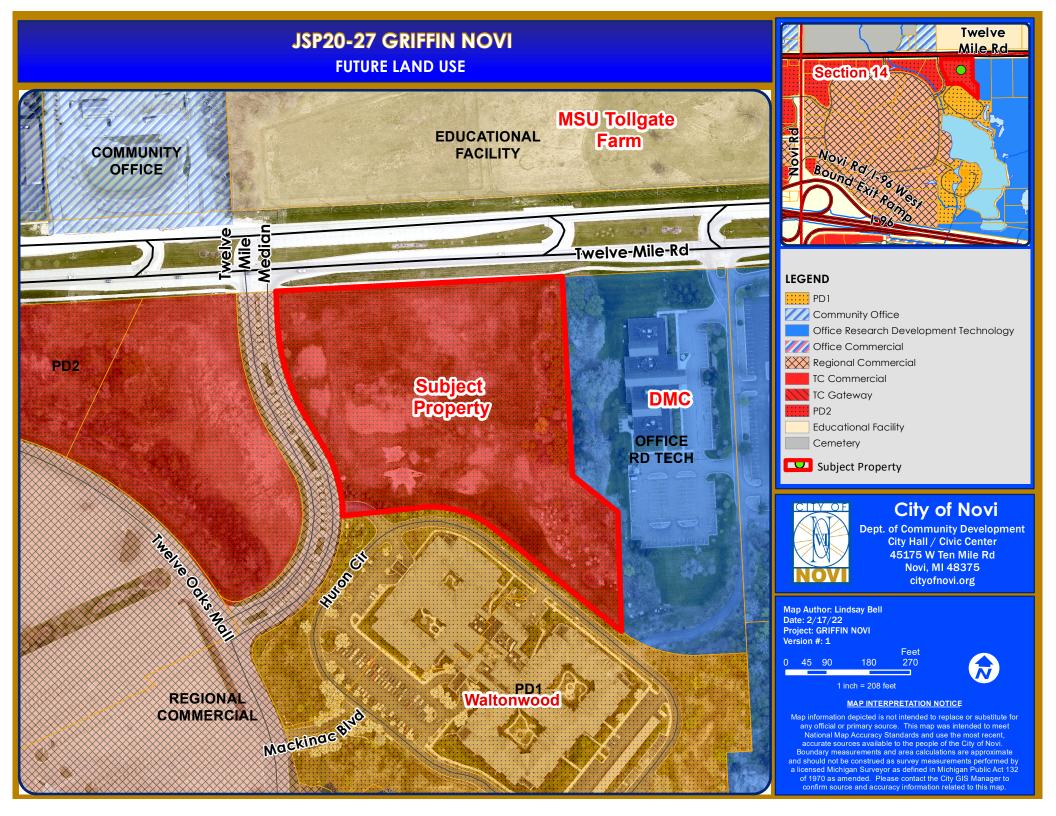
Recommend Denial – Stormwater Management Plan

In the matter of JSP 20-27 Griffin Novi, motion to <u>recommend denial</u> to the City Council for <u>Storm</u> <u>water Management Plan</u>...(because the plan is not in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.

<u>MAPS</u> Location Zoning Future Land Use Natural Features









SITE PLAN

Griffin Twelve Oaks

Twelve Mile Road - Between Novi Rd. & Meadowbrook Rd.

General Sheet Index

Tree Preservation Plan

Landscape Notes and Details

Preliminary Gradina Plan (1 of 2)

Preliminary Grading Plan (2 of 2)

Fire Truck Turning Plan / Hydrant Coverage Plan

Preliminary Utility Plan (1 of 2)

Preliminary Utility Plan (2 of 2)

Woodlands/Wetlands Plan

Landscape Plan

Overall Survey

Preliminary Site Plan

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Sheet No Title

Sheet No. Title

G 001

L1 12

L3

PSP1

PSP2

PSP3

PSP4

PSP5

PSP6

PSP7

BSB8

Owner

Singh Development, LLC 7125 Orchard Lake Road suite 200 West Bloomfield, MI 48322 Todd Rankine Director of Architecture and Planning trankine@singhmail.com 248-866-9799

Architect

Krieger | Klatt Architects Inc. 2120 E. 11 Mile Rd. Royal Oak, MI 48067 P.248.414.9270 F.248.414.9275

Civil Engineer

Nowak & Fraus Engineers 46777 Woodward Avenue Pontiac, Michigan 48342 P.248.332.7931

PSP9	Boundary / Topographic / Tree Survey
PSP10	Boundary / Topographic / Tree Survey
PSP11	MDOT Right-of-Way Topographic Survey
PSP12	Storm Water Management Plan (1 of 3)
PSP13	Storm Water Management Plan (2 of 3)
PSP14	Storm Water Management Plan (3 of 3)
PSP15	Open Space Plan
PSP16	Sidewalk Ramp Details Plan
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A.101	Apartment Building 'A' - Second & ThirdFloor Plans
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A.103	Apartment Building 'B' - Floor Plans
A.104	Apartment Building 'C' - Floor Plans
A.105	Apartment Building 'C' - Floor Plans
A.106	Apartment Building 'D' - Floor Plans
A.107	Apartment Building 'D' - Floor Plans
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A.110	Typical Townhouse Plans
A.111	Typical Townhouse Plans
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A.208	Clubhouse - Elevations
A.209	Typical Townhouse - Elevations
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A 211	Material Board
A.212	Accessory Structure Elevations
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A.302	Dumpster Enclosure Details

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P2	Building A Photometric Elevations
P3	Building B Photometric Elevations
P4	Building C Photometric Elevations

- Building D Photometric Elevations
- P6 Clubhouse Photometric Elevations P7 Typical Townhouse Photometric Elevations
- North Location Map NTS

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	A grigt View L	ooking South Wes

Aerial View Looking South West



krieger klatt

Singh Development, LLC 7125 Orchard Lake Road suite 200 West Bloomfield, MI 48322

Client:

Project:

Griffin Novi 12 Mile Rd. Novi

Issued

03-15-2021

08-03-2021

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ARCHITECTS architecture interiors consulting 1412 E. 11 Mile Rd. | Royal Oak, MI 48067 P: 248.414.9270 F: 248.414.9275 www.krieaerklaft.com

Description

Prelim, Site Plan

Review Prelim. Site Plan

iew Im. Site Plat

Prelim. Site

Bv

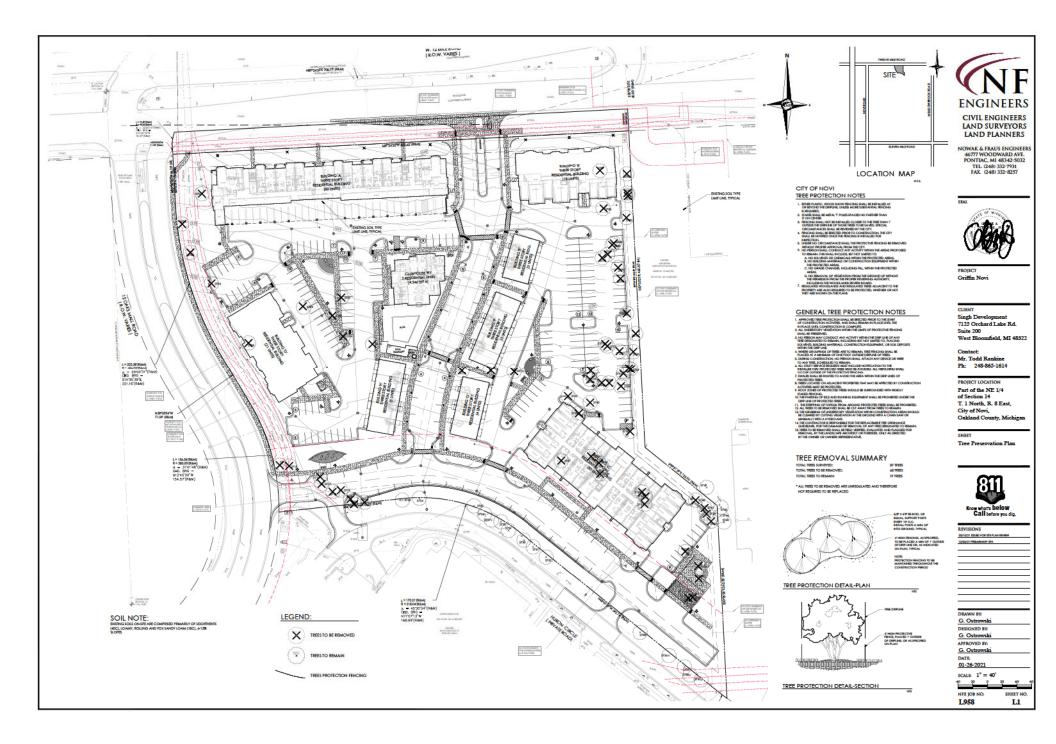
Unit Miı	n. Areas	Site Toto	ls						
Unit Type	Min. SF's	Building Type	Unit Type					Building Type	# Parking Spots
Studio	500 SF	1	Studio	1 Bedroom	2 Bedroom	3 Bedroom	Building Unit Total	Building A	30
1 Bedroom	775 SF	Building A	6	37	17	0	60	Building B	10
2 Bedroom	1,100 SF	Building B	0	6	9	3	18	Building C	12
3 Bedroom	1,250 SF	Building C	11	32	12	0	55	Building D	10
		Building D	0	6	11	4	21	Townhouses	34
		Rest of Site	0	3	9	8	20	Surface Parking	212
		Unit Type Total	17	84	58	15	174	Total Parking	308
		% of Total Units	09.8%	48.3%	33.3%	08.6%	100%	Parking Ratio	1.77

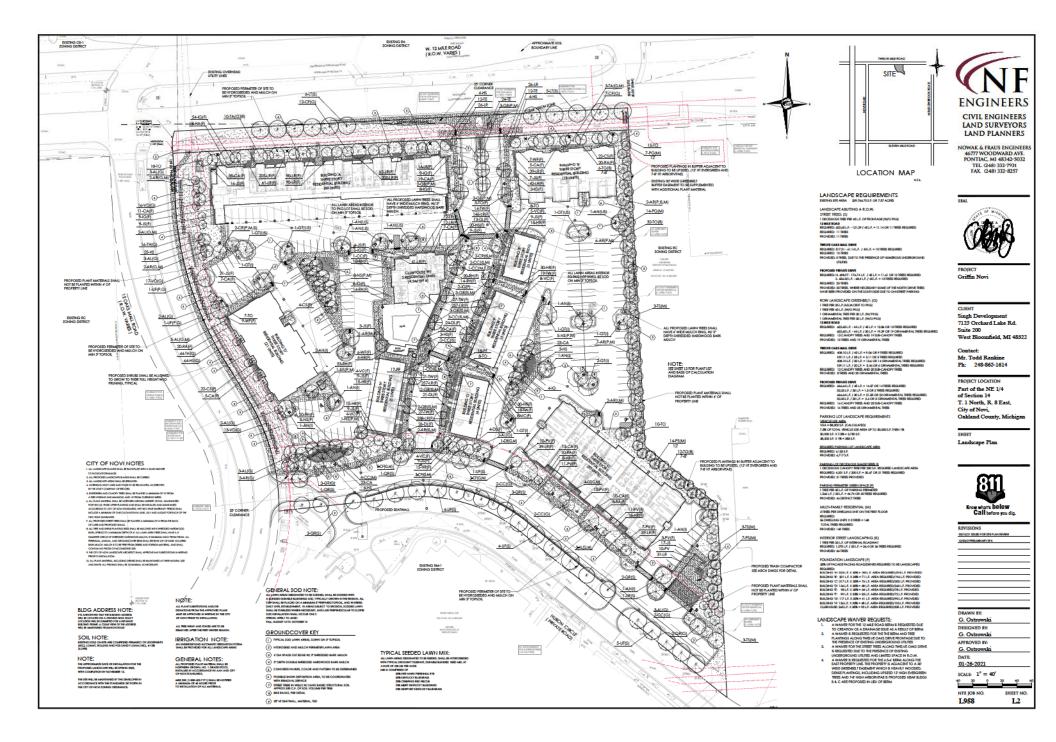


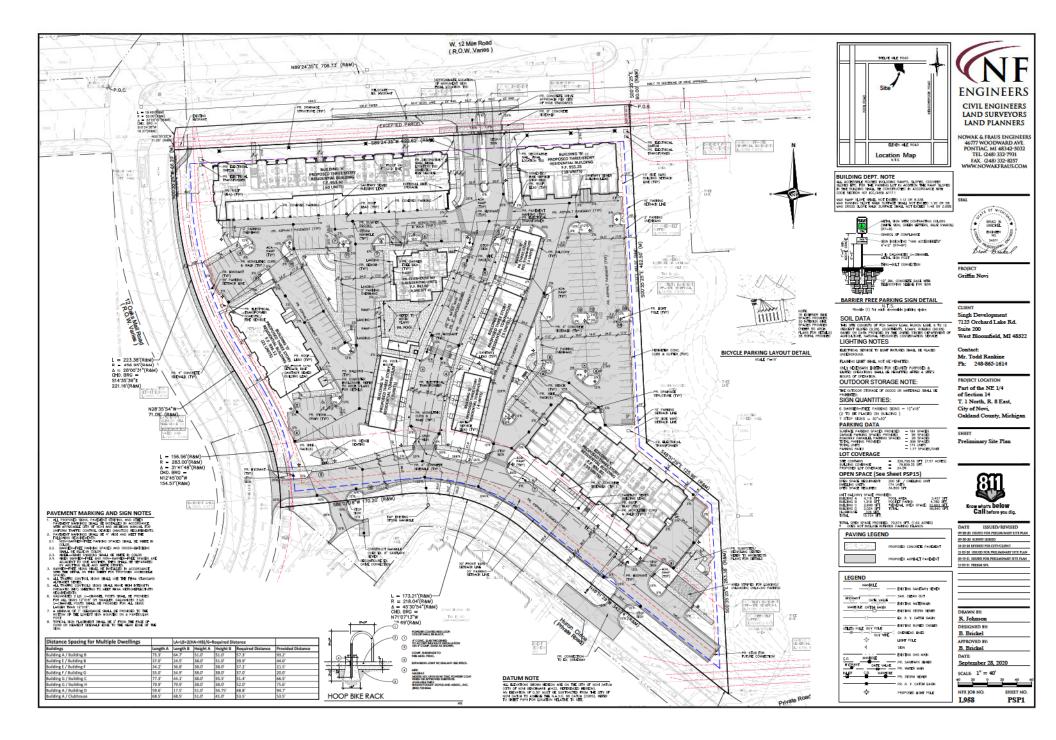
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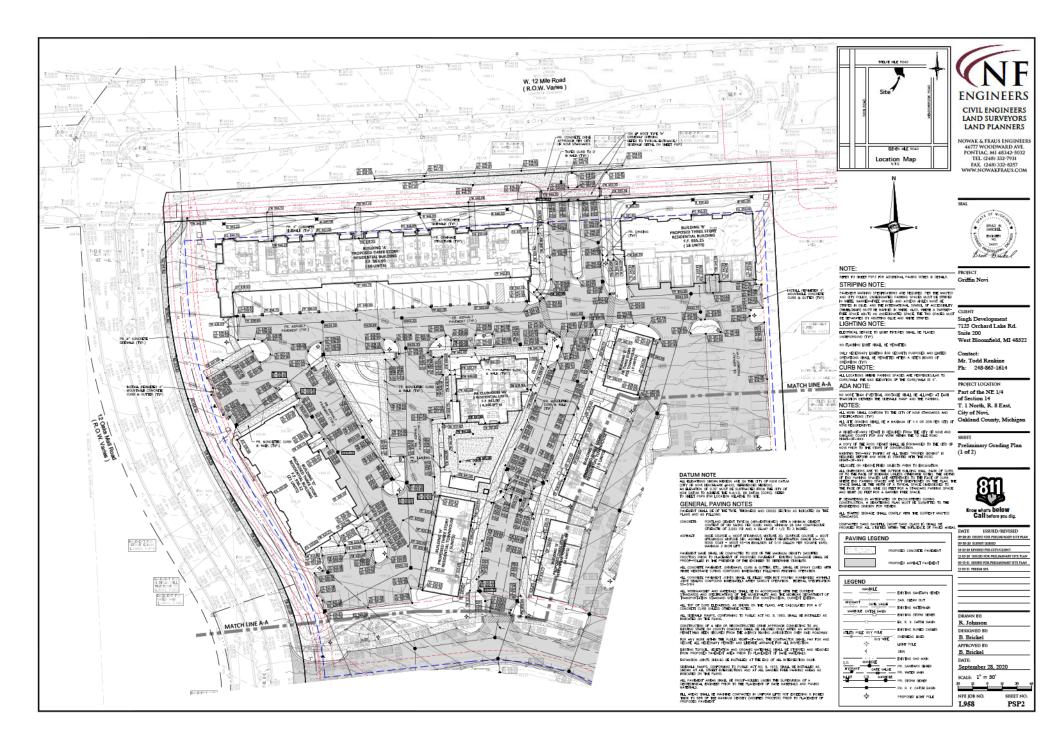
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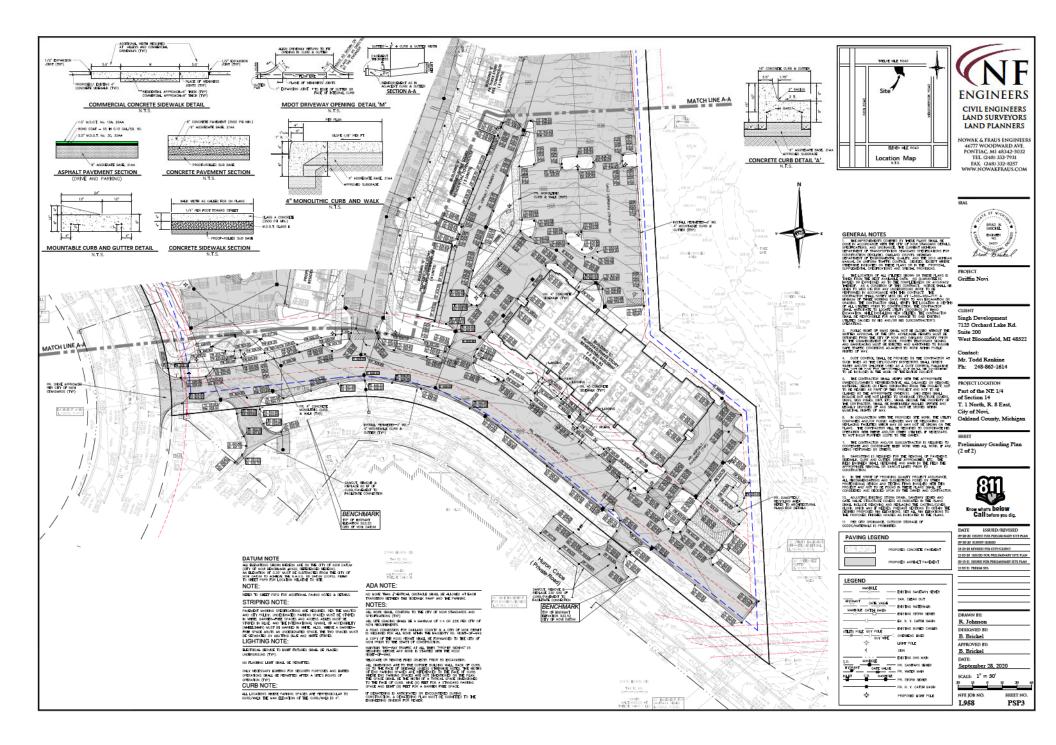


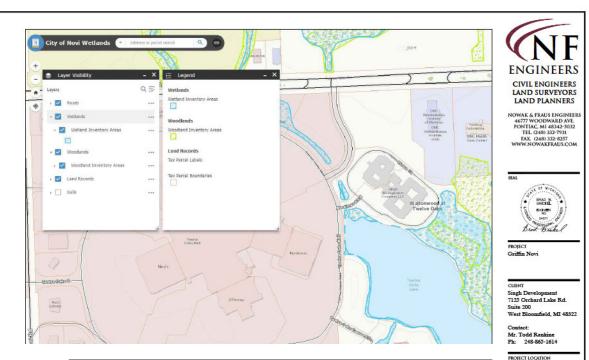


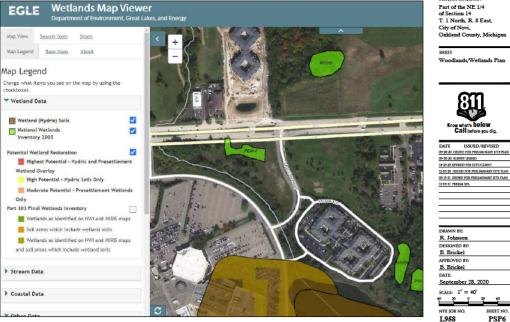








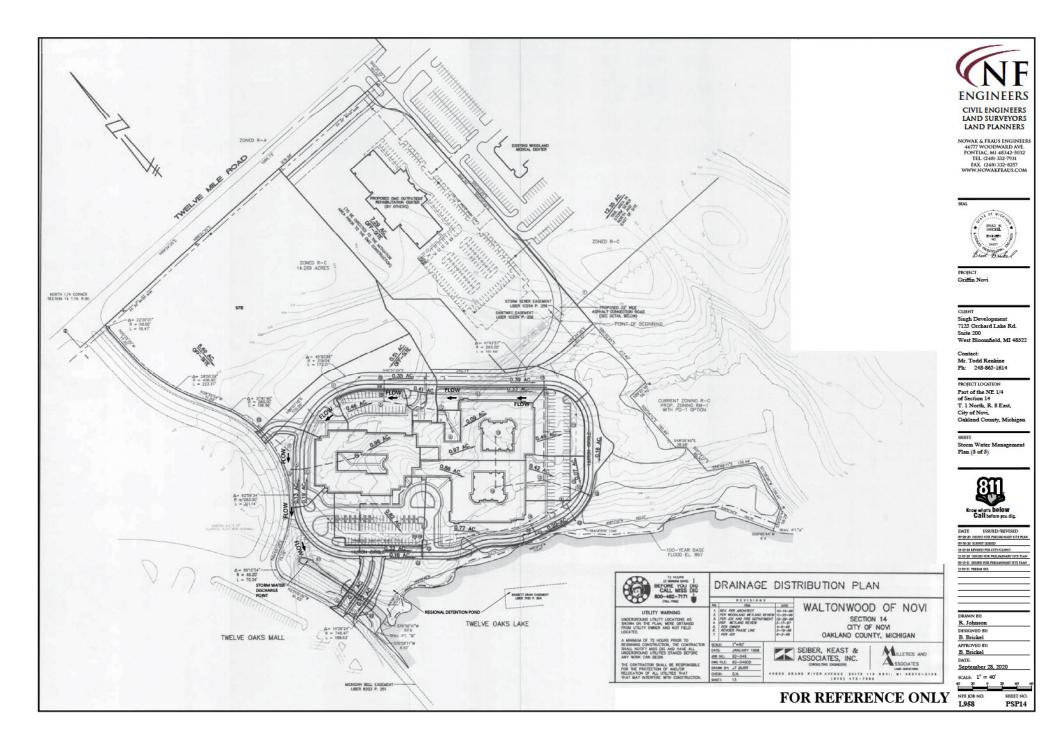


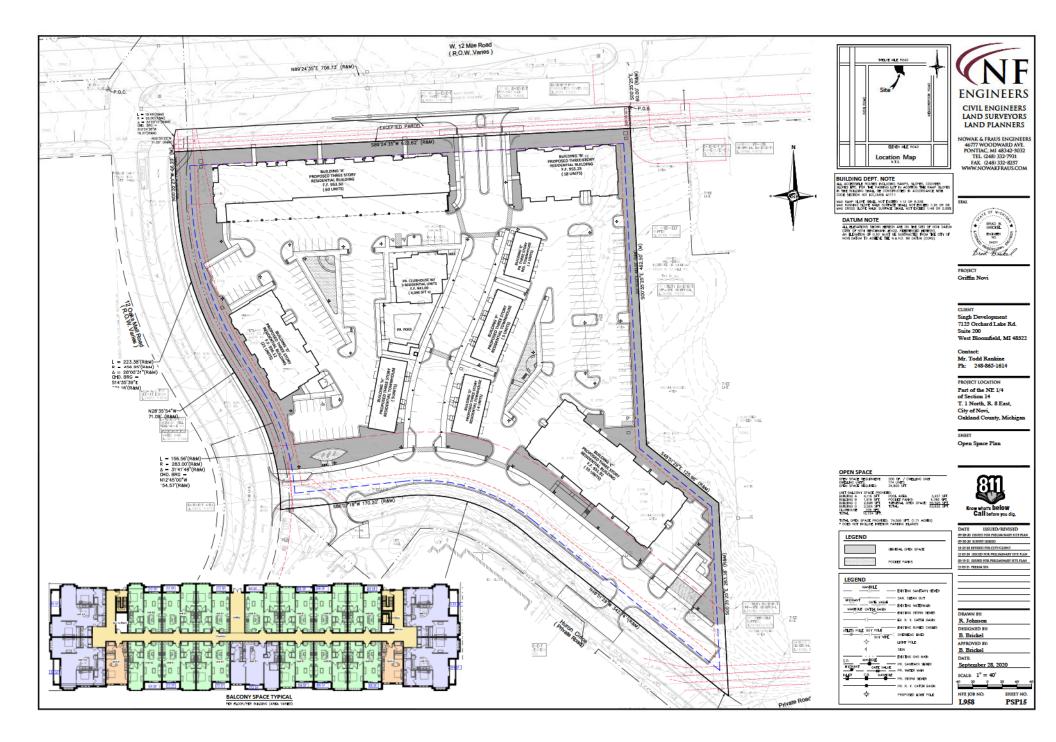


ISSUED/REVISED

SHEET NO.

PSP6













FRONT (NORTH) ELEVATION:

LEFT (EAST) SIDE ELEVATION:

TOTAL WALL AREA:





A Southwest Elevation



A 104 3/32" = 1'-0"

Prelim: Site Plan Review Unit Area Plans Prelim: Site Plan Review Prelim: Site Plan Review Prelim: Site Plan Review Prelim: Site Plan Deview 0-05-2020 \sim 03-15-2021 \vdash S 12-02-2021 view Ż \bigcirc \bigcirc \sim LĹ. Ż Seal: \triangleleft Z Note: _ Do not scale drawings. Use calculated dimensions only. Do not scale and calculated dimensions only. Verify existing conditions in field. North Arrow: Ш \sim Sheet Title: Apartment Building 'C' -Elevations

krieger klatt ARCHITECTS architecture interiors consulting 1412E.11 Mile Rd. | Royal Oak, MI 48067 1: 264.14.9275 www.kriegerklat.com

Client: Singh Development, LLC

Project:

Issued Description 07-27-2020 Client Review 08-27-2020 Prelim. Site Plan By

Griffin Novi

Project Number: Project Number



EXTERIOR MATERIAL PERCENTAGES:

FRONT (SOUTHWEST) ELEVATION:			REAR (NORTHEAST) ELEVATION:		
TOTAL ELEVATION AREA:	11,543 SQ.FT.		TOTAL WALL AREA:	11,549 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	3,892 SQ.FT. 3,613 SQ.FT. 421 SQ.FT. 2,932 SQ.FT. 685 SQ.FT.	33.7% 31.3% 03.6% 25.4% 06.0%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	3,847 SQ.FT. 3,762 SQ.FT. 323 SQ.FT. 2,932 SQ.FT. 685 SQ.FT.	33.3% 32.5% 02.8% 25.4% 06.0%
LEFT (NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE ELEVATIO	<u>N:</u>	
TOTAL WALL AREA:	3,502 SQ.FT.		TOTAL WALL AREA:	3,905 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	1,302 SQ.FT. 1,830 SQ.FT. 200 SQ.FT. 38 SQ.FT. 132 SQ.FT.	37.2% 52.2% 05.7% 01.1% 03.8%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	1,658 SQ.FT. 1,877 SQ.FT. 200 SQ.FT. 38 SQ.FT. 132 SQ.FT.	42.5% 48.0% 05.1% 01.0% 03.4%



A.205



RONT (NORTHEAST) ELEVATION:			REAR (SOUTHWEST) ELEVATION:		
TOTAL ELEVATION AREA:	6,973 SQ.FT.		TOTAL WALL AREA:	7,541 SQ.FT.	
MASONRY:	2,204 SQ.FT.	31.6%	MASONRY:	2,615 SQ.FT.	34.7%
SIDING/TRIM:	2,228 SQ.FT.	32.0%	SIDING/TRIM:	1,879 SQ.FT.	25.0%
METAL PANEL:	145 SQ.FT.	02.1%	METAL PANEL:	373 SQ.FT.	04.9%
ASPHALT SHINGLES:	2,324 SQ.FT.	33.3%	ASPHALT SHINGLES:	2,212 SQ.FT.	29.3%
STANDING SEAM METAL:	72 SQ.FT.	01.0%	STANDING SEAM METAL:	462 SQ.FT.	06.1%
EFT (NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE BASE FLOC	<u>R:</u>	
TOTAL WALL AREA:	3,740 SQ.FT.		TOTAL WALL AREA:	3,947 SQ.FT.	
MASONRY:	1,230 SQ.FT.	32.9%	MASONRY:	1,326 SQ.FT.	33.6%
SIDING/TRIM:	2,094 SQ.FT.	56.0%	SIDING/TRIM:	2,210 SQ.FT.	56.0%
METAL PANEL:	94 SQ.FT.	02.5%	METAL PANEL:	73 SQ.FT.	01.8%
ASPHALT SHINGLES:	322 SQ.FT.	08.6%	ASPHALT SHINGLES:	338 SQ.FT.	08.6%
STANDING SEAM METAL:	N/A SQ FT	N/A%	STANDING SEAM METAL:	N/A SQ FT	N/A%



ERONT (NORTHEAST) ELEVATION:			REAR (SOUTHWEST) ELEVATION:	
TOTAL ELEVATION AREA:	6,973 SQ.FT.		TOTAL WALL AREA:	7,541
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	2,204 SQ.FT. 2,228 SQ.FT. 145 SQ.FT. 2,324 SQ.FT. 72 SQ.FT.	31.6% 32.0% 02.1% 33.3% 01.0%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	2,615 1,875 373 5 2,212 462 5
LEFT (NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE BASE FLOOR:	
70711 10111 1051	0.740.00.77		70741 10411 4054	0.045

METAL PANEL: ASPHALT SHINGLES:	145 SQ.FT. 2.324 SQ.FT.	02.1% 33.3%	METAL PANEL: ASPHALT SHINGLES:	373 SQ.FT. 2.212 SQ.FT.	04.9 29.3
STANDING SEAM METAL:	72 SQ.FT.	01.0%	STANDING SEAM METAL:	462 SQ.FT.	06.1
(NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE BASE FLOO	R:	
TOTAL WALL AREA:	3,740 SQ.FT.		TOTAL WALL AREA:	3,947 SQ.FT.	
MASONRY:	1,230 SQ.FT.	32.9%	MASONRY:	1,326 SQ.FT.	33.6
SIDING/TRIM:	2.094 SQ.FT.	56.0%	SIDING/TRIM:	2.210 SQ.FT.	56.0
METAL PANEL:	94 SQ.FT.	02.5%	METAL PANEL:	73 SQ.FT.	01.8
ASPHALT SHINGLES:	322 SQ.FT.	08.6%	ASPHALT SHINGLES:	338 SQ.FT.	08.6
STANDING SEAM METAL:	N/A SQ.FT.	N/A%	STANDING SEAM METAL:	N/A SQ.FT.	N/A





krieger klatt ARCHITECTS architecture interiors consulting 14/2E 11 Mile Rd. | Royal Odr. MI 48087 12:248.14/3270 F 248.114.9275 www.kriegerklatt.com



By

Project:



1 Rear Elevation

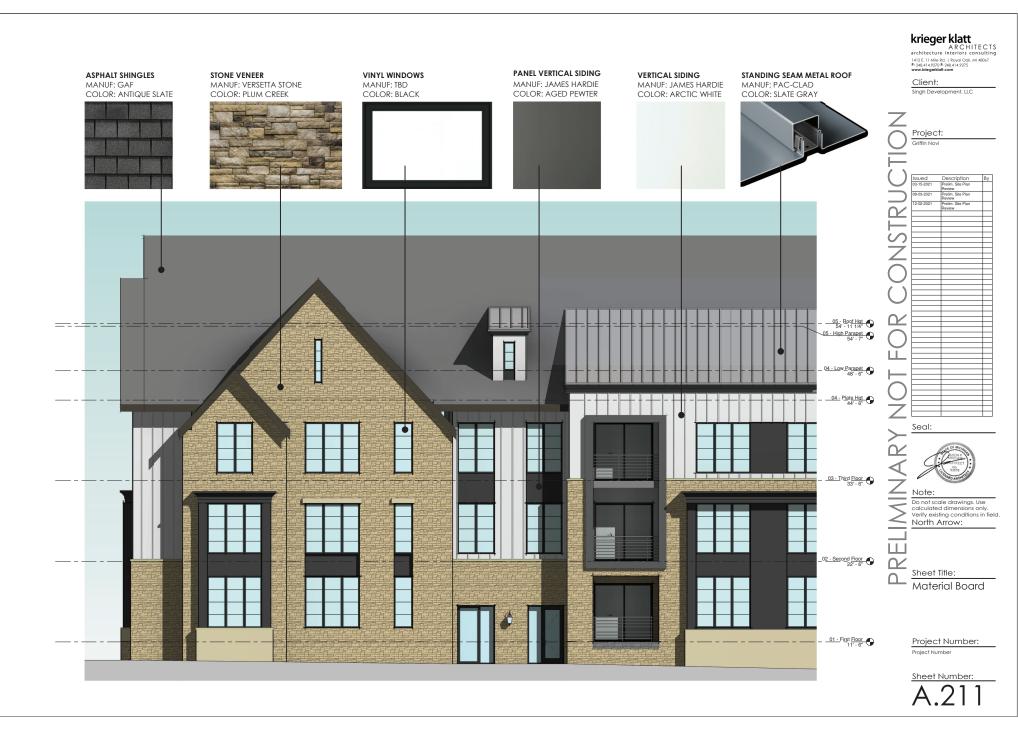


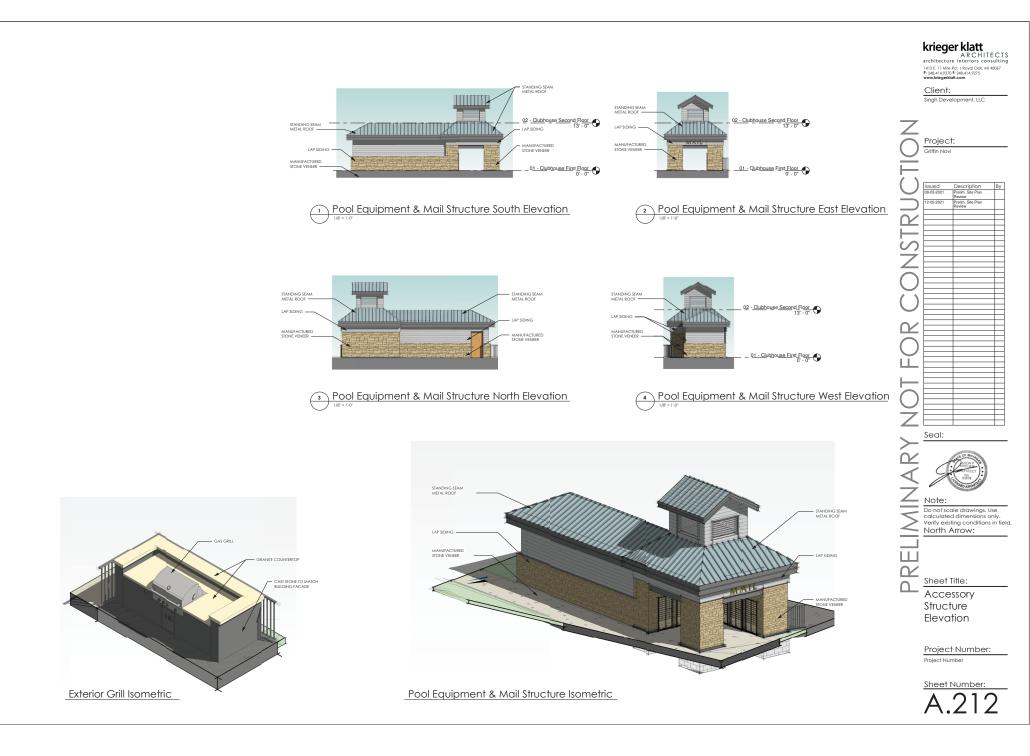
ONT ELEVATION:			REAR ELEVATION:		
TOTAL ELEVATION AREA:	2,220 SQ.FT.		TOTAL WALL AREA:	2,240 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	704 SQ.FT. 759 SQ.FT. N/A SQ.FT. 713 SQ.FT. 44 SQ.FT.	31.7% 34.2% N/A% 32.1% 2.0%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	734 SQ.FT. 730 SQ.FT. N/A SQ.FT. 776 SQ.FT. N/A SQ.FT.	32.8% 32.6% N/A% 34.6% N/A%
FT SIDE ELEVATION:			RIGHT SIDE ELEVATION:		
TOTAL WALL AREA:	1,509 SQ.FT.		TOTAL WALL AREA:	1,509 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	762 SQ.FT. 639 SQ.FT. N/A SQ.FT. 108 SQ.FT. N/A SQ.FT.	50.5% 43.3% N/A% 7.2% N/A%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	762 SQ.FT. 639 SQ.FT. N/A SQ.FT. 108 SQ.FT. N/A SQ.FT.	50.5% 43.3% N/A% 7.2% N/A%

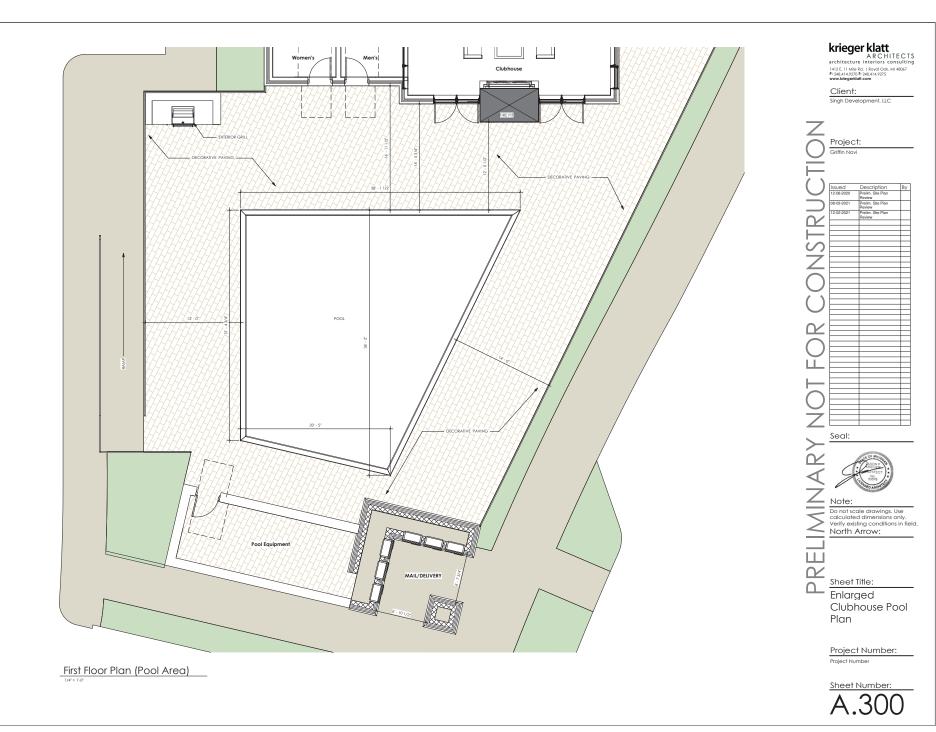


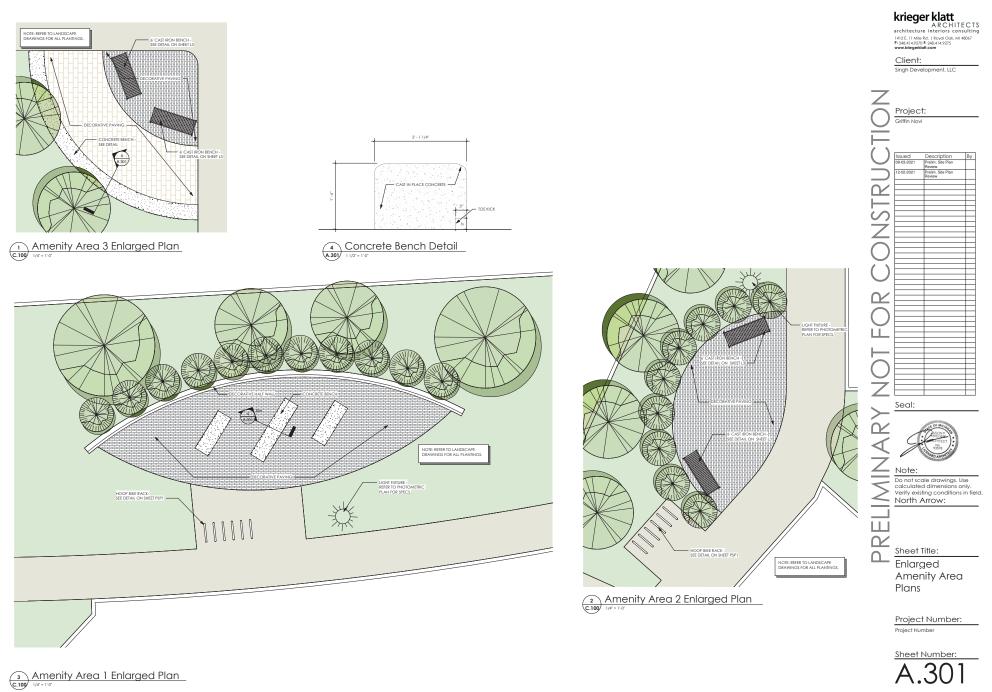
Project Number: Project Number

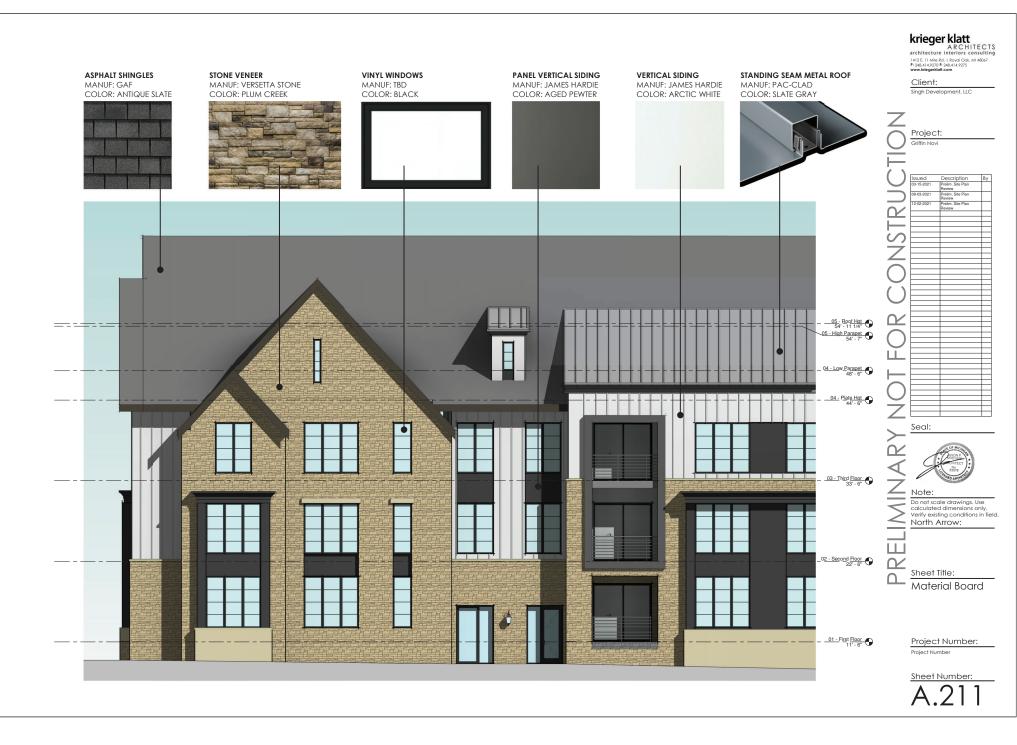
Typical Sheet Title: Townhouse -Elevations











PLANNING REVIEW



PLAN REVIEW CENTER REPORT

January 25, 2022 Planning Review Griffin Novi

JSP 20-27

PETITIONER

Singh Development LLC

REVIEW TYPE

2nd Revised Preliminary Site Plan

PROPERTY CHARACTERISTICS

Section	14				
Site Location		South of Twelve Mile Road and east of Novi Road, east of Twelve Oaks Mall access drive; 22-14-200-034			
Site School	Novi Comn	nunity School District			
Site Zoning	RC Region	al Center			
Adjoining	North	RA Residential Acreage			
	East	RC Regional Center			
	West	West RC Regional Center			
	South	South RM-1 Low Density Multifamily Residential			
Current Site	Vacant				
	North	Agricultural			
Adiaining Uses	East	Medical Office			
Adjoining Uses	West	Vacant			
	South	Assisted Living Facility			
Site Size	7.55				
Plan Date	December	3, 2021			

PROJECT SUMMARY

The subject property is approximately 7.55 acres and is located south of Twelve Mile Road, northeast of the Twelve Oaks Mall in the RC Regional Center District (Section 14). The applicant is proposing to develop the vacant parcel with 174 multi-family residential units. Four multi-story apartment buildings and four townhouse-style buildings are proposed, with one clubhouse building with community amenities that will also contain residential units on the upper floor. Parking would be provided in ground-level garages in the apartment buildings and in direct-entry garages for the townhomes. Additional surface lots and on-street spaces are also provided. An outdoor pool area is adjacent to the clubhouse. A private street network is proposed to connect the development to Twelve Mile Road and the Twelve Oaks Mall access drive on the west side of the property.

RECOMMENDATION

Approval of 2nd revised Preliminary Site Plan is **recommended**. The plan mostly conforms to the requirements of the Zoning Ordinance, with all deviations noted in the review letters. All reviewers currently recommend approval or conditional approval.

The Planning Commission will be asked to make a recommendation to the City Council for approval, approval subject to conditions, or denial of the Preliminary Site Plan, Special Land Use permit, Wetland permit, Woodland permit and Storm Water Management Plan. In its recommendation to City Council, the Planning Commission will 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 discussed below.

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. **This has been received.**
- 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, page 3.
- 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 Study as required.
- 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. There is a multiple family district adjacent to the property and the use proposed is not anticipated to have a negative effect on surrounding properties.
- 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. **Complete plans are provided**.
- 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, although the applicant requests several deviations from the standards to create a more urbanstyle development given the location and market trends. 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. The site is located at a higher grade than the adjacent residential use to the south, with the highest grade at the north end along Twelve Mile Road approximately 30 feet higher than the southern property boundary. The proposed buildings are oriented away from the community to the south, which should help to minimize their massing.
 - b. The relationship of one building to another whether on-site or on adjacent land, i.e., entrances, service areas and mechanical appurtenances. The buildings are oriented to the existing and planned street frontages, with parking areas kept internal to the site. This will improve the appearance of the development from adjacent sites and roadways.
 - c. The rooftops of buildings that may lie below street levels or from windows of higher adjacent buildings. The site is located at a higher grade than the adjacent residential use to the south, with the highest grade at the north end along Twelve Mile Road approximately 30 feet higher than the southern property boundary. There are no 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 detailed comments.
 - 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. Ensure 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.

Finally, Section 3.31.7.B.viii.d states that an applicant for mixed-use or residential developments must demonstrate the following:

- 1. The development will result in a recognizable and substantial benefit to the ultimate users of the project and to the community, where such benefit would otherwise be unfeasible or unlikely to be achieved. The applicant has proposed an off-site sidewalk to connect the project to the Twelve Oaks Mall parking area if the mall owners will agree to a crosswalk over the ring road.
- Based on the proposed uses, layout, and design of the overall project, the proposed building façade treatment, the proposed landscaping treatment, and the proposed signage, the development will result in a material enhancement to the area of the City in which it is situated. The overall design and appearance of the façade treatments, landscaping and layout are expected to enhance the area.
- 3. In relation to the underlying zoning, the proposed development will not result in an unreasonable negative economic impact upon surrounding properties. The residential use proposed would have a positive economic impact on the surrounding properties by providing additional customers and employees in close proximity.
- 4. Each particular proposed use in the development, as well as the quantity and location of such use, shall result in and contribute to a reasonable and mutually supportive mix of uses on the site, and/or a compatibility of uses in harmony with the surrounding area and other downtown areas of the City, and shall reflect innovative planning and design excellence. The residential uses proposed would be supportive of the regional shopping area and harmonious with other residential uses nearby.
- 5. The proposed development shall be under single ownership and/or control such that there is a single person or entity having responsibility for completing the project in conformity with this Ordinance. This provision shall not prohibit a transfer of ownership and/or control, upon due notice to the City Clerk, provided that the transfer is to a single person or entity, as required in the first instance. Singh is a single entity.
- 6. Development amenities shall be included as part of a mixed-use or residential development. The use of decorative, pedestrian-scale parking lot lighting, public pathways, and other similar features shall be an integral part of any site plan. Amenities shall include lighting, landscape plantings, sidewalk furniture, parks and other amenities that reflect a consistent residential theme. All such amenities shall be privately owned and maintained. The plans show a sidewalk network connecting the buildings to central amenity spaces including the clubhouse. Amenity space and bench details are provided on Sheet A300-A301 and lighting fixtures are shown on the photometric plan sheet. The applicant was asked to consider extending the sidewalk southward along the finger road to the Twelve Oaks loop road to foster better connections in the RC District. This sidewalk connection across the Waltonwood frontage to the south is now proposed in the latest revision. A crosswalk connection into the mall

parking lot is still to be determined. The applicant should continue to work with mall ownership to complete that connection – at minimum to the parking lot.

- 7. Buildings that are not located on a publicly dedicated roadway may be permitted to have parking on the ground level of the building. Such parking level shall not count against the maximum height/story requirement. The parking inside the building must be aesthetically and effectively screened from view through architectural design, landscaping, or other means, from adjacent drives, walkways and buildings, and particularly from the street level view. Apartment buildings have parking on ground level of internal drives, however the ground level is not entirely parking. Parking levels are not visible from street side of buildings. Building A's parking appear to be open, while all other buildings have garage doors.
- 8. In all cases, the maximum height shall include all rooftop appurtenances, architectural features, skylights or other such roof mounted building amenities. **Deviations to allow a greater height on two buildings are requested.**

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

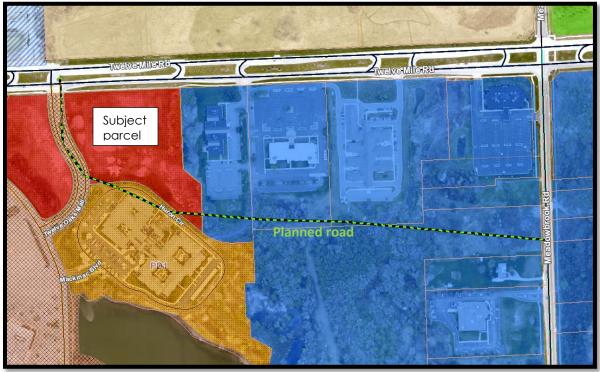
This project was reviewed for conformance with the Zoning Ordinance with respect to Article 3 (Zoning Districts), Article 4 (Use Standards), Article 5 (Site Standards), and any other applicable provisions of the Zoning Ordinance. <u>Please see the attached chart for information pertaining to ordinance requirements</u>. Items in **bold** below must be addressed and incorporated as part of the Final Site Plan submittal:

1. <u>Studies</u>: The applicant has submitted a Community Impact Study, and Traffic Impact Study, and a memo updating the Parking Study. **See comments on the revised Parking Study in the Traffic Review letter.**

- 2. <u>Building Setbacks PD-2 Option Standards</u>: Under the PD-2 Option, building setbacks are 50 feet from front and exterior side yards, and 35 feet from rear/interior side yards. There are front and exterior side yards on three sides of the property. The applicant requests deviations for building setbacks on all sides of the property, with the justification that the standard setbacks are for a more suburban style of development. The proposed project is intended to be a more urban style of development. By pushing the buildings closer to the property lines, parking can be located internal to the site, resulting in a better visual appearance from adjacent roadways.
- 3. <u>Building Setback (Section 3.6.2.H.i.a)</u>: Where the RC District abuts a residential district, the minimum building setback from the property line is required to be 3 feet for each foot of building height. Along the southern property line, this would require Building C (55-foot height) to have a 165-foot setback where the property abuts the RM-1 district. Likewise, the townhome buildings are approximately 38 feet in height, and therefore require a setback of 114 feet. As noted by the applicant, the use proposed on this property (multifamily residential) is identical to the use existing in the RM-1 District (multifamily residential). Staff supports the deviation to allow a minimum 87-foot building setback from the adjacent to the RM-1 District, as the buildings maintain a 150-foot setback from the Waltonwood buildings to the south as discussed below.
- 4. <u>Zoning Board of Appeals Conditions for Setback Variance</u>: As a condition of the approval of a variance to allow a minimum 14 feet for the rear yard setback for the Waltonwood Phase II project, the applicant indicated that a minimum distance of 150 feet would be provided between the proposed building, and any buildings constructed to the north (on the subject property). That approval, on March 4, 2003, required a deed restriction for the properties to ensure that an appropriate setback is maintained. The plans show a 150-foot distance is maintained between the closest buildings on both sites.
- 5. <u>Parking Setback Screening (Section 3.6.2.P)</u>: The proposed parking lots are generally internal to the site. The parking lot on the east side of the site is screened with landscaping in an existing 30-foot Greenbelt Buffer Easement with the adjacent property, with new landscaping proposed on the subject property. Waivers will be required for the lack of berms along Twelve Oaks Drive and the proposed southern road that have adjacent parking lots. The waiver is supported due to the existing topography and utilities, with hedges planted to provide the necessary screening of headlights. Refer to additional comments in the Landscape review.
- 6. <u>Total Parking Required and Proposed</u>: The proposed development would require a total of 355 parking spaces according to the Ordinance standards for a multifamily development (2 spaces per studio/1- and 2-bedroom unit, 2.5 per each 3+ bedroom units). The applicant is providing 308 parking spaces, which is 13% less than the requirement. The parking analysis provided by the applicant indicates a projected peak parking demand of 247 spaces.

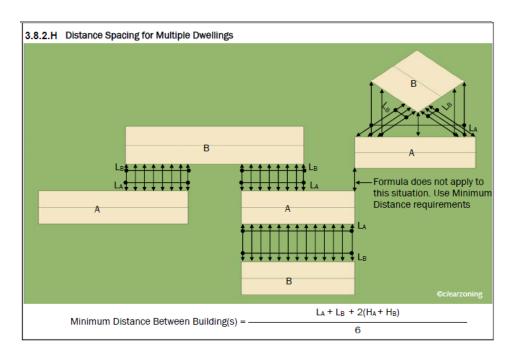
The updated parking memo provides a comparative parking demand for two communities: West Bloomfield, Michigan, and Cary, North Carolina. In West Bloomfield, a similar development proposed a parking rate of 1.63 spaces per unit, while the requirement is 1.25 spaces per unit. In a survey of multifamily housing developments in Cary, a consultant found that the average supply of spaces per unit was 1.60, or 0.99 spaces per bedroom. By comparison, the applicant has proposed 308 spaces, or 1.77 spaces per unit and 1.16 spaces per bedroom. The memo states that the weekend peak parking demand of 247 spaces was derived by multiplying the Multifamily Mid-Rise housing weekday peak demand from the ITE parking generation data by 8.3%. This was how much higher the Multifamily Low Rise weekend parking demand from the ITE tables increased from the weekday peak, so it was extrapolated that the peak for Mid-Rise developments would have a similar increase. **The proposed parking supply (308 spaces) is 25% higher than the projected peak demand (247 spaces), and therefore seems to contain a reasonable safeguard should these assumptions be off by some degree. The parking provided also exceeds the requirement for multi-family residential uses in the Town Center Districts by over 50 spaces. Staff recommends approval of the deviation to allow for a 13% reduction in parking from the Ordinance requirement.**

- 7. <u>Usable Open Space (Sec. 3.31.7.B.vii.v.iii.)</u>: A minimum of 200 square feet of usable open space is required per dwelling unit, or 34,800 square feet for this development. The applicant has proposed a total of 74,566 square feet of open space, however they include 55,595 square feet of "General Open Space" which is indicated on sheet PSP15. As the intent of usable open space is to be "devoted exclusively to recreational use", the areas counted toward the requirement need to be planned for passive or active recreation. The general open space includes the 15-foot wide greenbelt easement along the eastern property line, which is to be planted with fairly dense landscaping, leaving no area for recreation. Although it appears likely the applicant will be able to meet the requirement for usable open space, the plans should be revised to only include areas that qualify under the terms of the ordinance to be devoted to recreational use.
- 8. <u>Planned Residential Collector Road</u>: The Future Land Use map indicates a planned Residential Collector to be located in the approximate location of the site extending south from Twelve Mile Road and bending to the east to connect to Meadowbrook Road (see dashed green/black line below). This roadway has been planned for many years, even as far back as the 1980s, prior to the widening of Twelve Mile Road into its current boulevard configuration. The area surrounding the planned road has not been zoned or planned for residential uses, except for the Waltonwood development. The City's public works department does not see a need for a public roadway currently at this location given the capacity available on Twelve Mile Road. Therefore, the applicant's proposed private drive alignment along the southern portion of their site, with a stub left for possible future connection with development to the east, appears to be a reasonable alternative to the planned public road.



- 9. <u>Road Standards (Sec. 5.10)</u>: The Ordinance states a private drive network within a multiple-family development shall be built to the City's Design and Construction Standards for local streets (28-feet back-to-back width). Major drives are defined as a principal internal loop drive or cul-de-sac drive that has direct access to an exterior public road. Minor drives must be less than 600 feet in length. The southern road and north/south road through the site appear to be proposed according to major drive standards as required. On-street parallel parking is proposed along both major drives.
- 10. <u>Minimum Distance Between Buildings (Sec. 3.8.2.H.)</u>: The required minimum distance between buildings requires a calculation based on building length and height. [(Total length of building A +

total length of building B + 2(height of building + height of building B))/6] The applicant has provided a table of required and proposed distances in order to determine whether deviations are required and where those are located. **Deviations are requested for two locations where the distance between buildings are less than the required: between buildings E and F (21.5 feet proposed, 37.2 feet required) and between buildings F and G (20 feet proposed, 37 feet required).**



- 11. <u>Private Easements:</u> The site plan indicates various private easements with adjacent landowners. There is an 86-foot wide easement for ingress/egress spanning the southern boundary of the property. The applicant was asked to verify that the parties of that easement are satisfied that the road configuration and other improvements planned within this private easement are acceptable under the terms of the easement. Letters of approval, or concurrence with, the planned improvements shall be provided to demonstrate the project will not be contrary to those private agreements or subject to change in the future. The applicant indicates they have verbal approval from Taubman and are working to get letters of approval, which must be submitted prior to stamping set approval.
- 12. <u>Sidewalk Placement (Engineering Design Manual, Section 5.7</u>): The sidewalks along the boulevard entrance at Twelve Mile Road shall be relocated to 5 feet from back of curb in order to ensure pedestrian safety and improve maintenance in the winter months when sidewalks adjacent to the street can become covered in snowbanks. Sidewalks abutting parking spaces may remain adjacent to the curb, as long as a 5-foot clear path remains when vehicles are present (accounting for overhang). The applicant should otherwise comply with the requirements for sidewalk offset wherever possible. As noted in the Traffic Review letter, there remain 3 locations where the sidewalk location does not comply, which will require a DCS variance.
- 13. <u>Dumpster Location & Screening (Sec. 4.19</u>): Dumpsters are shown in two locations on the plan: at the southeast corner of Building D, and a combined dumpster/recycling center in the southeast corner of the site. **Both locations are within an exterior side yard, which will require a deviation.** The dumpster near Building D is located close to the side of the building. The applicant indicates the dumpster has been located to best avoid negative views from unit balconies, while still being accessible to waste hauler vehicles.
- 14. <u>Planning Review Chart</u>: Please refer to Planning Review chart for additional comments that need to be addressed.

15. <u>Wetland Impacts:</u> The plan proposes permanent wetland impacts to two small wetland areas, however additional information is required to determine the extent of the impacts. The Wetland and Watercourse Ordinance requires mitigation of all impacts over 0.25 acre. The total area of the two wetlands indicated on the site survey are 0.241 acre, so mitigation will not be required. **However, fill** volumes are also required to determine the type of wetland permit that is needed. <u>This information is</u> <u>required prior to the Planning Commission meeting, as a Non-Minor Wetland permit will require their</u> <u>approval, while a Minor wetland permit can be approved by the Community Development</u> <u>Department</u>. Please see the Wetland Review letter for additional information required for issuance of a Wetland Permit.

DEVIATIONS FROM AREA, BULK, YARD, AND DIMENSIONAL REQUIREMENTS (SEC. 3.31.5.):

As part of approval of a Preliminary Site Plan, 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; provided, however, that such authorization to grant deviations shall be conditioned upon the Council finding:

- 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.

The current site plan would require the following deviations from Ordinance requirements. The applicant has provided reasonable justification in the Community Impact Statement letter for certain deviations. However, others require further clarification or justification to be provided by the applicant, or modification of the plans. Staff comments are in **bold**.

- i. Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for front yard (Twelve Mile frontage). A minimum of 50 feet is required, 20 feet is provided. The applicant states the standard setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
- ii. Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for western exterior side yard (Twelve Oaks Mall Road frontage). A minimum of 50 feet is required, 30 feet is provided. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
- iii. Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for southern exterior side yard (Access Drive frontage). A minimum of 50 feet is required, 42 feet is provided. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
- iv. Deviation from Section 3.31.7.D for not meeting the minimum building setback requirements for the eastern side yard. A minimum of 35 feet is required, 19.2 feet is provided. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose.
- v. Deviation from Section 3.6.2.H for not meeting the requirement for additional setback from a

residential district to the south. A minimum of 174 feet is required for a building 58 feet in height, 87 feet is provided. This deviation is supported as the uses are both multi-family residential and the additional protection afforded by the larger setback is not warranted. However, the ZBA granted a conditional approval for a setback variance for the Waltonwood Phase 2 in 2003 that stated any building on the subject property would be a minimum of 150 feet from those buildings, which is shown on the plans.

- vi. Deviation from Section 3.31.7.B.viii.b.iv to exceed the maximum building height of 55 feet for Building C (58 feet proposed) and Building D (56 feet 7.5 inches proposed). The applicant states that the minor deviations for additional height are due to the site topography, and will not be perceivable to the human eye from ground level.
- vii. Deviation from Section 3.31.7.B.viii.b.vii to exceed the maximum building length of 125 feet without providing pedestrian entranceways every 125 feet along the frontage for Building B (135 feet proposed) and Building D (135 feet proposed). The applicant states that pedestrian entranceways are geared toward the parking lot and resident garages at the back of the building. There are entrances on the Twelve Mile Road frontage to individual units.
- viii. Deviation from Section 3.8.2.H to allow a reduction in the minimum distance between buildings in two locations: between Buildings E & F (21.5 feet proposed, at least 30 feet required), between Buildings F & G (20 feet proposed, at least 30 feet required. The applicant states the setbacks of the district are for a more suburban style of development and the deviations would be consistent with a more urban development as they propose. Pedestrian access and landscaping have been provided at these locations, so the site is not compromised as a result of this deviation.
- ix. Deviation from Sec. 5.2.12.C to allow reduction of minimum required parking spaces for multiple family residential uses. A minimum of 355 are required, 308 spaces are provided. The proposed parking supply (308 spaces) is 25% higher than the projected peak demand (247 spaces), and therefore seems to contain a reasonable safeguard should these assumptions be off by some degree. Staff recommends approval of the deviation to allow for a 13% reduction in parking from the Ordinance requirement.
- x. Deviation from Section 5.10.1.B.vi to allow parking stalls within 25 feet of Building D and the Clubhouse in a residential district (8-10 feet proposed, 25 feet required). The applicant states maintaining adequate parking for visitors is an important feature of the site. The unusual configuration of the property boundary creates some awkward angles that are not conducive to consistent rectilinear buffers. The deviations requested are located in areas that are less objectionable. For example, locating ADA accessible spaces closer to the building, near the community clubhouse, and near the high traffic Twelve Oaks Mall Road.
- xi. Deviation from Section 4.19.2.F for allowing a dumpster in the side yard instead of required rear yard. Staff supports this deviation as the site has three street frontages, which limits the possibilities to conform. The applicant indicates the dumpster has been located to best avoid negative views from unit balconies and exterior roadways, while still being accessible to waste hauler vehicles.
- xii. Design & Construction Standards variance for lack of sidewalk offset from the travel way in three locations on the site. Supported by staff in two locations, the sidewalk west of the pool should be offset from the curb in Final Site Plan submittal.
- xiii. Landscape deviation from Section 5.5.3.B.ii and iii for lack of 4.5-6 foot landscaped berm along eastern property line. Supported by staff as alternative screening is provided with large evergreen trees. However, in the southern section near Building C, additional fencing should be installed to completely block the headlights from the parking lot.
- xiv. Landscape deviation from Section 5.5.3.B.ii and iii for lack of berm or wall in the greenbelt of Twelve Mile Road, Twelve Oaks Drive and the southern road. Supported by staff due to the topography and presence of utilities, but the proposed hedges must be planted adjacent to the parking lots in order to screen headlights effectively.
- xv. Landscape deviation from Section 5.5.3.B.ii and iii for deficiency in greenbelt canopy trees on Twelve Oaks Drive. **Supported by staff due to utility conflicts.**
- xvi. Landscape deviation from Section 5.5.3.B.ii and iii for deficiency in street trees on Twelve Oaks Drive. **Supported by staff due to utility conflicts.**

- xvii. Landscape deviation from Section 5.5.3xx for a deficiency in multi-family unit trees. **Could be** supported by staff if at least 75% of requirement are provided.
- xviii. Landscape deviation to permit up to 30% of the multi-family unit trees to consist of subcanopy species. **Supported by staff.**
- xix. Landscape deviation from *Section 5.5.3.C.iii* for deficiency in parking lot perimeter landscaping. **Supported by staff as the parking areas are fully landscaped**.
- xx. Possible landscape deviation from Sec 5.5.3.E.ii for deficiency in mutlifamily building foundation landscaping along drives. Not supported by staff.

OTHER REVIEWS

- a. <u>Engineering Review:</u> Engineering is **recommending approval** of the Preliminary Site Plan, and Stormwater Management Plan. Additional comments to be addressed with Final Site Plan submittal.
- b. <u>Landscape Review</u>: Landscape review has identified several waivers that may be required. Refer to review letter for detailed comments. Landscape **recommends approval**. Additional comments to be addressed with Final Site Plan submittal.
- c. <u>Wetlands Review</u>: A Nonresidential Minor Use Wetlands Permit is required for the proposed impacts to regulated wetlands. The impacts do not appear to exceed the 0.25 acre threshold for mitigation, however clarifications of the amount of fill. Additional comments to be addressed with Final Site Plan. **Wetlands recommends approval.**
- d. <u>Woodlands Review</u>: Woodland review indicates there are no regulated woodlands on site. **No** further woodland review is required.
- e. <u>Traffic Review</u>: Additional comments to be addressed with Final Site Plan. Traffic recommends **approval**.
- f. <u>Traffic Study/Parking Memo</u>: TIS is **recommend for approval**. The parking generation analysis should be revised to remove misleading. See traffic letter for further details.
- g. <u>Facade Review</u>: Section 9 Façade Waiver required for overage of Vertical Batten Siding on several elevations. Façade previously **recommended approval**.
- h. <u>Fire Review:</u> **Conditional approval** of the Preliminary Site Plan was previously recommended. Additional comments to be addressed with Final Site Plan.

NEXT STEP: PLANNING COMMISSION PUBLIC HEARING

The Preliminary Site Plan with Special Land Use Permit, Wetland Permit and Stormwater Management Plan will be scheduled to go before the Planning Commission for public hearing on **February 23**, **2022**. Please provide the following via email or download link by **February 16**, **2022**:

- 1. 2nd Revised Preliminary Site Plan submittal in PDF format (maximum of 10MB). **NO CHANGES MADE**.
- 2. A response letter addressing ALL the comments from ALL the review letters and <u>specifically</u> request any deviations as you see fit. These would be used to guide the development agreement if the project receives necessary approvals.
- 3. A color rendering of the Site Plan (optional, to be used for Planning Commission presentation).
- 4. Façade material board.

CITY COUNCIL MEETING

The site plan will be placed on City Council's agenda once Planning Commission recommends approval. No additional information is required prior to City Council meeting, unless Planning Commission provides comments that would require a resubmittal.

FINAL SITE PLAN SUBMITTAL

If City Council grants approval and variances are approved by ZBA, the applicant should submit the following for Final Site Plan review and approval

- 1. Seven copies of Final Site Plan addressing all comments from Preliminary review
- 2. Response letter addressing all comments and <u>refer to sheet numbers where the change is reflected.</u> <u>Please refer to the last review letters from other reviewers.</u>
- 3. <u>Final Site Plan Application</u>

2nd Revised Preliminary Site Plan Review

- 4. Final Site Plan Checklist
- 5. Engineering Cost Estimate
- 6. Landscape Cost Estimate
- 7. Other Agency Checklist
- 8. Project & Street Naming Application with street layout plan for final Street Name approval
- 9. Drafts of any legal documents (note that off-site easements need to be executed and any onsite easements need to be submitted in draft form before stamping sets will be stamped)

ELECTRONIC STAMPING SET SUBMITTAL AND RESPONSE LETTER

After receiving Final Site Plan approval, please submit the following for Electronic stamping set approval:

- 1. Plans addressing the comments in all of the staff and consultant review letters in PDF format.
- 2. Response letter addressing all comments in ALL letters and ALL charts and refer to sheet numbers where the change is reflected.

STAMPING SET APPROVAL

Stamping sets are still required for this project. After having received all of the review letters from City staff the applicant should make the appropriate changes on the plans and submit <u>10 size 24" x 36"</u> copies with original signature and original seals, to the Community Development Department for final Stamping Set approval.

SITE AMENITIES

Site amenities will require special inspection. Those items will be added here at the time of Final Site Plan review.

SITE ADDRESSING

New addresses are required for this project. The applicant should contact the Building Division for addresses prior to applying for a building permit. Building permit applications cannot be processed without a correct address. The address application can be found by clicking on this link.

Please contact the Ordinance Division 248.735.5678 in the Community Development Department with any specific questions regarding addressing of sites.

STREET AND PROJECT NAME

The project and the street names must be reviewed and approved by the Project and Street Naming **Committee.** Please contact Madeleine Daniels (248-347-0579) in the Community Development Department for additional information. The application can be found by clicking on this link.

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 recommended that you begin working with Sarah Marchioni [248.347.0430 or smarchioni@cityofnovi.org] in the Community Development Department after Final Site Plan approval. 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 248.347.0484 or <u>Ibell@cityofnovi.org</u>.

Kindsmy Bell

Lindsay Bell, AICP – Senior Planner

Attachments:

1. Planning Review Chart

PLANNING REVIEW CHART: RC with PD-2 Option

CITY OF

Review Date:	January 25, 2022
Review Type:	2 nd Revised Preliminary Site Plan
Project Name:	JSP 20-27 Griffin Novi
Location:	Twelve Mile Road, northeast of Twelve Oaks Mall
Plan Date:	December 3, 2021
Prepared by:	Lindsay Bell, Senior Planner
	E-mail: lbell@cityofnovi.org; Phone: (248) 347-0484

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

ltem	Required Code	Proposed	Meets Code	Comments
Zoning and Use Requirem	ients			
Master Plan (adopted July 27, 2017)	Regional Commercial with PD-2 Option	PD-2: Planned Development	Yes	PD-2 option would require Planning Commission's recommendation to City Council – concurrent with site plan/special land use
Area Study	None		NA	
Zoning (Effective January 8, 2015, as amended)	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	Multiple Family Residential – 174 units MF Residential uses permitted as Special Land Use	Yes	Subject to City Council approval upon Planning Commission's recommendation
Phasing	Provide phases lines and detail description of activities in each phase	No phasing proposed	NA	
Planned Development Sit	e 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 See Planning Review letter for discussion
Community Impact Statement (Sec. 3.31.4.A.iii)	Required according to site plan manual (SDM link: <u>Site</u> <u>development Manual</u>)	Provided	Yes	

ltem	Required Code	Proposed	Meets Code	Comments
Traffic Study (Sec. 3.31.4.A.iii)	Required regardless of site size, with requirements in SPDM	Provided – includes parking study	Yes	See detailed comments in the TIS Review letter
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	See Planning Review letter for discussion	TBD	PD Option and PSP can proceed simultaneously – Review conditions listed in this section
Use Conditions for Allow	able uses under PD-2 Option (S	ec. 3.31.7.B)		
Applicant must demonstrate (Sec. 3.31.7.B.viii.d)	Recognizable & substantial benefit to ultimate users of the project and to the community;	Pocket parks with concrete and cast iron benches, decorative paving; Adjacent to clubhouse an outdoor pool area, fire pit; Extends sidewalk along off-site property to the south to connect to Mall parking lot		
	Based on proposed uses, layout and design, building façade treatment, proposed landscaping, and proposed signage – development will result in a material enhancement to the area		Yes	Buildings appear to be a well-designed and proportioned – see Façade Review for detailed comments
	Proposed development will not result in unreasonable negative economic impact upon surrounding properties relative to underlying zoning	Customers and employees for nearby businesses	Yes	Positive benefit anticipated
	Contribute to reasonable and mutually supportive mix of uses on the site and compatibility/harmony with surrounding uses	Residential use will contribute to mall activity, increase vibrancy of the area	Yes	
	Single ownership	Proposed	Yes	
	Streetscape amenities shall be included; use of decorative, pedestrian- scale parking lot lighting, public pathways; amenities	Sidewalks proposed, pocket parks, clubhouse building, residential lighting, Concrete and cast-	Yes	

ltem	Required Code	Proposed	Meets Code	Comments
	such as lighting, landscape plantings, etc. to reflect consistent residential theme	iron benches		
Marginal Access Service Drives (Sec. 3.31.7.F.)	Determination of need for marginal access service drives	Traffic study does not indicate need for service drive	Yes	
Height, bulk, density and	area limitations (Sec 3.1.23.D)			
Frontage on a Public Street (Sec. 5.12) Access To Major Thoroughfare (Sec. 5.12)	Frontage on a Public Street is required.	The site has frontage and access to Twelve Mile Road	Yes	
Minimum Zoning Lot Size, Width and Lot Coverage (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		NA	
	basis of off-street parking, loading, greenbelt screening, yard setback, or usable open space.		NA	
Open Space Area				See page 5
Building Height (Sec. 3.31)	45 ft. or 3 stories whichever is less		NA	See residential use standards below
a) when abutting a "majo	31.7.D) Per Section 5.10.1.B.v. " or drive" measure setbacks from e; c) when abutting a "minor of	m back of curb; b) wher	n abuttin	g a property line,
Front @ Twelve Mile (North)	50 ft.	20 ft	No	Requested Deviations will be subject to City
Exterior side yard @ Twelve Oaks Mall Road (West)	50 ft	30 ft	No	<u>Council approval.</u>
Exterior side yard Access Drive (South)	50 ft	42 ft from back of curb	No	
Side Yard (East)	35 ft.	19.2 ft.	No	
Off-Street Parking Setbac	k (Sec 3.31.7.D)			
Front @ Twelve Mile (North)	20 ft.	No parking in front yard	NA	

Item	Required Code	Proposed	Meets Code	Comments
Exterior side yard @ Twelve Oaks Mall Road (West)	20 ft.	30 ft. (Sec 3.6.2.C)	Yes	
Exterior side yard Access Drive (South)	20 ft.	20 ft. (Sec 3.6.2.C)	Yes	
Interior Side Yard (East)	10 ft.	15 ft.	Yes	
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.	See setbacks above	Yes	
Off-Street Parking in Front Yard (Sec 3.6.2.E)	Off-street parking is allowed in front yard.	Mostly proposed in interior	Yes	
Min. Building Setback Abutting Residential Districts (Sec 3.6.2.H)	Where abutting a Residential District, minimum setback of buildings to the district shall be 3 ft for every foot of building height Building height of 55 feet would require 165 feet setback from RM-1 District (Bldg C) Townhouse buildings ~38 ft, require 114 foot setback	Building C: 87.3 ft setback Townhouses: 86.2 ft setback	No	<u>This deviation could</u> <u>be considered by City</u> <u>Council with</u> <u>justification that they</u> <u>are both residential</u> <u>uses</u> *See Planning Letter for additional discussion
Adjacent to residential zoning (Sec 3.6.2.L)	Minimum 20 ft. setback where property abuts residentially zoned property	Residential zoning present to the south; Min 20 feet provided	Yes	
Wetland/Watercourse Setback (Sec 3.6.2.M)	A setback of 25ft from wetlands and from high watermark shall be maintained.		NA	<u>See wetland review</u> <u>comments</u>
Additional Building height (Sec 3.6.2.0)	Additional height upto 65 ft. may be allowed for properties within 1200 ft from a freeway subject to additional conditions	Does not qualify since adjacent to residential district	NA	
Parking setback screening (Sec 3.6.2.P)	Required parking setback area shall be landscaped per sec 5.5.3.			Please refer to Landscape Review for requirements
Modification of parking setback requirements	The Planning Commission may modify parking		NAŚ	

ltem	Required Co	de	Proposed	Meets Code	Comments
(Sec 3.6.2.Q)	setback requirements based on its determination according to Sec 3.6.2.Q.				
Standards for Mixed/Resid	dential under l	PD-2 Option (Sec	. 3.31.7.B.viii.b.)		
Mixed-Use buildings or MF Residential Buildings (Sec. 3.31.7.B.viii.a.)	u		Multi-family residential use only	Yes	
Density (Sec. 3.31.7.B.viii.b.i.)		not to exceed	174 units/7.57 acres = 22.98 du/ac	Yes	
Usable Open Space Area (Sec 3.31.7.B.viii.b.iii)	24 DUA Minimum of 200 sf of usable open space per dwelling unit For a total of 174 dwelling units, <u>required Open</u> <u>Space: 34,800 sf</u> (may include private pool and clubhouse amenities, pocket parks, play structures and/or walking trails that connect to the City's Non-Motorized Network)		Calculations indicate 74,566 sq ft provided, however 55,595 sf of this is "General Open Space"; some areas indicated on the plan do not meet the Ordinance definition of Usable Open Space	Yes?	Entire eastern property line will be landscaped, but not considered "usable" by residents; Review the definition of Usable Open Space and revise calculation to only include those areas that qualify under Sec. <u>3.31.7.B.viii.b.iii</u> or Sec 2.2
Building Height (Sec 3.31.7.B.viii.b.iv)	Building heig exceed 55 f whichever is	eet or 4 stories,	Building A: 55 feet Building B: 53 feet Building C: 58 feet Building D: 56 feet 7.5 inches Building E-G: 37.66 feet Clubhouse: 41 feet	Yes No Yes	Deviations Requested for Building C & D
Minimum Floor Area per	Efficiency	400 sq. ft.	500 sf	Yes	
	1 bedroom	500 sq. ft.	775 sf	Yes	4
(Sec 3.31.7.B.viii.b, v-vi)	2 bedroom		1,100 sf	Yes	-
Maximum Dwelling Unit Density/Net Site Area	3 bedroom Efficiency	Max 15%	1,250 sf 9.8% (17 units)	Yes Yes	
(Sec 3.31.7.B.viii.b, v-vi)	1 bedroom	Max 50%	48.3% (84 units)		
	2 bedroom 3+ bedroom		33.3% (58 units) 8.6% (15 units)		
Maximum length of the buildings (Sec 3.31.7.B.viii.b.vii)	A single build exceed 125 pedestrian e	ding shall not ft. unless entranceways d every 125 ft	Building A ~322 feet (3 entrances provided) <u>Building B ~135 ft (no</u>	Νο	Deviations requested for Buildings B & D

ltem	Required Code	Proposed	Meets Code	Comments
		entrances on 12 Mile) Building C ~215 ft (1 entrance provided) Building D ~135 ft (no entrance provided on frontage)		
Setback along natural shore line (Sec 3.31.7.B.viii)	A minimum of 100 feet along natural shore line is required.	No natural shore line exists within the property	NA	
Yard setback restrictions (Sec 3.31.7.B.viii)	Within any front, side or rear yard, <u>off-street</u> <u>parking, maneuvering</u> <u>lanes, service drives or</u> <u>loading areas</u> cannot exceed 30% of yard area	Appears to comply – paved areas generally internal to the site	Yes	
Pedestrian Orientation/Design Amenities (Sec 3.31.7.B.viii)	Significant pedestrian orientation with design amenities such as: pedestrian walkways, brick or decorative paving in plazas, lighting, benches, trash receptacles, landscape treatments, focal points	Pedestrian paths proposed throughout, pocket parks, lighting, benches Off-site Sidewalk extension to south now included	Yes	
Pedestrian Connectivity (Sec 3.31.7.B.viii)	6 feet concrete sidewalks along internal roads and to any community center, recreational facility, parking and neighboring buildings to permit safe and convenient pedestrian access.	8 foot sidewalks proposed on both sides of spine road, 6 foot sidewalk proposed along other drive areas	Yes	
	Where feasible sidewalks shall be connected to other pedestrian features abutting the site. All sidewalks shall comply	Provides connectivity to Twelve Mile pathway, Twelve Oaks Mall parking lot	Yes	Provide details for
	with barrier free design standards			verification with Final Site Plan
Minimum Distance between the buildings (Sec. 3.8.2.H)	(Total length of building A + total length of building B + 2(height of building + height of building B))/6	Calculations provided. Two distances (Buildings E- F and Buildings F-G) do not meet requirement	No	Deviation requested for two locations
	In no instance shall this distance be less than thirty (30) feet unless there is a corner-to-corner relationship in which case	Buildings F-G: 21.5 ft Buidings E-F: 20.0 ft	No	<u>Deviation requested</u> for two locations

		Proposed	Code	Comments
	the minimum distance shall be fifteen (15) feet.			
On-Street Parking (Sec 3.31.7.B.viii.b.xiii)	Parallel parking along major drives permitted if 26- foot drive aisles maintained	Spine road and southern access drive shows parallel parking spaces, min. aisle width of 26 feet	Yes	
5.10 Additional Road De	esign, Building Setback, And Par	king Setback Requireme	ents, Mul	tiple-Family Uses
Road standards 'Sec. 5.10)	A private drive network within a cluster, two -family, multiple-family, or non- residential uses and developments shall be built to City of Novi Design and Construction Standards for local street standards (28 feet back-to-back width)	Two roads would be considered Major Drives	Yes	
Major Drives 'Sec. 5.10.1.B)	- Width: 28 feet -	Proposed major drives are 28 feet wide (one 26 ft drive aisle with 8 ft parallel parking spaces)	Yes	
Winor Drive 'Sec. 5.10.1.B)	 Cannot exceed 600 feet Width: 24 feet with no on- street parking Width: 28 feet with parking on one side Parking on two sides is not allowed Needs turn-around if longer than 150 feet 	Meets the requirements	Yes	
Parking on Major and Minor Drives 'Sec. 5.10.1.B.iv-vi)	 Angled and perpendicular parking, permitted on minor drive, but not from a major drive; minimum centerline radius: 100 feet Adjacent parking and on-street parking shall be limited near curves with less than two-hundred thirty (230) feet of centerline radius Minimum building setback from the end of a parking stall shall be 25 feet in residential districts. 	On-street parallel parking is proposed on the N/S and southern Major Drives Some parking stalls less than 25 feet from buildings	Yes	<u>Deviation requested</u> (north and south of <u>Bldg D, Clubhouse</u>)

ltem	Required Code	Proposed	Meets Code	Comments
<u>Number of Parking</u> <u>Spaces</u> (Sec.5.2.12.A & B)	For 2 or less bedroom units: 2 spaces each For 3 or more bedroom units: 2 ½ spaces eachGarages: 96 Surface: 184For 3 or more bedroom units: 2 ½ spaces eachTOTAL PROPOSED: 308 spacesFor 17 studios: 34 spaces For 84-1 BR units: 168 spaces 58-2 BR units: 116 spaces 		No	<u>Deviation requested</u> <u>for parking – see</u> <u>discussion in</u> <u>Planning Review</u> <u>letter</u>
Landbank Parking (Sec.5. 2.14)	TOTAL: 356 spacesMaximum number of Landbank spaces: 25% of required parking	Not proposed	NA	
Parking Space Dimensions and Maneuvering Lanes (Sec. 5.3.2)	 90° Parking: 9 ft. x 19 ft. 24 ft. two way drives 9 ft. x 17 ft. parking spaces allowed along 7 ft. wide interior sidewalks as long as detail indicates a 4" curb at these locations and along landscaping 	 24 ft. two way drives 9 ft. x 17 ft. parking spaces with buffer or sidewalk as required 8 ft. x 23 ft. parallel spaces 	Yes	Refer to Traffic comments
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 	Not applicable	NA	
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 proposed wherever applicable	Yes	Refer to Traffic comments.

ltem	Required Code	Proposed	Meets Code	Comments
Barrier Free Spaces Barrier Free Code	To be determined once minimum required spaces for the clubhouse are determined	6 BF spaces are proposed		See Traffic Comments
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 	Appears to comply	Yes	
Barrier Free Signs Barrier Free Code	One sign for each accessible parking space.	Shown	Yes	
Minimum number of Bicycle Parking (Sec. 5.16.1)	One (1) space for each five (5) dwelling units For 174 units, 36 bike spaces are required *when 20+ spaces are required, 25% shall be covered spaces	18 spaces shown (6 in 3 locations) outdoors; Building A has bike room with storage for 60 spaces	Yes	
Bicycle Parking General requirements (Sec. 5.16)	 No farther than 120 ft. from the entrance being served When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations Spaces to be paved and the bike rack shall be inverted "U" design Shall be accessible via 6 ft. paved sidewalk 	Shown	Yes	
Bicycle Parking Lot layout (Sec 5.16.6)	Parking space width: 6 ft. One tier width: 10 ft. Two tier width: 16 ft. Maneuvering lane width: 4 ft. Parking space depth: 2 ft. single, 2 ½ ft. double	Layout provided	Yes	
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 	Community Dumpster/Recycling center shown southeast of Building C; Dumpster at SE corner of building D- 7 ft from building	Yes? No	<u>Deviation requested</u> for dumpster location

ltem	Required Code	Proposed	Meets Code	Comments
	than 10 ft., from property line. - Away from Barrier free Spaces			
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 	Detail provided	Yes?	Detail indicates material to match buildings
Accessory Structures Sec. 4.19		Flagpole near clubhouse; 5 locations of utility structures now indicated – some in front yards	Νο	Deviations required for front yard/side yard locations
Exterior lighting Sec. 5.7	Photometric plan and exterior lighting details needed at time of Preliminary Site Plan submittal.	Provided	Yes	See detailed comments in Lighting section
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		
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 connected to sidewalk	8 ft sidewalk proposed along internal spine road; 8 ft. existing sidewalk on 12 Mile road; 6 ft sidewalk to be	Yes	

ltem	Required Code	Proposed	Meets Code	Comments
	system or parking lot.	extended off-site to south to connect to Twelve Oaks Mall parking		
Pedestrian Connectivity	Assure safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets	A sidewalk network connects buildings within the site and to adjacent parcels	Yes	
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).	Provided	Yes	
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).	Provided	Yes	
Economic Impact	 Total cost of the proposed building & site improvements Number of anticipated jobs created (during construction & after building is occupied, if known) 	See Community Impact Statement	Yes	
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. 	Signage information not reviewed at this time		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.	Project name and street names have been approved by the committee		For changes to project and street naming contact Ben Peacock at 248-347- 0475

Item	Required Code	Proposed	Meets Code	Comments
Property Split	The proposed property split must be submitted to the Assessing Department for approval.	No property splits proposed.	NA	
Other Legal Requiremen	ts			
PRO Agreement (Sec. 7.13.2.D(3)	A PRO Agreement shall be prepared by the City Attorney and the applicant (or designee) and approved by the City Council, and which shall incorporate the PRO Plan and set forth the PRO Conditions and conditions imposed	Not proposed	NA	
Master Deed/Covenants and Restrictions	Applicant is required to submit this information for review with the Final Site Plan submittal		NA	
Conservation easements	Conservation easements are a condition of Wetland and/or Woodland permits	No woodlands; Wetland mitigation not required	NA	
Previous agreements	Provide all pre-existing easements and agreements that pertain to the property	Existing easements have been provided	Yes	Provide verification from Mall owner that they will not object to southern road that is within shared easement
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. 	Not indicated	No	Indicate security lighting on Final Stamping Set

Lighting and Photometric Plan (Sec. 5.7)				
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.	Provided	Yes	
Lighting Plan (Sec.5.7.A.2)	Specifications for all proposed & existing lighting fixtures.	3 fixtures shown	Yes	
	Photometric data	Shown	Yes	
	Fixture height	Shown	Yes	
	Mounting & design	Shown	Yes	-
	Glare control devices	Shown	Yes	1
	Type & color rendition of lamps	LED		
	Hours of operation	Not indicated	No	Provide hours of lighting on FSP
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.	18 ft. max shown	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 	Shown	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.	Parking/drives ratio provided: 5:1	No	Deviation required or revise calculation to include the Ave:Min ratio for overall site (not including any 0.0 fc values for areas not lit)
Type of lamps (Sec. 5.7.3.F)	Use of true color rendering lamps such as metal halide is preferred over high & low pressure sodium lamps.	LED	Yes	
	Parking areas: 0.2 min	0.4 min	Yes	1

Lighting and Photometric Plan (Sec. 5.7)				
5.7.3.k)	Loading & unloading areas: 0.4 min		NA	
	Walkways: 0.2 min	1.0 min	Yes	
	Building entrances, frequent use: 1.0 min	1.1 min	Yes	
	Building entrances, infrequent use: 0.2 min	0.9 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.	0.3 max	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. 	Where adjacent to RM-1 district max. 0.3 fc shown	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. 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

January, 25th 2022

Engineering Review

The Griffin (fka Uptown Place) JSP20-0027

<u>Applicant</u>

Singh Development

<u>Review Type</u>

2nd Revised Preliminary Site Plan

Property Characteristics

- Site Location:
- South of 12 Mile Road and East of Twelve Oaks Mall Road
- Site Size: 7.57 acres
- Plan Date: 12/02/2021
- Design Engineer: Nowak & Fraus Engineers

Project Summary

- Construction of an approximately eight (8) residential buildings, a 4,346 square-foot clubhouse, pool, and associated parking. Site access would be provided via Twelve Mile Road and Twelve Oaks Mall Road.
- Water service would be provided by an eight-inch extension from the existing 20inch water main along the south side of 12 Mile Road. A domestic lead and fire lead would be provided to serve each building, along with five (5) additional hydrants.
- Sanitary sewer service would be provided by an 8-inch extension from the existing 8inch sanitary sewer on the northside of the southern property. Sanitary leads would be provided to serve each building.
- Storm water would be collected by a single storm sewer collection system and discharged off-site.

Recommendation

Approval of the 2nd Revised Preliminary Site Plan and Revised Preliminary Storm Water Management Plan is **recommended**, contingent upon receipt of off-site drainage easement and Twelve Oaks Lake owner approval of ultimate storm water discharge.

Comments:

The 2nd Revised Preliminary Site Plan does meet the general requirements of Chapter 11 of the Code of Ordinances, the Storm Water Management Ordinance, and the Engineering Design Manual with the following exceptions, which can be addressed at Final Site Plan submittal:

<u>General</u>

- 1. Provide a minimum of **two ties** to established section or quarter section corners.
- 2. Provide at least two reference benchmarks at intervals no greater than 1,200 feet. At least one referenced benchmark shall be a City-established benchmark, which can be found on the City's website at this location: <u>https://novi.maps.arcgis.com/apps/webappviewer/index.html?id=5ce841f86</u> <u>197461c9f146e1330330bcf</u>
- 3. The City's datum is USGS datum NAVD 88. Revise the datum note as necessary.
- 4. Provide sight distance measurements for the 12 Mile Road entrance in accordance with Figure VIII-E of the Design and Construction Standards, Chapter 11 of the City of Novi Code of Ordinances, which can be found here:

https://library.municode.com/mi/novi/codes/code_of_ordinances?nodeld=P TIICOOR_CH11DECOST

- 5. A right-of-way permit will be required from the City of Novi and Oakland County for any work within the 12 Mile Road right-of-way.
- 6. Label the width of the existing half-width right-of-way along 12 Mile Road.
- 7. 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.
- 8. Traffic signs in the Road Commission for Oakland County (RCOC) right-of-way will be installed by RCOC.
- 9. Provide a traffic control plan for the proposed road work activity.
- 10. Illustrate and label compacted sand backfill (MDOT sand Class II) on the utility profiles.
- 11. Provide a construction materials table on the Utility Plan listing the quantity and material type for each utility (water, sanitary and storm) being proposed.
- 12. 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.
- 13. Generally, all proposed trees shall remain outside utility easements. Where proposed trees are required within a utility easement, the trees shall maintain a minimum 5-foot horizontal separation distance from any existing or

proposed utility. <u>All utilities shall be shown on the landscape plan</u>, or other appropriate sheet, to confirm the separation distance.

- 14. Light poles or other permeant structures within a utility easement will require a License Agreement.
 - Consider relocating the light poles that appear to be located over storm sewer and building leads.
- 15. An irrigation plan must be submitted with the Final Site Plan and approved prior to stamping set approval.
 - 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).
- 16. 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), and paving (2 sheets). The most updated details can be found on the City's website at this location: http://cityofnovi.org/Government/City-Services/Public-Services/Engineering-Division/Engineering-Standards-and-Construction-Details.aspx

<u>Water Main</u>

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- 17. Show 20-foot-wide water main easements on utility plan.
- 18. Label the size of all proposed water service leads.
 - 6-inch hydrant leads are allowed for leads less than or equal to 25 feet in length. 8-inch leads are required for leads greater than 25 feet in length.
- 19. Use two 45-degree bends in lieu of the 90-degree water main bend proposed at the southeast corner of the site.
- 20. Provide water main modeling calculations demonstrating that the required water supply of 3,000 GPM will be available.
- 21. Provide a profile for all proposed water main 8-inch and larger.
- 22. Provide a unique shut-off valve for each domestic service lead and fire lead within the proposed water main easements.
- 23. Hydrants shall be at least 7 feet off back of curb (allowing 3-foot clearance from sidewalk).
- 24. Three (3) sealed sets of revised 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,

The Griffin (fka Uptown Place) JSP20-0027

and electronic utility plan should be submitted to the Engineering Division for review, when no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets, and the standard detail sheets.

Sanitary Sewer

- 25. Provide a sanitary sewer monitoring manhole, unique to the clubhouse, 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).
- 26. Refer to the City's sewer unit factor sheet and break down the sanitary sewer basis of design calculations by number of bedrooms, clubhouse, poolhouse, etc.
- 27. Note on the construction materials table that 6-inch sanitary leads shall be a minimum SDR 23.5, and mains shall be SDR 26.
- 28. Replace the note on PSP4 that refers to the Detroit Water and Sewage Department with the Novi Water and Sewer Department.
- 29. Provide a testing bulkhead immediately upstream of the sanitary connection point. 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.
- 30. 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, when 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

- 31. Provide profiles for all storm sewer 12-inch and larger.
- 32. A minimum cover depth of 3 feet shall be maintained over all proposed storm sewer.
- 33. 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.
- 34. Illustrate all pipes intersecting storm structures on the storm profiles.
- 35. If applicable, an easement is required over the storm sewer accepting and conveying off-site drainage.
- 36. 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 castings shall be provided on all catch basins except curb inlet structures.

Storm Water Management Plan

- 37. 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.
- 38. An adequate maintenance access easement to the pretreatment structure shall be provided in the Storm Drainage Facility Maintenance Access Easement.
- 39. Provide the boundaries of each drainage area and runoff coefficient calculations specific to the area tributary to each storm structure.
- 40. The stormwater discharge from the site shall not exceed 0.15 cfs per acre
- 41. Approval from the property to the south, in the form of an off-site drainage easement, to discharge all storm water to the off-site storm sewer system is necessary before Stamping Set approval. The easement shall extend from the property line to the first off-site storm

Paving & Grading

- 42. The City's Future Land Use Map shows a future residential collector road running through the southern portion of this property, connecting the 12 Oaks Mall Ring Road to Meadowbrook Road. Upon review, the Engineering Division questions the necessity of this road considering much of the surrounding area is planned and zoned Office Service Technology, and there is currently little concern for traffic. However, there is a private 86-foot-wide ingress-egress easement (L.21763, P.525) on the southern portion of this property and approval of the impacts to this easement is needed from the parties involved. Please submit a letter from the involved parties to the Engineering Division prior to Final Site Plan submittal.
- 43. Provide a construction materials table on the Paving Plan listing the quantity and material type for each pavement cross-section being proposed.
- 44. Remove the asphalt road cross section detail or revise to adhere to the City standard paving detail (1.5" 5E1 on 2.5" 3C on 8" 21AA aggregate).
- 45. Revise Dumpster Pad detail to adhere to the City standard paving detail or remove detail and attach City standard paving detail to plans. (8" 3500 PSI concrete on 8" 21 AA aggregate)
- 46. Remove the concrete pavement cross section detail or revise to adhere to the City standard paving detail (8" MDOT grade P1 concrete on 8" 21AA aggregate).
- 47. All end islands and drive aisles shall have 6-inch straight-faced curb.
 - Revise the curbing around the entrance island to be 6-inch curb instead of 4-inch.
- 48. Revise the sidewalk cross-section to indicate a <u>maximum</u> cross-slope of 2% or remove and reference the City standard paving detail sheets.
- 49. Provide spot elevations at the intersection of the proposed pathway with the existing pathway.
- 50. Specify the product proposed and provide a detail for the detectable warning surface for barrier free ramps. The product shall be the concrete-

embedded detectable warning plates, or equal, and shall be approved by the Engineering Division. Stamped concrete will not be acceptable.

- 51. Provide at least 3-foot of buffer distance between the sidewalk and any fixed objects, including light poles, hydrants, and irrigation backflow devices. Include a note on the plan where the 3-foot separation cannot be provided.
- 52. Show proposed grades for any adjusted sanitary, water, and storm structures.
- 53. Site grading shall be limited to 1V:4H (25-percent), excluding landscaping berms. The westside of the entrance off Twelve Mile Road appears to exceed this standard.
- 54. The end islands shall conform to the City standard island design, or variations of the standard design, while still conforming to the standards as outlined in Section 2506 of Appendix A of the Zoning ordinance (i.e. 2' minor radius, 15' major radius, minimum 8' wide, 3' shorter than adjacent 19' stall).
- 55. Dimension the length and width of the covered parking stalls.

Soil Erosion and Sediment Control

56. A SESC permit is required. A full review has not been completed at this time. Please address the comments below and submit a SESC permit application under separate cover. The application can be found on the City's website at http://cityofnovi.org/Reference/Forms-and-Permits.aspx.

Off-Site Easements

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- 57. 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.
- 58. Approval from the neighboring property owner for the work associated with the off-site paving and utility work, in the form of a temporary construction easement and off-site drainage easement, shall be forwarded to the Engineering Division **prior to Stamping Set approval**.

License Agreements

59. A license Agreement will be required for any permanent structures proposed within utility easements. The agreement shall state that if the structures are removed or damaged in the event the utility requires maintenance, then it will be **the responsibility of the property owner** to repair or replace. A template agreement is available from the Engineering Division.

The following must be submitted with the Final Site Plan:

- 60. 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 <u>and indicating the revised</u> <u>sheets involved</u>. Additionally, a statement must be provided stating that all changes to the plan have been discussed in the applicant's response letter.
- 61. 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 site work and not any costs associated with construction of the building or any demolition work. <u>The estimate must be itemized</u> for each utility (water, sanitary, storm sewer), on-site paving (square yardage), 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 that can be found on the City's website. Partial submittals will <u>not</u> be accepted.)

- 62. 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.
- 63. A draft copy of the 20-foot-wide easement for the water main to be constructed onsite must be submitted to the Community Development Department. This document is available on our website.
- 64. A draft copy of the 20-foot-wide easement for the sanitary sewer to be constructed onsite must be submitted to the Community Development Department. This document is available on our website.
- 65. A draft copy of the 20-foot-wide easement for the sanitary sewer monitoring manhole access to be constructed onsite must be submitted to the Community Development Department. This document is available on our website.
- 66. Executed copies of approved off-site easements and letters from involved parties must be submitted.
 - a. A copy of the off-site drainage easement for discharge to the off-site storm sewer system must be submitted to the Community Development Department.

- b. A copy of a temporary construction easement for off-site paving and utility work must be submitted to the Community Development Department.
- c. Approval from the owner of the Twelve Oaks Lake for additional storm water discharge and increase in volume is needed prior to Final Site Plan approval.
- d. Approval from involved parties for impacts to the private 86-foot-wide ingress-egress easement (L.21763, P.525) on the southern portion of this property is needed prior to Final Site Plan approval.

The following must be addressed prior to construction:

- 67. A pre-construction meeting shall be required prior to any site work being started. Please contact Sarah Marchioni in the Community Development Department to setup a meeting (248-347-0430). Be advised that scheduling the pre-construction meeting can take 2-4 weeks.
- 68. 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.
- 69. Material certifications must be submitted to Spalding DeDecker for review prior to the construction of any onsite utilities. Contact Ted Meadows at 248-844-5400 for more information.
- 70. Construction inspection fees in the amount of **\$TBD** must be paid to the Community Development Department.
- 71. 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.** This amount includes engineering legal fees only. There may be additional legal fees for planning legal documents.
- 72. 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.
- 73. 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.
- 74. Water and Sanitary Sewer Fees must be paid prior to the pre-construction meeting. Contact the Water & Sewer Division at 248-347-0498 to determine the amount of these fees.
- 75. 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.

- 76. 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.
- 77. 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 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.
- 78. A permit for work within the road right-of-way of 12 Mile 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.**
- 79. A permit 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.
- 80. A permit 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.
- 81. An NPDES permit must be obtained from EGLE since the site is over 5 acres in size. EGLE may require an approved SESC plan to be submitted with the Notice of Coverage.
- 82. An inspection permit for the sanitary sewer tap must be obtained from the Oakland County Water Resources Commissioner (OCWRC).
- 83. The amount of the incomplete site work performance guarantee for this development at this time is **\$TBD** (equal to 1.2 times the amount required to complete the site improvements, excluding the storm water facilities) as specified in the Performance Guarantee Ordinance. This guarantee will be reduced prior to the Temporary Certificate of Occupancy (TCO), at which time it will be based on the percentage of construction completed.

Engineering Review of 2nd Revised Preliminary Site Plan The Griffin (fka Uptown Place)

<u>Prior to preparing stamping sets</u>, the Applicant is advised to provide any revised sheets directly to the Engineering Division 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 Humna Anjum at (248) 735-5632 with any questions.

Humme um

Humna Anjum Project Engineer

JSP20-0027

cc: Lindsay Bell, Community Development Ben Croy, PE; Engineering Victor Boron, Engineering LANDSCAPE REVIEW



PLAN REVIEW CENTER REPORT January 7, 2022 **The Griffin Novi**

Second Revised Preliminary Site Plan - Landscaping

Review Type

Second Revised Preliminary Landscape Review

Job # JSP20-0027

Property Characteristics

- Twelve Mile Road and Twelve Oaks Drive Site Location: • 7.57 ac.
- Site Acreage: •
- Site Zoning:
 - RC
- Adjacent Zoning:

North: RA, East, West: RC, South: RM-1 12/3/2021

Plan Date:

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 Ordingnee. Items in **bold** below must be addressed and incorporated as part of the revised Final Site Plan submittal. Please follow guidelines of the Zoning Ordinance and Landscape Design Guidelines. This review is a summary and is not intended to substitute for any Ordinance.

LANDSCAPE WAIVERS REQUIRED FOR PROPOSED LAYOUT:

- Lack of street trees along Twelve Oaks Drive. Supported by staff.
- Deficiency in greenbelt canopy trees along Twelve Oaks Drive. Supported by staff.
- Lack of the required berm in all greenbelts. Supported by staff.
- Deficiency in parking lot perimeter trees. Supported by staff.
- Lack of required 6-8' tall landscaped berm along east property line. Proposed alternative is supported by staff for the sections of frontage adjacent to the parking lot as the large evergreens will provide sufficient buffering from the building to the east but not supported for the southern property line leas.
- Deficiency in multi-family landscaping multi-family unit trees. Not supported by staff as currently proposed but could be with more trees added where there is room to reduce the extent of the waiver to no more than 25% of the requirement.
- Deficiency in multifamily unit foundation landscaping along drives. Not supported by staff.

Recommendation

This project is recommended for approval for Preliminary Site Plan if the three unsupported waivers are satisfactorily addressed. There are other corrections to be made that can be addressed on the Final Site Plans.

Ordinance Considerations

Existing and proposed overhead and underground utilities, including hydrants. (LDM 2.e.(4)) Provided

Existing Trees (Sec 37 Woodland Protection, Preliminary Site Plan checklist #17 and LDM 2.3 (2)) Please add a note to the tree chart stating that all trees will be removed.

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

- 1. The adjacent property to the east is zoned RC and is occupied by an office building.
- 2. Instead of the required 4.5-6 ft tall landscaped berm, a mixture of densely planted large evergreen trees and shrubs is proposed.
- 3. This alternative requires a landscape waiver.
- 4. The alternative is supported for the frontage along the parking lot and Building A, but it is not supported for the frontage near Building C, where a vinyl fence should be added to completely block headlights from the adjacent parking lot.

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

- 1. The project has frontages along three roads Twelve Mile Road, Twelve Oaks Drive and a new proposed road along the south of the property.
- 2. Due to the topography of the site and utility conflicts, berms are not proposed on any of the frontages. This requires a waiver for the Twelve Oaks Drive and proposed road frontages that front on parking lots, It is supported due to the topography and utilities, but a note needs to be added to the plans and included in the Master Deed that the shrubs shall maintained at height so they reach at least 3 feet above the nearest curb.
- 3. Fewer greenbelt canopy trees than are required are provided along Twelve Oaks Drive. **This requires a waiver** that is supported by staff due to the utility conflicts.
- 4. No street trees are proposed along Twelve Oaks Drive due to a number of utility lines there. This requires a landscape waiver that is supported by staff.
- 5. All required trees are provided along the south private drive, but some of the trees required for the north side were planted along the south side. Please move at least three of those to the north side of the road as noted on the Landscape Chart.
- 6. All greenbelt trees need to be planted behind the sidewalk and on the correct side of the street. Please move them as noted on the Landscape Chart.

Multi-family Development Landscaping (Zoning Sec. 5.5.3xx.)

Multi-family unit landscaping

- 1. Greenbelt trees cannot be double-counted as multi-family unit trees.
- 2. Only 114 of the required 168 trees (68%) are provided.
- 3. A landscape waiver for the deficiency in trees provided is required. The waiver would be supported by staff if at least 75% of the total requirement (126) are provided on the site.
- 4. A waiver to use subcanopy trees for up to 30% of the required 168 trees or the number of trees provided would be supported by staff.

Interior drive landscaping

- 1. The required number of trees is provided. Excess trees along the interior drives may be counted as multi-family unit trees.
- 2. <u>Please add porous or pervious pavers or tree grates along the central drive above the</u> <u>structural soil to enhance water and air reaching the roots beneath them.</u>
- 3. <u>Please provide a construction detail(s) for the structural soil and tree grates to be used,</u> with dimensions.
- 4. <u>If the details are not included on the landscape plan, please note on the landscape plan detail sheet where in the set they can be found.</u>

Building foundation landscaping.

- 1. As all of the buildings have double fronts, the proposed scheme is acceptable to staff since the landscaped sides of the building face the busiest traffic and have more than the required building frontage landscaped if #2 below is implemented.
- 2. Please add greenspace with at least one shrub in small landscape areas between units on the drive side of the townhouse buildings to make the vehicular use areas more attractive.
- 3. Please add calculations for the required clubhouse building landscaping area (not just the frontage) and label the areas provided to determine if a waiver is required.

Parking Lot Landscaping

- 1. The required parking lot interior area and trees are provided.
- 2. There is a deficiency in parking lot perimeter trees which requires a waiver. That waiver is supported by staff as the parking areas are landscaped satisfactorily.

<u>Plant List (LDM 4.)</u>

- 1. Provided
- 2. 21 of 35 species used (60%) are native to Michigan.
- 3. The trees meet the diversity requirements of the Landscape Design Manual.

Planting Notations and Details (LDM)

Provided

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

- 1. If the site's storm water detention system does not need to be modified for this project, then no detention basin landscaping is required. If it does, please add the required shrubs for the modified portions of the pond.
- 2. No Phragmites australis or Japanese knotweed was found on the site.

Irrigation (LDM 1.a.(1)(e) and 2.s)

The applicant's response letter indicates that an irrigation system will be used. <u>Please add</u> that plan to the Final Site Plans. The system and plans should meet the following 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.

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 <u>rmeader@cityofnovi.org</u>.

1 Meader

Rick Meader – Landscape Architect

LANDSCAPE REVIEW SUMMARY CHART – Second Revised Preliminary Site Plan

Review Date:	January 7, 2022
Project Name:	JSP20 – 0027: The Griffin Novi
Plan Date:	December 3, 2021
Prepared by:	Rick Meader, Landscape Architect E-mail: <u>rmeader@cityofnovi.org</u> ; Phone: (248) 735-5621

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

LANDSCAPE WAIVERS REQUIRED FOR PROPOSED LAYOUT:

- Lack of street trees along Twelve Oaks Drive. Supported by staff.
- Deficiency in greenbelt canopy trees along Twelve Oaks Drive. Supported by staff.
- Lack of the required berm in all greenbelts. Supported by staff.
- Deficiency in parking lot perimeter trees. Supported by staff.
- Lack of required 6-8' tall landscaped berm along east property line. Proposed alternative is supported by staff for the sections of frontage adjacent to the parking lot as the large evergreens will provide sufficient buffering from the building to the east but not supported for the southern property line legs.
- Deficiency in multi-family landscaping multi-family unit trees. Not supported by staff as currently proposed but could be with more trees added where there is room to reduce the extent of the waiver to no more than 25% of the requirement.
- Deficiency in multifamily unit foundation landscaping along drives. Not supported by staff.

Item	Required	Proposed	Meets Code	Comments
Landscape Plan Requir	ements – Basic Information	(LDM (2))		
Landscape Plan (Zoning Sec 5.5.2, LDM 2.e)	 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 	Scale 1" = 40'	Yes	
Owner/Developer Contact Information (LDM 2.a.)	Name, address and telephone number of the owner and developer or association	Yes	Yes	
Landscape Architect contact information (LDM 2.b.)	Name, Address and telephone number of RLA/PLA/LLA who created the plan	Yes	Yes	
Survey information (LDM 2.c.)	Legal description or boundary line survey	Yes	Yes	

ltem	Required	Proposed	Meets Code	Comments
Project Information (LDM 2.d.)	Name and Address	Location map on Sheet L1-L3	Yes	
Sealed by LA . (LDM 2.g.)	Requires original signature	No	No	Stamping sets must have live signature of LA.
Miss Dig Note (800) 482-7171 (LDM.3.a.(8))	Show on all plan sheets	Yes	Yes	
EXISTING CONDITIONS				
Existing plant material Existing woodlands or wetlands (LDM 2.e.(2))	 Show location type and size. Label to be saved or removed. Plan shall state if none exists. 	 Tree survey showing all trees 8" or greater is provided on L-1 No regulated woodlands are shown on the site. One small wetland is indicated on the west edge of the site on L-1 No trees on the site will be preserved. 		 On the Tree Inventory List, please indicate which trees are being removed, at least with a note at the top of the chart stating that all trees on the site will be removed. See DRG letter for full review of woodlands and wetlands.
Soil type (LDM.2.r.)	As determined by Soils survey of Oakland county	A note on Sheet L1 and Sheet PSP1 describes the soils on the site but no boundaries are shown.	Yes	Please turn on the soil boundary line.
Zoning (LDM 2.f.)	Site: RC North: RA, East, West: RC South: RM-1	Shown on L2	Yes	
PROPOSED IMPROVEME	INTS			
Existing and proposed improvements (LDM 2.e.(4))	Existing and proposed buildings, easements, parking spaces, vehicular use areas, and R.O.W	 Yes Dimensions are provided on Sheet PSP1 	Yes	
Existing and proposed utilities (LDM 2.e.(4))	 Overhead and underground utilities, including hydrants Show proposed lighting 	Yes	Yes	
Proposed topography - 2' contour minimum (LDM 2.e.(1))	Provide proposed contours at 2' interval	Sheet PSP2No berms are proposed	• Yes • No	
Clear Zones (LDM 2.e.(5))	25 ft. corner clearance required. Refer to Zoning Sec 5.5.9	RCOC clear vision zone provided at 12 Mile Road entrance.	Yes	Please show the city clear vision zones for the Waltonwoods entry to the southern drive,

Item	Required	Proposed	Meets Code	Comments
		City clear vision zone shown at Town Center drive intersection.		and move trees out of it as necessary.
LANDSCAPING REQUIR	EMENTS		•	
Berms and ROW Plantin	g			
• Berm should be locat	a maximum slope of 33%. G ted on lot line except in cor structed with 6" of topsoil.		ouraged. S	how 1ft. contours
Residential Adjacent to	Non-residential (Sec 5.5.3.	A) & (LDM 1.a)		
Berm requirements (Zoning Sec 5.5.A)	Residential adjacent to <u>I-1 requires:</u> • 4.5-6 ft landscaped berm along east property line • Opacity 80% winter, 90% summer.	Dense landscaping is proposed along the east property line in lieu of the required landscaped berm	No	 A landscape waiver is required for the proposed configuration. Staff supports the proposed substitution for the berm along the parking lot frontage. Staff mostly supports the proposed substitution of double-loaded evergreen plantings along the edges adjacent to the building, but the two "legs" of the property line facing the adjacent property's parking lot should also have a 6-foot vinyl fence to block headlights from shining at Building C (approximately 235lf of fence)
Planting requirements (LDM 1.a.)	LDM Novi Street Tree List			
Adjacent to Public Righ	nts-of-Way (Sec 5.5.B) and (LDM 1.b)		
ROW Landscape Scree	ning Requirements Chart (S	· ·	1	
Greenbelt width (2)(3) (5)	 Adj to parking: 20 ft Not adj to parking: 25 ft 	 12 Mile Road: 20 ft Twelve Oaks Mall Drive: 22.9' to pkg, 30' to bldg Proposed road: 42 ft min from edge of new road 	• Yes • Yes • Yes	
Min. berm crest width	Adj to parking: 2 ft	• 12 Mile Road: 0 ft	• Yes	1. A landscape waiver

Item	Required	Proposed	Meets Code	Comments
	• Not adj to parking: 0 ft	Twelve Oaks Mall Drive: 0 ft Proposed road: 0 ft	• Yes/No • Yes/No	is required for not providing the required berms between parking lots and Twelve Oaks Mall drive and the proposed drive. 2. Staff will support the waiver and not require additional hedges at the edge of the parking lots If the proposed hedges are maintained at a height of no less than 4 feet (3 feet above the top of curb), then no additional hedges at the parking lot are required. Please add this requirement as notes on the landscape plans and as a provision in the Master Deed for the site.
Min. berm height (9)	 Adj to parking: 3 ft Not adj to parking: 0 ft 	 12 Mile Road: 0 ft Twelve Oaks Mall Drive: 0 ft Proposed road: 0 ft 	 Yes Yes/No Yes/No 	See above
3' wall	(4)(7)	No walls are indicated		
Canopy deciduous or large evergreen trees Notes (1) (10)	 Adj to parking: 1/35 lf Not adj to parking: 1/45lf Twelve Mile Rd: (623-44)/45 = 13 trees Twelve Oaks Mall Drive: (70+70)/35+(517- 140/45 = 12 trees Proposed Road: (670-25*2-22-42)/45 = 12 trees 	 12 Mile Road: 13 trees Twelve Oaks Mall Drive: 8 trees Proposed road: 13 trees 	• Yes • No • Yes	 A landscape waiver is required for the deficiency in canopy trees along Twelve Oaks Drive. As there are many utility lines in that greenbelt that prevent trees from being planted there, the waiver is supported. All greenbelt trees along the southern drive need to be planted behind the sidewalk, and on the

Sub-canopy deciduous frees Notes (2)(10)• Adj to parking: 1/20 lf • Not adj to parking: 1/30 lf • Twelve Mile Rd: (623-65)/30 = 19 frees • Twelve Oaks Drive: (70+70)/20+ (517- 140)/30 = 20 frees • Proposed Road: (670-25*2-22-42)/30 = 19 frees• 12 Mile Road: 19 frees • Twelve Oaks Mall Drive: 20 frees • Proposed Drive: 25 frees• Yes • No • Yes <th>tem</th> <th>Required</th> <th>Proposed</th> <th>Meets Code</th> <th>Comments</th>	tem	Required	Proposed	Meets Code	Comments
Sub-canopy deciduous trees Notes (2)(10)• Not adj to parking: 1/30lf • Twelve Mile Rd: (623-65)/30 = 19 trees • Twelve Oaks Drive: 					north side of the road. Please move the two CCs on the south side of the road and the 4 greenbelt trees along the east stub behind the easement line. Street trees need to be in those areas.
Canopy deciduous trees in area between sidewalk and curb• Twelve Mile Rd: (623-121)/45=11 trees • Twelve Oaks Drive: (517-26)/45 = 11 trees • Proposed Road: • North: (670-75-75- 145)/45 = 8 trees • South (655-65*2)/45 =• 12 Mile Road: 11 trees • Twelve Oaks Mall Drive: 0 trees • Proposed road: • No • Yes • South: 20 trees• 12 Mile Road: 11 trees • Twelve Oaks Mall Drive: 0 trees • South: 20 trees• Yes • Yes	deciduous trees	 Not adj to parking: 1/30lf Twelve Mile Rd: (623-65)/30 = 19 trees Twelve Oaks Drive: (70+70)/20+ (517- 140)/30 = 20 trees Proposed Road: (670-25*2-22-42)/30 = 	trees • Twelve Oaks Mall Drive: 20 trees • Proposed Drive:	• Yes	See above
	Canopy deciduous rees in area between	 1/45 lf Twelve Mile Rd: (623-121)/45= 11 trees Twelve Oaks Drive: (517-26)/45 = 11 trees Proposed Road: o North: (670-75-75- 145)/45 = 8 trees o South (655-65*2)/45 = 	 trees Twelve Oaks Mall Drive: 0 trees Proposed road: North: 4 trees 	• No	 If the RCOC does not allow some or all of the required trees along 12 Mile Road, they do not need to be planted but a copy of their decision must be provided. A landscape waiver is required for the lack of street trees along Twelve Oaks Drive. Due to the utility conflicts, it is supported by staff. Please move at least 3 of the trees required for the north side back to the north side. There is room along the east stub where the greenbelt trees are now, and a total of two between the two entries (south of Building G) where there is just one now.

Item	Required	Proposed	Meets Code	Comments
Building Landscaping (Zoning Sec 5.5.3.E.ii.)	 3 deciduous canopy trees or large evergreen trees per dwelling unit on the first floor. # First Floor units * 3 = xxx 56 * 3 = 168 trees Up to 25% of the required number of trees may be subcanopy trees for diversity. 	 114 trees (68% of requirement) Less than 25% of the multi-family trees are subcanopy trees 	No	 Multi-family unit trees may be used to meet parking lot interior and perimeter landscape requirements but <u>may not</u> be double- counted as greenbelt trees. A landscape waiver is required for the deficiency in trees provided. The waiver is not supported by staff without providing as many trees as are reasonably possible. At least 75% of the requirement (126 trees) should be provided on site. There are still some areas where unit trees could be added, and subcanopy trees could be used in place of some of the canopy trees to get the count up. If the full requirement is not met, the subcanopy trees could only be 25% of the total number of trees provided, not of the requirement.
Interior Street Landscaping	 1 deciduous canopy tree along interior roads for every 35 lf (both sides), excluding driveways, interior roads adjacent to public rights-of-way and parking entry drives. 900 lf/35 = 26 trees Trees in boulevard islands that are not needed to meet the interior drive tree 	 Structural soil is proposed along the central drive to provide improved growing conditions for the central interior drive sidewalks. 26 trees 	Yes	 The length of the interior drives may be reduced by the widths of driveways and interior drives, so the total interior drive length is only 900lf Please provide a detail for how the trees in the sidewalk along the central drive will be planted in the structural soil. The response letter

Item	Required	Proposed	Meets Code	Comments
	requirement can be counted as multi- family unit trees.			 indicated it had been added but 1 couldn't find it. 3. Please use porous or pervious pavers over the structural soil to provide sufficient air and water for the trees' roots. 4. If tree grates are proposed as the source of air and water to the roots beneath the pavement, dimensioned details for them also need to be provided and they should be shown on the plan. 5. Excess interior street trees may be counted as multi- family unit trees.
Foundation Landscaping	35% of building façades facing road should be landscaped	 All of the buildings are double- fronted Over 35% of the buildings facing main roads are landscaped None of the building frontages facing the parking drives have landscaping. This includes every building. 	Yes	 The proposed configuration requires a landscape waiver as the ordinance requires the units have landscaping on the side of the building facing the drive. The waiver would be supported by staff if the applicant would add a small landscape area and shrub between units on the garage sides of the buildings. Maintenance concerns are not a valid reason to not provide them.
Building Foundation – Clubhouse	 Foundation landscaping required = perimeter * 8 (sf) Approx 420lf * 8 = 3360 sf 	 35% of building is landscaped Some landscape area is provided but the area isn't quantified 	TBD	Please add calculations for the actual area of landscaping provided around the building and pool, not just the frontage %.

ltem	Required	Proposed	Meets Code	Comments
Parking Area Landscap	e Requirements (Zoning Se	c 5.5.3.C & LDM 5)		
General requirements (LDM 1.c)	 Clear sight distance within parking islands No evergreen trees 	Yes	Yes	
Name, type and number of ground cover (LDM 1.c.(5))	As proposed on planting islands	NA	TBD	
General (Zoning Sec 5.	5.3.C)			
Parking lot Islands (a, b. i)	 A minimum of 200 SF to qualify 200sf landscape space per tree planted in island. 6" curbs Islands minimum width 10' BOC to BOC 	Parking lot islands are sized acceptably	Yes	
Curbs and Parking stall reduction (C)	Parking stall can be reduced to 17' with 4" curb adjacent to a sidewalk of minimum 7 ft.	Spaces are 17' and 19' long	Yes	
Contiguous space limit (i)	Maximum of 15 contiguous spaces	The longest bay is 15 spaces long	Yes	
•	OS-2, OSC, OST, B-1, B-2, B-3		C-1, RC, Sp	ecial Land Use or non-
A = Total square footage of vehicular use areas x 7.5%	district (Zoning Sec 5.5.3.C. • A = x SF x 7.5% = A sf • A = 50000 x 7.5% = 3750sf	m)		
B = Total square footage of additional paved vehicular use areas over 50,000 SF x 1 %	 B = x SF x 1% = B sf B = 38302 x 1% = 383 sf 			
All Categories				
C = A+B Total square footage of landscaped islands	 A + B = C SF C = 3750 + 383 = 4133 sf 	6717 sf	Yes	
D = C/200 Number of canopy trees required	 D = C/200 trees D = 4133/200 = 21 trees Multi-family unit trees within the parking lots may be used to meet the interior parking lot landscaping requirements. 	21 trees (multi- family unit trees are used to meet this requirement)	Yes	
Parking Lot Perimeter Trees	 1 Canopy tree per 35 lf 1566lf/35 = 45 trees Sub-canopy trees can be used under 	 36 trees Greenbelt canopy trees near parking lots 	No	1. A landscape waiver is required for the deficiency in parking lot perimeter trees.

Item	Required	Proposed	Meets Code	Comments
	overhead utility lines. • Multi-family unit trees within the parking lots may be used to meet the interior parking lot landscaping requirements.	are properly double-counted as perimeter trees. • Multifamily unit trees are used for the remaining perimeter trees		2. As the lots are fully landscaped where possible, this waiver would be supported by staff.
Parking land banked	NA	None		
Miscellaneous Landsco	aping Requirements			
Plantings around Fire Hydrant (<i>d</i>)	 No plantings with matured height greater than 12' within 10 ft. of fire hydrants, manholes, catch basins or other utility structures. Should also be 5 feet from underground lines. 	 The utility conflicts have been resolved There are numerous tree/light pole conflicts where a tree is planted almost on top of a light pole 	• Yes • No	Please provide proper spacing between trees and light poles
Landscaped area (g)	Areas not dedicated to parking use or driveways exceeding 100 sq. ft. shall be landscaped	Yes	Yes	
Name, type and number of ground cover (LDM 1.c.(5))	As proposed on planting islands	Sod is proposed	Yes	
Snow deposit (LDM.2.q.)	Show snow deposit areas on plan in locations where landscaping won't be damaged	Yes	Yes	
Transformers/Utility boxes (LDM 1.e from 1 through 5)	 A minimum of 2 ft. separation between box and the plants Ground cover below 4" is allowed up to pad. No plant materials within 8 ft. from the doors 	 Some transformer boxes are indicated and are landscaped on three sides Detail is provided. 	No	<u>Please show screening</u> <u>landscaping on all four</u> <u>sides per the detail.</u>
Detention/Retention Basin Planting requirements (Sec. 5.5.3.E.iv)	 Clusters shall cover 70- 75% of the basin rim area 10" to 14" tall grass along sides of basin Canopy trees shall be placed at 1/35lf of basin on east, south and west sides 	No detention basin or detention basin landscaping is shown on the plans.	TBD	Please add required detention landscaping for any new above- ground detention basins or the changed area(s) of existing detention basins.

Item	Required	Proposed	Meets Code	Comments
	 Refer to wetland for basin mix Include seed mix details on landscape plan 			
General Landscape Re	equirements (LDM 3)			
General Conditions (LDM 3.a)	Plant materials shall not be planted within 4 ft. of property line	Notes have been added	Yes	
Irrigation plan (LDM 2.s.)	 A fully automatic irrigation system and a method of draining is required with Final Site Plan OR Plans for alternative methods of providing sufficient water for plant establishment and long-term survival must be provided instead. 	No		 Please add irrigation plan or information as to how plants will be watered sufficiently for establishment and long- term survival. If xeriscaping is used, please provide information about plantings included. If an irrigation system is to be used, the plan for it must be included in the Final Site Plans. The irrigation system must follow the guidelines provided at the bottom of this chart.
Other information	Required by Planning	NA		
(LDM 2.u) Landscape tree credit (LDM3.b.(d))	Commission • 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 trees are being saved so no credits can be taken		
Plant Sizes for ROW, Woodland replacement and others (LDM 3.c)	Canopy Deciduous shall be 3" and sub-canopy deciduous shall be 2.5" caliper.	Included in plant list		
Plant size credit (LDM3.c.(2))	NA	No		
Prohibited Plants (LDM 3.d)		None are used		

ltem	Required	Proposed	Meets Code	Comments
Recommended trees for planting under overhead utilities (LDM 3.e)	Label the distance from the overhead utilities	All utility lines are shown		
Collected or Transplanted trees (LDM 3.f)		None		
Nonliving Durable Material: Mulch (LDM 4)	 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. Refer to section for additional information 	Included in details		
Landscape Notes and	Details– Use City of Novi Sta	indard Notes		
Plant List (LDM 4) – Incl	ude all cost estimates			
Quantities and sizes		Yes	Yes	
Root type		Yes	Yes	
Botanical and common names	 At least 50% of the species used must be native to the State of Michigan. For projects with 200 trees or more, LDM section 4 allows a maximum of 15% of the trees from one genus and 10% from one species. 	 21 of 35 species used (60%) are native to Michigan The tree diversity meets the requirement of the Landscape Design Manual 	• Yes • Yes	
Type and amount of lawn		Both sod and seed are proposed and are included in cost estimate	Yes	
Cost estimate (LDM 2.t)	For all new plantings, mulch and sod as listed on the plan	Yes	Yes	
Planting Details/Info (L	DM 2.i) – Utilize City of Novi	Standard Details		
Canopy Deciduous Tree	Refer to LDM for detail drawings	Yes	Yes	
Evergreen Tree		Yes	Yes	
Shrub		Yes	Yes	
Multi-stem tree		Yes	Yes	
Perennial/		Yes	Yes	

ltem	Required	Proposed	Meets Code	Comments
Ground Cover				
Tree stakes and guys	Wood stakes, fabric guys.	Yes	Yes	
Cross-Section of Berms	(LDM 2.j)			
Slope, height and width	 Label contour lines Maximum 33% slope Constructed of loam 6" top layer of topsoil 	No berms are proposed so no details are provided		
Type of Ground Cover				
Setbacks from Utilities	Overhead utility lines and 15 ft. setback from edge of utility or 20 ft. setback from closest pole, 10 feet from structures, hydrants	All utility lines and structures are shown on the landscape plan		
Walls (LDM 2.k & Zoning	g Sec 5.5.3.vi)			
Material, height and type of construction footing	Freestanding walls should have brick or stone exterior with masonry or concrete interior	No walls are proposed		
Walls greater than 3 ½ ft. should be designed and sealed by an Engineer		NA		
Notes (LDM 2.i) – Utilize	City of Novi Standard Deta	ils		
Installation date (LDM 2.1. & Zoning Sec 5.5.5.B)	 Provide intended date Between Mar 15 – Nov 15 	Spring-Nov 15, 2023	Yes	
Maintenance & Statement of intent (LDM 2.m & Zoning Sec 5.5.6)	 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. 	Yes	Yes	
Plant source (LDM 2.n & LDM 3.a.(2))	Shall be northern nursery grown, No.1 grade.	Yes	Yes	
Establishment period (Zoning Sec 5.5.6.B)	2 yr. Guarantee	Yes	Yes	
Approval of substitutions. (Zoning Sec 5.5.5.E)	City must approve any substitutions in writing prior to installation.	Yes	Yes	
NOTES: 1. This table is a workir	ng summary chart and not	intended to substitute	for any Or	dinance or City of Novi

Item	Required	Proposed	Meets Code	Comments
requirements or standards				

- 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:

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

WETLAND REVIEW



August 23, 2021

Ms. Lindsay Bell City Planner Department of Community Development City of Novi 45175 W. Ten Mile Road Novi, Michigan 48375

RE: The Griffin (fka Uptown Place); JSP20-0027 Wetland Review of Revised Preliminary Site Plan MSG Project No. N1030026

Dear Ms. Bell:

The Mannik & Smith Group, Inc. (MSG) reviewed the revised preliminary site plan for Griffin Twelve Oaks prepared by Krieger Klatt Architects dated August 3, 2021 and stamped "Received" by the City of Novi on August 5, 2021 (the rPSP) for conformance with the requirements of the City's Wetland Ordinance Chapter 12, Article V. Wetland information appears on *Sheet PSP8, Overall Survey* of the rPSP. The following sections reiterate information provided in MSG's *Wetland Review of Preliminary Site Plan* letter dated May 5, 2021. New information or comments are presented in **bold italics**.

The project site is located south of Twelve Mile Road and west of Meadowbrook Road in Section 14. The parcel number associated with the project site is 50-22-14-200-034 (Site). The PSP depicts development of the Site with multiple improvements including nine multi-unit residential buildings and associated private roads.

Published Data

MSG reviewed The City of Novi Wetlands Maps and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Wetlands Map Viewer for the project site (Figures 1 and 2, respectively). The project site contains wetlands as identified on National Wetland Inventory (NWI) and Michigan Resource Inventory System (MIRIS) maps (Figure 2). NWI and MIRIS wetlands are identified through interpretation of topographic data and aerial photographs by the associated governmental bodies.

MSG Wetland Boundary Verification

The preliminary site plan (PSP) dated March 5, 2021 depicted the locations of two wetlands on the Site that are identified as Wetlands A and B. MSG visited the Site on May 3, 2021 to evaluate the accuracy of the PSP's depiction of wetlands on the Site. The observed conditions at the Site generally consisted of vacant land predominantly covered with herbaceous vegetation (mown grass) and sparse trees, with a more densely wooded area generally located along the eastern boundary. Wetland delineation markers (pink ribbon) were observed that corresponded to the perimeter of Wetland B as depicted on the PSP. The delineation markers for Wetland A appeared to have largely been lost; a few stakes (survey lath) were observed near the Wetland A area. Selected inspection photographs are found at the end of this letter.

MSG concurs with the extent of Wetland B as depicted on the PSP and as observed in the field. Although the wetland is of poor quality (limited storage capacity and habitat function) and appears to have been a dumping or

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N1030026.Wetland Review.RPSP.docx

historical storage area for concrete blocks and other materials (Photo 6), it appears to be in communication with a more substantial and developed wetland environment to the immediate east of the Site (Photo 7).

It is MSG's opinion additional information regarding the limits of Wetland A is necessary. MSG observed a swale to the east of the southern end of Wetland A that included evidence of wetland hydrology and wetland vegetation at the (Photo 3, Photo 4, and Figure 3). It is unclear to MSG why this area was not included in the limits of Wetland A.

MSG reviewed the Response to Comments for Uptown Place Development letter prepared by Wilson Road Group (WRG) dated July 31, 2021. MSG notes WRG expanded the limits of Wetland A as suggested by MSG. The revised size of Wetland A was identified by WRG to be 0.206 acre, bringing the combined acreage for Wetlands A and B to 0.241 acres, which is below the City's 0.25-acre threshold for compensatory mitigation. The revised wetland acreage is depicted on Sheet PSP8 of the rPSP. MSG observed the square footage of Wetland A noted on Sheet PSP8 was not similarly adjusted however, and suggests this typo be corrected.

Permits and Regulatory Status

The rPSP proposes to impact a total of 0.206-acre of wetland and an unspecified area of wetland buffer. The following wetland related items are required for this project:

Item	Required/Not Required/Not Applicable		
Wetland Use Permit (Non-Minor or Minor)	Required, Minor assumed (see below)		
Wetland Mitigation	Not applicable		
Wetland Buffer Authorization	Required		
EGLE Wetland Permit	To be determined		
Wetland Conservation Easement	Not applicable		

1. Fill volumes for wetland impacts are not identified on the PSP. The volume of wetland proposed to be filled must be specified for verification that a Nonresidential Minor Use Permit is appropriate.

The fill volumes are not identified in the rPSP or WRG's July 31, 2021 response letter. This comment still applies.

2. The City requires compensatory wetland mitigation for regulated impacts of 0.25-acre and greater, or contiguous to a lake, pond, river or stream. The proposed impacts do not appear to meet the size threshold. However, based on City of Novi maps it appears Wetland B may be connected to Twelve Oaks Lake to the south (Figure 4). EGLE typically regulates wetlands within 500 feet of an inland lake, pond, stream, or river, and isolated wetlands greater than 5 acres in size. Therefore, EGLE jurisdiction may apply and wetland mitigation may be required. If EGLE were to regulate Wetland A, mitigation would likely be required for fills to that wetland, as well. MSG recommends that the client obtain verification from EGLE through a pre-application meeting regarding state jurisdictional status.

This comment still applies.

3. The extent of the wetland at the east-adjoining property should be defined to determine the area of wetland buffer that could be affected by the proposed development at the Site.

This comment still applies.

4. Although the habitat quality is not high for Wetland A and B and their associated natural features setbacks, MSG recommends the applicant include replacement native plantings, including trees and shrubs, in the remaining setback areas, particularly in areas that have been cleared of non-native invasive species.

This comment still applies.

Based on available information, MSG recommends approval of the rPSP for wetlands conditional upon the applicant satisfactorily addressing items 1 through 4 listed above.

Please contact the undersigned if you have any questions regarding the matters addressed in this letter.

Sincerely, The Mannik & Smith Group, Inc.

Joughn 9 Ken

Douglas Repen, CDT Environmental Scientist Certified Storm Water Management Operator C-20319

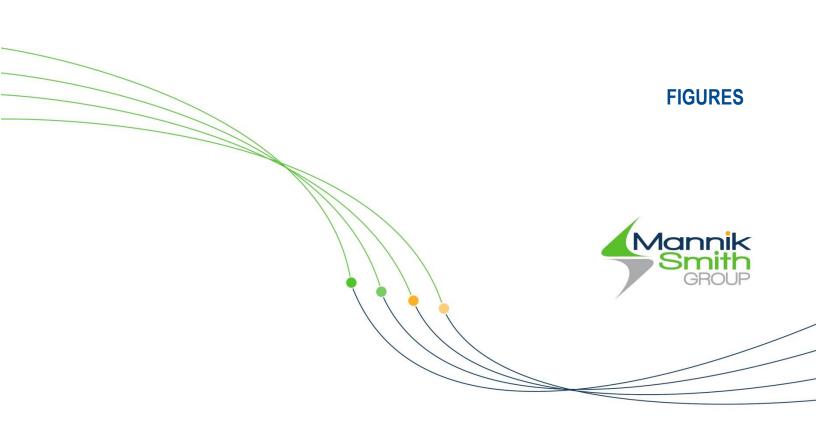
John A. Freelend

John A. Freeland, PhD, SPWS Senior Scientist

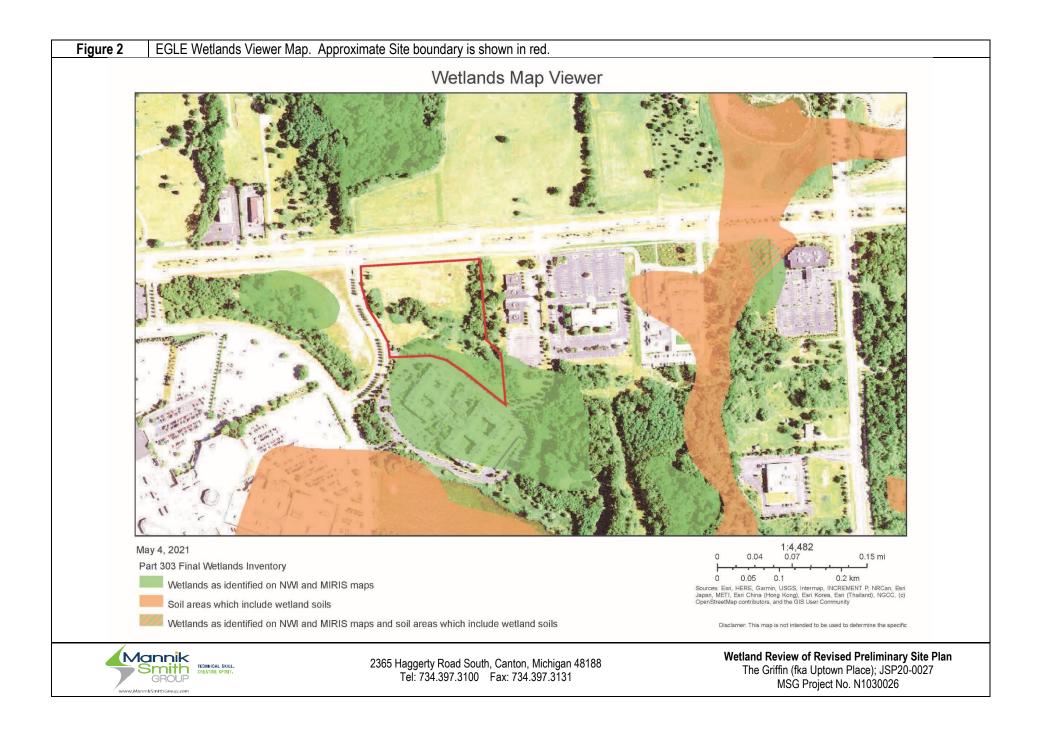
Craig S. Willey

Project Manager

CC: Barbara McBeth, City of Novi Planner Christian Carroll, City of Novi Planner Madeleine Daniels, City of Novi Planner Rick Meader, City of Novi Landscape Architect







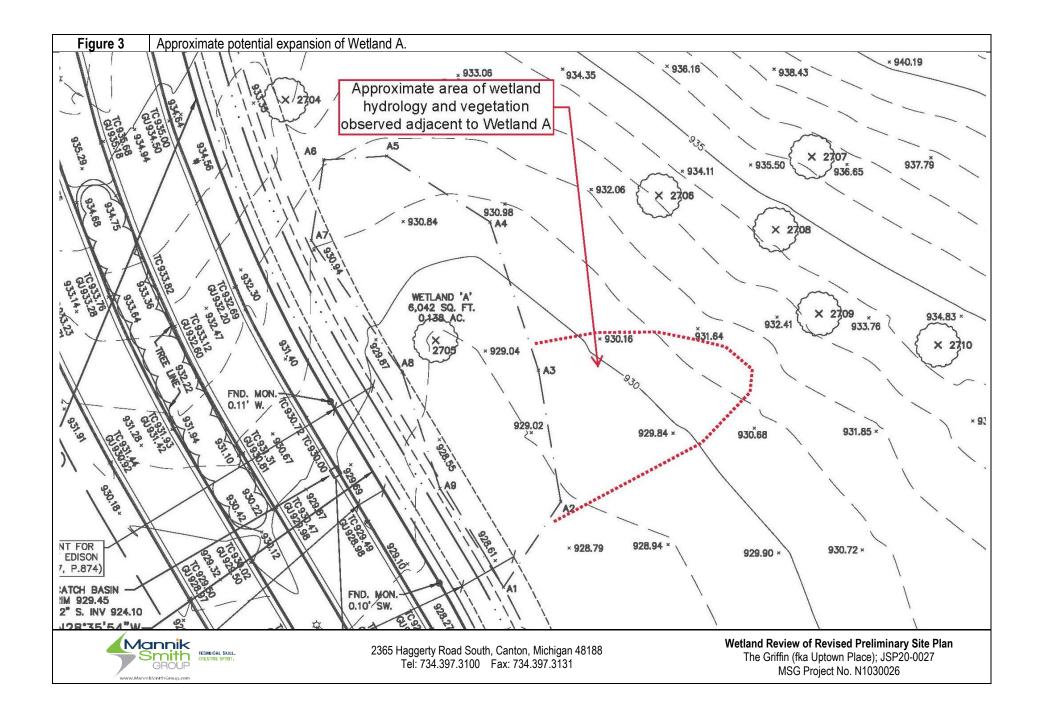








Photo 1: Overview of the Site, facing northwest (May 3, 2021).



Photo 2: View of Wetland A, facing north (May 3, 2021).



2365 Haggerty Road South, Canton, Michigan 48188 Tel: 734.397.3100 Fax: 734.397.3131 Wetland Review of Revised Preliminary Site Plan The Griffin (fka Uptown Place); JSP20-0027 MSG Project No. N1030026 Photo Page 1 of 4



Photo 3: View of swale adjoining Wetland A with wetland indicators, facing northeast (May 3, 2021).



Photo 4: Close view of swale adjoining Wetland A with wetland indicators, facing northwest (May 3, 2021).



2365 Haggerty Road South, Canton, Michigan 48188 Tel: 734.397.3100 Fax: 734.397.3131 Wetland Review of Revised Preliminary Site Plan The Griffin (fka Uptown Place); JSP20-0027 MSG Project No. N1030026 Photo Page 2 of 4



Photo 5: View of Wetland B, facing southwest (May 3, 2021).



Photo 6: View of concrete blocks in Wetland B (May 3, 2021).



2365 Haggerty Road South, Canton, Michigan 48188 Tel: 734.397.3100 Fax: 734.397.3131 Wetland Review of Revised Preliminary Site Plan The Griffin (fka Uptown Place); JSP20-0027 MSG Project No. N1030026 Photo Page 3 of 4



Photo 7: View of wetland area adjoining Wetland B to the east, facing east (May 3, 2021).



WOODLAND REVIEW



Corporate Headquarters 295 South Water Street, Suite 300 Kent, OH 44240 800-828-8312

> Local Office 3381 Lapeer Rd. West Auburn Hills, MI 48326

То:	Barbara McBeth, City Planner Community Development Department, City of Nov
From:	Kerry Gray, Principal Consultant Davey Resource Group
CC:	Christian Carroll, City of Novi Planner Lindsay Bell, City of Novi Senior Planner Rick Meader, City of Novi Landscape Architect Madeleine Daniels, City of Novi Planning Assistant Craig Willey, Mannik and Smith Group Douglas Repen, Mannik and Smith Group
Date:	May 5, 2021

RE: The Griffin (fka Uptown Place) Woodland Review #1 – JSP 20-27 (PSP21-0025)

Davey Resource Group, Inc. (DRG) has conducted a review of the Preliminary Site Plan for The Griffin Novi prepared by Krieger Klatt Architects (dated: 03/15/2021). DRG reviewed the plan for conformance with the City of Novi's Woodland Protection Ordinance, Chapter 37.

The applicant is proposing the construction of a multi-family residential development on an 8-acre parcel on 12 Mile Road between Novi and Meadowbrook Roads - Parcel ID: 22-14-200-034. There are no City-regulated woodlands on the site (see Figure 1 and Woodland Impacts below).

Recommendation: DRG has confirmed there are no regulated woodlands or trees on the site and **recommends approval** of the Griffin Novi Preliminary Site Plan.

Woodland RegulationRequiredWoodland Permit (Chapter 37, Section 37-26)NOTree Replacement (Chapter 37, Section 37-8)NOTree Protection (Fence) (Chapter 37, Section 37-9)NOWoodland Conservation Easement (Chapter 37-30 (e))NO

The following Woodland Regulations apply to this site:

Woodland Impacts

A site inspection conducted on May 4, 2021 confirmed that, while there are trees, there are no regulated woodlands or trees on the site (see site photos). The site is mostly grass/low lying weeds with a small stand of trees along the eastern property line, several small cottonwoods (*Populus deltoides*) and Siberan elms (*Ulmus pumila*) in the middle and along the western edge of the site, and a row of planted blue spruce (*Picea pungens*) along the south/eastern property lines. The small stand of trees (not a regulated woodland) contains a mix of boxelder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), Siberian elm (*Ulmus pumila*), buckthorn (*Rhamnus cathartica*) and black locust (*Robinia pseudoacia*). All trees are between 8" and 18" DBH and are not regulated by Chapter 37.



Site Photos

a. Eastern property line from 12 Mile Road

b.View south from 12 Mile Road



c. View southwest from 12 Mile Road



d. View west from 12 Mile Road



e. Trees along eastern property line





f. Blue spruce along southern property line



g. Looking north cottonwood trees in middle of the site



Figure 1. Griffin Novi Site City of Novi Regulated Woodland Map (No Regulated Woodland present on site) **TRAFFIC REVIEW**

ΑΞϹΟΜ

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

Project name: JSP20-027 The Griffin 2nd Revised Preliminary Site Plan Traffic Review

From: AECOM

Date: January 25, 2022

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

CC: Lindsay Bell, Madeleine Daniels, Victor Boron, Christian Carroll, Humna Anjum

Memo

Subject: JSP 20-027 The Griffin 2nd Revised Preliminary Site Plan Traffic Review

The second revised preliminary site plan was reviewed to the level of detail provided and AECOM recommends **approval** for the applicant to move forward with the condition that the comments provided below are adequately addressed to the satisfaction of the City.

GENERAL COMMENTS

- 1. The applicant, Singh Development, L.L.C., is proposing a housing development including a mixture of apartment buildings and townhomes on the south side of Twelve Mile Road, between Novi Road and Meadowbrook Road.
- 2. Twelve Mile Road is under the jurisdiction of the Road Commission for Oakland County (RCOC). Twelve Oaks Mall Road is a private road.
- 3. The parcel is currently zoned RC (Regional Center) and is also designated as a PD-2 (Planned Development) option on the future Master Plan Land Use Map. Under the PD-2 option, the applicant is directed to follow the amendments given in Ordinance No 18.295.
- 4. Summary of traffic-related waivers/variances:
 - a. The applicant has requested a variance for lack of sidewalk offset from the travel way at three locations.
 - b. The applicant has requested a waiver for trash receptacle located in side yard.
 - c. The applicant has requested a deviation for reduced amount of proposed parking spaces.

TRAFFIC IMPACTS

1. AECOM performed an initial trip generation estimate based on the ITE Trip Generation Manual, 10th Edition, as follows:

ITE Code: 221 (Multifamily Housing (Mid-Rise)) Development-specific Quantity: 174 Dwelling Units Zoning Change: N/A

Trip Generation Summary							
Estimated Trips Estimated Peak- Direction Trips Threshold Threshold							
AM Peak-Hour Trips	59	44	100	No			
PM Peak-Hour Trips	75	46	100	No			
Daily (One-Directional) Trips	947	N/A	750	Yes			

2. AECOM recommends performing the following traffic impact study in accordance with the City's requirements.

Trip Impact Study Recommendation						
Type of Study: Justification						
TIS	Trips exceeds the City's threshold for daily one-directional trips. A TIS was submitted and approval recommended with the initial PSP submission. The applicant has submitted supplemental parking study information which has been reviewed below.					

PARKING STUDY COMMENTS

Parking study review could not verify the claim preparer has made in the study (page 2 of 3): "However, weekend (<u>Sunday</u>) data for Multi-Family Mid-Rise Housing (LUC #221) is limited to only one (1) case study which does not provide a statistically significant estimate. Therefore, weekend parking demand for Multi-Family Low-Rise Housing (LUC #220) were reviewed which has relatively more data points. The result of the review suggests that peak parking demand rate is approximately 8.3% higher on weekends for low-rise multi-family dwelling units. Therefore, this rate was applied to the Mid-Rise land use to calculate a representative weekend peak demand."

The ITE Parking Generation 5th version suggests the following:

Land Use	Location	Independent Variable	Time Period (Weekday – Monday – Friday)	Time Period (Sunday)
220 – Multifamily Housing (Low-Rise)	General Urban/Suburban (no nearby rail transit)	Dwelling Units	Average Rate = 1.21 (119 data points)	Average Rate = 1.66 (1 data point)
				37.2% higher
221 - Multifamily Housing (Mid-Rise)	General Urban/Suburban (no nearby rail transit)	Dwelling Units	Average Rate = 1.31 (73 data points)	Average Rate = 2.05 (1 data point)
				56.5% higher

However, in the absence of adequate data points for the peak parking demand during weekend (Sunday) for Multifamily Housing, the applicant has arrived at the average existing parking supply rate based on the study of other similar developments. The parking study includes information on two other communities indicating an existing parking supply of 1.60 to 1.63 spaces per dwelling unit. The proposed parking supply in the Griffin Twelve Oaks Apartments is approximately 1.77 spaces per dwelling unit – higher than the existing parking supply data provided for other communities.

The applicant is requested to update the parking study to reflect the conclusion based on the other communities.

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 is 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.

EXT	EXTERNAL SITE ACCESS AND OPERATIONS						
No	Item	Proposed	Compliance	Remarks			
1	Driveway Radii O <u>Figure IX.1</u>	15', 20', and 25' Met		15', while in range, could be increased to standard 20'.			
2	Driveway Width O Figure IX.1	24' and 26' for non- divided, 22' for divided	Met				
3	Driveway Island Length O <u>Figure IX.1</u>	80.4'	Met	Non-standard, but within range.			
4	Emergency Access O <u>11-</u> <u>194.a.19</u>	Turning movements provided	Met				
5	Driveway sight distance O <u>Figure VIII-E</u>	Not provided	Inconclusive	Provide details of sight distance along 12 Mile Road in future plans.			
6	Driveway spacing						
6a	Same-side O <u>11.216.d.1.d</u>	424.5' and 508.1' indicated, centerline to centerline	Met	Same side driveway spacing is to be measured near-curb to near-curb. However, the centerline to centerline dimensions indicates compliance.			
6b	Opposite side O <u>11.216.d.1.e</u>	Not applicable for divided roadway with median (12 Mile Road).	Not applicable	Spacing on 12 Mile Road with the turnaround could be provided.			
7	External coordination (Road agency)	Required for any ROW Work	-	-			
8	External Sidewalk <u>Master</u> <u>Plan & EDM</u>	Existing sidewalk along 12 Mile Road, 5' width along southern road	Met	-			
9	Sidewalk Ramps EDM 7.4 & R-28-J	Indicated	Met				
10	Any Other Comments:	Taper dimensions meet	requirements.				

INTERNAL SITE OPERATIONS							
No.	Item	Proposed in the Plan	Compliance	Remarks			
11	Driveway Spacing	N/A					
12	Trash receptacle <u>ZO 5.4.4</u>	2 proposed	Met	Applicant could consider providing a trash receptacle closer to buildings A, B, E, and F.			
13	Emergency Vehicle Access	Fire turning movements have been provided	Met				
14	Maneuvering Lane <u>ZO 5.3.2</u>	24'	Met				
15	End islands <u>ZO 5.3.12</u>						
15a	Adjacent to a travel way	Dimensioned 3' shorter as typical, 12' outer radius	Partially Met	Outer radius should be 15' .			
15b	Internal to parking bays	Widths indicated, length for internal islands may be the same as spaces.	Met				
16	Parking spaces <u>ZO 5.2.12</u>	2' overhang dimensioned	Partially Met	Not indicated for all 17' spaces. Sidewalk east of building D is reduced to 4' due to both 2' overhangs near ramp.			
17	Adjacent parking spaces <u>ZO</u> <u>5.5.3.C.ii.i</u>	<15 spaces, 1 location >15 spaces	Met	More than 15 spaces without an island in covered parking area, however the City considers this a parking structure that does not require islands.			
18	Parking space length <u>ZO</u> <u>5.3.2</u>	17' perpendicular with curb, 19' perpendicular without curb, 23' parallel	Met	Include dimensions for parking spaces on the north side and south side of building D.			
19	Parking space Width <u>ZO</u> 5.3.2	9' perpendicular, 8' parallel	Met				
20	Parking space front curb height <u>ZO 5.3.2</u>	4" typically, bumpber blocks at barrier free spaces near clubhouse, no curb shown in covered area	Partially Met	Include a bumper block detail in future submittals. Face of bumper block must be 17' from end of spaces, bumper block must be 4" in height. Curb height should be indicated in covered parking area if sidewalk areas for pedestrians are present			
21	Accessible parking – number <u>ADA</u>	6	Met				
22	Accessible parking – size ADA	8' space and 8' aisle	Met				
23	Number of Van-accessible space ADA	Not labeled beyond sign detail	Inconclusive	All spaces dimensioned as van accessible.			
24 24a	Bicycle parking Requirement <u>ZO 5.16.1</u>	18 outdoor spaces, 20 interior spaces indicated	Met				

INTE	RNAL SITE OPERATIONS			
No.	Item	Proposed in the Plan	Compliance	Remarks
24b	Location <u>ZO 5.16.1</u>	3 locations outside, in Building A indoors	Met	
24c	Clear path from Street <u>ZO</u> <u>5.16.1</u>	6'	Met	
24d	Height of rack ZO 5.16.5.B	3'	Met	
24e	Other (Covered / Layout) <u>ZO</u> <u>5.16.1</u>	Layout provided, covered parking indicated	Met	
25	Sidewalk – min 5' wide <u>Master Plan</u>	8' indicated	Met	
26	Sidewalk ramps <u>EDM 7.4</u> & <u>R-28-J</u>	Indicated	Met	
27	Sidewalk – distance back of curb <u>EDM 7.4</u>	Not dimensioned	Not Met	When sidewalk is not abutting parking spaces, offset should be provided. Sidewalk on the west side of the pool area should be offset from travel way. Sidewalk on southeast corner of building D should be offset from travel way. Sidewalk on north corner of building C should be offset from travel way. Sidewalk along divided entry is offset 11', 15' should be used if possible. Variance has been requested for areas that offset cannot be met.
28	Cul-De-Sac O Figure VIII-F	N/A	-	-
29	Turning Areas ZO 5.10.1.B.II	N/A	-	-
30	Minor/Major Drives <u>ZO 5.10</u>	26', 24', and 27.5' drives	Met	No parking signs should be added along the 24' north/south minor drive along buildings E, F, and G.
31	Any Other Comments:			

SIG	NING AND STRIPING			
No.	Item	Proposed in the Plan	Compliance	Remarks
32	Signing: Sizes <u>MMUTCD</u>	Some included	Partially Met	30"x30" stop signs indicated, ADA parking sign size not included.
33	Signing table: quantities and sizes	Included	Partially Met	Include MMUTCD codes for the signs in the sign quantities.
34	Signs 12" x 18" or smaller in size shall be mounted on a galvanized 2 lb. U-channel post <u>MMUTCD</u>	Included	Met	

SIGI No.	NING AND STRIPING	Proposed in the	Compliance	Remarks
		Plan		
35	Signs greater than 12" x 18" shall be mounted on a galvanized 3 lb. or greater U- channel post <u>MMUTCD</u>	Included	Met	
36	Sign bottom height of 7' from final grade <u>MMUTCD</u>	Included	Met	
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 <u>MMUTCD</u>	Included	Met	
38	FHWA Standard Alphabet series used for all sign language <u>MMUTCD</u>	Included	Met	
39	High-Intensity Prismatic (HIP) sheeting to meet FHWA retro- reflectivity <u>MMUTCD</u>	Included	Met	
40	Parking space striping notes	Included	Met	
41	The international symbol for accessibility pavement markings ADA	Not included	Inconclusive	
42	Crosswalk pavement marking detail	Not included	Inconclusive	
43	Maintenance of Traffic Plans	Not included	Inconclusive	Plans to maintain access to adjacent property should be included. Maintenance of traffic plans along Twelve Mile Road should be submitted to RCOC for approval.
44	Any Other Comments:			· · ·

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

Patricia a Thompson

Patricia Thompson, EIT Traffic Engineer

Paulo K. Johnson

Paula K. Johnson, PE Senior Transportation Engineer

Saumin Shal

Saumil Shah, PMP Project Manager

TIS REVIEW

ΑΞϹΟΜ

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

Project name: JSP20-27 – The Griffin TIS Traffic Review From: AECOM

Date: May 6, 2021

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

CC: Lindsay Bell, Madeleine Kopko, Kate Richardson, Victor Boron, Christian Carroll

Memo

Subject: JSP20-27 - The Griffin TIS Traffic Review

The Traffic Impact Study was reviewed to the level of detail provided and AECOM recommends **denial** of the Traffic Impact Study; 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 on the south side of Twelve Mile Road, between Novi Road and Meadowbrook Road.
- 3. The TIS and Shared Parking Study were completed for the project approval.

BACKGROUND DATA

- 1. The following roadways were included in the study:
 - a. Twelve Mile Road: East/West, 45 mph, 4 lanes divided
 - b. Novi Road: North/South, 45 mph, 7 lanes with a two-way left-turn lane (TWLTL) south of 12 Mile and 5 lanes with TWLTL north of 12 Mile.
 - c. 12 Oaks Mall Road: Private road, North/South, 25 mph, 4 lanes.
 - d. The intersections at the crossovers from just west of Novi Road to just east of the site driveway were included in the study.
- Pre-COVID-19 volumes and turning movement counts were obtained for March 3 through 5, 2020 from the RCOC SCATS database. Weekday turning movement counts were collected on February 10, 2021, to compare to pre-COVID volumes.
 - With pre-COVID traffic numbers being 70 to 400% greater than post-COVID values, the pre-COVID volumes were used.
 - AM peak hour was identified at 7:45 AM to 8:45 AM and PM peak hour was identified as 4:45 PM to 5:45 PM.

EXISTING CONDITIONS

- The overall Level of Service (LOS) at the major road intersections is B, while LOS at the crossover intersections is A.
 a. The lowest individual movement LOS is D.
- 2. Minor queues were observed in the SimTraffic for peak 15 minute periods, but the queues quickly dissipated.

BACKGROUND (NO BUILD) CONDITIONS 2024

- 1. A conservative 0.5% annual growth rate was used to determine the 2023 build year data, based on the SEMCOG traffic volume forecasts.
- Overall operations at the intersections are not expected to change significantly, however, the LOS of the intersection at Twelve Mile Road and Novi Road is anticipated to change from B to C for the PM peak period, a change of only 0.5 seconds per vehicle.

SITE TRIP GENERATION

- 1. A total of 947 trips are anticipated based on the ITE trip generation codes.
 - a. Multi-Family Home (Mid-rise) was used to calculate the trips.

SITE TRAFFIC ASSIGNMENT

- 1. Adjacent street volumes were used to calculate site trip distribution.
 - a. The largest portion of the traffic is assumed to be coming from/going to the east on Twelve Mile Road.

FUTURE CONDITIONS

- 1. Operations at the signalized intersections are not expected to be impacted greatly.
- 2. The site driveways are expected to operate at LOS C during the AM peak period and LOS B during the PM peak period.

MULTI-MODAL TRANSPORTATION EVALUATION

- 1. There is a sidewalk proposed along with the development along Twelve Mile Road.
- 2. The preparer mentions the bike racks planned in the development but they are not included in the multi-modal figure.

ACCESS MANAGEMENT

- 1. Due to the volume of traffic on Twelve Mile Road, a right turn taper is warranted.
- 2. Driveway spacing is about 400 ft to 12 Oaks Mall Road and 475 ft to the DMC Driveway.
- 3. The site distances meet the required distance, with minimal vertical and horizontal deflection. Trees/vegetation along Twelve Mile Road should be evaluated to ensure they do not block sightlines.

PARKING STUDY

1. The parking analysis was done using ITE's Parking Generation, 5th Edition. The analysis was done with Weekday and Weekend average rates for 'Peak period parking demand' (11 PM to 7 AM) referring to the category 221 - Multifamily Housing (Mid-Rise). However, 'Weekend' analysis with dwelling units (Table 6) only reflects parking demand calculation from Saturday and parking calculation for Sunday is not taken into consideration. The average rate for 'Peak period parking demand' for Sunday is 2.05 as per the same standard which is 356 parking spaces for 174 units, exactly similar to the requirement (355) calculated from the City of Novi ordinance. And hence, we do not agree with the statement 'The projected peak parking demand for this site is 228 spaces and is expected to occur during the overnight hours, from 12 AM - 4 AM'. Based on the ITE's Parking Generation 5th Edition, the projected peak demand for the weekend (with rate from Sunday) for this site is 356 spaces and is expected to occur from 11 PM to 7 AM on Sunday based on the numbder of the dwelling units. We noted that 'peak period parking demand rates' for Saturdays and Sundays within the ITE's Parking Generation 5th edition are with limited sample sizes 3 and 1 respectively. But this can also be supported with the following facts:

- Sunday overnight is the logical peak period parking demand for residential development compared to weekdays or Saturdays.
- Lack of public transit within the City of Novi and high vehicle ownership and car dependency in this economic segment within this area.
- 94 spaces are provided as in-unit type garage spaces and can not be considered as available for cross-sharing even if a unit is emptied/not occupied or the unit owner doesn't own the car.

We encourage the applicant to arrive at the average peak period parking demand rate based on the study of similar developments in the region.

CONCLUSIONS

- 1. The intersections all currently operate at LOS D or higher.
- 2. The system is expected to operate at LOS D or higher in 2024 with background traffic growth
- 3. The proposed development is not expected to cause any significant congestion, with all intersections operating at LOS D or higher.
- 4. A right turn taper is warranted at the Twelve Mile Road entry.
- 5. The parking analysis based on the current methodology should be revisited and adequate parking supply to be provided within the plan. We encourage the applicant to arrive at the average peak period parking demand rate based on the study of similar developments in the region.

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

Sincerely,

AECOM

Patricia a Thomas

Patricia Thompson, EIT Traffic Engineer

Saumin Shal

Saumil Shah, PMP Project Manager

15-P

Jeff Wood, PE, PTOE Senior Traffic Engineer

FAÇADE REVIEW





May 5, 2021

*Façade Review Status Summary:*Façade Ordinance - Section 9 Waiver Recommended.

50850 Applebrooke Dr., Northville, MI 48167

City of Novi Planning Department 45175 W. 10 Mile Rd. Novi, MI 48375- 3024

Re: FACADE ORDINANCE REVIEW **The Griffin (FKA Uptown Place)** Façade Region: 1, Zoning District: RC

Dear Ms. McBeth;

The following Facade Review is based on the drawing prepared by Krieger Klatt Architects dated 3/15/21. The proposed percentages of materials on each elevation are shown in the tables below. Materials in violation of the Ordinance are highlighted in **bold**. The façade material sample board as required by Section 5.15.4.D of the Ordinance was provided in black & white format on sheet A.211. Physical samples of all materials should be provided to more clearly illustrate the proposed types, colors and textures of the façade materials.

Building A	Front	Right	Left	Rear	Ordinance Maximum (Minimum)
Stone	30%	32%	33%	36%	100% (30% Min.)
Siding, Vertical Batten	24%	46%	47%	22%	50% (Footnote 10)
Flat Metal Panels	2%	1%	1%	2%	50%
Standing Seam Roof	9%	0%	0%	8%	25%
Asphalt Shingles	35%	21%	19%	32%	50% (Footnote 14)

Building B	Front	Right	Left	Rear	Ordinance Maximum (Minimum)
Stone	35%	38%	30%	32%	100% (30% Min.)
Siding, Vertical Batten	26%	<mark>51%</mark>	<mark>59%</mark>	24%	50% (Footnote 10)
Flat Metal Panels	2%	2%	2%	5%	50%
Standing Seam Roof	1%	0%	0%	7%	25%
Asphalt Shingles	36%	9%	9%	32%	50% (Footnote 14)

Building C	Front	Right	Left	Rear	Ordinance Maximum (Minimum)
Stone	34%	43%	37%	33%	100% (30% Min.)
Siding, Vertical Batten	31%	48%	<mark>52%</mark>	33%	50% (Footnote 10)
Flat Metal Panels	4%	5%	6%	3%	50%
Standing Seam Roof	6%	3%	4%	6%	25%
Asphalt Shingles	25%	1%	1%	25%	50% (Footnote 14)

Building D	Front	Right	Left	Rear	Ordinance Maximum (Minimum)
Stone	32%	34%	34%	35%	100% (30% Min.)
Siding, Vertical Batten	22%	<mark>56%</mark>	<mark>56%</mark>	25%	50% (Footnote 10)
Flat Metal Panels	2%	2%	2%	5%	50%
Standing Seam Roof	1%	0%	0%	6%	25%
Asphalt Shingles	33%	8%	9%	29%	50% (Footnote 14)

Clubhouse	Front	Right	Left	Rear	Ordinance Maximum (Minimum)
Stone	43%	33%	32%	32%	100% (30% Min.)
Siding, Vertical Batten	22%	45%	44%	44%	50% (Footnote 10)
Flat Metal Panels	3%	2%	2%	2%	50%
Standing Seam Roof	0%	0%	0%	2%	25%
Asphalt Shingles	32%	20%	22%	20%	50% (Footnote 14)

Townhouse	Front	Right	Left	Rear	Ordinance Maximum (Minimum)
Stone	32%	50%	50%	33%	100% (30% Min.)
Siding, Vertical Batten	34%	43%	43%	33%	50% (Footnote 10)
Flat Metal Panels	0%	0%	0%	0%	50%
Standing Seam Roof	2%	0%	0%	0%	25%
Asphalt Shingles	32%	7%	7%	34%	50% (Footnote 14)

Façade Ordinance (Section 5.15) - As shown above, all facades are in full compliance with the Façade Ordinance with the exception of an overage of Vertical Batten Siding on the side elevations of Building B, C and D. In this case the deviation is minor in nature (\leq 9%) and is consistent with the overall composition of the facades. It should be noted that the percentages of Vertical Batten Siding and Asphalt Shingles are higher for residential style architecture as per footnotes 10 and 14 of the Façade Chart.

Recommendation – The design of all buildings exhibits well balanced proportions and composition of materials that are consistent with the intent and purpose of the Façade Ordinance. A Section 9 Waiver for the overage of Vertical Batten Siding on the side elevations of Buildings B, C and D is therefore recommended. Physical samples of all materials should be provided not less than 5 days prior to the Planning Commission meeting.

It should be noted that the gateway structures and dumpster enclosures must also meet the Façade Ordinance. Details of these structures were not included in the drawings at the time of this review.

Notes to the Applicant:

1. It is noted that no roof appurtenance or screening are indicated on the drawings. Section 5.15.3 of the Ordinance requires all roof appurtenances to be screened from view from all vantage points both on and off-site using materials compliant with the Facade Ordinance.

2. Inspections – The Façade Ordinance requires inspection(s) for all projects. It is the applicant's responsibility to request the inspection of each façade material at the appropriate time (before installation). In this case the materials should match the adjacent existing materials with respect to color and texture. 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.

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

Sincerely, DRN & Architects PC

Douglas R. Necci, AIA

FIRE REVIEW



CITY COUNCIL

Mayor Bob Gatt

Mayor Pro Tem Dave Staudt

Andrew Mutch

Laura Marie Casey

Hugh Crawford

Justin Fischer

Julie Maday

City Manager Peter E. Auger

Director of Public Safety Chief of Police David E. Molloy

Fire Chief Jeffery R. Johnson

Assistant Chief of Police Erick W. Zinser

Assistant Chief of Police Scott R. Baetens

Assistant Fire Chief John B. Martin

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

cityofnovi.org

April 20, 2021

TO: Barbara McBeth - City Planner Lindsay Bell - Plan Review Center Christian Carroll - Plan Review Center Madeleine Daniels - Planning Assistant

RE: The Griffin (FKA Uptown Place)

PSP# 21-0025

PSP# 20-0062 JSP# 20-27

Project Description:

Build a multi building/multi-tenant complex off Twelve Mile east of Novi Rd.

<u>Comments</u>:

- 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.
- Turning radius MUST meet city standards of 50' outside and 30' inside turning in front of buildings "D" and "H".
 (D.C.S. Sec 11-239(b)(5))
- The ability to serve at least two thousand (2,000) gallons per minute in single-family detached residential; three thousand (3,000) gallons per school areas; and at least four thousand (4,000) gallons per minute in office, industrial and shopping centers is essential. (D.C.S. Sec.11-68(a))
- Hydrants shall be spaced approximately three hundred (300) feet apart online in commercial, industrial, and multiple-residential areas. In cases where the buildings within developments are fully fire suppressed, hydrants shall be no more than five hundred (500) feet apart. The spacing of hydrants around commercial and/or industrial developments shall be considered as individual cases where special circumstances exist upon consultation with the fire chief. (D.C.S. Sec. 11-68 (f)(1)c)
- No part of a commercial, industrial, or multiple residential area shall be more than 300 feet from a hydrant. (D.C.S. Sec. 11-68 (f)(1)c.1)

- Proximity to hydrant: In any building or structure required to be equipped with a fire department connection, the connection shall be located within one hundred (100) feet of a fire hydrant. (Fire Prevention Ord. Sec. 15-17)
- 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.
- All fire apparatus access roads (public and private) with a dead-end drive-in excess of one hundred fifty (150) feet shall be designed with a turn-around designed in accordance with Figure VIII-I or a cul-de-sac designed in accordance with Figure VIII-F. (D.C.S. Sec 11-194 (a)(20))
- Fire Access roads MUST be able to support 35-ton weigh capacity. (International Fire Code 503.2.3)
- Water mains and fire hydrant MUST be put on the plans for review.
- **MUST** label which building is Townhouse, Apartment or Condo, or MUST provide fire leads for **ALL** structures.
- **MUST** provide **FDC** locations on ALL buildings that have a fire suppression system. (IFC 2015 912.2.1).
- •

Recommendation:

No updates have been provided since December 14,

2020.

Approved with Conditions

Conditions **MUST** be met to receive an APPROVAL at final site plan review.

Sincerely,

Kevin S. Pierce-Fire Marshal City of Novi – Fire Dept.

cc: file

APPLICANT RESPONSE LETTER



February 16, 2022

City of Novi 45175 Ten Mile Road Novi, Michigan 48375

Attention:Lindsay Bell, Senior PlannerRegarding:JSP 20-27 The Griffin Novi, 2nd Preliminary Site Plan Review responses

The following responses pertain to issues noted in the 2^{nd} Preliminary Site Plan Review dated January 25, 2022. <u>Only</u> comments requiring corrective action (noted in the review as <u>bold and underlined</u> comments) are listed below with our responses shown in Blue.

Ordinance Requirements

- 12. <u>Sidewalk Placement (Engineering Design Manual, Section 5.7)</u>: The sidewalks along the boulevard entrance at Twelve Mile Road shall be relocated to 5 feet from back of curb in order to ensure pedestrian safety and improve maintenance in the winter months when sidewalks adjacent to the street can become covered in snowbanks. Sidewalks abutting parking spaces may remain adjacent to the curb, as long as a 5-foot clear path remains when vehicles are present (accounting for overhang). The applicant should otherwise comply with the requirements for sidewalk offset wherever possible.</u> As noted in the Traffic Review letter, there remain 3 locations where the sidewalk location does not comply, which will require a DCS variance. The sidewalk adjacent to the dumpster at Building D will be relocated to meet the requirement. In addition, the sidewalk adjacent to Building C will be revised as required. A waiver for the sidewalk adjacent to the pool area will be requested.
- 15. <u>Wetland Impacts</u>: The plan proposes permanent wetland impacts to two small wetland areas, however additional information is required to determine the extent of the impacts. The Wetland and Watercourse Ordinance requires mitigation of all impacts over 0.25 acre. The total area of the two wetlands indicated on the site survey are 0.241 acre, so mitigation will not be required. However, fill volumes are also required to determine the type of wetland permit that is needed. This information is required prior to the Planning Commission meeting, as a Non-Minor Wetland permit will require their approval, while a Minor wetland permit can be approved by the Community Development Department. Please see the Wetland Review letter for additional information required for issuance of a Wetland Permit. Based upon our calculations the net total fill volume for the two wetlands is 1,880 cubic yards. This would require a Non-Minor Wetland permit.

PLANNING REVIEW CHART

Only items noted as "No" or "Yes?" are addressed here, as requested. All others are "No response required"

- Building Setback: Requested Deviations subject to City Council Approval. Deviation requested
- Minimum Setbacks abutting residential districts. <u>This deviation could be considered by City Council</u> with justification that they are both residential uses. Deviation requested
- Usable Open Space: Entire eastern property line will be landscaped, not considered "usable" Revise calculation. The Usable Open Space calculation has been revised to 59,840 s.f. based upon the review comment.
- Building Height: <u>Deviations requested for building C&D</u>. <u>Deviation requested</u>
- Maximum length of the buildings: <u>Deviations requested for building B &D</u>. <u>Deviation requested</u>
- Max distance between buildings: **Deviations requested for two locations**. **Deviation requested**
- Parking on Major and Minor drives. Deviations requested NORTH AND SOUTH OF Building D.



<u>Clubhouse</u>. Deviation requested

- Number of parking spaces: **Deviation requested for parking space reduction. Deviation requested**
- Dumpster location: <u>Deviation requested for setback distance</u>. <u>Deviation requested</u>
- Accessory structures: <u>Deviation requested for flagpole location in front yard/side yard locations.</u>
 Deviation requested
- Previous agreements. Provide verification from Mall owner they will not object to southern road within shared easement. The Mall owner has reviewed the proposed site plan and find no objection to the southern road within the shared easement. A copy of their review letter is attached with this submittal
- Average light level ratio: **Deviations requested**. **Deviation requested**

Engineering Review

Approval of the Preliminary Site Plan is recommended contingent upon receipt of off-site drainage easement and Twelve Oaks Lake owner approval of ultimate storm water discharge. No response required at this time. Applicant continues to pursue the authorizations requested.

Landscape Review

Approval of the Preliminary Site Plan is recommended if three unsupported waivers are satisfactorily addressed. Thank you. See below for the three edits requested.

- Lack of required 6-8' tall, landscaped berm along east property line. Proposed alternative is supported by staff for the sections of frontage adjacent to the parking lot as the large evergreens will provide sufficient buffering from the building to the east <u>but not supported</u> for the southern property line legs. Vinyl fencing, 6' high will be added to the dogleg portion of the southeastern property line, approx. 235 l.f., as an addition to the upsized evergreen trees and shrubs.
- 2. Deficiency in multi-family landscaping multi-family unit trees. Not supported by staff as currently proposed but could be with more trees added where there is room to reduce the extent of the waiver to no more than 25% of the requirement. Additional multi-family landscaping trees have been added where appropriate. As such 75% of the required trees have been provided for on-site. A waiver is requested for the shortage of the remaining 25%.
- 3. Deficiency in multifamily unit foundation landscaping along drives. Not supported by staff. Landscape islands will be provided in the rears of the townhome buildings where there is sufficient width to accommodate small plant beds to help break up the facades of the units along the drives.

Wetlands & Woodlands

Approval of the Preliminary Site Plan is recommended.

Based upon our calculations the net total fill volume for the two wetlands is 1,880 cubic yards. This would require a Non-Minor Wetland permit.

49287 WEST ROAD, WIXOM, MI 48393 PHONE: 248.773.7656 FAX: 866.690.4307



<u>Traffic Review</u> Approval of the Preliminary Site Plan is recommended No response required at this time.

Façade recommends approval. No response required at this time.

<u>Fire Review</u>

Conditional approval is recommended. Comments to be addressed with Final Site Plan. **No response required at this time.**

Sincerely,

Singh Development (Applicant/Developer) Nowak & Fraus (Engineering and Landscape) Krieger Klatt (Architecture & Planning) Wilson Road Group (Wetlands) Fleis & Vandenbrink (Traffic) Gasser Bush Associates (Lighting) Umlor Group (Entitlement Administration)

49287 WEST ROAD, WIXOM, MI 48393 PHONE: 248.773.7656 FAX: 866.690.4307

TRAFFIC IMPACT STATEMENT AND ORIGINAL PARKING ANALYSIS

GRIFFIN TWELVE OAKS APARTMENTS TRAFFIC IMPACT STUDY

NOVI, MICHIGAN

MARCH 5, 2021

PREPARED BY:



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

> #848080 © March 2021

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



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

Agency Review	Date	Comments



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REFERENCES

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EXECUTIVE SUMMARY

This report presents the results of a Traffic Impact Study (TIS) and parking evaluation for the proposed multifamily residential development. The project site includes approximately 8 acres of property, generally located in the southeast quadrant of the 12-Mile Road and 12 Oaks Mall Road intersection in Novi, Michigan, as shown in **Figure E1**. The proposed project includes the construction of 174 multi-family residential units; the full build out of the site is planned to be constructed in one phase. Site access is proposed via an existing site shared access driveway on 12 Oaks Mall Road and a proposed driveway on 12-Mile Road. 12 Oaks Mall Road is a private road, and 12-Mile Road is under the jurisdiction of the Road Commission of Oakland County (RCOC).





The scope of this study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practice and information published by the Institute of Transportation Engineers (ITE), and pursuant to the requirements of the City of Novi and the RCOC. Additionally, F&V solicited input regarding the scope of work from RCOC and the City of Novi's traffic engineering consultant (AECOM).



BACKGROUND DATA

This study provides an analysis of the traffic-related impacts of the proposed development at the following study intersections:

- 12-Mile Road & Novi Road
- 12-Mile Road & 12 Oaks Mall Road
- EB 12-Mile Road & Proposed Site Driveway
- EB 12-Mile Rd & WB to EB X/O W. of Novi Rd
- WB 12-Mile Rd & EB to WB X/O E. of Novi Rd
- WB 12-Mile Rd & EB to WB X/O E. of 12 Oaks Mall

Due to the impacts of COVID-19 and the subsequent closures of businesses and schools, current traffic volume data is not representative of "typical" operations. Therefore, the traffic volume data necessary for this study were obtained from multiple sources:

- Sydney Coordinated Activated Traffic System (SCATS) volume data was obtained from RCOC at all of the signalized study intersections within the network for use in this study. The SCATS data utilized for this study was obtained for the week of Tuesday March 3, 2020 through Thursday Match 5, 2020, prior to COVID-19 impacts. The three days (T, W, & Th) of turning movement counts were averaged together to provide peak hour volumes for a typical weekday.
- F&V subconsultant Traffic Data Collection, Inc. (TDC) performed weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak hour turning movement counts on Wednesday, February 10, 2021 at the study intersections as well, to provide a volume comparison.
- The Southeast Michigan Council of Governments (SEMCOG) community profiles dataset for the City of Novi provided background growth rate information. A conservative 0.5% annual growth rate was utilized to project the existing volumes to the buildout year of 2024.

The pre-COVID and post-COVID traffic volumes were compared, which indicated the pre-COVID volumes were significantly higher than current 2021 volumes. Therefore, the pre-COVID 2020 data was utilized for this study. The traffic volumes were then balanced upwards through the study network. 'Dummy nodes' were added at locations to account for sink and source volumes between intersections.

TRIP GENERATION

The number of weekday peak hour (AM and PM) and daily vehicle trips that would be generated by the proposed development was forecast based on data published by ITE in the Trip Generation Manual, 10th Edition. The proposed development includes the construction of 174 multi-family residential units; the full build out of the site is planned to be constructed in one phase. The site trip generation forecast is summarized in Table E1. The proposed trip generation included in this analysis was reviewed with the City of Novi's engineering consultant (AECOM) prior to use in the study.

Land Use	ITE	Amount	Units	Average Daily Traffic	AM Pe	eak Hou	ur (vph)	PM Pe	e <mark>ak Ho</mark> u	ır (vph)
Lanu USe	Code	Amount	UIIIIS	(vpd)	In	Out	Total	In	Out	Total
Multi-Family Home (Mid-Rise)	221	174	D.U.	947	15	44	59	46	29	75

Table E1: Trip Generation Summary

SITE TRIP DISTRIBUTION

The site access for the proposed development is proposed via two (2) driveways: one (1) via an existing shared site driveway on 12 Oaks Mall Road that is currently serving the Waltonwood at Twelve Oaks multi-family residential development, and one (1) via a proposed driveway on eastbound 12-Mile Road. The vehicular trips that would be generated by the proposed development were assigned to the study network based on the proposed site access plan, the existing peak hour traffic patterns on the adjacent roadway network, and the methodologies published by ITE. The adjacent street traffic volumes were used to develop the trip distribution. To determine the residential trip distribution, it was assumed that the majority of the trips in the AM are hometo-work based trips, and in the PM are work-to-home based trips. Therefore, the global trip generation is based on trips leaving the development in the AM and exiting the study network, then entering the study network and returning to the development in the PM. The ITE trip distribution methodology assumes that new trips will return to their direction of origin. The site trip distribution used in the analysis is summarized in Table E2.



New Trips Distribution								
From/To	Via	AM	PM					
North	Novi Road	8%	12%					
South	Novi Road	29%	20%					
East	12-Mile Road	43%	42%					
West	12-Mile Road	20%	26%					
	Total	100%	100%					

Table E2: Site Trip Distribution

CONCLUSIONS

The conclusions of this TIS are as follows:

1. Existing Conditions:

- All approaches and movements at the study intersections currently operate acceptably, at LOS D or better during both peak periods.
- Review of SimTraffic network simulations indicates acceptable operations throughout the study network during both peak periods, with minimal vehicle queueing.

2. Background Conditions (without the proposed development):

- A conservative annual growth rate of 0.5% per year was applied to the 2020 traffic volumes in order to determine the background 2024 traffic volumes.
- The results of the background conditions analysis indicates that all study intersections will continue to operate acceptably at LOS D or better during both peak periods, in a similar manner to existing conditions.

3. Future Conditions (with the proposed development):

- The results of the future conditions analysis indicates that, with the addition of the site-generated traffic, all study intersection approaches and movements will continue to operate acceptably at LOS D or better during both peak periods, in a manner similar to existing and background conditions.
- Review of SimTraffic microsimulations indicates acceptable operations during both peak periods, with negligible queueing and delays experienced at the study intersections.

4. Access Management

- The results of the RCOC auxiliary lane analysis indicate that a right-turn deceleration <u>taper only</u> is recommended at the proposed 12-Mile Road site driveway.
- The spacing of the proposed site driveway on 12 Mile Road meets the City of Novi access management criteria.
- The proposed site driveway on 12 Mile Road meets sight distance requirements.

5. Parking Study

• In accordance with ITE Parking Generation methodology, the projected peak parking demand for the proposed development is 228 spaces. The proposed site plan includes 274 spaces; therefore, the site is expected to have a peak parking occupancy of 83% and a parking surplus of 46 spaces.

RECOMMENDATIONS

The recommendations of this TIS are as follows:

1. Construct a right-turn deceleration taper only at the proposed site driveway on EB 12-Mile Road.



1 INTRODUCTION

This report presents the results of a Traffic Impact Study (TIS) and parking evaluation for the proposed multifamily residential development. The project site includes approximately 8 acres of property, generally located in the southeast quadrant of the 12-Mile Road and 12 Oaks Mall Road intersection in Novi, Michigan, as shown in **Figure 1**. The proposed project includes the construction of 174 multi-family residential units; the full build out of the site is planned to be constructed in one phase. Site access is proposed via an existing site shared access driveway on 12 Oaks Mall Road and a proposed driveway on 12-Mile Road. 12 Oaks Mall Road is a private road and 12-Mile Road is under the jurisdiction of the Road Commission of Oakland County (RCOC).

F&V proposes to complete a Traffic Impact Study (TIS) and parking evaluation for this project consistent with accepted traffic engineering practice and pursuant to the requirements of RCOC and the City of Novi, and their traffic engineering consultant AECOM. Specific tasks undertaken for this study include the following:

1. Study Area

- a. Provide illustrations and a narrative describing the site, surroundings, study area, and adjacent roadway system (functional classifications, lanes, speed limits, etc.)
- b. Provide a description of the study area including: surrounding land uses, intersection and roadway geometries, speed limits, functional classifications and traffic volume data. The description will also include surrounding land uses, expected development in the vicinity which could influence future traffic conditions, special site features, any sight distance limitations, existing (and proposed) right-of-way, and a description of any committed roadway improvements. In addition, a study area site map showing the site location, and the study intersections will also be provided.

2. Proposed Land Use

a. Obtain and review the proposed site plan which includes the proposed land uses, densities, and desired site access locations. A description of the current and proposed land use, including the number and type of dwelling units, will be accompanied with a complete project site plan (with buildings identified as to proposed use). A schedule for construction of the development and the proposed development stages will also be provided.

3. Existing Conditions

- a. Provide an analysis of the traffic-related impacts of the proposed development at the following study intersections:
 - 12-Mile Road & Novi Road
 - 12-Mile Road & 12 Oaks Mall Road
 - EB 12-Mile Road & Proposed Site Driveway
 - EB 12-Mile Rd & WB to EB X/O W. of Novi Rd
 - WB 12-Mile Rd & EB to WB X/O E. of Novi Rd
 - WB 12-Mile Rd & EB to WB X/O E. of 12 Oaks Mall
- b. Due to the impact of COVID-19 and the subsequent closures of businesses and schools, current traffic volume data is not representative of "typical" operations. Therefore, the data collection necessary for this study is proposed as follows:
 - i. Collect existing AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) traffic volumes at the study intersections.
 - ii. Obtain pre-COVID SCATS count data from RCOC at the signalized study intersections for use in this study. The SCATS data will be requested for a Tuesday, Wednesday, and Thursday (typical weekdays) prior to March 10, 2020. Compare the existing 2021 turning movement counts with the pre-COVID SCATS counts.
 - iii. Traffic volumes at the site driveway will be determined through balancing the traffic volumes along the 12-Mile corridor.
- c. Obtain signal timing permits at the signalized study intersections from RCOC for use in the study.



E F&V

FIGURE 1 SITE LOCATION

GRIFFIN TWELVE OAKS APARTMENTS - NOVI, MI

LEGEND	
	ROADS

-- PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)



- d. Identify the Existing AM and PM peak hour traffic volumes at the study intersections based on the turning movement count data. Provide baseline 2021 traffic volume assumptions to the City of Novi / AECOM for review and approval prior to use in the analysis.
- e. Calculate the **Existing** vehicle delays, LOS, and vehicle queues at the study intersection during the AM and PM. The analysis will be performed at each of the study intersections. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.
- f. Identify improvements (if any) for the study road network that would be required to accommodate the existing traffic volumes.

4. Future Background Growth

- a. If the planned completion date for the project or the last phase of the project is beyond one year of the study, an estimate of background traffic growth for the adjacent street network will be made and included in the analysis.
- b. Calculate the future background traffic volumes based on an appropriate traffic growth determined from local or statewide data to the project build-out year and/or any applicable background developments in the vicinity of this project as identified by the City of Novi.
- c. Provide the proposed growth rate to the City of Novi / AECOM for review and approval prior to use in the analysis.

5. Background Conditions (No Build)

- a. Calculate the **Background** (*without the proposed development*) vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM peak periods. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.
- b. Any state, local, or private transportation improvement projects in the project study area that will be underway in the build-out year and traffic that is generated by other proposed developments in the study area will be included as background conditions.
- c. Identify improvements (if any) for the study road network that would be required to accommodate the background traffic volumes.

6. Trip Generation

- a. Forecast the number of AM and PM peak hour and daily trips that would be generated by the proposed development based on data published by the Institute of Transportation Engineers (ITE) in *Trip Generation, 10th Edition* and/or local development data as approved for use by the City of Novi.
- b. Any trip reduction for pass-by trips, transit, ride-sharing, other modes, internal capture rates, etc. shall be based on ITE findings and documented survey results acceptable to the City. Projects intended to be developed in phases, trip generation by phase shall be described.
- c. A table will be provided in the report outlining the categories and quantities of land uses, with the corresponding trip generation rates or equations, and the resulting number of trips.
- d. Provide the proposed trip generation assumptions to the City of Novi / AECOM for review and approval prior to use in the analysis.

7. Trip Distribution and Traffic Assignment

- a. Assign the trips that would be generated by the proposed development to the adjacent road network based on existing traffic patterns. The distribution of the estimated trip generation to the adjacent street network and nearby intersections shall be included in the report and the basis will be explained. The distribution percentages with the corresponding volumes will be provided in a graphical format.
- b. Provide the proposed trip distribution assumptions to the City of Novi / AECOM for review and approval prior to use in the analysis.
- c. Combine the site-generated traffic assignments with the background traffic forecasts to establish the Future AM and PM peak hour traffic volumes.



8. Future Conditions (Buildout):

- a. Calculate the Future (with the proposed development) vehicle delays, LOS, and vehicle queues at the study intersections. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.
- b. Identify improvements (if any) for the study road network that would be required to accommodate the site-generated traffic volumes.

9. Access Management

- a. Provide an illustration on a map (or reduced copy of the site plan at size 11"x17") and description of the location and design of proposed access driveway including any sight distance limitations, dimensions from adjacent driveways and intersections within 200 feet on either side of the main roadway, data to demonstrate the number of driveways proposed is the fewest necessary and support that the access points will provide safe and efficient traffic operation and be in accordance with The City of Novi and RCOC standards.
- b. Evaluate the City of Novi and RCOC auxiliary lane warrants at the proposed site driveway intersections to determine the need for right-turn lanes on 12 Mile Road.

10. Multi-Modal

a. Provide an illustration, description, and location of the existing and proposed multi-modal facilities, including non-motorized facilities and transit within 200 feet of the proposed site location.

11. Parking Study

In accordance with City Zoning Ordinance Section 5.2.9, the Planning Commission may accept the recommendations of its Traffic Consultant or undertake a study to determine the most appropriate standard to use.

- a. Calculate the parking requirements for the proposed development land use based on the City of Novi zoning ordinance.
- b. Calculate the projected parking demand for the proposed development in accordance with ITE Parking Generation, 5th Edition.
- c. Evaluate the adequacy of overall site parking based on the proposed number of on-site parking spaces and the projected parking demand for this site.

The scope of this study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practice, and information published by the Institute of Transportation Engineers (ITE). In addition, AECOM and RCOC also provided input regarding the scope of work for this study. The study analyses were completed using Synchro/SimTraffic (Version 10). Sources of data for this study include F&V subconsultant Traffic Data Collection, Inc. (TDC), information provided by the City of Novi, RCOC, ITE, and the Southeast Michigan Council of Governments (SEMCOG). All background information is provided in **Appendix A**.

2 BACKGROUND DATA

2.1 EXISTING ROAD NETWORK

Vehicle transportation for the project site is proposed via site access on 12-Mile Road and 12 Oaks Mall Road; regional transportation is provided via I-96 and M-5/I-275. The surrounding land uses include commercial (12 Oaks Mall) to the west, residential (Waltonwood Apartments at Twelve Oaks) to the south, DMC rehabilitation center to the east, and vacant land to the north. The lane use and traffic control at the study intersections are shown on **Figure 2** and the study roadways are further described below. For the purposes of this study, all minor streets and driveways are assumed to have an operating speed of 25 miles per hour (mph), unless otherwise noted.



12-Mile Road runs in the east and west directions with a posted speed limit of 45 mph. The study section of 12-Mile Road is under the jurisdiction of RCOC and is classified as *Principal Arterial* with an Average Annual Daily Traffic (AADT) volume of approximately 27,900 vehicles per day (SEMCOG 2016). 12 Mile Road is a fourlane, median divided roadway, with two lanes of travel in each direction and widens at the signalized intersection with Novi Road to provide exclusive right-turn lanes in both directions. 12-Mile Road also widens at the EB-to-WB crossover located east of 12 Oaks Mall Road to provide an exclusive left-turn lane and at the crossover locations east and west of Novi Road to provide dual (2) left-turn lanes. Additionally, 12-Mile Road widens at the intersection with 12 Oaks Mall Road to provide an exclusive right-turn lane and dual (2) left-turn lanes into the 12 Oaks Mall site.

Novi Road runs in the north and south directions with a posted speed limit of 45 mph. The study section of Novi Road located south of 12-Mile Road is classified as a *Principal Arterial*, is under the jurisdiction of RCOC, and has an AADT volume of approximately 38,100 vehicles per day (SEMCOG 2016). Novi Road, south of 12-Mile Road, has a seven-lane cross-section, with three lanes in each direction and a center two-way left-turn lane (TWLT); at the intersection with 12-Mile Road, NB Novi Road provides an exclusive right-turn lane.

The study section of Novi Road located north of 12-Mile Road is classified as a *Minor Arterial*, is under the jurisdiction of the City of Novi, and has an AADT volume of approximately 12,600 vehicles per day (SEMCOG 2016). Novi Road, north of 12-Mile Road, has a five-lane cross-section, with two lanes in each direction and a center TWLT lane.

12 Oaks Mall Road is a private road that generally runs in the north and south directions and is located approximately ½ mile east of Novi Road. 12 Oaks Mall Road is a four-lane, median divided roadway, with two lanes of travel in each direction. There are no median openings along this roadway. The proposed site access drive is a right-in/right-out only driveway on northbound 12 Oaks Mall Road.

2.2 EXISTING TRAFFIC VOLUMES

Due to the impacts of COVID-19 and the subsequent closures of businesses and schools, current traffic volume data is not representative of "typical" operations. Therefore, the traffic volume data necessary for this study were obtained from multiple sources:

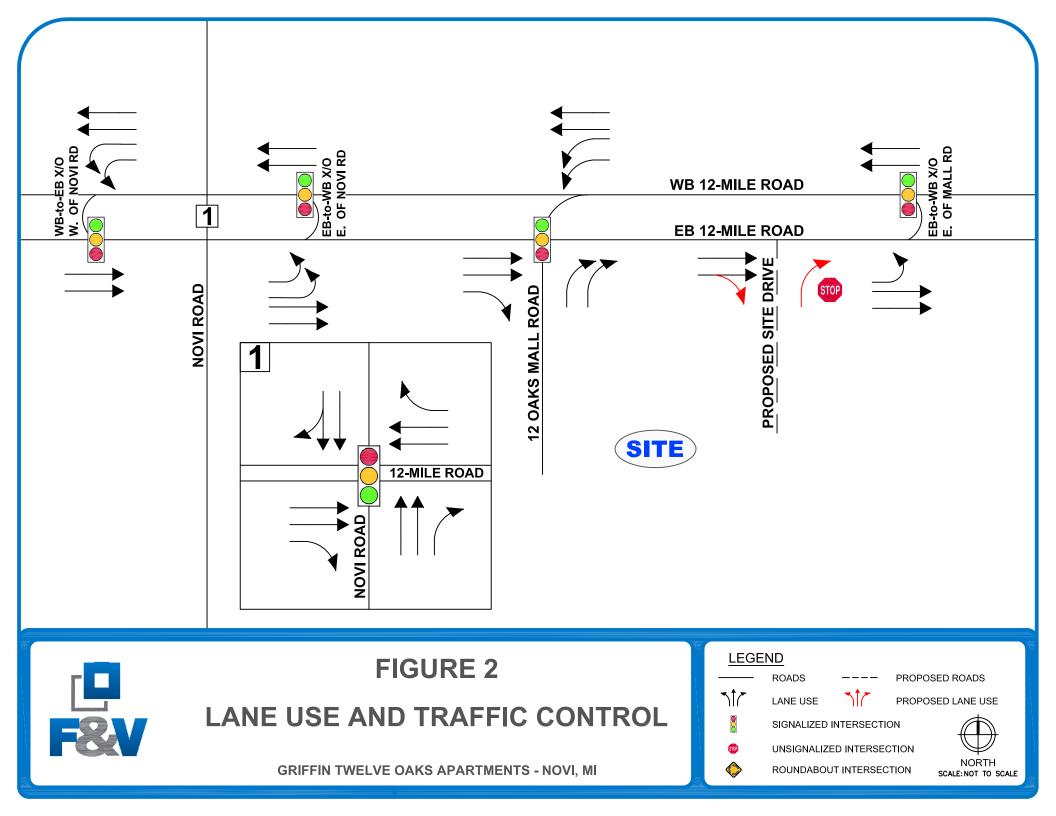
- Sydney Coordinated Activated Traffic System (SCATS) volume data was obtained from RCOC at all of the signalized study intersections within the network for use in this study. The SCATS data utilized for this study was obtained for the week of Tuesday March 3, 2020 through Thursday Match 5, 2020, prior to COVID-19 impacts. The three days (T, W, & Th) of turning movement counts were averaged together to provide peak hour volumes for a typical weekday.
- F&V subconsultant Traffic Data Collection, Inc. (TDC) performed weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak hour turning movement counts on Wednesday, February 10, 2021 at the study intersections, to provide a volume comparison.

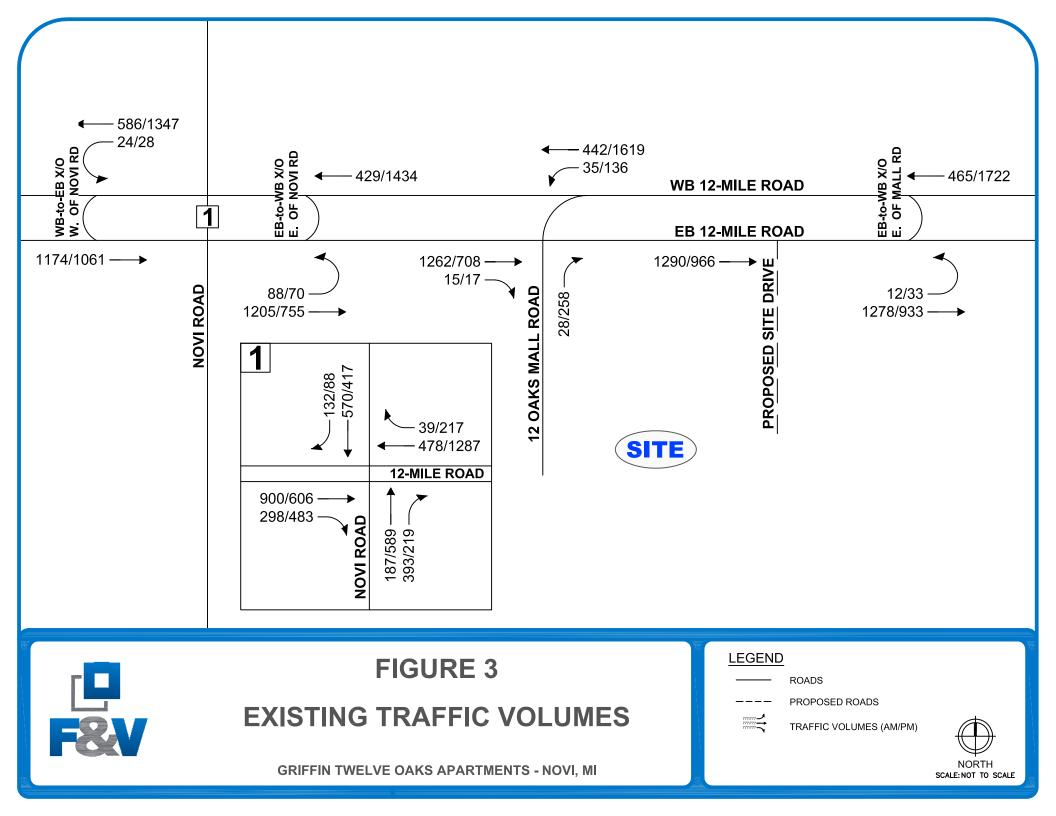
The pre-COVID and post-COVID traffic volumes were compared, which indicated the pre-COVID volumes are significantly larger, ranging from 70% to almost 400% greater volumes than the collected 2021 Turning Movement Counts (TMC). Therefore, through consulting with the City of Novi's traffic engineering consultant, the pre-COVID 2020 TMC data was utilized for this study, rather than adjusting the existing 2021 traffic volumes. The traffic volumes were then balanced upwards through the network and through volumes were balanced at the proposed site driveway; the baseline "Existing 2021" traffic volumes are shown in **Figure 3**.

During the review of the SCATS turning movement count data, Peak Hour Factors (PHFs) and commercial truck percentages were calculated and used in the traffic analysis. At locations where access is provided between study intersections, "dummy" intersections were used to account for sink and source volumes. The AM and PM peak hours of existing network traffic were identified to generally occur between 7:45 AM to 8:45 AM and 4:45 PM to 5:45 PM, respectively, for a typical weekday. The traffic volume data are included in **Appendix A**.









3 EXISTING CONDITIONS

3.1 EXISTING OPERATIONS

The existing AM and PM peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersection using Synchro/SimTraffic (Version 11) traffic analysis software. The results of the analysis of existing conditions were based on the existing lane use and traffic control shown on **Figure 2**, the existing traffic volumes shown on **Figure 3**, and the methodologies presented in the Highway Capacity Manual 6th Edition (HCM6). 12 Mile Road is a divided boulevard, and the lane use and traffic control at the signalized study intersections along this roadway includes non-NEMA phasing and clustered intersections, which are not supported by the HCM6 analysis methodology; therefore, HCM 2000 was determined to be more appropriate for use at the signalized study intersections. The only other intersection included within the study network for this analysis is the proposed stop-controlled site driveway location on EB 12-Mile Road; this proposed site driveway was evaluated using HCM6.

The signalized intersections within the study network operate on Sydney Coordinated Automated Traffic System (SCATS); therefore, the signal will perform real time optimizations to accommodate the traffic volume observed by the approach lane detectors. The signal timing permits for these intersections were provided by RCOC for use in this study. The back-up timings for each intersection were utilized as a baseline for each peak period and the signal splits were optimized for each scenario studied. Therefore, several movements at the signalized study intersections may experience reduced delays resulting from additional volumes, due to the real time optimizations and/or improved progression factors.

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

		LNIStillig		•				
				Exis	ting C	Condition	าร	
	Intersection	Control	Approach	AM Pe	eak	PM Peak		
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	
			EBT	17.6	В	13.8	В	
			EBR	21.3	С	19.7	В	
			WBT	15.3	В	16.5	В	
1	12-Mile Road	Signalized	WBR	18.6	В	13.1	В	
	Novi Road	Signalizeu	NBT	23.6	С	34.6	С	
	Novi Kodu		NBR	32.4	С	28.9	С	
			SBTR	29.4	С	32.9	С	
			Overall	20.8	С	19.5	В	
	EB 12-Mile Rd.		EB	2.8	А	2.8	А	
2	& WB-to-EB X/O	Signalized	SBL	43.3	D	43.3	D	
	W. of Novi Rd.		Overall	3.7	Α	4.0	Α	
	WB 12-Mile Rd.		WB	1.9	А	1.6	Α	
3	& EB-to WB X/O	Signalized	NBL	43.4	D	43.3	D	
	E. of Novi Rd.		Overall	9.0	Α	3.5	Α	
			EBT	3.8	Α	2.3	Α	
	12-Mile Road		EBR	2.2	Α	1.5	Α	
4	& 12 Oaks Mall	Signalized	NBR	33.1	С	41.4	D	
	Road	0	SBT	32.3	С	40.5	D	
			Overall	5.5	Α	16.7	В	

Table 1: Existing Intersection Operations



				Existing Conditions						
	Intersection	Control	Approach	AM Pe	eak	PM Peak				
				Delay (s/veh)	LOS	Delay (s/veh)	LOS			
	WB 12-Mile Rd. 5 EB-to WB X/O		WB	1.9	А	3.4	А			
5		Signalized	NBL	34.7	С	54.6	D			
	E. of 12 Oaks		Overall	2.9	А	4.4	А			

The results of the analysis indicates that all approaches and movements at the study intersections currently operate acceptably at LOS D or better during both peak periods; review of SimTraffic network simulations also indicates acceptable operations. Microsimulation observations indicate that minor vehicle queues are formed at the signalized intersections during the peak 15-minute periods; however, these queues dissipate quickly and are not present throughout the peak periods. Additionally, the vast majority of vehicle queues were observed to be serviced within each cycle length at the signalized intersections.

4 BACKGROUND (NO BUILD) CONDITIONS

4.1 BACKGROUND OPERATIONS

The proposed development is anticipated to be constructed in 2024; therefore, the Southeast Michigan Council of Governments (SEMCOG) community profiles dataset was reviewed for the City of Novi, in order to determine an applicable traffic growth for the background 2024 conditions. The SEMCOG population and employment forecasts (2015 - 2045) were reviewed and the forecasts showed a 0.21% and 0.24% annual growth for the City of Novi's population and employment, respectively. Therefore, a conservative annual growth rate of **0.5%** was applied to the existing 2020 traffic volumes to calculate the 2024 buildout year traffic volume *without the proposed development*.

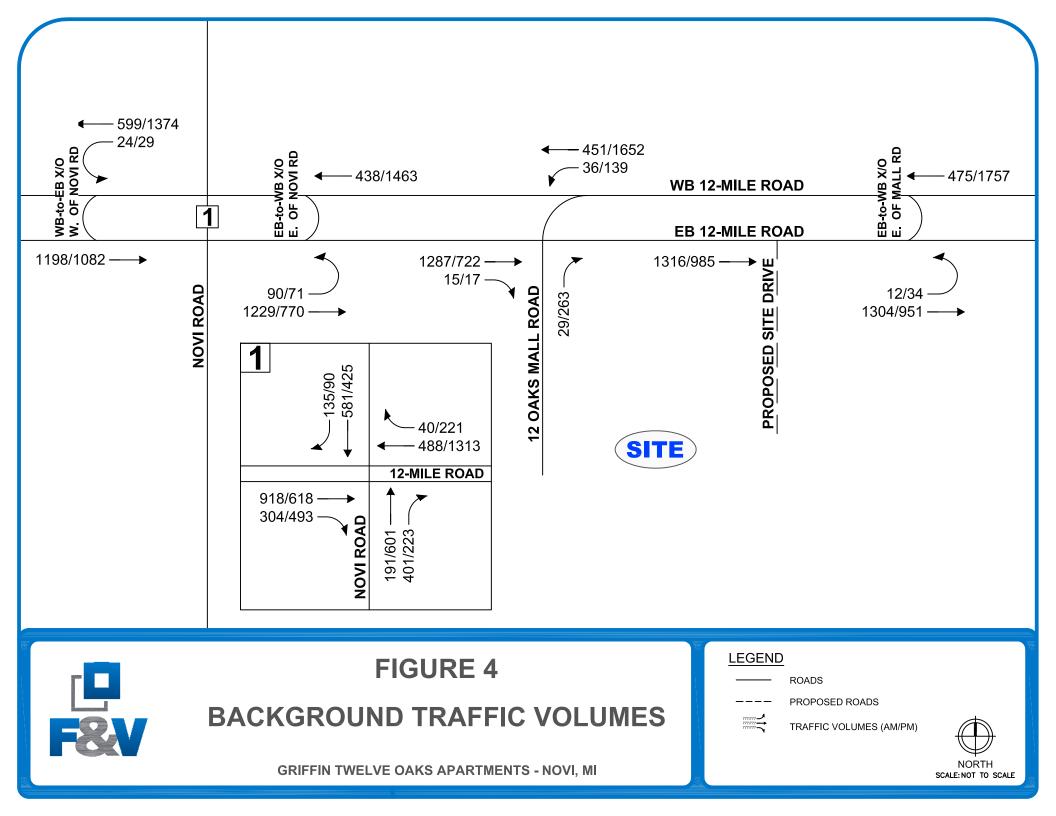
In addition to the background traffic growth, it is important to account for traffic that will be generated by developments within the vicinity of the study area that have yet to be constructed or are currently under construction. At the time of this study, there were no additional proposed developments identified by RCOC or the City of Novi that are under construction in the vicinity of the study that would be completed prior to site buildout in 2024 and which would contribute additional traffic to the roadway network.

Background peak hour vehicle delays and LOS were calculated based on the existing lane use and traffic control shown on **Figure 2**, the background 2024 traffic volumes *without the proposed development* shown on **Figure 4**, and the methodologies presented in the HCM. The results of the analysis of background conditions are presented in **Appendix C** and are summarized in **Table 2**.

The results of the background conditions analysis show that all of the intersection approaches and movements will continue to operate in a similar manner to existing conditions, with negligible changes in the delay. Several approaches and movements at the signalized study intersections showed a reduced delay; these improvements from existing conditions are due to HCM's deterministic calculation methodology and the SCATS signals real time optimizations. These improvements are typically the result of the improved "arrival on green" factor as a result of the increased traffic, the improved progression of traffic between intersections, and/or additional time being provided to an approach by the SCATS real time optimizations in order to accommodate additional traffic for a specific movement. With the increased traffic volumes along certain approaches and movements, the arrival of vehicles becomes more uniform and less random. As a result, the likelihood of vehicles arriving to an approach during a green signal or just before the phase change, and then experiencing little or no delay, increases. The HCM methodology takes an average delay of all vehicles utilizing a specific movement during the peak period in question. Therefore, typically with more vehicles, the probability of arriving on a green signal for any random vehicle increases, resulting in a decreased average delay for all vehicles on that approach or movement.

Review of SimTraffic microsimulations also indicates similar observations to those identified under existing conditions. The majority of vehicle queues during the peak periods were observed to be serviced within each cycle length at the signalized study intersections. Additionally, any queueing observed at the study intersections was observed to quickly dissipate and was not present throughout the peak hours.





				Exis	ting C	Conditior	IS	Backgr	rounc	l Conditi	ions		Diffe	rence	
	Intersection	Control	Approach	AM Pe	eak	PM Peak		AM Peak		PM Pe	eak	AM Pe	eak	PM P	eak
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
			EBT	17.6	В	13.8	В	18.4	В	15.0	В	0.8	-	1.2	-
			EBR	21.3	С	19.7	В	21.5	С	21.4	С	0.2	-	1.7	в→с
			WBT	15.3	В	16.5	В	15.3	В	17.4	В	0.0	-	0.9	-
1	12-Mile Road &	Signalized	WBR	18.6	В	13.1	В	14.8	В	13.2	В	-3.8*	-	0.1	-
ľ	Novi Road	Siyi lalizeu	NBT	23.6	С	34.6	С	23.3	С	34.2	С	-0.3	-	-0.4*	-
			NBR	32.4	С	28.9	С	32.4	С	28.6	С	0.0	-	-0.3*	-
			SBTR	29.4	С	32.9	С	29.2	С	32.4	С	-0.2*	-	-0.5*	-
			Overall	20.8	С	19.5	В	20.6	С	20.0	С	-0.2*	-	0.5	в→с
	EB 12-Mile Rd.		EB	2.8	А	2.8	А	2.8	А	2.8	А	0.0	-	0.0	-
2	& WB-to-EB X/O	Signalized	SBL	43.3	D	43.3	D	43.3	D	43.3	D	0.0	-	0.0	-
	W. of Novi Rd.		Overall	3.7	Α	4.0	Α	3.7	Α	4.1	Α	0.0	-	0.1	-
	WB 12-Mile Rd.		WB	1.9	А	1.6	А	1.9	А	1.8	А	0.0	-	0.2	-
3	& EB-to WB X/O	Signalized	NBL	43.4	D	43.3	D	43.4	D	43.3	D	0.0	-	0.0	-
	E. of Novi Rd.		Overall	9.0	Α	3.5	Α	9.0	Α	3.7	Α	0.0	-	0.2	-
			EBT	3.8	А	2.3	А	3.9	А	2.3	А	0.1	-	0.0	-
	12-Mile Road		EBR	2.2	А	1.5	А	2.2	А	1.5	А	0.0	-	0.0	-
4	& 12 Oaks Mall	Signalized	NBR	33.1	С	41.4	D	33.1	С	41.3	D	0.0	-	-0.1*	-
	Road		SBT	32.3	С	40.5	D	32.3	С	40.3	D	0.0	-	-0.2*	-
			Overall	5.5	Α	16.7	В	5.6	Α	16.6	В	0.1	-	-0.1*	-
	WB 12-Mile Rd.		WB	1.9	А	3.4	А	1.9	А	3.6	А	0.0	-	0.2	-
5	EB-to WB X/O	Signalized	NBL	34.7	С	54.6	D	34.7	С	54.5	D	0.0	-	-0.1*	-
	E. of 12 Oaks			2.9	Α	4.4	Α	2.9	Α	4.5	Α	0.0	-	0.1	-

Table 2: Background Intersection Operations

* Decreased delays are the result of SCATS real time optimizations and/or HCM Methodology

5 SITE TRIP GENERATION

The number of peak hour (AM and PM) and daily vehicle trips that would be generated by the proposed development was forecast based on data published by ITE in the Trip Generation Manual, 10th Edition. The proposed development includes the construction of 174 multi-family units; the full build out of the site is planned to be constructed in one phase. The site trip generation forecast is summarized in Table 3. The proposed trip generation included in this analysis was reviewed with the City Traffic Consultant (AECOM) prior to use in the study.

Table 3: Site Trip Generation										
Land Use	ITE	Amount	Units	Average Daily Traffic (vpd)	AM Pe	eak Hou	ur (vph)	PM Peak Hour (vph)		
Lanu Use	Code	Amount			In	Out	Total	In	Out	Total
Multi-Family Home (Mid-Rise)	221	174	D.U.	947	15	44	59	46	29	75

Table 3: Site Trip Constation

6 SITE TRAFFIC ASSIGNMENT

The site access for the proposed development is proposed via two (2) driveways: one (1) via an existing shared site driveway on 12 Oaks Mall Road that is currently serving the Waltonwood at Twelve Oaks multi-family residential development, and one (1) via a proposed driveway on eastbound 12-Mile Road. The vehicular trips that would be generated by the proposed development were assigned to the study network based on the proposed site access plan, the existing peak hour traffic patterns on the adjacent roadway network, and the methodologies published by ITE. The adjacent street traffic volumes were used to develop the trip distribution. To determine residential trips distribution, it was assumed that the majority of the trips in the AM are home-to-work based trips, and in the PM are work-to-home based trips. Therefore, the global trip generation is based on trips leaving the development in the AM and exiting the study network, then entering the study network and returning to the development in the PM. The ITE trip distribution methodology assumes that new trips will return to their direction of origin. The site trip distribution used in the analysis is summarized in **Table 4**.

From/To	Via	AM	PM
North	Novi Road	8%	12%
South	Novi Road	29%	20%
East	12-Mile Road	43%	42%
West	12-Mile Road	20%	26%
	Total	100%	100%

Table	4:	Site	Trip	Distribution
-------	----	------	------	--------------

The vehicular traffic volumes shown in **Table 3** were distributed to the roadway network according to the distribution shown in **Table 4**. The site generated trips are shown on **Figure 5** and were added to the future background traffic volumes shown on **Figure 4** to calculate the future peak hour traffic volumes with the proposed development. Future traffic volumes are shown on **Figure 6**.

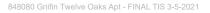
7 FUTURE CONDITIONS

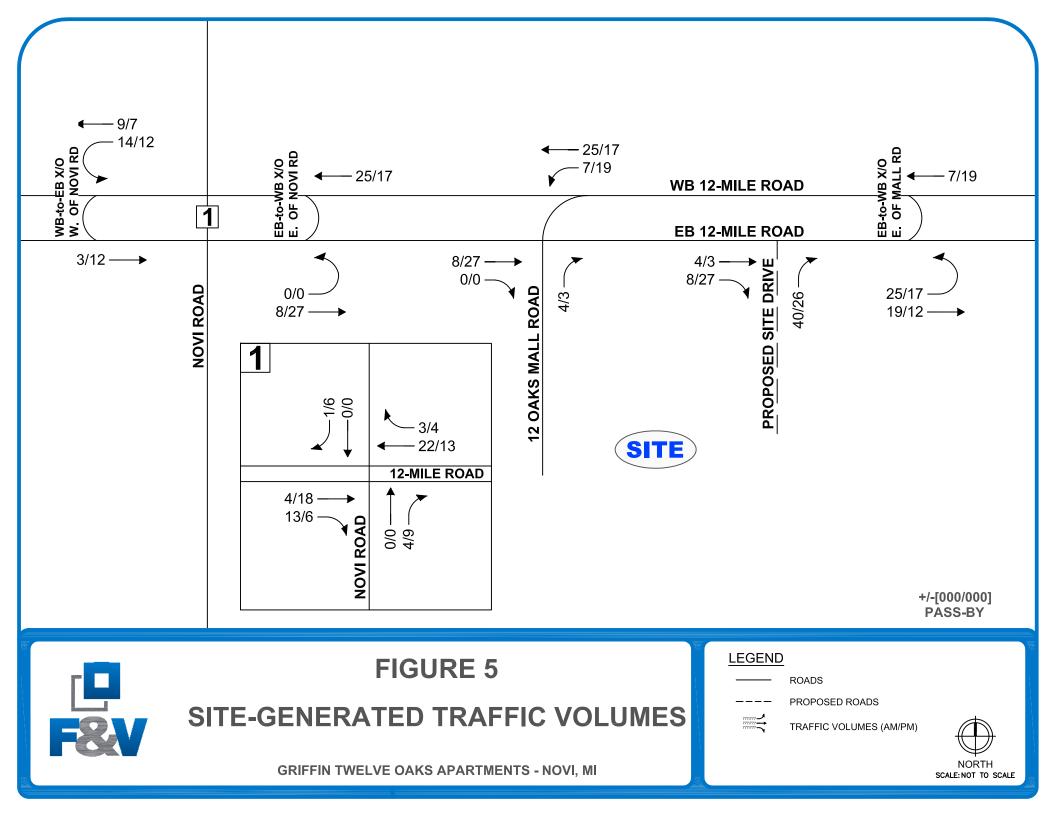
7.1 FUTURE OPERATIONS

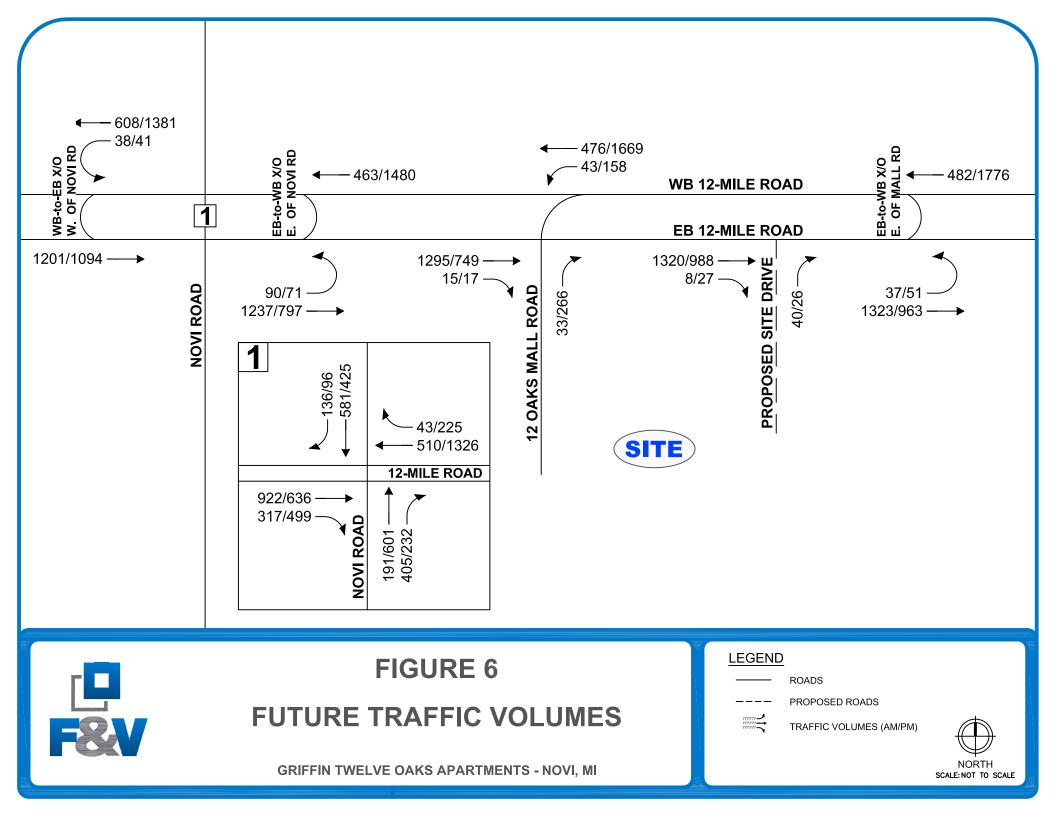
The future peak hour vehicle delays and LOS *with the proposed development* were calculated based on the future lane use and traffic control shown on **Figure 2**, the proposed site access plan, the future traffic volumes shown on **Figure 6**, and the methodologies presented in the HCM. The results of the future conditions analysis are presented in **Appendix D** and are summarized in **Table 5**.

The results of the future conditions analysis show that, with the addition of the site generated traffic, all study intersection approaches and movements will operate in a manner similar to existing and background conditions, with negligible changes in delays. As previously identified under the background conditions analysis, several approaches and movements at the signalized study intersections showed a reduced delay; these improvements are due to the SCATS signals real time optimizations made to accommodate additional traffic generated by the proposed development and/or the improved progression of traffic between intersections.

The results of the future conditions analysis also indicates that the proposed site driveway on 12-Mile Road will operate acceptably at LOS D or better during both peak periods. Review of SimTraffic microsimulations at all of the study intersections and proposed site driveways indicate acceptable operations during both peak periods. Minor vehicle queueing was observed at the signalized intersections; however, the majority of vehicle queues were observed to be serviced within each cycle length and any queues observed during the peak periods would dissipate and not remain present throughout the peak periods.







				Backgr	round	Conditi	ons	Futi	ure Co	ondition	S	Difference			
	Intersection	Control	Approach	AM Pe	eak	PM Peak		AM Peak		PM Peak		AM Pe	eak	PM P	eak
			npprodon	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
			EBT	18.4	В	15.0	В	19.2	В	14.7	В	0.8	-	-0.3*	-
			EBR	21.5	С	21.4	С	21.5	С	20.7	С	0.0	-	-0.7*	-
	12 Mile Dood		WBT	15.3	В	17.4	В	16.2	В	3.7	А	0.9	-	-13.7*	B→A
1	12-Mile Road &	Signalized	WBR	14.8	В	13.2	В	15.1	В	1.2	А	0.3	-	-12.0*	B→A
ľ	Novi Road	Signalized	NBT	23.3	С	34.2	С	22.7	С	34.0	С	-0.6*	-	-0.2*	-
			NBR	32.4	С	28.6	С	32.3	С	28.9	С	-0.1*	-	0.3	-
			SBTR	29.2	С	32.4	С	28.6	С	32.4	С	-0.6*	-	0.0	-
			Overall	20.6	С	20.0	С	20.5	С	19.8	В	-0.1*	-	-0.2*	С→В
	EB 12-Mile Rd.		EB	2.8	А	2.8	Α	2.9	А	2.9	А	0.1	-	0.1	-
2	& WB-to-EB X/O	Signalized	SBL	43.3	D	43.3	D	43.3	D	43.3	D	0.0	-	0.0	-
	W. of Novi Rd.		Overall	3.7	Α	4.1	Α	4.2	Α	4.6	Α	0.5	-	0.5	-
	WB 12-Mile Rd.		WB	1.9	А	1.8	А	2.0	А	14.2	В	0.1	-	12.4	А→В
3	& EB-to WB X/O	Signalized	NBL	43.4	D	43.3	D	43.4	D	53.0	D	0.0	-	9.7	-
	E. of Novi Rd.		Overall	9.0	Α	3.7	Α	8.7	Α	15.9	В	-0.3*	-	12.2	А→В
			EBT	3.9	Α	2.3	Α	4.1	Α	2.4	Α	0.2	-	0.1	-
	12-Mile Road		EBR	2.2	А	1.5	Α	2.2	Α	1.5	Α	0.0	-	0.0	-
4	& 12 Oaks Mall	Signalized	NBR	33.1	С	41.3	D	32.9	С	40.9	D	-0.2*	-	-0.4*	-
	Road		SBT	32.3	С	40.3	D	32.1	С	39.8	D	-0.2*	-	-0.5*	-
			Overall	5.6	Α	16.6	В	6.0	Α	16.7	В	0.4	-	0.1	-
	WB 12-Mile Rd.		WB	1.9	Α	3.6	А	1.9	Α	3.9	Α	0.0	-	0.3	-
5	5 EB-to WB X/O	Signalized	NBL	34.7	С	54.5	D	34.8	С	47.3	D	0.1	-	-7.2*	-
	E. of 12 Oaks		Overall	2.9	Α	4.5	Α	4.8	Α	5.1	Α	1.9	-	0.6	-
6	EB 12-Mile Rd. Stop EB & Site Drive (Minor.) SBI		EB SBL	N/A			Free 18.1 C 14		Free 14.2 B		N	N/A			

Table 5: Future Intersection Operations

* Decreased delays are the result of SCATS real time optimizations and/or HCM Methodology

8 MULTI-MODAL TRANSPORTATION EVALUATION

The existing and proposed multi-modal facilities, including non-motorized facilities and transit within the vicinity of the proposed site, are shown on **Figure 7**. The multi-modal figure indicates all possible points of conflict between motorized traffic and pedestrian/bicycle traffic on 12-Mile Road between Novi Road and Meadowbrook Road. The proposed development site plan includes a sidewalk throughout the site, with a connection to the existing sidewalk along the south side of 12-Mile Road. Additionally, the proposed development site plan includes multiple bike rack locations throughout the project site.

9 ACCESS MANAGEMENT

9.1 AUXILIARY TURN LANE

12-Mile Road is a median divided roadway; therefore, only the right-turn treatment warrants were evaluated at the proposed site driveway. The City of Novi Right-turn warrants were utilized for this analysis and were based on the existing AADT volumes and future traffic volumes as shown in **Figure 6.** The results of the analysis indicate that a <u>right-turn deceleration taper only</u> is recommended at the proposed site driveways on 12-Mile Road. The RCOC turn lane warrant chart is attached in **Appendix E**.





F8

FIGURE 7

MULTI-MODAL CIRCULATION PLAN

GRIFFIN TWELVE OAKS APARTMENTS - NOVI, MI





PROPOSED SIDEWALK

SIDEWALK

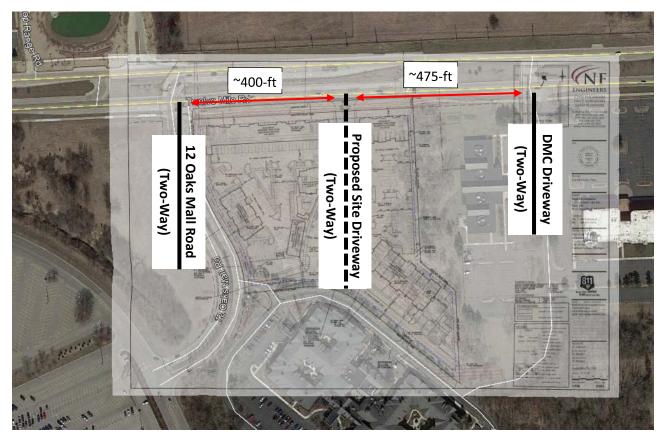
EXISTING CROSSWALK / CONFLICT POINT

PROPOSED CROSSWALK/CONFLICT POINT

9.2 DRIVEWAY SPACING

The City of Novi standards for access management were reviewed with respect to the proposed site driveway on EB 12-Mile Road. Per the City of Novi driveway spacing standards for a 45mph roadway, a minimum distance of 230-ft (measured from near approach curb to near approach curb) is recommended. The results of the driveway spacing analysis show that the proposed driveway on 12 Mile Road will meet the City access management criteria.

FIGURE 8: DRIVEWAY SPACING



9.3 SIGHT DISTANCE REVIEW

The intersection sight distance at the proposed site driveway on EB 12-Mile Road was reviewed. The City of Novi and the RCOC sight distance requirements for a 45 mph roadway is 460 feet and 500 feet, respectively; therefore, the RCOC standards were utilized to provide a conservative approach. There is minimal vertical and horizontal deflection on 12-Mile Road adjacent to the site driveway; therefore, the only potential sight distance limitations are due to trees/vegetation along 12-Mile Road, which should be removed during construction.

10 PARKING STUDY

10.1 INTRODUCTION

The proposed Griffin Twelve Oaks Apartments development includes the construction of 174 multi-family residential homes. The proposed site plan includes 274 parking spaces. In accordance with City Zoning Ordinance Section 5.2.9, the Planning Commission may accept the recommendations of its Traffic Consultant or undertake a study to determine the most appropriate standard to use. Therefore, this analysis was performed to determine if the proposed 274 parking spaces provides the necessary parking to accommodate the proposed development.



10.2 PARKING ANALYSIS

A parking analysis is a two-step process. The first step in determining the parking needs for a development is to calculate the projected parking *demand*. Parking demand calculations determine how much parking will be generated by the development. Step two in the parking analysis process is to determine if the parking supply is adequate to accommodate the projected parking demand; and if the parking supply is not adequate, provide recommendations to accommodate the projected parking demand.

A parking lot is typically designed to accommodate 85-95% occupancy, depending on the proposed land use(s), layout, and parking management (self-parking, valet, etc.). As vehicles traversing through the parking lot search for the open spaces or wait for vehicles to exit, a buffer is provided between supply and demand that allows for easier turnover in the parking lot and less congestion. For parking lots with a higher turnover (such as grocery stores and restaurants) the parking occupancy percentage should be lower, and for parking lots with less turnover (office buildings and residential) the parking occupancy percentage can be higher.

Projected Parking Demand

The Institute of Transportation Engineers (ITE) *Parking Generation, 5th Edition* was used to determine the parking demand for this site. The ITE *Parking Generation* is an informational guide used by engineers and planners for the purposes of determining the parking demand associated with various land uses. The parking generation data included in *Parking Generation* are provided by various state and local government agencies, consulting firms, individual transportation professionals, universities, developers, associations, local sections, districts, and student chapters of ITE located throughout the U.S. The data is examined by ITE for validity and reasonableness before being entered into the comprehensive database. Therefore, the data presented by ITE in the *Parking Generation* provides a comprehensive average of parking demand for the various land uses throughout the country and is a recommended resource for the calculation parking demand.

The proposed development includes construction of 174 multi-family units: 97 one-bed, 63 two-bed, and 14 three-bed units. The parking analysis was performed to determine if the proposed parking supply of 274 parking spaces will be adequate to accommodate the projected parking demand. The proposed development includes an apartment/townhomes complex with three floors of residential units. For this study, the best fit land use was determined to be Multi-Family Housing: Mid-Rise (Land Use Code #221).

Multi-Family Housing: Mid-Rise (Land Use Code #221) Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and with between three and 10 levels (floors) of residence.

The ITE *Parking Generation*, 5th *Edition* has data associated with this land use for urban/suburban, dense urban and center city core. Regarding parking generation, an urban/suburban area is defined by ITE as, "an *area of vehicle-centered access where nearly all person trips that enter or exit a development site are by personal passenger or commercial vehicle." Therefore, it was determined that this area of the City of Novi is a typical urban/suburban¹ environment and the parking demand calculations were based on this assumption.*

ITE presents two methodologies for determining parking demand; total number of units and the number of beds per unit. The projected parking demand analysis for the site was performed using both methodologies as summarized in **Table 6**. The highest projected parking demand associated with each methodology was used to calculate the projected peak parking demand for the site. The results of this analysis indicate that the higher parking demand is associated with the number of units, rather than calculations by bedrooms.

¹ The primary difference between urban/suburban, dense urban and city core is the presence of transit. *General Urban/Suburban*an area associated with almost homogeneous vehicle-centered access. *Dense Multi-Use Urban*— a fully developed area (or nearly so), with diverse and interacting complementary land uses, good pedestrian connectivity, <u>and convenient and frequent transit</u>. *Center City Core*— the downtown area for a major metropolitan region at the focal point of a <u>regional light- or heavy-rail transit system</u>.



			ITE F	Parking Generation S	5th Edition		
Methodology	Size	Independent Variable	Peak Peric Demand	Peak Period Parking Demand (veh)			
			Weekday	Weekend	Weekday	Weekend	
Spaces per DU	174	D. U.	1.31 space / DU	1.22 space / DU	228	212	
	97	D. U.	0.75 space / 1-bed	0.77 space / 1-bed	73	75	
Spaces per bod per DU	63	D. U.	1.5 space / 2-bed	1.54 space / 2-bed	95	98	
Spaces per bed per DU	14	D. U.	2.25 space / 3-bed	2.31 space / 3-bed	32	33	
	174	D. U.	Combin	200	206		
	Parking Demand 228 212						

Table 6: ITE Parking Generation, Parking Demand

Proposed Parking Supply

The projected parking demand calculated was compared to the proposed parking supply for this site to determine if there is adequate parking to accommodate the proposed operations. The highest daily parking demands for this development are expected to occur on the weekdays. There is essentially no difference in overnight peak parking demand on weekdays and weekends. The results of the analysis are summarized in **Table 7** and show that there is adequate parking to accommodate the proposed development.

The peak parking demand for this site was also compared to the City of Novi Zoning Ordinance requirements which requires two (2) parking spaces per each dwelling unit having two (2) or less bedrooms, and two and one-half (2 ½) parking spaces for each dwelling unit having three (3) or more bedrooms for this site. The results of this analysis are summarized in **Table 7** and show the Novi parking supply requirements for this site have a projected surplus of 127 parking spaces and would have the site significantly overparked based on the ordinance requirements.

			Independent	Novi Zoning (Proposed	
Methodology	Land Use	Size	Variable	Parking Supply Requirements	Parking (spaces)	Parking (spaces)
Spaces per bed	Multi-Family	160	D. U.	2 spaces / 1-2 bed	320	274
per DU	Housing: Mid-Rise	14	D. U.	2.5 spaces / 3+ bed	35	274
				Parking Supply	355	274
		eak Parking Demand	228	228		
		ted Parking Surplus	127	46		
Total Parking Percent Occupancy 64.						83.2%

Table 7: Parking Supply Summary

10.3 CONCLUSIONS

The conclusions of this parking evaluation are as follows:

- The projected peak parking demand for this site is 228 spaces and is expected to occur during the overnight hours, from 12AM-4AM.
- The projected peak proposed parking supply for this site includes 274 spaces, which results in a parking surplus of 46 spaces and a peak occupancy of 83%. Therefore, the proposed parking supply is acceptable to accommodate the projected parking demand.
- The parking supply requirements outlined in the Novi Zoning Ordinance would result in a parking surplus of 127 spaces.



10 CONCLUSIONS

The conclusions of this TIS are as follows:

1. Existing Conditions:

- All approaches and movements at the study intersections currently operate acceptably, at LOS D or better during both peak periods.
- Review of SimTraffic network simulations indicates acceptable operations throughout the study network during both peak periods, with minimal vehicle queueing.

2. Background Conditions (without the proposed development):

- A conservative annual growth rate of 0.5% per year was applied to the 2020 traffic volumes in order to determine the background 2024 traffic volumes.
- The results of the background conditions analysis indicates that all study intersections will continue to operate acceptably at LOS D or better during both peak periods, in a similar manner to existing conditions.

3. Future Conditions (with the proposed development):

- The results of the future conditions analysis indicates that, with the addition of the site-generated traffic, all study intersection approaches and movements will continue to operate acceptably at LOS D or better during both peak periods, in a manner similar to existing and background conditions.
- Review of SimTraffic microsimulations indicates acceptable operations during both peak periods, with negligible queueing and delays experienced at the study intersections.

4. Access Management

- The results of the RCOC auxiliary lane analysis indicate that a right-turn deceleration <u>taper only</u> is recommended at the proposed 12-Mile Road site driveway.
- The spacing of the proposed site driveway on 12 Mile Road meets the City of Novi access management criteria.
- The proposed site driveway on 12 Mile Road meets sight distance requirements.

5. Parking Study

 In accordance with ITE Parking Generation methodology, the projected peak parking demand for the proposed development is 228 spaces. The proposed site plan includes 274 spaces; therefore, the site is expected to have a peak parking occupancy of 83% and a parking surplus of 46 spaces.

11 RECOMMENDATIONS

The recommendations of this TIS are as follows:

1. Construct a right-turn deceleration taper only at the proposed site driveway on EB 12-Mile Road.





Appendix A

BACKGROUND INFORMATION



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17:15	EB	68	111	2	181
17:15	NB	20	39	-	59
17:30	WB	39	-	-	39
17:30	EB	74	116	7	197
17:30	NB	15	41	-	56
17:45	WB	26	-	-	26
17:45	EB	65	106	7	178
17:45	NB	15	40	-	55
18:00	WB	20	-	-	20
18:00	EB	59	82	3	144
18:00	NB	16	52	-	68

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16:30	EB 63 48 93 204
16:30	NB 88 49 56 193
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16:45	EB 73 64 115 252
16:45	NB 79 57 58 194
17:00	WB 220 154 40 414
17:00	SB 36 71 - 107
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17:15	WB 184 117 55 356
17:15	SB 55 76 - 131
17:15	EB 100 78 141 319
17:15	NB 89 71 59 219 WP 170 102 68 240
17:30 17:30	WB 170 102 68 340 SB 54 68 - 122
17:30	EB 70 65 110 245
17:30	NB 88 63 57 208
17:45	WB 180 119 40 339
17:45 17:45	SB 51 73 - 124 EB 68 59 82 209
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18:00	SB 46 72 - 118
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08:30EB 114 89 70 273 $08:30$ NB 21 16 63 100 $08:45$ WB 68 48 3 119 $08:45$ SB 48 73 $ 121$ $08:45$ NB 32 19 56 107 $09:45$ NB 32 19 56 107 $09:00$ WB 62 48 12 122 $09:00$ SB 78 100 $ 178$ $09:00$ EB 136 102 64 302 $09:00$ NB 25 20 59 104 $16:15$ SB 43 74 $ 117$ $16:15$ EB 61 49 102 212 $16:15$ NB 70 36 46 152 $16:30$ WB 174 109 40 323 $16:30$ SB 47 67 $ 114$ $16:30$ EB 66 49 115 230 $16:30$ NB 75 58 43 176 $16:45$ WB 170 120 44 334 $16:45$ SB 51 88 $ 139$ $16:45$ NB 94 58 63 215 $17:00$ WB 203 112 39 354 $17:00$ SB 49 77 $ 126$ $17:00$ EB 70 68 138 <td< td=""><td></td><td></td></td<>		
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08:45WB 68 48 3 119 $08:45$ SB 48 73 - 121 $08:45$ NB 32 19 56 107 $09:45$ NB 32 19 56 107 $09:00$ WB 62 48 12 122 $09:00$ SB 78 100 - 178 $09:00$ EB 136 102 64 302 $09:00$ NB 25 20 59 104 $16:15$ SB 43 74 - 117 $16:15$ EB 61 49 102 212 $16:15$ NB 70 36 46 152 $16:30$ WB 174 109 40 323 $16:30$ SB 47 67 - 114 $16:30$ EB 66 49 115 230 $16:30$ NB 75 58 43 176 $16:45$ WB 170 120 44 334 $16:45$ SB 51 88 - 139 $16:45$ NB 94 58 63 215 $17:00$ WB 203 112 39 354 $17:00$ EB 70 68 138 276 $17:00$ NB 86 54 46 186 $17:15$ NB 80 65 54 199 $17:30$ WB 175 120 45 340 </td <td></td> <td></td>		
08:45SB 48 73 $ 121$ $08:45$ EB 65 64 63 192 $08:45$ NB 32 19 56 107 $09:00$ WB 62 48 12 122 $09:00$ SB 78 100 $ 178$ $09:00$ EB 136 102 64 302 $09:00$ NB 25 20 59 104 $16:15$ SB 43 74 $ 117$ $16:15$ EB 61 49 102 212 $16:15$ NB 70 36 46 152 $16:30$ WB 174 109 40 323 $16:30$ EB 66 49 115 230 $16:30$ RB 75 58 43 176 $16:45$ WB 170 120 44 334 $16:45$ SB 51 88 $ 139$ $16:45$ EB 72 77 100 249 $16:45$ NB 94 58 63 215 $17:00$ WB 203 112 39 354 $17:00$ EB 70 68 138 276 $17:00$ EB 70 68 138 276 $17:00$ NB 86 54 46 186 $17:15$ NB 80 65 54 199 $17:30$ WB 175 120 45 </td <td></td> <td></td>		
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17.50 THE 100 07 55 222	17:00 17:00 17:00 17:15 17:15 17:15 17:15 17:15 17:30 17:30	SB 49 77 - 126 EB 70 68 138 276 NB 86 54 46 186 WB 173 100 68 341 SB 66 66 - 132 EB 99 90 123 312 NB 80 65 54 199 WB 175 120 45 340 SB 56 77 - 133 EB 86 77 134 297

17:45	WB	227	12	5 61	413
17:45	SB	59	74		133
17:45	EB	77	66	121	264
17:45	NB	72	56	61	189
18:00	WB	179	12	2 54	355
18:00	SB	51	81		132
18:00	EB	65	55	109	229

Tuesday, 03 March 2020 Approach detector(s) NB 1 2 WB 3 4				
07:45 08:00 08:00 08:15 08:15 08:30 08:30 08:45 08:45	NB 4 5 9 WB 44 33 77 NB 1 1 2 WB 54 33 87 NB 0 2 2 WB 69 36 105 NB DA 0 0 WB 71 55 126 NB DA 1 1 WB 85 62 147 NB 4 4 8 WB 81 65 146 NB 1 3 4 WB 84 66 150 NB 0 0 0 WB 60 47 107			
16:15 16:30 16:30 16:45 16:45 17:00 17:00 17:15	NB 6 3 9 WB 245 179 424 NB 6 5 11 WB 267 161 428 NB 8 4 12 WB 239 149 388 NB 1 3 4 WB 258 165 423 NB 5 5 10 WB 230 150 380 NB 3 2 5 WB 247 201 448 NB 5 0 5 WB 241 202 443 NB 2 1 3 WB 230 162 392			
Wednesday, 04 March 2020 NB 1 2 WB 3 4				

07:15	NB	0	1	1
07:15	WB	27	39	66
07:30	NB	1	1	2
07:30	WB	38	38	76
07:45	NB	0	1	1
07:45	WB	61	42	103

08:00 08:00 08:15 08:15 08:30 08:30 08:45 08:45 09:00 09:00	NB112WB7335108NB022WB514192NBDA11WB5645101NBDA11WB6846114NB112WB513182
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N	05 March 2020 NB 1 2 VB 3 4
07:15 07:15 07:30 07:30 07:45 07:45 08:00 08:00 08:15 08:15 08:30 08:30 08:30 08:45 08:45 09:00 09:00	NB 1 1 2 WB 27 25 52 NB 1 4 5 WB 43 24 67 NB 2 1 3 WB 49 41 90 NB 2 1 3 WB 61 56 117 NB 1 3 4 WB 55 40 95 NB 0 1 1 WB 54 38 92 NB 1 2 3 WB 62 47 109 NB 0 0 0 WB 44 27 71
16:15 16:15	NB 6 3 9 WB 221 133 354

16:30	NB 7 4 11
16:30	WB 216 135 351
16:45	NB 9 7 16
16:45	WB 207 173 380
17:00	NB 1 3 4
17:00	WB 208 150 358
17:15	NB 8 2 10
17:15	WB 235 159 394
17:30	NB 7 4 11
17:30	WB 226 172 398
17:45	NB 3 7 10
17:45	WB 271 190 461
18:00	NB 8 2 10
18:00	WB 223 155 378

Appr E	3 March 2020 oach detector(s) B 1 /B 3 4
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Wednesday, 04 March 2020 FB 1

EB	1	
WB	3	4

07:15	EB	14	-	14
07:15	WB	12	19	31
07:30	EB	18	-	18
07:30	WB	19	27	46
07:45	EB	18	-	18
07:45	WB	16	46	62

08:00 08:00 08:15 08:15 08:30 08:30 08:45 08:45 09:00 09:00	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
16:15 16:15 16:30 16:30 16:45 16:45 17:00 17:00 17:15 17:15 17:15 17:30 17:30 17:45 17:45 18:00 18:00	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
E	05 March 2020 EB 1 WB 3 4
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16:15 16:15	EB 11 - 11 WB 32 154 186

16:30	EB	13	-	13
16:30	WB	15	168	183
16:45	EB	20	-	20
16:45	WB	24	153	177
17:00	EB	10	-	10
17:00	WB	20	194	214
17:15	EB	22	-	22
17:15	WB	23	162	185
17:30	EB	22	-	22
17:30	WB	17	165	182
17:45	EB	26	-	26
17:45	WB	27	208	235
18:00	EB	15	-	15
18:00	WB	28	165	193

Tuesday, 03 March 2020 Approach detector(s) WB 1 EB 3 4			
07:15 07:15 07:30 07:30 07:45 07:45 08:00 08:00 08:15 08:15 08:30 08:30 08:45 08:45 09:00 09:00	WB 6 - EB 4 160 WB 7 - EB 13 187 WB 7 - EB 13 193 WB 8 - EB 8 175 WB 11 - EB 8 169 WB 9 - EB 7 166 WB 12 - EB 14 114 WB 10 - EB 11 183	6 164 7 200 7 206 8 183 11 177 9 173 12 128 10 194	
$16:15 \\ 16:15 \\ 16:30 \\ 16:30 \\ 16:45 \\ 16:45 \\ 17:00 \\ 17:00 \\ 17:15 \\ 17:15 \\ 17:15 \\ 17:30 \\ 17:30 \\ 17:45 \\ 17:45 \\ 18:00 \\ 18:00 \\ 18:00 \\ 18:00 \\ 18:00 \\ 100 \\ $	WB 5 - EB 20 72 WB 6 - EB 31 66 WB 10 - EB 18 83 WB 10 - EB 19 80 WB 8 - EB 16 108 WB 8 - EB 17 93 WB 9 - EB 23 71 WB 5 - EB 14 70	5 92 6 97 10 101 10 99 8 124 8 110 9 94 5 84	
Wednesday, 04 March 2020 WB 1 EB 3 4			

07:15	WB 1 -	1
07:15	EB 1 85	86
07:30	WB 4 -	4
07:30	EB 2 112	114
07:45	WB 5 -	5
07:45	EB 5 109	114

08:00 08:00 08:15 08:15 08:30 08:30 08:45 08:45 09:00 09:00	WB 3 - EB 5 116 WB 6 - EB 1 111 WB 10 - EB 5 88 WB 6 - EB 9 105 WB 8 - EB 8 131	6 1 112 - 10 93 6 5 114 8
16:15 16:15 16:30 16:30 16:45 16:45 17:00 17:00 17:15 17:15 17:15 17:30 17:30 17:45 17:45 18:00 18:00	WB 5 - EB 9 64 WB 2 - EB 23 72 WB 6 - EB 19 72 WB 9 - EB 17 96 WB 4 - EB 13 10 WB 3 - EB 19 74 WB 7 - EB 10 70 WB 7 - EB 10 70 WB 4 - EB 10 70 WB 4 - EB 20 69	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
V	05 March 20 VB 1 EB 3 4	020
07:15 07:15 07:30 07:30 07:45 07:45 08:00 08:00 08:15 08:15 08:15 08:30 08:45 08:45 08:45 09:00 09:00	 WB 3 - EB 1 78 WB 3 - EB 2 84 WB 9 - EB 4 132 WB 5 - EB 9 126 WB 3 - EB 9 147 WB 6 - EB 6 112 WB 7 - EB 7 70 WB 8 - EB 7 136 	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
16:15 16:15 16:30	WB 6 - EB 16 62 WB 3 -	6 2 78 3

16:30	EB	23	70	93
16:45	WB	5	-	5
16:45	EB	17	79	96
17:00	WB	10	-	10
17:00	EB	16	76	92
17:15	WB	8	-	8
17:15	EB	21	118	139
17:30	WB	1	-	1
17:30	EB	17	95	112
17:45	WB	9	-	9
17:45	EB	16	89	105
18:00	WB	5	-	5
18:00	EB	25	66	91



www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 24 NE File Name : TMC_1 EB 12 Mile & XO W Novi_2-10-21 Site Code : TMC_1 Start Date : 2/10/2021 Page No : 1

4 Hour video traffic study was conducted during typical weekday (Wednesday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session during COVID 19.

				oups Printed	- Pass Car	rs - Single	Units - H	Heavy Truck	s - Peds				
	X/0	D 715' We Southl		Rd.		EB 12 M West					lile Road		
Start Time	Right	Left		App. Total	Right	Thru		App. Total	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	9	0	9	0	0	0	0	43	0	0	43	52
07:15 AM	0	11	0	11	0	0	0	0	69	0	0	69	80
07:30 AM	0	11	0	11	0	0	0	0	91	0	0	91	102
07:45 AM	0	12	0	12	0	0	0	0	99	0	0	99	111
Total	0	43	0	43	0	0	0	0	302	0	0	302	345
08:00 AM	0	10	0	10	0	0	0	0	85	0	0	85	95
08:15 AM	0	9	0	9	0	0	0	0	104	0	0	104	113
08:30 AM	0	17	0	17	0	0	0	0	90	0	0	90	107
08:45 AM	0	15	0	15	0	0	0	0	103	0	0	103	118
Total	0	51	0	51	0	0	0	0	382	0	0	382	433
*** BREAK ***													
04:00 PM	0	29	0	29	0	0	0	0	147	0	0	147	176
04:15 PM	0	36	0	36	0	0	0	0	146	0	0	146	182
04:30 PM	0	37	0	37	0	0	0	0	170	0	0	170	207
04:45 PM	0	33	0	33	0	0	0	0	170	0	0	170	203
Total	0	135	0	135	0	0	0	0	633	0	0	633	768
05:00 PM	0	33	0	33	0	0	0	0	201	0	0	201	234
05:15 PM	0	42	0	42	0	0	0	0	158	0	0	158	200
05:30 PM	0	46	0	46	0	0	0	0	139	0	0	139	185
05:45 PM	0	25	0	25	0	0	0	0	142	0	0	142	167
Total	0	146	0	146	0	0	0	0	640	0	0	640	786
Grand Total	0	375	0	375	0	0	0	0	1957	0	0	1957	2332
Apprch %	0	100	0		0	0	0		100	0	0		
Total %	0	16.1	0	16.1	0	0	0	0	83.9	0	0	83.9	
Pass Cars	0	373	0	373	0	0	0	0	1937	0	0	1937	2310
% Pass Cars	0	99.5	0	99.5	0	0	0	0	99	0	0	99	99.1
Single Units	0	2	0	2	0	0	0	0	14	0	0	14	16
% Single Units	0	0.5	0	0.5	0	0	0	0	0.7	0	0	0.7	0.7
Heavy Trucks	0	0	0	0	0	0	0	0	6	0	0	6	6
<u>% Heavy Trucks</u>	0	0	0	0	0	0	0	0	0.3	0	0	0.3	0.3
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0

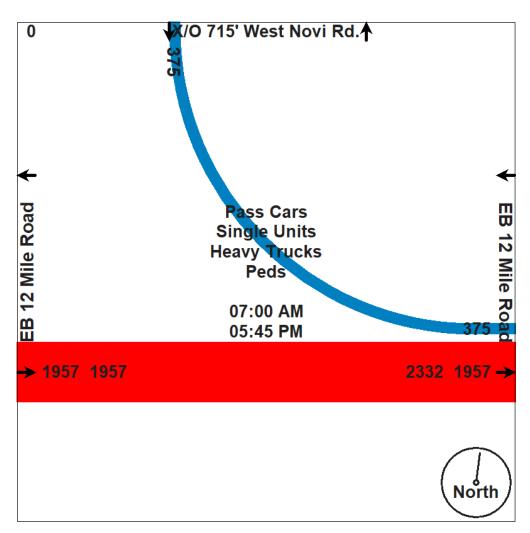
TDC Traffic Comments: Signalized controlled intersection, no ped. signals. Video VCU camera was located within NE intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Singh Novi Uptown Place Apt. Traffic Impact Study for Fleis & Vandenbrink.





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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 24 NE File Name : TMC_1 EB 12 Mile & XO W Novi_2-10-21 Site Code : TMC_1 Start Date : 2/10/2021 Page No : 2

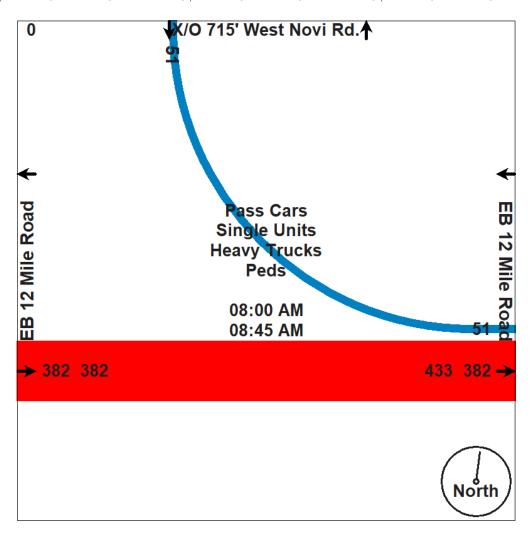




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 24 NE File Name : TMC_1 EB 12 Mile & XO W Novi_2-10-21 Site Code : TMC_1 Start Date : 2/10/2021 Page No : 3

		15' West No Southbound	-		12 Mile Ro Vestbound		EE	3 12 Mile Ro Eastbound		
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis Fron	n 07:00 AM to	0 11:45 AM	- Peak 1 of 1							
Peak Hour for Entire Inte	rsection Begi	ns at 08:00	AM							
08:00 AM	0	10	10	0	0	0	85	0	85	95
08:15 AM	0	9	9	0	0	0	104	0	104	113
08:30 AM	0	17	17	0	0	0	90	0	90	107
08:45 AM	0	15	15	0	0	0	103	0	103	118
Total Volume	0	51	51	0	0	0	382	0	382	433
% App. Total	0	100		0	0		100	0		
PHF	.000	.750	.750	.000	.000	.000	.918	.000	.918	.917
Pass Cars	0	51	51	0	0	0	377	0	377	428
% Pass Cars	0	100	100	0	0	0	98.7	0	98.7	98.8
Single Units	0	0	0	0	0	0	3	0	3	3
% Single Units	0	0	0	0	0	0	0.8	0	0.8	0.7
Heavy Trucks	0	0	0	0	0	0	2	0	2	2
% Heavy Trucks	0	0	0	0	0	0	0.5	0	0.5	0.5
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0

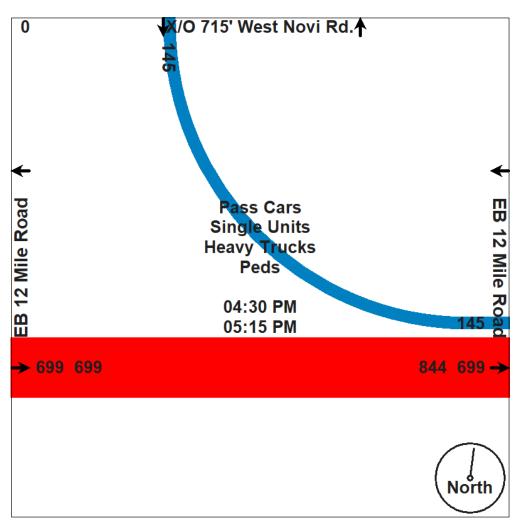




www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 24 NE File Name : TMC_1 EB 12 Mile & XO W Novi_2-10-21 Site Code : TMC_1 Start Date : 2/10/2021 Page No : 4

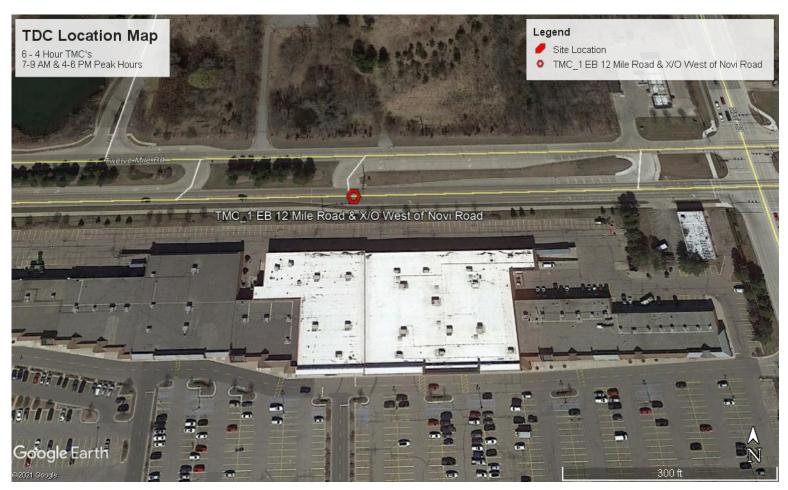
	X/O 7	15' West No	vi Rd.	EB	12 Mile Ro	ad	EE	3 12 Mile Ro	ad	
		Southbound		١	Vestbound			Eastbound		
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis Fror										
Peak Hour for Entire Inte	ersection Begi	ins at 04:30	PM							
04:30 PM	0	37	37	0	0	0	170	0	170	207
04:45 PM	0	33	33	0	0	0	170	0	170	203
05:00 PM	0	33	33	0	0	0	201	0	201	234
05:15 PM	0	42	42	0	0	0	158	0	158	200
Total Volume	0	145	145	0	0	0	699	0	699	844
% App. Total	0	100		0	0		100	0		
PHF	.000	.863	.863	.000	.000	.000	.869	.000	.869	.902
Pass Cars	0	145	145	0	0	0	698	0	698	843
% Pass Cars	0	100	100	0	0	0	99.9	0	99.9	99.9
Single Units	0	0	0	0	0	0	1	0	1	1
% Single Units	0	0	0	0	0	0	0.1	0	0.1	0.1
Heavy Trucks	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 24 NE File Name : TMC_1 EB 12 Mile & XO W Novi_2-10-21 Site Code : TMC_1 Start Date : 2/10/2021 Page No : 5

Aerial Photo





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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3CU SE File Name : TMC_2 WB 12 Mile & Novi_2-10-21 Site Code : TMC_2 Start Date : 2/10/2021 Page No : 1

4 Hour video traffic study was conducted during typical weekday (Wednesday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session during COVID 19.

						Group	s Printe	ed- Pa	iss Car	s - Sing	le Unit	s - Hea	avy Tru	ucks - I	Peds						
		N	ovi Ro	ad			WB 1	2 Mile	Road	-		N	ovi Ro	ad			WB 1	2 Mile	Road		
		So	uthbo	und			W	estbo	und			No	orthbo	und			E	astbou	Ind		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	13	35	0	0	48	10	35	0	0	45	0	21	0	0	21	0	0	0	0	0	114
07:15 AM	11	50	0	0	61	6	57	0	0	63	0	21	0	0	21	0	0	0	0	0	145
07:30 AM	12	55	0	0	67	7	54	0	0	61	0	32	0	0	32	0	0	0	0	0	160
07:45 AM	16	70	0	0	86	6	65	0	0	71	0	35	0	0	35	0	0	0	0	0	192
Total	52	210	0	0	262	29	211	0	0	240	0	109	0	0	109	0	0	0	0	0	611
08:00 AM	20	58	0	0	78	5	69	0	0	74	0	25	0	0	25	0	0	0	0	0	177
08:15 AM	18	60	0	0	78	8	58	0	0	66	0	33	0	0	33	0	0	0	0	0	177
08:30 AM	13	77	0	0	90	6	75	0	0	81	0	50	0	0	50	0	0	0	0	0	221
08:45 AM	15	70	0	0	85	5	72	0	0	77	0	39	0	0	39	0	0	0	0	0	201
Total	66	265	0	0	331	24	274	0	0	298	0	147	0	0	147	0	0	0	0	0	776
*** BREAK **	*																				
04:00 PM	15	77	0	0	92	13	140	0	0	153	0	108	0	0	108	0	0	0	0	0	353
04:15 PM	17	73	0	0	90	22	138	0	0	160	0	96	0	0	96	0	0	0	0	0	346
04:30 PM	13	70	0	0	83	30	162	0	0	192	0	112	1	0	113	0	0	0	0	0	388
04:45 PM	18	86	0	0	104	23	143	0	0	166	0	124	1	0	125	0	0	0	0	0	395
Total	63	306	0	0	369	88	583	0	0	671	0	440	2	0	442	0	0	0	0	0	1482
05:00 PM	20	75	0	0	95	29	114	0	0	143	0	120	2	0	122	0	0	0	0	0	360
05:15 PM	18	77	Ō	Ō	95	20	149	Ō	Õ	169	Ō	117	1	Ō	118	Ō	Ō	Ō	Ō	Ō	382
05:30 PM	20	80	0	0	100	32	132	0	0	164	0	123	0	0	123	0	0	0	0	0	387
05:45 PM	13	80	0	0	93	24	116	0	0	140	0	110	0	0	110	0	0	0	0	0	343
Total	71	312	0	0	383	105	511	0	0	616	0	470	3	0	473	0	0	0	0	0	1472
Grand Total	252	1093	0	0	1345	246	1579	0	0	1825	0	1166	5	0	1171	0	0	0	0	0	4341
Apprch %	18.7	81.3	0	0		13.5	86.5	0	0		0	99.6	0.4	0		0	0	0	0		
Total %	5.8	25.2	0	0	31	5.7	36.4	0	0	42	0	26.9	0.1	0	27	0	0	0	0	0	
Pass Cars	250	1081	0	0	1331	243	1559	0	0	1802	0	1155	5	0	1160	0	0	0	0	0	4293
% Pass Cars	99.2	98.9	0	0	99	98.8	98.7	0	0	98.7	0	99.1	100	0	99.1	0	0	0	0	0	98.9
Single Units	2	8	0	0	10	2	15	0	0	17	0	9	0	0	9	0	0	0	0	0	36
% Single Units	0.8	0.7	0	0	0.7	0.8	0.9	0	0	0.9	0	0.8	0	0	0.8	0	0	0	0	0	0.8
Heavy Trucks	0	4	0	0	4	1	5	0	0	6	0	2	0	0	2	0	0	0	0	0	12
% Heavy Trucks	0	0.4	0	0	0.3	0.4	0.3	0	0	0.3	0	0.2	0	0	0.2	0	0	0	0	0	0.3
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

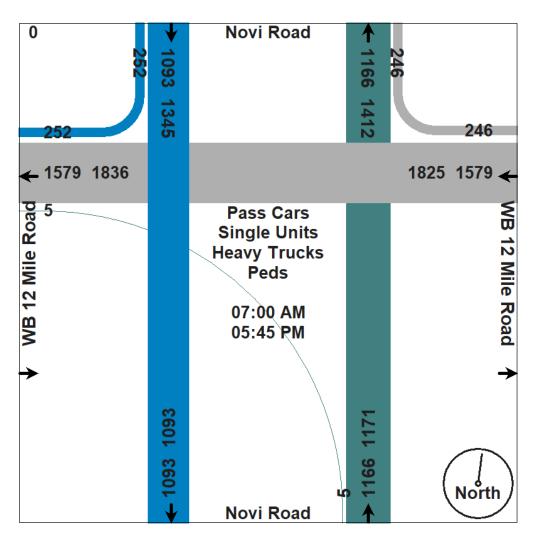
TDC Traffic Comments: Signalized controlled intersection, push button ped. signals for west, north & east legs. Video VCU camera was located within SE intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Singh Novi Uptown Place Apt. Traffic Impact Study for Fleis & Vandenbrink.





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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3CU SE File Name : TMC_2 WB 12 Mile & Novi_2-10-21 Site Code : TMC_2 Start Date : 2/10/2021 Page No : 2

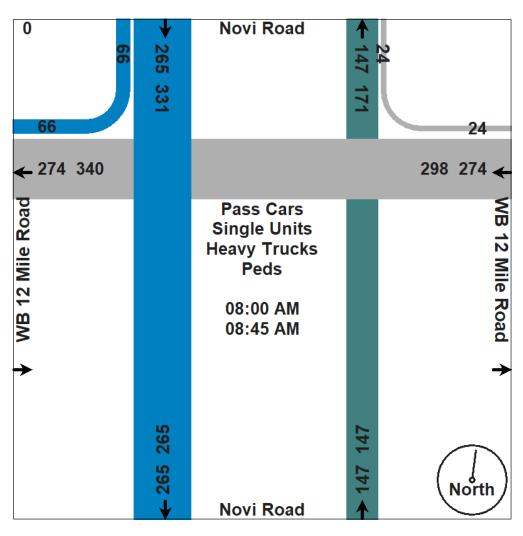




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3CU SE File Name : TMC_2 WB 12 Mile & Novi_2-10-21 Site Code : TMC_2 Start Date : 2/10/2021 Page No : 3

		Novi	Road		1	NB 12 N	/lile Roa	ad		Novi	Road		٧	VB 12 N	/lile Roa	ad	
		South	bound			West	bound			North	bound			Easth	bound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analy	ysis Fron	n 07:00	AM to 1	1:45 AM ·	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	Begins	at 08:00	AM												
08:00 AM	20	58	0	78	5	69	0	74	0	25	0	25	0	0	0	0	177
08:15 AM	18	60	0	78	8	58	0	66	0	33	0	33	0	0	0	0	177
08:30 AM	13	77	0	90	6	75	0	81	0	50	0	50	0	0	0	0	221
08:45 AM	15	70	0	85	5	72	0	77	0	39	0	39	0	0	0	0	201
Total Volume	66	265	0	331	24	274	0	298	0	147	0	147	0	0	0	0	776
% App. Total	19.9	80.1	0		8.1	91.9	0		0	100	0		0	0	0		
PHF	.825	.860	.000	.919	.750	.913	.000	.920	.000	.735	.000	.735	.000	.000	.000	.000	.878
Pass Cars	66	262	0	328	24	265	0	289	0	141	0	141	0	0	0	0	758
% Pass Cars	100	98.9	0	99.1	100	96.7	0	97.0	0	95.9	0	95.9	0	0	0	0	97.7
Single Units	0	2	0	2	0	7	0	7	0	5	0	5	0	0	0	0	14
% Single Units	0	0.8	0	0.6	0	2.6	0	2.3	0	3.4	0	3.4	0	0	0	0	1.8
Heavy Trucks	0	1	0	1	0	2	0	2	0	1	0	1	0	0	0	0	4
% Heavy Trucks	0	0.4	0	0.3	0	0.7	0	0.7	0	0.7	0	0.7	0	0	0	0	0.5
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

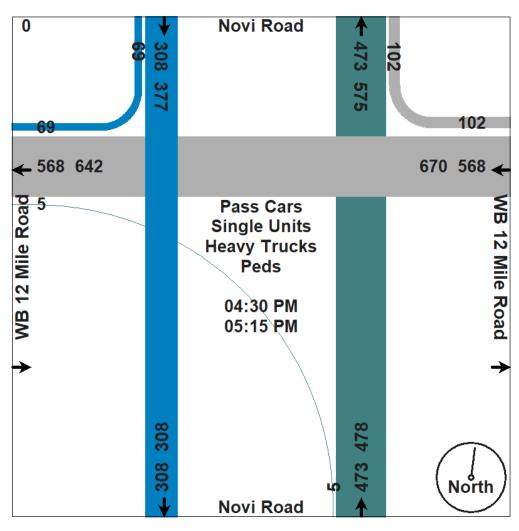




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3CU SE File Name : TMC_2 WB 12 Mile & Novi_2-10-21 Site Code : TMC_2 Start Date : 2/10/2021 Page No : 4

		Novi	Road		١	NB 12 N	/lile Roa	ad		Novi	Road		٧	VB 12 N	/lile Roa	ad	
		South	bound			West	bound			North	bound			Easth	bound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analy	ysis Fror	n 12:00	PM to C	5:45 PM -	Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	Begins	at 04:30	PM												
04:30 PM	13	70	0	83	30	162	0	192	0	112	1	113	0	0	0	0	388
04:45 PM	18	86	0	104	23	143	0	166	0	124	1	125	0	0	0	0	395
05:00 PM	20	75	0	95	29	114	0	143	0	120	2	122	0	0	0	0	360
05:15 PM	18	77	0	95	20	149	0	169	0	117	1	118	0	0	0	0	382
Total Volume	69	308	0	377	102	568	0	670	0	473	5	478	0	0	0	0	1525
% App. Total	18.3	81.7	0		15.2	84.8	0		0	99	1		0	0	0		
PHF	.863	.895	.000	.906	.850	.877	.000	.872	.000	.954	.625	.956	.000	.000	.000	.000	.965
Pass Cars	69	303	0	372	101	565	0	666	0	471	5	476	0	0	0	0	1514
% Pass Cars	100	98.4	0	98.7	99.0	99.5	0	99.4	0	99.6	100	99.6	0	0	0	0	99.3
Single Units	0	3	0	3	0	2	0	2	0	2	0	2	0	0	0	0	7
% Single Units	0	1.0	0	0.8	0	0.4	0	0.3	0	0.4	0	0.4	0	0	0	0	0.5
Heavy Trucks	0	2	0	2	1	1	0	2	0	0	0	0	0	0	0	0	4
% Heavy Trucks	0	0.6	0	0.5	1.0	0.2	0	0.3	0	0	0	0	0	0	0	0	0.3
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3CU SE File Name : TMC_2 WB 12 Mile & Novi_2-10-21 Site Code : TMC_2 Start Date : 2/10/2021 Page No : 5

Aerial Photo





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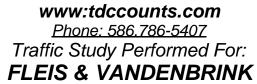
Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3HT NW File Name : TMC_3 EB 12 Mile & Novi_2-10-21 Site Code : TMC_3 Start Date : 2/10/2021 Page No : 1

4 Hour video traffic study was conducted during typical weekday (Wednesday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session during COVID 19.

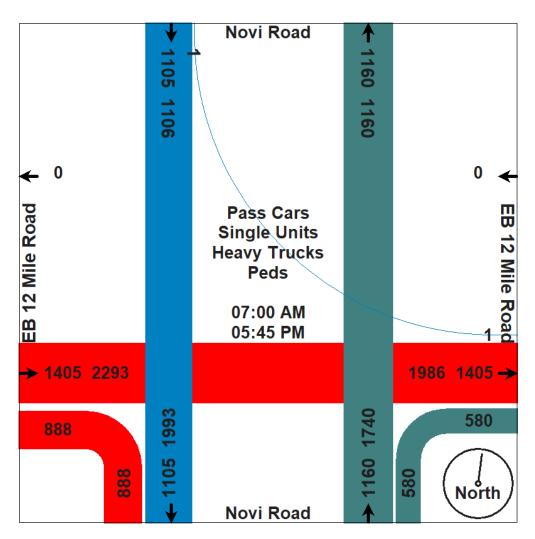
						Group	s Printe	ed- Pa	iss Ca	rs - Sing	le Uni	s - Hea	avy Tru	ucks -	Peds						
		N	lovi Ro	ad		-	EB 1	2 Mile	Road	-		N	ovi Ro	ad			EB 1	2 Mile	Road		
		Sc	outhbo	und			W	estbou	und			No	orthbo	und			E	astbou	ind		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	33	1	0	34	0	0	0	0	0	17	21	0	0	38	14	37	0	0	51	123
07:15 AM	0	52	0	0	52	0	0	0	0	0	19	21	0	0	40	32	51	0	0	83	175
07:30 AM	0	55	0	0	55	0	0	0	0	0	21	31	0	0	52	24	84	0	0	108	215
07:45 AM	0	68	0	0	68	0	0	0	0	0	38	35	0	0	73	25	78	0	0	103	244
Total	0	208	1	0	209	0	0	0	0	0	95	108	0	0	203	95	250	0	0	345	757
08:00 AM	0	54	0	0	54	0	0	0	0	0	29	25	0	0	54	23	71	0	0	94	202
08:15 AM	0	66	0	0	66	0	0	0	0	0	28	30	0	0	58	23	88	0	0	110	202
08:30 AM	0	79	0	0	79	0	0	0	0	0	26	52	0	0	78	39	75	0	0	114	271
08:45 AM	0	67	0	0	67	0	0	0	0	0	33	39	0	0	70	34	72	0	0	106	245
Total	0	266	0	0	266	0	0	0	0	0	116	146	0	0	262	118	306	0	0	424	952
i otai	Ŭ	200	Ũ	Ũ	200	Ŭ	Ū	Ũ	Ū	Ũ	110	110	Ũ	Ū	202	110	000	Ũ	Ũ		002
*** BREAK **	*																				
04:00 PM	0	79	0	0	79	0	0	0	0	0	41	106	0	0	147	75	97	0	0	172	398
04:15 PM	0	66	0	0	66	0	0	0	0	0	44	95	0	0	139	89	93	0	0	182	387
04:30 PM	0	78	0	0	78	0	0	0	0	0	50	110	0	0	160	81	126	0	0	207	445
04:45 PM	0	88	0	0	88	0	0	0	0	0	46	124	0	0	170	80	118	0	0	198	456
Total	0	311	0	0	311	0	0	0	0	0	181	435	0	0	616	325	434	0	0	759	1686
05:00 PM	0	75	0	0	75	0	0	0	0	0	38	120	0	0	158	97	128	0	0	225	458
05:15 PM	0	86	0	0	86	Ő	0	0	0	0	59	120	Ő	0	180	94	103	Ő	0	197	463
05:30 PM	Ő	76	0	0	76	Ö	0	Ő	1	1	49	121	Ő	Ő	170	91	90	Ő	0	181	428
05:45 PM	Ő	83	0	0	83	Ő	0	Ő	0	0	42	109	Ő	Ő	151	68	94	Ő	0	162	396
Total	0	320	0	0	320	0	0	0	1	1	188	471	0	0	659	350	415	0	0	765	1745
	Ũ	020	•	•	020		Ũ	•	•	•			Ū	Ũ		000		Ū	•		
Grand Total	0	1105	1	0	1106	0	0	0	1	1	580	1160	0	0	1740	888	1405	0	0	2293	5140
Apprch %	0	99.9	0.1	0		0	0	0	100		33.3	66.7	0	0		38.7	61.3	0	0		
Total %	0	21.5	0	0	21.5	0	0	0	0	0	11.3	22.6	0	0	33.9	17.3	27.3	0	0	44.6	
Pass Cars	0	1094	0	0	1094	0	0	0	0	0	568	1149	0	0	1717	876	1394	0	0	2270	5081
% Pass Cars	0	99	0	0	98.9	0	0	0	0	0	97.9	99.1	0	0	98.7	98.6	99.2	0	0	99	98.9
Single Units	0	7	1	0	8	0	0	0	0	0	8	9	0	0	17	7	9	0	0	16	41
% Single Units	0	0.6	100	0	0.7	0	0	0	0	0	1.4	0.8	0	0	1	0.8	0.6	0	0	0.7	0.8
Heavy Trucks	0	4	0	0	4	0	0	0	0	0	4	2	0	0	6	5	2	0	0	7	17
% Heavy Trucks	0	0.4	0	0	0.4	0	0	0	0	0	0.7	0.2	0	0	0.3	0.6	0.1	0	0	0.3	0.3
Peds	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
% Peds	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0

TDC Traffic Comments: Signalized controlled intersection, push button ped. signals for west, south & east legs. Video VCU camera was located within NW intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Singh Novi Uptown Place Apt. Traffic Impact Study for Fleis & Vandenbrink.





Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3HT NW File Name : TMC_3 EB 12 Mile & Novi_2-10-21 Site Code : TMC_3 Start Date : 2/10/2021 Page No : 2



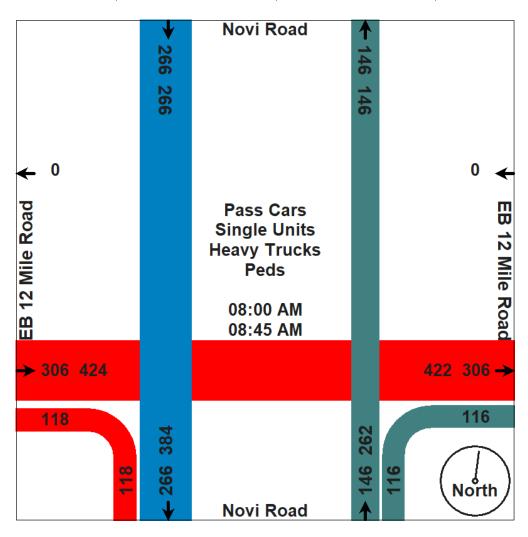




www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3HT NW File Name : TMC_3 EB 12 Mile & Novi_2-10-21 Site Code : TMC_3 Start Date : 2/10/2021 Page No : 3

		Novi	Pood			EB 12 N		d		Novi	Road			EB 12 N	Ailo Doc	d	
								iu					I			iu	
			bound				bound			1	bound				ound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analy						of 1											
Peak Hour for E	ntire Inte	rsection	Begins	at 08:00	AM												
08:00 AM	0	54	0	54	0	0	0	0	29	25	0	54	23	71	0	94	202
08:15 AM	0	66	0	66	0	0	0	0	28	30	0	58	22	88	0	110	234
08:30 AM	0	79	0	79	0	0	0	0	26	52	0	78	39	75	0	114	271
08:45 AM	0	67	0	67	0	0	0	0	33	39	0	72	34	72	0	106	245
Total Volume	0	266	0	266	0	0	0	0	116	146	0	262	118	306	0	424	952
% App. Total	0	100	0		0	0	0		44.3	55.7	0		27.8	72.2	0		
PHF	.000	.842	.000	.842	.000	.000	.000	.000	.879	.702	.000	.840	.756	.869	.000	.930	.878
Pass Cars	0	262	0	262	0	0	0	0	111	140	0	251	116	303	0	419	932
% Pass Cars	0	98.5	0	98.5	0	0	0	0	95.7	95.9	0	95.8	98.3	99.0	0	98.8	97.9
Single Units	0	2	0	2	0	0	0	0	3	5	0	8	0	3	0	3	13
% Single Units	0	0.8	0	0.8	0	0	0	0	2.6	3.4	0	3.1	0	1.0	0	0.7	1.4
Heavy Trucks	0	2	0	2	0	0	0	0	2	1	0	3	2	0	0	2	7
% Heavy Trucks	0	0.8	0	0.8	0	0	0	0	1.7	0.7	0	1.1	1.7	0	0	0.5	0.7
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

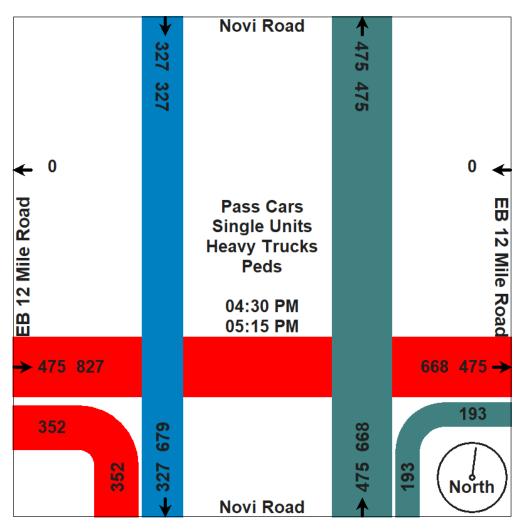




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3HT NW File Name : TMC_3 EB 12 Mile & Novi_2-10-21 Site Code : TMC_3 Start Date : 2/10/2021 Page No : 4

		Marri	Deed					al		Navi	Deed					ام	
			Road		I	EB 12 N		a			Road		I	EB 12 N		ad	
		South	bound			West	bound			North	bound			East	bound		
Start Time	Right	Thru	Left /	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analy	ysis Fron	n 12:00	PM to 05	:45 PM -	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	Begins a	at 04:30	PM												
04:30 PM	0	78	0	78	0	0	0	0	50	110	0	160	81	126	0	207	445
04:45 PM	0	88	0	88	0	0	0	0	46	124	0	170	80	118	0	198	456
05:00 PM	0	75	0	75	0	0	0	0	38	120	0	158	97	128	0	225	458
05:15 PM	0	86	0	86	0	0	0	0	59	121	0	180	94	103	0	197	463
Total Volume	0	327	0	327	0	0	0	0	193	475	0	668	352	475	0	827	1822
% App. Total	0	100	0		0	0	0		28.9	71.1	0		42.6	57.4	0		
PHF	.000	.929	.000	.929	.000	.000	.000	.000	.818	.958	.000	.928	.907	.928	.000	.919	.984
Pass Cars	0	322	0	322	0	0	0	0	192	473	0	665	351	475	0	826	1813
% Pass Cars	0	98.5	0	98.5	0	0	0	0	99.5	99.6	0	99.6	99.7	100	0	99.9	99.5
Single Units	0	3	0	3	0	0	0	0	0	2	0	2	1	0	0	1	6
% Single Units	0	0.9	0	0.9	0	0	0	0	0	0.4	0	0.3	0.3	0	0	0.1	0.3
Heavy Trucks	0	2	0	2	0	0	0	0	1	0	0	1	0	0	0	0	3
% Heavy Trucks	0	0.6	0	0.6	0	0	0	0	0.5	0	0	0.1	0	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3HT NW File Name : TMC_3 EB 12 Mile & Novi_2-10-21 Site Code : TMC_3 Start Date : 2/10/2021 Page No : 5

Aerial Photo







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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3DQ SW File Name : TMC_4 WB 12 Mile & XO E Novi_2-10-21 Site Code : TMC_4 Start Date : 2/10/2021 Page No : 1

4 Hour video traffic study was conducted during typical weekday (Wednesday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session during COVID 19.

				oups Printed					s - Peds				
		WB 12 M)	X/O 715' E		d.			/lile Road		
Ot ant Time a	T I:	Westb		Ann. Tatal	Dist	North		Ann Tatal	Dist		ound	Ann Tatal	Lat Tatal
Start Time 07:00 AM	Thru 32	Left			Right	Left 17		App. Total 17	Right	Thru		App. Total	Int. Total
		0	0 0	32	0 0		0		0	0 0	0	0	49
07:15 AM 07:30 AM	53 41	0 0	0	53	0	13 19	0 0	13 19	0 0	0	0 0	0	66 60
	51	0	0	41	-	19 22	-	19	0	0	0	-	
07:45 AM Total	177	0	0	51 177	0	71	0	71	0	0	0	0	<u>73</u> 248
TOTAL	177	0	0	177	0	/ 1	0	11	0	0	0	0	240
08:00 AM	58	0	0	58	0	17	0	17	0	0	0	0	75
08:15 AM	49	0	0	49	0	16	0	16	0	0	0	0	65
08:30 AM	69	0	0	69	0	15	0	15	0	0	0	0	84
08:45 AM	64	0	0	64	0	20	0	20	0	0	0	0	84
Total	240	0	0	240	0	68	0	68	0	0	0	0	308
*** BREAK ***													
04:00 PM	135	0	0	135	0	18	0	18	0	0	0	0	153
04:15 PM	132	0	0	132	0	33	0	33	0	0	0	0	165
04:30 PM	149	0	0	149	0	38	0	38	0	0	0	0	187
04:45 PM	139	0	0	139	0	29	0	29	0	0	0	0	168
Total	555	0	0	555	0	118	0	118	0	0	0	0	673
05:00 PM	121	0	0	121	0	21	0	21	0	0	0	0	142
05:15 PM	139	0	0	139	0	34	0	34	0	0	0	0	173
05:30 PM	140	0	0	140	0	32	0	32	0	0	0	0	172
05:45 PM	108	0	0	108	0	29	0	29	0	0	0	0	137
Total	508	0	0	508	0	116	0	116	0	0	0	0	624
Grand Total	1480	0	0	1480	0	373	0	373	0	0	0	0	1853
Apprch %	100	0	0		0	100	0		0	0	0		
Total %	79.9	0	0	79.9	0	20.1	0	20.1	0	0	0	0	
Pass Cars	1462	0	0	1462	0	367	0	367	0	0	0	0	1829
% Pass Cars	98.8	0	0	98.8	0	98.4	0	98.4	0	0	0	0	98.7
Single Units	15	0	0	15	0	3	0	3	0	0	0	0	18
% Single Units	1	0	0	1	0	0.8	0	0.8	0	0	0	0	1
Heavy Trucks	3	0	0	3	0	3	0	3	0	0	0	0	6
% Heavy Trucks	0.2	0	0	0.2	0	0.8	0	0.8	0	0	0	0	0.3
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0

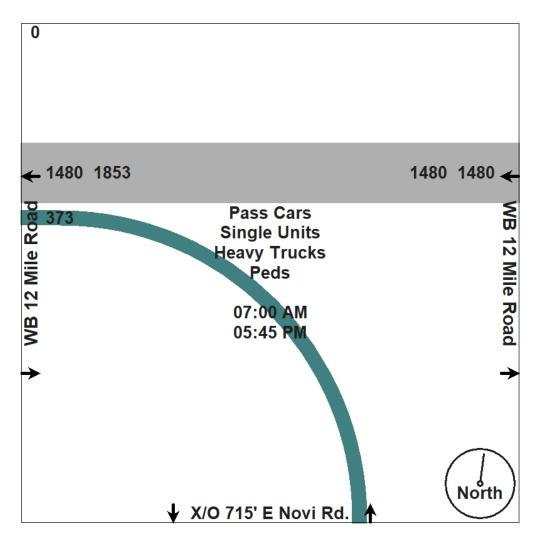
TDC Traffic Comments: Signalized controlled intersection, no ped. signals. Video VCU camera was located within SW intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Singh Novi Uptown Place Apt. Traffic Impact Study for Fleis & Vandenbrink.





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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3DQ SW File Name : TMC_4 WB 12 Mile & XO E Novi_2-10-21 Site Code : TMC_4 Start Date : 2/10/2021 Page No : 2

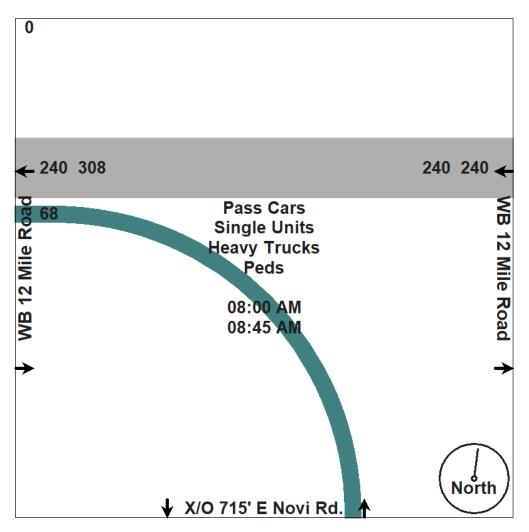




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3DQ SW File Name : TMC_4 WB 12 Mile & XO E Novi_2-10-21 Site Code : TMC_4 Start Date : 2/10/2021 Page No : 3

		12 Mile Ro Vestbound	ad		15' E Novi Iorthbound	-		12 Mile Ro Eastbound	bad	
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From	n 07:00 AM to	11:45 AM ·	Peak 1 of 1	-			-			
Peak Hour for Entire Inte	rsection Begir	ns at 08:00	AM							
08:00 AM	58	0	58	0	17	17	0	0	0	75
08:15 AM	49	0	49	0	16	16	0	0	0	65
08:30 AM	69	0	69	0	15	15	0	0	0	84
08:45 AM	64	0	64	0	20	20	0	0	0	84
Total Volume	240	0	240	0	68	68	0	0	0	308
% App. Total	100	0		0	100		0	0		
PHF	.870	.000	.870	.000	.850	.850	.000	.000	.000	.917
Pass Cars	234	0	234	0	64	64	0	0	0	298
% Pass Cars	97.5	0	97.5	0	94.1	94.1	0	0	0	96.8
Single Units	6	0	6	0	2	2	0	0	0	8
% Single Units	2.5	0	2.5	0	2.9	2.9	0	0	0	2.6
Heavy Trucks	0	0	0	0	2	2	0	0	0	2
% Heavy Trucks	0	0	0	0	2.9	2.9	0	0	0	0.6
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0

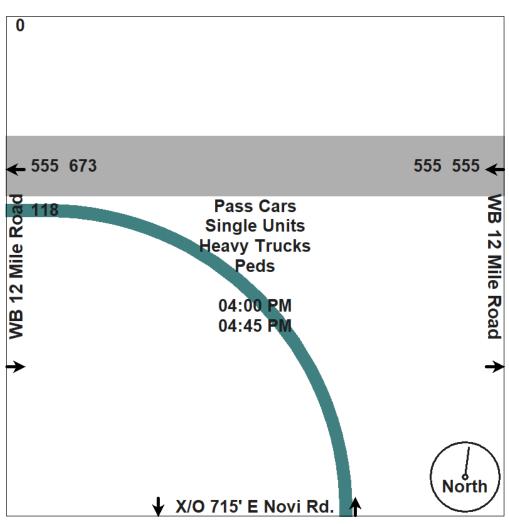




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3DQ SW File Name : TMC_4 WB 12 Mile & XO E Novi_2-10-21 Site Code : TMC_4 Start Date : 2/10/2021 Page No : 4

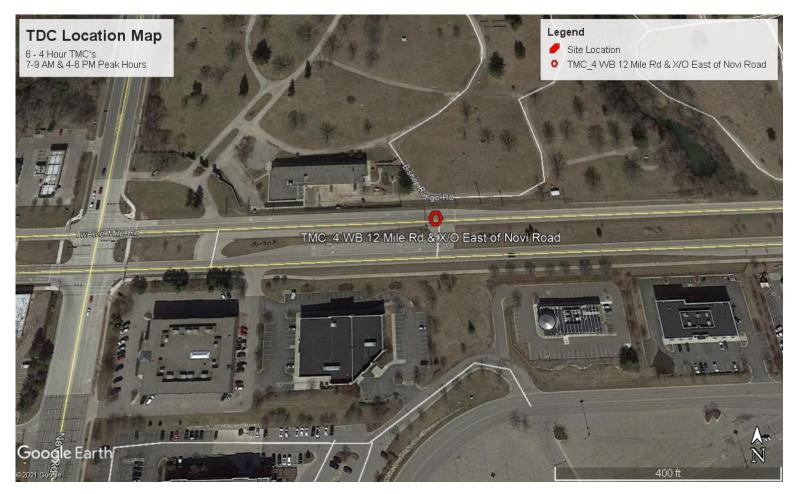
		12 Mile Ro			'15' E Novi	-		12 Mile Ro	bad	
		<u>Westbound</u>		N	lorthbound			Eastbound		
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis Fron	n 12:00 PM to	05:45 PM	- Peak 1 of 1							
Peak Hour for Entire Inte	rsection Begi	ns at 04:00	PM							
04:00 PM	135	0	135	0	18	18	0	0	0	153
04:15 PM	132	0	132	0	33	33	0	0	0	165
04:30 PM	149	0	149	0	38	38	0	0	0	187
04:45 PM	139	0	139	0	29	29	0	0	0	168
Total Volume	555	0	555	0	118	118	0	0	0	673
% App. Total	100	0		0	100		0	0		
PHF	.931	.000	.931	.000	.776	.776	.000	.000	.000	.900
Pass Cars	548	0	548	0	118	118	0	0	0	666
% Pass Cars	98.7	0	98.7	0	100	100	0	0	0	99.0
Single Units	5	0	5	0	0	0	0	0	0	5
% Single Units	0.9	0	0.9	0	0	0	0	0	0	0.7
Heavy Trucks	2	0	2	0	0	0	0	0	0	2
% Heavy Trucks	0.4	0	0.4	0	0	0	0	0	0	0.3
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 3DQ SW File Name : TMC_4 WB 12 Mile & XO E Novi_2-10-21 Site Code : TMC_4 Start Date : 2/10/2021 Page No : 5

Aerial Photo







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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 34G SE File Name : TMC_5 EB 12 Mile & 12 Oaks Mall_2-10-21 Site Code : TMC_5 Start Date : 2/10/2021 Page No : 1

4 Hour video traffic study was conducted during typical weekday (Wednesday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session during COVID 19.

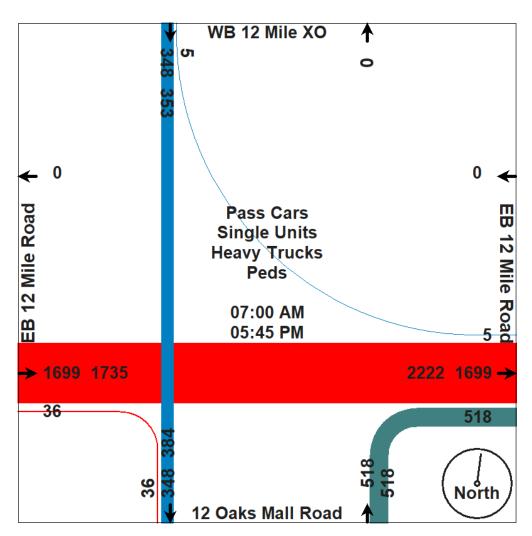
						Group	s Printe	ed- Pa	iss Ca	rs - Sing	le Unit	s - Hea	avy Tru	ucks -	Peds						
		WB	12 Mil	le XO		-	EB 1	2 Mile	Road	-		12 Oa	ks Ma	II Road	ł		EB 1	2 Mile	Road		
			outhbo	und			W	estbou	und			No	orthbo	und			E	astbou	und		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	3	0	0	3	0	0	0	0	0	4	0	0	0	4	1	32	0	0	33	40
07:15 AM	0	5	0	0	5	0	0	0	0	0	4	0	0	0	4	0	57	0	0	57	66
07:30 AM	0	3	0	0	3	0	0	0	0	0	5	0	0	0	5	2	68	0	0	70	78
07:45 AM	0	7	0	0	7	0	0	0	0	0	2	0	0	0	2	1	83	0	0	84	93
Total	0	18	0	0	18	0	0	0	0	0	15	0	0	0	15	4	240	0	0	244	277
00.00 AM		-	0	~	-		~	~	~	0		^	0	0	0	0	00	~	~	01	100
08:00 AM	0	5	0	0	5	0	0	0	0	0	6	0	0	0	6	2	89	0	0	91	102
08:15 AM	0	5	0	0	5	0	0	0	0	0	7	0	0	0	7	1	101	0	0	102	114
08:30 AM	0	17	2	0	19	0	0	0	0	0	4	0	0	0	4 7	1	80	0	0	81	104
08:45 AM Total	0	<u>35</u> 62	0	0	<u>35</u> 64	0	0	0	0	0	24	0	0	0	24	5	<u>80</u> 350	0	0	81 355	<u>123</u> 443
TOTAL	0	62	Z	0	04	0	0	0	0	0	24	0	0	0	24	5	350	0	0	300	443
*** BREAK **	*																				
04:00 PM	0	30	0	0	30	0	0	0	0	0	62	0	0	0	62	2	143	0	0	145	237
04:15 PM	0	33	1	0	34	0	0	0	0	0	65	0	0	0	65	5	127	0	0	132	231
04:30 PM	0	38	1	0	39	0	0	0	0	0	60	0	0	0	60	5	139	0	0	144	243
04:45 PM	0	32	0	0	32	0	0	0	0	0	62	0	0	0	62	3	147	0	0	150	244
Total	0	133	2	0	135	0	0	0	0	0	249	0	0	0	249	15	556	0	0	571	955
05:00 PM	0	31	0	0	31	0	0	0	0	0	77	0	0	0	77	2	158	0	0	160	268
05:15 PM	0	29	0	0	29	0	0	0	0	0	51	0	0	0	51	1	154	0	0	155	200
05:30 PM	0	39	0	0	39	0	0	0	0	0	55	0	0	0	55	3	118	0	0	121	215
05:45 PM	0	36	1	0	37	0	0	0	0	0	47	0	0	0	47	6	123	0	0	121	213
Total	0	135	1	0	136	0	0	0	0	0	230	0	0	0	230	12	553	0	0	565	931
Total	0	100		0	150	0	0	0	0	0	200	0	0	0	200	12	000	0	0	505	551
Grand Total	0	348	5	0	353	0	0	0	0	0	518	0	0	0	518	36	1699	0	0	1735	2606
Apprch %	0	98.6	1.4	0		0	0	0	0		100	0	0	0		2.1	97.9	0	0		
Total %	0	13.4	0.2	0	13.5	0	0	0	0	0	19.9	0	0	0	19.9	1.4	65.2	0	0	66.6	
Pass Cars	0	344	5	0	349	0	0	0	0	0	512	0	0	0	512	35	1681	0	0	1716	2577
% Pass Cars	0	98.9	100	0	98.9	0	0	0	0	0	98.8	0	0	0	98.8	97.2	98.9	0	0	98.9	98.9
Single Units	0	4	0	0	4	0	0	0	0	0	5	0	0	0	5	1	15	0	0	16	25
% Single Units	0	1.1	0	0	1.1	0	0	0	0	0	1	0	0	0	1	2.8	0.9	0	0	0.9	1
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	0	3	4
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0.2	0	0.2	0	0	0.2	0.2
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TDC Traffic Comments: Signalized controlled intersection, push button ped. signal for south leg. Video VCU camera was located within SE intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Singh Novi Uptown Place Apt. Traffic Impact Study for Fleis & Vandenbrink.



www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 34G SE File Name : TMC_5 EB 12 Mile & 12 Oaks Mall_2-10-21 Site Code : TMC_5 Start Date : 2/10/2021 Page No : 2

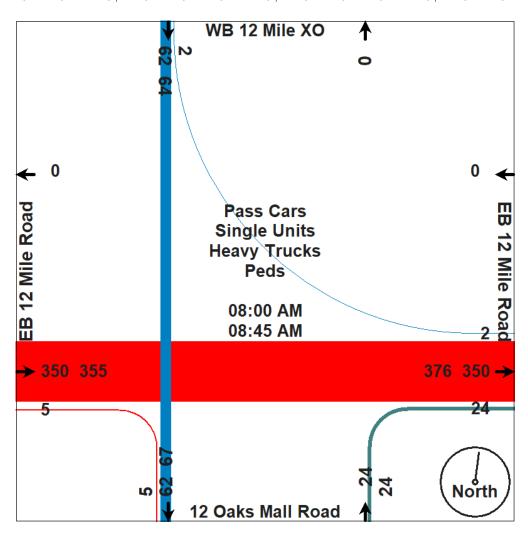




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 34G SE File Name : TMC_5 EB 12 Mile & 12 Oaks Mall_2-10-21 Site Code : TMC_5 Start Date : 2/10/2021 Page No : 3

		WB 12	Mile XC)		EB 12 N		ıd	1.	2 Oaks		ad			/lile Roa	d	
		South	bound			West	bound			North	bound			East	bound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analy	ysis Fror	n 07:00	AM to 1	1:45 AM -	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	Begins	at 08:00	AM												
08:00 AM	0	5	0	5	0	0	0	0	6	0	0	6	2	89	0	91	102
08:15 AM	0	5	0	5	0	0	0	0	7	0	0	7	1	101	0	102	114
08:30 AM	0	17	2	19	0	0	0	0	4	0	0	4	1	80	0	81	104
08:45 AM	0	35	0	35	0	0	0	0	7	0	0	7	1	80	0	81	123
Total Volume	0	62	2	64	0	0	0	0	24	0	0	24	5	350	0	355	443
% App. Total	0	96.9	3.1		0	0	0		100	0	0		1.4	98.6	0		
PHF	.000	.443	.250	.457	.000	.000	.000	.000	.857	.000	.000	.857	.625	.866	.000	.870	.900
Pass Cars	0	60	2	62	0	0	0	0	23	0	0	23	5	344	0	349	434
% Pass Cars	0	96.8	100	96.9	0	0	0	0	95.8	0	0	95.8	100	98.3	0	98.3	98.0
Single Units	0	2	0	2	0	0	0	0	1	0	0	1	0	5	0	5	8
% Single Units	0	3.2	0	3.1	0	0	0	0	4.2	0	0	4.2	0	1.4	0	1.4	1.8
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.3	0.2
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

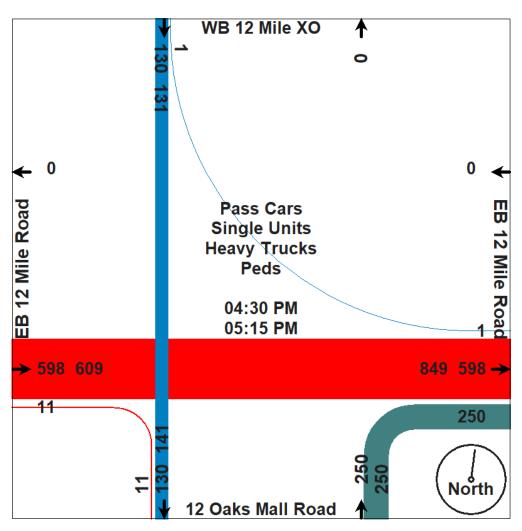




www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 34G SE File Name : TMC_5 EB 12 Mile & 12 Oaks Mall_2-10-21 Site Code : TMC_5 Start Date : 2/10/2021 Page No : 4

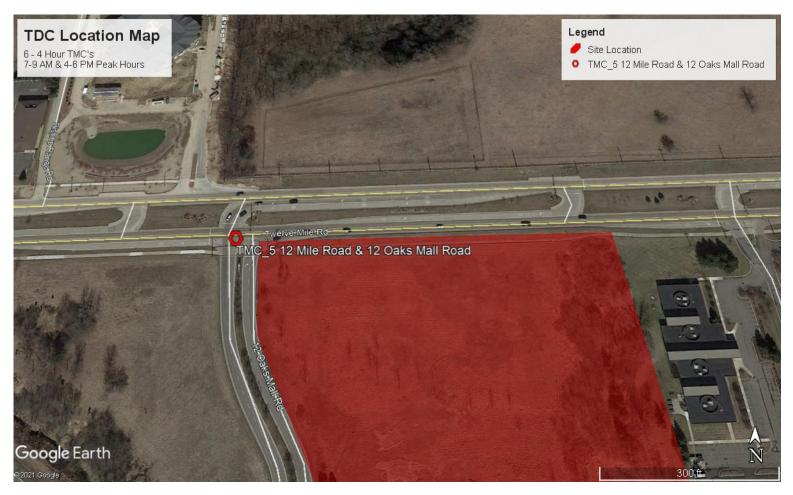
		WB 12	Mile XO		I	EB 12 N	lile Roa	ad	1:	2 Oaks	Mall Ro	ad	I	EB 12 N	lile Roa	ıd	
		South	bound			West	bound			North	bound			Eastl	bound		
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analy	ysis Fron	n 12:00	PM to 05	5:45 PM -	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	Begins	at 04:30	PM												
04:30 PM	0	38	1	39	0	0	0	0	60	0	0	60	5	139	0	144	243
04:45 PM	0	32	0	32	0	0	0	0	62	0	0	62	3	147	0	150	244
05:00 PM	0	31	0	31	0	0	0	0	77	0	0	77	2	158	0	160	268
05:15 PM	0	29	0	29	0	0	0	0	51	0	0	51	1	154	0	155	235
Total Volume	0	130	1	131	0	0	0	0	250	0	0	250	11	598	0	609	990
% App. Total	0	99.2	0.8		0	0	0		100	0	0		1.8	98.2	0		
PHF	.000	.855	.250	.840	.000	.000	.000	.000	.812	.000	.000	.812	.550	.946	.000	.952	.924
Pass Cars	0	130	1	131	0	0	0	0	248	0	0	248	11	597	0	608	987
% Pass Cars	0	100	100	100	0	0	0	0	99.2	0	0	99.2	100	99.8	0	99.8	99.7
Single Units	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
% Single Units	0	0	0	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0	0.1
Heavy Trucks	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
% Heavy Trucks	0	0	0	0	0	0	0	0	0.4	0	0	0.4	0	0.2	0	0.2	0.2
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 34G SE File Name : TMC_5 EB 12 Mile & 12 Oaks Mall_2-10-21 Site Code : TMC_5 Start Date : 2/10/2021 Page No : 5

Aerial Photo







www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 1US SW

File Name : TMC_6 WB 12 Mile & XO E 12 Oaks Mall_2-10-21 Site Code : TMC_6 Start Date : 2/10/2021 Page No : 1

4 Hour video traffic study was conducted during typical weekday (Wednesday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session during COVID 19.

				oups Printed					s - Peds				
		WB 12 M			X/0	O 650' E 1		/lall		WB 12 M			
Ctart Time	Thur	Westb		Ann Total	Right	North		App. Total	Diacht		bound	Ann Tatal	Int Total
Start Time 07:00 AM	Thru 45	Left	Peas 0	App. Total 45		Left		<u>App. Totai</u> 2	Right 0	Thru 0	Peds 0	App. Total	Int. Total 47
07:15 AM	45 61	0 0	0	45 61	0 0	2 0	0 0	2	0	0	0	0	47 61
07:30 AM	56	0	0	56	0	1	0	1	0	0	0	0	57
07:45 AM	50 61	0	0	61	0	0	0	0	0	0	0	0	61
Total	223	0	0	223	0	3	0	3	0	0	0	0	226
1 Otal	225	0	0	223	0	5	0	5	0	0	0	0	220
08:00 AM	76	0	0	76	0	0	0	0	0	0	0	0	76
08:15 AM	56	0	0	56	0	0	0	0	0	0	0	0	56
08:30 AM	96	0	0	96	0	0	0	0	0	0	0	0	96
08:45 AM	123	0	0	123	0	0	0	0	0	0	0	0	123
Total	351	0	0	351	0	0	0	0	0	0	0	0	351
*** BREAK ***													
04:00 PM	159	0	0	159	0	15	0	15	0	0	0	0	174
04:15 PM	158	0	0	158	0	7	0	7	0	0	0	0	165
04:30 PM	187	0	0	187	0	7	0	7	0	0	0	0	194
04:45 PM	172	0	0	172	0	9	0	9	0	0	0	0	181
Total	676	0	0	676	0	38	0	38	0	0	0	0	714
05:00 PM	156	0	0	156	0	10	0	10	0	0	0	0	166
05:15 PM	157	0	0	157	Ō	7	0	7	0	0	0	0	164
05:30 PM	174	0	0	174	0	9	0	9	0	0	0	0	183
05:45 PM	148	0	0	148	0	8	0	8	0	0	0	0	156
Total	635	0	0	635	0	34	0	34	0	0	0	0	669
Grand Total	1885	0	0	1885	0	75	0	75	0	0	0	0	1960
Apprch %	100	Õ	Õ		Õ	100	Õ		Ő	Õ	Õ		
Total %	96.2	0	0	96.2	0	3.8	0	3.8	0	0	0	0	
Pass Cars	1868	0	0	1868	0	71	0	71	0	0	0	0	1939
% Pass Cars	99.1	0	0	99.1	0	94.7	0	94.7	0	0	0	0	98.9
Single Units	13	0	0	13	0	4	0	4	0	0	0	0	17
% Single Units	0.7	0	0	0.7	0	5.3	0	5.3	0	0	0	0	0.9
Heavy Trucks	4	0	0	4	0	0	0	0	0	0	0	0	4
% Heavy Trucks	0.2	0	0	0.2	0	0	0	0	0	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0

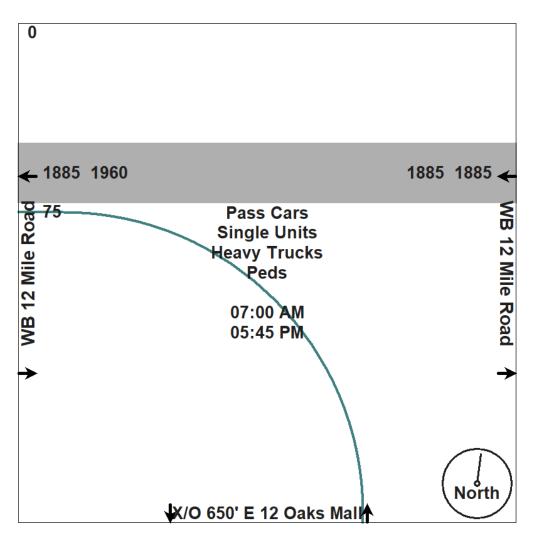
TDC Traffic Comments: Signalized controlled intersection, no ped. signals. Video VCU camera was located within SW intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Singh Novi Uptown Place Apt. Traffic Impact Study for Fleis & Vandenbrink.





www:tdccounts.com <u>Phone: 586.786-5407</u> Traffic Study Performed For: **FLEIS & VANDENBRINK**

Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 1US SW File Name : TMC_6 WB 12 Mile & XO E 12 Oaks Mall_2-10-21 Site Code : TMC_6 Start Date : 2/10/2021 Page No : 2

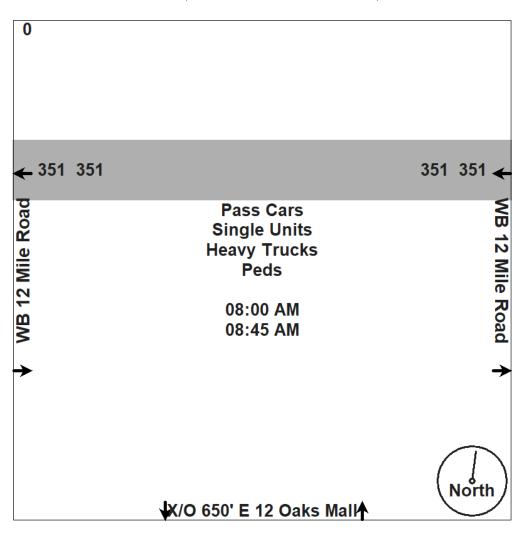




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Project:Novi Uptown Traffic Impact Study Study:4 Hr. Video Turning Movement Count Weather:Cldy, Dry Deg's 10s Count By Miovision Video VCU 1US SW File Name : TMC_6 WB 12 Mile & XO E 12 Oaks Mall_2-10-21 Site Code : TMC_6 Start Date : 2/10/2021 Page No : 3

	14/	B 12 Mile Ro	ad		i0' E 12 Oak		14/6	3 12 Mile Ro	ad	
	vv		au				VVE		au	
		Westbound			Northbound			Eastbound		
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From	m 07:00 AM t	to 11:45 AM	- Peak 1 of 1							
Peak Hour for Entire Inte	ersection Beg	jins at 08:00	AM							
08:00 AM	76	0	76	0	0	0	0	0	0	76
08:15 AM	56	0	56	0	0	0	0	0	0	56
08:30 AM	96	0	96	0	0	0	0	0	0	96
08:45 AM	123	0	123	0	0	0	0	0	0	123
Total Volume	351	0	351	0	0	0	0	0	0	351
% App. Total	100	0		0	0		0	0		
PHF	.713	.000	.713	.000	.000	.000	.000	.000	.000	.713
Pass Cars	344	0	344	0	0	0	0	0	0	344
% Pass Cars	98.0	0	98.0	0	0	0	0	0	0	98.0
Single Units	7	0	7	0	0	0	0	0	0	7
% Single Units	2.0	0	2.0	0	0	0	0	0	0	2.0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0

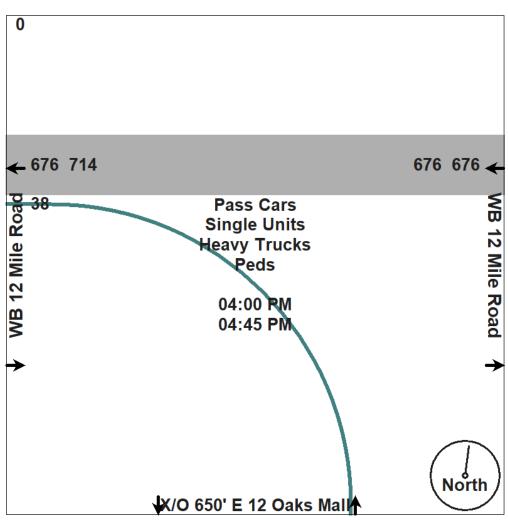




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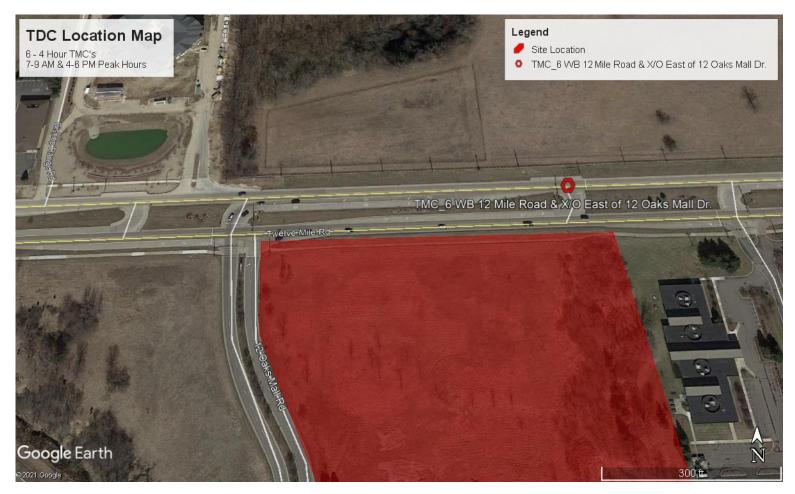
		3 12 Mile Ro	ad)' E 12 Oak			12 Mile Ro	ad	
		<u>Westbound</u>		N	lorthbound			Eastbound		
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis Fron	n 12:00 PM to	05:45 PM	- Peak 1 of 1							
Peak Hour for Entire Inte	rsection Begi	ns at 04:00	PM							
04:00 PM	159	0	159	0	15	15	0	0	0	174
04:15 PM	158	0	158	0	7	7	0	0	0	165
04:30 PM	187	0	187	0	7	7	0	0	0	194
04:45 PM	172	0	172	0	9	9	0	0	0	181
Total Volume	676	0	676	0	38	38	0	0	0	714
% App. Total	100	0		0	100		0	0		
PHF	.904	.000	.904	.000	.633	.633	.000	.000	.000	.920
Pass Cars	671	0	671	0	35	35	0	0	0	706
% Pass Cars	99.3	0	99.3	0	92.1	92.1	0	0	0	98.9
Single Units	2	0	2	0	3	3	0	0	0	5
% Single Units	0.3	0	0.3	0	7.9	7.9	0	0	0	0.7
Heavy Trucks	3	0	3	0	0	0	0	0	0	3
% Heavy Trucks	0.4	0	0.4	0	0	0	0	0	0	0.4
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



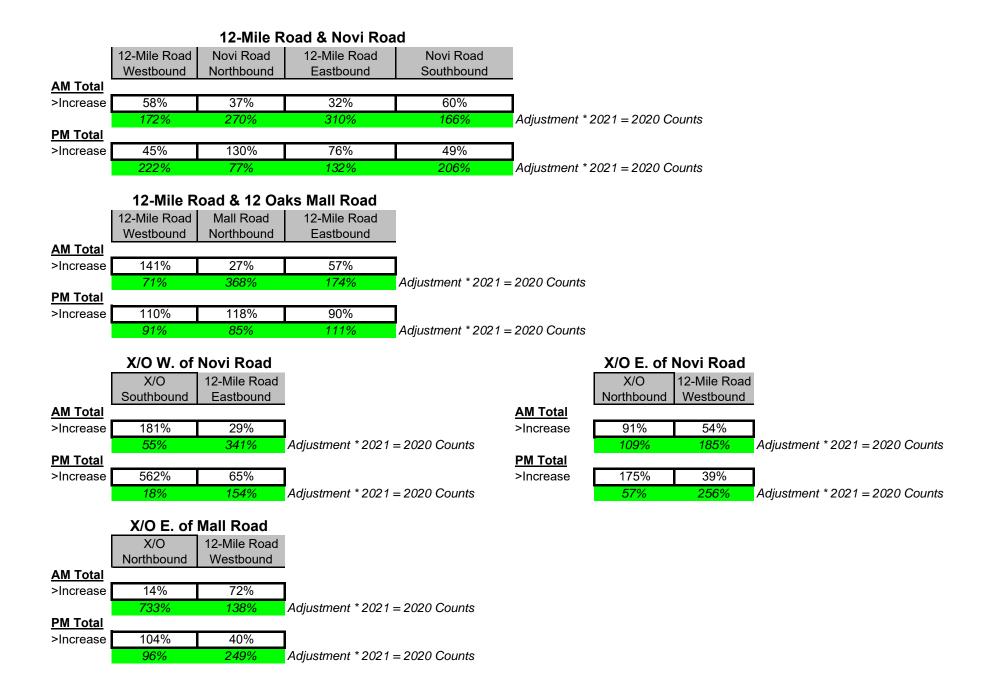
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Aerial Photo







OAKLAND COUNTY ROAD COMMISSION <u>TRAFFIC - SAFETY DEPARTMENT</u> <u>SIGNAL WORK ORDER</u>
LOCATION: 12 Mile + 12 Oaks Mall Dr East DATE: 6/9/17
CITY/TOWNSHIP: Nov. By: C. Markel
COUNTY#: 725 STATE#: CHARGES: Material: 53391.098
Labor: 53391.0989 PLEASE PERFORM THE FOLLOWING:
ELECTRICAL DEVICE:INSTALLMODERNIZEMAINTENANCE
UNDERGROUND:
EDISON OK:YESNO JOB#:JUL 3 1 2017
COORDINATE W/DISTRICT 7:
DIAL 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4
SPLIT. 1 2 3 4 1 2
CHANGE TIMING CHANGE OFFSET
CHANGE CYCLE LENGTH Image: Change Cycle Length ADD DIAL/SPLIT Image: Cycle Length
× CHANGE BREAKOUT OR EPROM: Change Personal: ty - Rev # 4
CHANGE HOURS OF OPERATION:
OLD:
REPROGRAM TBC
INSTALL INTERCONNECT: TBC MINITROL TONE
MBT OK:YESNO
NO CHANGE - RECORD CORRECTION
X OTHER: Swap out existing 2070 SCATS controller w/ Mod 52 SCATS
Controller. Swap out d-connector. Hook up cameras per Assheet.
Requires a checksum change.
APPROVED BY: DATE: 6/9/17
DATE INSTALLED: 7/29/17
INSTALLED BY: $\mathbf{b} - \mathbf{\%}$

INTERSECTION :- 725 12 MILE & 12 OAKS MALL DR EAST / X/O DESCRIPTION PROMS :- X00725D / F2202 CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER SOFTWARE TYPE :- MOD 52 SCATS INPUTS :-17. NOTE :- ALL DETECTORS ARE AUTOSCOPE 1. X/O L (LK) (2004 CAMERAS). 18. 2. X/O R (LK) 3. 12 MILE L PRES (LK) 19. -20. -4. 12 MILE R PRES (LK) 21. -5. 12 MILE RT PRES (LK) 6. NB 12 OAKS MALL EAST RT L (5 SEC) 22. -7. NB 12 OAKS MALL EAST RT R (5 SEC) 23. -24. -8. -9. -10. -11. -12. -13. -14. -15. -16. Opticom 1 (Pin S on D-connector) (FOR FUTURE USE) PED 2: 12 MILE PED SOUTH P.B. (WA) APPROACHES :-A APPR 1 : 12 MILE L,R,RT B APPR 2 : 12 OAKS MALL DR EAST RT L,RT R B APPR 1 : X/O L,R PEDESTRIANS :-FLEXIDATA :-1. NO PED 1 SEQUENCE A, B A,B 2. 12 MILE PED SOUTH (P-) AUTO REL A R-REL A в R+ REL B Q- REL O+ REL LOOKAHEAD SPECIAL FEATURES :-The personality revision number is currently 4 (=D). A STAGE HAS A PERMANENT DEMAND. DEMAND FOR B STAGE IN FLEXI AND ISOLATED, SET ZNEG TO DISABLE. Opticom 1 calls A stage. Pedestrians have automatic introduction using SCATS Y-. Night Flash code: Set Y+ to activate the night flash in Flexilink.

BACKPANEL :- SIZE P44-12 CABINET A FLA LOAD SWITCH 2: 12 MILE LOAD SWITCH 4: 12 OAKS MALL DR EAST / X/O В FLR WA LOAD SWITCH 9: 12 MILE PED SOUTH JUMPERS :-195-196,197-198,199-200,201-202,207-208,217-218,219-220,221-222,298-302, 321-PB1, 325-326, 327-328, 329-PB1, 334-335, 343-PB1, 347-348, 349-350, 351-PB1, 365-PB1,369-PB1,373-PB1,387-PB1,391-PB1,395-PB1. SIGNAL MONITOR :- NONE. All switches OFF EXCEPT: Dual Select A&B; G&Y Enable; SSM 2,4. Minimum Flash = 4 + 2 + 1. ******** * CONTROLLER INFORMATION SHEET * CHECKSUMS TIMES: 3D/075 FOR SITE NO. 725 * * * PERS: EF/357 * CARISSA MARKEL * DATE :09-JUN-2017 * TOTAL: D2/322

FLEXILINK PLAN DATA

Interse	ction #	725	_ State #			Date:	06/09/17	Prepa	ared By:	Carissa M	larkel
			- 12 Oaks N					City:	Novi		
								Annr	avad By:	Rachel Jo	200
Hours	of Opera	ation:	7 Days: 9a	am - 10pm				Appr	oveu by.	Nachel Ju	nes
Hours	of Flash	ing:	7 Days: 10)pm - 9am							
		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	
0	CL		80	100							
1	A		0	0							
2	В		45	55							
3	С										
4	D										
5	E										
6	F										
7	G										
8	R-										
9	R+				9						
10	Of (Y-)		14	15							
11	Y+	С									
12	Z-										
13	Z+										
14	Q-										
15	Q+										
16	XH										
17	XL								<u> </u>		

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0. Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

						[Timers	
Phase	Direction	Min	Max	ECO	Amber	All Red	Gap	Hdwy	Waste
A	12 Mile	10.0	40.0		4.3	1.8	3.0	1.2	10.0
B	12 Oaks Mall Dr East / X/O	7.0	20.0		3.5	1.6	3.2	1.2	10.0
С									
D									
E									
F									
G									

[Day	Hours	Plan#
SC1	14	0:00	0
SC2	14	9:00	1
SC3	8	15:00	2
SC4	8	19:00	1
SC5	14	22:00	0
SC6			
SC7			
SC8			
SC9			
SC10			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2
12 Mile Ped South	7.0	18.0	3.1

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		Х		

DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON, FRI, SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

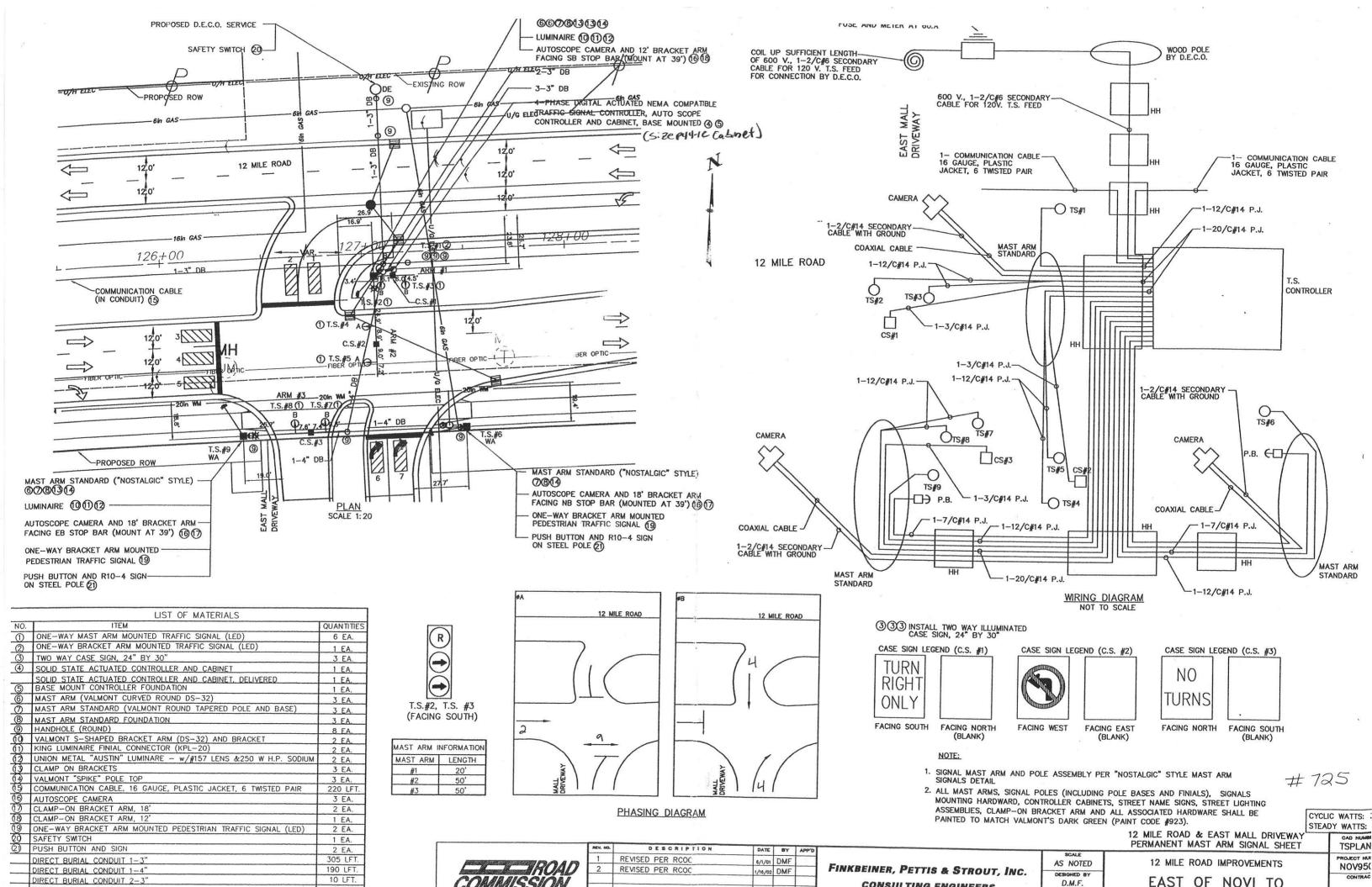
	Autosco	pe Outpu					ns #18 & # 37 to +24 VDC	C O#725
Camera	EIM	EIM	Output	D-Conn	Vehicle Detec	ctor No.		Phase No.
Number	Switch	LED#	Harness	Pin	D-Conn format	On Print	Detector Description	(1,2,3,)
	Position		Pin#	(1,2,)	(9,10,)	(1,2,)		
	1	1	29	1	9	1	X/O L	4
	1	2	30	2	10	2	X/O R	4
	1	3	31					
1	1	4	32					
	1	5	33					
	1	6	34					
	1	7	35					
	1	8	36					
	2	1	10	3	11	3	EB 12 MILE L	2
	2	2	11	4	12	4	EB 12 MILE R	2
[2	3	12	5	13	5	EB 12 MILE RT	2
2	2	4	13					
	2	5	14					
	2	6	15					
	2	7	16					
	2	8	17					
	3	1	21	6	14	6	NB 12 OAKS MALL RT L	4
	3	2	22	7	15	7	NB 12 OAKS MALL RT R	4
	3	3	23					
3	3	4	24					
° [3	5	25					
	3	6	26					
	3	7	27					
	3	8	28					
	4	1	2					
	4	2	3					
	4	3	4					
Γ	4	4	5				1	
	4	5	6					
	4	6	7					
	4	7	8					
	4	8	9					

Autoscope 37-Pin Male Output Harness (33457G2) Wiring

1

Autoscope 37-Pin Female Input Harness (33457G3) Wiring

EIM		Input	Phase Status	
Switch	EIM	Harness	Input From	Backpanel Terminal Position and Number
Position	LED#	Pin#	+24 VDC	
5	1	29	Phase 8 Green	
5	1	30	Phase 7 Green	
5	1	31	Phase 6 Green	
5	1	32	Phase 5 Green	
5	1	33	Phase 4 Green	LS 4 Green 221
5	1	34	Phase 3 Green	
5	1	35	Phase 2 Green	LS 2 Green 199
5	1	36	Phase 1 Green	
6	2	10	Phase 8 Red	
6	2	11	Phase 7 Red	
6	2	12	Phase 6 Red	· · · ·
6	2	13	Phase 5 Red	
6	2	14	Phase 4 Red	LS 4 Red 217
6	2	15	Phase 3 Red	
6	2	16	Phase 2 Red	LS 2 Red 195
6	2	17	Phase 1 Red	



	FIC	- SAI	TY RO. FETY L WORK	DEP/	ART	MEN		<u>DN</u>										
LOCATION: NON: + 12 Mile										_DA	TE:	9	113	5/1	9			
CITY/TOWNSHIP: Nou:									_ BY	l:	2.1	Ma	e ke	21				
COUNTY#:STATE#:																		
PLEAS	E PE	RFO	RM TH	E FO	OLLO	OWI	NG											
ELECTRICAL DEVICE: INSTAL	L _		MODE	ERN	IZE]	MAIN	NTE	NA	NCI	Ξ						
UNDERGROUND:																		
EDISON OK:YESNO					JO	B#:												
COORDINATE W/DISTRICT 7:																		
			- 1						2	2	2		4			4		
DIAL 1 SPLIT. 1	1.55	1 3	1 4	2	2	2	24		3	3	3	3		4	4	4	4	
CHANGE TIMING CHANGE OFFSET										_								
CHANGE CYCLE LENGTH									_									
CHANGE BREAKOUT OR EPROM:	•				te.							4		1.000.00	~			
CHANGE HOURS OF OPERATION:			5		e.			-										
OLD:					5									CER	2 2	2	0.010	
NEW:														ULI	2	0	2013	ļ
REPROGRAM TBC														AFR	0 01	PEF	ATI	ONS
INSTALL INTERCONNECT: TB	C _		MINIT	ROI			TO	NE										
MBT OK:YESNO																		
NO CHANGE - RECORD CORRECTIO	DN																	
X OTHER: Meet w/ contract	TOC	0	n r	100	da	-Y	9	116	110	1	a	ł	9 F	im.		۰ 		
Wire Flash Program for																		
out of flash. Please c																		
APPROVED BY:)										I	DATI	E: _	3 /	13	1.	9	
DATE INSTALLED: <u>9/14/19</u>																	-	
INSTALLED BY: <u> </u>																		

INTERSECTION :- 25 12 Mile & Novi DESCRIPTION PROMS :- X00025D / F2403 CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER SOFTWARE TYPE :- Mod 52 SCATS INPUTS :-17. NOTE :- ALL DETECTORS ARE LOOPS. 1. WB 12 MILE L PRES (LK) 2. WB 12 MILE C PRES (LK) 18. -19. -3. WB 12 MILE R PRES (LK) 20. -4. SB NOVI L PRES (LK) 21. -5. SB NOVI R PRES (LK) 22. -6. EB 12 MILE L PRES (LK) 23. Opticom 2 (BACKPANEL 167 - VD7) 7. EB 12 MILE C PRES (LK) 8. EB 12 MILE R PRES (LK) 24. Opticom 1 (BACKPANEL 175 - VD8) 9. NB NOVI L PRES (LK) 10. NB NOVI C PRES (LK) 11. NB NOVI R PRES (LK) 12. -13. -14. -15. -16. -PED 2: 12 MILE PED P.B. (WA) PED 4: NOVI PED P.B. (WB) APPROACHES :-A APPR 1 : WB 12 MILE L,C,R A APPR 2 : EB 12 MILE L,C,R B APPR 1 : SB NOVI L,R B APPR 2 : NB NOVI L,C,R FLEXIDATA :-PEDESTRIANS :-SEQUENCE A, B 1. NO PED 1 A,B 2. 12 MILE PED (P-) AUTO REL A 3. NO PED 3 R- REL A В 4. NOVI PED (P+) R+ REL B Q- REL O+ REL LOOKAHEAD SPECIAL FEATURES :-The personality revision number is currently 3 (=C). Opticom 1 calls A stage. Opticom 2 calls B stage. Ped 12 MILE PED introduction is suppressed when OPTICOM is active. Ped NOVI PED introduction is suppressed when OPTICOM is active. NOVI NEAR has early cut-off operation in B stage.

BACKPANEL :- SIZE P44-12 CABINET		
LOAD SWITCH 2 - 12 MILE	A	FLR
LOAD SWITCH 3 - NOVI FAR	С	FLR
LOAD SWITCH 4 - NOVI NEAR	В	FLR
LOAD SWITCH 9 - 12 MILE PED	WA	
LOAD SWITCH 10 - NOVI PED	WB	

JUMPERS :-

195-196,197-198,199-200,201-202,207-208,211-212,213-214,215-216,217-218, 219-220,221-222,223-224,229-230,321-PB1,325-326,327-328,329-PB1,334-335, 343-344,345-346,347-348,349-350,351-PB1,356-357,365-PB1,369-PB1,373-PB1, 387-PB1,391-PB1,395-PB1,298-302.

SIGNAL MONITOR :- 3-4.

All switched OFF EXCEPT: Dual Select A&B; G&Y Enable; SSM 2,3,4. Minimum Flash = 4 + 2 + 1.

*	CONTROLLER INFORMATION	SHEET *	CHECKSU	JMS
*	FOR SITE NO. 25	*	TIMES:	64/144
*	CARISSA MARKEL	*	PERS:	02/002
*	DATE :- 13-SEP-2019	*	TOTAL:	66/146
* *	*****	****		

FLEXILINK PLAN DATA

Intersection #	25	
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State #_____

Date: 10/07/08

Prepared By: Rachel Jones

Intersection: 12 Mile Road and Novi Road

Flash: None

City: Novi

Approved By: Deneau

		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8
0	CL		80	100	100					
1	A		0	0	0					
2	В		45	55	55					
3	C									
4	D									
5	E								Р ₀ .	
6	F									
7	G									
8	R-									
9	R+									
10	Of (Y-)		54	75	75					
11	Y+	С								
12	Z-									
13	Z+									
14	Q-									
15	Q+									
16	XH									14.7
17	XL									

NOTE: STAGES WITH ONE SECOND PHASE TIMES ARE SKIPPED

BLANK ENTRIES ARE DEFAULT VALUES = 0 FOR ENTRIES #0 - #7, #16 - #17

254 FOR ENTRIES #8 - #15 'C' ENTRY MEANS CONTINOUS = 255

						[Timers	
Phase	Direction	Min	Max	ECO	Amber	All Red	Gap	Hdwy	Waste
Α	12 Mile Road	15.0	45.0		4.3	2.1	3.0	1.2	6.0
В	Novi Road	10.0	35.0	3.0	4.3	1.2	3.0	1.2	6.0
С									
D									
E									. 17
F									
G									

	Day	Hours	Plan#
SC1	8	6:00	2
SC2	8	9:30	1
SC3	8	15:00	3
SC4	8	19:00	1
SC5	14	0:00	1
SC6			
SC7			
SC8			
SC9			
SC10			

Pedestrian Crossing Times

7.0	17.0	4.3
7.0	6.0	4.3

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		Х		

DAY OF WEEK CODE NUMBER

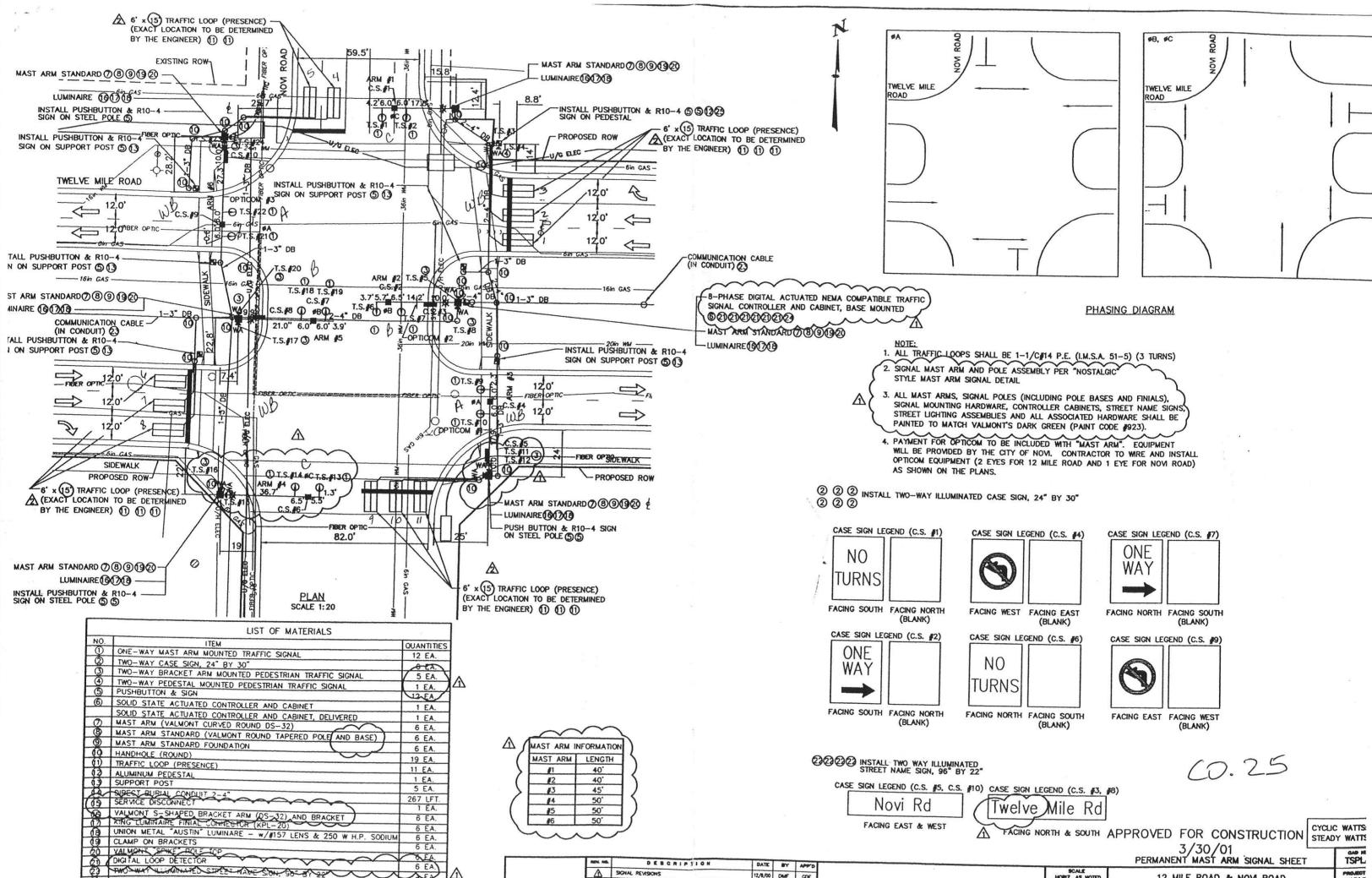
0	End of Schedule	4	WED	8	MON-FRI	12	MON, FRI, SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

D Connector Form for Mod 50 w/Loops

1

Intersection Name:	12 Mile & Novi Rd
County No:	25
Date:	2-23-06

Detecton Number on Print	Detector Description	D-Conn Term #	D-Conn Description	Phase
1	WB 12 mile L	1	Det. 9	a
2	WB 12 Mile C	2	Det. 10	2
3	WBI2 Mile R	3	Det. 11	2
4	SB Novi L	4	Det. 12	4
5	SB Novi R	5	Det. 13	4
6	EBIZMileL	6	Det. 14	2
7	EB 12 Mile C	7	Det. 15	2
8	EB 12 Mile R	8	Det. 16	2
9	NB Novi L	9	Det. 17	4
10	NB Novi C	10	Det. 18	4
1	NB Novi R	11	Det. 19	4
		12	Det. 20	
		13	Det. 21	19 B
		14	Det. 22	
		15	Det. 23	
-		16	Det. 24	
8		Backpanel		
		Backpanel		
3		Backpanel		
		Backpanel		



ACING	NORTH & SOUTH	APPROVED	FOR	CONST	RUCTION	CYCLIC STEADY	WATTS:
		PERMANE	S/SC	0/01 st arm 's	IGNAL SHEET	Γ	TSPL
	SCALE HORT AS HOTED	12 1			M POAD		PROJECT

×.													[P]) (smi Sek	n na h	ing dag	8.5° 1		1. Ç
	KLAN TRAF	FIC	- SA		ΥI	DEP.	ART	ME		<u>NO</u>				JUI	1	0	2016	ີ	
LOCATION: 12 Mile + X10	Ē1,	0	12	0	ak	5 0	w	est				DA	A TÉ	:2	til.	16	1.0	e	
CITY/TOWNSHIP: Nov:											_В	Y:	С.	M	ark	e l			
COUNTY#: 190 STATE#:									L	abi	01	: 5	30.	51	.00	180	ì	- 2	
PI	LEASE	E PE	RFC	RM	TH	E FO	OLL	OW			ria	Is:	, 5	30	51. (098	1		
ELECTRICAL DEVICE: IN	STAL	L _	1000	_ M(ODE	ERN	IZE			MA	NT	ENA	NCI	Е					
UNDERGROUND:						_													
EDISON OK: YESN	10						JC	B#:											
COORDINATE W/DISTRICT 7:																			
								1											
DIAL. SPLIT	. 1	1 2	1	1 4		2	2	23	2 4		3	3	3	3 4		4	4	4	4
CHANGE TIMING CHANGE OFFSET									-		_								
CHANGE CYCLE LENGTH																			
ADD DIAL/SPEIT		6				0.0			1.		P		+ 5						
		W 16	() · · ·	C		er		61.	1 7			e v h	-	-					
CHANGE HOURS OF OPERATIO	N:																		
OLD: NEW:																			
REPROGRAM TBC																			
	TDC	7		MD	ותיו				TO										
INSTALL INTERCONNECT: MBT OK: YES NO		·		WIII	111	XUL	·		101	NE									
NO CHANGE - RECORD CORRE	CTIO	NT.																	
NO CHANGE - RECORD CORRE			2	171) ¢		orl		P	414	110			M	ad	~) (170
530 controller. Swap																			
27																25			
Assheet. Install + h Checksum change. A											Ke	Gu	NC	-	a				
Checusen Change .	$\left(\right)$	1.	D	pe	5	9	10	* un	500	× .									
APPROVED BY:	¥	}	X	,									_ D.	ATE	<u>}: 2</u>	- /	3_	16	
DATE INSTALLED:	~	6	_	3	4	4	5												
INSTALLED BY:	-/1	1	H		/	1	A	n	E	\leq									

×

INTERSECTION :- 1190 12 MILE & X/O E/O 12 OAKS WEST DESCRIPTION PROMS :- X01190 / F2002 CONTROLLER TYPE :- STANDARD PERSONALITY SOFTWARE TYPE :- MOD 52 SCATS INPUTS :-1. X/O E/O 12 OAKS WEST L (NL) NOTE :- ALL DETECTORS ARE AUTOSCOPE 2. X/O E/O 12 OAKS WEST R (NL) (2004 CAMERAS). 3. 12 MILE L (LK) 4. 12 MILE R (LK) APPROACHES :-A APP 1 : 12 MILE L,R B APP 1 : X/O E/O 12 OAKS WEST L,R FLEXIDATA :-PEDESTRIANS :-A,B SEQUENCE A, B AUTO REL R-REL A A R+ REL B B Q- REL Q+ REL SPECIAL FEATURES :-Personality revision is 5 (=E). A STAGE HAS A PERMANENT DEMAND DEMAND FOR STAGE B IN FLEXI AND ISOLATED, SET ZNEG TO DISABLE. BACKPANEL :- SIZE P44-12 CABINET LOAD SWITCH 2 - 12 MILE A FLA LOAD SWITCH 4 - X/O E/O 12 OAKS WEST B FLR JUMPERS :-195-196,197-198,199-200,217-218,219-220,221-222,298-302,321-PB1, 325-326,327-328,329-PB1,343-PB1,347-348,349-350,351-PB1,365-PB1, 369-PB1,373-PB1,387-PB1,391-PB1,395-PB1. SIGNAL MONITOR :- NONE. All switches OFF EXCEPT: Dual Select A&B; G&Y Enable; SSM 2,4. Minimum Flash = 4 + 2 + 1. * CONTROLLER INFORMATION SHEET *CHECKSUMS* FOR SITE NO. 1190*TIMES: F5/365* CARISSA MARKEL*PERS: 05/005* 01-Feb-2016*TOTAL: F0/360

				F	LEXILIN	K PLAN	IDATA							
Interse	ction #	1190	State #			Date:	02/01/16	Prepa	ared By:	Carissa M	1 arkel			
				O E/O 12 Oaks West City: Novi										
Hours	of Opera	ation:	7 Days: 9	Days: 9am - 10pm Approved By: Rachel Jor										
Hours	of Flash	ing:	7 Days: 1	0pm - 9am	l									
		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	1			
0	CL		80	100							1			
1	A		0	0							1			
2	В		60	70							1			
3	С]			
4	D]			
5	E													
6	F													
7	G													
8	R-													
9	R+		C	С										
10	Of (Y-)		3	24										
11	Y+	С												
12	Z-													
13	Z+													
14	Q-													
15	Q+													
16	XH													

17 NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0. Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

								Timers	
Phase	Direction	Min	Max	ECO	Amber	All Red	Gap	Hdwy	Waste
A	12 Mile	10.0	30.0		4.3	1.0	3.0	1.2	10.0
В	X/O E/O 12 Oaks West	5.0	20.0		3.5	1.4	3.0	1.2	10.0
С									
D									
E									
F									
G									

[Day	Hours	Plan#
SC1	14	0:00	0
SC2	14	9:00	1
SC3	8	15:00	2
SC4	8	19:00	1
SC5	14	22:00	0
SC6			
SC7			
SC8			
SC9			
SC10			

XL

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		Х		

DAY OF WEEK CODE NUMBER

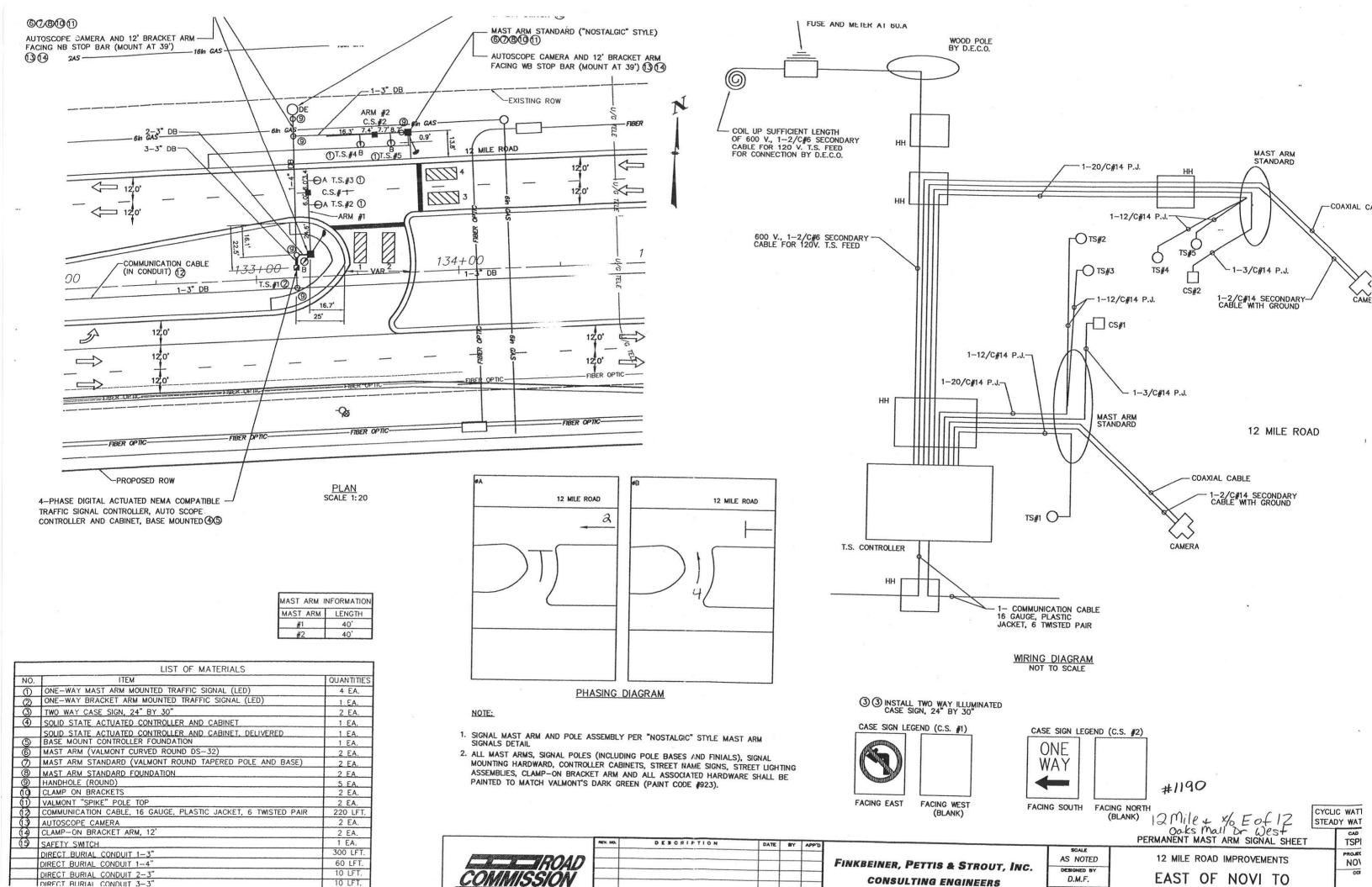
0	End of Schedule	4	WED	8	MON-FRI	12	MON, FRI, SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON, FRI	15	NEVER

	Autosc	ope Outpu			#20 to Logic Con		ns #18 & # 37 to +24 VDC	CO
Camera		EIM		D-Conn				Phase No.
Number	C	LED#	Harness	Pin	D-Conn format		Detector Description	(1,2,3,)
	Position		Pin#	(1,2,)	(9,10,)	(1,2,)		
	1	1	29	1	9	1	X/O E/O 12 Oaks West L	4
	1	2	30	2	10	2	X/O E/O 12 Oaks West R	4
	1	3	31					
1	1	4	32					
	1	5	33					
	1	6	34					
	1	7	35					
	1	8	36					
	2	1	10	3	11	3	12 Mile L	2
	2	2	11	4	12	4	12 Mile R	2
	2	3	12					
2	2	4	13					
	2	5	14					
	2	6	15					
	2	7	16					
	2	8	17					
	3	1	21					
	3	2	22					
Ļ	3	3	23					
3	3	4	24					
	3	5	25					
H	3	6	26					
F	3	7	27					
	3	8	28					
_	4	1	2					
-	4	2	3					
-	4	3	4					
4	4	4	5					
	4	5	6					
F	4	6	7					
L	4	7	8					
	4	8	9					

Autoscope 37-Pin Male Output Harness (33457G2) Wiring

Autoscope 37-Pin Female Input Harness (33457G3) Wiring

EIM		Input	Phase Status	
Switch	EIM	Harness	Input From	Backpanel Terminal Position and Number
Position	LED#	Pin#	+24 VDC	
5	1	29	Phase 8 Green	
5	1	30	Phase 7 Green	
5	1	31	Phase 6 Green	2
5	1	32	Phase 5 Green	
5	1	33	Phase 4 Green	LS 4 Green 221
5	1	34	Phase 3 Green	
5	1	35	Phase 2 Green	LS 2 Green 199
5	1	36	Phase 1 Green	
6	2	10	Phase 8 Red	
6	2	11	Phase 7 Red	
6	2	12	Phase 6 Red	
6	2	13	Phase 5 Red	
6	2	14	Phase 4 Red	LS 4 Red 217
6	2	15	Phase 3 Red	
6	2	16	Phase 2 Red	LS 2 Red 195
6	2	17	Phase 1 Red	



OAKLAND COUNTY ROAD COMMISSION TRAFFIC - SAFETY DEPARTMENT SIGNAL WORK ORDER
LOCATION: 12 Mile & ×10 E/O NOVI. DATE: 3-12-17
CITY/TOWNSHIP: NOVI BY: RACHEL JONES
COUNTY#: 1142 STATE#:CHARGES: 53391-0989 (10bor)
PLEASE PERFORM THE FOLLOWING: 53391-0981 (Materials)
ELECTRICAL DEVICE: INSTALL MODERNIZE MAINTENANCE
UNDERGROUND:
EDISON OK:YESNO JOB#:JUN 1 3 2017
COORDINATE W/DISTRICT 7:
DIAL 1 1 1 2 2 2 2 3 3 3 4 4 4 SPLIT. 1 2 3 4 4 4 4 4 4
CHANGE TIMING CHANGE OFFSET
CHANGE CYCLE LENGTH
ADD DIAL/SPLIT
λ _CHANGE BREAKOUT OR EPROM: <u><u>REV 2</u></u>
CHANGE HOURS OF OPERATION:
OLD:
NEW:
REPROGRAM TBC
INSTALL INTERCONNECT: TBC MINITROL TONE
MBT OK: YES NO
NO CHANGE - RECORD CORRECTION
× OTHER: Swap out 2070 W/MOD 52 SCATS controller
Swop. out p-connector and mook up loops per popernork.
Requires a decksom change.
APPROVED BY: DATE: 3/2/11
DATE INSTALLED: $6 - 10 - 17$
DATE INSTALLED: 6-10-17 INSTALLED BY: Jordan - Parken

3

INTERSECTION :- 1142 12 Mile & X/O East of Novi Rd. DESCRIPTION PROMS :- X01142D / F2002 CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER SOFTWARE :- MOD 52 SCATS INPUTS :-1. XOVER L PRES (LK) Note: All detectors 2. XOVER C PRES (LK) are loops. 3. XOVER R PRES (LK) 4. 12 MILE L PRES (LK) 5. 12 MILE R PRES (LK) APPROACHES :-A APPR 1 : 12 MILE L,R B APPR 1 : XOVER L, C, R FLEXIDATA :-SEQUENCE A, B A,B AUTO REL R- REL A A R+ REL В B Q- REL Q+ REL LOOKAHEAD SPECIAL FEATURES :-The personality revision number is currently 2 (=B). A stage has a permanent demand. Demand for B stage in flexi and isol, set ZNEG to disable. BACKPANEL 8 PHASE EAGLE LOAD SWITCH 2 - 12 MILE ROAD A FLA LOAD SWITCH 4 - CROSSOVER В FLR JUMPERS 298-302,195-196,197-198,199-200,217-218,219-220,221-222,321-PB1, 325-326-327-328,329-PB1,343-PB1,347-348,349-350,351-PB1,365-PB1, 369-PB1, 373-PB1, 387-PB1, 391-PB1, 395-PB1. SIGNAL MONITOR: NONE. All switches OFF EXCEPT: Dual Select A&B; G&Y Enable; SSM 2,4. Minimum Flash = 4 + 2 + 1****** Checksums: * CONTROLLER INFORMATION SHEET * Times C5 / 305 FOR SITE NO. 1142 * Pers 58 / 130 * Total 9D / 235 * Rachel Jones * DATE :- 2-MAR-2017 *********

FLEXILINK PLAN DATA

Interse	ction #	1142	State #			Date:	03/02/17	Prepa	ared By:	Rachel Jo	nes
Interse	ction:	12 Mile &	X/O E/O N	ovi				City:	Novi		
								Appr	oved Bv:	R. Jones	
Hours	of Opera	ation:	7 Days: 24	Hours				, the			
Hours	of Flash	ing:	None								
		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	
0	CL		80	100	100						
1	A		0	0	0						
2	В		43	53	53						
3	С										
4	D										
5	E										
6	F										
7	G										
8	R-										
9	R+										
10	Of (Y-)		47	68	68						
11	Y+	С									
12	Z-										
13	Z+										
14	Q-										
15	Q+										
16	XH										-
17	XL										

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0. Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

								Timers	
Phase	Direction	Min	Max	ECO	Amber	All Red	Gap	Hdwy	Waste
A	12 Mile	10.0	30.0		4.3	1.2	3.0	1.2	6.0
B	X-Over	7.0	20.0		3.5	1.8	3.0	1.2	6.0
С							e		
D									
E									
F									
G									

[Day	Hours	Plan#
SC1	8	6:00	2
SC2	8	9:30	1
SC3	8	15:00	3
SC4	8	19:00	1
SC5	14	0:00	1
SC6			
SC7			_
SC8			
SC9			
SC10			

Pedestrian Crossing Times

Direction	Walk	CL 1	CL 2

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated
		Х		

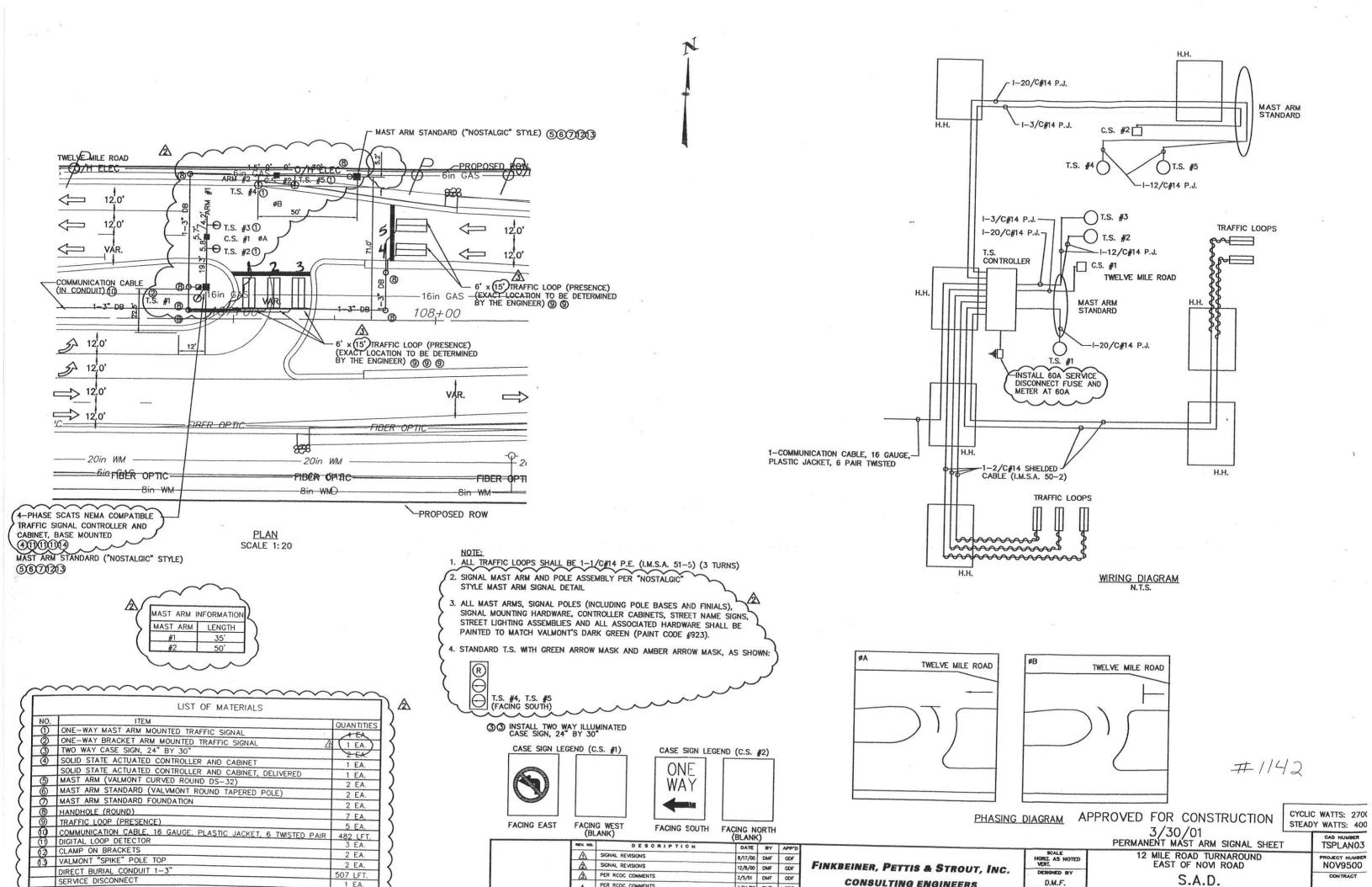
DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON, FRI, SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

D Connector Form for Mod 52 w/Loops

Intersection Name: <u>12 Mile & X/O E/O Novi</u> County No: <u>1142</u> Date: <u>3/2/2017</u>

Detector # on Print	Detector Description	D-Conn Term #	D-Conn Description	Phase
1	X-Over L	1	Det. 9	4
2	X-Over C	2	Det. 10	4
3	X-Over R	3	Det. 11	4
4	12 Mile L	4	Det. 12	2
5	12 Mile R	5	Det. 13	2
		6	Det. 14	
		7	Det. 15	
		8	Det. 16	
		9	Det. 17	
		10	Det. 18	
		11	Det. 19	
		12	Det. 20	
		13	Det. 21	
		14	Det. 22	
		15	Det. 23	
		16	Det. 24	
		Backpanel		



	9 2										
5 x	OAKLAND COUNTY ROAD COMMISSION TRAFFIC - SAFETY DEPARTMENT SIGNAL WORK ORDER										
	LOCATION: 12 MILE & X/O W/O NOVI DATE: 3-3-17										
	CITY/TOWNSHIP: NOVI										
	COUNTY#: 1143 STATE#: CHARGES: 53391-0989 (1000)										
	COUNTY#: 1143 STATE#: CHARGES: 53391-0989 (10bor) PLEASE PERFORM THE FOLLOWING: 53391-0981 (motorio										
	ELECTRICAL DEVICE: INSTALL MODERNIZE MAINTENANCE										
	UNDERGROUND:										
	EDISON OK:YESNO JOB#:JUN 132										
	COORDINATE W/DISTRICT 7:										
	DIAL 1 1 1 2 2 2 3 3 3 4 4 4 4 SPLIT. 1 2 3 4 <										
	CHANGE TIMING										
	CHANGE OFFSET CHANGE CYCLE LENGTH										
	ADD DIAL/SPLIT										
-	CHANGE HOURS OF OPERATION:										
	OLD:										
	NEW:										
-	REPROGRAM TBC										
_	INSTALL INTERCONNECT:TBCMINITROLTONE										
	MBT OK:YESNO										
_	NO CHANGE - RECORD CORRECTION										
-	x other: Swap out 2070 for MOD 52 SCATS controller Swap out D-connector and hook up loops per paperwork. Requires a decksum change										
	out D-connector and hook up loops per poperwork.										
	Requires a decksum change										
	i										
	$\bigcirc \downarrow \bigcirc$										
A	PPROVED BY: DATE: 3/3/17										
	175 DIOTALLED (100 - 17										
D	ATE INSTALLED: 6-10 17										

INTERSECTION :- 1143 12 Mile & X/O West of Novi Rd. DESCRIPTION PROMS :- X01143D / F2002 CONTROLLER TYPE :- STANDARD PERSONALITY CONTROLLER SOFTWARE :- MOD 52 SCATS INPUTS :-1. X-OVER L PRES (LK) Note: All detectors 2. X-OVER C PRES (LK) are loops. 3. X-OVER R PRES (LK) 4. 12 MILE RD L PRES (LK) 5. 12 MILE RD R PRES (LK) APPROACHES :-A APPR 1 : 12 MILE RD L,R B APPR 1 : X-OVER L,C,R FLEXIDATA :-SEQUENCE A, B A,B AUTO REL R- REL A A R+ REL B В Q- REL O+ REL LOOKAHEAD SPECIAL FEATURES :-The personality revision number is currently 2 (=B). A stage has a permanent demand. Demand for B stage in flexi and isol, set ZNEG to disable. BACKPANEL 8 PHASE EAGLE LOAD SWITCH 2 - 12 MILE RD A FLA LOAD SWITCH 4 - CROSSOVER B FLR JUMPERS 195-196,197-198,199-200,217-218,219-220,221-222,321-PB1,325-326, 327-328,329-PB1,343-PB1,347-348,349-350,351-PB1,365-PB1,369-PB1, 373-PB1,387-PB1,391-PB1,395-PB1,298-305. SIGNAL MONITOR: NONE. All switches OFF EXCEPT: Dual Select A&B; G&Y Enable; SSM 2,4. Minimum Flash = 4 + 2 + 1. ****** Checksums: * CONTROLLER INFORMATION SHEET * Times E7 / 347 * FOR SITE NO. 1143 * Pers 5A / 132 * Total BD / 275 Rachel Jones * DATE :- 3-Mar-2017 * *

FLEXILINK PLAN DATA

1	ation #	11/2	State #			Date:	03/03/17	Prepa	red By:	Rachel Joi	nes
Interse	ction #	1143	- State #								
Intorse	ction:	12 Mile &	X/O W/O N	lovi				City:	Novi		
Interse	ction.	12 11110 0	740 1101							1000 V V41	10
Hours	of Opera	ation:	7 Days: 24	1 Hours				Appro	oved By:	R. Jones	
Tiouro	or opere										
Hours	of Flash	ing:	None								
		5									
		PL0	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	
0	CL		80	100	100						
1	A		0	0	0						
2	В		43	53	53						
3	С										
4	D										
5	E										
6	F										
7	G										
8	R-										
9	R+										
10	Of (Y-)		47	68	68						
11	Y+	С									
12	Z-										
13	Z+										
14	Q-										
15	Q+										
16	XH										
17	XI										1

NOTE: Stages with 1 second of phase time are skipped. Blank entries are default values equal to 0. Except for an AWA controller, entries #8 to #15 (=254) and 'C' entry means continuous (=255).

						[Timers	
Dhaco	Direction	Min	Max	ECO	Amber	All Red	Gap	Hdwy	Waste
rnase	12 Mile	10.0	30.0		4.3	1.2	3.0	1.2	6.0
A	X-Over	7.0	20.0		3.5	1.9	3.0	1.2	6.0
B	X-Over	1.0	20.0						
<u>C</u>			-						
D									
E									
F					<u> </u>				
G								I	

[Day	Hours	Plan#
SC1	8	6:00	2
SC2	8	9:30	1
SC3	8	15:00	3
SC4	8	19:00	1
SC5	14	0:00	1
SC6			
SC7			
SC8			
SC9			
SC10			

Pedestrian Crossing Times

Fedestrian crossing rank	Walk	CL 1	CL 2
Direction	vvaik	ULI	UL Z

Normal Operating Mode

Isolated	Flexilink	Masterlink	Master Isolated	Flexi Isolated	
		X			

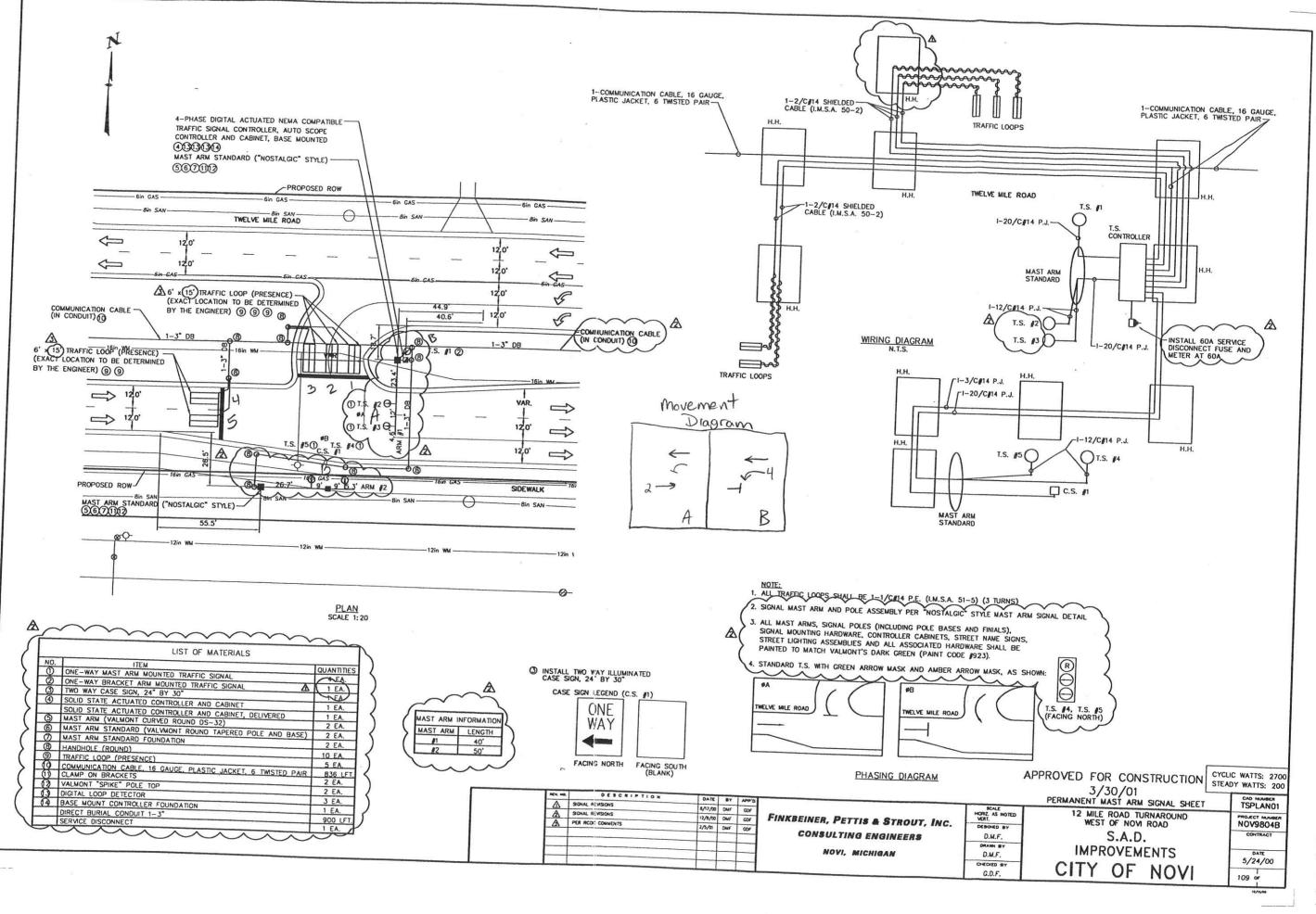
DAY OF WEEK CODE NUMBER

0	End of Schedule	4	WED	8	MON-FRI	12	MON, FRI, SAT
1	SUN	5	THUR	9	MON-SAT	13	SAT,SUN
2	MON	6	FRI	10	TUE,WED,THU	14	EVERY DAY
3	TUE	7	SAT	11	MON,FRI	15	NEVER

D Connector Form for Mod 52 w/Loops

	12 Mile & X/O W/O Novi		
County No:	1143		
Date:	3/3/2017		•
Detector # on Print	Detector Description	D-Conn Term #	D-Conn Descrip

Detector # on Print	Detector Description	D-Conn Term #	D-Conn Description	Phase
1	X-Over L	1	Det. 9	4
2	X-Over C	2	Det. 10	4
3	X-Over R	3	Det. 11	4
4	4 12 Mile L		Det. 12	2
5	12 Mile R	5	Det. 13	2
		6	Det. 14	
		7	Det. 15	
		8	Det. 16	
		9	Det. 17	
		10	Det. 18	
		11	Det. 19	
	185	12	Det. 20	
		13	Det. 21	
		14	Det. 22	
10		15	Det. 23	
-		16	Det. 24	
		Backpanel		
0		Backpanel		
		Backpanel		



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Search...

Southeast Michigan

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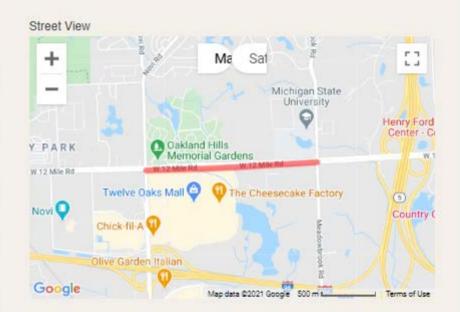
Home Data and Maps Transportation Data Crash and Road Data

Crash and Road Data

Road Segment Report

12 Mile Rd W, (PR Number 4462980)

From:	Novi Rd 2.053 BMP
To:	Meadowbrook Rd 3.056 EMP
FALINK ID:	18755
Community:	City of Novi
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	1.003 miles
Number of Lanes:	2
Posted Speed:	0 (source:)
Route Classification:	Not a route
Annual Crash Average 2015-2019:	<u>6</u>
Traffic Volume (2016)*:	17,500 (Observed AADT)
Pavement Type (2018):	Concrete
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment
Long Range (RTP) Projects:	No long-range projects for this segment.



* AADT values are derived from Traffic Counts



Southeast Michigan

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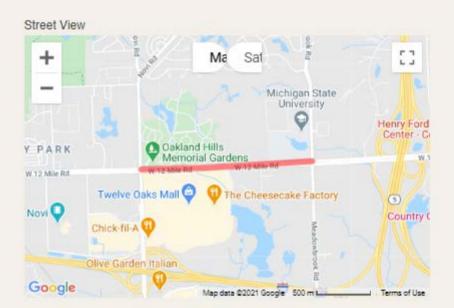
Home Data and Maps Transportation Data Crash and Road Data

Crash and Road Data

Road Segment Report

12 Mile Rd W, (PR Number 4414623)

From:	Novi Rd 0.663 BMP
To:	Meadowbrook Rd 1.666 EMP
FALINK ID:	18462
Community:	City of Novi
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	1.003 miles
Number of Lanes:	2
Posted Speed:	0 (source:)
Route Classification:	Not a route
Annual Crash Average 2015-2019:	<u>9</u>
Traffic Volume (2016)*:	10,400 (Observed AADT)
Pavement Type (2018):	Concrete
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.



* AADT values are derived from Traffic Counts



Southeast Michigan

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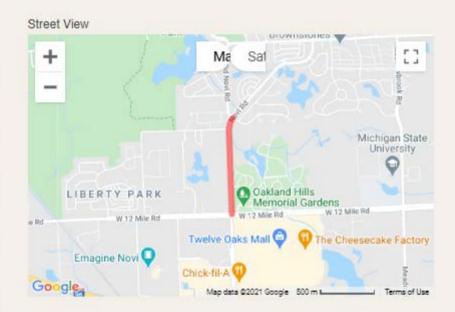
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Home Data and Maps Transportation Data Crash and Road Data

Crash and Road Data

Road Segment Report

\mathbf{b}	
Novi Rd, (PR Number 621910)	
From:	Novi Rd 0.445 BMP
То:	12 Mile Rd W 1.009 EMP
FALINK ID:	452
Community:	City of Novi
County:	Oakland
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.564 miles
Number of Lanes:	4
Posted Speed:	40 (source: TCO)
Route Classification:	M-1
Annual Crash Average 2015-2019:	<u>15</u>
Traffic Volume (2016)*:	12,600 (Observed AADT)
Pavement Type (2018):	Asphalt
Pavement Rating (2018):	Good
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.





Southeast Michigan

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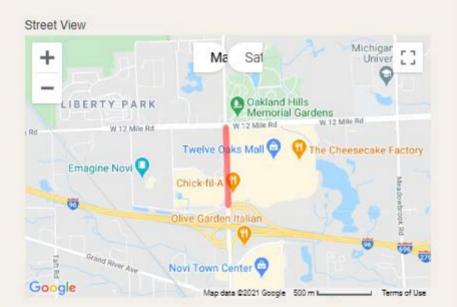
Home Data and Maps Transportation Data Crash and Road Data

Crash and Road Data

Road Segment Report

Novi Rd, (PR Number 621910)

From:	12 Mile Rd W 1.025 BMP
то	W I 96/Novi Ramp 1.481 EMP
FALINK ID:	454
Community:	City of Novi
County:	Oakland
Functional Class:	3 - Other Principal Arterial
Direction:	1 Way
Length:	0.456 miles
Number of Lanes:	6
Posted Speed:	40 (source: TCO)
Route Classification:	M-1
Annual Crash Average 2015-2019:	<u>48</u>
Traffic Volume (2016)*:	38,100 (Observed AADT)
Pavement Type (2018):	Asphalt
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.



SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

City of Novi

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

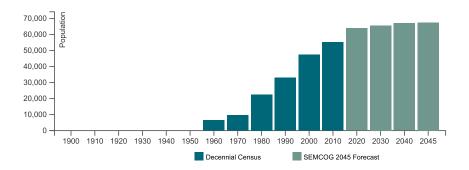
SEMCOG MEMBER Census 2010 Population: 55,224 Area: 31.2 square miles

VIEW COMMUNITY EXPLORER MAP

Population and Households

Link to American Community Survey (ACS) Profiles: Select a Year 2015-2019
Social | Demographic
Population and Household Estimates for Southeast Michigan, 2020

Population Forecast



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

Population and Households

Population and Households	Census 2010	Change 2000- 2010	Pct Change 2000- 2010	SEMCOG Jul 2020	SEMCOG 2045
Total Population	55,224	7,838	16.5%	64,834	67,417
Group Quarters Population	360	93	34.8%	549	740
Household Population	54,864	7,552	16.0%	64,285	66,677
Housing Units	24,226	4,509	22.9%	27,566	-
Households (Occupied Units)	22,258	3,466	18.4%	26,015	27,345
Residential Vacancy Rate	8.1%	3.4%	-	5.6%	-
Average Household Size	2.46	-0.05	-	2.47	2.44

Source: U.S. Census Bureau, SEMCOG Population and Household Estimates, and SEMCOG 2045 Regional Development Forecast

Components of Population Change

Components of Population Change	2000- 2005 Avg.	2006- 2010 Avg.	2011-2018 Avg.
Natural Increase (Births - Deaths)	390	252	213
Births	701	583	637
Deaths	311	331	424
Net Migration (Movement In - Movement Out)	534	353	826
Population Change (Natural Increase + Net Migration)	924	605	1,039

Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

City of Novi

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

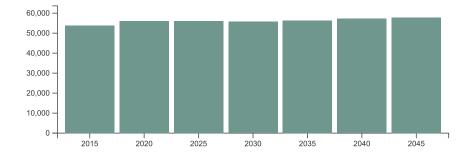
SEMCOG MEMBER Census 2010 Population: 55,224 Area: 31.2 square miles

VIEW COMMUNITY EXPLORER MAP

Economy & Jobs

Link to American Community Survey (ACS) Profiles: Select a Year 2015-2019 V Economic

Forecasted Jobs



Source: SEMCOG 2045 Regional Development Forecast

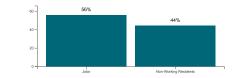
Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
Natural Resources, Mining, & Construction	2,321	2,665	2,533	2,501	2,532	2,569	2,605	284	12.2%
Manufacturing	3,958	3,890	3,673	3,412	3,244	3,100	2,944	-1,014	-25.6%
Wholesale Trade	3,188	3,285	3,279	3,243	3,243	3,240	3,218	30	0.9%
Retail Trade	9,469	9,491	9,183	8,611	8,123	7,809	7,510	-1,959	-20.7%
Transportation, Warehousing, & Utilities	909	925	910	916	929	937	940	31	3.4%
Information & Financial Activities	5,797	5,910	5,854	5,777	5,850	5,890	5,875	78	1.3%
Professional and Technical Services & Corporate HQ	6,318	6,867	7,219	7,785	8,320	8,812	9,392	3,074	48.7%
Administrative, Support, & Waste Services	4,012	4,138	4,192	4,215	4,307	4,402	4,460	448	11.2%
Education Services	1,812	1,886	1,887	1,866	1,890	1,915	1,936	124	6.8%
Healthcare Services	6,654	7,105	7,384	7,551	7,917	8,368	8,736	2,082	31.3%
Leisure & Hospitality	6,511	6,951	7,007	7,016	7,114	7,282	7,446	935	14.4%
Other Services	2,152	2,212	2,159	2,119	2,112	2,098	2,069	-83	-3.9%
Public Administration	758	767	760	755	754	752	749	-9	-1.2%
Total Employment Numbers	53,859	56,092	56,040	55,767	56,335	57,174	57,880	4,021	7.5%

Source: SEMCOG 2045 Regional Development Forecast

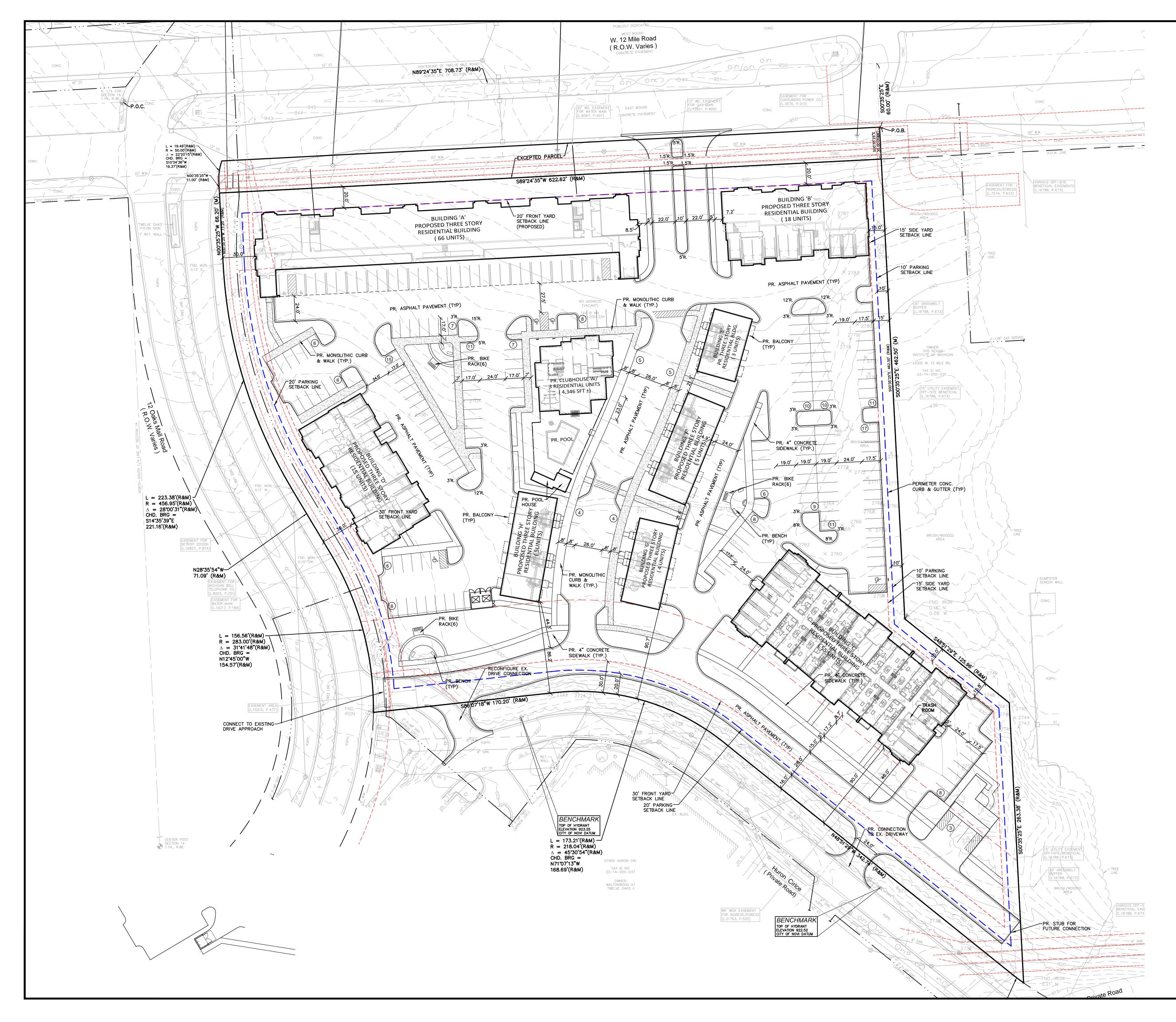
Daytime Population

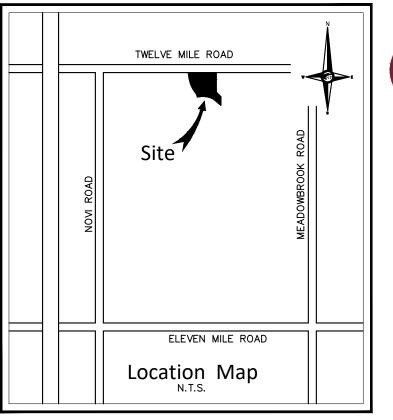
Daytime Population	ACS 2016
Jobs	36,078
Non-Working Residents	28,531
Age 15 and under	12,980
Not in labor force	14,353
Unemployed	1,198
Daytime Population	64,609

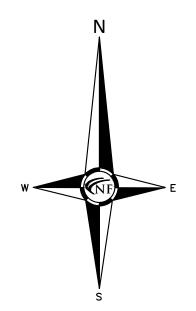


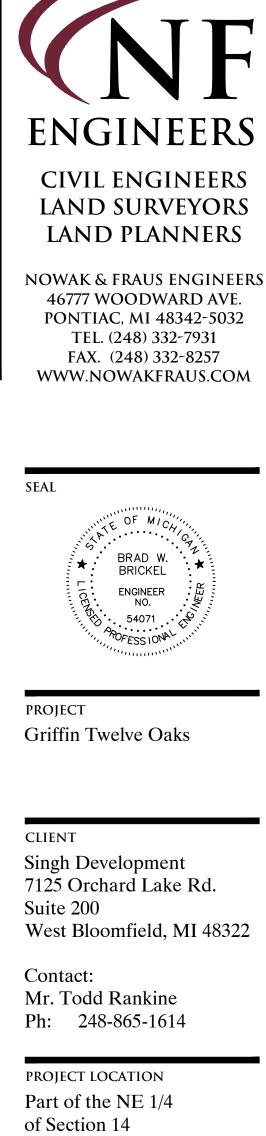
Source: 2012-2016 American Community Survey 5-Year Estimates and 2012-2016 Census Transportation Planning Products Program (CTPP). For additional information, visit SEMCOG's Interactive Commuting Patterns Map

Note: The number of residents attending school outside Southeast Michigan is not available. Likewise, the number of students commuting into Southeast Michigan to attend school is also not known.









Part of the NE 1/4 of Section 14 T. 1 North, R. 8 East, City of Novi, Oakland County, Michigan

SHEET Preliminary Site Plan



DATE	ISSUE	D/REVI	ISED				
09-28-20 188	UED FOR PR	ELIMINA	RY SITE PL	AN			
09-30-20 SU	RVEY ISSUED)					
10-23-20 REV	ISED PER CI	TY/CLIEN	Т				
12-03-20 ISS	UED FOR PR	ELIMINAR	Y SITE PLA	۸N			
	DV						
DRAWN R. John							
DESIGNE	-						
B. Bric	kel						
APPROVE	-						
B. Bric	kel						
DATE:							
Septem	ber 28,	2020					
SCALE:	1'' = 40	,					
SCALE:	1 - 40	20	40	6			
		20	-10				
NFE JOB	NO.	SF	HEET N	0.			
L958	-	PSP1					
レフンロ		rdri					

TOTAL PARKING PROVIDED TOTAL UNITS PARKING RATIO	- 274 SPACES - 174 UNITS - 1.57 SPACES/UNIT				
LOT COVERAGE					
SITE CONTAINS = BUILDING COVERAGE = PROPOSED LOT COVERAGE =	79,809.35 SFT.				
PAVING LEGEND					
A A A A A A A A A A A A A A A A A A A	OPOSED CONCRETE PAVEMENT				
PR	OPOSED ASPHALT PAVEMENT				
LEGEND					
MANHOLE	- EXISTING SANITARY SEWER				
HYDRANT	— SAN. CLEAN OUT				
	EXISTING WATERMAIN				
MANHOLE CATCH BASIN	- EXISTING STORM SEWER				
X	EX. R. Y. CATCH BASIN				
UTILITY POLE GUY POLE	- EXISTING BURIED CABLES				
	< OVERHEAD LINES				
	LIGHT POLE				
q	SIGN				
	- EXISTING GAS MAIN				
C.O. MANHOLE	- PR. SANITARY SEWER				
•	_ PR. WATER MAIN				
INLET C.B. MANHOLE	- PR. STORM SEWER				
×	- PR. R. Y. CATCH BASIN				
÷.	PROPOSED LIGHT POLE				

PARKING DATA	
SURFACE PARKING SPACES PROVIDED GARAGE PARKING SPACES PROVIDED	– 183 SPACES – 97 SPACES

Appendix B

EXISTING TRAFFIC CONDITIONS



Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Exhibit 20-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

V@ Aaæ & Aaæ $A_{a} = A_{a} = A_{a} + A_{a} +$

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)					
А	<u>≤</u> 10					
В	> 10 and <u><</u> 15					
С	> 15 and <u><</u> 25					
D	> 25 and <u><</u> 35					
E	> 35 and <u><</u> 50					
F	> 50					

Exhibit 20-2. Level of Service Criteria for Stop-Controlled Intersections (Motor Vehciles)

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. A total delay of 50 sec/veh is assumed as the break point between LOS E and F.

V@AŠUÙÁ& ãr\ ãæÁ [Á/Y ÙÔÁġ ch + ^&cā] + Åsã~hÁ [{ ^, @æÁ [{ Á@Ak ãr\ ãæÁ + ^ åÁġ AÔ@ġ ch Á JÁ[A• \hat{a} } æðã ^ åÁġ ch + ^&cā] + Éá | á] æðã Ás ^&e + Á + ^ A | \hat{A} | \hat{A}] cā] + Åsã~h | \hat{A} @ \hat{A} $\hat{$

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle. The criteria are given in Exhibit 19-8. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with a control delay of 10 s/veh or less. This level is typically assigned when the volume-to-capacity ratio is low and either progression is extremely favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during a green indication and travel through the intersection without stopping.

LOS B describes operations with control delay between 10 and 20 s/veh. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
А	<u>≤</u> 10.0
В	> 10.0 and <u><</u> 20.0
С	> 20.0 and <u><</u> 35.0
D	> 35.0 and <u><</u> 55.0
E	> 55.0 and <u><</u> 80.0
F	>80.0

Exhibit 19.8. Level-of-Service Criteria for Signalized Intersections (Motorized Vehicles)

1. If the v/c ratio for a lane group exceeds 1.0, a LOS F is assigned to the individual lane group. LOS for approach-based and intersection-wide assessments are determined solely by the control delay.

LOS C describes operations with control delay between 20 and 35 s/veh. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e. one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number if vehicle stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D describes operations with control delay between 35 and 55 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with control delay between 55 and 80 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level, considered to be unacceptable to most drivers, often occurs with over-saturation, that is, when arrival flow rates exceed the capacity of the intersection. This level is typically assigned when the volume-to-capacity ratio is high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- † †	1					<u></u>	1		<u></u>	
Traffic Volume (vph)	0	900	298	0	0	0	0	187	393	0	570	0
Future Volume (vph)	0	900	298	0	0	0	0	187	393	0	570	0
· · · · /	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.4	6.4					8.5	8.5		5.5	
Lane Util. Factor		0.95	1.00					0.95	1.00		0.95	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		3800	1700					3725	1667		3800	
Flt Permitted		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		3800	1700					3725	1667		3800	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	0	968	320	0	0	0	0	197	414	0	655	0
RTOR Reduction (vph)	0	0	79	0	0	0	0	0	35	0	0	0
Lane Group Flow (vph)	0	968	241	0	0	0	0	197	379	0	655	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Turn Type		NA	Perm					NA	Perm		NA	
Protected Phases		2	0					8	0		4	
Permitted Phases		F1 0	2					22.2	8		24.2	
Actuated Green, G (s)		51.9	51.9					33.2	33.2		36.2	
Effective Green, g (s)		51.9 0.52	51.9					33.2	33.2		36.2	_
Actuated g/C Ratio Clearance Time (s)		0.52 6.4	0.52 6.4					0.33 8.5	0.33 8.5		0.36 5.5	
Vehicle Extension (s)		0.4 3.0	0.4 3.0					8.5 3.0	8.5 3.0		5.5 3.0	
		<u> </u>	882					1236	553		1375	
Lane Grp Cap (vph) v/s Ratio Prot		c0.25	882					0.05	553		0.17	
v/s Ratio Perm		0.20	0.14					0.05	c0.23		0.17	
v/c Ratio		0.49	0.14					0.16	0.69		0.48	
Uniform Delay, d1		15.5	13.5					23.6	28.9		24.6	
Progression Factor		1.08	1.53					1.00	1.00		0.04	
Incremental Delay, d2		0.8	0.7					0.1	3.5		0.2	
Delay (s)		17.6	21.3					23.6	32.4		1.2	
Level of Service		В	С					C	С		A	
Approach Delay (s)		18.6			0.0			29.6			1.2	
Approach LOS		В			A			С			A	
Intersection Summary												
HCM 2000 Control Delay			16.7	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capacity	ratio		0.57									
Actuated Cycle Length (s)			100.0	S	um of lost	t time (s)			14.9			
Intersection Capacity Utilization			59.2%			of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					<u></u>	1		<u></u>			∱ }	
Traffic Volume (vph)	0	0	0	0	478	39	0	187	0	0	570	132
Future Volume (vph)	0	0	0	0	478	39	0	187	0	0	570	132
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)					6.4	6.4		5.5			8.5	
Lane Util. Factor					0.95	1.00		0.95			0.95	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		1.00			1.00	
Satd. Flow (prot)					3725	1667		3725			3693	
Flt Permitted					1.00	1.00		1.00			1.00	
Satd. Flow (perm)					3725	1667		3725			3693	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	0	509	41	0	197	0	0	655	152
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	0	0	23	0
Lane Group Flow (vph)	0	0	0	0	509	21	0	197	0	0	784	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Turn Type					NA	Perm		NA			NA	
Protected Phases					6			4			8	
Permitted Phases						6						
Actuated Green, G (s)					51.9	51.9		36.2			33.2	
Effective Green, g (s)					51.9	51.9		36.2			33.2	
Actuated g/C Ratio					0.52	0.52		0.36			0.33	
Clearance Time (s)					6.4	6.4		5.5			8.5	
Vehicle Extension (s)					3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)					1933	865		1348			1226	
v/s Ratio Prot					c0.14			0.05			c0.21	
v/s Ratio Perm						0.01						
v/c Ratio					0.26	0.02		0.15			0.64	
Uniform Delay, d1					13.4	11.7		21.5			28.3	
Progression Factor					1.12	1.59		0.00			1.00	
Incremental Delay, d2					0.3	0.1		0.1			1.1	
Delay (s)					15.3	18.6		0.1			29.4	
Level of Service					В	В		А			С	
Approach Delay (s)		0.0			15.6			0.1			29.4	
Approach LOS		А			В			А			С	
Intersection Summary												
HCM 2000 Control Delay			20.8	H	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capacit	iy ratio		0.41									
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)			14.9			
Intersection Capacity Utilization	on		59.2%			of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

~ ۶ ۹. Movement EBL EBT WBT **WBR** SBL SBR Lane Configurations **↑**↑ ኘኘ Traffic Volume (vph) 0 1174 0 0 24 0 Future Volume (vph) 0 1174 0 0 24 0 2000 Ideal Flow (vphpl) 2000 2000 2000 2000 2000 Total Lost time (s) 5.5 5.4 Lane Util. Factor 0.95 0.97 Frt 1.00 1.00 Flt Protected 1.00 0.95 Satd. Flow (prot) 3762 3686 Flt Permitted 1.00 0.95 Satd. Flow (perm) 3762 3686 Peak-hour factor, PHF 0.95 0.95 0.92 0.92 0.86 0.86 Adj. Flow (vph) 0 1236 0 0 28 0 RTOR Reduction (vph) 0 0 0 0 26 0 Lane Group Flow (vph) 0 1236 0 0 2 0 Heavy Vehicles (%) 0% 1% 1% 2% 2% 0% Turn Type NA Prot Protected Phases 2 4 Permitted Phases Actuated Green, G (s) 82.1 7.0 Effective Green, q (s) 82.1 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.4 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 258 3088 v/s Ratio Prot c0.33 c0.00 v/s Ratio Perm 0.01 v/c Ratio 0.40 Uniform Delay, d1 2.4 43.3 **Progression Factor** 1.00 1.00 Incremental Delay, d2 0.4 0.0 Delay (s) 2.8 43.3 Level of Service А D Approach Delay (s) 2.8 0.0 43.3 Approach LOS А А D Intersection Summary HCM 2000 Control Delay 3.7 HCM 2000 Level of Service А HCM 2000 Volume to Capacity ratio 0.37 10.9 Actuated Cycle Length (s) 100.0 Sum of lost time (s) Intersection Capacity Utilization 54.1% ICU Level of Service А Analysis Period (min) 15

c Critical Lane Group

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Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	LUI	LDIX	WDL	1	ኘ	NDR		
Traffic Volume (vph)	0	0	0	429	88	0		
Future Volume (vph)	0	0	0	429	88	0		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000		
Total Lost time (s)				5.5	5.3			
Lane Util. Factor				0.95	0.97			
Frt				1.00	1.00			
Flt Protected				1.00	0.95			
Satd. Flow (prot)				3762	3510			
Flt Permitted				1.00	0.95			
Satd. Flow (perm)				3762	3510			
Peak-hour factor, PHF	0.92	0.92	0.88	0.88	0.88	0.88		
Adj. Flow (vph)	0	0	0	488	100	0		
RTOR Reduction (vph)	0	0	0	0	93	0		
Lane Group Flow (vph)	0	0	0	488	7	0		
Heavy Vehicles (%)	2%	2%	1%	1%	5%	5%		
Turn Type				NA	Prot			
Protected Phases				6	8			
Permitted Phases								
Actuated Green, G (s)				82.2	7.0			
Effective Green, g (s)				82.2	7.0			
Actuated g/C Ratio				0.82	0.07			
Clearance Time (s)				5.5	5.3			
Vehicle Extension (s)				3.0	3.0			
Lane Grp Cap (vph)				3092	245			
v/s Ratio Prot				c0.13	c0.00			
v/s Ratio Perm								
v/c Ratio				0.16	0.03			
Uniform Delay, d1				1.8	43.3			
Progression Factor				1.00	1.00			
Incremental Delay, d2				0.1	0.0			
Delay (s)				1.9	43.4			
Level of Service				А	D			
Approach Delay (s)	0.0			1.9	43.4			
Approach LOS	А			А	D			
Intersection Summary								
HCM 2000 Control Delay			9.0	Н	CM 2000	Level of Service	:	
HCM 2000 Volume to Capaci	ty ratio		0.15					
Actuated Cycle Length (s)			100.0		um of lost			
Intersection Capacity Utilizati	on		50.8%	IC	CU Level c	of Service		
Analysis Period (min)			15					
c Critical Lane Group								

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<u></u>	1						77		<u></u>	
Traffic Volume (vph)	0	1262	15	0	0	0	0	0	28	0	35	0
Future Volume (vph)	0	1262	15	0	0	0	0	0	28	0	35	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.1	6.1						5.1		5.1	
Lane Util. Factor		0.95	1.00						0.88		0.95	
Frt		1.00	0.85						0.85		1.00	
Flt Protected		1.00	1.00						1.00		1.00	
Satd. Flow (prot)		3762	1683						2877		3585	
Flt Permitted		1.00	1.00						1.00		1.00	
Satd. Flow (perm)		3762	1683						2877		3585	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.88	0.88	0.88	0.67	0.67	0.67
Adj. Flow (vph)	0	1328	16	0	0	0	0	0	32	0	52	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	29	0	0	0
Lane Group Flow (vph)	0	1328	12	0	0	0	0	0	3	0	52	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	4%	4%	4%	6%	6%	6%
Turn Type		NA	Perm						Perm		NA	
Protected Phases		2									4	
Permitted Phases			2						8			
Actuated Green, G (s)		61.5	61.5						7.3		7.3	
Effective Green, g (s)		61.5	61.5						7.3		7.3	
Actuated g/C Ratio		0.77	0.77						0.09		0.09	
Clearance Time (s)		6.1	6.1						5.1		5.1	
Vehicle Extension (s)		3.0	3.0						3.2		3.2	
Lane Grp Cap (vph)		2892	1293						262		327	
v/s Ratio Prot		c0.35									c0.01	
v/s Ratio Perm		<u> </u>	0.01						0.00		0.17	
v/c Ratio		0.46	0.01						0.01		0.16	
Uniform Delay, d1		3.3	2.2						33.1		33.5	
Progression Factor		1.00	1.00						1.00		0.96	
Incremental Delay, d2		0.5	0.0						0.0		0.2	
Delay (s)		3.8	2.2						33.1		32.3	
Level of Service		A	А		0.0			11 1	С		C	
Approach Delay (s)		3.8			0.0			33.1 C			32.3	
Approach LOS		А			A			C			С	
Intersection Summary												
HCM 2000 Control Delay			5.5	Н	CM 2000	Level of S	Service		А			
HCM 2000 Volume to Capacity	y ratio		0.43									
Actuated Cycle Length (s)			80.0		um of los				11.2			
Intersection Capacity Utilizatio	n		61.6%	IC	U Level	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations		LDR		<u></u>	<u> </u>	HBR.	
Traffic Volume (vph)	0	0	0	465	12	0	
Future Volume (vph)	0	0	0	465	12	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)				5.3	4.9		
Lane Util. Factor				0.95	1.00		
Frt				1.00	1.00		
Flt Protected				1.00	0.95		
Satd. Flow (prot)				3725	1900		
Flt Permitted				1.00	0.95		
Satd. Flow (perm)				3725	1900		
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.75	0.75	
Adj. Flow (vph)	0	0	0	495	16	0	
RTOR Reduction (vph)	0	0	0	0	15	0	
Lane Group Flow (vph)	0	0	0	495	1	0	
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%	
Turn Type				NA	Prot		
Protected Phases				6	8		
Permitted Phases							
Actuated Green, G (s)				64.3	5.5		
Effective Green, g (s)				64.3	5.5		
Actuated g/C Ratio				0.80	0.07		
Clearance Time (s)				5.3	4.9		
Vehicle Extension (s)				3.0	3.0		
Lane Grp Cap (vph)				2993	130		
v/s Ratio Prot				c0.13	c0.00		
v/s Ratio Perm							
v/c Ratio				0.17	0.01		
Uniform Delay, d1				1.8	34.7		
Progression Factor				1.00	1.00		
Incremental Delay, d2				0.1	0.0		
Delay (s)				1.9	34.7		
Level of Service				А	С		
Approach Delay (s)	0.0			1.9	34.7		
Approach LOS	A			A	С		
Intersection Summary							
HCM 2000 Control Delay			2.9	H	CM 2000	Level of Servic	(
HCM 2000 Volume to Capacit	ty ratio		0.15				
Actuated Cycle Length (s)			80.0		um of lost		
Intersection Capacity Utilization	on		33.8%	IC	U Level o	of Service	
Analysis Period (min)			15				
c Critical Lane Group							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- † †	1					<u></u>	1		<u></u>	
Traffic Volume (vph)	0	606	483	0	0	0	0	589	219	0	417	0
Future Volume (vph)	0	606	483	0	0	0	0	589	219	0	417	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.4	6.4					8.5	8.5		5.5	
Lane Util. Factor		0.95	1.00					0.95	1.00		0.95	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		3800	1700					3800	1700		3762	
Flt Permitted		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		3800	1700					3800	1700		3762	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	0	673	537	0	0	0	0	627	233	0	439	0
RTOR Reduction (vph)	0	0	71	0	0	0	0	0	172	0	0	0
Lane Group Flow (vph)	0	673	466	0	0	0	0	627	61	0	439	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Turn Type		NA	Perm					NA	Perm		NA	
Protected Phases		2						8			4	
Permitted Phases			2						8			
Actuated Green, G (s)		59.5	59.5					25.6	25.6		28.6	
Effective Green, g (s)		59.5	59.5					25.6	25.6		28.6	
Actuated g/C Ratio		0.60	0.60					0.26	0.26		0.29	
Clearance Time (s)		6.4	6.4					8.5	8.5		5.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0		3.0	
Lane Grp Cap (vph)		2261	1011					972	435		1075	
v/s Ratio Prot		0.18						c0.17			0.12	
v/s Ratio Perm			c0.27					0 (5	0.04		0.11	
v/c Ratio		0.30	0.46					0.65	0.14		0.41	
Uniform Delay, d1		10.0	11.3					33.2	28.7		28.9	
Progression Factor		1.36	1.62					1.00	1.00		0.04	
Incremental Delay, d2		0.3	1.4					1.5	0.1		0.2	_
Delay (s)		13.8	19.7 D					34.6	28.9		1.4	
Level of Service		B	В		0.0			C	С		A	_
Approach Delay (s)		16.4			0.0			33.1			1.4	
Approach LOS		В			A			С			A	
Intersection Summary												
HCM 2000 Control Delay			19.5	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	/ ratio		0.52									
Actuated Cycle Length (s)			100.0		um of lost				14.9			_
Intersection Capacity Utilizatio	n		59.8%	IC	CU Level (of Service			В			
Analysis Period (min)			15									_
c Critical Lane Group												

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					<u></u>	1		<u></u>			∱ }	
Traffic Volume (vph)	0	0	0	0	1287	217	0	589	0	0	417	88
Future Volume (vph)	0	0	0	0	1287	217	0	589	0	0	417	88
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)					6.4	6.4		5.5			8.5	
Lane Util. Factor					0.95	1.00		0.95			0.95	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		1.00			1.00	
Satd. Flow (prot)					3800	1700		3800			3664	
Flt Permitted					1.00	1.00		1.00			1.00	
Satd. Flow (perm)					3800	1700		3800			3664	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1369	231	0	627	0	0	439	93
RTOR Reduction (vph)	0	0	0	0	0	31	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	0	1369	200	0	627	0	0	513	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type					NA	Perm		NA			NA	
Protected Phases					6			4			8	
Permitted Phases						6						
Actuated Green, G (s)					59.5	59.5		28.6			25.6	
Effective Green, g (s)					59.5	59.5		28.6			25.6	
Actuated g/C Ratio					0.60	0.60		0.29			0.26	
Clearance Time (s)					6.4	6.4		5.5			8.5	
Vehicle Extension (s)					3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)					2261	1011		1086			937	
v/s Ratio Prot					c0.36			c0.17			0.14	
v/s Ratio Perm						0.12						
v/c Ratio					0.61	0.20		0.58			0.55	
Uniform Delay, d1					12.8	9.3		30.5			32.2	
Progression Factor					1.21	1.37		0.00			1.00	
Incremental Delay, d2					1.1	0.4		0.6			0.7	
Delay (s)					16.5	13.1		0.6			32.9	
Level of Service					В	В		А			С	
Approach Delay (s)		0.0			16.0			0.6			32.9	
Approach LOS		А			В			А			С	
Intersection Summary												
HCM 2000 Control Delay			15.8	H	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	ratio		0.62									
Actuated Cycle Length (s)			100.0		um of los				14.9			
Intersection Capacity Utilization	ſ		59.8%	IC	U Level	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		- ††			ካካ		
Traffic Volume (vph)	0	1061	0	0	28	0	
Future Volume (vph)	0	1061	0	0	28	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)		5.5			5.4		
Lane Util. Factor		0.95			0.97		
Frt		1.00			1.00		
Flt Protected		1.00			0.95		
Satd. Flow (prot)		3800			3686		
Flt Permitted		1.00			0.95		
Satd. Flow (perm)		3800			3686		
Peak-hour factor, PHF	0.84	0.84	0.92	0.92	0.70	0.70	
Adj. Flow (vph)	0	1263	0	0	40	0	
RTOR Reduction (vph)	0	0	0	0	37	0	
Lane Group Flow (vph)	0	1263	0	0	3	0	
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	
Turn Type		NA			Prot		
Protected Phases		2			4		
Permitted Phases		_					
Actuated Green, G (s)		82.1			7.0		
Effective Green, g (s)		82.1			7.0		
Actuated g/C Ratio		0.82			0.07		
Clearance Time (s)		5.5			5.4		
Vehicle Extension (s)		3.0			3.0		
Lane Grp Cap (vph)		3119			258		
v/s Ratio Prot		c0.33			c0.00		
v/s Ratio Perm		00.00			00.00		
v/c Ratio		0.40			0.01		
Uniform Delay, d1		2.4			43.3		
Progression Factor		1.00			1.00		
Incremental Delay, d2		0.4			0.0		
Delay (s)		2.8			43.3		
Level of Service		A			D		
Approach Delay (s)		2.8	0.0		43.3		
Approach LOS		2.0 A	A		D		
					-		
Intersection Summary							
HCM 2000 Control Delay			4.0	H	CM 2000	Level of Serv	vice
HCM 2000 Volume to Capacity	ratio		0.37				
Actuated Cycle Length (s)			100.0		um of lost		
Intersection Capacity Utilization			71.2%	IC	U Level c	of Service	
Analysis Period (min)			15				
c Critical Lane Group							

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Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations		LDIX		101	ኘኘ		
Traffic Volume (vph)	0	0	0	1434	70	0	
Future Volume (vph)	0	0	0	1434	70	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)				5.5	5.3		
Lane Util. Factor				0.95	0.97		
Frt				1.00	1.00		
Flt Protected				1.00	0.95		
Satd. Flow (prot)				3762	3686		
Flt Permitted				1.00	0.95		
Satd. Flow (perm)				3762	3686		
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.95	0.92	
Adj. Flow (vph)	0	0	0	1526	74	0	
RTOR Reduction (vph)	0	0	0	0	69	0	
Lane Group Flow (vph)	0	0	0	1526	5	0	
Heavy Vehicles (%)	2%	2%	1%	1%	0%	2%	
Turn Type				NA	Prot		
Protected Phases				6	8		
Permitted Phases							
Actuated Green, G (s)				82.2	7.0		
Effective Green, g (s)				82.2	7.0		
Actuated g/C Ratio				0.82	0.07		
Clearance Time (s)				5.5	5.3		
Vehicle Extension (s)				3.0	3.0		
Lane Grp Cap (vph)				3092	258		
v/s Ratio Prot				c0.41	c0.00		
v/s Ratio Perm							
v/c Ratio				0.49	0.02		
Uniform Delay, d1				2.7	43.3		
Progression Factor				0.42	1.00		
Incremental Delay, d2				0.5	0.0		
Delay (s)				1.6	43.3		
Level of Service	0.0			A	D		
Approach Delay (s)	0.0			1.6	43.3		
Approach LOS	A			А	D		
Intersection Summary							
HCM 2000 Control Delay			3.5	Н	CM 2000	Level of Service	
HCM 2000 Volume to Capac	ity ratio		0.46				
Actuated Cycle Length (s)			100.0		um of lost		
Intersection Capacity Utilizati	on		65.4%	IC	CU Level o	of Service	
Analysis Period (min)			15				
c Critical Lane Group							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		^	1						77		<u></u>	
Traffic Volume (vph)	0	708	17	0	0	0	0	0	258	0	136	0
Future Volume (vph)	0	708	17	0	0	0	0	0	258	0	136	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.1	6.1						5.1		5.1	
Lane Util. Factor		0.95	1.00						0.88		0.95	
Frt		1.00	0.85						0.85		1.00	
Flt Protected		1.00	1.00						1.00		1.00	
Satd. Flow (prot)		3800	1700						2962		3800	
Flt Permitted		1.00	1.00						1.00		1.00	
Satd. Flow (perm)		3800	1700						2962		3800	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87	0.89	0.89	0.89
Adj. Flow (vph)	0	745	18	0	0	0	0	0	297	0	153	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	268	0	0	0
Lane Group Flow (vph)	0	745	14	0	0	0	0	0	29	0	153	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Turn Type		NA	Perm						Perm		NA	
Protected Phases		2									4	
Permitted Phases			2						8			
Actuated Green, G (s)		79.2	79.2						9.6		9.6	
Effective Green, g (s)		79.2	79.2						9.6		9.6	
Actuated g/C Ratio		0.79	0.79						0.10		0.10	
Clearance Time (s)		6.1	6.1						5.1		5.1	
Vehicle Extension (s)		3.0	3.0						3.2		3.2	
Lane Grp Cap (vph)		3009	1346						284		364	
v/s Ratio Prot		c0.20									c0.04	
v/s Ratio Perm			0.01						0.01			
v/c Ratio		0.25	0.01						0.10		0.42	
Uniform Delay, d1		2.7	2.2						41.3		42.6	
Progression Factor		0.77	0.66						1.00		0.94	
Incremental Delay, d2		0.2	0.0						0.2		0.7	
Delay (s)		2.3	1.5						41.4		40.5	
Level of Service		А	А						D		D	
Approach Delay (s)		2.2			0.0			41.4			40.5	
Approach LOS		А			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			16.7	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	y ratio		0.27									
Actuated Cycle Length (s)			100.0		um of lost				11.2			
Intersection Capacity Utilizatio	n		80.7%	IC	U Level o	of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		231		<u></u>	<u> </u>	
Traffic Volume (vph)	0	0	0	1722	33	0
Future Volume (vph)	0	0	0	1722	33	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)				5.3	4.9	
Lane Util. Factor				0.95	1.00	
Frt				1.00	1.00	
Flt Protected				1.00	0.95	
Satd. Flow (prot)				3800	1743	
Flt Permitted				1.00	0.95	
Satd. Flow (perm)				3800	1743	
Peak-hour factor, PHF	0.92	0.92	0.91	0.91	0.92	0.92
Adj. Flow (vph)	0	0	0	1892	36	0
RTOR Reduction (vph)	0	0	0	0	34	0
Lane Group Flow (vph)	0	0	0	1892	2	0
Heavy Vehicles (%)	2%	2%	0%	0%	9%	9%
Turn Type				NA	Prot	
Protected Phases				6	8	
Permitted Phases						
Actuated Green, G (s)				83.8	6.0	
Effective Green, g (s)				83.8	6.0	
Actuated g/C Ratio				0.84	0.06	
Clearance Time (s)				5.3	4.9	
Vehicle Extension (s)				3.0	3.0	
Lane Grp Cap (vph)				3184	104	
v/s Ratio Prot				c0.50	c0.00	
v/s Ratio Perm						
v/c Ratio				0.59	0.02	
Uniform Delay, d1				2.6	44.2	
Progression Factor				1.00	1.23	
Incremental Delay, d2				0.8	0.1	
Delay (s)				3.4	54.6	
Level of Service				А	D	
Approach Delay (s)	0.0			3.4	54.6	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			4.4	H	CM 2000	Level of Servic
HCM 2000 Volume to Capacity	y ratio		0.56			
Actuated Cycle Length (s)			100.0		um of lost	
Intersection Capacity Utilizatio	n		66.8%	IC	U Level c	of Service
Analysis Period (min)			15			
c Critical Lane Group						

Intersection: 10: Novi Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	NB
	ED	ĒD	ĹD	ND	IND	IND
Directions Served	Т	Т	R	Т	Т	R
Maximum Queue (ft)	250	257	108	101	88	222
Average Queue (ft)	125	124	46	48	32	105
95th Queue (ft)	220	220	83	88	72	191
Link Distance (ft)	608	608	608	2381	2381	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						650
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: Novi Road & WB 12-Mile Road

N 4				CD	00
Movement	WB	WB	WB	SB	SB
Directions Served	Т	Т	R	Т	TR
Maximum Queue (ft)	190	204	35	239	236
Average Queue (ft)	83	85	12	135	139
95th Queue (ft)	153	157	35	210	220
Link Distance (ft)	617	617	617	2347	2347
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20: EB 12-Mile Road & WB-to-EB X/O W. of Novi Rd

Movement	EB	EB	SB	SB
	T	<u></u> т		
Directions Served	I		L	L
Maximum Queue (ft)	105	116	29	51
Average Queue (ft)	57	56	3	17
95th Queue (ft)	91	96	17	45
Link Distance (ft)	1724	1724	23	23
Upstream Blk Time (%)			1	13
Queuing Penalty (veh)			0	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 21: WB-to-EB X/O W. of Novi Rd & WB 12-Mile Road

Movement		
Directions Served		
Maximum Queue (ft)		
Average Queue (ft)		
95th Queue (ft)		
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%) Queuing Penalty (veh)		
Oueuing Penalty (veh)		

Intersection: 30: EB-to-WB X/O E. of Novi Rd & WB 12-Mile Road

Movement	WB	WB	NB	NB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	87	82	47	76
Average Queue (ft)	32	28	12	35
95th Queue (ft)	65	64	39	68
Link Distance (ft)	833	833	23	23
Upstream Blk Time (%)			6	26
Queuing Penalty (veh)			3	11
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 31: EB 12-Mile Road & EB-to-WB X/O E. of Novi Rd

Movement	EB
Directions Served	L
Maximum Queue (ft)	10
Average Queue (ft)	0
95th Queue (ft)	7
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: 12 Oaks Mall Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	Т	Т	R	R	R	Т	Т
Maximum Queue (ft)	153	131	29	51	11	49	67
Average Queue (ft)	48	62	2	14	1	3	24
95th Queue (ft)	105	109	12	39	7	20	55
Link Distance (ft)	965	965		598	598	21	21
Upstream Blk Time (%)						1	21
Queuing Penalty (veh)						0	4
Storage Bay Dist (ft)			250				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 41: WB 12-Mile Road

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 50: EB-to-WB X/O E. of 12 Oaks & WB 12-Mile Road

Movement	WB	WB	NB
Directions Served	Т	Т	L
Maximum Queue (ft)	84	69	39
Average Queue (ft)	33	14	10
95th Queue (ft)	67	45	33
Link Distance (ft)	1852	1852	36
Upstream Blk Time (%)			4
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 51: EB 12-Mile Road & EB-to-WB X/O E. of 12 Oaks

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)
Zone Summary

Zone wide Queuing Penalty: 20

Intersection: 10: Novi Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	NB
Directions Served	I		R	I		R
Maximum Queue (ft)	180	183	180	199	204	122
Average Queue (ft)	84	83	78	129	122	43
95th Queue (ft)	153	157	140	192	198	90
Link Distance (ft)	608	608	608	2381	2381	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						650
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: Novi Road & WB 12-Mile Road

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	Т	Т	R	Т	Т	Т	TR
Maximum Queue (ft)	416	405	120	4	9	168	182
Average Queue (ft)	197	207	44	0	1	101	98
95th Queue (ft)	331	337	87	4	6	158	168
Link Distance (ft)	617	617	617	44	44	2347	2347
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 20: EB 12-Mile Road & WB-to-EB X/O W. of Novi Rd

Movement	EB	EB	SB	SB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	96	129	30	56
Average Queue (ft)	47	62	2	14
95th Queue (ft)	83	115	14	45
Link Distance (ft)	1724	1724	23	23
Upstream Blk Time (%)			1	9
Queuing Penalty (veh)			0	1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 21: WB-to-EB X/O W. of Novi Rd & WB 12-Mile Road

lovement	
irections Served	
laximum Queue (ft)	
verage Queue (ft)	
5th Queue (ft)	
ink Distance (ft)	
pstream Blk Time (%)	
lueuing Penalty (veh)	
torage Bay Dist (ft)	
torage Blk Time (%)	
lueuing Penalty (veh)	

Intersection: 30: EB-to-WB X/O E. of Novi Rd & WB 12-Mile Road

Movement	WB	WB	NB	NB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	121	138	50	76
Average Queue (ft)	48	54	13	33
95th Queue (ft)	102	116	40	65
Link Distance (ft)	833	833	23	23
Upstream Blk Time (%)			8	30
Queuing Penalty (veh)			3	11
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 31: EB 12-Mile Road & EB-to-WB X/O E. of Novi Rd

Movement	EB	EB
Directions Served	L	L
Maximum Queue (ft)	12	13
Average Queue (ft)	0	1
95th Queue (ft)	6	7
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	300
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 40: 12 Oaks Mall Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	 T	T	R	R	R	T	T
Maximum Queue (ft)	101	121	26	114	54	56	75
Average Queue (ft)	28	50	3	50	14	22	52
95th Queue (ft)	74	96	18	92	41	55	78
Link Distance (ft)	965	965		598	598	21	21
Upstream Blk Time (%)						13	42
Queuing Penalty (veh)						9	29
Storage Bay Dist (ft)			250				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 41: WB 12-Mile Road

Movement	WB	WB
Directions Served	L	L
Maximum Queue (ft)	39	41
Average Queue (ft)	2	3
95th Queue (ft)	18	20
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	450	450
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 50: EB-to-WB X/O E. of 12 Oaks & WB 12-Mile Road

Movement	WB	WB	NB
Directions Served	Т	Т	L
Maximum Queue (ft)	121	112	78
Average Queue (ft)	63	52	30
95th Queue (ft)	111	97	67
Link Distance (ft)	1852	1852	36
Upstream Blk Time (%)			24
Queuing Penalty (veh)			8
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 51: EB 12-Mile Road & EB-to-WB X/O E. of 12 Oaks

Movement	EB
Directions Served	L
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	132
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	
Zone Summary	

Zone wide Queuing Penalty: 60

Appendix C

BACKGROUND TRAFFIC CONDITIONS



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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<u></u>	1					<u></u>	1		^	
Traffic Volume (vph)	0	918	304	0	0	0	0	191	401	0	581	0
Future Volume (vph)	0	918	304	0	0	0	0	191	401	0	581	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.4	6.4					8.5	8.5		5.5	
Lane Util. Factor		0.95	1.00					0.95	1.00		0.95	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		3800	1700					3725	1667		3800	
Flt Permitted		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		3800	1700					3725	1667		3800	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	0	987	327	0	0	0	0	201	422	0	668	0
RTOR Reduction (vph)	0	0	77	0	0	0	0	0	32	0	0	0
Lane Group Flow (vph)	0	987	250	0	0	0	0	201	390	0	668	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Turn Type		NA	Perm					NA	Perm		NA	
Protected Phases		2						8			4	
Permitted Phases			2						8			
Actuated Green, G (s)		51.4	51.4					33.7	33.7		36.7	
Effective Green, g (s)		51.4	51.4					33.7	33.7		36.7	
Actuated g/C Ratio		0.51	0.51					0.34	0.34		0.37	
Clearance Time (s)		6.4	6.4					8.5	8.5		5.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0		3.0	
Lane Grp Cap (vph)		1953	873					1255	561		1394	
v/s Ratio Prot		c0.26	0.45					0.05			0.18	
v/s Ratio Perm		0.54	0.15					0.1/	c0.23		0.40	
v/c Ratio		0.51	0.29					0.16	0.69		0.48	
Uniform Delay, d1		16.0	13.9					23.2	28.7		24.3	
Progression Factor		1.10	1.50					1.00	1.00		0.04	
Incremental Delay, d2		0.9 18.4	0.8 21.5					0.1 23.3	3.7 32.4		0.2 1.1	
Delay (s) Level of Service		18.4 B	21.5 C					23.3 C	32.4 C			
Approach Delay (s)			C		0.0				C		A 1.1	
Approach LOS		19.2 B			0.0 A			29.5 C			A	
		D			~			C			~	_
Intersection Summary HCM 2000 Control Delay			17.0		CM 2000	Level of S	Sonvico		В			
HCM 2000 Volume to Capacity	ratio		0.58	п		LEVELOL	SEIVICE		D			
Actuated Cycle Length (s)	1010		100.0	C	um of lost	t time (c)			14.9			
Intersection Capacity Utilization	1		60.1%			of Service			14.9 B			
Analysis Period (min)	I		15						D			
c Critical Lane Group			10									

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					- 11	1		^			≜ ⊅	
Traffic Volume (vph)	0	0	0	0	488	40	0	191	0	0	581	135
Future Volume (vph)	0	0	0	0	488	40	0	191	0	0	581	135
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)					6.4	6.4		5.5			8.5	
Lane Util. Factor					0.95	1.00		0.95			0.95	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		1.00			1.00	
Satd. Flow (prot)					3725	1667		3725			3693	
Flt Permitted					1.00	1.00		1.00			1.00	
Satd. Flow (perm)					3725	1667		3725			3693	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	0	519	43	0	201	0	0	668	155
RTOR Reduction (vph)	0	0	0	0	0	21	0	0	0	0	23	0
Lane Group Flow (vph)	0	0	0	0	519	22	0	201	0	0	800	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Turn Type					NA	Perm		NA			NA	
Protected Phases					6			4			8	
Permitted Phases						6						
Actuated Green, G (s)					51.4	51.4		36.7			33.7	
Effective Green, g (s)					51.4	51.4		36.7			33.7	
Actuated g/C Ratio					0.51	0.51		0.37			0.34	
Clearance Time (s)					6.4	6.4		5.5			8.5	
Vehicle Extension (s)					3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)					1914	856		1367			1244	
v/s Ratio Prot					c0.14			0.05			c0.22	
v/s Ratio Perm						0.01						
v/c Ratio					0.27	0.03		0.15			0.64	
Uniform Delay, d1					13.7	12.0		21.2			28.1	
Progression Factor					1.09	1.24		0.00			1.00	
Incremental Delay, d2					0.3	0.1		0.0			1.1	
Delay (s)					15.3	14.8		0.1			29.2	
Level of Service					В	В		А			С	
Approach Delay (s)		0.0			15.2			0.1			29.2	
Approach LOS		А			В			А			С	
Intersection Summary												
HCM 2000 Control Delay			20.6	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capac	city ratio		0.42									
Actuated Cycle Length (s)			100.0		um of los				14.9			
Intersection Capacity Utilization	tion		60.1%	IC	CU Level	of Service	;		В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		††			ኘኘ			
Traffic Volume (vph)	0	1198	0	0	24	0		
Future Volume (vph)	0	1198	0	0	24	0		
, , , ,	2000	2000	2000	2000	2000	2000		
Total Lost time (s)		5.5			5.4			
ane Util. Factor		0.95			0.97			
Frt		1.00			1.00			
Flt Protected		1.00			0.95			
Satd. Flow (prot)		3762			3686			
Flt Permitted		1.00			0.95			
Satd. Flow (perm)		3762			3686			
	0.95	0.95	0.92	0.92	0.86	0.86		
Adj. Flow (vph)	0.75	1261	0.72	0.72	28	0		
RTOR Reduction (vph)	0	0	0	0	26	0		
Lane Group Flow (vph)	0	1261	0	0	20	0		
Heavy Vehicles (%)	1%	1%	2%	2%	0%	0%		
Turn Type	170	NA	270	270	Prot	0.00		
Protected Phases		2			4			
Permitted Phases		2			7			
Actuated Green, G (s)		82.1			7.0			
Effective Green, g (s)		82.1			7.0			
Actuated g/C Ratio		0.82			0.07			
Clearance Time (s)		5.5			5.4			
Vehicle Extension (s)		3.0			3.0			
Lane Grp Cap (vph)		3088			258			
v/s Ratio Prot		c0.34			c0.00			
v/s Ratio Perm		00.01			00.00			
v/c Ratio		0.41			0.01			
Uniform Delay, d1		2.4			43.3			
Progression Factor		1.00			1.00			
Incremental Delay, d2		0.4			0.0			
Delay (s)		2.8			43.3			
Level of Service		2.0 A			D			
Approach Delay (s)		2.8	0.0		43.3			
Approach LOS		A	A		D			
Intersection Summary								
HCM 2000 Control Delay			3.7	H	CM 2000	Level of Service	А	
HCM 2000 Volume to Capacity r	atio		0.38					
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)	10.9	
Intersection Capacity Utilization			55.1%	IC	CU Level o	of Service	В	
Analysis Period (min)			15					
c Critical Lane Group								

Intersection SummaryHCM 2000 Control Delay9.0HCM 2000 Level of ServiceHCM 2000 Volume to Capacity ratio0.15Actuated Cycle Length (s)100.0Sum of lost time (s)Intersection Capacity Utilization51.7%ICU Level of ServiceAnalysis Period (min)15		-	\mathbf{r}	1	-	•	1	
Lane Configurations Image: Configurations Image: Configurations Traffic Volume (vph) 0 0 438 90 0 Future Volume (vph) 0 0 0 438 90 0 Future Volume (vph) 2000 2000 2000 2000 2000 2000 Total Lost time (s) 5.5 5.3 5.3 Lane Util. Factor 0.95 0.97 Frt 1.00 1.00 1.00 1.00 1.00 Stat. Flow (port) 3762 3510 Fit Permitted 1.00 0.95 Satd. Flow (perm) 3762 3510 Stat. Flow (port) 0 0 0 95 O Lane Group Flow (vph) 0 0 0 95 O Lane Group Flow (vph) 0 0 0 95 O Lane Group Flow (vph) 0 0 0 95 S Turn Type NA Prot Protected Phases 6 8 8 0.07 Clearance Time (s) 5.5 5.3 Vehicles (%) 2% 1% 1% 5% 5 5.3	Movement	FBT	FBR	WBI	WBT	NBI	NBR	
Traffic Volume (vph) 0 0 438 90 0 Future Volume (vph) 0 0 438 90 0 Ideal Flow (vphp) 2000 2000 2000 2000 2000 2000 Ideal Flow (vphp) 2000 2000 2000 2000 2000 2000 Total Lost time (s) 5.5 5.3			2011					
Future Volume (vph) 0 0 438 90 0 Ideal Flow (vphp) 2000 2000 2000 2000 2000 2000 Total Lost time (s) 5.5 5.3 Lane Util. Factor 0.95 0.97 Frt 1.00 0.95 Satol. Flow (port) 3762 3510 Ptermitted 1.00 0.95 Satol. Flow (perm) 3762 3510 Peak-hour factor, PHF 0.92 0.88 0.88 0.88 0.88 Adj. Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 1% 5% 5% Turn Type NA Prot Protected Phases 6 8 Permitted Phases 6 8 2 7.0 Effective Green, G (s) 82.2 7.0 Effective Green, G (s) 3.0 Lane Gro Cap (vph) 3002 Lane Gro Cap (vph) 3092 245		0	0	0			0	
Ideal Flow (vphp) 2000 2000 2000 2000 2000 Total Lost time (s) 5.5 5.3 Lane Util. Factor 0.95 0.97 Frt 1.00 1.00 Flt Protected 1.00 0.95 Satd. Flow (port) 3762 3510 Flt Permitted 1.00 0.95 Satd. Flow (perm) 3762 3510 Peak-hour factor, PHF 0.92 0.88 0.88 0.88 Adj. Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 5% Turn Type NA Prot Proteted Phases 6 8 Permitted Phases 6 8 22 7.0 26 265 5.3 27 0 Effective Green, G (s) 82								
Total Lost time (s) 5.5 5.3 Lane Util. Factor 0.95 0.97 Frt 1.00 1.00 Flt Protected 1.00 0.95 Satd. Flow (prot) 3762 3510 Flt Permitted 1.00 0.95 Satd. Flow (perm) 3762 3510 Peak-hour factor, PHF 0.92 0.88 0.88 0.88 Adj. Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 5 Protected Phases 6 8 Permitted 1.00 1 Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 3.0	· · · ·							
Lane Util. Factor 0.95 0.97 Frt 1.00 1.00 Ft Protected 1.00 0.95 Satd. Flow (port) 3762 3510 Fit Permitted 1.00 0.95 Satd. Flow (perm) 3762 3510 Peak-hour factor, PHF 0.92 0.88 0.88 0.88 Adj. Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 1% 5% 5% Turn Type NA Prot Prot Prot Prot Prot Prot Prot Effective Green, g (s) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0		2000	2000	2000			2000	
Frt 1.00 1.00 Flt Protected 1.00 0.95 Satd. Flow (prot) 3762 3510 Flt Permitted 1.00 0.95 Satd. Flow (perm) 3762 3510 Peak-hour factor, PHF 0.92 0.98 0.88 0.88 0.88 Adj. Flow (vph) 0 0 0 498 102 0 RTOR Reduction (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 95 5% Turn Type NA Prot Prot Prot Protected Phases 6 8 Permitted 1.00 1.00 Lane Group Groen, g (s) 82.2 7.0 2.0 2.0 1.0 1.0 Lane Gro Cap (vph) 30.92 2.45 .03.0 3.0								
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Fit Permitted 1.00 0.95 Satd. Flow (perm) 3762 3510 Peak-hour factor, PHF 0.92 0.88 0.88 0.88 0.88 Adj. Flow (yph) 0 0 0 498 102 0 RTOR Reduction (vph) 0 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 5% 5% Turn Type NA Prot Protected Phases 6 8 Permitted Phases 6 8 Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Perm v/c Ratio 0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 Incremental Delay, d2 0.1 0.0 0.0 Level of Service A <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
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Peak-hour factor, PHF 0.92 0.82 0.88 0.88 0.88 0.88 Adj. Flow (vph) 0 0 0 498 102 0 RTOR Reduction (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 1% 5% 5% Turn Type NA Prot Prot Protected Phases 6 8 Permitted Phases 6 8 22 7.0 26 27.0 <								
Adj. Flow (vph) 0 0 0 498 102 0 RTOR Reduction (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 1% 5% 5% Turn Type NA Prot Protected Phases 6 8 Permitted Phases 6 8 Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Perm	· · · · · · · · · · · · · · · · · · ·	0.92	0.92	0.88			0.88	
RTOR Reduction (vph) 0 0 0 95 0 Lane Group Flow (vph) 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 1% 5% 5% Turn Type NA Prot Protected Phases 6 8 Permitted Phases 6 8 Permitted Phases 7.0 Actuated Green, G (s) 82.2 7.0 Actuated Green, G (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Perm v/c Ratio 0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 Incremental Delay, d2 0.1 0.0 Delay (s) 1.9 43.4 Level of Service A D Approach LOS A A D Approach LOS A A <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>								
Lane Group Flow (vph) 0 0 498 7 0 Heavy Vehicles (%) 2% 2% 1% 1% 5% 5% Turn Type NA Prot Protected Phases 6 8 Permitted Phases 6 8 Permitted Phases 6 8 Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 3.0 3.0 3.0 Lane Grp Cap (vph) 3092 245 V/S Ratio Prot c0.13 c0.00 V/s Ratio Prot c0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 1.00 Incremental Delay, d2 0.1 0.0 Incremental Delay, d2 0.1 0.0 1.9 43.4 Approach LOS A A Approach LOS A A D								
Heavy Vehicles (%) 2% 2% 1% 5% 5% Turn Type NA Prot Protected Phases 6 8 Permitted Phases 6 8 Permitted Phases 7.0 Actuated Green, G (s) 82.2 7.0 7.0 Actuated g/C Ratio 0.82 0.07 0.07 Clearance Time (s) 5.5 5.3 5.3 Vehicle Extension (s) 3.0 3.0 3.0 Lane Grp Cap (vph) 3092 245 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Perm v/c Ratio 0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 Incremental Delay, d2 0.1 0.0 D 1.4 4.3.4 Level of Service A D A D Approach LOS A A D Intersection Summary PCM 2000 Control Delay 9.0 HCM 2000 Level of Service HCM 2000 Volume to Capacity ratio 0.15								
Turn Type NA Prot Protected Phases 6 8 Permitted Phases 3 82.2 7.0 Actuated Green, G (s) 82.2 7.0 7.0 Actuated Green, g (s) 82.2 7.0 7.0 Actuated g/C Ratio 0.82 0.07 7.0 Clearance Time (s) 5.5 5.3 7.0 Vehicle Extension (s) 3.0 3.0 3.0 Lane Grp Cap (vph) 3092 245 7.0 v/s Ratio Prot c0.13 c0.00 7.0 V/s Ratio Perm 9.0 1.00 1.00 Inform Delay, d1 1.8 43.3 7 Progression Factor 1.00 1.00 1.00 Incremental Delay, d2 0.1 0.0 1.00 Incremental Delay, d2 0.1 0.0 1.9 43.4 Level of Service A D A D 1.1 Approach LOS A A D 1.1 1.1								
Protected Phases 6 8 Permitted Phases Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Prot c0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 Incremental Delay, d2 0.1 0.0 Delay (s) 1.9 43.4 Level of Service A D Approach LOS A A Maproach LOS A A MCM 2000 Control Delay 9.0 HCM 2000 Level of Service HCM 2000 Volume to Capacity ratio 0.15 Actuated Cycle Length (s) Intersection Capacity Utilization 51.7% ICU Level of Service HCM 2000 Volume to Capacity ratio 0.15		270	270	170			0.00	
Permitted Phases Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Perm								
Actuated Green, G (s) 82.2 7.0 Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Perm v/c Ratio 0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 Incremental Delay, d2 0.1 0.0 Delay (s) 1.9 43.4 Level of Service A D Approach LOS A A D Intersection Summary 9.0 HCM 2000 Level of Service HCM 2000 Volume to Capacity ratio 0.15 - Actuated Cycle Length (s) 100.0 Sum of lost time (s) Intersection Capacity Utilization 51.7% ICU Level of Service					U	0		
Effective Green, g (s) 82.2 7.0 Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Perm v/c Ratio 0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 Incremental Delay, d2 0.1 0.0 Delay (s) 1.9 43.4 Level of Service A D Approach Delay (s) 0.0 1.9 43.4 Approach LOS A A D Intersection Summary HCM 2000 Control Delay 9.0 HCM 2000 Level of Service HCM 2000 Volume to Capacity ratio 0.15 Actuated Cycle Length (s) 100.0 Sum of lost time (s) Intersection Capacity Utilization 51.7% ICU Level of Service Analysis Period (min) 15					82.2	7.0		
Actuated g/C Ratio 0.82 0.07 Clearance Time (s) 5.5 5.3 Vehicle Extension (s) 3.0 3.0 Lane Grp Cap (vph) 3092 245 v/s Ratio Prot c0.13 c0.00 v/s Ratio Perm v/s Ratio Perm v/s Ratio Perm v/c Ratio 0.16 0.03 Uniform Delay, d1 1.8 43.3 Progression Factor 1.00 1.00 Incremental Delay, d2 0.1 0.0 Delay (s) 1.9 43.4 Level of Service A D Approach LOS A A HCM 2000 Control Delay 9.0 HCM 2000 Level of Service HCM 2000 Volume to Capacity ratio 0.15 Actuated Cycle Length (s) Intersection Capacity Utilization 51.7% ICU Level of Service Analysis Period (min) 15 15								
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Actuated Cycle Length (s)100.0Sum of lost time (s)Intersection Capacity Utilization51.7%ICU Level of ServiceAnalysis Period (min)15		ity ratio						
Intersection Capacity Utilization51.7%ICU Level of ServiceAnalysis Period (min)15	Actuated Cycle Length (s)	,			Si	um of lost	time (s)	
Analysis Period (min) 15		on						
	Analysis Period (min)							
	c Critical Lane Group							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		† †	1						77		<u></u>	
Traffic Volume (vph)	0	1287	15	0	0	0	0	0	29	0	36	0
Future Volume (vph)	0	1287	15	0	0	0	0	0	29	0	36	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.1	6.1						5.1		5.1	
Lane Util. Factor		0.95	1.00						0.88		0.95	
Frt		1.00	0.85						0.85		1.00	
Flt Protected		1.00	1.00						1.00		1.00	
Satd. Flow (prot)		3762	1683						2877		3585	
Flt Permitted		1.00	1.00						1.00		1.00	
Satd. Flow (perm)		3762	1683						2877		3585	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.88	0.88	0.88	0.67	0.67	0.67
Adj. Flow (vph)	0	1355	16	0	0	0	0	0	33	0	54	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	30	0	0	0
Lane Group Flow (vph)	0	1355	12	0	0	0	0	0	3	0	54	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	4%	4%	4%	6%	6%	6%
Turn Type		NA	Perm						Perm		NA	
Protected Phases		2									4	
Permitted Phases			2						8			
Actuated Green, G (s)		61.5	61.5						7.3		7.3	
Effective Green, g (s)		61.5	61.5						7.3		7.3	
Actuated g/C Ratio		0.77	0.77						0.09		0.09	
Clearance Time (s)		6.1	6.1						5.1		5.1	
Vehicle Extension (s)		3.0	3.0						3.2		3.2	
Lane Grp Cap (vph)		2892	1293						262		327	
v/s Ratio Prot		c0.36									c0.02	
v/s Ratio Perm			0.01						0.00			
v/c Ratio		0.47	0.01						0.01		0.17	
Uniform Delay, d1		3.3	2.2						33.1		33.5	
Progression Factor		1.00	1.00						1.00		0.96	
Incremental Delay, d2		0.5	0.0						0.0		0.3	
Delay (s)		3.9	2.2						33.1		32.3	
Level of Service		А	А						С		С	
Approach Delay (s)		3.9			0.0			33.1			32.3	
Approach LOS		А			А			С			С	
Intersection Summary												
HCM 2000 Control Delay			5.6	Н	CM 2000	Level of S	Service		А			
HCM 2000 Volume to Capacity	ratio		0.44									
Actuated Cycle Length (s)			80.0		um of lost				11.2			
Intersection Capacity Utilization	۱		62.5%	IC	CU Level of	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations		LDIX	WDL	† †	<u> </u>	NDR			
Traffic Volume (vph)	0	0	0	475	12	0			
Future Volume (vph)	0	0	0	475	12	0			
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000			
Total Lost time (s)	2000	2000	2000	5.3	4.9	2000			
Lane Util. Factor				0.95	1.00				
Frt				1.00	1.00				
Flt Protected				1.00	0.95				
Satd. Flow (prot)				3725	1900				
Flt Permitted				1.00	0.95				
Satd. Flow (perm)				3725	1900				
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.75	0.75			
Adj. Flow (vph)	0.92	0.92	0.94	0.94 505	16	0.75			
RTOR Reduction (vph)	0	0	0	0	15	0			
Lane Group Flow (vph)	0	0	0	505	10	0			
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%			
	Z 70	270	270	Z%	Prot	070			
Furn Type Protected Phases									
Protected Phases				6	8				
				64.2	FF				
Actuated Green, G (s)				64.3 64.3	5.5 5.5				
Effective Green, g (s)									
Actuated g/C Ratio				0.80	0.07				
Clearance Time (s)				5.3	4.9				
Vehicle Extension (s)				3.0	3.0				
Lane Grp Cap (vph)				2993	130				
v/s Ratio Prot				c0.14	c0.00				
v/s Ratio Perm				0.47	0.01				
//c Ratio				0.17	0.01				
Uniform Delay, d1				1.8	34.7				
Progression Factor				1.00	1.00				
ncremental Delay, d2				0.1	0.0				
Delay (s)				1.9	34.7				
evel of Service	~ ~			A	С				
Approach Delay (s)	0.0			1.9	34.7				
Approach LOS	А			A	С				
Intersection Summary									
HCM 2000 Control Delay			2.9	H	CM 2000	Level of Service)	А	
HCM 2000 Volume to Capaci	ity ratio		0.16						
Actuated Cycle Length (s)			80.0		um of lost			10.2	
Intersection Capacity Utilization	on		34.1%	IC	U Level a	of Service		А	
Analysis Period (min)			15						
c Critical Lane Group									

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- ††	1					- † †	1		<u></u>	
Traffic Volume (vph)	0	618	493	0	0	0	0	601	223	0	425	0
Future Volume (vph)	0	618	493	0	0	0	0	601	223	0	425	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.4	6.4					8.5	8.5		5.5	
Lane Util. Factor		0.95	1.00					0.95	1.00		0.95	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		3800	1700					3800	1700		3762	
Flt Permitted		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		3800	1700					3800	1700		3762	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	0	687	548	0	0	0	0	639	237	0	447	0
RTOR Reduction (vph)	0	0	69	0	0	0	0	0	165	0	0	0
Lane Group Flow (vph)	0	687	479	0	0	0	0	639	72	0	447	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Turn Type		NA	Perm					NA	Perm		NA	
Protected Phases		2						8			4	
Permitted Phases			2						8			
Actuated Green, G (s)		58.9	58.9					26.2	26.2		29.2	
Effective Green, g (s)		58.9	58.9					26.2	26.2		29.2	
Actuated g/C Ratio		0.59	0.59					0.26	0.26		0.29	
Clearance Time (s)		6.4	6.4					8.5	8.5		5.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0		3.0	
Lane Grp Cap (vph)		2238	1001					995	445		1098	
v/s Ratio Prot		0.18	0.00					c0.17			0.12	
v/s Ratio Perm		0.01	c0.28					o (1	0.04		0.11	
v/c Ratio		0.31	0.48					0.64	0.16		0.41	
Uniform Delay, d1		10.3	11.8					32.7	28.4		28.4	
Progression Factor		1.42	1.69					1.00	1.00		0.04	
Incremental Delay, d2		0.3	1.5					1.4	0.2		0.2	_
Delay (s)		15.0	21.4					34.2	28.6		1.4	
Level of Service		B	С		0.0			C	С		A	_
Approach Delay (s)		17.8			0.0			32.7			1.4	
Approach LOS		В			A			С			А	
Intersection Summary												
HCM 2000 Control Delay			20.0	Н	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capacity	<i>i</i> ratio		0.53	_								
Actuated Cycle Length (s)			100.0		um of lost				14.9			
Intersection Capacity Utilization	1		60.8%	IC	U Level a	of Service	!		В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					<u></u>	1		<u></u>			At≽	
Traffic Volume (vph)	0	0	0	0	1313	221	0	601	0	0	425	90
Future Volume (vph)	0	0	0	0	1313	221	0	601	0	0	425	90
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)					6.4	6.4		5.5			8.5	
Lane Util. Factor					0.95	1.00		0.95			0.95	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		1.00			1.00	
Satd. Flow (prot)					3800	1700		3800			3663	
Flt Permitted					1.00	1.00		1.00			1.00	
Satd. Flow (perm)					3800	1700		3800			3663	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1397	235	0	639	0	0	447	95
RTOR Reduction (vph)	0	0	0	0	0	30	0	0	0	0	18	0
Lane Group Flow (vph)	0	0	0	0	1397	205	0	639	0	0	524	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type					NA	Perm		NA			NA	
Protected Phases					6			4			8	
Permitted Phases						6						
Actuated Green, G (s)					58.9	58.9		29.2			26.2	
Effective Green, g (s)					58.9	58.9		29.2			26.2	
Actuated g/C Ratio					0.59	0.59		0.29			0.26	
Clearance Time (s)					6.4	6.4		5.5			8.5	
Vehicle Extension (s)					3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)					2238	1001		1109			959	
v/s Ratio Prot					c0.37			c0.17			0.14	
v/s Ratio Perm						0.12						
v/c Ratio					0.62	0.20		0.58			0.55	
Uniform Delay, d1					13.4	9.6		30.1			31.8	
Progression Factor					1.21	1.33		0.00			1.00	
Incremental Delay, d2					1.2	0.4		0.6			0.6	
Delay (s)					17.4	13.2		0.6			32.4	
Level of Service					В	В		А			С	
Approach Delay (s)		0.0			16.8			0.6			32.4	
Approach LOS		А			В			А			С	
Intersection Summary												
HCM 2000 Control Delay			16.1	H	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capa	city ratio		0.63									
Actuated Cycle Length (s)			100.0		um of lost				14.9			
Intersection Capacity Utiliza	tion		60.8%	IC	CU Level of	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		<u>††</u>			ኘኘ			
Traffic Volume (vph)	0	1082	0	0	29	0		
Future Volume (vph)	0	1082	0	0	29	0		
· · · ·	2000	2000	2000	2000	2000	2000		
Total Lost time (s)		5.5			5.4			
Lane Util. Factor		0.95			0.97			
Frt		1.00			1.00			
Flt Protected		1.00			0.95			
Satd. Flow (prot)		3800			3686			
Flt Permitted		1.00			0.95			
Satd. Flow (perm)		3800			3686			
	0.84	0.84	0.92	0.92	0.70	0.70		
Adj. Flow (vph)	0.01	1288	0.72	0	41	0		
RTOR Reduction (vph)	0	0	0	0	38	0		
Lane Group Flow (vph)	0	1288	0	0	3	0		
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%		
Turn Type		NA			Prot			
Protected Phases		2			4			
Permitted Phases		-			•			
Actuated Green, G (s)		82.1			7.0			
Effective Green, g (s)		82.1			7.0			
Actuated g/C Ratio		0.82			0.07			
Clearance Time (s)		5.5			5.4			
Vehicle Extension (s)		3.0			3.0			
Lane Grp Cap (vph)		3119			258			
v/s Ratio Prot		c0.34			c0.00			
v/s Ratio Perm		0.04			0.00			
v/c Ratio		0.41			0.01			
Uniform Delay, d1		2.4			43.3			
Progression Factor		1.00			1.00			
Incremental Delay, d2		0.4			0.0			
Delay (s)		2.8			43.3			
Level of Service		2.0 A			43.3 D			
Approach Delay (s)		2.8	0.0		43.3			
Approach LOS		2.0 A	A		43.3 D			
Intersection Summary								
HCM 2000 Control Delay			4.1	Н	CM 2000	Level of Service	A	
HCM 2000 Volume to Capacity r	atio		0.38					
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)	10.9	
Intersection Capacity Utilization			72.4%			of Service	С	
Analysis Period (min)			15					
c Critical Lane Group								

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		BR		^	ኘካ	
Traffic Volume (vph)	0	0	0	1463	71	0
Future Volume (vph)	0	0	0	1463	71	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)				5.5	5.3	
Lane Util. Factor				0.95	0.97	
Frt				1.00	1.00	
Flt Protected				1.00	0.95	
Satd. Flow (prot)				3762	3686	
Flt Permitted				1.00	0.95	
Satd. Flow (perm)				3762	3686	
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.95	0.92
Adj. Flow (vph)	0	0	0	1556	75	0
RTOR Reduction (vph)	0	0	0	0	70	0
Lane Group Flow (vph)	0	0	0	1556	5	0
Heavy Vehicles (%)	2%	2%	1%	1%	0%	2%
Turn Type				NA	Prot	
Protected Phases				6	8	
Permitted Phases						
Actuated Green, G (s)				82.2	7.0	
Effective Green, g (s)				82.2	7.0	
Actuated g/C Ratio				0.82	0.07	
Clearance Time (s)				5.5	5.3	
Vehicle Extension (s)				3.0	3.0	
Lane Grp Cap (vph)				3092	258	
v/s Ratio Prot				c0.41	c0.00	
v/s Ratio Perm						
v/c Ratio				0.50	0.02	
Uniform Delay, d1				2.7	43.3	
Progression Factor				0.49	1.00	
Incremental Delay, d2				0.5	0.0	
Delay (s)				1.8	43.3	
Level of Service				А	D	
Approach Delay (s)	0.0			1.8	43.3	
Approach LOS	А			А	D	
Intersection Summary						
HCM 2000 Control Delay			3.7	H	CM 2000	Level of Service
HCM 2000 Volume to Capacity	y ratio		0.47			
Actuated Cycle Length (s)			100.0		um of lost	
Intersection Capacity Utilizatio	n		66.6%	IC	U Level c	f Service
Analysis Period (min)			15			
c Critical Lane Group						

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- † †	1						77		<u></u>	
Traffic Volume (vph)	0	722	17	0	0	0	0	0	263	0	139	0
Future Volume (vph)	0	722	17	0	0	0	0	0	263	0	139	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.1	6.1						5.1		5.1	
Lane Util. Factor		0.95	1.00						0.88		0.95	
Frt		1.00	0.85						0.85		1.00	
Flt Protected		1.00	1.00						1.00		1.00	
Satd. Flow (prot)		3800	1700						2962		3800	
Flt Permitted		1.00	1.00						1.00		1.00	
Satd. Flow (perm)		3800	1700						2962		3800	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87	0.89	0.89	0.89
Adj. Flow (vph)	0	760	18	0	0	0	0	0	302	0	156	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	273	0	0	0
Lane Group Flow (vph)	0	760	14	0	0	0	0	0	29	0	156	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Turn Type		NA	Perm						Perm		NA	
Protected Phases		2									4	
Permitted Phases			2						8			
Actuated Green, G (s)		79.1	79.1						9.7		9.7	
Effective Green, g (s)		79.1	79.1						9.7		9.7	_
Actuated g/C Ratio		0.79	0.79						0.10		0.10	
Clearance Time (s)		6.1	6.1						5.1		5.1	_
Vehicle Extension (s)		3.0	3.0						3.2		3.2	
Lane Grp Cap (vph)		3005	1344						287		368	
v/s Ratio Prot		c0.20							0.04		c0.04	
v/s Ratio Perm		0.05	0.01						0.01		0.40	_
v/c Ratio		0.25	0.01						0.10		0.42	
Uniform Delay, d1		2.7	2.2						41.2		42.5	_
Progression Factor		0.78	0.68						1.00		0.93	
Incremental Delay, d2		0.2 2.3	0.0 1.5						0.2 41.3		0.7 40.3	
Delay (s) Level of Service		2.3 A	1.5 A						41.3 D		40.3 D	
Approach Delay (s)		2.3	A		0.0			41.3	D		40.3	
Approach LOS		2.3 A			A			41.3 D			40.3 D	
Intersection Summary												
HCM 2000 Control Delay			16.6	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	ratio		0.27						_			
Actuated Cycle Length (s)			100.0	S	um of lost	time (s)			11.2			
Intersection Capacity Utilization			82.1%			of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations				<u></u>	5		
Traffic Volume (vph)	0	0	0	1757	34	0	
Future Volume (vph)	0	0	0	1757	34	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)				5.3	4.9		
Lane Util. Factor				0.95	1.00		
Frt				1.00	1.00		
Flt Protected				1.00	0.95		
Satd. Flow (prot)				3800	1743		
Flt Permitted				1.00	0.95		
Satd. Flow (perm)				3800	1743		
Peak-hour factor, PHF	0.92	0.92	0.91	0.91	0.92	0.92	
Adj. Flow (vph)	0.72	0.72	0	1931	37	0	
RTOR Reduction (vph)	0	0	0	0	35	0	
Lane Group Flow (vph)	0	0	0	1931	2	0	
Heavy Vehicles (%)	2%	2%	0%	0%	9%	9%	
Turn Type	270	270	0.0	NA	Prot		
Protected Phases				6	8		
Permitted Phases				Ū	U		
Actuated Green, G (s)				83.7	6.1		
Effective Green, g (s)				83.7	6.1		
Actuated g/C Ratio				0.84	0.06		
Clearance Time (s)				5.3	4.9		
Vehicle Extension (s)				3.0	3.0		
Lane Grp Cap (vph)				3180	106		
v/s Ratio Prot				c0.51	c0.00		
v/s Ratio Perm				0.01	00.00		
v/c Ratio				0.61	0.02		
Uniform Delay, d1				2.7	44.1		
Progression Factor				1.00	1.23		
Incremental Delay, d2				0.9	0.1		
Delay (s)				3.6	54.5		
Level of Service				A	D		
Approach Delay (s)	0.0			3.6	54.5		
Approach LOS	A			A	D		
Intersection Summary					-		
HCM 2000 Control Delay			4.5	<u> </u>	CM 2000	Level of Service	
HCM 2000 Volume to Capac	ity ratio		0.57		GIVI 2000		
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)	
Intersection Capacity Utilizat	ion		67.7%			of Service	
Analysis Period (min)			15				
c Critical Lane Group			10				
o onical cane of oup							

Intersection: 10: Novi Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	NB	SB
Directions Served	Т	Т	R	Т	Т	R	Т
Maximum Queue (ft)	279	292	109	106	94	262	8
Average Queue (ft)	132	133	49	44	27	111	0
95th Queue (ft)	225	230	89	87	69	206	5
Link Distance (ft)	608	608	608	2381	2381		44
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)						650	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 11: Novi Road & WB 12-Mile Road

Movement	WB	WB	WB	SB	SB
	T	 			
Directions Served	I		R		TR
Maximum Queue (ft)	164	177	48	254	258
Average Queue (ft)	84	93	13	138	137
95th Queue (ft)	145	159	40	213	222
Link Distance (ft)	617	617	617	2347	2347
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20: EB 12-Mile Road & WB-to-EB X/O W. of Novi Rd

Movement	EB	EB	SB	SB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	114	124	30	52
Average Queue (ft)	57	56	2	16
95th Queue (ft)	101	105	14	46
Link Distance (ft)	1724	1724	23	23
Upstream Blk Time (%)			1	10
Queuing Penalty (veh)			0	1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 21: WB-to-EB X/O W. of Novi Rd & WB 12-Mile Road

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 30: EB-to-WB X/O E. of Novi Rd & WB 12-Mile Road

Movement	WB	WB	NB	NB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	77	77	52	74
Average Queue (ft)	31	27	13	39
95th Queue (ft)	63	63	42	70
Link Distance (ft)	833	833	23	23
Upstream Blk Time (%)			5	26
Queuing Penalty (veh)			2	12
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 31: EB 12-Mile Road & EB-to-WB X/O E. of Novi Rd

Movement	EB	EB
Directions Served	L	Т
Maximum Queue (ft)	7	4
Average Queue (ft)	1	0
95th Queue (ft)	7	3
Link Distance (ft)		646
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 40: 12 Oaks Mall Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	Т	Т	R	R	R	Т	Т
Maximum Queue (ft)	121	134	29	41	11	33	70
Average Queue (ft)	48	62	2	15	0	3	26
95th Queue (ft)	104	115	15	37	5	17	59
Link Distance (ft)	965	965		598	598	21	21
Upstream Blk Time (%)						2	21
Queuing Penalty (veh)						0	4
Storage Bay Dist (ft)			250				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 41: WB 12-Mile Road

Movement	WB
Directions Served	L
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	450
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 50: EB-to-WB X/O E. of 12 Oaks & WB 12-Mile Road

Movement	WB	WB	NB
Directions Served	Т	Т	L
Maximum Queue (ft)	74	53	39
Average Queue (ft)	34	14	8
95th Queue (ft)	65	42	31
Link Distance (ft)	1852	1852	36
Upstream Blk Time (%)			4
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 51: EB 12-Mile Road & EB-to-WB X/O E. of 12 Oaks

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)
Zone Summary

Zone wide Queuing Penalty: 20

Intersection: 10: Novi Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	NB	SB
Directions Served	T	 T	R	T	T	R	T
Maximum Queue (ft)	197	197	178	227	228	139	4
Average Queue (ft)	98	92	80	131	126	47	0
95th Queue (ft)	166	161	143	208	211	97	4
Link Distance (ft)	608	608	608	2381	2381		44
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)						650	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 11: Novi Road & WB 12-Mile Road

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	Т	Т	R	Т	Т	Т	TR
Maximum Queue (ft)	424	411	120	4	5	183	187
Average Queue (ft)	206	217	47	0	0	106	99
95th Queue (ft)	348	353	93	3	4	162	171
Link Distance (ft)	617	617	617	44	44	2347	2347
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 20: EB 12-Mile Road & WB-to-EB X/O W. of Novi Rd

Movement	EB	EB	SB	SB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	102	132	34	56
Average Queue (ft)	49	66	2	16
95th Queue (ft)	84	112	16	46
Link Distance (ft)	1724	1724	23	23
Upstream Blk Time (%)			1	10
Queuing Penalty (veh)			0	1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 21: WB-to-EB X/O W. of Novi Rd & WB 12-Mile Road

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 30: EB-to-WB X/O E. of Novi Rd & WB 12-Mile Road

Movement	WB	WB	NB	NB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	132	152	50	72
Average Queue (ft)	48	55	15	35
95th Queue (ft)	102	123	44	64
Link Distance (ft)	833	833	23	23
Upstream Blk Time (%)			8	31
Queuing Penalty (veh)			3	11
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 31: EB 12-Mile Road & EB-to-WB X/O E. of Novi Rd

Movement	EB	EB
Directions Served	L	L
Maximum Queue (ft)	16	6
Average Queue (ft)	1	0
95th Queue (ft)	10	4
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	300
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 40: 12 Oaks Mall Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	Т	Т	R	R	R	Т	Т
Maximum Queue (ft)	118	141	27	129	102	56	75
Average Queue (ft)	31	58	3	62	19	21	51
95th Queue (ft)	83	107	15	107	57	54	79
Link Distance (ft)	965	965		598	598	21	21
Upstream Blk Time (%)						14	45
Queuing Penalty (veh)						10	32
Storage Bay Dist (ft)			250				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 41: WB 12-Mile Road

Movement	WB	WB
	VVD	VVD
Directions Served	L	L
Maximum Queue (ft)	44	49
Average Queue (ft)	2	4
95th Queue (ft)	20	26
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	450	450
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 50: EB-to-WB X/O E. of 12 Oaks & WB 12-Mile Road

Movement	WB	WB	NB
Directions Served	Т	Т	L
Maximum Queue (ft)	127	104	76
Average Queue (ft)	62	45	27
95th Queue (ft)	105	96	64
Link Distance (ft)	1852	1852	36
Upstream Blk Time (%)			22
Queuing Penalty (veh)			7
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 51: EB 12-Mile Road & EB-to-WB X/O E. of 12 Oaks

Movement	EB
Directions Served	L
Maximum Queue (ft)	12
Average Queue (ft)	0
95th Queue (ft)	6
Link Distance (ft)	132
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	
Zone Summary	

Zone wide Queuing Penalty: 64

Appendix D

FUTURE TRAFFIC CONDITIONS



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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		^	1					<u></u>	1		††	
Traffic Volume (vph)	0	922	317	0	0	0	0	191	405	0	581	0
Future Volume (vph)	0	945	325	0	0	0	0	196	415	0	596	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.4	6.4					8.5	8.5		5.5	
Lane Util. Factor		0.95	1.00					0.95	1.00		0.95	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		3800	1700					3725	1667		3800	
Flt Permitted		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (perm)		3800	1700					3725	1667		3800	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	0	1016	349	0	0	0	0	206	437	0	685	0
RTOR Reduction (vph)	0	0	75	0	0	0	0	0	29	0	0	0
Lane Group Flow (vph)	0	1016	274	0	0	0	0	206	408	0	685	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Turn Type		NA	Perm					NA	Perm		NA	
Protected Phases		2						8			4	
Permitted Phases		F0 F	2					04 (8		07 (
Actuated Green, G (s)		50.5	50.5					34.6	34.6		37.6	
Effective Green, g (s)		50.5	50.5					34.6	34.6		37.6	
Actuated g/C Ratio		0.50	0.50					0.35	0.35		0.38	
Clearance Time (s)		6.4	6.4 3.0					8.5 3.0	8.5 3.0		5.5 3.0	
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		1919	858					1288	576		1428	
v/s Ratio Prot v/s Ratio Perm		c0.27	0.14					0.06	c0.24		0.18	
v/c Ratio		0.53	0.16 0.32					0.16	0.71		0.48	
Uniform Delay, d1		16.7	14.6					22.6	28.3		23.8	
Progression Factor		1.09	1.41					1.00	1.00		0.04	
Incremental Delay, d2		1.09	0.9					0.1	4.0		0.04	
Delay (s)		19.2	21.5					22.7	32.3		1.1	
Level of Service		В	C					C	02.0 C		A	
Approach Delay (s)		19.8	Ŭ		0.0			29.2	Ŭ		1.1	
Approach LOS		В			A			C			A	
Intersection Summary												
HCM 2000 Control Delay			17.3	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	ratio		0.60									
Actuated Cycle Length (s)			100.0	Si	um of lost	t time (s)			14.9			
Intersection Capacity Utilization	1		60.5%			of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 11: Novi Road & WB 12-Mile Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					- 11	1		^			A	
Traffic Volume (vph)	0	0	0	0	510	43	0	191	0	0	581	136
Future Volume (vph)	0	0	0	0	523	44	0	196	0	0	596	139
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)					6.4	6.4		5.5			8.5	
Lane Util. Factor					0.95	1.00		0.95			0.95	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		1.00			1.00	
Satd. Flow (prot)					3725	1667		3725			3692	
Flt Permitted					1.00	1.00		1.00			1.00	
Satd. Flow (perm)					3725	1667		3725			3692	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	0	556	47	0	206	0	0	685	160
RTOR Reduction (vph)	0	0	0	0	0	23	0	0	0	0	23	0
Lane Group Flow (vph)	0	0	0	0	556	24	0	206	0	0	822	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%
Turn Type					NA	Perm		NA			NA	_
Protected Phases					6			4			8	
Permitted Phases					ГОГ	6		37.6			34.6	
Actuated Green, G (s)					50.5 50.5	50.5 50.5		37.6			34.0 34.6	
Effective Green, g (s) Actuated g/C Ratio					0.50	0.50		0.38			0.35	
Clearance Time (s)					6.4	6.4		5.5			8.5	
Vehicle Extension (s)					3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)					1881	841		1400			1277	
v/s Ratio Prot					c0.15	041		0.06			c0.22	
v/s Ratio Perm					00.10	0.01		0.00			0.22	
v/c Ratio					0.30	0.03		0.15			0.64	
Uniform Delay, d1					14.4	12.4		20.6			27.5	
Progression Factor					1.10	1.21		0.00			1.00	
Incremental Delay, d2					0.4	0.1		0.0			1.1	
Delay (s)					16.2	15.1		0.1			28.6	
Level of Service					В	В		А			С	
Approach Delay (s)		0.0			16.2			0.1			28.6	
Approach LOS		А			В			А			С	
Intersection Summary												
HCM 2000 Control Delay			20.5	Н	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capacity	/ ratio		0.44									
Actuated Cycle Length (s)			100.0	Si	um of losi	t time (s)			14.9			
Intersection Capacity Utilization	n		60.5%	IC	U Level (of Service	:		В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		† †			ኘኘ	
Traffic Volume (vph)	0	1201	0	0	38	0
Future Volume (vph)	0	1231	0	0	39	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Total Lost time (s)		5.5			5.4	
Lane Util. Factor		0.95			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3762			3686	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3762			3686	
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.86	0.86
Adj. Flow (vph)	0	1296	0	0	45	0
RTOR Reduction (vph)	0	0	0	0	42	0
Lane Group Flow (vph)	0	1296	0	0	3	0
Heavy Vehicles (%)	1%	1%	2%	2%	0%	0%
Turn Type		NA			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		82.1			7.0	
Effective Green, g (s)		82.1			7.0	
Actuated g/C Ratio		0.82			0.07	
Clearance Time (s)		5.5			5.4	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3088			258	
v/s Ratio Prot		c0.34			c0.00	
v/s Ratio Perm						
v/c Ratio		0.42			0.01	
Uniform Delay, d1		2.4			43.3	
Progression Factor		1.00			1.00	
Incremental Delay, d2		0.4			0.0	
Delay (s)		2.9			43.3	
Level of Service		А			D	
Approach Delay (s)		2.9	0.0		43.3	
Approach LOS		А	A		D	
Intersection Summary						
HCM 2000 Control Delay			4.2	H	CM 2000	Level of Servi
HCM 2000 Volume to Capacity	ratio		0.39			
Actuated Cycle Length (s)			100.0		um of lost	
Intersection Capacity Utilization	1		55.4%	IC	U Level c	of Service
Analysis Period (min)			15			
c Critical Lane Group						

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Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations		2011		† †	ኘኘ		
Traffic Volume (vph)	0	0	0	463	90	0	
Future Volume (vph)	0	0	0	475	92	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)				5.5	5.3		
Lane Util. Factor				0.95	0.97		
Frt				1.00	1.00		
Flt Protected				1.00	0.95		
Satd. Flow (prot)				3762	3510		
Flt Permitted				1.00	0.95		
Satd. Flow (perm)				3762	3510		
Peak-hour factor, PHF	0.92	0.92	0.88	0.88	0.88	0.88	
Adj. Flow (vph)	0	0	0	540	105	0	
RTOR Reduction (vph)	0	0	0	0	98	0	
Lane Group Flow (vph)	0	0	0	540	7	0	
Heavy Vehicles (%)	2%	2%	1%	1%	5%	5%	
Turn Type				NA	Prot		
Protected Phases				6	8		
Permitted Phases							
Actuated Green, G (s)				82.2	7.0		
Effective Green, g (s)				82.2	7.0		
Actuated g/C Ratio				0.82	0.07		
Clearance Time (s)				5.5	5.3		
Vehicle Extension (s)				3.0	3.0		
Lane Grp Cap (vph)				3092	245		
v/s Ratio Prot				c0.14	c0.00		
v/s Ratio Perm							
v/c Ratio				0.17	0.03		
Uniform Delay, d1				1.8	43.3		
Progression Factor				1.00	1.00		
Incremental Delay, d2				0.1	0.0		
Delay (s)				2.0	43.4		
Level of Service				А	D		
Approach Delay (s)	0.0			2.0	43.4		
Approach LOS	А			А	D		
Intersection Summary							
HCM 2000 Control Delay			8.7	H	CM 2000	Level of Service)
HCM 2000 Volume to Capaci	ty ratio		0.16				
Actuated Cycle Length (s)			100.0		um of lost		
Intersection Capacity Utilization	on		52.6%	IC	U Level c	of Service	
Analysis Period (min)			15				
c Critical Lane Group							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- ††	1						77		- ††	
Traffic Volume (vph)	0	1295	15	0	0	0	0	0	33	0	43	0
Future Volume (vph)	0	1328	15	0	0	0	0	0	34	0	44	0
· · · · /	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.1	6.1						5.1		5.1	
Lane Util. Factor		0.95	1.00						0.88		0.95	
Frt		1.00	0.85						0.85		1.00	
Flt Protected		1.00	1.00						1.00		1.00	
Satd. Flow (prot)		3762	1683						2877		3585	
Flt Permitted		1.00	1.00						1.00		1.00	
Satd. Flow (perm)		3762	1683						2877		3585	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.88	0.88	0.88	0.67	0.67	0.67
Adj. Flow (vph)	0	1398	16	0	0	0	0	0	39	0	66	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	35	0	0	0
Lane Group Flow (vph)	0	1398	12	0	0	0	0	0	4	0	66	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	4%	4%	4%	6%	6%	6%
Turn Type		NA	Perm						Perm		NA	
Protected Phases		2	2						0		4	
Permitted Phases		(1)	2 61.3						8		7 5	
Actuated Green, G (s) Effective Green, g (s)		61.3 61.3	61.3						7.5 7.5		7.5 7.5	
Actuated g/C Ratio		01.3	01.3						0.09		0.09	
Clearance Time (s)		6.1	6.1						5.1		5.1	
Vehicle Extension (s)		3.0	3.0						3.2		3.2	
Lane Grp Cap (vph)		2882	1289						269		336	
v/s Ratio Prot		c0.37	1207						209		c0.02	
v/s Ratio Perm		0.57	0.01						0.00		CU.UZ	
v/c Ratio		0.49	0.01						0.00		0.20	
Uniform Delay, d1		3.5	2.2						32.9		33.5	
Progression Factor		1.00	1.00						1.00		0.95	
Incremental Delay, d2		0.6	0.0						0.0		0.3	
Delay (s)		4.1	2.2						32.9		32.1	
Level of Service		А	А						С		С	
Approach Delay (s)		4.0			0.0			32.9			32.1	
Approach LOS		А			А			С			С	
Intersection Summary												
HCM 2000 Control Delay			6.0	Н	CM 2000	Level of S	Service		А			
HCM 2000 Volume to Capacity	ratio		0.45									
Actuated Cycle Length (s)			80.0	Si	um of lost	time (s)			11.2			
Intersection Capacity Utilization			63.3%	IC	U Level of	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations		2011		† †	1			
Traffic Volume (vph)	0	0	0	482	37	0		
Future Volume (vph)	0	0	0	494	38	0		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000		
Total Lost time (s)				5.3	4.9			
Lane Util. Factor				0.95	1.00			
Frt				1.00	1.00			
Flt Protected				1.00	0.95			
Satd. Flow (prot)				3725	1900			
Flt Permitted				1.00	0.95			
Satd. Flow (perm)				3725	1900			
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.75	0.75		
Adj. Flow (vph)	0	0	0	526	51	0		
RTOR Reduction (vph)	0	0	0	0	47	0		
Lane Group Flow (vph)	0	0	0	526	4	0		
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%		
Turn Type				NA	Prot			
Protected Phases				6	8			
Permitted Phases								
Actuated Green, G (s)				64.3	5.5			
Effective Green, g (s)				64.3	5.5			
Actuated g/C Ratio				0.80	0.07			
Clearance Time (s)				5.3	4.9			
Vehicle Extension (s)				3.0	3.0			
Lane Grp Cap (vph)				2993	130			
v/s Ratio Prot				c0.14	c0.00			
v/s Ratio Perm								
v/c Ratio				0.18	0.03			
Uniform Delay, d1				1.8	34.8			
Progression Factor				1.00	1.00			
Incremental Delay, d2				0.1	0.1			
Delay (s)				1.9	34.8			
Level of Service				А	С			
Approach Delay (s)	0.0			1.9	34.8			
Approach LOS	А			А	С			
Intersection Summary								
HCM 2000 Control Delay			4.8	H	CM 2000	Level of Service	2	
HCM 2000 Volume to Capacit	ty ratio		0.16					
Actuated Cycle Length (s)			80.0		um of lost			
Intersection Capacity Utilization	on		34.2%	IC	U Level c	of Service		
Analysis Period (min)			15					
c Critical Lane Group								

	nters	sectio	on
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Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	朴朴					1
Traffic Vol, veh/h	1320	8	0	0	0	40
Future Vol, veh/h	1353	8	0	0	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage	e, # 0	-	10821	30432	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	92	92
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	1424	8	0	0	0	45

Major/Minor	Major1		Minor1	
Conflicting Flow All	0	0	-	716
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.92
Pot Cap-1 Maneuver	-	-	0	320
Stage 1	-	-	0	-
Stage 2	-	-	0	-
Platoon blocked, %	-	-		
Mov Cap-1 Maneuve		-	-	320
Mov Cap-2 Maneuve	r -	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Approach	EB		NB	
HCM Control Delay,	s 0		18.1	
HCM LOS			С	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	
Capacity (veh/h)	320	-	-	
HCM Lane V/C Ratio	0.139	-	-	
HCM Control Delay (s)	18.1	-	-	
HCM Lane LOS	С	-	-	
HCM 95th %tile Q(veh)	0.5	-	-	

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- † †	1					- † †	1		††	
Traffic Volume (vph)	0	636	499	0	0	0	0	601	232	0	425	0
Future Volume (vph)	0	636	499	0	0	0	0	601	232	0	425	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.4	6.4					8.5	8.5		5.5	
Lane Util. Factor		0.95	1.00					0.95	1.00		0.95	
Frt		1.00	0.85					1.00	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)		3800	1700					3800	1700		3762	
Flt Permitted		1.00	1.00					1.00	1.00		1.00	
Satd. Flow (perm)	0.00	3800	1700	0.00	0.00	0.00	0.04	3800	1700	0.05	3762	0.05
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	0	707	554 70	0	0 0	0	0	639 0	247 157	0	447	0
RTOR Reduction (vph) Lane Group Flow (vph)	0 0	0 707	484	0 0	0	0 0	0 0	639	90	0	0 447	0 0
Heavy Vehicles (%)	0%	0%	404	2%	2%	2%	0%	039	90	1%	1%	1%
Turn Type	070	NA	Perm	Ζ/0	Ζ/0	Ζ/0	070	NA	Perm	1 /0	NA	1 /0
Protected Phases		NA 2	Pellii					NA 8	Pellii		NA 4	
Permitted Phases		Z	2					0	8		4	
Actuated Green, G (s)		58.8	58.8					26.3	26.3		29.3	
Effective Green, g (s)		58.8	58.8					26.3	26.3		29.3	
Actuated g/C Ratio		0.59	0.59					0.26	0.26		0.29	
Clearance Time (s)		6.4	6.4					8.5	8.5		5.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0		3.0	
Lane Grp Cap (vph)		2234	999					999	447		1102	
v/s Ratio Prot		0.19						c0.17			0.12	
v/s Ratio Perm			c0.28						0.05			
v/c Ratio		0.32	0.48					0.64	0.20		0.41	
Uniform Delay, d1		10.4	11.9					32.7	28.7		28.4	
Progression Factor		1.38	1.62					1.00	1.00		0.04	
Incremental Delay, d2		0.3	1.6					1.4	0.2		0.2	
Delay (s)		14.7	20.7					34.0	28.9		1.5	
Level of Service		В	С					С	С		A	
Approach Delay (s)		17.4			0.0			32.6			1.5	
Approach LOS		В			A			С			А	
Intersection Summary			-									
HCM 2000 Control Delay			19.8	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	ratio		0.53									
Actuated Cycle Length (s)			100.0		um of los				14.9			
Intersection Capacity Utilization	1		61.3%	IC	U Level	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 11: Novi Road & WB 12-Mile Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					<u></u>	1		^			At≯	
Traffic Volume (vph)	0	0	0	0	1326	225	0	601	0	0	425	96
Future Volume (vph)	0	0	0	0	1326	225	0	601	0	0	425	96
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)					6.4	6.4		5.5			8.5	
Lane Util. Factor					0.95	1.00		0.95			0.95	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		1.00			1.00	
Satd. Flow (prot)					3800	1700		3800			3658	
Flt Permitted					1.00	1.00		1.00			1.00	
Satd. Flow (perm)					3800	1700		3800			3658	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1411	239	0	639	0	0	447	101
RTOR Reduction (vph)	0	0	0	0	0	30	0	0	0	0	20	0
Lane Group Flow (vph)	0	0	0	0	1411	209	0	639	0	0	528	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type					NA	Perm		NA			NA	_
Protected Phases					6	1		4			8	
Permitted Phases					F0 0	6 58.8		29.3			26.3	
Actuated Green, G (s)					58.8 58.8	58.8		29.3 29.3			26.3	
Effective Green, g (s) Actuated g/C Ratio					0.59	0.59		0.29			0.26	
Clearance Time (s)					6.4	6.4		5.5			8.5	
Vehicle Extension (s)					3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)					2234	999		1113			962	
v/s Ratio Prot					c0.37	777		c0.17			0.14	
v/s Ratio Perm					0.57	0.12		CU.17			0.14	
v/c Ratio					0.63	0.12		0.57			0.55	
Uniform Delay, d1					13.5	9.7		30.0			31.7	
Progression Factor					0.20	0.08		0.00			1.00	
Incremental Delay, d2					1.0	0.4		0.6			0.6	
Delay (s)					3.7	1.2		0.6			32.4	
Level of Service					А	А		А			С	
Approach Delay (s)		0.0			3.3			0.6			32.4	
Approach LOS		А			А			А			С	
Intersection Summary												
HCM 2000 Control Delay			8.3	Н	CM 2000	Level of S	Service		А			
HCM 2000 Volume to Capacity	/ ratio		0.63									
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)			14.9			
Intersection Capacity Utilization	n		61.3%	IC	U Level o	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		<u>†</u> †			ኘኘ		
Traffic Volume (vph)	0	1094	0	0	41	0	
Future Volume (vph)	0	1094	0	0	41	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)		5.5			5.4		
Lane Util. Factor		0.95			0.97		
Frt		1.00			1.00		
Flt Protected		1.00			0.95		
Satd. Flow (prot)		3800			3686		
Flt Permitted		1.00			0.95		
Satd. Flow (perm)		3800			3686		
Peak-hour factor, PHF	0.84	0.84	0.92	0.92	0.70	0.70	Ì
Adj. Flow (vph)	0	1302	0	0	59	0	
RTOR Reduction (vph)	0	0	0	0	55	0	
Lane Group Flow (vph)	0	1302	0	0	4	0	
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	
Turn Type		NA			Prot		
Protected Phases		2			4		
Permitted Phases							
Actuated Green, G (s)		82.1			7.0		
Effective Green, g (s)		82.1			7.0		
Actuated g/C Ratio		0.82			0.07		
Clearance Time (s)		5.5			5.4		
Vehicle Extension (s)		3.0			3.0		
Lane Grp Cap (vph)		3119			258		
v/s Ratio Prot		c0.34			c0.00		
v/s Ratio Perm							
v/c Ratio		0.42			0.02		
Uniform Delay, d1		2.4			43.3		
Progression Factor		1.00			1.00		
Incremental Delay, d2		0.4			0.0		
Delay (s)		2.9			43.3		
Level of Service		А			D		
Approach Delay (s)		2.9	0.0		43.3		
Approach LOS		А	А		D		
Intersection Summary							
HCM 2000 Control Delay			4.6	H	CM 2000	Level of Servic	e
HCM 2000 Volume to Capacity r	atio		0.39				-
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)	
Intersection Capacity Utilization			72.9%			of Service	
Analysis Period (min)			15				
c Critical Lane Group							

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Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations		LDIX	WDL	^	ኘካ	NDR	
Traffic Volume (vph)	0	0	0	1480	71	0	
Future Volume (vph)	0	0	0	1480	71	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)				5.5	5.3		
Lane Util. Factor				0.95	0.97		
Frt				1.00	1.00		
Flt Protected				1.00	0.95		
Satd. Flow (prot)				3762	3686		
Flt Permitted				1.00	0.95		
Satd. Flow (perm)				3762	3686		
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.95	0.92	
Adj. Flow (vph)	0	0	0	1574	75	0	
RTOR Reduction (vph)	0	0	0	0	51	0	
Lane Group Flow (vph)	0	0	0	1574	24	0	
Heavy Vehicles (%)	2%	2%	1%	1%	0%	2%	
Turn Type				NA	Prot		
Protected Phases				6	8		
Permitted Phases							
Actuated Green, G (s)				62.2	27.0		
Effective Green, g (s)				62.2	27.0		
Actuated g/C Ratio				0.62	0.27		
Clearance Time (s)				5.5	5.3		
Vehicle Extension (s)				3.0	3.0		
Lane Grp Cap (vph)				2339	995		
v/s Ratio Prot				c0.42	c0.01		
v/s Ratio Perm							
v/c Ratio				0.67	0.02		
Uniform Delay, d1				12.3	26.8		
Progression Factor				1.05	1.98		
Incremental Delay, d2				1.3	0.0		
Delay (s)				14.2	53.0		
Level of Service				В	D		
Approach Delay (s)	0.0			14.2	53.0		
Approach LOS	А			В	D		
Intersection Summary							
HCM 2000 Control Delay			15.9	H	CM 2000	Level of Service	
HCM 2000 Volume to Capacit	ty ratio		0.48				
Actuated Cycle Length (s)			100.0		um of lost		
Intersection Capacity Utilization	on		67.7%	IC	U Level c	of Service	
Analysis Period (min)			15				
c Critical Lane Group							

	۶	-	$\mathbf{\hat{z}}$	4	-	•	1	Ť	1	1	ŧ	~
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<u>†</u> †	1						77		<u></u>	
Traffic Volume (vph)	0	749	17	0	0	0	0	0	266	0	158	0
Future Volume (vph)	0	749	17	0	0	0	0	0	266	0	158	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		6.1	6.1						5.1		5.1	
Lane Util. Factor		0.95	1.00						0.88		0.95	
Frt		1.00	0.85						0.85		1.00	
Flt Protected		1.00	1.00						1.00		1.00	
Satd. Flow (prot)		3800	1700						2962		3800	
Flt Permitted		1.00	1.00						1.00		1.00	
Satd. Flow (perm)		3800	1700						2962		3800	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87	0.89	0.89	0.89
Adj. Flow (vph)	0	788	18	0	0	0	0	0	306	0	178	0
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	275	0	0	0
Lane Group Flow (vph)	0	788	14	0	0	0	0	0	31	0	178	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Turn Type		NA	Perm						Perm		NA	
Protected Phases		2									4	
Permitted Phases			2						8			
Actuated Green, G (s)		78.6	78.6						10.2		10.2	
Effective Green, g (s)		78.6	78.6						10.2		10.2	
Actuated g/C Ratio		0.79	0.79						0.10		0.10	
Clearance Time (s)		6.1	6.1						5.1		5.1	
Vehicle Extension (s)		3.0	3.0						3.2		3.2	
Lane Grp Cap (vph)		2986	1336						302		387	
v/s Ratio Prot		c0.21									c0.05	
v/s Ratio Perm			0.01						0.01			
v/c Ratio		0.26	0.01						0.10		0.46	
Uniform Delay, d1		2.9	2.3						40.7		42.3	
Progression Factor		0.76	0.63						1.00		0.92	
Incremental Delay, d2		0.2	0.0						0.2		0.7	
Delay (s)		2.4	1.5						40.9		39.8	
Level of Service		А	А						D		D	
Approach Delay (s)		2.4			0.0			40.9			39.8	
Approach LOS		А			А			D			D	
Intersection Summary												
HCM 2000 Control Delay			16.7	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	ratio		0.29									
Actuated Cycle Length (s)			100.0		um of lost				11.2			
Intersection Capacity Utilization	۱		83.3%	IC	U Level o	of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

	-	\mathbf{r}	1	-	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations		2011		† †	<u> </u>		
Traffic Volume (vph)	0	0	0	1776	51	0	
Future Volume (vph)	0	0	0	1776	51	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	
Total Lost time (s)				5.3	4.9		
Lane Util. Factor				0.95	1.00		
Frt				1.00	1.00		
Flt Protected				1.00	0.95		
Satd. Flow (prot)				3800	1743		
Flt Permitted				1.00	0.95		
Satd. Flow (perm)				3800	1743		
Peak-hour factor, PHF	0.92	0.92	0.91	0.91	0.92	0.92	
Adj. Flow (vph)	0	0.72	0	1952	55	0	
RTOR Reduction (vph)	0	0	0	0	41	0	
Lane Group Flow (vph)	0	0	0	1952	14	0	
Heavy Vehicles (%)	2%	2%	0%	0%	9%	9%	
Turn Type				NA	Prot		
Protected Phases				6	8		
Permitted Phases				Ū	Ŭ		
Actuated Green, G (s)				83.0	6.8		
Effective Green, g (s)				83.0	6.8		
Actuated g/C Ratio				0.83	0.07		
Clearance Time (s)				5.3	4.9		
Vehicle Extension (s)				3.0	3.0		
Lane Grp Cap (vph)				3154	118		
v/s Ratio Prot				c0.51	c0.01		
v/s Ratio Perm							
v/c Ratio				0.62	0.12		
Uniform Delay, d1				3.0	43.8		
Progression Factor				1.00	1.07		
Incremental Delay, d2				0.9	0.4		
Delay (s)				3.9	47.3		
Level of Service				A	D		
Approach Delay (s)	0.0			3.9	47.3		
Approach LOS	A			A	D		
Intersection Summary							
HCM 2000 Control Delay			5.1	H	CM 2000	Level of Service)
HCM 2000 Volume to Capacit	y ratio		0.58				
Actuated Cycle Length (s)			100.0	Si	um of lost	time (s)	
Intersection Capacity Utilizatio	n		68.2%			of Service	
Analysis Period (min)			15				
c Critical Lane Group							

Intersection

Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	朴朴					1
Traffic Vol, veh/h	988	27	0	0	0	26
Future Vol, veh/h	988	27	0	0	0	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage	e,# 0	-	10821	30432	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	92	92	92	92
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	1040	28	0	0	0	28

Major/Minor M	Major1			Ν	1inor1	
Conflicting Flow All	0	0			-	534
Stage 1	-	-			-	-
Stage 2	-	-			-	-
Critical Hdwy	-	-			-	7.14
Critical Hdwy Stg 1	-	-			-	-
Critical Hdwy Stg 2	-	-			-	-
Follow-up Hdwy	-	-			-	3.92
Pot Cap-1 Maneuver	-	-			0	420
Stage 1	-	-			0	-
Stage 2	-	-			0	-
Platoon blocked, %	-	-				
Mov Cap-1 Maneuver	-	-			-	420
Mov Cap-2 Maneuver	-	-			-	-
Stage 1	-	-			-	-
Stage 2	-	-			-	-
Approach	EB				NB	
HCM Control Delay, s	0				14.2	
HCM LOS					В	
Minor Lane/Major Mvm	t NI	BLn1	EBT	EBR		
			LDI	LDK		
Capacity (veh/h)		420	-	-		

HCM Lane V/C Ratio	0.067	-	-	
HCM Control Delay (s)	14.2	-	-	
HCM Lane LOS	В	-	-	
HCM 95th %tile Q(veh)	0.2	-	-	

Intersection: 10: Novi Road & EB 12-Mile Road

Movement	ГD	ГD	ГD	ND	ND	ND
Movement	EB	EB	EB	NB	NB	NB
Directions Served	Т	Т	R	Т	Т	R
Maximum Queue (ft)	302	284	99	101	94	215
Average Queue (ft)	137	136	52	52	30	113
95th Queue (ft)	240	233	90	91	70	197
Link Distance (ft)	608	608	608	2381	2381	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						650
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: Novi Road & WB 12-Mile Road

Intersection: 20: EB 12-Mile Road & WB-to-EB X/O W. of Novi Rd

Movement	EB	EB	SB	SB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	114	126	44	65
Average Queue (ft)	60	55	6	21
95th Queue (ft)	98	103	26	53
Link Distance (ft)	1724	1724	23	23
Upstream Blk Time (%)			3	15
Queuing Penalty (veh)			1	3
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 21: WB-to-EB X/O W. of Novi Rd & WB 12-Mile Road

Movement		
Directions Served		
Maximum Queue (ft)		
Average Queue (ft)		
95th Queue (ft)		
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%) Queuing Penalty (veh)		
Oueuing Penalty (veh)		

Intersection: 30: EB-to-WB X/O E. of Novi Rd & WB 12-Mile Road

Movement	WB	WB	NB	NB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	69	74	56	70
Average Queue (ft)	30	29	12	37
95th Queue (ft)	60	65	40	71
Link Distance (ft)	833	833	23	23
Upstream Blk Time (%)			6	23
Queuing Penalty (veh)			3	11
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 31: EB 12-Mile Road & EB-to-WB X/O E. of Novi Rd

Movement	EB
Directions Served	L
Maximum Queue (ft)	9
Average Queue (ft)	0
95th Queue (ft)	8
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: 12 Oaks Mall Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	SB	SB
Directions Served	Т	Т	R	R	R	Т	Т
Maximum Queue (ft)	131	144	22	61	7	33	75
Average Queue (ft)	49	62	2	14	0	3	28
95th Queue (ft)	103	116	13	39	5	18	64
Link Distance (ft)	965	965		598	598	21	21
Upstream Blk Time (%)						3	25
Queuing Penalty (veh)						1	6
Storage Bay Dist (ft)			250				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 41: WB 12-Mile Road

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 50: EB-to-WB X/O E. of 12 Oaks & WB 12-Mile Road

Movement	WB	WB	NB
Directions Served	Т	Т	L
Maximum Queue (ft)	88	58	63
Average Queue (ft)	36	17	26
95th Queue (ft)	70	45	58
Link Distance (ft)	1852	1852	36
Upstream Blk Time (%)			11
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 51: EB 12-Mile Road & EB-to-WB X/O E. of 12 Oaks

Movement	EB
Directions Served	L
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	132
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 60: Site Drive & EB 12-Mile Road

Movement	NB
Directions Served	R
Maximum Queue (ft)	76
Average Queue (ft)	28
95th Queue (ft)	58
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 28

Intersection: 10: Novi Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	NB
	ED	٢D	ĹĎ	ND	IND	ND
Directions Served	Т	Т	R	Т	Т	R
Maximum Queue (ft)	183	189	185	223	227	113
Average Queue (ft)	96	93	83	132	127	45
95th Queue (ft)	155	160	145	195	197	89
Link Distance (ft)	608	608	608	2381	2381	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						650
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: Novi Road & WB 12-Mile Road

Movement				ND	CD	CD
Movement	WB	WB	WB	NB	SB	SB
Directions Served	Т	Т	R	Т	Т	TR
Maximum Queue (ft)	359	350	118	10	201	209
Average Queue (ft)	197	208	50	0	106	103
95th Queue (ft)	319	329	97	5	173	179
Link Distance (ft)	617	617	617	44	2347	2347
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 20: EB 12-Mile Road & WB-to-EB X/O W. of Novi Rd

Movement	EB	EB	SB	SB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	92	126	39	70
Average Queue (ft)	48	64	5	25
95th Queue (ft)	82	110	24	59
Link Distance (ft)	1724	1724	23	23
Upstream Blk Time (%)			3	15
Queuing Penalty (veh)			1	3
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 21: WB-to-EB X/O W. of Novi Rd & WB 12-Mile Road

Movement	W
Directions Served	L
Maximum Queue (ft)	7
Average Queue (ft)	0
95th Queue (ft)	5
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 30: EB-to-WB X/O E. of Novi Rd & WB 12-Mile Road

Movement	WB	WB	NB	NB
Directions Served	Т	Т	L	L
Maximum Queue (ft)	127	144	47	66
Average Queue (ft)	51	59	11	33
95th Queue (ft)	111	123	35	66
Link Distance (ft)	833	833	23	23
Upstream Blk Time (%)			9	28
Queuing Penalty (veh)			3	10
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 31: EB 12-Mile Road & EB-to-WB X/O E. of Novi Rd

Movement	EB
Directions Served	L
Maximum Queue (ft)	7
Average Queue (ft)	0
95th Queue (ft)	5
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 40: 12 Oaks Mall Road & EB 12-Mile Road

Movement	EB	EB	EB	NB	NB	SB	SB
	T					 	
Directions Served			R	R	R		
Maximum Queue (ft)	136	158	29	134	44	55	75
Average Queue (ft)	37	60	5	53	15	28	58
95th Queue (ft)	91	111	21	96	33	60	86
Link Distance (ft)	965	965		598	598	21	21
Upstream Blk Time (%)						19	47
Queuing Penalty (veh)						15	37
Storage Bay Dist (ft)			250				
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 41: WB 12-Mile Road

Movement	WB	WB
Directions Served	L	L
Maximum Queue (ft)	53	69
Average Queue (ft)	4	9
95th Queue (ft)	29	40
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	450	450
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 50: EB-to-WB X/O E. of 12 Oaks & WB 12-Mile Road

Movement	WB	WB	NB
Directions Served	Т	Т	L
Maximum Queue (ft)	153	133	82
Average Queue (ft)	70	53	39
95th Queue (ft)	128	109	78
Link Distance (ft)	1852	1852	36
Upstream Blk Time (%)			31
Queuing Penalty (veh)			16
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 51: EB 12-Mile Road & EB-to-WB X/O E. of 12 Oaks

Movement	EB
Directions Served	L
Maximum Queue (ft)	30
Average Queue (ft)	2
95th Queue (ft)	14
Link Distance (ft)	132
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 60: Site Drive & EB 12-Mile Road

Movement	NB
Directions Served	R
Maximum Queue (ft)	54
Average Queue (ft)	18
95th Queue (ft)	45
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 86

Appendix E

WARRANT SUMMARIES





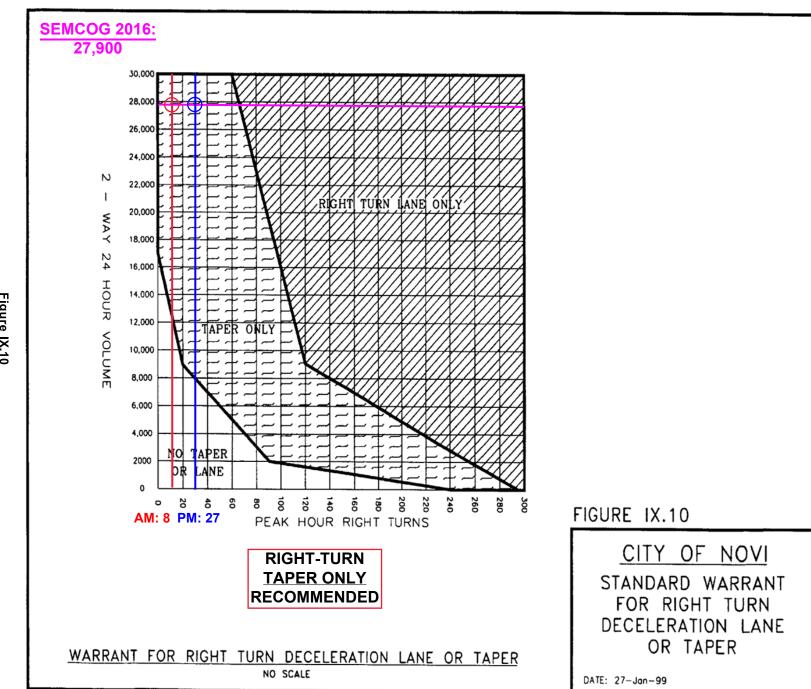


Figure IX.10

Municode

PARKING ANALYSIS MEMO - UPDATED



Мемо

	VIA EMAIL
То:	Mr. Todd Rankine Singh Development, LLC
From:	Julie M. Kroll, PE, PTOE Bandhan Ayon, EIT Fleis & VandenBrink
Date:	November 24, 2021
Re:	Griffin Twelve Oaks Apartments, Novi, Michigan Parking Study

INTRODUCTION

This memorandum presents the results of a parking evaluation for the proposed project site located in the southeast quadrant of the 12-Mile Road and 12 Oaks Mall Road intersection in Novi, Michigan. The proposed development includes construction of 174 multi-family units. The parking analysis was performed to determine if the proposed parking supply of 308 parking spaces will be adequate to accommodate the projected parking demand.

It is our understanding that the applicant seeks to obtain a parking reduction from City of Novi Zoning ordinance requirements. Fleis & VandenBrink (F&V) completed a parking analysis in support of this request.

PROJECTED PARKING SUPPLY

The subject property proposed 174 multi-family units: 17 studio, one-bed, 63 two-bed, and 14 three-bed units. The site plan proposes a total 308 parking spaces comprising 212 surface parking spaces and 96 spaces of garage parking. **Table 1** summarizes the breakdown of studio, 1-bedroom, 2-bedroom, and 3-bedroom dwelling units (DU) for the proposed development and associated parking ratio.

Site Data	Number of Bedrooms per Dwelling Unit								
	Studio 1 2 3								
Dwelling units	17	80	63	14	174				
Bedrooms	17	80	126	42	265				
Bedroom Mix	6.4%	30.2%	47.5%	15.9%	100%				
	308								
	1.77								
Proposed Spaces per Bedroom					1.16				

Table 1: Proposed Site Data

COMPARATIVE PARKING DEMAND

In order to provide a comparative evaluation, parking supply and requirements in two other communities (i.e., West Bloomfield Township, MI, and City of Cary, NC) were reviewed. West Bloomfield and Cary both have similar characteristics of Novi which are mostly suburban in nature, have limited access to public transportation (no rail transit/city bus only), and significant growth potential for new developments.

Multi-family residential parking supply for similar development in West Bloomfield Township were reviewed where the petitioner proposed 347 parking spaces for the 213 units or 1.63 spaces per unit. The parking requirements in West Bloomfield for multifamily residential district is 1.25 spaces per dwelling unit (1 parking space + 0.25 space for guest), which is substantially lower than the requirements by City of Novi.

Similarly, Cary has a parking supply of 1.16 to 1.99 spaces per unit for multi-family apartments. Although Cary has higher population density than Novi, it has a parking supply of an average 1.60 spaces per unit for multi-family residential development. These data are presented by Noell Consulting Group (a real estate advisory firm) who conducted a parking need assessment study examining recent multi-family housing in City of Cary. A summary of findings from that assessment are attached for reference.

ITE PARKING GENERATION

The Institute of Transportation Engineers (ITE) *Parking Generation, 5th Edition* was used to determine the parking demand for this site. The ITE *Parking Generation* is an informational guide used by engineers and planners for the purposes of determining the parking demand associated with various land uses. The parking generation data included in *Parking Generation* are provided by various state and local government agencies, consulting firms, individual transportation professionals, universities, developers, associations, local sections, districts, and student chapters of ITE located throughout the U.S. The data is examined by ITE for validity and reasonableness before being entered into the comprehensive database. Therefore, the data presented by ITE in the *Parking Generation* provides a comprehensive average of parking demand for the various land uses throughout the country and is a recommended resource for the calculation parking demand.

The proposed development includes construction of 174 multi-family units: 17 studio, one-bed, 63 two-bed, and 14 three-bed units. The site plan proposes a total of 308 parking spaces. The proposed development includes an apartment/townhomes complex with three floors of residential units. For this study, the best fit land use was determined to be Multi-Family Housing: Mid-Rise (Land Use Code #221). The most appropriate location/setting is "General Urban/Suburban (no nearby rail transit)".

Multi-Family Housing: Mid-Rise (Land Use Code #221) Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and with between three and 10 levels (floors) of residence.

Based on the site data presented in **Table 1**, ITE Parking Generation data indicates an average weekday peak parking generation rate of 1.31 spaces per dwelling unit, and an average weekday peak parking generation of 0.75 spaces per bedroom. Typically, peak parking demand is slightly higher on weekends. However, weekend (Sunday) data for Multi-Family Mid-Rise Housing (LUC #221) is limited to only one (1) case study which does not provide a statistically significant estimate. Therefore, weekend parking demand for Multi-Family Low-Rise Housing (LUC #220) were reviewed which has relatively more data points. The result of the review suggests that peak parking demand rate is approximately 8.3% higher on weekends for low-rise multi-family dwelling units. Therefore, this rate was applied to the Mid-Rise land use to calculate a representative weekend peak demand.

ITE presents two methodologies for determining parking demand: total number of units and the number of beds per unit. The projected parking demand analysis for the site was performed using both methodologies as summarized in **Table 2**. The highest projected parking demand associated with each methodology was used to calculate the projected peak parking demand for the site. The results of this analysis indicate that the higher parking demand is associated with the number of dwelling units, rather than calculations by bedrooms.

			ITE Parking Generation 5th Edition					
Methodology	Size	Independent Variable	Peak Period Parkir	ng Demand (Rates)	Peak Period Parking Demand (veh)			
			Weekday	Weekend	Weekday	Weekend		
Spaces per DU	174	D. U.	1.31 space / DU	1.42 space / DU	228	247		
Spaces per bed per DU	97	D. U.	0.75 space / 1-bed	0.81 space / 1-bed	73	79		
	63	D. U.	1.5 space / 2-bed	1.62 space / 2-bed	95	102		
	14	D. U.	2.25 space / 3-bed	2.44 space / 3-bed	32	34		
	174	D. U.	Combined Total		200	215		
				Parking Demand	228	247		

Table 2: ITE Parking Generation, Parking Demand



PARKING REQUIREMENTS

The projected parking demand calculated was compared to the proposed parking supply for this site to determine if there is adequate parking to accommodate the proposed operations. The highest daily parking demands for this development are expected to occur on the weekend. The results of the analysis are summarized in **Table 3** and show that there is adequate parking to accommodate the proposed development.

The peak parking demand for this site was also compared to the City of Novi Zoning Ordinance requirements which requires two (2) parking spaces per each dwelling unit having two (2) or less bedrooms, and two and one-half (2 ½) parking spaces for each dwelling unit having three (3) or more bedrooms for this site. The results of this analysis are summarized in **Table 3** and show the Novi parking supply requirements for this site have a projected surplus of 108 parking spaces and would have the site significantly overparked based on the ordinance requirements.

		Size	Independent	Novi Zoning Ordinance		Proposed	
Methodology	Land Use		Variable	Parking Supply Requirements	Parking (spaces)	Parking (spaces)	
Chapped per bod per DU	Multi-Family	160	D. U.	2 spaces / 1-2 bed	320	308	
Spaces per bed per DU	Housing: Mid-Rise	14	D. U.	2.5 spaces / 3+ bed	35	300	
	355	308					
Peak Parking Demand per ITE					247	247	
Projected Parking Surplus					108	61	
Total Parking Percent Occupancy					69.5%	80.2%	

Table 3: Parking Supply Summary

CONCLUSIONS

The conclusions of this parking evaluation are as follows:

- The projected peak parking demand for this site is 247 spaces and is expected to occur during the overnight hours in weekend.
- The projected peak proposed parking supply for this site includes 308 spaces, which results in a parking surplus of 61 spaces and a peak occupancy of 80%. Therefore, the proposed parking supply is acceptable to accommodate the projected parking demand.
- The parking supply requirements outlined in the Novi Zoning Ordinance would result in a parking surplus of 108 spaces.

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

Attached: Site Plan Parking Need Assessment in Cary



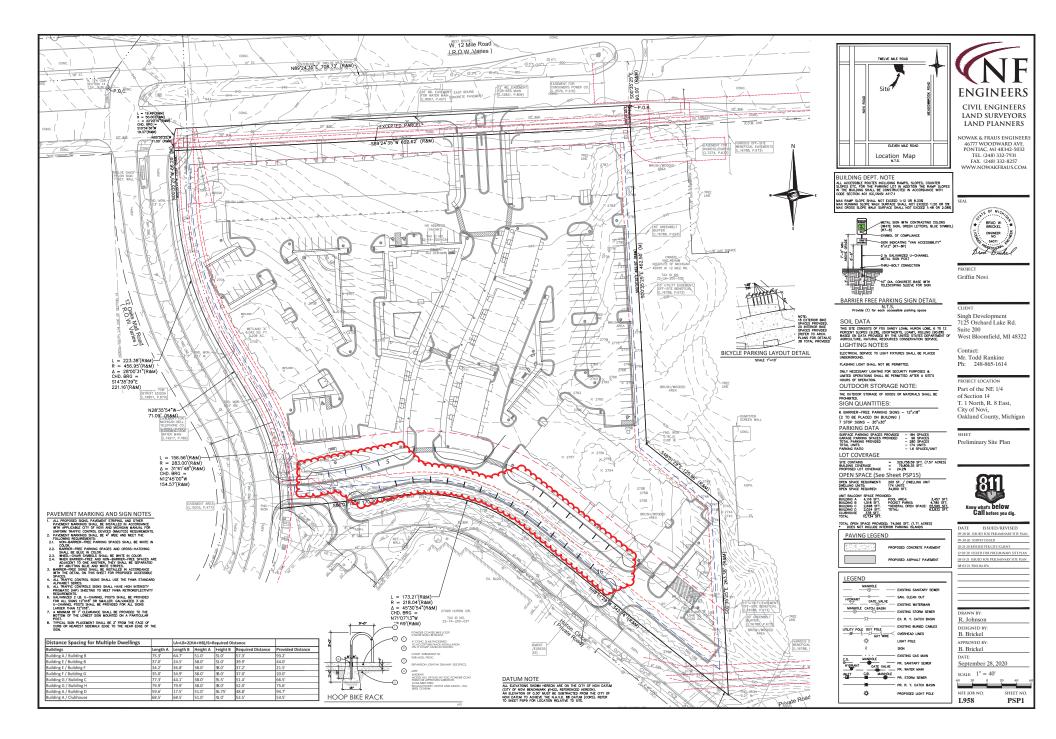




Exhibit 2

Parking Utilization Among Comparable Projects

The table below presents data pertaining to parking utilization among relevant comps in the local market. Some important take-aways include: Existing spaces per unit among the comp set range from 1.16 to 1.94, averaging 1.60 spaces per unit. Most leasing agents report that this is more parking than is necessary with an average of 46% utilized during the day and an average of 81% of full capacity reported to be sufficient. Following from this a ratio of 1.32 parking spaces/unit is sufficient among the set of comparables. A large presence of residents who work from home (15%) contributes to reduced reliance on cars and parking.

	Lofts at Weston Lakeside Survey	The Bristol Survey	Marq at Weston Survey	Bradford Apartments Survey	Bexley Panther Creek Survey	Parkside Place Survey	The Dakota	
			ALÊIR		HRITHE	atte		Summary
Total Units	215	260	302	370	288	294	314	299
Estimated Total Spaces	325	472	600	430	560	450	400	462
Spaces Per Unit	1.51	1.82	1.99	1.16	1.94	1.53	1.27	1.60
Spaces Per Bed	0.98	1.21	1.24	0.60	1.17	0.96	0.78	0.99
Bedrooms Per Door	1.54	1.50	1.61	1.93	1.67	1.59	1.62	1.64
Daytime Utilization	"Plenty"	30%	25-30%	81%	27%	CND	25-30%	46%
Evening Utilization	"Not been an issue"	98%	60-75%	100%	85%	CND	80-85%	94%
What % of Existing Parking Would Still Work?	85%	85%-90%	75%	81%	85%	78%	85%	81%
Utilized Spaces Per Unit	1.28	1.59	1.49	0.94	1.65	1.19	1.08	1.32
Work From Home	5%	10%	20-25%	30%	15%	"Few. Right near Research Park."	15-20%	15%
Walkscore	4	60	43	47	16	28	19	29

SOURCE: Noell Consulting Group, CoStar, Reports from Local Leasing Agents



From:	Erin Puckett				
To:	Avi Grewal				
Cc:	Todd Rankine				
Subject:	RE: Parking Study				
Date:	Wednesday, November 24, 2021 1:28:06 PM				
Attachments:	image001.png				
	image002.png				
	image003.png				
	image004.png				

Avi,

My apologies for the delay, this slipped through the cracks with so much going on before the holiday.

Our consultants for the Multi-Family Parking Study surveyed parking occupancy across three time periods on a weekday and weekend at 12 Cary apartment developments, and after inflating those peak rates to represent 100% unit occupancy, found that most multi-family developments in Cary could likely be adequately parked at a rate of approximately 1 space per bedroom. Based on these findings, as well as comparisons to some national-level industry-accepted rates (ITE and ULI), we hope to go forward to Council with the following recommendations:

Unit Type	Rate
1 Bedroom	1 sp./du
2 Bedroom	2 sp./du
3+ Bedroom	2.5 sp./du + 0.5 sp./bedroom over 3
Visitor Parking (all unit types)	0.15 sp./du

The main changes here are to the one-bedroom units, which are currently required to provide 2 spaces per unit, and to visitor parking, which is currently 0.25 spaces per unit. Two or more bedroom units would essentially stay the same. The option for an administrative reduction of up to 15% (so long as strong justification is provided) will remain for additional flexibility where warranted.

The associated LDO amendment is tentatively scheduled to go to public hearing at Council's Dec. 16th meeting, meaning the earliest this could likely get approved would be February. In the interim, we are using these study recommendations as the baseline for evaluating custom parking rates requested by applicants as part of PDD or MXD rezoning requests.

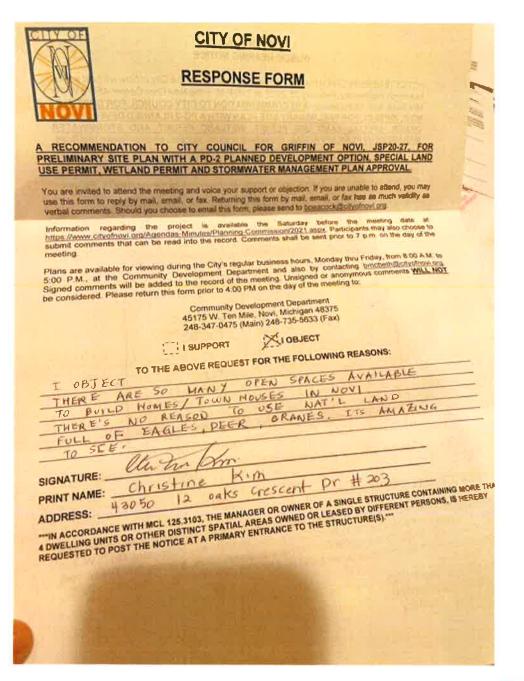
Please let me know if you have any questions about this information. We should have the full study document available to share soon.

Regards,

Erin Puckett, AICP Senior Planner Town of Cary Planning and Development Services 316 N Academy Street Cary, NC 27513

Peacock, Ben

From: Sent: To: Subject: christine kim <eens111@yahoo.com> Wednesday, February 9, 2022 11:19 PM Peacock, Ben Object to planned development



Sent from my iPhone

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CITY OF NOVI COMMUNITY DEVELOPMENT

A RECOMMENDATION TO CITY COUNCIL FOR GRIFFIN OF NOVI, JSP20-27, FOR PRELIMINARY SITE PLAN WITH A PD-2 PLANNED DEVELOPMENT OPTION, SPECIAL LAND USE PERMIT, WETLAND PERMIT AND STORMWATER MANAGEMENT PLAN APPROVAL.

You are invited to attend the meeting and voice your support or objection. If you are unable to attend, you may use this form to reply by mail, email, or fax. Returning this form by mail, email, or fax has as much validity as verbal comments. Should you choose to email this form, please send to <u>bpeacock@cityofnovi.org</u>.

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Community Development Department 45175 W. Ten Mile, Novi, Michigan 48375 248-347-0475 (Main) 248-735-5633 (Fax)

X I OBJECT TO THE ABOVE REQUEST FOR THE FOLLOWING REASONS: THIS PROPOSED SITE PLAN FOR 174 NEW UNITS ON 7.5 ACRES IS TOO LARGE THE ENCLAVE HAS ONLY 90 UNITS ON 16.689 ACRES. THIS PROPOSED SITE CANNOT BEALLOWED TO EXIT USING THE EXISTING MALLEXIT ROAD TO 12 MILE ROAD. THEY SHOULD ONLY BE ALLOWED TO EXIT DIRECTLY TO 12 MILE ROAD. THE MALL TRAFFIC IS TROHEAVY ON EASTER, THANKS GIVING AND CHRISTMAS BLACIL FRIDAY SHOPPING DAYS, THIS WILL CREATE EXCESSIVE CONJECTION. SIGNATURE: David J. Cheemwood, July Guenwood

PRINT NAME: ___

ADDRESS:

IN ACCORDANCE WITH MCL 125.3103, THE MANAGER OR OWNER OF A SINGLE STRUCTURE CONTAINING MORE THAN 4 DWELLING UNITS OR OTHER DISTINCT SPATIAL AREAS OWNED OR LEASED BY DIFFERENT PERSONS, IS HEREBY REQUESTED TO POST THE NOTICE AT A PRIMARY ENTRANCE TO THE STRUCTURE(S).

> David L. Greenwood 43050 12 Oaks Crescent Unit 3011 Novi, Mi 48377

Taeko Greenwood 43050 12 Oaks Crescent Unit #3011 Novi, MI 48377

* NOTE: INADDITION: WITH (2) CARS PER UNIT IT IS POSSIBLE THIS SITE PLAN COULD HAVE 348 CARS. THIS SITE PLAN ONLY HAS ABOUT 305 PARKING PLACES. WITH GUESTS THEY DO NOT HAVE ENOUGH PARKING PLACES.





RESPONSE FORM

FEB 1 4 2022

RECEMED

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X I OBJECT

TO THE ABOVE REQUEST FOR THE FOLLOWING REASONS:

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SIGNATURE: Mary Houp

PRINT NAME: MARY HOEY

ADDRESS: 43000 Twelve BAKS Crescent # 6055 NOVI 48377

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X I OBJECT I SUPPORT TO THE ABOVE REQUEST FOR THE FOLLOWING REASONS: SIGNATURE: onnie **PRINT NAME:** ADDRESS:

IN ACCORDANCE WITH MCL 125.3103, THE MANAGER OR OWNER OF A SINGLE STRUCTURE CONTAINING MORE THAN 4 DWELLING UNITS OR OTHER DISTINCT SPATIAL AREAS OWNED OR LEASED BY DIFFERENT PERSONS, IS HEREBY REQUESTED TO POST THE NOTICE AT A PRIMARY ENTRANCE TO THE STRUCTURE(S).

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USUPPORT TO THE ABOVE REQUEST FOR THE FOLLOWING REASONS: SIGNATURE: PRINT NAME: ADDRESS:

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TO THE ABOVE REQUEST FOR THE FOLLOWING REASONS:

SIGNATURE: PRINT NAME: 48370 1 ADDRESS: RESCENT KS

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FEB 1 8 2022

Griffin Twelve Oaks

Twelve Mile Road - Between Novi Rd. & Meadowbrook Rd.

General Sheet Index

Tree Preservation Plan

Landscape Notes and Details

Preliminary Gradina Plan (1 of 2)

Preliminary Grading Plan (2 of 2)

Fire Truck Turning Plan / Hydrant Coverage Plan

Preliminary Utility Plan (1 of 2)

Preliminary Utility Plan (2 of 2)

Woodlands/Wetlands Plan

Landscape Plan

Overall Survey

Preliminary Site Plan

Cover Sheet

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Sheet No Title

Sheet No. Title

G 001

L1 12

L3

PSP1

PSP2

PSP3

PSP4

PSP5

PSP6

PSP7

BSB8

Owner

Singh Development, LLC 7125 Orchard Lake Road suite 200 West Bloomfield, MI 48322 Todd Rankine Director of Architecture and Planning trankine@singhmail.com 248-866-9799

Architect

Krieger | Klatt Architects Inc. 2120 E. 11 Mile Rd. Royal Oak, MI 48067 P.248.414.9270 F.248.414.9275

Civil Engineer

Nowak & Fraus Engineers 46777 Woodward Avenue Pontiac, Michigan 48342 P.248.332.7931

PSP9	Boundary / Topographic / Tree Survey
PSP10	Boundary / Topographic / Tree Survey
PSP11	MDOT Right-of-Way Topographic Survey
PSP12	Storm Water Management Plan (1 of 3)
PSP13	Storm Water Management Plan (2 of 3)
PSP14	Storm Water Management Plan (3 of 3)
PSP15	Open Space Plan
PSP16	Sidewalk Ramp Details Plan
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A.101	Apartment Building 'A' - Second & ThirdFloor Plans
A.102	Apartment Building 'B' - Floor Plans
A.103	Apartment Building 'B' - Floor Plans
A.104	Apartment Building 'C' - Floor Plans
A.105	Apartment Building 'C' - Floor Plans
A.106	Apartment Building 'D' - Floor Plans
A.107	Apartment Building 'D' - Floor Plans
A.108	Clubhouse - First Floor Plan
A.109	Clubhouse - Second & Third Floor Plans
A.110	Typical Townhouse Plans
A.111	Typical Townhouse Plans
A.112	Typical Townhouse Plans
A.200	Apartment Building 'A' - Elevations
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A.302	Dumpster Enclosure Details

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P2	Building A Photometric Elevations
P3	Building B Photometric Elevations
P4	Building C Photometric Elevations

- Building D Photometric Elevations
- P6 Clubhouse Photometric Elevations P7 Typical Townhouse Photometric Elevations
- North Location Map NTS

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	A grigt View L	ooking South Wes

Aerial View Looking South West



krieger klatt

Singh Development, LLC 7125 Orchard Lake Road suite 200 West Bloomfield, MI 48322

Client:

Project:

Griffin Novi 12 Mile Rd. Novi

Issued

03-15-2021

08-03-2021

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ARCHITECTS architecture interiors consulting 1412 E. 11 Mile Rd. | Royal Oak, MI 48067 P: 248.414.9270 F: 248.414.9275 www.krieaerklaft.com

Description

Prelim, Site Plan

Review Prelim. Site Plan

iew Im. Site Plat

Prelim. Site

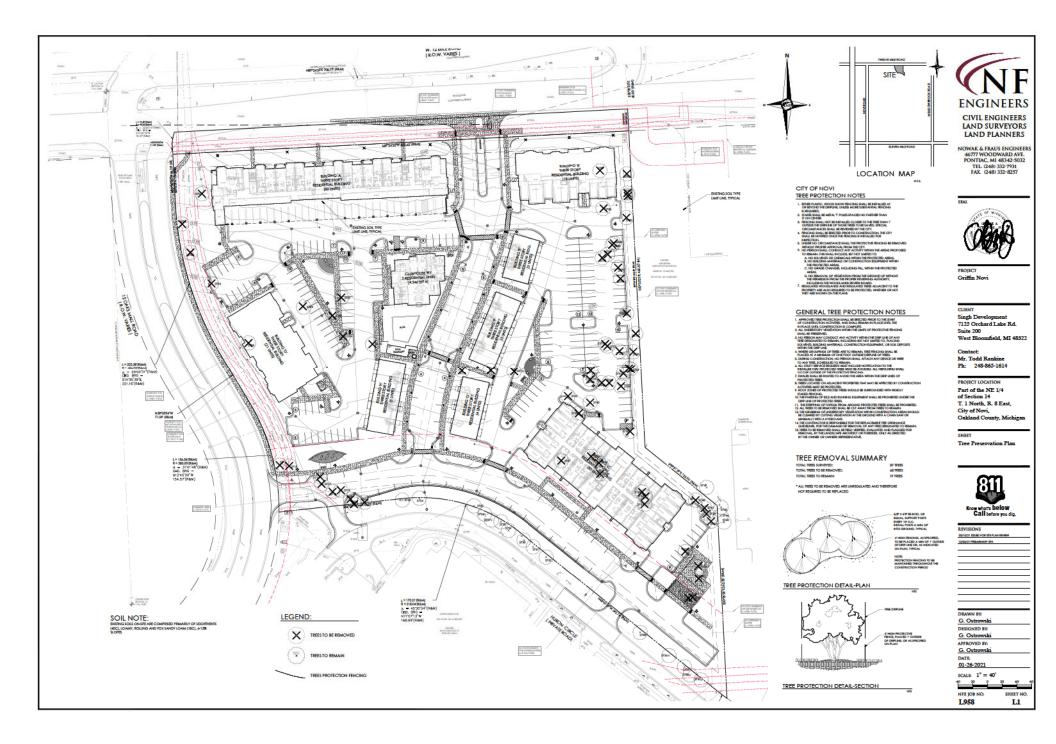
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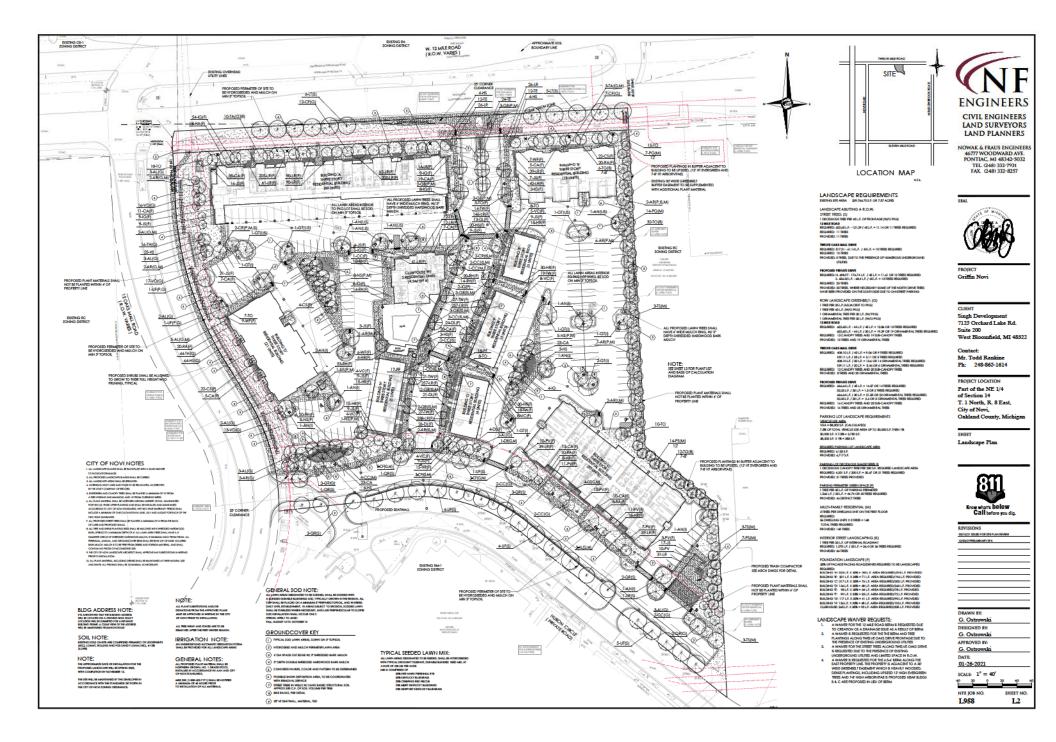
Unit Miı	n. Areas	Site Toto	ls						
Unit Type	Min. SF's	Building Type	Unit Type					Building Type	# Parking Spots
Studio	500 SF	1	Studio	1 Bedroom	2 Bedroom	3 Bedroom	Building Unit Total	Building A	30
1 Bedroom	775 SF	Building A	6	37	17	0	60	Building B	10
2 Bedroom	1,100 SF	Building B	0	6	9	3	18	Building C	12
3 Bedroom	1,250 SF	Building C	11	32	12	0	55	Building D	10
		Building D	0	6	11	4	21	Townhouses	34
		Rest of Site	0	3	9	8	20	Surface Parking	212
		Unit Type Total	17	84	58	15	174	Total Parking	308
		% of Total Units	09.8%	48.3%	33.3%	08.6%	100%	Parking Ratio	1.77

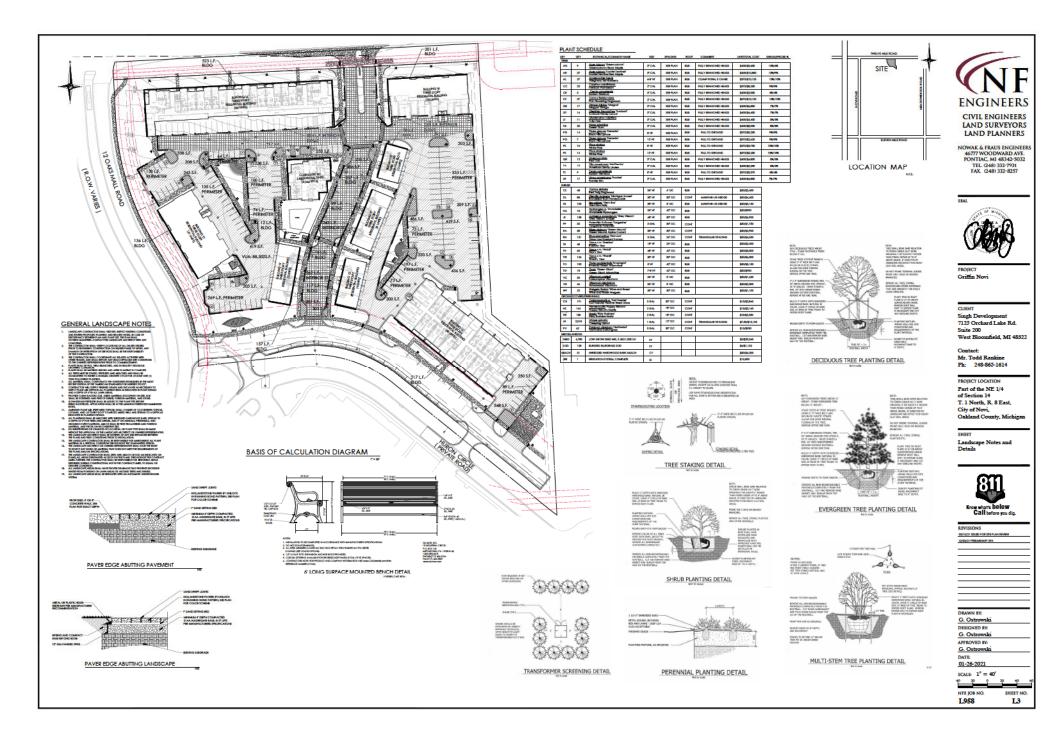


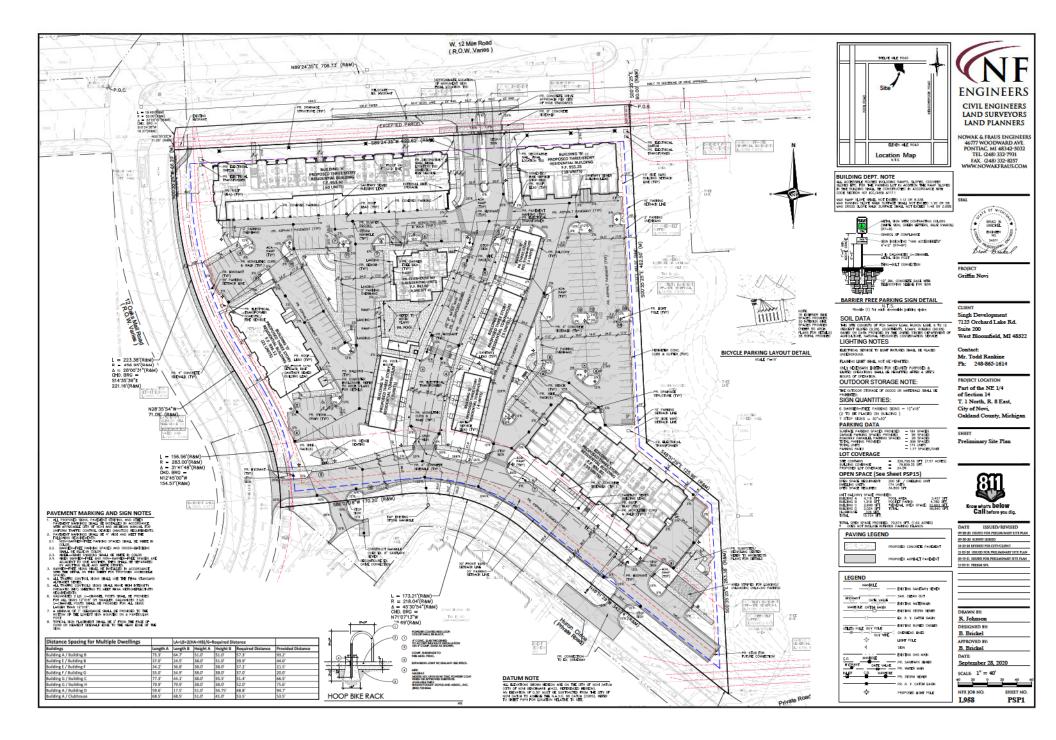
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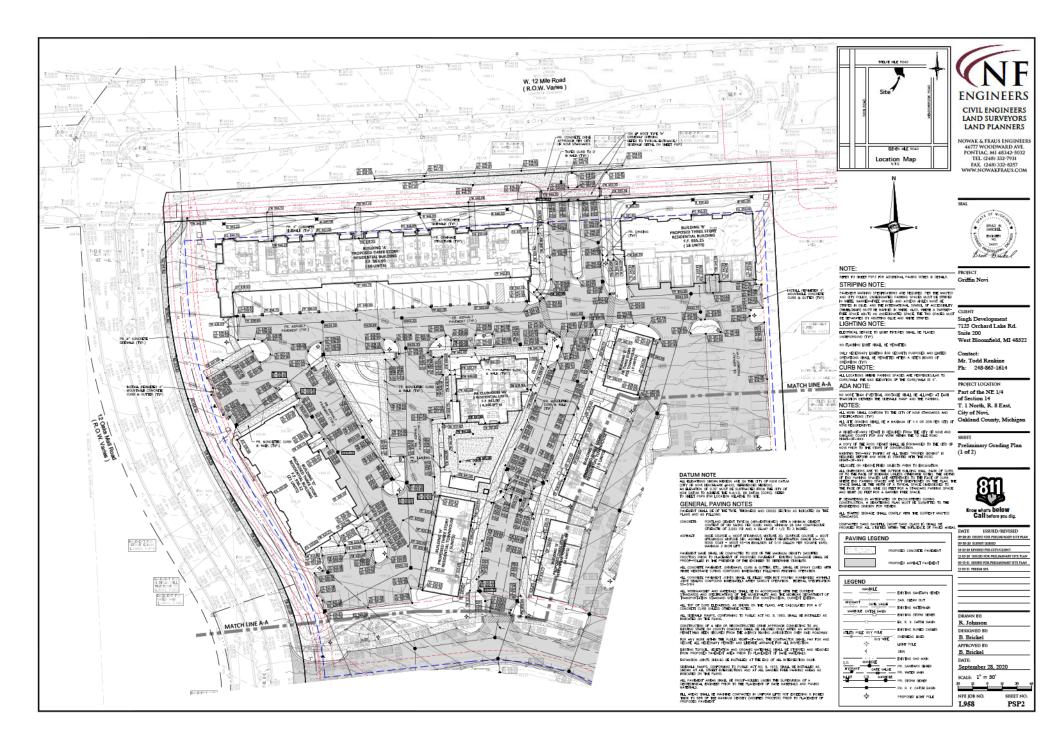
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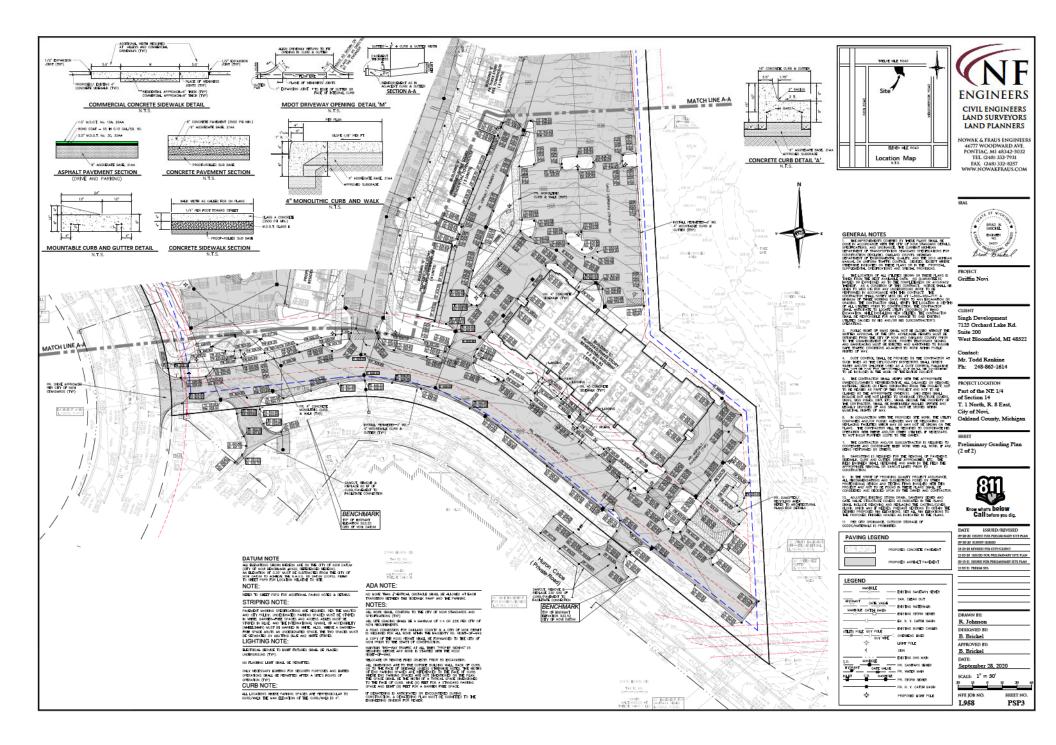


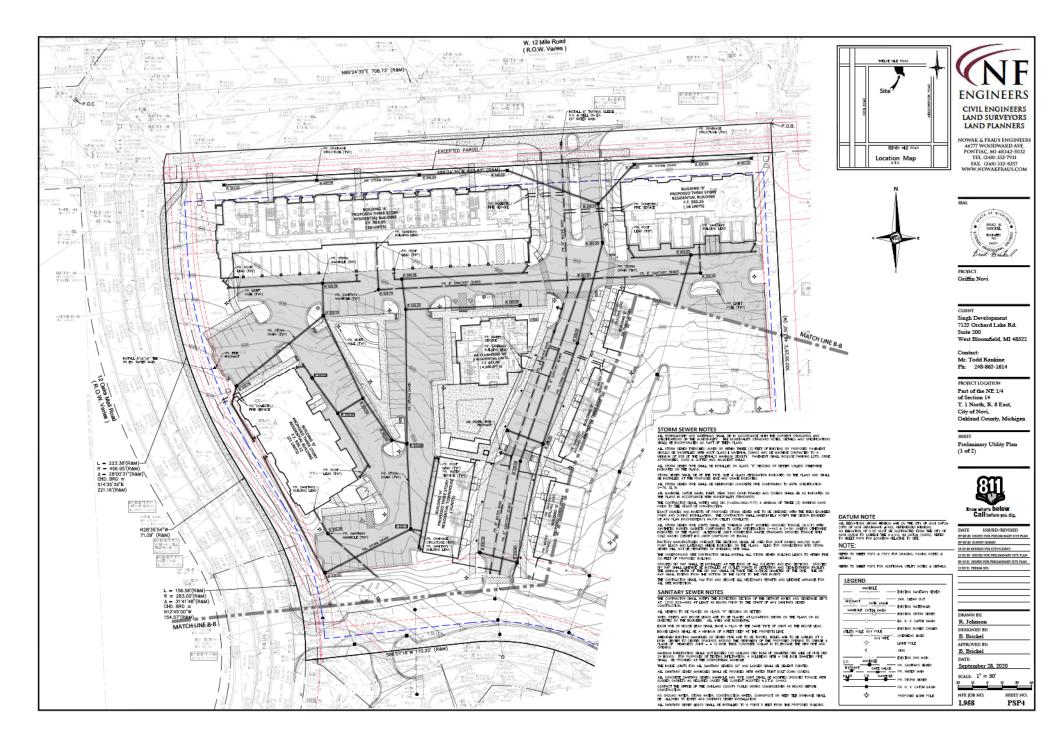


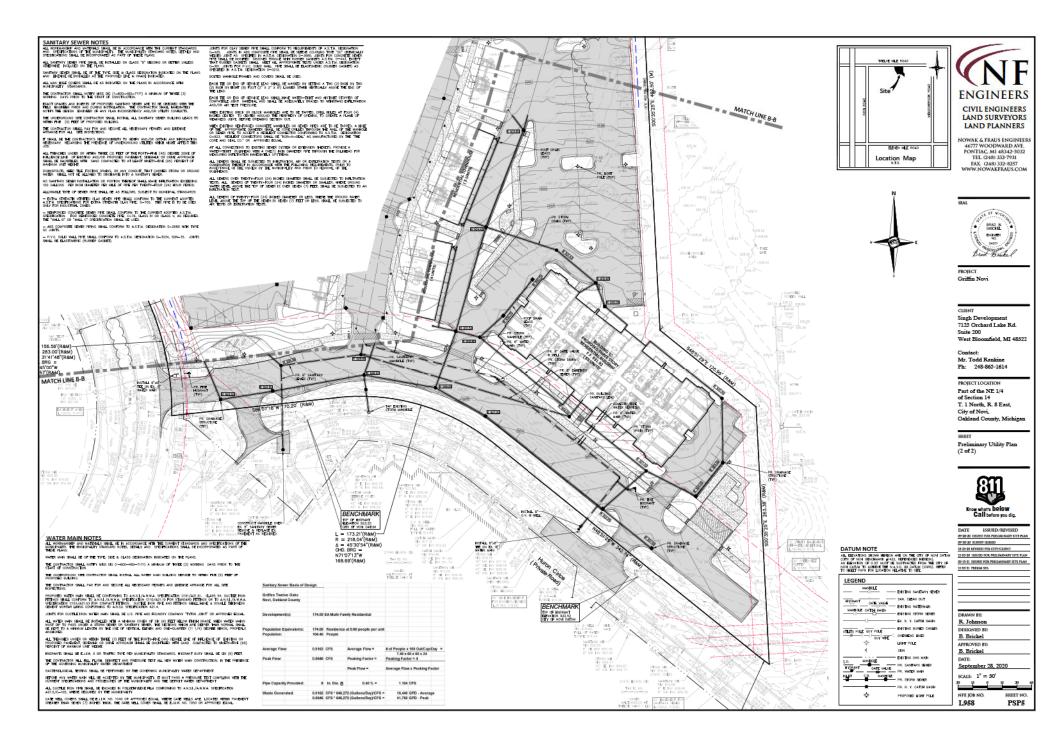


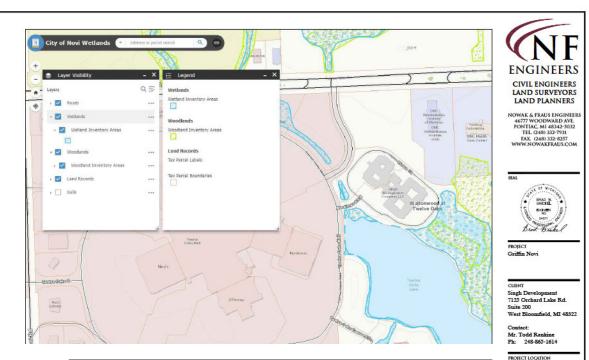


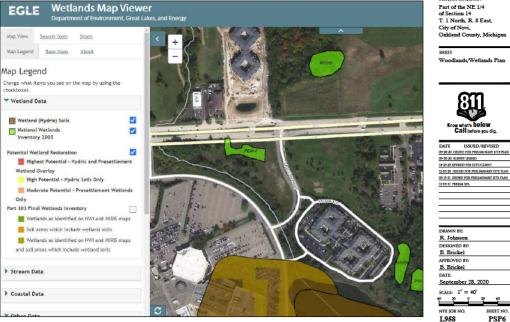








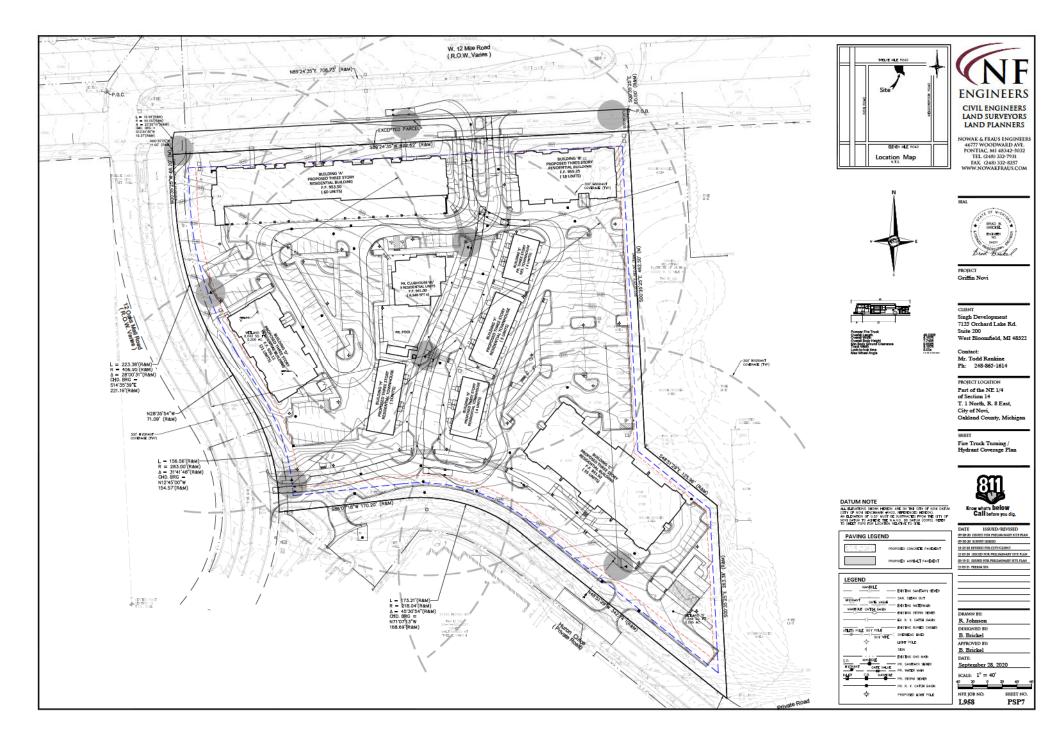


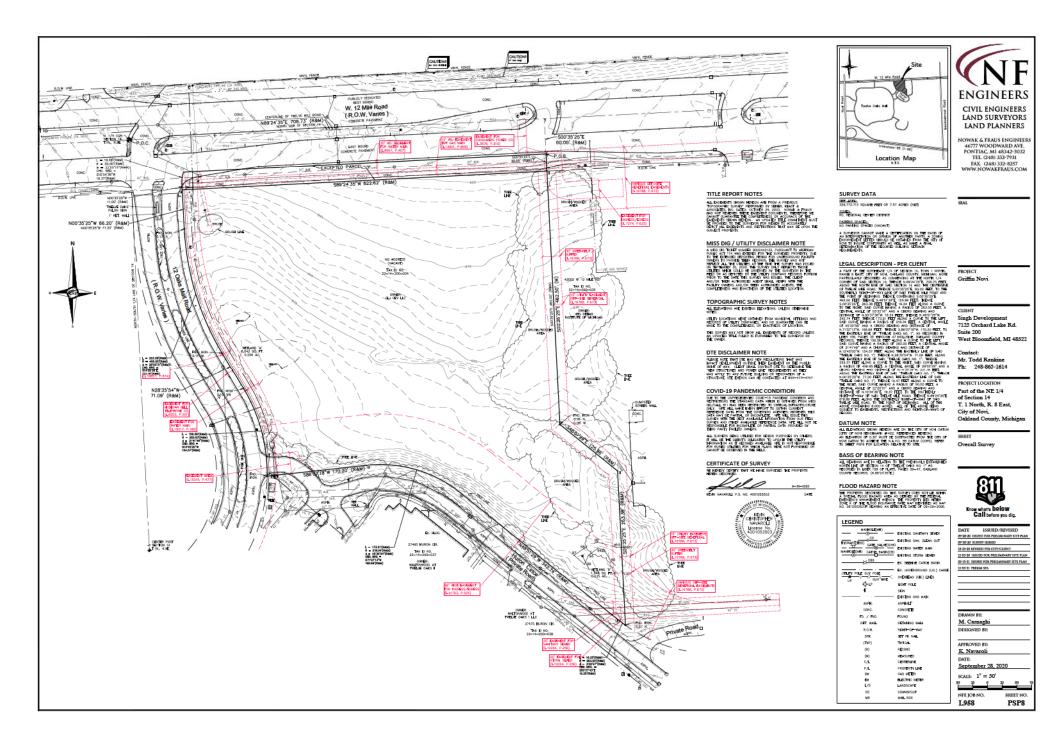


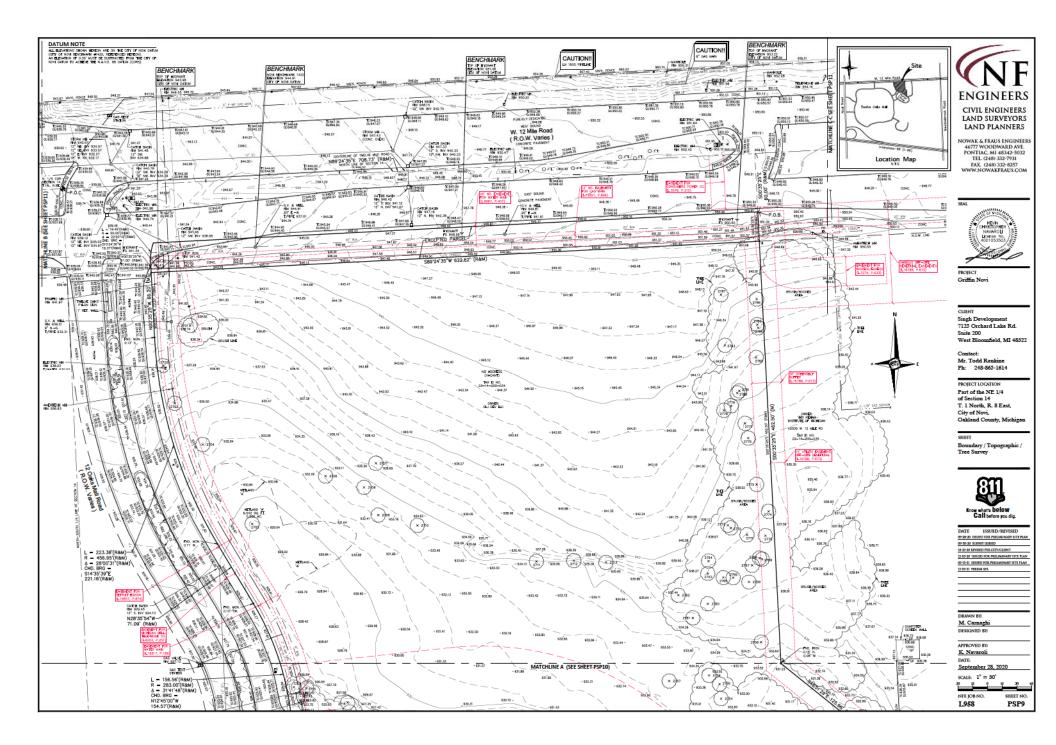
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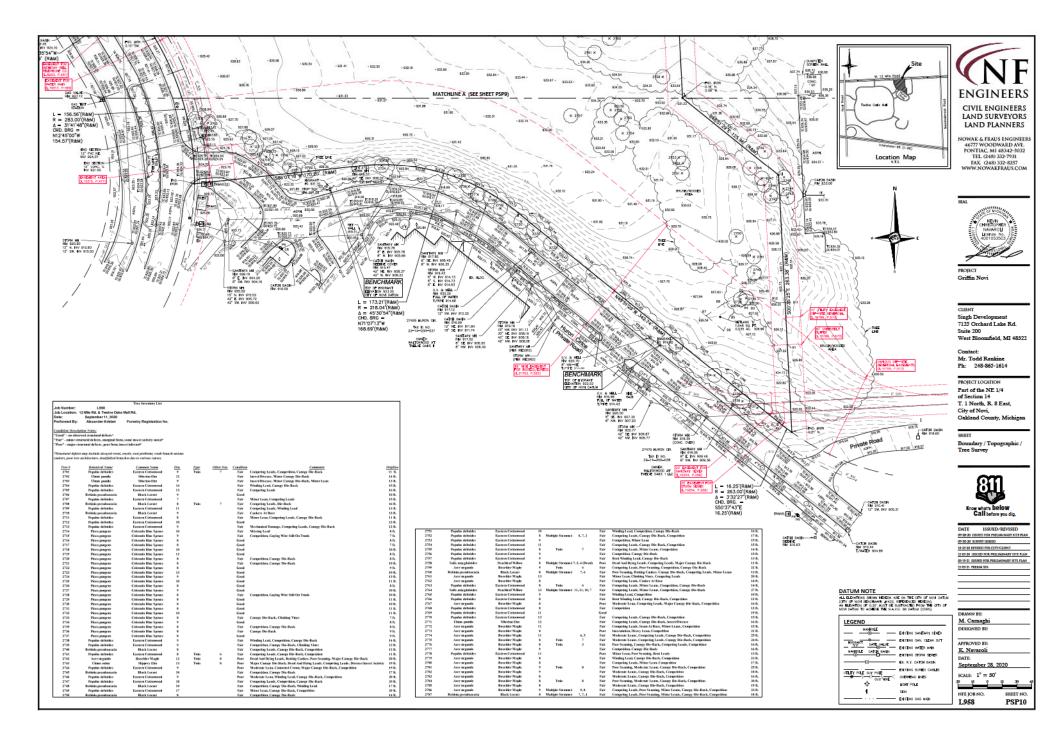
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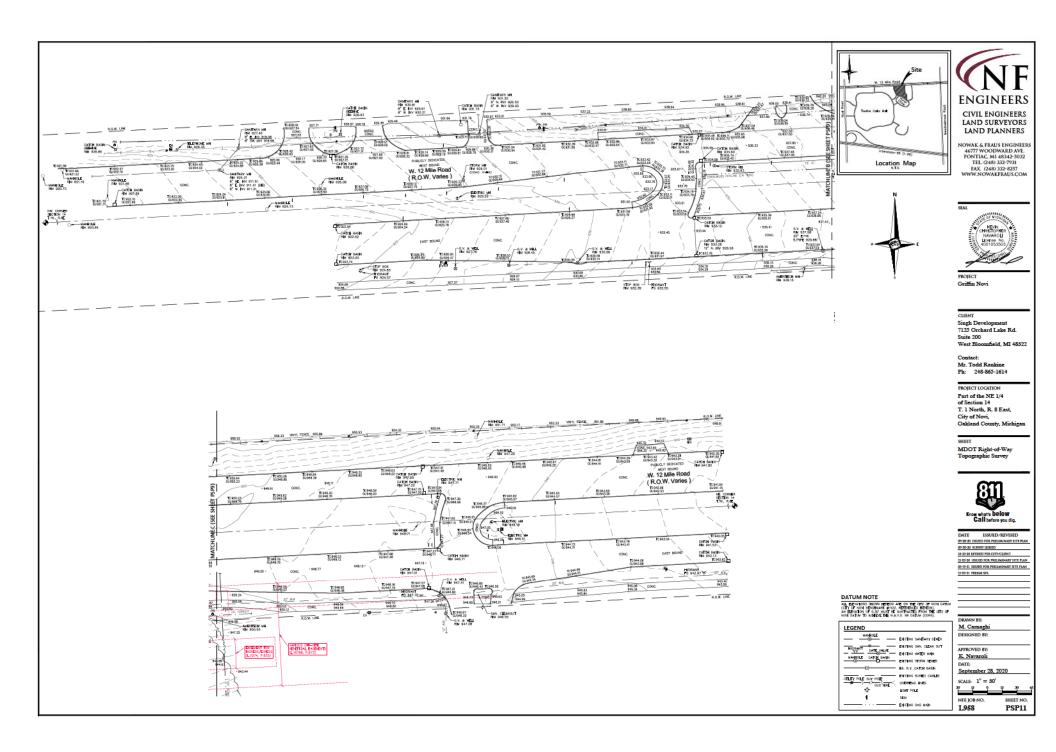
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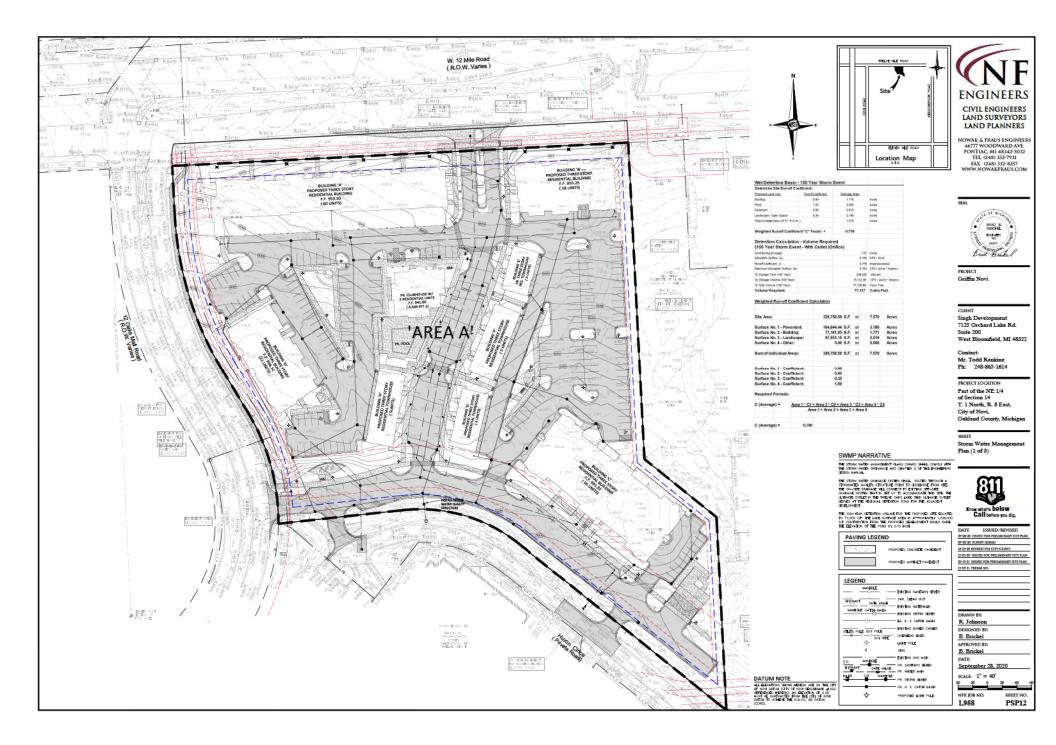














NOWAK & FRAUS ENGINEERS 46777 WOODWARD AVE PONTIAC, MI 48342-5032 TEL (248) 332-7931 FAX. (248) 332-8257 WWW.NOWAKFRAUS.COM



PROJECT Griffin Novi

CLIENT Singh Develops 7125 Orchard Lake Rd. Suite 200 West Bloomfield, MI 48322

Contact: Mr. Todd Rankine Ph: 248-865-1614

PROJECT LOCATION Part of the NE 1/4 of Section 14 T. 1 North, R. 8 East, City of Novi, Oakland County, Michigan

SHEET Storm Water Management Plan (2 of 3)



Know	what's below all before you dig.
DATE	ISSUED/REVISED
09-28-20 153	URD FOR PRELIMINARY SITE FLAN
09-30-30 50	RVEY ISSUED
10-13-20 KPV	ISED PER CITY/CLIENT
12-09-20 155	UED FOR PRELIMINARY STEE FLAN
03-15-21 1559	JED FOR FRELININARY STE FLAN
12-03-21 PRA	LIM SPA

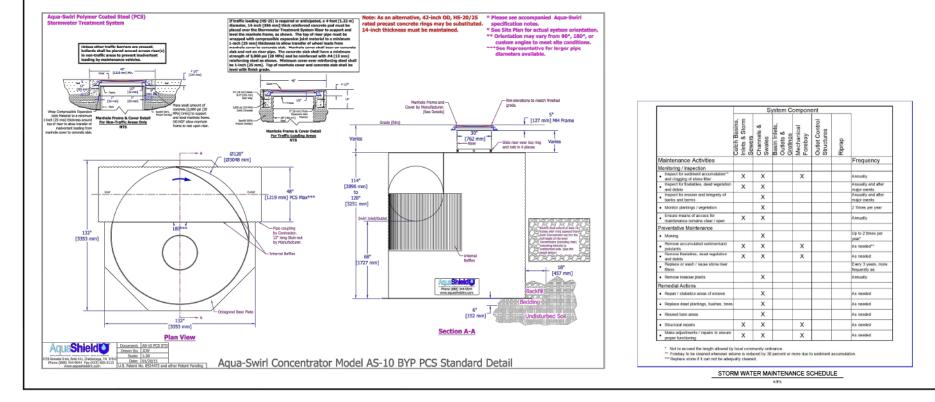
		_
		_
DRAWN BY:		
R. Johnson		
DESIGNED BY:		
B. Brickel		
APPROVED BY:		_
B. Brickel		
DATE		
September 28, 2020		
SCALE: 1" = 40'		
0 20 0 20	60	

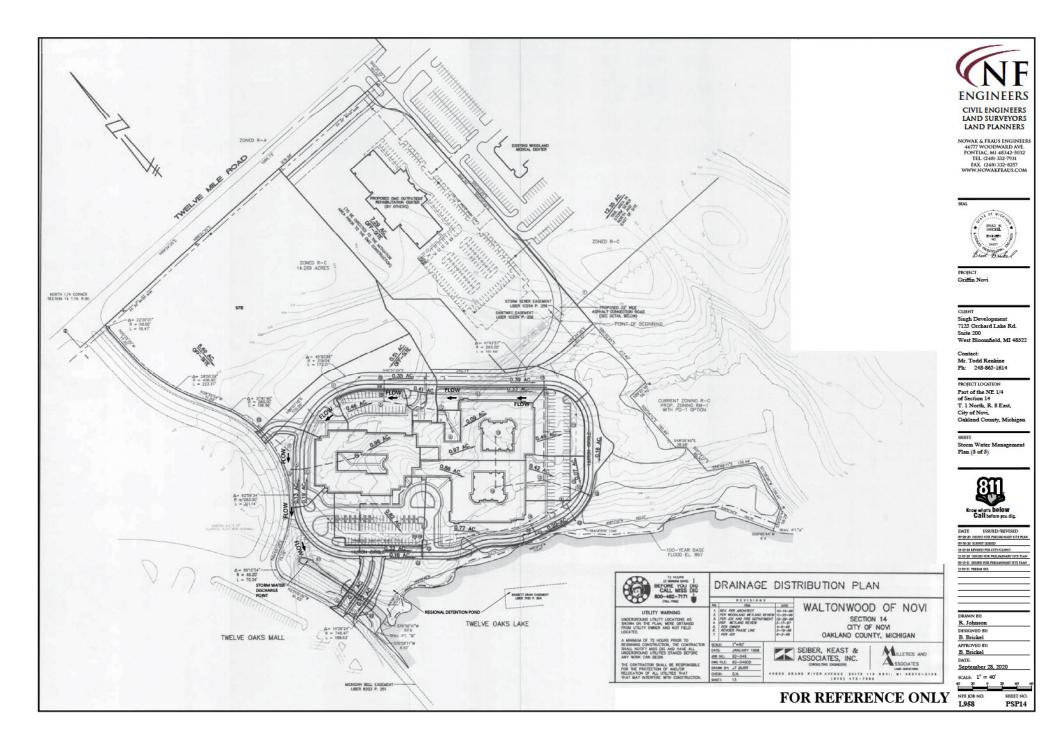
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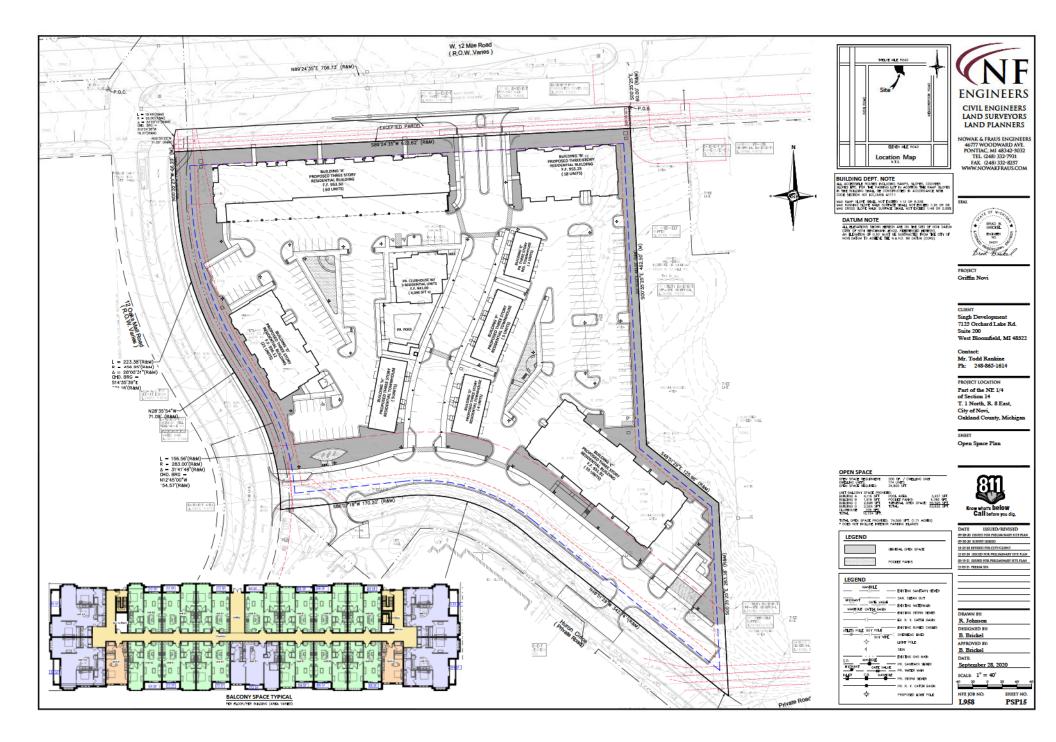
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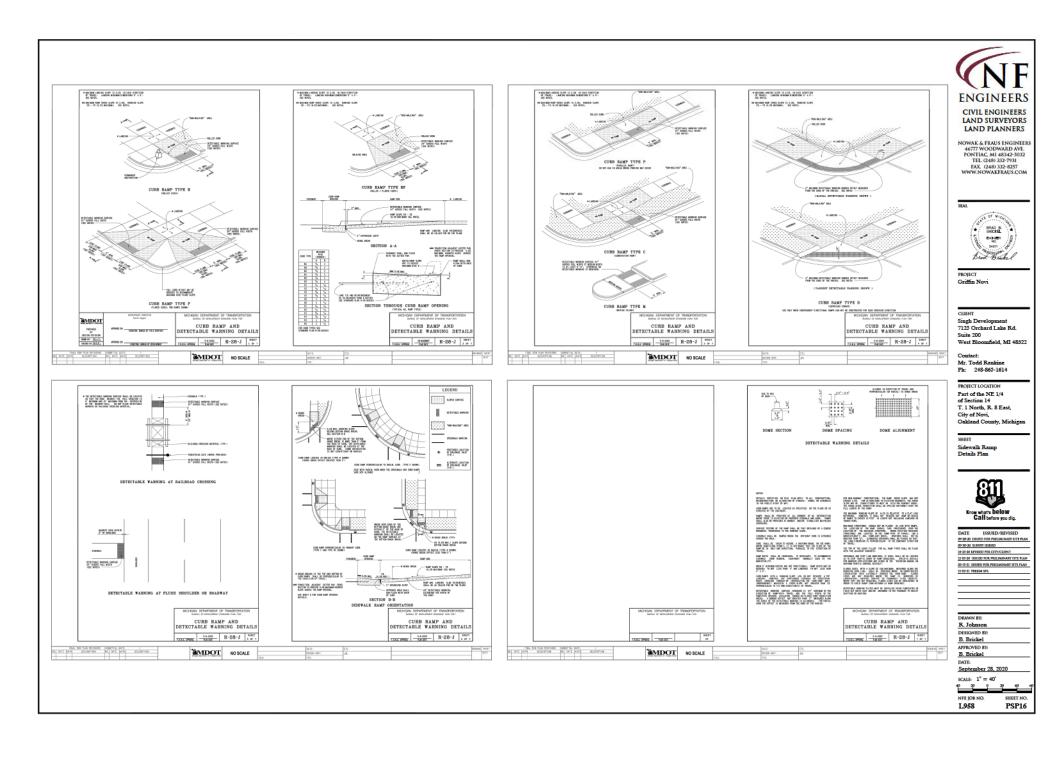
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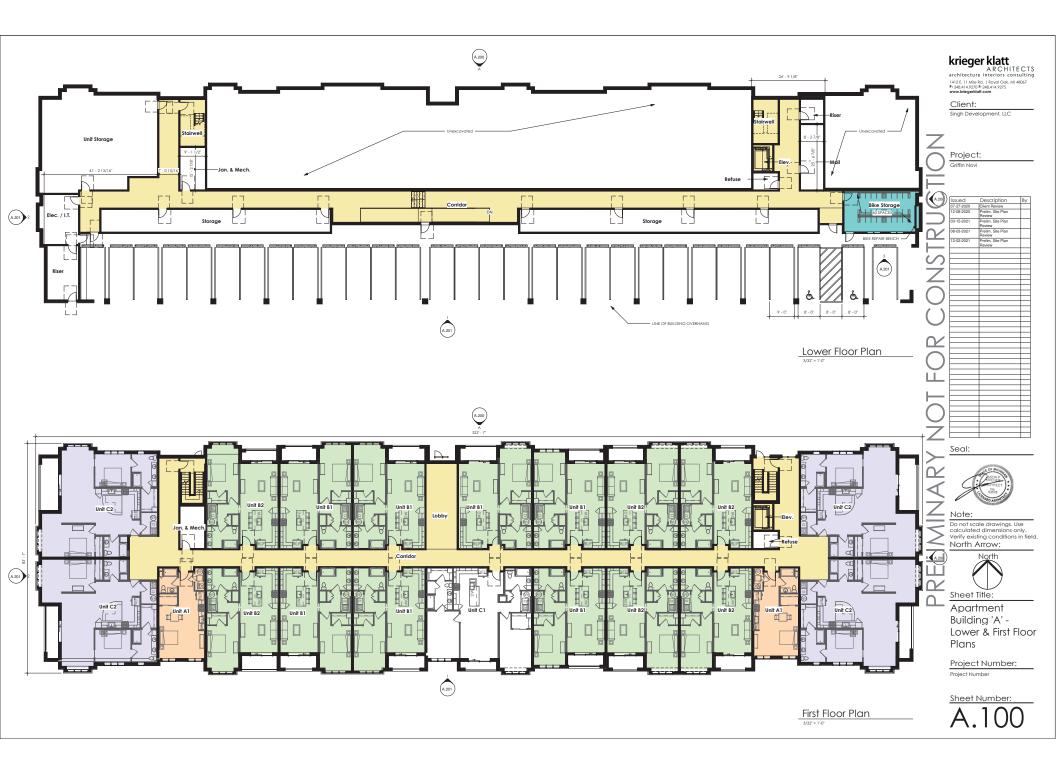
L958

















Bv



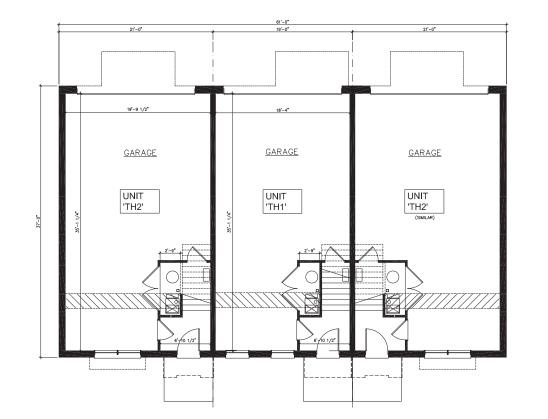




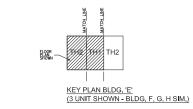












SCALE: 1/4" = 1'-0"

krieger klatt ARCHITECTS architecture Interiors consulting 2120 Ext Bover Mile Rood, Royal Ook, MI 49307 Mover 2041 47207 Processed 47205 Web Integration

Client: Singh Developments, LLC

Project:

Uptown Place

ssued:	
12-08-2020	Prelim Site Plan
	Review
03-15-2021	Prelim Site Plan
	Review
08-03-2021	Prelim Site Plan
	Kevlew
12-02-2021	Prelim Site Plan
	Review

Seal:



Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

North Arrow:

Sheet Title: Typical Townhouse Plans

Scale: 1/4" = 1'-0"

Project Number: 20-047

Sheet Number:

A.110

krieger klatt AR CHITECTS architecture Interfors consulting 2120 East Beven Mit Road, Royal Ook, Markinger Mones Beilinger Meissenweitzen

Client: Singh Developments, LLC



lssued: 12-08-2020 Prelim Site Plan Review 03-15-2021 Prelim Site Plan Review 08-03-2021 Prelim Site Plan Review Prelim Site Plan 12-02-2021





Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

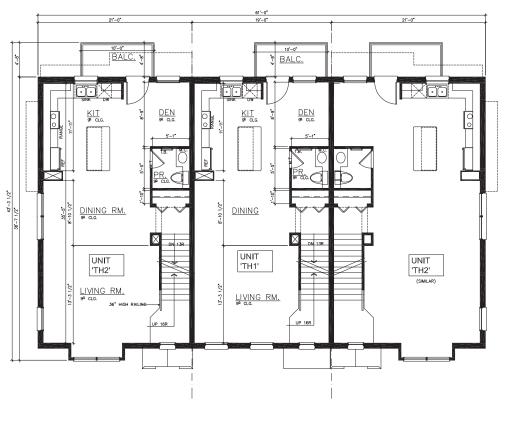
North Arrow:

Sheet Title: Typical Townhouse Plans

Scale: 1/4" = 1'-0"

Project Number: 20-047

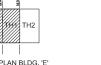




SECOND FLOOR PLANS - UNITS A & B



SCALE: 1/4" = 1'-0"





krieger klatt ARCHITECTS schitecture Interfors consulting 2120 East Breen ME Rood. Royel Ook. MI 4807 Word Baltstop Rozeld Alexa Web Integenitizen Client: Singh Developments, LLC

Project:

Uptown Place





Note:

Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

North Arrow:

Sheet Title: Typical Townhouse Plans

Scale: 1/4" = 1'-0"

Project Number: 20-047

Sheet Number:

TOH LINE N

TAN 1

TH2 TH1 TH2

KEY PLAN BLDG. 'E' (3 UNIT SHOWN - BLDG. F, G, H SIM.)

FLOOR PLAN SHOWN

SCALE: 1/4" = 1'-0"

A.112



THIRD FLOOR PLANS - UNITS A & B









FRONT (NORTH) ELEVATION:

LEFT (EAST) SIDE ELEVATION:

TOTAL WALL AREA:





A Southwest Elevation



A 104 3/32" = 1'-0"

Prelim: Site Plan Review Unit Area Plans Prelim: Site Plan Review Prelim: Site Plan Review Prelim: Site Plan Review Prelim: Site Plan Deview 0-05-2020 \sim 03-15-2021 \vdash S 12-02-2021 view Ż \bigcirc \bigcirc \sim LĹ. Ż Seal: \triangleleft Z Note: _ Do not scale drawings. Use calculated dimensions only. Do not scale and calculated dimensions only. Verify existing conditions in field. North Arrow: Ш \sim Sheet Title: Apartment Building 'C' -Elevations

krieger klatt ARCHITECTS architecture interiors consulting 1412E.11 Mile Rd. | Royal Oak, MI 48067 1: 264.14.9275 www.kriegerklat.com

Client: Singh Development, LLC

Project:

Issued Description 07-27-2020 Client Review 08-27-2020 Prelim. Site Plan By

Griffin Novi

Project Number: Project Number



EXTERIOR MATERIAL PERCENTAGES:

FRONT (SOUTHWEST) ELEVATION:			REAR (NORTHEAST) ELEVATION:		
TOTAL ELEVATION AREA:	11,543 SQ.FT.		TOTAL WALL AREA:	11,549 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	3,892 SQ.FT. 3,613 SQ.FT. 421 SQ.FT. 2,932 SQ.FT. 685 SQ.FT.	33.7% 31.3% 03.6% 25.4% 06.0%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	3,847 SQ.FT. 3,762 SQ.FT. 323 SQ.FT. 2,932 SQ.FT. 685 SQ.FT.	33.3% 32.5% 02.8% 25.4% 06.0%
LEFT_(NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE ELEVATION	<u>.</u>	
TOTAL WALL AREA:	3,502 SQ.FT.		TOTAL WALL AREA:	3,905 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	1,302 SQ.FT. 1,830 SQ.FT. 200 SQ.FT. 38 SQ.FT. 132 SQ.FT.	37.2% 52.2% 05.7% 01.1% 03.8%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	1,458 SQ.FT. 1,877 SQ.FT. 200 SQ.FT. 38 SQ.FT. 132 SQ.FT.	42.5% 48.0% 05.1% 01.0% 03.4%



A.205



RONT (NORTHEAST) ELEVATION:			REAR (SOUTHWEST) ELEVATION:		
TOTAL ELEVATION AREA:	6,973 SQ.FT.		TOTAL WALL AREA:	7,541 SQ.FT.	
MASONRY:	2,204 SQ.FT.	31.6%	MASONRY:	2,615 SQ.FT.	34.7%
SIDING/TRIM:	2,228 SQ.FT.	32.0%	SIDING/TRIM:	1,879 SQ.FT.	25.0%
METAL PANEL:	145 SQ.FT.	02.1%	METAL PANEL:	373 SQ.FT.	04.9%
ASPHALT SHINGLES:	2,324 SQ.FT.	33.3%	ASPHALT SHINGLES:	2,212 SQ.FT.	29.3%
STANDING SEAM METAL:	72 SQ.FT.	01.0%	STANDING SEAM METAL:	462 SQ.FT.	06.1%
EFT (NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE BASE FLOO	<u>R:</u>	
TOTAL WALL AREA:	3,740 SQ.FT.		TOTAL WALL AREA:	3,947 SQ.FT.	
MASONRY:	1,230 SQ.FT.	32.9%	MASONRY:	1,326 SQ.FT.	33.6%
SIDING/TRIM:	2,094 SQ.FT.	56.0%	SIDING/TRIM:	2,210 SQ.FT.	56.0%
METAL PANEL:	94 SQ.FT.	02.5%	METAL PANEL:	73 SQ.FT.	01.8%
ASPHALT SHINGLES:	322 SQ.FT.	08.6%	ASPHALT SHINGLES:	338 SQ.FT.	08.6%
STANDING SEAM METAL:	N/A SQ FT	N/A%	STANDING SEAM METAL:	N/A SQ FT	N/A%



ERONT (NORTHEAST) ELEVATION:			REAR (SOUTHWEST) ELEVATION:	
TOTAL ELEVATION AREA:	6,973 SQ.FT.		TOTAL WALL AREA:	7,541
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	2,204 SQ.FT. 2,228 SQ.FT. 145 SQ.FT. 2,324 SQ.FT. 72 SQ.FT.	31.6% 32.0% 02.1% 33.3% 01.0%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	2,615 1,875 373 5 2,212 462 5
LEFT (NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE BASE FLOOR:	
70711 10111 1051	0.740.00.77		70741 10411 4054	0.045

METAL PANEL: ASPHALT SHINGLES:	145 SQ.FT. 2.324 SQ.FT.	02.1% 33.3%	METAL PANEL: ASPHALT SHINGLES:	373 SQ.FT. 2.212 SQ.FT.	04.9 29.3
STANDING SEAM METAL:	72 SQ.FT.	01.0%	STANDING SEAM METAL:	462 SQ.FT.	06.1
(NORTHWEST) SIDE ELEVATION:			RIGHT (SOUTHEAST) SIDE BASE FLOO	R:	
TOTAL WALL AREA:	3,740 SQ.FT.		TOTAL WALL AREA:	3,947 SQ.FT.	
MASONRY:	1,230 SQ.FT.	32.9%	MASONRY:	1,326 SQ.FT.	33.6
SIDING/TRIM:	2.094 SQ.FT.	56.0%	SIDING/TRIM:	2.210 SQ.FT.	56.0
METAL PANEL:	94 SQ.FT.	02.5%	METAL PANEL:	73 SQ.FT.	01.8
ASPHALT SHINGLES:	322 SQ.FT.	08.6%	ASPHALT SHINGLES:	338 SQ.FT.	08.6
STANDING SEAM METAL:	N/A SQ.FT.	N/A%	STANDING SEAM METAL:	N/A SQ.FT.	N/A





krieger klatt ARCHITECTS architecture interiors consulting 14/2E 11 Mile Rd. | Royal Odr. MI 48087 12:248.14/3270 F 248.114.9275 www.kriegerklatt.com



By

Project:



1 Rear Elevation

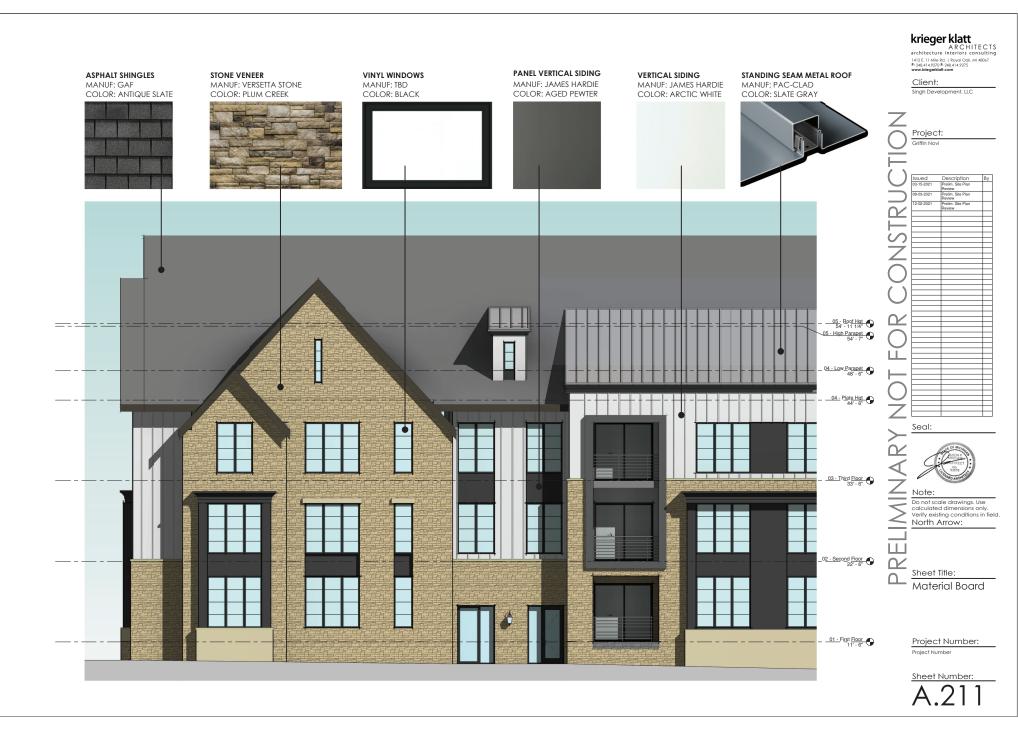


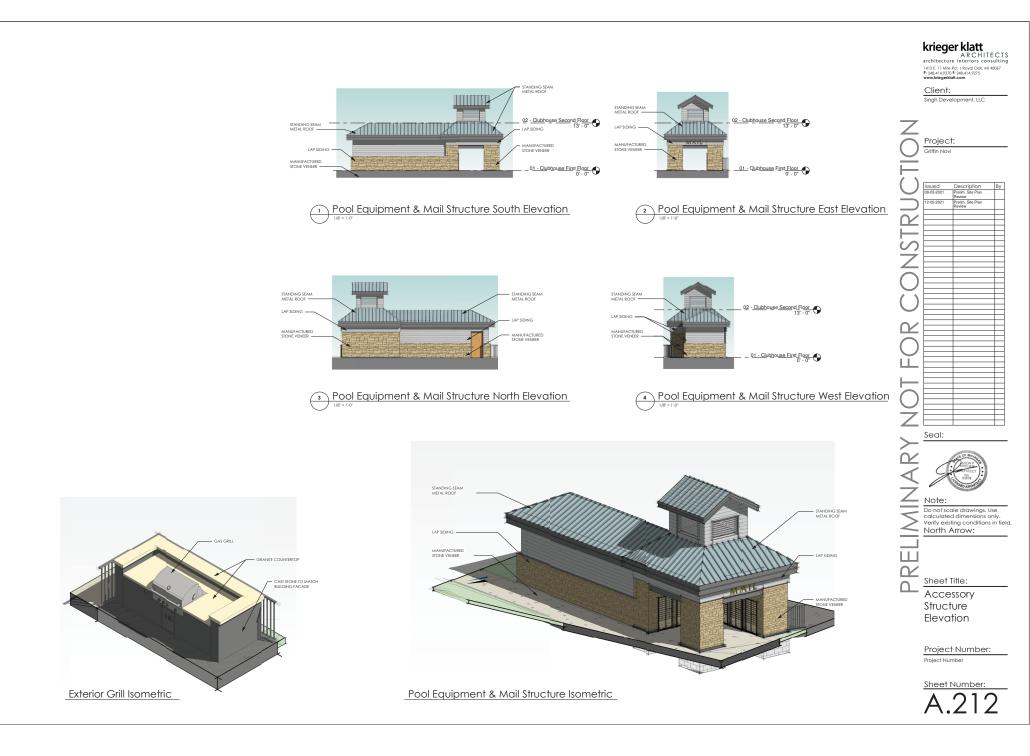
ONT ELEVATION:			REAR ELEVATION:		
TOTAL ELEVATION AREA:	2,220 SQ.FT.		TOTAL WALL AREA:	2,240 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	704 SQ.FT. 759 SQ.FT. N/A SQ.FT. 713 SQ.FT. 44 SQ.FT.	31.7% 34.2% N/A% 32.1% 2.0%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	734 SQ.FT. 730 SQ.FT. N/A SQ.FT. 776 SQ.FT. N/A SQ.FT.	32.8% 32.6% N/A% 34.6% N/A%
FT SIDE ELEVATION:			RIGHT SIDE ELEVATION:		
TOTAL WALL AREA:	1,509 SQ.FT.		TOTAL WALL AREA:	1,509 SQ.FT.	
MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	762 SQ.FT. 639 SQ.FT. N/A SQ.FT. 108 SQ.FT. N/A SQ.FT.	50.5% 43.3% N/A% 7.2% N/A%	MASONRY: SIDING/TRIM: METAL PANEL: ASPHALT SHINGLES: STANDING SEAM METAL:	762 SQ.FT. 639 SQ.FT. N/A SQ.FT. 108 SQ.FT. N/A SQ.FT.	50.5% 43.3% N/A% 7.2% N/A%

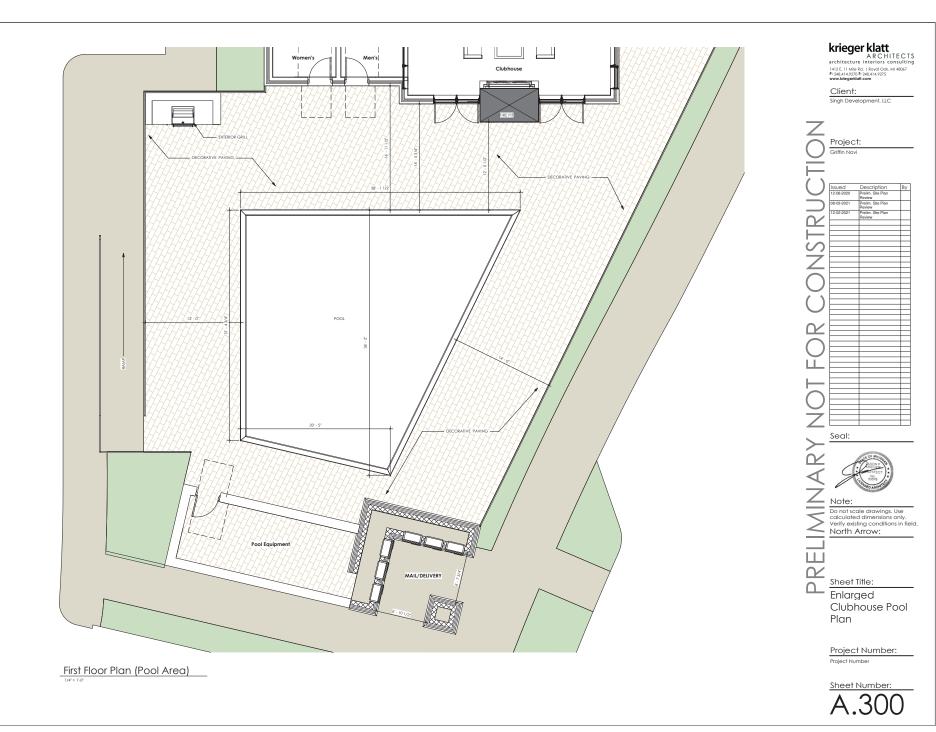


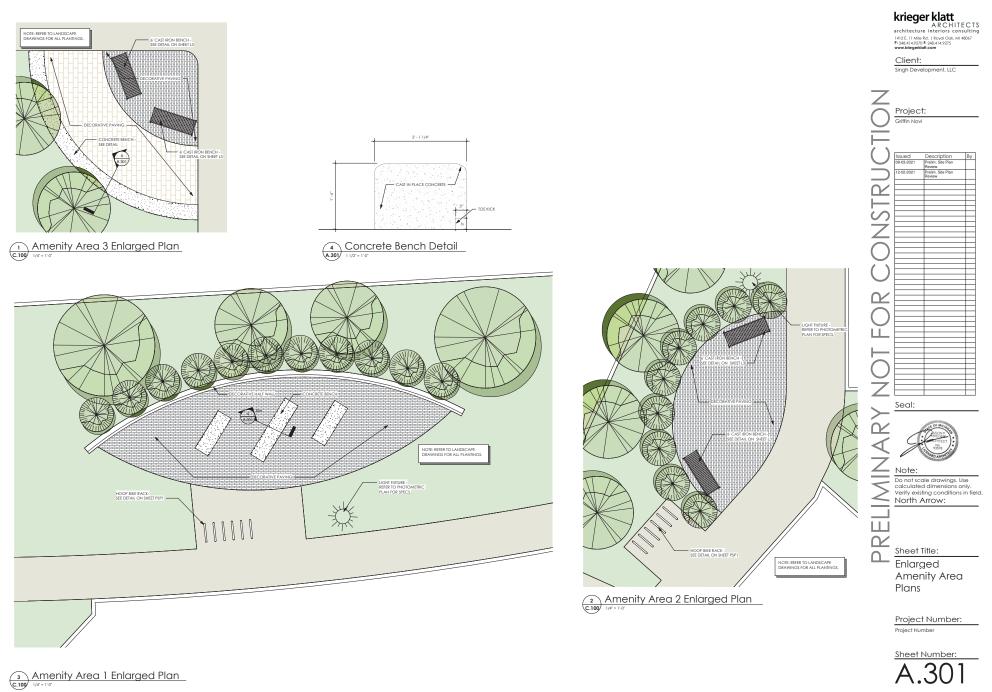
Project Number: Project Number

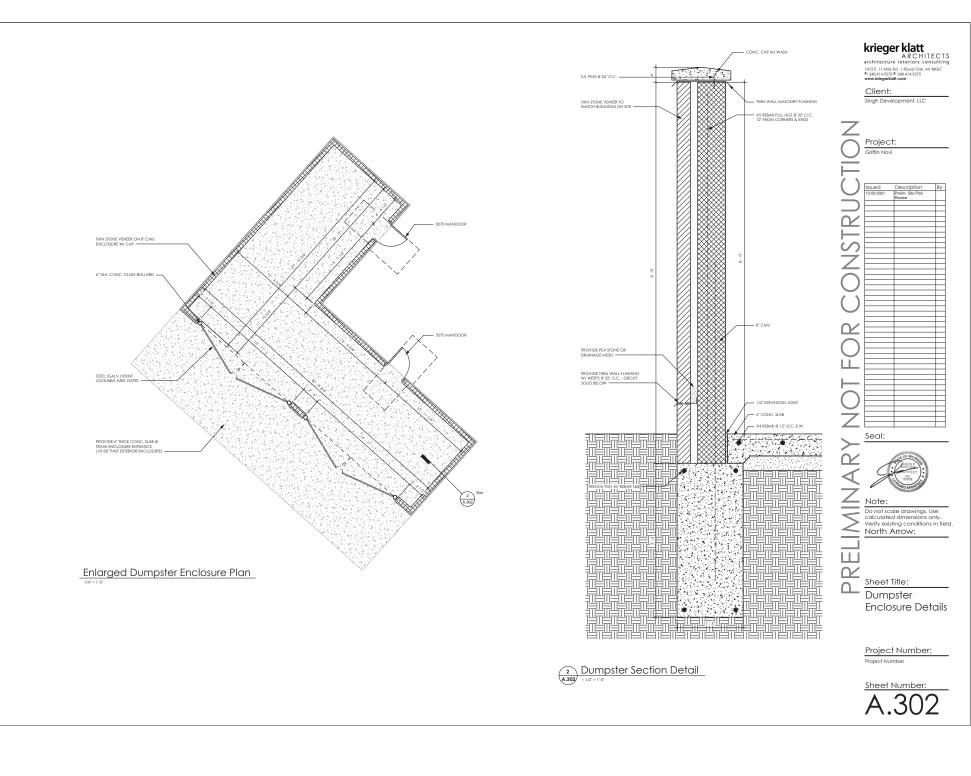
Typical Sheet Title: Townhouse -Elevations

















 Specify
 Specify
 Wall
 Multi-failed
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 Bockpiles / Cencey Deales: <u>Not</u> <u>Kipit Single With Napit Bores: Kolo Single Boles:</u> <u>Not New 5 4 13 30 7 18</u>
 Mapping Meteoration:
 Process Test Service
 Process Test Service
 Service T

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Pav Lamp	Light Loss Pactor	-
$\widehat{\Box}$	А	a	Lithonia Lighting	NDCRI LED PI 40K ROCKI VF	WOORI LED WITH PL - PERFORMANCE FACKAGE, 4000K, BOCKI, VIELAL CORFORT FORWIND OFTIC	ώrο	1227	0.3	Ŧ
â	в	6	CENERATION LIGHTING	CL1442238L	SMALL DECOMPTIVE WALL LANTERN	uro	3377	0.3	r
ô	BR	11	CENERATION LIGHTING	OL1442258L	SMALL DECOMPTIVE WALL LANTERN - RESIDENT CONTROLLED, ASSURED OFF	uit)	3377	0	v
0	СН	20	EUN VALUEY LIGHTING	CMP-VED-VED-66.ED- 5256A-NW	CAST HETEL FORT TOP FITTER AND UPPER HOUSENG WITH CAST 6-FORT METAL FAMME, I LED HECKLE CONERTTHE OF 6 LEES, VERTCAL BASE-UP PORTION, I CLERK PLARTIC OFTIC HELOW BACH LED, CHART FLAT CLARK HUN.	uro	155	0.9	14
0	CL	14	EUN VALUEY LIGHTING	CMP-VED-VED-46EED- 2004A-NW	LED-CAAT WETEL PORT TOP FITTER MOD LEPTER HOUSEND WITH CART + PORT HITLAN HAME, J LED HOUSELE CONESTING OF 44 LED, WETECAE MARE-UP PORTIDIN, J CLERR PLATTIC OFTIC BELOW MICH LED, CLERR HAAT GLARE LENE.		114	0.9	18
0	D	17	SUM UNLEY LIGHTING	CMP-VLED-IV-MLED- 325mA-NW	CAST HETEL FORT TOP FITTER AND UPPER HOUSING WITH CAST 6-FORT NETAL FAMME, 1 LED HOOLLE CONESTING OF 44 LEDS, VERTICAL BARE-UP FORTION, 1 CLARK PLATTIC OPTIC BELOW MACH LED. CUMM FLAT CLARK HON.	uno	364	0.9	28'

General Note

General Note 1. SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT. 2. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0" 3. LIGHTING ALTERNATES REQUIRE NEW PHOTOMETRIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL. 4. STREET LIGHTS WILL BE CONTROLLED BY PHOTOCELLS NOT TIMERS. 5. BUILDING SECURITY LIGHTING WILL BE ADDRESSED AT THE TIME OF BUILDING PERMIT REVIEW, BUT WILL COMPLY WITH SEC. 5.3.7H OF THE ZONING ORDIANCE

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTULA PERFORMANCE OF ANY MANUFACTURERS I UMINARIE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GRADE MAD/OR FLOOR UP.

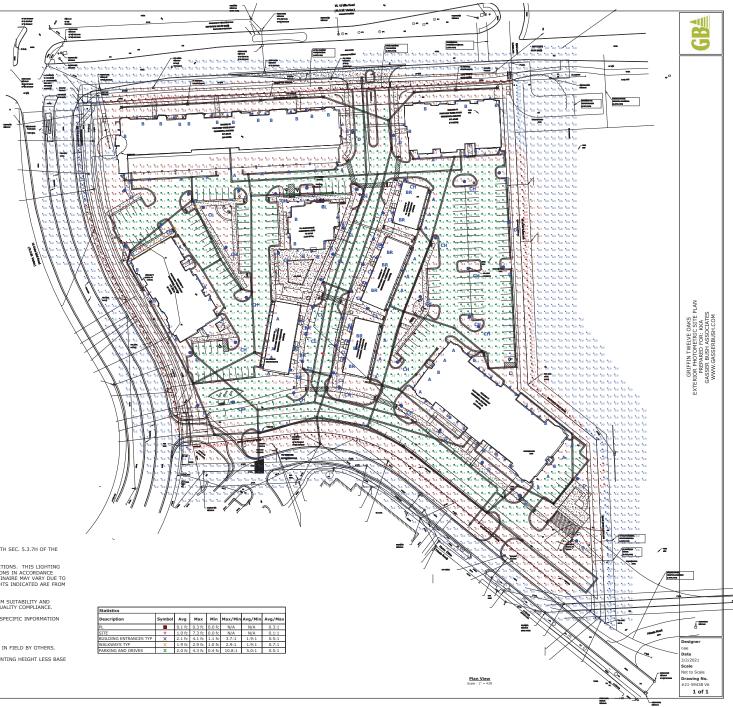
THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SYSTEM SUITABILITY AND SAFETY. THE ENGINEER AND/OR ARCHITECT IS RESPONSIBLE TO REVIEW FOR MICHIGAN ENERGY CODE AND LIGHTING QUALITY COMPLIANCE.

UNLESS EXEMPT, PROJECT MUST COMPLY WITH LIGHTING CONTROLS REQUIRMENTS DEFINED IN ASHRAE 90.1 2013. FOR SPECIFIC INFORMATION CONTACT GBA CONTROLS GROUP AT ASG@GASSERBUSH.COM OR 734-266-6705.

FOR ORDERING INQUIRIES CONTACT GASSER BUSH AT QUOTES@GASSERBUSH.COM OR 734-266-6705.

THIS DRAWING WAS GENERATED FROM AN ELECTRONIC IMAGE FOR ESTIMATION PURPOSE ONLY. LAYOUT TO BE VERIFIED IN FIELD BY OTHERS.

MOUNTING HEIGHT IS MEASURED FROM GRADE TO FACE OF FIXTURE. POLE HEIGHT SHOULD BE CALCULATED AS THE MOUNTING HEIGHT LESS BASE HEIGHT.





SEE SCHEDULE FOR LUMINARE MOUNTING HEIGHT.
 CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"
 LIGHTING ALTERNATES REQUIRE NEW PHOTOMETRIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL.

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINARE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS. MUTTING HEIGHTS INDICATED ARE FROM GRADE AND/OR FLOOR UP.

THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SYSTEM SUITABILITY AND SAFETY. THE ENGINEER AND/OR ARCHITECT IS RESPONSIBLE TO REVIEW FOR MICHIGAN ENERGY CODE AND LIGHTING QUALITY COMPLIANCE.

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MOUNTING HEIGHT IS MEASURED FROM GRADE TO FACE OF FIXTURE. POLE HEIGHT SHOULD BE CALCULATED AS THE MOUNTING HEIGHT LESS BASE HEIGHT.

Statistics										
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max			
EAST ELEVATIONS	+	0.1 fc	1.7 fc	0.0 fc	N/A	N/A	0.1:1			
NORTH ELEVATIONS	+	0.1 fc	1.9 fc	0.0 fc	N/A	N/A	0.1:1			
SOUTH ELEVATIONS	+	0.0 fc	0.5 fc	0.0 fc	N/A	N/A	0.0:1			
WEST ELEVATIONS	+	0.0 fc	0.6 fc	0.0 fc	N/A	N/A	0.0:1			

Schedule	:hedule												
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Lumens Per Lamp	Light Loss Factor	Wattage	мн			
$\widehat{\Box}$	A				WDGE1 LED WITH P1 - PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT FORWARD OPTIC	LED	1227	0.5	10.0002	9,			
â	в		GENERATION	OL14402SBL	SMALL DECORATIVE WALL LANTERN	LED	3377	0.5	39	6'			



Plan View Scale - 1" = 15f GRIFFIN TWELVE OAKS BUILDING C ELEVATION PHOTOMETRIC DRAWING REPARED FOI: KKA GASER BUSH ASSOCIATES WWW.GASSERBUSH.COM

GB≜

SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"

CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"
 LIGHTING ALTERNATES REQUIRE NEW PHOTOMETRIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL.

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN CALCULA EPROFENNACE OF ANY MANUFACTURESS LUMINATE MAY VARY DUE TO VARIATION IN LECENTICAL VOLTAGE, TOLERANCE IN LAMES, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GRADE AND/OR FLORU P.

THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SYSTEM SUITABILITY AND SAFETY. THE ENGINEER ANJ/OR ARCHITECT IS RESPONSIBLE TO REVIEW FOR MICHIGAN ENERGY CODE AND LIGHTING QUALITY COMPLIANCE.

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MOUNTING HEIGHT IS MEASURED FROM GRADE TO FACE OF FIXTURE. POLE HEIGHT SHOULD BE CALCULATED AS THE MOUNTING HEIGHT LESS BASE HEIGHT.

Schedule				-					
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Lumens Per Lamp	Light Loss Factor	Wattage
$\widehat{\Box}$	A	8	Lithonia Lighting	WDGE1 LED P1 40K 80CRI VF	WDGE1 LED WITH P1 - PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT FORWARD OPTIC	LED	1227	0.5	10.0002
$\hat{\Box}$	В	15	GENERATION LIGHTING	OL14402SBL	SMALL DECORATIVE WALL LANTERN	LED	3377	0.5	39

Statistics											
Description	Symbol	Avg	Мах	Min	Max/Min	Avg/Min	Avg/Max				
NORTHEAST ELEVATION	+	0.0 fc	2.7 fc	0.0 fc	N/A	N/A	0.0:1				
NORTHWEST ELEVATION	+	0.0 fc	2.1 fc	0.0 fc	N/A	N/A	0.0:1				
SOUTHEAST ELEVATION	+	0.0 fc	2.0 fc	0.0 fc	N/A	N/A	0.0:1				
SOUTHWEST ELEVATION	+	0.0 fc	2.0 fc	0.0 fc	N/A	N/A	0.0:1				

Designer nae Date 07/13/2021 Scale Not to Scale Drawing No. #21-59438 1 of 1



UNLESS EXEMPT, PROJECT MUST COMPLY WITH LIGHTING CONTROLS REQUIRMENTS DEFINED IN ASHRAE 90.1 2013. FOR SPECIFIC INFORMATION CONTACT GBA CONTROLS GROUP AT ASG@GASSERBUSH.COM OR 734-266-6705.

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MOUNTING HEIGHT IS MEASURED FROM GRADE TO FACE OF FIXTURE. POLE HEIGHT SHOULD BE CALCULATED AS THE MOUNTING HEIGHT LESS BASE HEIGHT.

Statistics	Statistics										
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max				
NORTHEAST ELEVATION	+	0.1 fc	25.9 fc	0.0 fc	N/A	N/A	0.0:1				
NORTHWEST ELEVATION	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A	N/A				
SOUTHEAST ELEVATION	+	0.1 fc	21.2 fc	0.0 fc	N/A	N/A	0.0:1				
SOUTHWEST ELEVATION	+	0.1 fc	17.9 fc	0.0 fc	N/A	N/A	0.0:1				

Designer nae Date 07/13/2021 Scale Not to Scale Drawing No. #21-59438

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Designer



1. SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT.

CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"
 LIGHTING ALTERNATES REQUIRE NEW PHOTOMETRIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL.

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN MUBRIC CONTROLLED CONDITIONS IN ACCOMPANCE WITH LILUMINATION ENGINEERING SOCIETY APPROVED METHODS. TO LERANCE IN LAMES, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GRADE AND/OR FLOOR UP.

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MOUNTING HEIGHT IS MEASURED FROM GRADE TO FACE OF FIXTURE. POLE HEIGHT SHOULD BE CALCULATED AS THE MOUNTING HEIGHT LESS BASE HEIGHT.

Schedule									
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Lumens Per Lamp	Light Loss Factor	Wattage
\Box	А	0	Lithonia Lighting	WDGE1 LED P1 40K 80CRI VF	WDGE1 LED WITH P1 - PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT FORWARD OPTIC	LED	1227	0.5	10.0002
$\hat{\Box}$	В	8	GENERATION LIGHTING	OL14402SBL	SMALL DECORATIVE WALL LANTERN	LED	3377	0.5	39

Statistics									
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max		
EAST ELEVATION	+	0.0 fc	0.4 fc	0.0 fc	N/A	N/A	0.0:1		
NORTH ELEVATION	+	0.0 fc	2.2 fc	0.0 fc	N/A	N/A	0.0:1		
SOUTH ELEVATION	+	0.0 fc	1.2 fc	0.0 fc	N/A	N/A	0.0:1		
WEST ELEVATION	+	0.0 fc	3.5 fc	0.0 fc	N/A	N/A	0.0:1		

 Designer

 nae

 Date

 07/13/2021

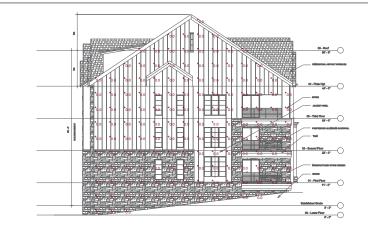
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 Drawing No.

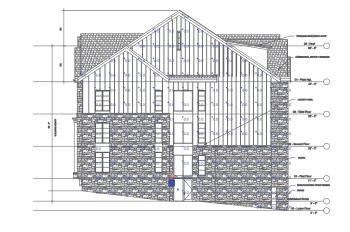
 #21-59438

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SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT.
 CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"

CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: 0' - 0"
 LIGHTING ALTERNATES REQUIRE NEW PHOTOMETRIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL.

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Schedule	Schedule												
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Lumens Per Lamp	Light Loss Factor	Wattage	мн			
$\widehat{\Box}$	A	6	Lithonia Lighting	WDGE1 LED P1 40K 80CRI VF	WDGE1 LED WITH P1 - PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT FORWARD OPTIC	LED	1227	0.5	10.0002	9'			
$\hat{\Box}$	В	5	GENERATION LIGHTING	OL14402SBL	SMALL DECORATIVE WALL LANTERN	LED	3377	0.5	39	6'			

Statistics										
Description	Symbol	Avg	Мах	Min	Max/Min	Avg/Min	Avg/Max			
EAST ELEVATION	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A	N/A			
NORTH ELEVATION	+	0.1 fc	26.9 fc	0.0 fc	N/A	N/A	0.0:1			
SOUTH ELEVAITON	+	0.0 fc	2.4 fc	0.0 fc	N/A	N/A	0.0:1			
WEST ELEVATION	+	0.0 fc	0.9 fc	0.0 fc	N/A	N/A	0.0:1			

GRIFFIN TWELVE OAKS BUILDING B ELEVATTON POHTOMETRIC DRAWING REPARED FORI, KKA GASER BUSH ASOCIATES WWW.GASERBUSH.COM

 Designer

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 Date

 07/13/2021

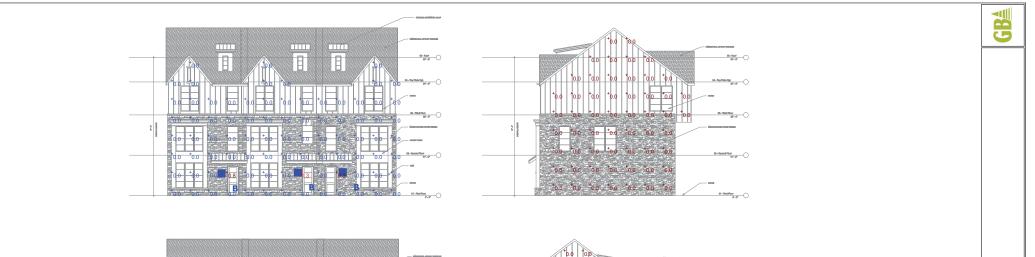
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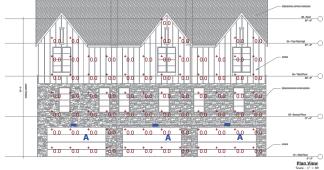
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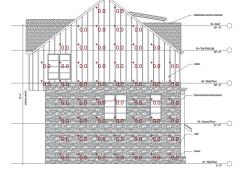
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 #21-59438

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- Senara node 1. SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT. 2. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT.0' 0° 3. LIGHTING ALTERNATES REQUIRE NEW PHOTOMETRIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL.

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Schedule										
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Lumens Per Lamp	Light Loss Factor	Wattage	мн
\Box	A	3		WDGE1 LED P1 40K 80CRI VF	WDGE1 LED WITH P1 - PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT FORWARD OPTIC	LED	1227	0.5	10.0002	9'
Â	В		GENERATION LIGHTING	OL14402SBL	SMALL DECORATIVE WALL LANTERN	LED	3377	0.5	39	6'

Statistics									
Description	Symbol	Avg	Мах	Min	Max/Min	Avg/Min	Avg/Max		
FRONT ELEVATION	+	0.0 fc	1.3 fc	0.0 fc	N/A	N/A	0.0:1		
REAR ELEVATION	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A	N/A		
SIDE ELEVATION	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A	N/A		
SIDE ELEVATION	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A	N/A		

Designer Designer nae Date 07/13/2021 Scale Not to Scale Drawing No. #21-59438

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